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REPORT ON
CO, NOx, SO2 & VOC EMISSIONS TESTING

RECEIVED
JUL 06 2004
State of Indiana
Department of Environmental Management
Office of Air Quality

Performed for:
Nucor Steel
Crawfordsville, Indiana
PPFF Baghouse
on **May** 19,2004

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Carlos Brown, Project Manager

TABLE OF CONTENTS

1-1 PROJECT OVERVIEW

Air Test Professionals, Inc. was contracted by Nucor Steel to perform air emissions sampling at the PPFF Baghouse Inlet Duct that controls emissions from EAF 1 and **2,** and the AOD. The sampling was performed in Crawfordsville, Indiana on May 19, **2004.** The objective of the testing was to determine compliance with permit requirements for the pollutants listed below. The following personnel were involved with the testing program:

ATP	Andrew Young
ATP	Carlos Brown
ATP	Terry Kauffman
Nucor Steel	Mark Washer
IDEM	Jarrod Fisher

The testing program included flow determination **(US** EPA Methods **1-2),** gas analysis **(US** EPA Method **3),** moisture content **(US** EPA Method **4),** SO2 emissions **(US** EPA Method 6C), NOx emissions **(US** EPA Method 7E), CO emissions (US EPA Method 10), and VOC emissions (US EPA Method 25A). Listed below is a summary of the results.

Test Summary
Table 1-1

Pollutant	**Emissions** (lb/hr)	**Permitted Limits** (lb/hr)
Carbon Monoxide	274.29 (lb/hr)	1,004 (lb/hr)
Nitrogen Oxide	72.87 (lb/hr)	175.7 (lb/hr)
Sulfur Dioxide	62.77 (lbihr)	125.0 (lbihr)
Volatile Organic Compounds	2.90 (lb/hr)	45.18 (lb/hr)

Pollutant	**Emissions** (lb/ton)	**Permitted Limits** (lb/ton)
Carbon Monoxide	1.029 (lb/ton)	2.0 (lb/ton)
Nitrogen Oxide	0.280 (lb/ton)	0.35 (lb/ton)
Sulfur Dioxide	0.233 (lb/ton)	0.25 (lb/ton)
Volatile Organic Compounds	0.011 (lb/ton)	0.09 (lb/ton)

2-1 RESULTS

CO, NOx, SO2, VOC Emissions

PPFF Bughouse Inlet Duct

Table 2-1

Gas Conditions		**1**	**2**	**3**	**Avg**	
Ts	Stack Temperature	207.9	245.4	230.6	227.9	
Bwo	Moisture (volume %)	1.09	1.11	1.34	1.18	
0 2	Oxygen (dry volume %)	19.0	19.0	19.0	19.0	
C02	Carbon Dioxide(dry volume %)	0.0	0.5	1.0	0.5	
Volumetric Flow Rate						
Qa	Actual Conditions (acfm)	1,357,580	1,282,895	1,307,762	1,316,079	
Qstd	Standard Conditions (dscfm)	1,067,344	954,822	991,941	1,004,702	
CARBON MONOXIDE						
C_{gas}	Emission (PPM)	59.50	100.20	29.80	63.17	
E_r	Emission Rate (lbs/hr)	276.88	417.12	128.88	274.29	
E	Emission Rate (lbs/ton)	1.1817	1.4473	0.4586	1.0292	266.5
NITROGEN OXIDE						
C_{gas}	Emission (PPM)	12.37	7.13	10.59	10.03	
E_r	Emission Rate (lbs/hr)	94.58	48.80	75.24	72.87	
E	Emission Rate (lbs/ton)	0.4037	0.1693	0.2678	0.2802	[illegible]
SULFUR **DIOXIDE**						
C_{gas}	Emission (PPM)	4.61	7.22	7.12	6.32	
E_r	Emission Rate (lbs/hr)	49.10	68.76	70.45	62.77	
E	Emission Rate (lbs/ton)	0.2096	0.2386	0.2507	0.2330	269.4
VOLATILE ORGANIC COMPOUNDS						
C_{gas}	Emission (PPM)	0.26	0.94	0.38	0.53	
E_r	Emission Rate (lbs/hr)	1.56	5.04	2.11	2.90	
E	Emission Rate (lbs/ton)	0.0066	0.0175	0.0075	0.0105	276.2

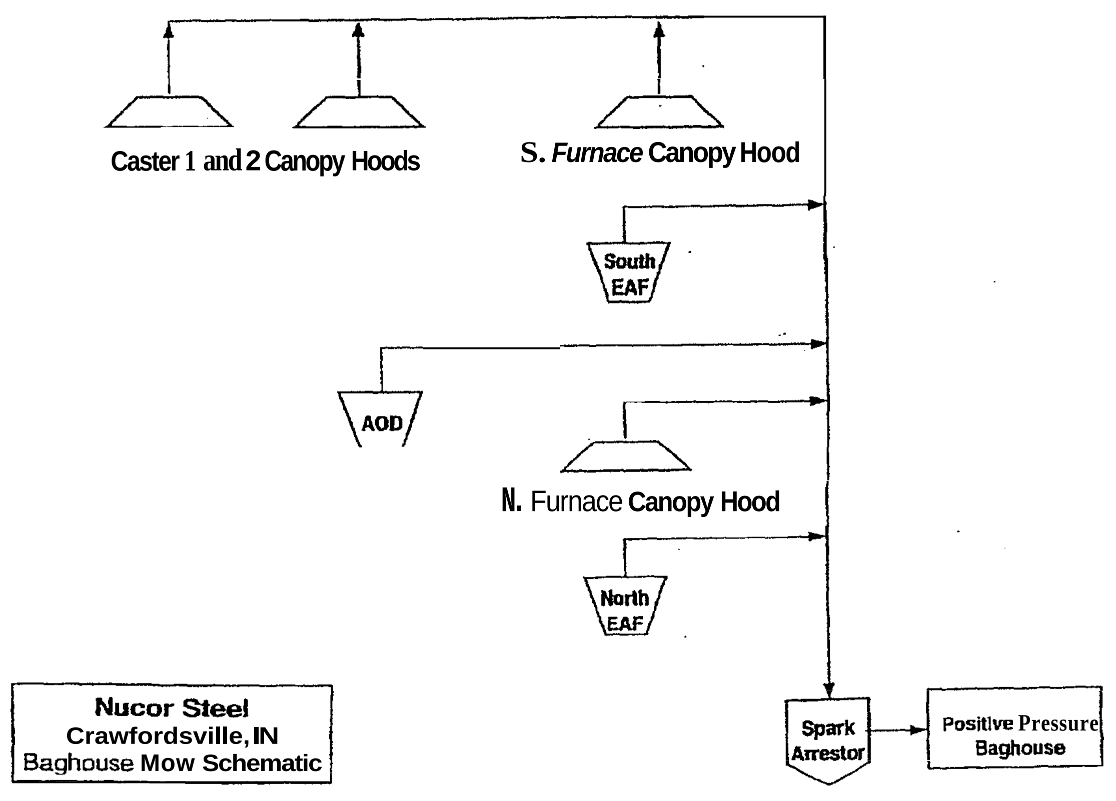
3-1 PROCESS DESCRIPTION

Nucor steel operates a meltshop, which is comprised of the following process **units:** Two (2) EAF **units,** one **(1)** ladle metallurgy station, one **(1)** AOD with two **(2)** continuous casters. Of these, the two EAF units, the AOD, and the two caster units, each is evacuated through the **meltshop baghouse.**

The EAF units melt various grades of scrap metal, scrap substitute, pebbled lime, and coke into molten steel. The molten steel is refined into various grades of carbon steel at the ladle metallurgy station ***or*** refined into stainless steel at the AOD. The molten steel **from** the ladle metallurgy station or AOD is cast into continuous strips at the two continuous casters.

The emissions from the EAF units, AOD, and casters are generated from melting, refining, charging, tapping, and casting operations and are captured in a direct shell evacuation (DEC) system and overhead canopy hoods. **All** captured emissions are evacuated through the positive pressure fabric filter (PPFF) **baghouse** for collection.

The testing reported in this document **was performed** at **12** of the 16 EAF (PPFF) **baghouse** compartments.



4-1 METHODOLOGY

The sampling procedures utilized by Air Test Professionals, Inc. were as follows:

Title 40 CFR Part 60 Appendix A

Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determining of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Determination of Oxygen and Carbon Dioxide Percentages"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 6C	"Determination of Sulfur Dioxide Emissions from Stationary Sources"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide from Stationary Sources"
Method 25A	"Determination of Volatile Organic Compounds from Stationary Sources"

SAMPLE POINT DETERMINATION

Sampling point locations were determined according to EPA Reference Method 1.

Sampling Points
Table **4**-1

Location	Dimensions	Points / Port	Total Points
PPFF Inlet Duct	278" x 176" ID	8	32

4-2 METHODOLOGY

SAMPLE AND VELOCITY TRAVERSE – EPA METHOD 1

Method 1 was utilizes for the representative measurement of pollutant emissions and/or total volumetric flow rate. A measurement site where the effluent gas stream, flowing in a known direction, is selected and divided into a sample grid according to the published percentages of the diameter. A traverse point is then located at each of these percentage points. Sampling or velocity measurement is performed at a site located at least two stack or duct diameters downstream and one-half diameter upstream fiom a disturbance such as a bend, expansion, contraction, or visible flame.

VELOCITY AND VOLUMETRIC FLOW RATE – EPA METHOD 2

EPA Method 2 was used to determine the gas velocity and flow rate at the stack. Each set of velocity determinations included the measurement of gas velocity pressure and gas temperature at each of the Method 1 determined traverse points. The velocity pressures were measures with a Type S pitot tube. Gas temperature measurements made with a Type K thermocouple and digital pyrometer.

GAS COMPOSITION AND MOLECULAR WEIGHT – EPA METHOD 3

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

MOISTURE CONTENT – EPA METHOD 4

The gas moisture was determined by quantitatively condensing moisture in the chilled impingers and silica absorption. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

SULFUR DIOXIDE CONCENTRATION – EPA METHOD 6C

A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to a NDIR or fluorescence analyzer for SO2 concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

NITROGEN OXIDE CONCENTRATION – EPA METHOD 7E

A gas sample is continuously drawn fiom the stack and a portion of the sample is conveyed to a chemiluminescent analyzer for NOx concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

CARBON MONOXIDE CONCENTRATION – EPA METHOD 10

A continuous gas sample is drawn from the stack and a portion of the sample is conveyed to an NDIR analyzer for carbon monoxide concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol gases are used to calibrate the instrument as well as run system bias and drift checks.

4-2 METHODOLOGY, cont.

VOC DETERMINATION – EPA METHOD 25A

Flue gas is drawn into a flame ionization analyzer (FIA) that determines organic concentrations and generates an output proportional to the gas concentration. The sample line is heated to 250 degrees F to prevent the development of condensation in the sampling apparatus. Gases used for either calibrations, fuel, or combustion air, are contained in compressed gas cylinders and are prepared according to the procedure in EPA Protocol No. 1. Calibration gases consist of Zero Gas with less than 0.1 ppmv, Low-level gas at 25 to 35 percent of span, Mid-level gas at 45 to 55 percent of span and High-level gas at 80 to 90 percent of span. Pre-test instrument calibration checks and post-test drift checks are conducted during the test period to validate sampling accuracy. All calibrations and sample measurements are collected and compiled utilizing an electric data-recording device. The sample average is determined by the integration of the output recorded over the period specified in the applicable regulation.

This method is applicable for the measurement of aromatic hydrocarbons and is expressed in terms of propane or in terms of carbon.

APPENDIX A

SAMPLE CALCULATIONS

1. Volume of water collected (wstd)

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

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

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

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

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

3. Sample gas pressure (in Hg)

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

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

4. Actual vapor pressure (in Hg)

$$P_v = P_s$$

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

5. Moisture content (%)

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

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

6. Saturated moisture content (%)

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

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

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

$$M_d = M_{CO_2}\left(\frac{CO_2}{100}\right) + M_{O_2}\left(\frac{O_2}{100}\right) + M_{CO+N_2}\left(\frac{CO+N_2}{100}\right)$$

M_d	dry molecular weight of sample gas (lbllb-mole)
M_{CO2}	molecular weight of carbon dioxide (lb/lb-mole)
M_{O2}	molecular weight of oxygen (lb/lb-mole)
M_{CO+N2}	molecular weight of carbon monoxide and nitrogen (lb/lb-mole)
CO_2	portion of carbon dioxide in the gas stream by volume (%)
O_2	portion of oxygen in the gas stream by volume (%)
$CO+N_2$	portion of carbon monoxide and nitrogen in gas stream by volume (%)
100	conversion factor (%)

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

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

M_d	dry molecular weight of sample gas (lb/lb-mole)
B_{wo}	portion of water vapor in the gas stream by volume (%)
M_{H2O}	molecular weight of water (lb/lb-mole)
M_s	molecular weight of sample gas, wet basis (Ibllb-mole)

9. Velocity of sample gas (Wsec)

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

V_s	average sample gas velocity (Wsec)
K_p	velocity pressure coefficient (dimensionless)
C_p	pitot tube constant
AP	average differential pressure in the gas stream (in H_2O)
t_s	average sample gas temperature (°F)
M_s	molecular weight of sample gas, wet basis (lb/lb-mole)
P_s	absolute sample gas pressure (in Hg)
460	conversion constant, °F to °R

10. Total flow of sample gas (acfm)

$$Q_a = (60)(A_s)(V_s)$$

Qa	volumetric flow rate at actual conditions (acfm)
A_s	cross-sectional area of sampling location (ft^2)
V_s	average sample gas velocity (ft/sec)
60	conversion factor (seconds/minute)

11. Total flow of sample gas (dscfrn)

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

Q_{std}	volumetric flow rate at standard conditions (dscfm)
Q_a	volumetric flow rate at actual conditions (acfin)
P_s	absolute sample gas pressure (in Hg)
B_{wo}	portion of water vapor in the gas stream by volume (%)
t_s	average sample gas temperature (°F)
17.64	conversion factor (°R/in Hg)
460	conversion constant, °F to °R

12. Gas emission concentration (pprn)

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

C_{gas}	effluent gas concentration (ppm)
C	average gas concentration indicated by gas analyzer (ppm)
C_o	average of initial and final system bias checks for zero gas (ppm)
C_{ma}	actual concentration of the upscale gas (ppm)
C_m	average of initial and final system bias check for upscale cal gas (ppm)

13. Carbon Monoxide emission rate (lbs/hr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(1.3762x10^7)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$1.3762x10^7$	CO conversion factor (ppm to lbs/dscf)

14. Nitrogen Oxide emission rate (lbshr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(8.3752x10^6)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$8.3752x10^6$	NOx conversion factor (ppm to lbs/dscf)

15. Sulfur Dioxide emission rate (lbs/hr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(6.0151x10^6)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$6.0151x10^6$	SO2 conversion factor (ppm to lbs/dscf)

16. VOC emissions, mass emission rate (Ibshr)

$$VOC_{lb/hr} = \frac{(PPM)(Q_{std})(60)(12)}{(385)(10^6)}$$

$VOC_{lbs/hr}$	mass emission rate (lbs/hr)
PPM	pollutant concentration dry as carbon
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	per minute to per hour conversion
12	molecular weight factor
$385x10^6$	ppm to dry standard cubic feet conversion factor

17. Pollutant emission rate (lbslton)

$$E_{lbs/ton} = \frac{(E)}{(P_{tons/hr})}$$

$E_{lbs/ton}$	emission rate (Ibslton)
E	pollutant emission rate (lbs/hr)
$P_{tons/hr}$	facility production rate (tons/hr)

APPENDIX B

GASES - STACK EMISSION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	PPFF Baghouse
Date:	05/19/2004

Gas Emissions	**Run 1**	**Run 2**	**Run 3**	**Average**
CO (ppm)	59.50	100.20	29.80	63.17
CO (lbslhr)	276.88	417.12	128.88	**274.29**
CO (lblton)	1.1817	1.4473	0.4586	**1.0292**
NOx (ppm)	12.37	7.13	10.59	10.03
NOx (lbs/hr)	94.58	48.80	75.24	**72.87**
NOx (lb/ton)	0.4037	0.1693	0.2678	**0.2802**
SO2 (ppm)	4.61	7.22	7.12	6.32
SO2 (lbs/hr)	49.10	68.76	70.45	**62.77**
SO2 (lb/ton)	0.2096	0.2386	0.2507	**0.2330**
VOC (ppm)	0.26	0.94	0.38	0.53
VOC (lbs/hr)	1.56	5.04	2.11	**2.90**
VOC (lb/ton)	0.0066	0.0175	0.0075	**0.0105**
Avg. Stack Vol. Flow Rate				
ACFM	1,357,580	1,282,895	1,307,762	1,316,079
DSCFM	1,067,344	954,822	991,941	1,004,702
Avg. Stack Temp	207.9	245.4	230.6	227.9
Stack Gas Velocity	66.59	62.93	64.15	64.56
Avg. Velocity Head	1.109	0.941	1,000	1.02
Avg. Sq. Rt of Delta P	1.053	0.970	1.000	1.01
% Moisture of Stack Gas	1.09%	1.11%	1.34%	1.18%
Sample Volume	26.011	22.212	20.855	23.026

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	PPFF Baghouse
Date:	05/19/2004
Run Number:	1

Molecular Weight of Stack Gas. Dry Basis, Md
%CO2 = 0
%02 = 19
Md (glgmol) = 28.76

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 6.1
Vw (scf) = 0.28713

Volume of Dry Gas Collected @ STD. COND.. Vm
Tm (F) = 82.0
Vm (ft^3) = 26.395
Pb (in Hg) = 30.08
delta H (in H2O) = 1.720
gamma = 1.002
Vm (dscf) = 26.01

Moisture Content of Stack Gas. Bwo
Bwo = 1 09%
1-Bwo = 98.91%

Molecular Weight of Stack Gas. Ms
Ms (glgmol) = 28.64

Area of Stack (enter diameter in inches). As
Depth - . 176
Width - 278
diameter (in) = 0
No. of Stacks = 1
As(L*W) (ft^2) = 339.8
As(dia.) (ft^2) = 339.8

Absolute Pressure. Ps
Static (in H2O) = 0.05
Ps (in Hg) - 30.08

Stack Gas Velocity, Vs
Cp - 0.84
sqr(delta p) = 1.053
Ts (F) = 207.9
Vs (fps) = 66.59

Stack Gas Flowrate, Qs
As (fl^2) = 339.78
Qs (acfm) = 1,357,580

Stack Gas Flowrate @ STD. COND.. Dry Basis. Qstd
Qstd (dsdm) = 1,067,344
Qstd (dsdh) = 64,040,632

Pollutant Mass Emission Rate. PMR

C (dry corrected) (PPM) =	59 50	1237	4.61	0.26
PMR (lblhr) =	276 88	94 58	49.10	1.56
PMR (lb/ton) =	11817	0 4037	0.2096	0.006645
	CO	NOx	SO2	VOC

FIELD DATA

Start Time	10:09
Stop Time	11:09

Run 1	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	1.10	1.049		1.720	184	78	78
2	1.40	1.183		1.720	189	81	79
3	1.40	1.183		1.720	186	82	79
4	1.05	1.025		1.720	180	84	80
5	0.74	0.860		1.720	197	86	80
6	0.89	0.943		1.720	194	87	82
7	1.05	1.025		1.720	192	89	83
8	0.94	0.970			181		
9	0.72	0.849			151		
10	0.97	0.985			160		
11	1.15	1.072			156		
12	0.98	0.990			152		
13	0.52	0.721			179		
14	0.83	0.911			187		
15	1.20	1.095			192		
16	1.25	1.118			197		
17	0.82	0.906			192		
18	1.02	1.010			180		
19	1.45	1.204			169		
20	1.40	1.183			165		
21	1.40	1.183			225		
22	1.50	1.225			245		
23	1.60	1.265			250		
24	1.25	1.118			257		
25	1.30	1.140			237		
26	1.65	1.285			262		
27	1.55	1.245			242		
28	1.30	1.140			223		
29	0.78	0.883			268		
30	0.97	0.985	346.325		280		
31	0.97	0.985	319.93		287		
32	0.94	0.970			293		

	Avg Δ P	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
	1.128	1.053	26.395	1.720	207.9	82.0

Production Rate

Furnace 1	128.8
Furnace 2	56.9
AOD Vessel	48.6
Total tons	234.3
Process Time (min)	60
Tonslhr	**234.3**

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	PPFF Baghouse
Date:	05119104
Run Number:	2

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2	=	0.5
%O2	=	19.0
Md (glgmol)	=	28.84

Volume of Water Vapor Collected @ STD COND.. Vw

Vlc (mL)	=	5.3
Vw (scf)	=	0.2495

Volume of Dry Gas Collected @ STD. COND., Vm

Tm (F)	=	88.4
Vm (ft^3)	=	22.804
Pb (in Hg)	=	30.08
delta H (in H2O)	=	1.720
gamma	=	1.002
Vm (dscf)	=	22.21

Moisture Content of Stack Gas. Bwo

Bwo		1.11%
I-Bwo	=	98.89%

Molecular Weight of Slack Gas. Ms

Ms (glgmol)	=	28.72

Area of Slack (enter diameter in inches), As

Depth	=	176
Width	=	278
diameter (in)	=	0
No. of Stacks	=	I
As(L*W) (ft^2)	=	339.8
As(dia.) (ft^2)	=	339.8

Absolute Pressure. Ps

Static (in H20)	=	0.05
Ps (in Hg)	=	30.08

Stack Gas Velocity. Vs

Cp	=	0.84
sqr(delta p)	=	0.970
Ts (F)	=	245.4
Vs (fps)	=	62.93

Stack Gas Flowrate, Qs

As (fl^2)	=	339.78
Qs (adm)	=	1,282,895

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

Qstd (dsdm)	=	954.822
Qstd (dscfh)	=	57,289,290

Pollutant Mass Emission Rate. PMR

C (dry, corrected) (PPM) =	100.20	7 13	7.22	0.94
PMR (lb/hr) =	417.1187	48.8016	68.7584	5.035505
PMR (lb/ton) =	1 4473	0 1693	0.2386	0.017472
	CO	NOx	SO2	VOC

FIELD DATA

Start Time	11:44
Stop Time	12:44

Run 2	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	1.20	1.095		1.720	187	85	84
2	1.25	1.118		1.720	188	88	84
3	1.30	1.140		1.720	189	90	85
4	0.98	0.990		1.720	203	92	86
5	0.78	0.883		1.720	179	93	86
6	0.94	0.970		1.720	181	94	87
7	0.93	0.964		1.720	184	95	88
8	0.82	0.906			186		
9	0.54	0.735			211		
10	0.63	0.794			212		
11	0.88	0.938			217		
12	0.81	0.900			222		
13	0.50	0.707			191		
14	0.68	0.825			201		
15	1.07	1.034			210		
16	1.00	1.000			218		
17	0.65	0.806			241		
18	0.78	0.883			250		
19	1.01	1.005			252		
20	1.00	1.000			256		
21	1.15	1.072			269		
22	1.20	1.095			294		
23	1.35	1.162			302		
24	0.96	0.980			300		
25	1.30	1.140			300		
26	1.40	1.183			301		
27	1.25	1.118			313		
28	0.94	0.970			316		
29	0.75	0.866			308		
30	0.84	0.917	370.648		315		
31	0.88	0.938	347.844		324		
32	0.81	0.900			332		

Avg Δ P	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.956	0.970	22.804	1.720	245.4	88.4

Production Rate

Furnace 1	142
Furnace 2	90.1
AOD Vessel	56.1
Total tons	288.2
Process Time (min)	60
Tonslhr	288.2

Company:	Nucor Steel
Location:	Crawfordsville. Indiana
Source:	PPFF Baghouse
Date:	05/19/04
Run Number:	3

Molecular Weight of Stack Gas. Dry Basis, Md
%CO2 = 1.0
%O2 19.0
Md (g/gmol) = 28.92

Volume of Water Vapor Collected @ STD. COND.. Vw
Vlc (mL) = 6
Vw (sd) = 0.28242

Volume of Dry Gas Collected @ STD. COND.. Vm
Tm (F) = 92.3
Vm (ft^3) = 21.562
Pb (*in* Hg) = 30.08
delta H (in H2O) = 1.744
gamma = 1.002
Vm (dscf) = 20.86

Moisture Content of Stack Gas. Bwo
Bwo 1.34%
1-Bwo = 98.66%

Molecular Weight of Stack Gas. Ms
Ms (glgmol) = 28.77

Area of Stack (enter diameter in inches), As
Depth = 176
Width = 278
diameter (in) = 0
No. of Stacks = 1
As(L*W) (ft^2) = 339.8
As(dia.) (ft^2) = 339.8

Absolute Pressure. Ps
Static (in H20) = 0.05
Ps (in Hg) = 30.08

Stack Gas Velocity. Vs
Cp 0.84
sqr(delta p) = 1.000
Ts (F) = 230.6
Vs (fps) = 64.15

Stack Gas Flowrate. Qs
As (ft^2) = 339.78
Qs (acfm) = 1,307,762

Stack Gas Flowrate @ STD. COND., Dry Basis. Qstd
Qstd (dscfm) = 991,941
Qstd (dscfh) = 59,516,444

Pollutant Mass Emission Rate. PMR

	CO	NOx	SO2	VOC
C (dry, corrected) (PPM) =	29.80	10.59	7.12	0.38
PMR (lb/hr) =	128.8759	75.2381	70.4539	2.11476613
PMR (lb/ton) =	0.4586	0.2678	0.2507	8E-03

FIELD DATA

Start Time	13:01
Stop Time	13:44

Run 3	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	1.15	1.072		1.744	191	91	90
2	1.30	1.140		1.744	197	94	90
3	1.25	1.118		1.744	199	96	91
4	1.10	1.049		1.744	208	93	91
5	0.75	0.866		1.744	185	94	91
6	0.90	0.949		1.744	187	95	91
7	0.95	0.975			190		
8	0.90	0.949			191		
9	0.60	0.775			220		
10	0.69	0.831			224		
11	0.90	0.949			225		
12	0.95	0.975			225		
13	0.55	0.742			181		
14	0.75	0.866			184		
15	1.05	1.025			186		
16	1.15	1.072			197		
17	0.70	0.837			220		
18	0.85	0.922			228		
19	1.05	1.025			232		
20	1.15	1.072			231		
21	1.25	1.118			258		
22	1.35	1.162			264		
23	1.40	1.183			271		
24	1.10	1.049			290		
25	1.35	1.162			242		
26	1.45	1.204			261		
27	1.40	1.183			272		
28	1.30	1.140			288		
29	0.70	0.837			277		
30	0.78	0.883	392.53		279		
31	0.87	0.9331	370.9681		284		
32	0.89)	0.943			291		

	Avg Δ P	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
	1.017	1.000	21.562	1.744	230.6	92.3

Production Rate

Furnace 1	151.4
Furnace 2	65.1
AOD Vessel	64.5
Total tons	281
Process Time (min)	60
Tons/hr	281.0

Industrial Environmental Monitoring Instruments Inc.
7410 Worthington Galena Rd
Worthington, Ohio 43085

Sample Analysis Certificate

Client: Air Test Professionals
Address: 1201 N Graham Ave
Indianapolis, In 46219

Date: 5/25/04
Project Number: Nucor Steel PPFF
Sample Date: 5/19/04
Date Received: 5/25/04
Date Analyzed: 5/25/04
Analyst: RAR

Attn: Andrew Young
Your Project: Nucor Steel PPFF Baghouse
Sampled By: Andrew Young

Analysis: CO
Method: 10

Results:

Sample ID:	ATP-1	59.5 ppm
	ATP-2	100.2 ppm
	ATP-3	29.8 ppm

QA/QC:

Instrument calibrated using three EPA Protocol 1 CO standards and UHP nitrogen. Sampling system tested for bias and instrument tested for drift and error. "Certificates of Analysis" are attached for each standard.

Reviewed By: Ronald A. Ramer
President

772 MARION ROAD, COLUMBUS. Oh10 43207 (614)444-1177

SPECIALTY GASES CERTIFICATE OF ANALYSIS

TYPICAL AND GUARANTEED

DATE 08/23/02 SEND TO: I. E. MONT

PRODUCT- NITROGEN ULTRA HIGH PURITY

		Cyl Serial NK01705	Cyl. Serial	Cyl. Serial
Component	Requested	Actual	Actual	Actual
Hydrocarbons	<0.5 PPM	0.09 PPM		
Oxygen	<1.0 PPM	0.41 PPM		
Moisture	<1.0 PPM	0.87 PPM		
Co	<0.1 PPM	0.06 PPM		

Method of Analysis: Gow Mac Hydrocarbon Analyzer
Illinois Oxygen Analyzer
Meeco Aquamatic Moisture Analyzer

Certified By:

JOSH WEINMANN ANALYST

It is recommended the above cylinders not be depleted below **50 psig unless** otherwise **indicated**

APPENDIX C

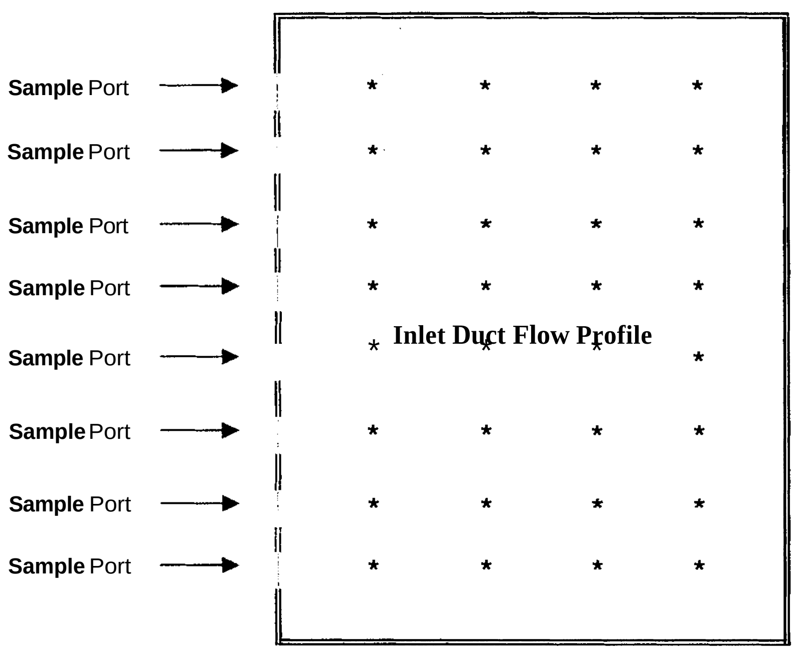
VELOCITY TRAVERSE POINT DETERMINATION
(EPA **Method** 1)

Nucor Steel @ **Crawfordsville, Indiana**
PPFF Baghouse Compartment

Depth-in :	176	**Dia. (inches)**	**215.54**
Height-in :	278	**Ports:**	**8**

Points Per Port:

	2	4	5	8	10	13
1	44.00	**22.00**	17.60	11.00	8.80	6.77
2	132.00	**66.00**	52.80	33.00	26.40	20.31
3		**110.00**	88.00	55.00	44.00	33.85
4		**154.00**	123.20	77.00	61.60	47.38
5			158.40	99.00	79.20	60.92
6				121.00	96.80	74.46
7				143.00	114.40	88.00
8				165.00	132.00	101.54
9					149.60	115.08
10						128.62
11						142.15
12						155.69
13						169.23
Spacing	0.00	**44.00**	35.20	22.00	17.60	13.54



ATP - Air Test Professionals, Inc.

Time: 1029 / 1104 (Start / Stop) **Analysis Used for Run(s)** 1

Field Data Sheet

Molecular Weight Determination (40 CFR 60 Methods 3 - 4)

Client	Nucor Steel	Meter Box ID	A1	O2 19.0	
Location	Crawfordsville IN	Meter Box Gamma	1.003	C02 0.0	
Unit	PPFF Baghouse - Inlet	Meter Box Delta H @	1.744	Stack Dia.	
Operator	Andrew Young	Pre-test Leak Rate	0.000 cfm @	15	in. Hg
Date	5-19-04	Post-test Leak Rate	0.000 cfm @	12	in. Hg
Barometric	30.08	Static Pressure	0.05	Pitot Check ✓	

ELASPED TIME	DGM VOLUME	ORIFICE Delta H	IMPINGER OUTLET (F)	DGM IN TEMP (F)	DGM OUT TEMP (F)	PUMP VAC (IN HG)
0	319.930	1.74	67	78	78	1
5	324.1	1.74	66	81	79	1
10	327.5	1.74	66	82	79	1
15	331.3	1.74	66	84	80	1
20	335.3	1.74	66	86	80	2
25	339.0	1.74	66	87	82	3
30	342.7	1.74	66	89	83	4
35	346.325					
Final Vol.						

M4 Analysis

Initial Liquid Impinger Volume (nil)	200
Final Liquid Impinger Volume (ml)	200
Initial Silica Gel Weight (gm)	180
Final Silica Gel Weight (gm)	186.1
Total Impinger Catch (ml)	6.1

NOTE: Flow rate does not exceed *0.75* cfm. Total volume must equal more than 21 scf over the elapsed time of the run. Moisture assembly maintained at approximately 250 F to keep gas steam above dew point until first impinger.

MZ Analysis

	#	Delta P	Stack T	~~Pre~~ ΔP	~~Post~~ Stack Temp	
A	1	1.10	184	0.82	192	E
	2	1.40	189	1.02	180	
	3	1.40	186	1.45	169	
	4	1.05	180	1.40	165	
B	5	0.74	197	1.40	225	F
	6	0.89	194	1.50	245	
	7	1.05	192	1.60	250	
	8	0.94	181	1.25	257	
C	9	0.72	151	1.30	237	G
	10	0.97	160	1.65	262	
	11	1.15	156	1.55	242	
	12	0.98	152	1.30	223	
D	13	0.52	179	0.78	268	H
	14	0.83	187	0.97	280	
	15	1.20	192	0.97	287	
	16	1.25	197	0.94	293	

ATP - Air Test Professionals, Inc.

Time: 1213 / 1243 (Start / Stop)

Analysis Used for Run(s) 2

Field Data Sheet

Molecular Weight Determination (40 CFR 60 Methods 3 - 4)

Client	Nucor Steel	Meter Box ID	A-1	O2	19.0
Location	Crawfordsville IN	Meter Box Gamma	1.003	CO2	0.5
Unit	PPFF Baghouse - Inlet	Meter Box Delta H @	1.744	Stack Dia.	
Operator	Andrew Young	Pre-test Leak Rate	0.000 cfm @	15" in. Hg	
Date	5-19-04	Post-test Leak Rate	0.000 cfm @	9" in. Hg	
Barometric	30.08	Static Pressure	+0.05	Pitot Check	✓

ELAPSED TIME	DGM VOLUME	ORIFICE Delta H	IMPINGER OUTLET (F)	DGM IN TEMP (F)	DGM OUT TEMP (F)	PUMP VAC (IN HG)
0	347.844	1.74	66	85	84	2
5	351.7	1.74	58	88	84	2
10	355.5	1.74	61	90	85	2
15	359.3	1.74	62	92	86	2
20	363.4	1.74	62	93	86	2
25	367.3	1.74	62	94	87	2
30	370.648	1.74	63	95	88	2
35						
Final Vol.						

M4 Analysis

Initial Liquid Impinger Volume (ml)	200
Final Liquid Impinger Volume (ml)	200
Initial Silica Gel Weight (gm)	180
Final Silica Gel Weight (gm)	185.3
Total Impinger Catch (ml)	5.3

NOTE: Row rate does not exceed 0.75 cfm. Total volume must equal more than 21 scf over the elapsed time of the run. Moisture assembly maintained at approximately 250 F to keep gas steam above dew point until first impinger.

M2 Analysis

	#	Delta P	Stack T	~~Pre~~ ΔP	~~Post~~ Ts	
	1	1.20	187	0.65	241	
A	2	1.25	188	0.78	250	E
	3	1.30	189	1.01	252	
	4	0.98	203	1.00	256	
	5	0.78	179	1.15	269	
B	6	0.94	181	1.20	294	F
	7	0.93	184	1.35	302	
	8	0.82	186	0.96	300	
	9	0.54	211	1.30	300	
C	10	0.63	212	1.40	301	G
	11	0.88	217	1.25	313	
	12	0.81	222	0.94	316	
	13	0.50	191	0.75	308	
D	14	0.68	201	0.84	315	H
	15	1.07	210	0.88	324	
	16	1.00	218	0.81	332	

ATP - Air Test Professionals, Inc.

Time: 1311 / 1341 (Start / Stop)

Analysis Used for Run(s) 3

Field Data Sheet
Molecular Weight Determination (40 CFR 60 Methods 3 - 4)

Client	Nucor Stee	Meter Box ID	A-1	O2	19.0
Location	Crawfordsville IN	Meter Box Gamma	1.003	C02	[illegible]
Unit	PPFF Baghouse -INLET	Meter Box Delta H @	1.744	Stack Dia.	
Operator	Andrew Young	Pre-test Leak Rate	0.000 cfm @ 12 in. Hg		
Date	5-19-04	Post-test Leak Rate	0.000 cfm @ 8 in. Hg		
Barometric	30.08	Static Pressure	0.05	Pitot Check	✓

ELASPED TIME	DGM VOLUME	ORIFICE Delta H	IMPINGER OUTLET (F)	DGM IN TEMP (F)	DGM OUT TEMP (F)	PUMP VAC (IN HG.)
0	370.968	1.74	67	91	90	3
5	374.9	1.74	67	74	90	3
10	378.5	1.74	66	96	91	6
15	382.0	1.74	66	93	91	3
20	385.6	1.74	65	94	91	3
25	389.3	1.74	62	95	91	3
30	392.530					
35						
Final Vol.						

M4 Analysis

Initial Liquid Impinger Volume (ml)	200
Final Liquid Impinger Volume (ml)	200
Initial Silica Gel Weight (gm)	180
Final Silica Gel Weight (gm)	186.0
Total Impinger Catch (ml)	6.0

NOTE: Flow rate does not exceed 0.75 cfm. Total volume must equal more than 21 scf over h e elapsed time of the run. Moisture assembly maintained at approximately 250 F to keep gas steam above dew point until first impinger.

M2 Analysis

#	Delta P	Stack T	Pre	Post
1	1.15	191	0.70	220
2	1.30	197	0.85	228
3	1.25	199	1.05	232
4	1.10	208	1.15	231
5	0.75	185	1.25	258
6	0.90	187	1.35	264
7	0.95	190	1.40	271
8	0.90	191	1.10	290
9	0.60	220	1.35	242
10	0.69	224	1.45	261
11	0.90	225	1.40	272
12	0.95	225	1.30	288
13	0.55	181	0.70	277
14	0.75	184	0.78	279
15	1.05	186	0.87	284
16	1.15	197	0.89	291

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: PPFF Baghouse
Date: 5/19/04

******** ON ********
******** RUN ********
Nucor PPFF Baghouse
07:56:51 05/19/04
NOx 1 000.10 Ø NOx
SO2 3 100.60 100 SO2
VOC 5 001.02

******** OFF ********

******** RUN ********

08:04:53 05/19/04
1 000.00
3 061.89 62.4 SO2
5 001.10

******** OFF ********

******** ON ********
******** RUN ********

08:08:04 05/19/04
1 049.91 49.9 NOx
3 -000.75 Ø SO2
5 000.97

******** OFF ********

******** ON ********
******** RUN ********

08:12:25 05/19/04
1 023.41 23.5 NOx
3 -000.95
5 000.92

******** OFF ********

******** RUN ********
BIAS Check
08:22:13 05/19/04
1 023.31 23.5 NOx
3 -000.49 Ø SO2
5 -000.58

******** OFF ********

******** RUN ********

08:24:34 05/19/04
1 000.00
3 -000.48
5 109.36 109 VOC

******** OFF ********

******** ON ********
******** RUN ********

:27 05/19/04
1 .02 Ø NOx
3 62.19 62.4 SO2
5 063.73 63.7 VOC

******** OFF ********

******** ON ********
******** RUN ********

08:35:46 05/19/04
1 000.00
3 000.43
5 038.42 38.7 VOC

******** OFF ********

******** ON ********

******** ON ********
******** RUN ******** 1

10:09:48 05/19/04
1 013.30
3 000.73
5 000.39

10:10:48 05/19/04
1 012.72
3 000.88
5 000.50

10:11:48 05/19/04
1 013.11
3 000.88
5 -000.10

10:12:48 05/19/04
1 012.51
3 000.88
5 -000.10

10:13:48 05/19/04
1 012.21
3 001.04
5 -000.08

10:14:48 05/19/04
1 030.31
3 001.04
5 -000.26

10:15:48 05/19/04
1 025.41
3 001.04
5 -000.22

10:16:48 05/19/04
1 022.41
3 001.04
5 -000.34

10:17:48 05/19/04
1 020.61
3 001.04
5 -000.29

10:18:48 05/19/04
1 019.60
3 001.19
5 -000.30

10:19:48 05/19/04
1 018.51
3 001.19
5 -000.33

10:20:48 05/19/04
1 018.61
3 001.19
5 -000.34

10:21:48 05/19/04
1 019.21
3 001.19
5 -000.34

10:22:48 05/19/04
1 018.90
3 000.58
5 -000.29

10:23:48 05/19/04
1 018.51
3 000.73
5 -000.32

10:24:48 05/19/04
1 017.71
3 000.88
5 -000.30

10:25:48 05/19/04
1 017.01
3 001.04
5 -000.32

10:26:48 05/19/04
1 016.60
3 001.19
5 -000.32

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: PPFF Baghouse
Date: 5/19/04

10:27:48 05/19/04
1 016.30
3 001.04
5 -000.27

10:28:48 05/19/04
1 015.21
3 001.04
5 -000.30

10:29:48 05/19/04
1 009.50
3 001.96
5 -000.30

10:30:48 05/19/04
1 009.40
3 003.18
5 -000.32

10:31:48 05/19/04
1 009.30
3 002.72
5 -000.29

10:32:48 05/19/04
1 009.60
3 003.18
5 -000.26

10:33:48 05/19/04
1 010.50
3 003.49
5 -000.22

10:34:48 05/19/04
1 016.80
3 007.16
5 -000.32

10:35:48 05/19/04
1 015.30
3 008.83
5 -000.35

10:36:48 05/19/04
1 017.20
3 007.46
5 -000.32

10:37:48 05/19/04
1 015.81
3 005.77
5 -000.29

10:38:48 05/19/04
1 016.30
3 004.72
5 -000.25

10:39:48 05/19/04
1 016.80
3 003.94
5 -000.26

10:40:48 05/19/04
1 016.70
3 003.64
5 -000.28

10:41:48 05/19/04
1 016.41
3 003.33
5 -000.31

10:42:48 05/19/04
1 013.00
3 003.79
5 -000.26

10:43:48 05/19/04
1 016.21
3 007.31
5 -000.24

10:44:48 05/19/04
1 013.90
3 010.21
5 000.25

10:45:48 05/19/04
1 020.91
3 011.12
5 000.23

10:46:48 05/19/04
1 011.50
3 008.07
5 -000.13

10:47:48 05/19/04
1 008.70
3 006.08
5 -000.10

10:48:48 05/19/04
1 008.20
3 006.23
5 -000.11

10:49:48 05/19/04
1 008.10
3 007.46
5 -000.17

10:50:48 05/19/04
1 008.10
3 009.14
5 -000.19

10:51:48 05/19/04
1 008.01
3 012.35
5 -000.27

10:52:48 05/19/04
1 010.20
3 009.76
5 -000.28

10:53:48 05/19/04
1 010.00
3 011.74
5 -000.30

10:54:48 05/19/04
1 009.40
3 008.22
5 -000.29

10:55:48 05/19/04
1 007.70
3 006.85
5 -000.30

10:56:48 05/19/04
1 007.50
3 005.32
5 001.73

10:57:48 05/19/04
1 013.21
3 004.25
5 000.00

10:58:48 05/19/04
1 004.50
3 003.79
5 002.09

10:59:48 05/19/04
1 002.60
3 003.79
5 002.93

11:00:48 05/19/04
1 002.50
3 003.64
5 001.91

11:01:48 05/19/04
1 002.70
3 003.58
5 003.67

11:02:48 05/19/04
1 002.40
3 003.33
5 002.63

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: PPFF Baghouse
Date: 5/19/04

```
 11:03:43  05/19/04
1  001.30
3  003.49
5  000.56

 11:04:48  05/19/04
1  004.00
3  003.64
5  000.16

 11:05:48  05/19/04
1  002.00
3  003.49
5  000.08

 11:06:48  05/19/04
1  002.20
3  003.33
5 -000.05

 11:07:48  05/19/04
1  001.60
3  003.33
5 -000.13

 11:08:48  05/19/04
1  001.80
3  003.33
5  000.00

 11:09:48  05/19/04
1  001.80
3  003.49
5 -000.01

********  STOP  ********
  11:09:55  05/19/04
Run statistics     N=00061
   Min     Avg     Max
1  001.30 012.19 030.31
3  000.58 004.09 012.35
5 -000.35 000.08 003.67

  11:09:57  05/19/04
RUN  starts logging
STOP stops logging
PROG starts programming

********  OFF  ********

********  ON   ********
********  RUN  ********

 11:19:50  05/19/04
1  000.00
3  067.24
5  036.41     38.7 VOC

********  RUN  ********

 11:29:50  05/19/04
1  023.01    23.5 NOx
3 -000.64    Ø SO2
5 -000.31    Ø VOC

********  OFF  ********

********  ON   ********
********  RUN  ********

 11:34:50  05/19/04
1  000.00    Ø NOx
3  062.64    62.4 SO2
5 -000.37

********  OFF  ********

********  ON   ********
********  RUN 2 ********

 11:44:13  05/19/04
1  009.00
3  014.34
5  003.42

 11:45:13  05/19/04
1  005.60
3  011.27
5  007.14

 11:46:13  05/19/04
1  005.10
3  008.98
5  004.26

 11:47:13  05/19/04
1  005.00
3  007.61
5  002.83

 11:48:13  05/19/04
1  003.80
3  004.55
5  000.56

 11:49:13  05/19/04
1  004.50
3  002.72
5  000.49

 11:50:13  05/19/04
1  004.60
3  001.80
5  000.26

 11:51:13  05/19/04
1  002.20
3  001.19
5  000.23

 11:52:13  05/19/04
1  001.50
3  001.04
5  000.41

 11:53:13  05/19/04
1  002.40
3  001.04
5 -000.08

 11:54:13  05/19/04
1  001.90
3  001.04
5  000.05

 11:55:13  05/19/04
1  001.90
3  000.88
5 -000.11

 11:56:13  05/19/04
1  002.40
3  000.58
5 -000.12

 11:57:13  05/19/04
1  002.50
3  000.43
5 -000.16

 11:58:13  05/19/04
1  002.70
3  000.28
5 -000.12

 11:59:13  05/19/04
1  002.40
3  000.28
5 -000.13

 12:00:13  05/19/04
1  004.00
3  000.28
5 -000.02

 12:01:13  05/19/04
1  008.30
3  000.43
5 -000.07

 12:02:13  05/19/04
1  004.10
3  000.28
5 -000.07
```

ANALYZER FIELD DATA

Company. Nucor Steel
Location: Crawfordsville, Indiana
Source: PPFF Baghouse
Date: 5/19/04

```
   12:03:13   05/19/04
1   004.50
3   000.73
5  -000.06

   12:04:13   05/19/04
1   005.80
3   000.88
5   000.42

   12:05:13   05/19/04
1   005.70
3   001.04
5   001.66

   12:06:13   05/19/04
1   003.80
3   001.34
5   007.58

   12:07:13   05/19/04
1   002.60
3   001.80
5   006.72

   12:08:13   05/19/04
1   002.10
3   002.10
5   003.61

   12:09:13   05/19/04
1   002.10
3   002.41
5   002.81

   12:10:13   05/19/04
1   001.30
3   002.87
5   000.54

   12:11:13   05/19/04
1   001.70
3   004.25
5   000.06

   12:12:13   05/19/04
1   002.10
3   005.62
5   000.40

   12:13:13   05/19/04
1   002.40
3   006.23
5   000.42

   12:14:13   05/19/04
1   002.50
3   005.32
5   000.46

   12:15:13   05/19/04
1   002.40
3   004.87
5   000.45

   12:16:13   05/19/04
1   002.60
3   004.87
5   000.50

   12:17:13   05/19/04
1   002.90
3   005.02
5   000.55

   12:18:13   05/19/04
1   003.30
3   004.25
5   000.45

   12:19:13   05/19/04
1   003.80
3   003.63
5   000.44

   12:20:13   05/19/04
1   003.00
3   003.48
5   000.52

   12:21:13   05/19/04
1   004.50
3   003.49
5   000.52

   12:22:13   05/19/04
1   007.50
3   003.49
5   000.35

   12:23:13   05/19/04
1   011.00
3   004.25
5   000.34

   12:24:13   05/19/04
1   016.10
3   003.94
5   000.38

   12:25:13   05/19/04
1   022.20
3   009.29
5   000.42

   12:26:13   05/19/04
1   022.80
3   007.16
5   000.35

   12:27:13   05/19/04
1   017.20
3   006.70
5   000.39

   12:28:13   05/19/04
1   021.21
3   005.47
5   000.45

   12:29:13   05/19/04
1   013.41
3   009.14
5   001.25

   12:30:13   05/19/04
1   018.30
3   003.94
5   000.50

   12:31:13   05/19/04
1   013.20
3   002.56
5   000.42

   12:32:13   05/19/04
1   012.40
3   005.17
5   000.35

   12:33:13   05/19/04
1   011.90
3   008.98
5   000.25

   12:34:13   05/19/04
1   011.01
3   011.74
5   000.34

   12:35:13   05/19/04
1   013.10
3   031.92
5   000.16

   12:36:13   05/19/04
1   003.90
3   017.09
5   000.11

   12:37:13   05/19/04
1   004.20
3   015.87
5   000.16

   12:38:13   05/19/04
1   003.90
3   018.62
5   000.37
```

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: PPFF Baghouse
Date: 5/19/04

```
12:39:13  05/19/04
1  004.60
3  018.16
5  000.50

12:40:13  05/19/04
1  017.30
3  022.13
5  000.59

12:41:13  05/19/04
1  015.70
3  023.81
5  000.35

12:42:13  05/19/04
1  004.80
3  014.80
5  000.43

12:43:13  05/19/04
1  016.30
3  009.76
5  000.50

12:44:-3  05/19/3"
1  015.70
3  010.51
5  000.64

****.***  STOP  *********
12:44:20  05/19/04
Run statistics   N=00061
    Min     Avg     Max
1  001.30 007.06 022.80
3  000.28 006.35 031.92
5 -0fig.10 000.92 007.50

12:44:21  05/19/04
RUN  starts logging
STOP stops logging
PROG starts programming

********   OFF   ********

********   ON    ********
********   RUN   ********

12:51:24  05/19/04
1  023.50     23.5 NOx
3 -001.25     Ø SO2
5 -001.49     Ø VOC

********   OFF   ********

********   ON    ********
********   RUN   ********

12:56:06  05/19/04
1  000.00     Ø NOx
3  061.58     62.4 SO2
5  037.01     38.7 VOC

********   OFF   ********

********   ON    ********
********   RUN 3 ********

13:01:28  05/19/04
1  002.50
3  002.26
5  000.86

13:02:28  05/19/04
1  008.30
3  002.42
5  000.26

13:03:28  05/19/04
1  009.99
3  002.57
5  000.34

13:04:28  05/19/04
1  013.80
3  003.94
5  000.40

13:05:28  05/19/04
1  013.00
3  004.40
5  000.31

13:06:28  05/19/04
1  012.40
3  003.79
5  000.24

13:07:28  05/19/04
1  012.70
3  003.33
5  000.18

·3:08:20  05/19/04
1  [illegible]2.11
3  [illegible]03.33
5  000.09

13:09:28  05/19/04
1  012.90
3  002.87
5  000.05

13:10:28  05/19/04
1  012.30
3  002.97
5  000.34

13:11:28  05/19/04
1  013.50
3  005.02
5  001.09

13:12:28  05/19/04
1  012.50
3  004.25
5  000.49

13:13:28  05/19/04
1  012.10
3  002.57
5  001.15

13:14:28  05/19/04
1  012.10
3  001.65
5  003.22

13:15:28  05/19/04
1  003.70
3  001.34
5  002.45

13:16:28  05/19/04
1  002.20
3  003.49
5  000.76

13:17:28  05/19/04
1  002.10
3  005.62
5  000.61

13:18:28  05/19/04
1  001.80
3  006.85
5  000.29

13:19:28  05/19/04
1  003.30
3  007.00
5  000.22

13:20:28  05/19/04
1  008.50
3  009.29
5  000.11

13:21:28  05/19/04
1  006.70
3  009.38
5  000.03
```

ANALYZER FIELD DATA

Company	Nucor Steel
Location:	Crawfordsville, Indiana
source:	PPFF Baghouse
Date:	5/19/04

```
13:22:28  05/19/04
1  007.70
3  008.07
5  000.10

13:23:28  05/19/04
1  012.30
3  007.61
5  000.09

13:24:28  05/19/04
1  011.30
3  006.53
5  000.04

13:25:28  05/19/04
1  012.30
3  005.47
5  000.05

13:26:28  05/19/04
1  013.10
3  005.17
5  000.05

13:27:28  05/19/04
1  012.30
3  005.17
5 -000.01

13:28:28  05/19/04
1  008.80
3  005.32
5  000.06

13:29:28  05/19/04
1  010.70
3  005.93
5  000.17

13:30:28  05/19/04
1  019.60
3  006.85
5  001.25

13:31:28  05/19/04
1  024.70
3  004.10
5  000.40

13:32:28  05/19/04
1  012.40
3  002.87
5  000.22

13:33:28  05/19/04
1  011.20
3  004.55
5  000.14

13:34:28  05/19/04
1  011.70
3  007.00
5  000.14

13:35:28  05/19/04
1  011.50
3  012.51
5  000.07

13:36:28  05/19/04
1  010.60
3  014.34
5  000.04

13:37:28  05/19/04
1  011.00
3  012.20
5  000.03

13:38:28  05/19/04
1  010.70
3  011.89
5 -000.01

13:39:28  05/19/04
1  010.50
3  010.66
5  000.00

13:40:28  05/19/04
1  010.40
3  008.98
5  000.00

13:41:28  05/19/04
1  010.60
3  007.00
5  000.03

13:42:28  05/19/04
1  009.80
3  006.23
5  000.04

13:43:28  05/19/04
1  010.20
3  006.70
5  000.07

13:44:28  05/19/04
1  010.10
3  006.23
5  000.05

*** ON  (RUNNING)  ***
********  STOP  ********
13:44:39  05/19/04
Run statistics   N=00044
    Min     Avg     Max
1  001.80 010.52 024.70
3  001.34 005.88 014.34
5 -000.01 000.37 003.22

13:44:41  05/19/04
RUN  starts logging
STOP stops logging
PROG starts programming

********  OFF  ********

********  RUN  ********

13:51:36  05/19/04
1  000.00     Ø NOx
3  060.81     62.4 SO2
5  036.43     38.7 VOC

********  OFF  ********

********  ON   ********
********  RUN  ********

13:54:59  05/19/04
1  023.20     23.5 NOx
3 -001.24     Ø SO2
5 -001.06     Ø VOC

********  OFF  ********
```

APPENDIX D

ATP - Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, Indiana 46219

Phone (3 17) 345-1723
Fax (317) 351-0411
Email: atp_stack@sbcglobal.net

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION		PROJECT INFORMATION	
COMPANY:	ATP	PROJECT NAME/NUMBER:	Nucor Steel - PPFF Baghouse
SEND REPORT TO:	Andrew Young	BILLING INFORMATION	
ADDRESS:	1201 N. Graham Ave.	BILL TO:	
	Indianapolis, Indiana 46219	ADDRESS:	Same
PHONE:	(317) 345-1723	PHONE:	
FAX:	(317) 351-0411	FAX:	PO NO: 079

LAB JOB NO.

SAMPLE NO	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV									REMARKS / PRECAUTIONS
Run 1	ATP - 1	05/19/04		AIR	tedlar		1	X							* analyze for carbon monoxide
Run 2	ATP - 2	05/19/04		AIR	tedlar		1	X							
Run 3	ATP - 3	05/19/04		AIR	tedlar		1	X							

SAMPLER: Andrew Young | SHIPMENT METHOD: | AIRBILL NO:

REQUIRED TURNAROUND: *

1 RELINQUISHED BY:	DATE	2 RELINQUISHED BY:	DATE	3 RELINQUISHED BY:	DATE
SIGNATURE: Andrew Young	5/24/04	SIGNATURE		SIGNATURE	
PRINTED NAME/COMPANY: Andrew Young ATP	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME
1 RECEIVED BY:	DATE	2 RECEIVED BY:	DATE	3 RECEIVED BY:	DATE
SIGNATURE: Ronald A. Rayner	5-25-04	SIGNATURE		SIGNATURE	
PRINTED NAME/COMPANY: Ronald A. Rayner IE	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME

APPENDIX E

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	PPFF Baghouse
Date:	05/19/2004

Pollutant Gas Type:	SO2
Instrument Span:	105
Upscale Calibration Gas:	62.4

ANALYZER CALIBRATION DATA

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.00	-0.79	0.79	0.75%	Pass
Mid-range gas	62.40	61.89	0.51	0.49%	Pass
High-range gas	101.00	100.60	0.40	0.38%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	m Calibration ɔonse (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Run # 1								
Zero gas	-0.49	0.29%	Pass	-0.64	0.14%	Pass	0.14%	Pass
Upscale gas	62.19	0.29%	Pass	62.64	0.71%	Pass	0.43%	Pass
Run # 2								
Zero gas	-0.64	0.14%	Pass	-1.25	0.44%	Pass	0.58%	Pass
Upscale gas	62.64	0.71%	Pass	61.58	0.30%	Pass	1.01%	Pass
Run # 3								
Zero gas	-1.25	0.44%	Pass	-1.24	0.43%	Pass	0.01%	Pass
Upscale gas	61.58	0.30%	Pass	60.81	1.03%	Pass	0.73%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (dry, ppm)
Run # 1	4.09	4.61
Run # 2	6.35	7.22
Run # 3	5.88	7.12

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company	Nucor Steel
Location:	Crawfordsville, Indiana
Source	PPFF Baghouse
Date:	05/19/2004

Pollutant Gas Type:	NOx
Instrument Span:	50
Upscale Calibration Gas:	23.5

ANALYZER CALIBRATION DATA

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	0.10	0.10	0.20%	Pass
Mid-range gas	23.5	23.41	0.09	0.18%	Pass
High-range gas	49.9	49.91	0.01	0.02%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Run # 1								
Zero gas	0.00	0.20%	Pass	0.00	0.20%	Pass	0.00%	Pass
Upscale gas	23.31	0.20%	Pass	23.01	0.80%	Pass	0.60%	Pass
Run # 2								
Zero gas	0.00	0.20%	Pass	0.00	0.20%	Pass	0.00%	Pass
Upscale gas	23.01	0.80%	Pass	23.50	0.18%	Pass	0.98%	Pass
Run # 3								
Zero gas	0.00	0.20%	Pass	0.00	0.20%	Pass	0.00%	Pass
Upscale gas	23.50	0.18%	Pass	23.20	0.42%	Pass	0.60%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (dry, ppm)
Run # 1	12.19	12.37
Run # 2	7.06	7.13
Run # 3	10 52	10.59

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-26

Company:	**Nucor Steel**
Location:	Crawfordsville, **Indiana**
Source:	PPFF Baghouse
Date:	**05/19/04**

	Run 1	Run 2	Run3	Average
Y qa =	1.000	0.984	1.045	1.010

Average result must be within 5% of Y

Result (%) **0.78**

PASSED POST CAL

Dry Gas Meter **Box:**

ID:	A-1
Y:	1.002
Delta **H:**	1.72

Run 1	Volume	Delta H	DGM Inlet	DGM Outlet
1		1.72	78	78
2		1.72	81	79
3		1.72	82	79
4		1.72	84	80
5		1.72	86	80
6		1.72	87	82
7		1.72	89	83
8				
9				
10	346.325			
11	319.93			
12				

Volume	Delta H	Meter Temp
26.395	1.720	82.0

Barometric Pressure	Test Time
30.08	35.5

Y qa: 1.000

Run 2	Volume	Delta H	DGM Inlet	DGM Outlet
1		1.720	85	84
2		1.720	88	84
3		1.720	90	85
4		1.720	92	86
5		1.720	93	86
6		1.720	94	87
7		1.720	95	88
8				
9				
10	370.648			
11	347.844			
12				

Volume	Delta H	Meter Temp
22.804	1.720	88.4

Barometric Pressure	Test Time
30.08	

Y qa: 0.984

Run 3	Volume	Delta H	DGM Inlet	DGM Outlet
1		1.720	91	90
2		1.720	94	90
3		1.720	96	91
4		1.720	93	91
5		1.720	94	91
6		1.720	95	91
7				
8				
9				
10	392.53			
11	370.968			
12				

Volume	Delta H	Meter Temp
21.562	1.720	92.3

Barometric Pressure	Test Time
30.08	30.0

Y qa: 1.045

Meter Box Post-Test Calibration

APEX INSTRUMENTS
EPA Method 5
522 Series Meter Box Calibration
Post-Test Orifice Method
English Meter Box Units, English K' Factor

Filename: Orifice Calibration

Box ID#: **A-1**

Date: ---------------------> 01/20/04
Barometric Pressure: ----> 29.98 in Hg
Critical Orifice Vacuum:-> 20 in Hg

IMPORTANT!!! For valid test results, the Critical Orifice Vacuum must be equal to or higher than the value shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

.... DRY GAS METER READINGS .... CRITICAL ORIFICE READINGS

dH	Time	Volume Initial	Volume Final	Volume Total	Initial Temps. Inlet	Initial Temps. Outlet	Final Temps. Inlet	Final Temps. Outlet	Orifice Serial#	K' Orifice Coefficient	Vacuum	-- Ambient Temperature -- Initial	Final	Average
(in H20)	(min)	(cu ft)	(cu ft)	(cu ft)	(deg F)	(deg F)	(deg F)	(deg F)	(number)	(see above)	(in Hg)	(deg F)	(deg F)	(deg F)
0.38	14.08	216	221	5.00	95	93	96	94	**AT-15**	**0.265**	20	88	88	88
0.38	14.08	221	226	5.00	96	94	97	95	**AT-15**	**0.265**	20	88	88	88
0.38	14.08	226	231	5.00	97	95	98	95	**AT-15**	**0.265**	20	88	88	88

** RESULTS **

... DRY GAS METER ...		----- ORIFICE -----		-- DRY GAS METER --		--------- ORIFICE ---------		
VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@		
Vm(std)	Vm(std)	Vcr(std)	Vm(std)	Value	Variation	Value	Value	Variation
(cu ft)	(liters)	(cu ft)	(liters)	(number)	(number)	(in H20)	(mm H20)	(in H20)
4.7731297	135.175	4.77848116	135.32659	1.00112	-0.0017	1.7248317	43.81073	0.00826
4.7645372	134.9317	4.77848116	135.32659	1.00293	0.00015	1.7155279	43.57441	-0.001
4.7581131	134.7498	4.77848116	135.32659	1.00428	0.0015	1.7093635	43.41783	-0.0072
			Average Y ------->	**1.00278**		**1.717**	43.60099	<-----... Average dH@

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

Calibrated by: Carlos Brown   Date: January 20, 2004

ATP – Air Test Professionals, Inc.
Pitot Tube Calibration

Reference: 40 CFR 60, Appendix A, Method 2, Section 2.1

Probe Length/ID.: **12 ft. (w/2ft ext.) Type-S**

External Tubing Diameter: 0.375" inches

Base *to* Opening Plane Distance (Pa): 0.470" inches

Base *to* Opening Plane Distance (Pa): 0.470" inches

	Measured	**Allowable**
Pa/Dt	1.25"	1.05 – 1.50 inches
Pb/Dt	1.25"	1.05 – 1.50 inches
Angle a 1	0 deg	$\alpha 1$ and a 2 $\leq$ **10.0**
Angle a 2	0 deg	$\alpha 1$ and ***a2*** $\leq$ 10.0
Angle β 1	0 deg	$\beta 1$ and $\beta 2 \leq$ 10.0
Angle β 2	0 deg	$\beta 1$ and $\beta 2 \leq$ **10.0**
z (inches)	**0.0"**	0.125 inches
w (inches)	0.0"	0.03 1 inches
	If all criteria are met, Pitot Coefficient is 0.84	Pitot Coefficient: 0.84

Calibrated By: Carlos Brown   Date Calibrated: February 16, 2004

ATP – Air Test Professionals, Inc.

Thermocouple Calibration

Probe Length/ID: 12 **ft. Type-S** Dry Gas Meter ID: **A-**1

Standard Used: Mercury Thermometer Temperature Scale: Degrees F

Temperature Range	Mercury Thermometer	Probe Thermometer
Hot Bath	**425 deg**	**425 deg**
Room Temperature	**72 deg**	**72 deg**
Ice Bath	30 deg	30 deg

Calibrated By: Carlos Brown Date Calibrated: February 16, 2004

AGA
Member of the Linde Gas Group

Linde

LE MONITORING INSTRUMENTS (800) 532-7474 www.lemiinc.com

Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be' used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

B16405B

Material:	6232	Blend Tolerance:	5 % Relative
EPA NO/N2 2-49 PPM		**Store/Use** Temp:	35 to 90 F
Production #:	100061997	Blend Type:	EPA Protocol
Lot #:	02499A3090EI	Cyl. Pressure:	2000 psig
Cylinder #:	CC34494	**Balance Gas:**	Nitrogen
Expiration Date:	1I2312005	CGA:	660
Shelf Life:	24 months	Analytical Accuracy:	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
10102-43-9	Nitric Oxide	22	23.5 +/- 0.2 ppm	0112312003
7727-37-9	Nitrogen		Balance	01/23/2003

CAS #	Analyzed (For Ref Use Only)	Concentration	Analysis Date
N/A 2	NOx	23.5 ppm	01/23/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
10102-43-9	Nitric Oxide	ND11377 . LS	100.9 ppm	1112112007
10102-43-9	Nitric Oxide	CC120225 , GMIS	20.35 ppm	11/22/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba CLA-510SS	568093024	Chemiluminescence	01/21/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or' equivalent, standards, weights, or equipment.

Analytical report approved by Jim Healy

James R Healy

HiQ Analysis Certificate

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Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder **is** not to be used when pressure is under 150 psig.

Manufactured and certified at:
Linde Gas LLC
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
LINDE COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6232	**Blend Tolerance:**	5 % Relative
EPA NO/N2 2-49 PPM		Blend Type:	EPA Protocol
Production #:	100079533	**Cyl. Pressure:**	2000 psig
Lot #:	02499A4140BF		Nitrogen
Cylinder #:	CC174364	**Balance Gas:**	660
Expiration Date:	1/1912006	**Analytical Accuracy:**	1.00 % Relative
Shelf Life:	24 months	**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
10102-43-9	Nitric Oxide	495	49.9 +/- 0.5 ppm	0111912004
7727-37-9	Nitrogen		Balance	01/19/2004

CAS #	Analyzed (For Ref Use Only)	Concentration	Analysis Date
N/A	NOx	49 9 ppm	01/19/2004

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
10102-43-9	Nitric Oxide	CC137201 , GMIS	20.41 ppm	01/09/2006

Instrument	Serial #	Analytical Principle	Calibration Date
Nicolet Magna 550	ACJ9300713	FTIR	10/27/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17198B

Analytical report approved by Jim Healy

Jim R Healy

HiQ Analysis Certificate

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316194B

Certificate of Analysis

EPA Protocol
Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6655 EPA SO2/N2 15-99 PPM	Blend Tolerance:	5 % Relative
Production #:	100056269	Store/Use Temp:	35 to 90 F
Batch #:	02499H2260BK	Blend Type:	EPA Protocol
Cylinder #:	CC150625	Cyl. Pressure:	2000 psig
Expiration Date:	9/12/2004	Balance Gas:	Nitrogen
Shelf Life:	24 months	CGA:	660
		Analytical Accuracy:	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
7446-09-5	Sulfur Dioxide	60	62.4 +/- 0.6 ppm	09/12/2002
7727-37-9	Nitrogen		Balance	09/12/2002

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7446-09-5	Sulfur Dioxide	CC130050 , GMIS	101.6 ppm	07/26/2004
7446-09-5	Sulfur Dioxide	CC3837 , GMIS	50.45 ppm	07/26/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568279012	Non-Dispersive Infrared	08/05/2002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Jim Healy

Jim R Healy

HiQ Analytical Certificate

06/23/2004 15:33 6144365144 IE

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316149 B

Notice: This Cylinder is not to be used when pressure is under 150 psig.

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Maumee Specialty Gas Plant
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MAUMEE OH 43537
419-893-7226

Produced for customer:
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450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6681	Blend Tolerance;	5 % Relative
EPA SO2/N2 1.00-3500 PPM		Store/Use Temp;	35 to 90 F
Production #:	100056267	Blend Type:	EPA Protocol
Batch #:	02499H2260BJ	Cyl. Pressure:	2000 psig
Cylinder #:	CC150571	Balance Gas:	Nitrogen
Expiration Date:	9/6/2004	CGA:	660
Shelf Life:	24 months	Analytical Accuracy:	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
7446-09-5	Sulfur Dioxide	100	101 +/- 1 ppm	09/06/2002
7727-37-9	Nitrogen		Balance	09/06/2002

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7446-09-5	Sulfur Dioxide	CC130050 , GMIS	101.6 ppm	07/26/2004
7446-09-5	Sulfur Dioxide	CC113475 , GMIS	500.4 ppm	06/20/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568279012	Non-Dispersive Infrared	08/05/2002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Jim Healy

James R Healy

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EPA Protocol

Performed according to EPA-600/R-97/121, Procedure GI

Notice: This Cylinder is not to be used when pressure is under 150 psig.

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AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6647	**Blend Tolerance:**	5 % Relative
EPA C3H8/N2 1-99 PPM		**Blend Type:**	EPA Protocol
Production #:	100077554	**Cyl. Pressure:**	2000 psig
Lot #:	02499M3020ZF	**Balance Gas:**	Nitrogen
Cylinder #:	CC3860	**CGA:**	350
Expiration Date:	12/15/2006	**Analytical Accuracy:**	1.00 % Relative
~~**Shelf Life:**~~	~~36 months~~	~~**Confidence:**~~	~~95 %~~

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
74-98-6	Propane	39	38.7 +/- 0.4 ppm	12/15/2003
7727-37-9	Nitrogen		Balance	12/15/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
74-98-6	Propane	CC100454 , GMIS	i0.52 ppm	06/05/2005
74-98-6	Propane	CC154126 , GMIS	101.0 ppm	06/05/2005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba FIA-510	56847471	Flame Ionization	11/11/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17111B

Analytical report approved by Jim Healy

James R Healy

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Certificate of Analysis

EPA Protocol

Performed according to EPA-6001R-971121, Procedure GI

Notice: This Cylinder is **not** to be used when pressure is under 150 psig.

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Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6647	**Blend Tolerance:**	5 % Relative
EPA C3H8/N2 1-99 PPM		Blend Type:	EPA Protocol
Production #:	100077553	Cyl. Pressure:	2000 psig
Lot #:	02499M3020ZE	Balance Gas:	Nitrogen
Cylinder #:	CC13911	**CGA:**	350
Expiration Date:	12/15/2006	**Analytical Accuracy:**	1.00 % Relative
Shelf Life:	36 months	**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
74-98-6	Propane	64	63.7 +/- 0.6 ppm	12/1512003
7727-37-9	Nitrogen		Balance	12/15/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
74-98-6	Propane	CC100454 , GMIS	10.52 ppm	06/05/2005
4-98-6	Propane	CC154126 , GMIS	101.0 ppm	06/05/2005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba FIA-510	56847471	Flame Ionization	11/11/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17112B

alytical report approved by Jim Healy

James R Healy

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Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

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Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	4004 EPA PROPANE/N2 100-999 PPM	**Blend Tolerance:**	5 % Relative
Production #:	100077552	**Blend Type:**	EPA Protocol
Lot #:	02499M3010G1	**Cyl. Pressure:**	2000 psig
Cylinder #:	CC27516	**Balance Gas:**	Nitrogen
Expiration Date:	12/8/2006	**CGA:**	350
Shelf Life:	36 months	**Analytical Accuracy:**	1.00 % Relative
		Confideuce:	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
74-98-6	Propane	109	109 +/- 1 ppm	12/08/2003
7727-37-9	Nitrogen		Balance	12/08/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
74-98-6	Propane	CC73695 , GMIS	1004 ppm	09/11/2005
74-98-6	Propane	CC154126 , GMIS	101.0 ppm	06/05/2005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba FIA-510 .	56847471	Flame Ionization	11/11/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17057B

Analytical report approved by Jim Healy

James R Healy

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Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure GI

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
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- Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6154	**Blend Tolerance:**	5 % Relative
EPA CO/N2 10-99 PPM		**Blend Type:**	EPA Protocol
Production #:	100076206	**Cyl. Pressure:**	2000 psig
Lot #:	02499K3310UA	**Balance Gas:**	Nitrogen
Cylinder #:	CC167431	**CGA:**	350
Expiration Date:	11/12/2006	**Analytical Accuracy:**	1.00 % Relative
Shelf Life:	36 months	**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
630-08-0	Carbon Monoxide	30.3	30.1 +/- 0.3 ppm	11/12/2003
7727-37-9	Nitrogen		Balance	11112/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
630-08-0	Carbon Monoxide	CC3859 , GMIS	25.08 ppm	06/042004
630-08-0	Carbon Monoxide	CC13630 . GMIS	99.53 ppm	0911212005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568384012	Non-Dispersive Infrared	09/26/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17004B

Analytical report approved by Jim Healy

Jim R Healy

HIQ Analysis Certificate

06/23/2004 15:33 6144365144 IE

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Certificate of Analysis
EPA Protocol
Performed according to EPA-600/R-97/121, Procedure G1

Notice; This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 CREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6154 EPA CO/N2 10-99 PPM	Blend Tolerance:	5 % Relative
Production #:	100076208	Blend Type:	EPA Protocol
Lot #:	02499K3280ZE	Cyl. Pressure:	2000 psig
Cylinder #:	CC175246	Balance Gas:	Nitrogen
Expiration Date:	11/12/2006	CGA:	350
Shelf Life:	36 months	Analytical Accuracy:	1.00 % Relative
		Confidence:	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
630-08-0	Carbon Monoxide	89.1	89.1 +/- 0.9 ppm	11/12/2003
7727-37-9	Nitrogen		Balance	11/12/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
630-08-0	Carbon Monoxide	CC3859 . GMIS	25.08 ppm	06/04/2004
630-08-0	Carbon Monoxide	CC13630 , GMIS	99.53 ppm	09112/2005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568384012	Non-Dispersive Infrared	09/26/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17006B

Analytical report approved by Jim Healy

James R Healy

HiQ Analysis Certificate

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CERTIFICATE OF ANALYSIS
EPA PROTOCOL
PERFORMED ACCORDING TO EPA-600/R-97/121, PROCEDURE G I

NOTICE: THIS CYLINDER IS NOT TO BE USED WHEN PRESSURE IS UNDER 150 psig

MANUFACTURED AND CERTIFIED AT:

AGA Gas inc.
Specialty Gas Division
6421 Monclova Road
Maumee, Ohio 43537
419-893-7226

ANALYTICAL ANC CYLINDER DATA:

Certified Component	Concentration and Uncertainty	Date of Certification
Carbon Monoxide	133 ± 1 ppm	1/28/2002

Analyzed for Reference Use Only	Concentration	Date of Analysis
N/A - Not Applicable for this Mixture	N/A	N/A

Production Number: 100046348
Cylinder Number: CC23930 B158113
Expiration Date: 1/28/2005

Cylinder Pressure (psi): 2000
Balance Gas: Nitrogen
CGA: 350

REFERENCE STANDARDS DATA (TRACEABLE TO NIST AND NMI STANDARDS):

Reference Standard Number	Cylinder Number	Concentration and Component	Expiration Date
GMIS	CC73603	507.7 ppm Carbon Monoxide	3/21/2002
GMIS	CC100557	50.56 ppm Carbon Monoxide	3/21/2002

INSTRUMENTATION DATA:

Instrument Model	Serial Number	Date of Last Calibration	Analytical Principle
Horiba VIA-510	569466011	1/28/2002	Non-Dispersive Infrared (NDIR)

Analytical Report Approved By: [signature]

AGA
Member of the Linde Gas Group

APPENDIX F

APPENDIX G

COMPLIANCE TEST PROTOCOL
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Date Prepared: April 1,2004 Proposed Test Date May 19-21, 2004

Plant Address and Location: 4537 S. Nucor Road, Crawfordsville, Indiana 47933

1. Source Information

AFS: ______ Id Number: ______ Permit Number: 107-16823-00038

Company: Nucor Steel

Mail Address: RR2 Box 311, CR 400 E

City: Crawfordsville, Indiana Zip: 47933

Co.Contact: Mark Washer Phone: (765) 364-1323

Check program if applicable:

FESOP: ______

Title V: X

SSOA: ______

AGENCY USE ONLY		Date Rec'd: ______
Inspector:	Reviewer:	Date Appr: ______

2. Tester Information

Name: Air Test Professionals, Inc.

Address: 1201 N. Graham Ave.

Contact: Carlos M. Brown Phone: 317-345-1723

Pre-Test Inspection Complete? Yes

3. Proeess Information

Unit to Test: PPFF Baghouse (2-EAF's + I-AOD)

Max. Rated **Capacity:** 502 tons per hour

Proposed Operating Speed: Close to Max as possible

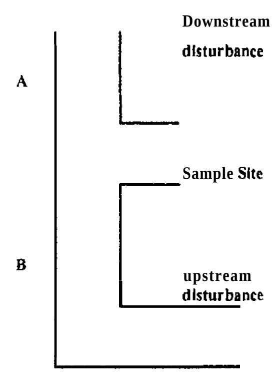
Pollution Control Equipment: PPFF Baghouse

Process Description: Process of melting screap metal to make carbon steel.

Fuel Type: N/A

4. Test Information

		# Runs	Time/Run
Methods 1-4	Moisture/Flow	3	30 min @ Inlet
Method 5			
Method 6C	SO2	3	60 min @ Inlet
Method 7E	NOx	3	60 min @ Inlet
Method 10	CO	3	60 min @ Inlet
Other Testing:	M25A	3	60 min @ Inlet



Distance A: > 1/2 diameters

Distance B: > 2 diameters

Note:

5. Sampling Strategy

a. Describe any deviations from the standard test method.

None

b. **Describe** method used to determlne quantity of raw **materials**

Plant personnel will keep record of weight rates. New Baseline Values for Fan Amps and Delta P's.

6. Sample Site Location

Does sample port location meet 40 CFR 60, Appx A, Method 1 Section 1.2 requirements: Yes/No: YES If No, Explain ______

Number of sample points for M5: 32

Diameter at sample site: 209" Stack height: N/A

Approx. stack gas flow (ACFM): 1,309,000

Approx. gas temp. **(degF):** 250 F Max

Approx. gas moisture (%): 3%

Reason for test:

State Agreed Order: Yes/No: ______ Operating permlt: Yes/No: Yes

Construction Permlt: Yes/No: ______ Compliance w 326 ______

NSPS 40 CFR 60 Subpart: ______ Other ______

Title V: ______

Other **(i.e.** EPA, CD, state, 114) ______

326 IAC 3-2.1 requires this completed form and fee to be submitted 35 days prior to proposed test date lo:
(FEE NOT APPLICABLE IFFESOP OR TITLE V)

Compliance Data Section
Office of Air Management
Indiana Department of Environmental Management
100 North Senate
PO BOX 6015
Indianpolis, IN 46206-6015

Questions may be directed lo 317-232-8338, FAX : 317-233-6865

APPENDIX H

Furnace 1 Production: 5/19/04

Heat No.	Tons	Tap Time	Prev. Tap Time	Tap-to-Tap Minutes	Average tonslhr
141211	130	9:25 AM	8:40 AM	45	173.3
141212	130	10:36 AM	9:25 AM	71	109.9
141213	130	11:30 AM	10:36 AM	54	144.4
141214	129	12:22 PM	11:30 AM	52	148.8
141215	130	1:22 PM	12:22 PM	60	130.0
[illegible]	129	2:10 PM	1:22 PM	[illegible]	161.3
141217	130	3:01 PM	2:10 PM	51	152.9
141218	130	3:47 PM	3:01 PM	46	169.6
[illegible]	129	4:30 PM	3:47 PM	[illegible]	180.0
[illegible]	129	5:52 PM	4:30 PM	[illegible]	94.4
[illegible]	128	6:47 PM	5:52 PM	[illegible]	139.6
[illegible]	130	7:39 PM	6:47 PM	52	150.0
[illegible]	129	8:37 PM	7:39 PM	[illegible]	133.4
[illegible]	129	9:50 PM	8:37 PM	73	106.0

Furnace 2 Production: 5/19/04

Heat No.	Tons	Tap Time	Prev. Tap Time	Tap-to-Tap Minutes	Average tons/hr
246985	106	9:25 AM	8:33 AM	52	122.3
246986	112	11:23 AM	9:25 AM	118	56.9
246987	118	12:40 PM	11:23 AM	77	91.9
[illegible]	115	2:26 PM	12:40 PM	106	65.1
246989	118	3:54 PM	2:26 PM	88	80.5
[illegible]	116	[illegible]	3:54 PM	[illegible]	[illegible]
[illegible]	116	6:57 PM	[illegible]	[illegible]	[illegible]
[illegible]	116	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	115	[illegible]	[illegible]	[illegible]	[illegible]
246994	115	10:42 PM	9:34 PM	68	101.5

Stack Gases - SOx, NOx, CO, VOC

	Run Time	Furn 1 Tons	Furn 2 Tons	AOD Tons	TOTAL
Run 1	10:09 am - 11:09 am	128.8	56.9	48.6	234.3
Run 2	11:44 am - 12:44 pm	142.0	90.1	56.1	**288.2**
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	281.0
					803.5

AOD Production Data: 5/19/04

Heat No.	Tons	Tap Time	Charge Time	Charge-Tap Minutes	Average tons/hr
[illegible]	119.1	12:17 PM	9:55 AM	142	50.3
[illegible]	117.1	2:04 PM	12:22 PM	102	68.9
246987	123.8	3:37 PM	2:11 PM	86	86.4
[illegible]	117.8	4:47 PM	3:40 PM	67	105.5
[illegible]	116.2	6:44 PM	[illegible]	91	76.6
[illegible]	116.2	8:05 PM	6:46 PM	79	[illegible]
[illegible]	117.1	9:20 PM	8:07 PM	73	[illegible]
[illegible]	118	10:29 PM	9:22 PM	67	[illegible]

Run 1 - PM & Metals

	Run Time	Furn 1 Tons**	Furn 2 Tons**	AOD Tons**	TOTAL**	Avg. Run Production
Run 1	4:00 pm - 9:34 pm	706.7	458.0	560.0	1724.7	334.9

**Run I testing was suspended 25 minutes due to furnace downtime.
Production totals are based on 309 minutes run time rather than 334 minutes

EBT HEAT RECORD

HEAT NO: 141211 FULL WEIGHT: ______ DATE: 5-18 KWH END: ______
HEATS ON BOTTOM: ______ TARE WEIGHT: ______ MELTER: DAN KWH START: ______
LADLE NO: 12 WEIGHT TAPPED: 136 AIM GRADE: 1008A2 KWH USED: 52
CAST HEAT TAPPED: 0'40 HEATS ON DELTA: 157 PATCH: ______ LBS(EST

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		05			052		08							15
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL	40,000	
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
SCRAP TOTAL	75	60
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			8	Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			8	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp
	3071		

LADLE ALLOYS	WEIGHT(LBS)
B#1	

OXYGEN PPM 1014

TAP TIME: 9:25

REMARKS (list)

QF-0043 9/12/97

EBT HEAT RECORD

HEAT NO: 141212
FULL WEIGHT:
DATE: 5-19
KWH END:
HEATS ON BOTTOR:
TARE WEIGHT:
RELTER: Myers 10083
KWH START:
LADLE NO: 925
WEIGHT TAPPED: 260000
KWH USED: 50
LAST HEAT TAPPED: 925
HEATS ON DELTA:
AIM GRADE:
LBS(EST
PATCH:

CHERISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		.027			.047		.071							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL	30,000	
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
SCRLP TOTAL	95	60
BURNT LIRE	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			8	Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd 'bucket				
Power on			8	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Tire	Temp
	3069	-022	

LADLE ALLOYS

LADLE ALLOYS	WEIGHT(LBS)
B#1	

OXYGEN PPM 1344

TAP TIRE: 11:36

REMARKS (list)

QF-0043 9/12/97

EBT HEAT RECORD

HEAT NO:	141213	FULL WEIGHT:		DATE:	5-19
HEATS ON BOTTOM:		TARE WEIGHT:		MELTER:	Myers
LADLE NO:	5	WEIGHT TAPPED:	260000	AIM GRADE:	1068A2
LAST HEAT TAPPED:	10:36	HEATS ON DELTA:	159	PATCH:	LBS(EST)

KWH END:	
KWH START:	
KWH USED:	419

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		.039			0.57		.072							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	120
SCRAP TOTAL		135 ton
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			6	Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			6	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

LADLE ALLOYS	WEIGHT(LBS)
B#1	

Time	Temp	Time	Temp
	3076	.007	

OXYGEN PPM 1132

TAP TIME: 11:30

REMARKS (list)

Add A Phase 5 mins

EBT HEAT RECORD

HEAT NO: 141214 | FULL WEIGHT: | DATE: 5-19 | KWH END:
HEATS ON BOTTON: | TARE WEIGHT: | HELTER: Miers | KWH START:
LADLE NO: 70 | WEIGHT TAPPED: 238000 | AIM GRADE: | KWH USED: 47
LAST HEAT TAPPED: 11:30 | HEATS ON DELTA: 160 | PATCH: — LBS(EST)

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		.038			.050		.086							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	129
SCRAP TOTAL		139-540W
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			16	Tap no,
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			19	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp
	3033	.0241	

LADLE ALLOYS | WEIGHT(LBS)

LADLE ALLOYS	WEIGHT(LBS)
1	

OXYGEN PPM 1168

TAP TIRE: 12:22

REMARKS (list)

Add #8 Phase - 6 min

OF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 141215 FULL WEIGHT: ______ DATE: 5-19 KWH END: ______
HEATS ON BOTTOM: ______ TARE WEIGHT: ______ MELTER: M. Vers KWH START: ______
LADLE NO: 17 WEIGHT TAPPED: 260000 AIM GRADE: ______ KWH USED: 379
LAST HEAT TAPPED: 12:22 HEATS ON DELTA: 1161 PATCH: ______ LBS(EST)

SAMPLE	TIRE	C		Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		043				058		088							
F-2															
F-3															
F-4															

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	129
SCRAP TOTAL		139.56 W
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Tire	Temp	Tire	Temp
	2946	1027	

LADLE ALLOYS WEIGHT(LBS)

1	

OXYGEN PPM 906

TAP TIME 1:22

REMARKS (list)

QF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE

EBT HEAT RECORD

HEAT NO: 141216 FULL WEIGHT: ______ DATE: 5-19 KWH EM): ______

HEATS ON BOTTOM: ______ TARE WEIGHT: ______ MELTER: myers KWH START: ______

LADLE NO: 11 WEIGHT TAPPED: 258000 AIM GRADE: ______ KWH USED: 47

LAST HEAT TAPPED: 1:22 HEATS ON DELTA: 162 PATCH: ~ LBS(EST)

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		035			056		092							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	129
SCRAP TOTAL		139.5 ton
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			6	Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			6	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Tamp
	2988	2025	

LADLE ALLOYS	WEIGHT(LBS)
1	

OXYGEN PPM 1049

TAP TIME: 2:10

REMARKS (list)

QF-0043 9/12/97

NUCOR STEEL CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 141217 | FULL WEIGHT: ______ | DATE: 5-19 | KYH END: ______
HEATS ON BOTTOM: ______ | TARE WEIGHT: ______ | MELTER: Myers | KYH START: ______
LADLE NO: 5 | WEIGHT TAPPED: 260000 | AIM GRADE: ______ | KWH USED: 47
LAST HEAT TAPPED: 2110 | HEATS ON DELTA: 163 | PATCH: — LBS(EST)

SAMPLE	TINE	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		044			060		092							
F-2														
F-3														
F-4														

CHEMISTRY

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	129
SCRAP TOTAL		139.5 ton
BURNT LIME	2000	
DOLO LIME	3500	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			6	Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			6	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp
	3018	2027	

LADLE ALLOYS WEIGHT(LBS)

LADLE ALLOYS	WEIGHT(LBS)
/	

OXYGEN PPM 1010

TAP TIME: 3101

REMARKS (list) Door back

QF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 141218 | FULL WEIGHT: | DATE: 5-19 | KWH END:
HEATS ON BOTTOM: | TARE WEIGHT: | MELTER: Myers | KWH START:
LADLE NO: 16 | WEIGHT TAPPED: 260000 | AIM GRADE: | KWH USED: 46
LAST HEAT TAPPED: 3101 | HEATS ON DELTA: 164 | PATCH: — LBS(EST)

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		031			016		069							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	133
SCRAP TOTAL		141.5 TON
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			6	Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			6	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Tire	Temp	Tire	Temp
	2973	2927	

LADLE ALLOYS WEIGHT(LBS)

(	

OXYGEN PPM 831

TAP TIME: 3:47

REMARKS (list)

CF—— 9/12/97

19

NUCOR STEEL - CRAWFORDSVILLE

EBT HEAT RECORD

HEAT NO: 1412[illegible]
HEATS ON BOTTOM:
LADLE NO: 12
LAST HEAT TAPPED: 3147

FULL WEIGHT:
TARE WEIGHT: 258000
WEIGHT TAPPED: 765
HEATS ON DELTA: 5

DATE:
AIM MELTER: Myers
GRADE:
PATCH: 1000 LBS(EST)

KWH END:
KWH START:
KWH USED: 3

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		036			053		091							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	Full Pow	Back
SCRAP TOTAL		130 ton
BURNT LIME	~~2000~~	
DOLO LINE		
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners,				CF
				CF CH
Vulcan lance on				CF 0
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp
	3125	1080	

LADLE ALLOYS WEIGHT(LBS)

OXYGEN PPM 1672

TAP TINE: 4:30

REMARKS (list)

Patch 8 mins

Full Pow Back - DS1 Bombed

QF-0043 9/12/97

20

NUCOR STEEL - CRAWFORDSVILLE

EBT HEAT RECORD

HEAT NO: 1412[illegible]   FULL WEIGHT: ______   DATE: 5-19   KWH END: ______

HEATS ON BOTTOM: ______   TARE WEIGHT: ______   MELTER: Myers   KYH START: ______

LADLE NO: 11   WEIGHT TAPPED: 258000   AIM GRADE: ______   KWH USED: 23

LAST HEAT TAPPED: 4:30   HEATS ON DELTA: 166   PATCH: — LBS(EST)

CHEH ISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1														
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		Scrap
	P.B	127
	150	[illegible]
SCRAP TOTAL		138.5 ton
BURNT LIME	2000	
DOLO LIME	5500	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			6	Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			6	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcrn lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Tamp
	2970	-0020	

LADLE ALLOYS WEIGHT(LBS)

/	

OXYGEN PPM 1247

TAP TIRE: 5:52

REMARKS (list)

150,000 P.Beck Castor /
Hot Mill [illegible] Tailed Out
53 mins

QF-0043 9/12/97

EBT HEAT RECORD

HEAT NO: 141221 FULL WEIGHT: ______ DATE: 5-19 KWH END: ______

HEATS ON BOTTOM: ______ TARE WEIGHT: ______ MELTER: Myers KWH START: ______

LADLE NO: 7 WEIGHT TAPPED: 25. AIM GRADE: ______ KWH USED: 39

LAST HEAT TAPPED: 5152 HEATS ON DELTA: ______ PATCH: — LBS(EST)

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		033			042		076							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	154	130
SCRAP TOTAL		142 tons
BURNT LIME	2000	
DOLO LIME	4700	
CHG. CARBON	1500	

	START	END		
Drop 1st bucket			6	Tap no.
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			6	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

LADLE ALLOYS WEIGHT(LBS)

Time	Temp	Time	Temp
	2990	2920	

OXYGEN PPM 1310

TAP TIME: 6:47

REMARKS (list)

QF-0043 9/12/97

141222

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: ~~[illegible]~~ FULL WEIGHT: ______ DATE: 5-19 KWH END: ______
HEATS ON BOTTOM: ______ TARE WEIGHT: ______ MELTER: Myers KWH START: ______
LADLE NO: 10 WEIGHT TAPPED: 260000 AIM GRADE: ______ KWH USED: 46
LAST HEAT TAPPED: ______ HEATS ON DELTA: 168 PATCH: — LBS(EST)

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		.03			.047		.086							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	141
SCRAP TOTAL		145.5 ton
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			6	Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on			6	Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Tire	Terp	Tire	Terp
	2941	1026	

LADLE ALLOYS	WEIGHT(LBS)
1	

OXYGEN PPM 832

TAP TIME: 7:39

REMARKS (list)

QF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 141223 ~~[illegible]~~
HEATS ON **BOTTOM:** ____
LADLE NO: 12
LAST HEAT TAPPED: +

FULL WEIGHT: ____
TARE WEIGHT: ____
WEIGHT TAPPED: 258000
HEATS ON DELTA: 1169

DATE: 5-19
MELTER: [illegible]
AIM GRADE: ____
PATCH: —— LBS(**EST**)

KWH END: ____
KYH START: ____
KWH USED: ____

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		~~[illegible]~~			~~[illegible]~~		~~[illegible]~~							
F-2		037			051		023							
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHEL**ING**		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	129
SCRAP TOTAL		139.5
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop **1st** bucket			6	Tap no.
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF 0
Drop 2nd bucket			6	Tap **no.**
Power on				Tap no.
Oxy-fuel burners				**CF**
				CF CH
Vulcan lance on				**CF 0**
Carbon Injector on				Lbs. **Inj**

Time	Temp	Tiae	Teap
	3029	1022	

LADLE ALLOYS	**WEIGHT(LBS)**
1	

OXYGEN PPM 1256

TAP **TIME:** 8:37

REMARKS (list)

Add C Phase Yarins

QF-0043 9/12/97

NUCOR STEEL - CRAUFORDSVILLE
EBT HEAT RECORD

HEAT NO: 141224 **FULL WEIGHT:** ______ DATE: 5-1 KWH END: ______
HEATS ON **BOTTOM:** ______ TARE YEIGHT: ______ **MELTER:** Myers KWH START: ______
LADLE NO: 11 WEIGHT TAPPED: 258000 AIM GRADE: ______ KWH USED: 318
LAST HEAT TAPPED: 8:37 HEATS ON DELTA: 170 **PATCH:** 2500 **LBS(EST)**

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		040			050		083							
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	130
SCRAP **TOTAL**		140 ton
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on			6	**Tap** no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF 0
Drop 2nd bucket				
Power on			6	**Tap no.**
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF 0
Carbon Injector on				Lbs. **Inj**

Time	**Temp**	Time	Temp
	3002	-036	

LADLE ALLOYS **WEIGHT(LBS)**

1	

OXYGEN PPM 1012

TAP TIME: 9:50

REMARKS (list)

Patch - 11 mins

QF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 141225 FULL WEIGHT: ______ DATE: 5-18 KWH EM): ______
HEATS ON BOTTOM: ______ TARE WEIGHT: ______ HELTER: Tim KWH START: ______
LADLE NO: ______ WEIGHT TAPPED: 129 RIM GRADE: ______ KWH USED: 50
LAST HEAT TAPPED: 9:50 HEATS ON DELTA: 171 PATCH: — LBS(EST)

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		059			054									
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	150	130
SCRAP TOTAL		140 ton
BURNT LIME	2000	
DOLO LIME	4700	
CRG. CARBON	1500	

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp
	2991		

OXYGEN PPM 1018

LADLE ALLOYS · WEIGHT(LBS)

TAP TIME: 22:54

REMARKS (list)

QF-0043 9/12/97

EBT HEAT RECORD

HEAT NO: 246985
FULL WEIGHT:
DATE: 5-18-04
KWH EM):
HEATS ON BOTTOM:
TARE WEIGHT:
MELTER:
KWH START:
LADLE NO: 0
WEIGHT TAPPED: 212
AIM GRADE: 40953
KWH USED: 51
LAST HEAT TAPPED: 02:33
HEATS ON DELTA: 81
PATCH: LBS(EST)

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		.58				158			5.97					35
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL	40	
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
SCRAP TOTAL	162	90
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON	—	

	START	END	
Drop 1st bucket			
Power on			Tap no.
			Tap no.
			Tap no.
Oxy-fuel burners			CF
			CF CH
Vulcan lance on			CF O
Drop 2nd bucket			
Power on			Tap no.
			Tap no.
Oxy-fuel burners			CF
			CF CH
Vulcan lance on			CF O
Carbon Injector on			Lbs. Inj

Time	Temp	Time	Temp
	2950		

OXYGEN PPM

LADLE ALLOYS	WEIGHT(LBS)

TAP TIME: 09:25

REMARKS (list)

QF-0043 9/12/97

EBT HEAT RECORD

HEAT NO: 246986 FULL UEIGHT: ______ DATE: 5-18-04 KWH END: ______

HEATS ON BOTTOH: ______ TARE WEIGHT: ______ HELTER: [illegible] KWH START: ______

LADLE NO: 0 WEIGHT TAPPED: 224000 AIM GRADE: 409 S3 KWH USED: 52

AST HEAT TAPPED: 09:25 HEATS ON DELTA: 82 PATCH: ______ LBS(EST)

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	tlo	Sn	V	N	TOTAL RESID
F-1		.82			.07	.10	.14		8.9				.005	53
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	80	46
SCRAP TOTAL	160000	92
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON	—	

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF 0
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp

LADLE ALLOYS WEIGHT(LBS)

OXYGEN PPM

TAP TIME: 11:23

REMARKS (list) 8

QF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 24-6987 FULL WEIGHT: ______ DATE: 5-19-09 KWH END: ______
HEATS ON BOTTOM: ______ TARE WEIGHT: ______ MELTER: ______ KWH START: ______
LADLE NO: 6 WEIGHT TAPPED: 236000 GRADE: 409 KWH USED: 53
LAST HEAT TAPPED: 11:23 HEATS ON DELTA: 83 PATCH: ______ LBS(EST)

SAMPLE	TIME	C		Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		.8			.03	.05	.14	.18		8				.006	.38
F-2															
F-3															
F-4															

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	81	45
SCRAP TOTAL	162000	90000
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcrn lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Tine	Temp
			2971

LADLE ALLOYS WEIGHT(LBS)

LADLE ALLOYS	WEIGHT(LBS)

OXYGEN PPM ______

TAP TIME: 12:40

REMARKS (list)

QF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 24-6988 FULL WEIGHT: ______ DATE: 5-19-04 KWH END: ______
HERTS ON BOTTOH: ______ TARE YEIGHT: ______ MELTER: ______ KWH START: ______
LADLE NO: 0 WEIGHT TAPPED: 230000 AIM GRADE: 409 KWH USED: 56
LAST HEAT TAPPED: 12:40 HEATS ON DELTA: 84 PATCH: ______ LBS(EST)

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		1.0		.03	.05	.19	.16		4				.007	73
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	81	
SCRAP TOTAL	162000	90000
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

lire	Terp	Time	Temp

LADLE ALLOYS WEIGHT(LBS)

OXYGEN PPM ______

TAP TIME: 14:26

REMARKS (list)

QF-0043 9/12/97

NUCOR STEEL – CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO:	24-6989	FULL YEIGHT:		DATE:	5-19-04
HEATS ON BOTTOM:		TARE YEIGHT:		RELTER:	[illegible]
LADLE NO:	0	WEIGHT TAPPED:	236000	AIR GRADE:	409
LAST HEAT TAPPED:	14:26	HEATS ON DELTA:	85	PATCH:	

KUH END:
KWH START: [illegible]
LBSKWHTUSED: [illegible]

CHERISTRY

SAMPLE	TIRE	C	Mn	P	S	Si	Cu	Ni	Cr	Ro	Sn	V	N	TOTAL RESID
F-1		1,2			.06	.22	.13		11				.007	.32
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT X2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
	80	45
SCRAP TOTAL	160000	90000
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcrn lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcrn lance on				CF O
Carbon Injector on				Lbs. Inj

LADLE ALLOYS	WEIGHT(LBS)

Time	Temp	Time	Temp
			3012

OXYGEN PPM

TAP TIRE: 15:54

REMARKS (list)

QF-0043 9/12/97

EBT HEAT RECORD

HEAT NO: 24-6490 | FULL WEIGHT: | DATE: 5-19-09 | KWH END:
HEATS ON BOTTOM: | TARE WEIGHT: | MELTER: | KWH START:
LADLE NO: 0 | WEIGHT TAPPED: 232006 | AIM GRADE: 409 | KWH USED: .56
LAST HEAT TAPPED: 15:54 | HEATS ON DELTA: 86 | PATCH: LBS(EST)

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESXD
F-1		1,5			.04	.2	.15		11				.006	.4
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S ~~SHREDDED~~		
SHREDDED		
SCRAP TOTAL	160000	9000 6
BURNT LIME	3000	
DOLO LIME	4500	
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF 0
Drop 2nd bucket				
Power on				Tap no.
				Top no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF 0
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp
			2986

LADLE ALLOYS | WEIGHT(LBS)

OXYGEN PPM

TAP TIME: 17:36

REMARKS (list)

QF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 24-6991 FULL WEIGHT: ______ DATE: 5-19-09 KWH END: ______
HEATS ON BOTTOM: ______ TARE WEIGHT: ______ MELTER: [illegible] KWH START: ______
LADLE NO: 0 WEIGHT TAPPED: 236000 AIM GRADE: 409 KWH USED: 54
LAST HEAT TAPPED: 17:36 HEATS ON DELTA: 87 PATCH: 2200 LBS(EST)

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		1.3			.06	.16	.14		10				.006	35
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
SCRAP TOTAL	160000	90000
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

LADLE ALLOYS | WEIGHT(LBS)

LADLE ALLOYS	WEIGHT(LBS)

Time	Temp	Tine	Temp
			3061

OXYGEN PPM

TAP TIME: 18:57

REMARKS (list)
patch 11
Hot Mill 10

QF-0043 9/12/97

NUCOR STEEL CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 24-6992 FULL WEIGHT: ______ DATE: 5-19-04 KWH END: ______
HEATS ON BOTTOM: ______ TARE UEIGHT: ______ MELTER: [illegible] KWH START: ______
LADLE NO: 0 WEIGHT TAPPED: 232000 AIR GRADE: 4097 KWH USED: 52
LAST HEAT TAPPED: 18:57 HEATS ON DELTA: 88 PATCH: [illegible] LBS(EST)

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		1.2			.05	.15	.14		10				.004	.34
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
SCRAP TOTAL	160000	90000
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Ory-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp
			2965

LADLE ALLOYS WEIGHT(LBS)

OXYGEN PPM

TAP TIME: 20:16

REMARKS (list)
[illegible]

QF-0043 9/12/97

NUCOR STEEL - **CRAWFORDSVILLE**
EBT HEAT RECORD

HEAT **NO:** 24-6993	FULL **WEIGHT:**	DATE: 5-19-04	KWH END:
HEATS ON **BOTTOM:**	TARE WEIGHT:	**MELTER:** [illegible]	KWH START:
LADLE NO: 0	WEIGHT TAPPED: 234000	**AIM** GRADE: 409	**KWH USED:** 52
LAST HEAT **TAPPED:** 20:16	HEATS ON DELTA: 89	PATCH: 2200 **LBS(EST)**	

CHEHISTRY

SAMPLE	**TIME**	C	**Mn**	P	S	**Si**	Cu	**Ni**	**Cr**	no	**Sn**	**V**	**N**	TOTAL RESID
F-1		1.12			.043		.016							.035
F-2														
F-3														
F-4														

CHARGE	**BKT #1**	**BKT** 12
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
SCRAP TOTAL	160000	90000
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				**Tap** no.
				Tap no.
				Tap no.
Oxy-fuel burners				**CF**
				CF CH
Vulcan lance on				**CF O**
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcrn lance on				CF 0
Carbon Injector on				Lbs. **Inj**

Tiae	Temp	Time	**Temp**
			3057

LADLE ALLOYS **WEIGHT(LBS)**

OXYGEN PPM

TAP TIME: 21:34

REMARKS (list)

patch 11

QF-0043 9/12/97

NUCOR STEEL - CRAWFORDSVILLE
EBT HEAT RECORD

HEAT NO: 24-6444
HEATS ON BOTTOM:
LADLE NO: 0
LAST HEAT TAPPED: 21:34

FULL WEIGHT:
TARE WEIGHT:
WEIGHT TAPPED: 230000
HEATS ON DELTA: 90

DATE: 5-19-04
MELTER: [illegible]
AIM GRADE: 4089
PATCH: LBS(EST)

KWH END:
KWH START:
KWH USED: 46

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	N	TOTAL RESID
F-1		1.065			042		16							37
F-2														
F-3														
F-4														

CHARGE	BKT #1	BKT #2
HOT HEEL		
BUSHELING		
SKULLS		
BUNDLES		
P/S		
SHREDDED		
SCRAP TOTAL	160000	90000
BURNT LIME	3000	
DOLO LIME	5000	
CRG. CARBON		

	START	END		
Drop 1st bucket				
Power on				Tap no.
				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Drop 2nd bucket				
Power on				Tap no.
				Tap no.
Oxy-fuel burners				CF
				CF CH
Vulcan lance on				CF O
Carbon Injector on				Lbs. Inj

Time	Temp	Time	Temp
	2965		

LADLE ALLOYS WEIGHT(LBS)

OXYGEN PPM 77

TAP TIME: 22:42

REMARKS (list)

QF-0043 9/12/97

Heat # **246985** **Grade** **409S2** Operator bfay

Practice CRSS LCLN Slag ANY SS GRADE Heat Created 05/19/04 09:39

Lining D April#2 04 Lining Minutes 605 Heats 160 Min. Weight 200,000

AddsWiz Oxygen Estimate 75046 TapToCharge 173.0248

Spec	C	Mn	P	S	Si	Cr	Ni	N	Ti
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	C	Mn	P	S	Si	Cr	Ni	N	Ti
T1	0.582	0.270	0.040	0.065	0.158	5.970	0.140	0.005	0.008
A1	0.026	0.140	0.032	0.065	0.009	7.430	0.150	0.008	0.002
A2	0.009	0.190	0.030	0.048	0.016	9.150	0.140	0.007	0.002
A3	0.009	0.260	0.029	0.018	0.204	10.030	0.140	0.006	0.002
A4	0.010	0.280	0.029	0.018	0.322	10.620	0.140	0.007	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
42.51	6.35	30.04	20 91	0.00	0.00	25,818.52

TimeActivity	Activity	Temp	%C	0 2 Cnts	N2 Cnts	Ar Cnts
9 40	Chem T1					
9 55	Charge					
9.58	Sample		0.5823			6816
10 03	Temp	2753				
10.04	Decarb					
10 04	AddsWiz					
10.05	Sample		0.5908	3623		10476
10 06	Decarb					
10 06	AddsWiz					
10 35	Sample		0 0147	89996		80254
10 38	Temp	2980				
10 39	Decarb					
10 53	Chern A1					
10 56	Reduce					
10 58	AddsWiz					
11 07	Sample		0 0067	106435		185644
11:15	Temp	2970				
11 18	Chem A2					
11 18	AddsWiz					
11 22	Reduce					
11 28	Sample		0 0088	106435		207823
11 32	Temp	2887				
11-46	AddsWiz					
11 50	Fuel %Al					
11 55	Sample		0 0094	116279		229997
11 59	Temp	2931				
12 11	Chem A4					
12 13	Fuel %Si					
12 16	Sample		0 0106	119817		238525
12 17	Tap					
Tap Heat	05/19/04 12 17		TOTALS	**119817**	**0**	**238621**

Charge Heat 05/19/04 9 55 Transfer Wt 214.000

Charge - Tap 143 **Tap Wt 238,234**

ADDITIONS	Recipe1	Recipe2	Recipe3	Recipd	Recipe5	Recipe5	Recipe7	Stainless lime	WizDec01	WizDSg01	WizRe 1
Al	500		250	1,000			200				1,0
Dolo										2,772	
FeCrSi											1,0
FeSi	1,000				250						1,5
HCFeCr									17,602		
LCCr	3,500		3,500			1,000					
Lime		1,000						5,000		1,740	
Total	**5,000**	**1,000**	**3,750**	**1,000**	**250**	**1,000**	**200**	**5,000**	**17,602**	**4,512**	**3,6**

Nucor Steel - Crawfordsville AOD Log

Heat #	**246986**	**Grade**	**409S2**	Operator	bfay
Practice	CRSS LCLN	Slag	ANY SS GRADE	Heat Created.	05119/04 12:22
Lining ID	April#2 04	Lining Minutes	748	Heats 161	Min. Weight 200,000

AddsWiz Oxygen Estimate 64707 TapToCharge 4.9585

Spec	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
T1	0.820	0.340	0.038	0.070	0.106	8.850	0.140	0.005	0.007
A1	0.019	0.210	0.031	0.050	0.010	9.550	0.150	0.005	0.002
A2	0.011	0.300	0.029	0.045	0.122	10.910	0.140	0.006	0.002
A3	0.010	0.320	0.030	0.031	0.189	11.000	0.140	0.006	0.002
L4	0.009	0.330	0.029	0.016	0.243	11.020	0.140	0.006	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
44.28	5.78	34.65	15.04	0.00	0.00	16,135.44,

TimeActivity	**Activity**	**Temp**	**%C**	**0 2 Cnts**	**N2 Cnts**	**Ar Cnts**
12:22	**Charge**					
12:23	**Chem** T1					
12:25	**Sample**		0.8199			4557
12:27	**Temp**	2725				
12:28	Decarb					
12:28	AddsWiz					
12:57	**Sample**		0.0148	78345		78653
13:01	**Temp**	2999.				
13:02	Decarb					
13:06	**Chem A1**					
13:12	**Reduce**					
13:13	AddsWiz					
13:19	**Sample**		0.0040	89910		139344
13:22	Temp	3074				
13:26	**Chem** A2					
13:29	**Reduce**					
13:33	**Sample**		0.0124	89910		155807
13:39	**Temp**	3015				
13:46	Chem A3					
13:48	**Reduce**					
13:54	**Sample**		0.0100	89910		176715
14:04	Tap					
Tap Heat	05/19/04 14:04		**TOTALS**	**89910**	**0**	**176832**
Charge Heat	05/**19/04** 12:22	**Transfer** Wt	224,000			
Charge - Tap	**102**	**Tap Wt**	**234,273**			

ADDITIONS	Recipe1	Recipe2	Recipe3	Recipe4	Recipe5	Stainless lime	WizDec01	WizDSg01	WizRed01	WizRed02	Tot
Al	250		300						816	700	2,0
Dolo								2,134			2,1
FeCrSi									1,000		1,0
FeSi	350		150						1,225	1,000	2,7
HCFeCr							10,000				10,0
LCCr	750				500						1,2
Lime		1,000		500		5,000		500			7,0
Total	**1,350**	**1,000**	**450**	**500**	**500**	**5,000**	**10,000**	**2,634**	**3,041**	**1,700**	**26,1**

Heat#	**246987**	**Grade**	**409S2**	Operator	jnichols
Practice	CRSS LCLN	Slag	ANY SS GRADE	Heat Created	05/19/04 14:11
Lining ID	April#2 04	Lining Minutes	850	Heats 162	Min. Weight 200,000

AddsWiz Oxygen Estimate 81095 TapToCharge 6.929333

Spec	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
T1	0.817	0.330	0.035	0.054	0.138	8.010	0.150	0.005	0.008
A1	0.006	0.210	0.028	0.052	0.009	8.710	0.170	0.005	0.002
A2	0.009	0.310	0.027	0.013	0.056	11.280	0.160	0.006	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
51.13	8.17	**29.19**	11.28	*0.00*	**0.00**	22,464.85

TimeActivity	**Activity**	**Temp**	**%C**	**0 2 Cnts**	**N2 Cnts**	**Ar Cnts**
14:11	Charge					
14:12	Chem T1					
14:13	Sample		0.8175			4428
14:15	Temp	2643				
14:16	**Decarb**					
14:16	Sample		0.8175	45		6722
14:22	**Decarb**					
14:22	AddsWiz					
14:54	Sample		0.0147	94780		83063
14:56	Temp	3158				
14:57	**Decarb**					
15:01	Sample		0.0065	96805		101020
15:03	Temp	3065				
15:04	**Decarb**					
15:09	Chem A1					
15:09	Reduce					
15:09	AddsWiz					
15:21	Sample		0.0071	101121		163460
15:27	Temp	3043				
15:30	Chem A2					
15:31	Reduce					
15:36	Sample		0.0095	101121		179103
15:37	Tap					
Tap Heat	05/19/04 15.37		**TOTALS**	**101121**	**0**	**179216**

Charge Heat	05/19/04 14:11	Transfer Wt	236.000
Charge - Tap	**86**	**Tap Wt**	**247,565**

ADDITIONS	Recipe1	Recipe2	Stainless lime	WizDec01	WizDSg01	WizRed01	WizRed02	WizRSg01	Total
Al	100					1,154	600		**1,854**
Dolo					2,997			1,273	**4,270**
FeCrSi						1,000			**1,000**
FeSi	400	250				1,814	800		**3,264**
HCFeCr				13,000					**13,000**
Lime			5,000		2,310			2,823	**10,133**
Total,	**500**	**250**	**5,000**	**13,000**	**5,307**	**3,968**	**1,400**	**4,096**	**33,521**

Heat #	**246988**	**Grade**	**409S2**	Operator	jnichols
Practice	CRSS LCLN	Slag	ANY SS GRADE	Heat Created	05/19/04 15:40
Lining ID	April#2 04	Lining Minutes	935	Heats 163	Min. Weight 200,000

AddsWiz Oxygen Estimate 73566 TapToCharge 3.925

Spec	C	**Mn**	**P**	**S**	**Si**	**Cr**	Ni	N	**Ti**
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	C	**Mn**	P	**S**	**Si**	Cr	**Ni**	**N**	**Ti**
T I	1.046	0.340	0.034	0.049	0.189	9.070	0.120	0.007	0.014
A1	0.009	0.250	0.028	0.049	0.010	9.980	0.140	0.005	0.002
A2	0.008	0.330	0.028	0.008	0.236	11.350	0.130	0.006	0.003

PctCaO	PctMgO	PctSiO2 21	PctAl2O3 13-14	PctCr2O3	PctFeO	WtSlag
49.12	7.18	30.54	12.78	0.00	0.00	16,048.11

55-56 11-12

TimeActivity	**Activity**	**Temp**	**%C**	**0 2 Cnts**	**N2 Cnts**	**Ar Cnk**
15:40	Charge					
15:44	Chem T1					
15:45	Sample		1.0456			8512
15:47	Temp	2669				
15:47	Decarb					
15:48	AddsWiz					
16:17	Sample		0.0148	82585		84681
16:20	Temp	3041				
16:20	Decarb					
16:24	Chem A1					
16:27	Reduce					
16:27	AddsWiz					
16:37	Sample		0.0057	89875		145934
16:44	Temp	3071				
16:47	Tap					

Tap Heat	05/19/04 16:47		**TOTALS**	***89875***	**0**	**146049**
Charge Heat	05/19/04 15:40	Transfer Wt	230,000			
Charge - **Tap**	67	**Tap** Wt	***235,622***			

'ADDITIONS	Recipe1	WizDec01	WizDSg01	WizRed01	WizRed02	WizRSg01	Total
Al				1,200	250		**1,450**
Dolo			2,190			700	**2,890**
FeCrSi				1,000			**1,000**
FeSi				1,022	708		**1,730**
HCFeCr	1,000	6,774					**7,774**
Lime			450			1,500	**1,950**
Total	**1,000**	**6,774**	**2,640**	**3,222**	**958**	**2,200**	**16,794**

Nucor Steel - Crawfordsville AOD Log

Heat# **246989** **Grade** **409S2** Operator jnichols

Practice CRSS LCLN Slag ANY SS GRADE. Heat Created 05/19/04 16:56

Lining ID April#2 04 Lining Minutes 1002 Heats 164 Min. Weight 200,000

AddsWiz Oxygen Estimate 63016 TapToCharge 25.796

Spec	C	Mn	P	S	Si	Cr	Ni	N	Ti
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	C	Mn	P	S	Si	Cr	Ni	N	Ti
T1	1.181	0.310	0.033	0.056	0.224	10.870	0.140	0.007	0.018
A1	0.024	0.270	0.027	0.054	0.010	10.590	0.150	0.005	0.002
A2	0.009	0.320	0.027	0.006	0.150	11.370	0.140	0.005	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
51.48	8.28	26.46	13.26	0.02	0.00	15,319.50

TimeActivity	Activity	Temp	%C	O2 Cnb	N2 Cnts	Ar Cnts
16:56	Chem T1					
17:13	Charge					
17:18	Sample		1.1813			9086
17:19	Temp	2719				
17:20	Decarb					
17:21	AddsWiz					
17:48	Sample		0.0148	71185		86518
17:50	Temp	3031				
17:51	Decarb					
17:57	Chem A1					
18:04	Reduce					
18:04	AddsWiz					
18:15	Sample		0.0064	81893		174900
18:18	Temp	3057				
18:41	Reduce					
18:42	Sample		0.0064	81893		181362
18:44	Tap					

Tap **Heat** 05/19/04 18:44 **TOTALS** 81893 0 181472

Charge **Heat** 05/19/04 17:13 **Transfer Wt** 234,000

Charge - Tap 91 **Tap Wt** 232,455

ADDITIONS	Recipe1	Recipe2	Stainless lime	WizDSg 01	WizRed0 1	WizRed0 2	WizRSg 01	**Total**
Al					1,000	450		**1,450**
Dolo				1,808			1,077	**2,885**
FeCrSi					509			509
FeSi		200			541	600		1,341
HCFeCr	750							750
Lime			5,000				1,851	**6,851**
Total	750	200	5,000	1,808	2,050	1,050	2,928	13,786

Heat#	**246990**	**Grade**	**409S2**	Operator	jnichols
Practice	CRSS LCLN	Slag	ANY SS GRADE	Heat Created	05/19/04 18:46
Lining ID	April#2 04	Lining Minutes	1093	Heats 165	Min. Weight 200,000

AddsWiz Oxygen Estimate 69766 TapToCharge 2.133333

Spec	C	Mn	P	S	Si	Cr	Ni	N	Ti
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	C	Mn	P	S	Si	Cr	Ni	N	Ti
T1	1.526	0.410	0.034	0.049	0.205	10.900	0.190	0.006	0.016
A1	0.059	0.370	0.028	0.041	0.010	11.070	0.190	0.004	0.002
A2	0.006	0.400	0.028	0.003	0.192	11.390	0.190	0.004	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
51.12	7.72	24.39	16.12	0.03	0.00	13,346.82

TimeActivity	Activity	Temp	%C	O2 Cnts	N2 Cnts	Ar Cnts
18:46	Charge					
18:46	Chem T1					
18:50	Sample		1.5260			6600
18:52	Temp	2773				
18:53	Decarb					
18:55	AddsWiz					
19:23	Sample		0.0148	77151		87515
19:25	Temp	3023				
19:25	Decarb					
19:29	Chem A1					
19:44	Reduce					
19:44	AddsWiz					
19:51	Sample		0.0035	90528		186898
19:56	Temp	3109				
20:03	Reduce					
20:03	Chem A2					
20:04	Sample		0.0064	90528		193620
20:05	Tap					
Tap Heat	05/19/04 20:05		TOTALS	**90528**	**0**	**193744**
Charge Heat	05/19/04 18:46	Transfer Wt	236.000			
Charge - Tap	**79**	Tap Wt	**232,566**			

ADDITIONS	Recipe1	Recipe2	Stainless lime	WizDSg 01	WizRed0 1	WizRed0 2	**Total**
Al					900	600	**1,500**
Dolo				2,500			**2,500**
FeSi		150				1,000	**1,150**
HCFeCr	500						**500**
Lime			5,000	1,500			**6,500**
Total	**500**	**150**	**5,000**	**4,000**	**900**	**1,600**	**12,150**

Nucor Steel - Crawfordsville AOD Log

Heat#	**246991**	**Grade**	**40982**	**Operator**	**jnichols**
Practice	**CRSS LCLN**	**Slag**	**ANY SS GRADE**	**Heat Created**	05/19/04 20:07
Lining ID	April#2 **04**	**Lining Minutes**	**1172**	**Heats 166**	Min. **Weight 200,000**

AddsWiz **Oxygen Estimate 60933** TapToCharge **2.158333**

Spec	C	Mn	P	S	Si	Cr	Ni	N	Ti
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	C	Mn	P	S	Si	Cr	Ni	N	Ti
T1	1.265	0.270	0.032	0.062	0.163	10.240	0.160	0.006	0.015
A1	0.056	0.250	0.027	0.032	0.009	10.420	0.160	0.004	0.002
A2	0.008	0.290	0.026	0.004	0.143	11.130	0.160	0.005	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
55.64	9.29	20.82	13.74	0.02	0.00	15,580.41

TimeActivity	Activity	Temp	%C	0 2 Cnts	N2 Cnts	Ar Cnts
20:07	Charge					
20:08	Chem T1					
20:11	Sample		1.2647			6145
20:12	Temp	2884				
20:13	Decarb					
20:14	AddsWiz					
20:42	Sample		0.0148	70455		83622
20:44	Temp	3038				
20:45	Decarb					
20:49	Chem A1					
21:02	Reduce					
21:02	AddsWiz					
21:09	Sample		0.0034	82362		175733
21:13	Temp	3122				
21:17	Reduce					
21:17	Chem A2					
21:19	Sample		0.0078	82362		183385
21:20	Tap					

Tap Heat	**05/19/04** 21:20		**TOTALS**	**82362**	**0**	**183481**
Charge Heat	**05/19/04** 20:07	**Transfer Wt**	**234,000**			
Charge - Tap	**72**	**Tap Wt**	**234,190**			

ADDITIONS	Recipe1	Stainless lime	WizDec0 1	WizDSg 01	WizRed0 1	WizRed0 2	**Total**
Al					900	600	**1,500**
Dolo				3,400			**3,400**
FeCrSi					**616**		**616**
FeSi	**300**					**800**	**1,100**
HCFeCr			2,800				**2,800**
Lime		**5,000**		**3,000**			**8,000**
Total	**300**	**5,000**	**2,800**	**6,400**	**1,516**	**1,400**	**17,416**

Nucor Steel - Crawfordsville AOD Log

Heat #	**246992**	**Grade**	**409S2**	Operator	jnichols		
Practice	CRSS LCLN	Slag	ANY SS GRADE	Heat Created	05/19/04 21:22		
Lining ID	April#2 04	Lining Minutes	1244	Heats	167	Min. Weight	200,000

AddsWiz Oxygen Estimate 62770 TapToCharge 2.237333

Spec	C	Mn	P	S	Si	Cr	Ni	N	Ti
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	I1.250			

Sample	**C**	**Mn**	P	S	**Si**	Cr	Ni	N	Ti
T1	1.221	0.290	0.025	0.053	0.152	9.870	0.150	0.004	0.015
A1	0.021	0.270	0.023	0.032	0.010	10.060	0.160	0.004	0.002
A2	0.009	0.310	0.024	0.003	0.047	11.100	0.150	0.005	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
59.27	9.74	16.99	13.50	0.00	0.00	15,268 07

TimeActivity	Activity	Temp	**%C**	**02** Cnts	N2 **Cnts**	Ar **Cnts**
21:22	**Charge**					
21:23	**Chem T1**					
21:25	Sample		1.2210			6608
21:27	Temp	2863				
21:28	Decarb					
21:28	AddsWiz					
21:56	Sample		0.0148	72608		81673
21:58	Temp	3083				
21:59	**Decarb**					
22:09	**Chenl A1**					
22:11	Reduce					
22:11	AddsWiz					
22:18	Sample		0.0051	77351		158460
22:22	Temp	3073				
22:26	Chem A2					
22:26	**Reduce**					
22:28	Sample		0.0088	77351		163554
22:29	Tap					
Tap Heat	05/19104 22:29		**TOTALS**	**77351**	0	**163663**
Charge Heat	05/19/04 21:22	Transfer Wt	232,000			
Charge - Tap	**67**	Tap **Wt**	**235,916**			

ADDITIONS	Recipe1	Recipe2	Stainless lime	WizDec01	WizDSg01	WizRed01	WizRed02	Total
1006	1,500							**1,500**
Al						1,000	450	**1,450**
Dolo					3,500			**3,500**
FeCrSi						1,000		**1,000**
FeSi		600					350	**950**
HCFeCr				4,000				**4,000**
LCCr		700						**700**
Lime			5,000		3,000			**8,000**
Total	**1,500**	**1,300**	**5,000**	**4,000**	**6,500**	**2,000**	**800**	**21,100**

Nucor Steel - Crawfordsville AOD Log

Heat #	**246993**	**Grade**	**409S2**	Operator	jnichols		
Practice	CRSS LCLN	Slag	ANY SS GRADE	Heat Created	05/19/04 22:30		
Lining ID	April#2 04	Lining Minutes	1311	Heats 168		Min. Weight	200,000

AddsWiz Oxygen Estimate 72507 TapToCharge 1.558333

Spec	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
T1	1.123	0.340	0.030	0.047	0.170	9.380	0.140	0.006	0.012
A1	0.031	0.300	0.024	0.039	0.010	10.040	0.150	0.004	0.002
A2	0.011	0.350	0.024	0.003	0.209	11.000	0.140	0.006	0.004

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
54.97	8.24	21.86	14.48	0.00	0.00	*15,733 01*

TimeActivity	**Activity**	**Temp**	**%C**	**O2 Cnts**	**N2 Cnts**	**Ar Cnts**
22:30	Charge					
22:32	Chem T1					
22:34	Sample		1.1233			6708
22:35	Temp	2805				
22:35	AddsWiz					
22:36	Decarb					
23:05	Sample		0.0148	76200		81759
23:06	Temp	3048				
23:08	Decarb					
23:10	Chem A1					
23:20	Reduce					
23:20	AddsWiz					
23:27	Sample		0.0059	82297		156354
23:31	Temp	3043				
23:34	Chem A2					
23:35	Reduce					
23:36	Sample		0.0109	82297		161991
23:37	Tap					
Tap Heat	05/19/04 23.37		**TOTALS**	**82297**	**0**	**162100**
Charge Heat	05/19/04 22:30	Transfer Wt	233.000			
Charge - Tap	**67**	**Tap Wt**	**239,806**			

ADDITIONS	Recipe1	Recipe2	Recipe3	Stainless lime	WizDec01	WizDSg01	WizRed01	WizRed02	Total
1006	300		1,000				1,500		**2,800**
Al							1,175	400	**1,575**
Dolo						3,000			**3,000**
FeCrSi							1,000		**1,000**
FeSi		175					450	300	**925**
HCFeCr					5,625				**5,625**
LCCr		1,200							**1,200**
Lime				5,000		3,000			**8,000**
Total	**300**	**1,375**	**1,000**	**5,000**	**5,625**	**6,000**	**4,125**	**700**	**24,125**

Heat #	**246994**	**Grade**	**409S2**	Operator	jnichols		
Practice	CRSS LCLN	Slag	ANY SS GRADE	Heat Created	05/19/04 23:38		
Lining ID	April#2 04	Lining Minutes	1378	Heats 169		Min. Weight	200,000

AddsWiz Oxygen Estimate 66721 TapToCharge 1.45

Spec	C	Mn	P	S	Si	Cr	Ni	N	Ti
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	C	Mn	P	S	Si	Cr	Ni	N	Ti
T1	1.066	0.330	0.024	0.043	0.172	9.160	0.150	0.007	0.014
A1	0.033	0.310	0.021	0.024	0.009	10.140	0.160	0.005	0.002
A2	0.009	0.360	0.021	0.008	0.140	11.340	0.160	0.005	0.004

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
53.01	5.85	23.72	16.90	0.01	0.00	15,326.78

TimeActivity	Activity	Temp	%C	O2 Cnts	N2 Cnts	Ar Cnts
23 39	Charge					
23 39	Chem T1					
23 42	Sample		1 0655			5320
23 43	Temp	2789				
23 43	AddsWiz					
23.44	Decarb					
0.12	Sample		0.0148	74717		78605
0.14	Temp	3019				
0 14	Decarb					
0 18	Chem A1					
0 28	Reduce					
0 28	AddsWiz					
0 34	Sample		0 0059	83750		152677
0 38	Temp	3095				
0 42	Chem A2					
0 44	Chem A2					
0 44	Reduce					
0 46	Sample		0.0095	83750		159257
0 47	Tap					
Tap Heat	05/20/04 0 47		**TOTALS**	**83750**	**0**	**159362**

Charge Heat	05/19/04 23 39	Transfer Wt	229,000
Charge - Tap	**68**	**Tap Wt**	**237,513**

ADDITIONS	Recipe1	Recipe2	Recipe3	Stainless **lime**	WizDec01	WizDSg01	WizRed01	WizRed02	**Total**
1006	300	1,500	1,000				1,500		**4,300**
Al							1,100	700	**1,800**
Dolo						2,000			**2,000**
FeCrSi							1,000		**1,000**
FeSi		350					150	650	**1,350**
HCFeCr					6,374				**6,374**
LCCr		500							**500**
Lime				*5,000*		*3,000*			**8,000**
Total	**300**	**2,350**	**1,000**	**5,000**	**6,374**	**5,000**	**3,750**	**1,350**	**25,124**

Heat # 246995 **Grade 409S2** Operator jnichols

Practice CRSS LCLN Slag ANY SS GRADE Heat Created 05/20/04 00:48

Lining ID April#2 04 Lining Minutes 1446 Heats 170 Min. Weight 200,000

AddsWiz Oxygen Estimate 14025 TapToCharge 1.683333

Spec	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
Min	0.004				0.100	11.050			
Max	0.015			0.010	0.200	11.250			

Sample	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
T1	1.156	0.330	0.029	0.049	0.228	9.490	0.140	0.006	0.015
A1	0.031	0.280	0.023	0.038	0.009	10.540	0.150	0.004	0.002
A2	0.009	0.330	0.024	0.003	0.171	11.420	0.150	0.005	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
54.48	6.00	22.95	13.82	2.62	0.00	14,875.93

TimeActivity	Activity	Temp	%C	O2 Cnts	N2 Cnts	Ar Cnts
0:48	Charge					
0:49	Chem T1					
0:51	Sample		1.1557			5506
0:53	Temp	2800				
0:53	AddsWiz					
0:54	Decarb					
1:21	Sample		0.0148	74799		77818
1:23	Temp	3040				
1:24	Decarb					
1:29	Chem A1					
1:38	Reduce					
1:39	AddsWiz					
1:39	AddsWiz					
1:39	AddsWiz					
1:46	Sample		0.0054	82790		160007
1:50	Temp	3064				
1:55	Chem A2					
1:57	Reduce					
1:57	Chem A2					
1:59	Sample		0.0096	82790		165050
1:59	Tap					
Tap Heat	05120104 1:59		**TOTALS**	**82790**	**0**	**165152**
Charge Heat	05120104 0.48	Transfer Wt	232,000			
Charge - Tap	**71**	**Tap Wt**	**236,423**			

ADDITIONS	Recipe1	Recipe2	Recipe3	Recipe4	Recipe5	WizDec01	WizRed01	Total
1006		300			500		1,500	**2,300**
Al				500			950	**1,450**
Dolo	2,000		1,500					**3,500**
FeCrSi							1,000	**1,000**
FeSi				400	250		147	**797**
HCFeCr						5,103		**5,103**
LCCr								
Lime	3,000		3,000					**6,000**
Total	**5,000**	**300**	**4,500**	**900**	**750**	**5,103**	**3,597**	**20,150**

Nucor Steel - Crawfordsville AOD Log

Heat #	**246996**	**Grade**	**1005S1**	Operator	jnichols
Practice	Castrip	Slag	LCLNCarbon	Heat Created	05/20/04 02:02
Lining ID	April#2 04	Lining Minutes	1517	Heats 171	Min. Weight 200.000

AddsWiz Oxygen Estimate   TapToCharge 7.166667

Spec	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
Min	0.010	0.250			0.150				
Max	0.040	0.450			0.200				

Sample	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
F1	0.107	0.130	0.012	0.065	0.010	0.781	0.050	0.007	0.002
T1	0.051	0.090	0.010	0.064	0.001	0.563	0.052	0.009	0.002
A1	0.013	0.590	0.012		0.415	0.579	0.053	0.004	0.003
A2	0.013	0.590	0.012		0.381	0.587	0.052	0.004	0.003

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
52.80	9.57	11.48	25.69	0.00	0.00	6,805.43

TimeActivity	**Activity**	**Temp**	**%C**	**0 2 Cnts**	**N2 Cnts**	**Ar Cnts**
2:06	Chem T1					
2:07	**Charge.**					
2:09	Decarb					
2:15	**Reduce**					
2:22	**Sample**		0.0401	12346		37405
2:27	Temp	3007				
2:28	Chem A1					
2:29	**Fuel** %Al					
2:30	**Reduce**					
2:30	**Reduce**					
2:33	**Sample**		0.0141	14142		47833
2:35	**Temp**	3011				
2:38	Chem A2					
2:38	**Fuel** %Al					
2:39	**Reduce**					
2:42	**Sample**		0.0130	15112		56695
2:42	Tap					
Tap Heat	05/20/04 2:42		**TOTALS**	**15112**	**0**	**56889**
Charge Heat	05/20/04 2:07	**Transfer** Wt	232,997			
Charge - Tap	**36**	**Tap Wt**	**235,465**			

ADDITIONS	Recipe1	Recipe2	Recipe4	Recipe5	Recipe6	**Total**
1006					100	**100**
Al	500	800				**1,300**
Dolo			1,500			**1,500**
FeSi		1,200				**1,200**
Lime			3,000			**3,000**
Med *C*		1,300		100		**1,400**
Total	**500**	**3,300**	**4,500**	**100**	**100**	**8,500**

Nucor Steel - Crawfordsville AOD Log

Heat#	**246997**	**Grade**	**1005S1**	Operator	jnichols
Practice	Castrip	Slag	LCLNCarbon	Heat Created	05/20/04 02:47
Lining ID	April#2 04	Lining Minutes	1553	Heats 172	Min. Weight 200,000

AddsWiz Oxygen Estimate — TapToCharge 12.73333

Spec	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
Min	0.010	0.250			0.150				
Max	3.040	0.450			0.200				

Sample	**C**	**Mn**	**P**	**S**	**Si**	**Cr**	**Ni**	**N**	**Ti**
F1	0.051	0.050	0.003	0.037		0.135	0.022	0.008	0.002
L1	0.012	0.570	0.004		0.319	0.165	0.023	0.004	0.002
A1	0.012	0.570	0.004		0.316	0.164	0.022	0.004	0.002

PctCaO	PctMgO	PctSiO2	PctAl2O3	PctCr2O3	PctFeO	WtSlag
57.16	10.24	12.75	19.73	0.00	0.00	6,322.28

TimeActivity	**Activity**	**Temp**	**%C**	**O2 Cnts**	**N2 Cnts**	**Ar Cnts**
2 48	**Chm F1**					
2.55	**Charge**					
2:58	Decarb					
3:03	Reduce					
3 11	**Sample**		0.0289	12162		38147
3.17	Temp	2989				
3.20	**Chm A1**					
3 20	Reduce					
3 22	Sample		0.0136	12162		43471
3:23	Tap					
Tap **Heat**	05/20/04 3 23		**TOTALS**	**12162**	**0**	**43598**
Charge Heat	05/20/04 2.55	**Transfer** Wt	236,000			
Charge - Tap	**28**	**Tap Wt**	**238,596**			

ADDITIONS	Recipe1	Recipe3	Recipe4	**Total**
Al	500	850		**1,350**
FeSi		1,200		**1,200**
Med C		1,400	150	**1,550**
Total	**500**	**3,450**	**150**	**4,100**

Castrip LMS Baghouse testing for Emissions:

Test Date: 01/03/2003

Production Rate: Approximately 53.8 tph, LMS only.

The process and air pollution control equipment were operating normally at the time of testing.

#63321

4.2

16.1

ATP – Air Test Professionals, Inc.

1201 North Graham Avenue, Indianapolis, Indiana 46219

(317) 345-1720 FAX (317) 351-0411

REPORT on Compliance Testing
For CO, NOx, SO2, Lead and PM/PM10 TESTING

Performed for:
Nucor Steel
Crawfordsville, Indiana
Castrip
on October 2nd, 3rd and 5th, 2006

ATP – Air Test Professionals, Inc. 1201 North Graham Avenue, Indianapolis, Indiana 46219

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To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Andrew Young, Project Manager

TABLE OF CONTENTS

1-1 PROJECT OVERVIEW

Air Test Professionals, Inc. was contracted by Nucor Steel to perform air emissions sampling at the LMS baghouse stack that controls emissions from the LMS and Strip Caster. The sampling was performed in Crawfordsville, Indiana on October 2nd, 3rd and 5th, 2006. The objective of the testing was to determine compliance with permit requirements for the pollutants listed below. The following personnel were involved with the testing program:

ATP	Carlos Brown
ATP	Andrew Young
ATP	Nita Greenburg
Nucor	Trevor Beers
Nucor	Eric Ferguson
IDEM	David Harrison

The testing program included flow and gas analysis (US EPA Methods 1-4), particulate (US EPA Method 5), condensible particulate matter (US EPA Method 202), Carbon Monoxide emissions (US EPA Method 10), Nitrogen Oxide emissions (US EPA Method 7E), Sulfur Dioxide emissions (US EPA Method 6C), Lead emissions (US EPA Method 29) and visible emissions (US EPA Method 9.) Listed below is a summary of the results.

Test Summary
Table 1-1

Pollutant	Filterable (PM/PM10)	Filterable & Condensible (PM/PM10)	Permitted Emission Limits
Particulate Matter	*0.0016 (gr/dscf) 0.0146 (lb/ton)	0.0067 (gr/dscf) 0.0630 (lb/ton)	*0.0018 / 0.0052 (gr/dscf)

Pollutant	Total Lead	Permitted Emission Limit
Lead	3.57E-06 (lb/ton)	3.30E-04 (lb/ton)

Pollutant	Average Emissions	Permitted Emission Limits
Carbon Monoxide	0.129 (lb/ton) 13	0.141 (lb/ton)
Nitrogen Oxide	0.05 (lb/ton)	0.19 (lb/ton)
Sulfur Dioxide	0.189 (lb/ton) 179	0.210 (lb/ton)

2-1 RESULTS

PM/PM10, CO, NOx and SO2 Emissions
Castrip Baghouse Stack

Table 2-1

Gas Conditions		**1**	**2**	**3**	**Average**
Ts	Stack Temperature	122.4	154.2	127.4	134.7
Bwo	Moisture (volume %)	1.75	2.53	1.75	2.01
O2	Oxygen (dry volume %)	20.0	20.0	20.0	20.0
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	132,707	128,339	130,733	130,593
Qstd	Standard Conditions (dscfm)	119,018	108,319	116,279	114,539
PM/PM10					
E_{TSP}	Filterable (gr/dscf)	0.0017	0.0018	0.0012	**0.0016**
E	Filterable & Condensible (gr/dscf)	0.0034	0.0057	0.0108	**0.0067**
PM/PM10					
E_{TSP}	Filterable (lb/ton)	0.0164	0.0157	0.0118	**0.0146**
E	Filterable & Condensible (lb/ton)	0.0330	0.0498	0.1062	**0.0630**
CARBON MONOXIDE					
C_{gas}	Emission (PPM)	17.14	18.21	44.29	26.55
E	Emission (lb/ton)	0.0838	0.0805	0.2213	**0.1285**
NITROGEN OXIDE					
C_{gas}	Emission (PPM)	6.32	3.62	10.51	6.82
E	Emission (lb/ton)	0.0508	0.0263	0.0863	**0.0544**
SULFUR DIOXIDE					
C_{gas}	Emission (PPM)	11.32	21.45	19.63	17.47
E	Emission (lb/ton)	0.1266	0.2169	0.2244	**0.1893**

2-2 RESULTS

LEAD EMISSIONS
Castrip Baghouse Stack

Table 2-2

Gas Conditions		1	2	3	Average
Ts	Stack Temperature	118.6	152.0	127.1	132.5
Bwo	Moisture (volume %)	1.76	2.25	2.09	2.03
O2	Oxygen (dry volume %)	20.0	20.0	20.0	20.0
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	132,739	134,292	131,593	132,875
Qstd	Standard Conditions (dscfm)	119,764	113,724	116,697	116,728
Lead Emissions					
E	Emission Rate (lb/ton)	6.26E-06	3.38E-06	1.07E-06	**3.57E-06**

2-3 RESULTS

VISIBLE EMISSIONS - OPACITY
Castrip Baghouse Stack

Table 2-3

Run No.	**1**	**2**	**3**	**Average**
Date	October 2, 2006	October 3, 2006	October 5, 2006	
Start Time (approx)	09:02	14:32	09:04	
Stop Time (approx)	10:02	15:32	10:04	
Visible Emissions				
Opacity (EPA RM 9)	0.0	0.0	0.0	**0.0 %**

3-1 PROCESS DESCRIPTION

Nucor Steel of Crawfordsville, Indiana operates the units listed below:

A Strip Caster Line rated at a maximum steel production rate of 270 tons per hour from the existing electric arc furnace (EAF) and is capable of producing several grades of steel at various widths and thicknesses:

1. One (1) ladle metallurgy station (LMS) identified as LMS-2. Particulate emissions are controlled by the LMS baghouse with the remaining emissions exhausted through the roof monitor. The LMS stack and roof monitor are identified as S-20 and S-21, respectively.

2. One (1) tundish that feeds the molten metal from the LMS ladle to one (1) continuous strip caster. Particulate emissions are controlled by the LMS baghouse with the remaining emissions exhausted through the roof monitor. The LMS stack and roof monitor are identified as S-20 and S-21, respectively.

3. One (1) hot rolling stand. The stand rolls the steel strips from the continuous strip caster to a desired gauge.

4. Two (2) coilers. After the strip passes the rolling mill it is then rolled into coils.

The testing reported in this document was performed at the LMS baghouse stack.

4-1 METHODOLOGY

The sampling procedures utilized by Air Test Professionals, Inc. were as follows:

Title 40 CFR Part 60 Appendix A

Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determining of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Gas Analysis for the Determination of Molecular Weight"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 5	"Determination of Particulate Emissions from Stationary Sources"
Method 6C	"Determination of Sulfur Dioxide Emissions from Stationary Sources"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide Emissions from Stationary Sources"
Method 12	"Determination of Lead Emissions from Stationary Sources"
Method 9	"Visual Determination of the Opacity from Stationary Sources"

Title 40 CFR Part 51 Appendix M

Method 202	"Determination of Condensible Particulate Emissions from Stationary Sources"

SAMPLE POINT DETERMINATION

Sampling point locations were determined according to EPA Reference Method 1.

Sampling Points

Table 4-1

Location/Pollutant	Dimensions	Points/Port	Total Points
LMS Baghouse Stack			
PM/PM10	96" ID	12	24
Lead	96" ID	6	24

4-2 METHODOLOGY

SAMPLE AND VELOCITY TRAVERSE – EPA METHOD 1
Method 1 is utilized for the representative measurement of pollutant emissions and/or total volumetric flow rate. A measurement site where the effluent gas stream, flowing in a known direction, is selected and divided into a sample grid according to the published percentages of the diameter. A traverse point is then located at each of these percentage points. Sampling or velocity measurement is performed at a site located at least two stack or duct diameters downstream and one-half diameter upstream from a disturbance such as a bend, expansion, contraction, or visible flame.

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

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

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

PARTICULATE/CONDENSIBLE DETERMINATION – EPA METHOD 5/202
Stack gas is withdrawn isokinetically and particulate matter is collected on the nozzle and filter. Condensible particulate is captured in the first three impingers; each impinger contains 100 mls of deionized water. A fourth and final impinger contains an amount of approximately 200 grams of silica gel. The impinger temperature exit gas is maintained at or below 68 degrees Fahrenheit.

The nozzle and glass filter holder are rinsed with acetone and captured in a sealed glass container. The impingers and connecting glassware are rinsed twice with deionized water and captured in a sealed container. Two rinses of methylene chloride were captured and stored in a sealed container.

SULFUR DIOXIDE CONCENTRATION – EPA METHOD 6C
A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to an NDIR or fluorescence analyzer for SO2 concentration determination. The moisture in the wet stack gas is removed before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

4-2 METHODOLOGY, cont.

NITROGEN OXIDE CONCENTRATION – EPA METHOD 7E
A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to a chemiluminescent analyzer for NOx concentration determination. The moisture in the wet stack gas is removed before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

CARBON MONOXIDE CONCENTRATION – EPA METHOD 10
A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to a non-dispersive infrared (NDIR) analyzer for CO concentration determination. The moisture in the wet stack gas is removed before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

LEAD EMISSIONS DETERMINATION – EPA METHOD 12
Stack gas is withdrawn isokinetically and Lead particulate matter is collected on the nozzle, probe and filter. Lead particulate matter is also captured in the first two impingers; each impinger contains 100 mls of 0.1 N Nitric Acid. A fourth and final impinger contains an amount of approximately 200 grams of silica gel. The impinger temperature exit gas is maintained at or below 68 degrees Fahrenheit, while the probe and filter are maintained at temperatures of 248 degrees F(+/- 25 deg F.) The probe, nozzle, impingers and glass filter holder are rinsed with approximately 100 mLs of 0.1 N nitric acid and captured in a sealed glass container.

VISIBLE EMISSIONS – EPA METHOD 9
Stack opacity readings were taken at 15-second intervals, for 60-minutes per each 60-minutes tested by a certified visible emissions reader. The visible emissions readings were conducted during each of the particulate test runs. The results are reported as an average emissions percentage for each test period. Copies of the visible emissions certification cards are included in Appendix G.

APPENDIX A

SAMPLE CALCULATIONS

1. Volume of water collected (wstd)

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

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

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

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

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

3. Sample gas pressure (in Hg)

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

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

4. Actual vapor pressure (in Hg)

$$P_v = P_s$$

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

5. Moisture content (%)

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

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

6. Saturated moisture content (%)

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

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

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

$$M_d = M_{CO_2}\left(\frac{CO_2}{100}\right) + M_{O_2}\left(\frac{O_2}{100}\right) + M_{CO+N_2}\left(\frac{CO+N_2}{100}\right)$$

M_d	dry molecular weight of sample gas (lb/lb-mole)
M_{CO2}	molecular weight of carbon dioxide (lb/lb-mole)
M_{O2}	molecular weight of oxygen (lb/lb-mole)
M_{CO+N2}	molecular weight of carbon monoxide and nitrogen (lb/lb-mole)
CO_2	portion of carbon dioxide in the gas stream by volume (%)
O_2	portion of oxygen in the gas stream by volume (%)
$CO+N_2$	portion of carbon monoxide and nitrogen in gas stream by volume (%)
100	conversion factor (%)

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

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

M_d	dry molecular weight of sample gas (lb/lb-mole)
B_{wo}	portion of water vapor in the gas stream by volume (%)
M_{H2O}	molecular weight of water (lb/lb-mole)
M_s	molecular weight of sample gas, wet basis (lb/lb-mole)

9. Velocity of sample gas (ft/sec)

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

V_s	average sample gas velocity (ft/sec)
K_p	velocity pressure coefficient (dimensionless)
C_p	pitot tube constant
ΔP	average differential pressure in the gas stream (in H_2O)
t_s	average sample gas temperature (°F)
M_s	molecular weight of sample gas, wet basis (lb/lb-mole)
P_s	absolute sample gas pressure (in Hg)
460	conversion constant, °F to °R

10. Total flow of sample gas (acfm)

$$Q_a = \left(60\right)\left(A_s\right)\left(V_s\right)$$

Q_a	volumetric flow rate at actual conditions (acfm).
A_s	cross-sectional area of sampling location (ft^2)
V_s	average sample gas velocity (ft/sec)
60	conversion factor (seconds/minute)

11. Total flow of sample gas (dscfm)

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

Q_{std}	volumetric flow rate at standard conditions (dscfm)
Q_a	volumetric flow rate at actual conditions (acfm)
P_s	absolute sample gas pressure (in Hg)
B_{wo}	portion of water vapor in the gas stream by volume (%)
t_s	average sample gas temperature (°F)
17.64	conversion factor (°R/in Hg)
460	conversion constant, °F to °R

12. Percent isokinetic (%)

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

I	percent relative to isokinetic sampling (%)
T_s	absolute sample gas temperature (°R)
V_{mstd}	volume of sample gas through dry gas meter at standard conditions (ft^3)
P_s	absolute sample gas pressure (in Hg)
V_s	average sample gas velocity (ft/sec)
D_n	diameter of nozzle (inches)
B_{wo}	portion of water vapor in the gas stream by volume (%)
θ	total sample time (minutes)
0.09450	conversion constant

13. Particulate concentration (gr/dscf)

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

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

14. Particulate emissions, mass emission rate (lbs/hr)

$$E_{lb/hr} = \frac{(M_n)(Q_{std})}{(7.567)(V_{mstd})}$$

$E_{lbs/hr}$	mass emission rate (lbs/hr)
M_n	particulate collected, corrected for reagent blank (grams)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
V_{mstd}	volume of sample gas through dry gas meter at standard conditions (ft^3)
7.567	conversion factor (grams/pound)

15. Gas emission concentration (ppm)

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

C_{gas}	effluent gas concentration (ppm)
C	average gas concentration indicated by gas analyzer (ppm)
C_o	average of initial and final system bias checks for zero gas (ppm)
C_{ma}	actual concentration of the upscale gas (ppm)
C_m	average of initial and final system bias check for upscale cal gas (ppm)

16. Carbon Monoxide emission rate (lbs/hr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(1.3762x10^7)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$1.3762x10^7$	CO conversion factor (ppm to lbs/dscf)

17. Nitrogen Oxide emission rate (lbs/hr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(8.3752x10^6)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$8.3752x10^6$	NOx conversion factor (ppm to lbs/dscf)

18. Sulfur Dioxide emission rate (lbs/hr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(6.0151x10^6)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$6.0151x10^6$	SO2 conversion factor (ppm to lbs/dscf)

19. Pollutant emission rate (lbs/ton)

$$E_{lbs/ton} = \frac{(E)}{(P_{tons/hr})}$$

$E_{lbs/ton}$	emission rate (lbs/ton)
E	pollutant emission rate (lbs/hr)
$P_{tons/hr}$	facility production rate (tons/hr)

APPENDIX B

FIELD DATA PRINTOUTS

Particulate & Gas Emissions

STACK EMISSION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	CASTRIP
Date:	10/2-3/06 - 10/05/06

Particulate Concentration	**Run 1**	**Run 2**	**Run 3**	**Average**
Filterable PM/PM10 (gr/dscf)	0.0017	0.0018	0.0012	**0.0016**
Filterable and Condensible PM/PM10 (gr/dscf)	0.0034	0.0057	0.0108	**0.0067**
Filterable (lbs/ton)	0.0164	0.0157	0.0118	**0.0146**
Filterable + Condensible (lbs/ton)	0.0330	0.0498	0.1062	**0.0630**
Gas Concentration				
Carbon Monoxide (lbs/ton)	0.0838	0.0805	0.2213	**0.1285**
Nitrogen Oxide (lbs/ton)	0.0508	0.0263	0.0863	**0.0544**
Sulfur Dioxide (lbs/ton)	0.1266	0.2169	0.2244	**0.1893**
Avg. Stack Vol. Flow Rate				
ACFM	132,707	128,339	130,733	130,593
DSCFM	119,018	108,319	116,279	114,539
Avg. Stack Temp	122.42	154.21	127.38	134.67
Stack Gas Velocity	44.002	42.554	43.347	43.301
Avg. Velocity Head	0.555	0.491	0.535	0.527
Avg. Sq. Rt of Delta P	0.745	0.700	0.731	0.726
	ISOKINETIC TESTING SUMMARY			
Allowable isokinetic 90-110%	100.23	101.40	99.75	100.46
% Moisture of Stack Gas	1.70%	2.22%	1.75%	1.89%
Sample Volume	46.240	42.576	44.962	44.593

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	CASTRIP
Date:	10/2/06
Run Number:	1

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20
Md (g/gmol) = 28.8

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 17
Vw (scf) = 0.80019

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 70.7
Vm (ft^3) = 46.401
Pb (in Hg) = 30.13
delta H (in H2O) = 1.948
gamma = 0.99
Vm (dscf) = 46.24

Moisture Content of Stack Gas, Bwo
Bwo = 1.70%
1-Bwo = 98.30%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.62

Area of Stack (enter diameter in inches), As
Depth = 0
Width = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 30.11

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.745
Ts (F) = 122.4
Vs (fps) = 44.00

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 132,707

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 119,018
Qstd (dscf/hr) = 7,141,102

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.244
Time of Run (min) = 60.00
Vn (fps) = 44.10

Area of Nozzle, An
An (ft^2) = 0.00032472

% Isokinetic, %I
%I = 100.23
% Isokinetic measured from intermediate values
%I = 100.23

PM/PM10
Pollutant Mass Emission Rate, PMR

	Filterable	Condensible	Total
Mn (g) =	0.0051	0.0052	
PMR (lb/hr) =	1.7364	1.7704	3.5068
PMR (lb/ton) =	0.0164	0.0167	0.0330

Grains per acf
gr/acf = 0.0015

PM/PM10
Grains per dscf

gr/dscf =	0.0017	0.0017	0.0034

Pollutant Mass Emission Rate, PMR

	CO	NOx	SO2
C (dry, corrected) (PPM) =	17.14	6.32	11.32
PMR (lb/hr) =	8.894	5.389	13.439
PMR (lb/ton) =	0.084	0.051	0.127

FIELD DATA

K' Factor 3.5

Start Time 9:01
Stop Time 10:09

	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.65	0.806		2.28	96	66	64
2	0.65	0.806		2.28	96	66	64
3	0.62	0.787		2.17	98	66	64
4	0.62	0.787		2.17	102	66	65
5	0.62	0.787		2.17	104	67	65
6	0.60	0.775		2.10	107	68	65
7	0.58	0.762		2.03	113	68	65
8	0.58	0.762		2.03	115	69	66
9	0.57	0.755		2.00	118	70	66
10	0.57	0.755		2.00	118	71	67
11	0.50	0.707		1.75	120	71	68
12	0.50	0.707		1.75	126	71	68
13	0.54	0.735		1.89	130	73	68
14	0.52	0.721		1.82	131	73	68
15	0.52	0.721		1.82	134	73	68
16	0.54	0.735		1.89	134	75	70
17	0.50	0.707		1.75	137	77	71
18	0.50	0.707		1.75	138	78	71
19	0.52	0.721		1.82	138	79	72
20	0.52	0.721		1.82	137	80	73
21	0.52	0.721		1.82	137	81	74
22	0.52	0.721		1.82	137	81	74
23	0.48	0.693	906.001	1.68	136	81	74
24	0.62	0.787	859.6	2.17	136	81	74

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.557	0.745	46.401	1.948	122.4	70.7

Production Rate

LMS Tons	115
Process Time (min)	65
Tons/hr	106.15

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	CASTRIP
Date:	10/03/06
Run Number:	2

FIELD DATA

K' Factor	3.5

Start Time	14:32
Stop Time	15:36

	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.60	0.775		2.10	149	86	85
2	0.55	0.742		1.93	149	87	86
3	0.55	0.742		1.93	150	87	86
4	0.52	0.721		1.82	151	88	87
5	0.46	0.678		1.61	152	89	87
6	0.46	0.678		1.61	153	89	87
7	0.46	0.678		1.61	155	91	89
8	0.44	0.663		1.54	156	92	89
9	0.42	0.648		1.47	157	92	89
10	0.40	0.632		1.40	157	93	90
11	0.40	0.632		1.40	152	93	90
12	0.40	0.632		1.40	144	94	91
13	0.50	0.707		1.75	159	95	92
14	0.54	0.735		1.89	160	96	92
15	0.54	0.735		1.89	161	96	93
16	0.54	0.735		1.89	156	96	93
17	0.48	0.693		1.68	156	97	93
18	0.48	0.693		1.68	155	98	94
19	0.45	0.671		1.58	155	98	94
20	0.48	0.693		1.68	156	98	94
21	0.52	0.721		1.82	155	99	95
22	0.54	0.735		1.89	155	99	95
23	0.54	0.735	961.297	1.89	154	100	95
24	0.54	0.735	916.7	1.89	154	101	96

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.492	0.700	44.597	1.722	154.2	92.4

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20
Md (g/gmol) = 28.8

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 20.5
Vw (scf) = 0.96494

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 92.4
Vm (ft^3) = 44.597
Pb (in Hg) = 30.06
delta H (in H2O) = 1.722
gamma = 0.99
Vm (dscf) = 42.58

Moisture Content of Stack Gas, Bwo
Bwo = 2.22%
1-Bwo = 97.78%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.56

Area of Stack (enter diameter in inches), As
L = 0
W = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 30.04

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.700
Ts (F) = 154.2
Vs (fps) = 42.55

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 128,339

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 108,319
Qstd (dscf/hr) = 6,499,122

Velocity at the Nozzle, Vn — Area of Nozzle, An
Dia. of Nozzle (in) = 0.244 — An (ft^2) = 0.00032472
Time of Run (min) = 60
Vn (fps) = 43.15

% Isokinetic, %I
%I = 101.40
% Isokinetic measured from intermediate values
%I = 101.40

PM/PM10
Pollutant Mass Emission Rate, PMR

	Filterable	Condensible	Total
Mn (g) =	0.0050	0.0108	
PMR (lb/hr) =	1.6826	3.6345	5.3172
PMR (lb/ton) =	0.0157	0.0340	**0.0498**

Grains per acf
gr/acf = 0.0015

PM/PM10
Grains per dscf

gr/dscf =	**0.0018**	0.0039	**0.0057**

Pollutant Mass Emission Rate, PMR

	CO	NOx	SO2
C (dry, corrected) (PPM) =	18.21	3.62	21.45
PMR (lb/hr) =	8.600	2.809	23.176
PMR (lb/ton) =	**0.080**	**0.026**	**0.217**

Production Rate

LMS Tons	114
Process Time (min)	64
Tons/hr	**106.88**

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	CASTRIP
Date:	10/05/06
Run Number:	3

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20
Md (g/gmol) = 28.8

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 17
Vw (scf) = 0.80019

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 59.0
Vm (ft^3) = 44.1
Pb (in Hg) = 30.15
delta H (in H2O) = 1.875
gamma = 0.99
Vm (dscf) = 44.96

Moisture Content of Stack Gas, Bwo
Bwo = 1.75%
1-Bwo = 98.25%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.61

Area of Stack (enter diameter in inches), As
L = 0
W = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 30.13

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.731
Ts (F) = 127.4
Vs (fps) = 43.35

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 130,733

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 116,279
Qstd (dscf/hr) = 6,976,729

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.244
Time of Run (min) = 60
Vn (fps) = 43.24

Area of Nozzle, An
An (ft^2) = 0.00032472

% Isokinetic, %I
%I = 99.75
% Isokinetic measured from intermediate values
%I = 99.76

PM/PM10
Pollutant Mass Emission Rate, PMR

	Filterable	Condensible	Total
Mn (g) =	0.0035	0.0280	
PMR (lb/hr) =	1.1973	9.5784	10.7756
PMR (lb/ton) =	0.0118	0.0944	**0.1062**

Grains per acf
gr/acf = 0.0011

PM/PM10
Grains per dscf
gr/dscf = **0.0012** 0.0096 **0.0108**

Pollutant Mass Emission Rate, PMR

	CO	NOx	SO2
C (dry, corrected) (PPM) =	44.29	10.51	19.63
PMR (lb/hr) =	22.453	8.755	22.768
PMR (lb/ton) =	**0.221**	**0.086**	**0.224**

FIELD DATA

K' Factor	3.5

Start Time	8:59
Stop Time	10:07

	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.50	0.707		1.75	106	57	56
2	0.50	0.707		1.75	108	57	56
3	0.48	0.693		1.68	109	57	56
4	0.48	0.693		1.68	110	57	56
5	0.46	0.678		1.61	110	57	56
6	0.44	0.663		1.54	115	58	56
7	0.50	0.707		1.75	123	58	56
8	0.51	0.714		1.79	130	59	57
9	0.54	0.735		1.89	137	59	57
10	0.55	0.742		1.93	142	61	57
11	0.57	0.755		2.00	140	61	57
12	0.60	0.775		2.10	138	62	57
13	0.55	0.742		1.93	144	61	57
14	0.55	0.742		1.93	148	61	57
15	0.52	0.721		1.82	146	62	58
16	0.52	0.721		1.82	144	62	58
17	0.51	0.714		1.79	140	63	58
18	0.52	0.721		1.82	139	63	58
19	0.58	0.762		2.03	131	63	58
20	0.60	0.775		2.10	127	63	58
21	0.60	0.775		2.10	124	64	59
22	0.58	0.762		2.03	120	64	59
23	0.60	0.775	1007.6	2.10	116	64	59
24	0.60	0.775	963.5	2.10	110	64	59

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.536	0.731	44.1	1.875	127.4	59.0

Production Rate

LMS Tons	115
Process Time (min)	68
Tons/hr	**101.47**

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10-2-06 to 10-5-06

Pollutant Gas Type:	CO
Instrument Span:	182
Upscale Calibration Gas:	94.36

ANALYZER CALIBRATION DATA 10/02/06 Run # 1

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	-0.1	0.1	0.05%	Pass
Mid-range gas	94.36	93.4	1.0	0.53%	Pass
High-range gas	182.0	181.6	0.4	0.22%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	0.1	0.11%	Pass	0.4	0.27%	Pass	0.16%	Pass
Upscale gas	90.5	1.59%	Pass	90.5	1.59%	Pass	0.00%	Pass

ANALYZER CALIBRATION DATA 10/03/06 Run # 2

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	0.1	0.1	0.05%	Pass
Mid-range gas	94.36	93.1	1.3	0.69%	Pass
High-range gas	182.0	181.4	0.6	0.33%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	0.3	0.11%	Pass	0.3	0.11%	Pass	0.00%	Pass
Upscale gas	91.2	1.04%	Pass	90.3	1.54%	Pass	0.49%	Pass

ANALYZER CALIBRATION DATA 10/05/06 Run # 3

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	0.2	0.2	0.11%	Pass
Mid-range gas	94.36	94.0	0.4	0.20%	Pass
High-range gas	182.0	182.2	0.2	0.11%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	0.3	0.05%	Pass	0.4	0.11%	Pass	0.05%	Pass
Upscale gas	93.6	0.22%	Pass	93.5	0.27%	Pass	0.05%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (dry, ppm)
Run # 1	16.64	17.14
Run # 2	17.76	18.21
Run # 3	44.1	44.29

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10-2-06 to 10-5-06

Pollutant Gas Type: NOx
Instrument Span: 87.1
Upscale Calibration Gas: 49.1

ANALYZER CALIBRATION DATA 10/02/06 Run # 1

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	0.0	0.0	0.00%	Pass
Mid-range gas	49.1	49.8	0.7	0.83%	Pass
High-range gas	87.1	87.8	0.7	0.80%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	-0.1	0.11%	Pass	0.0	0.00%	Pass	0.11%	Pass
Upscale gas	48.9	1.03%	Pass	49.2	0.69%	Pass	0.34%	Pass

ANALYZER CALIBRATION DATA 10/03/06 Run # 2

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	-0.2	0.2	0.23%	Pass
Mid-range gas	49.1	49.7	0.6	0.69%	Pass
High-range gas	87.1	88.1	1.0	1.15%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	0.2	0.46%	Pass	0.1	0.34%	Pass	0.11%	Pass
Upscale gas	49.9	0.23%	Pass	49.5	0.23%	Pass	0.46%	Pass

ANALYZER CALIBRATION DATA 10/05/06 Run # 3

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	-0.1	0.1	0.11%	Pass
Mid-range gas	49.1	49.9	0.8	0.92%	Pass
High-range gas	87.1	87.3	0.2	0.23%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	-0.2	0.11%	Pass	0.0	0.11%	Pass	0.23%	Pass
Upscale gas	49.6	0.34%	Pass	50.1	0.23%	Pass	0.57%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (dry, ppm)
Run # 1	6.27	6.32
Run # 2	3.6	3.62
Run # 3	10.59	10.51

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10-2-06 to 10-5-06

Pollutant Gas Type: SO_2
Instrument Span: 150.1
Upscale Calibration Gas: 62.09

ANALYZER CALIBRATION DATA 10/02/06 Run # 1

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	0.0	0.0	0.00%	Pass
Mid-range gas	62.09	60.8	1.3	0.86%	Pass
High-range gas	150.1	150.0	0.1	0.07%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Final Values System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	-0.1	0.07%	Pass	0.1	0.07%	Pass	0.13%	Pass
Upscale gas	57.8	2.00%	Pass	58.3	1.67%	Pass	0.33%	Pass

ANALYZER CALIBRATION DATA 10/03/06 Run # 2

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	-0.1	0.1	0.07%	Pass
Mid-range gas	62.09	60.7	1.4	0.93%	Pass
High-range gas	150.1	151.2	1.1	0.73%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Final Values System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	0.5	0.40%	Pass	0.7	0.53%	Pass	0.13%	Pass
Upscale gas	58.4	1.53%	Pass	57.8	1.93%	Pass	0.40%	Pass

ANALYZER CALIBRATION DATA 10/05/06 Run # 3

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	-0.2	0.2	0.13%	Pass
Mid-range gas	62.09	60.8	1.3	0.86%	Pass
High-range gas	150.1	152.0	1.9	1.27%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Final Values System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Zero gas	0.0	0.13%	Pass	1.3	1.00%	Pass	0.87%	Pass
Upscale gas	60.1	0.47%	Pass	58.1	1.80%	Pass	1.33%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (dry, ppm)
Run # 1	10.58	11.32
Run # 2	20.46	21.45
Run # 3	19.13	19.63

APPENDIX B

FIELD DATA PRINTOUTS

Lead Emissions

STACK EMISSION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	LEAD - Castrip
Date:	10/2/06 - 10/5/06

Particulate Concentration	**Run 1**	**Run 2**	**Run 3**	**Average**
Lead (lb/ton)	6.26E-06	3.38E-06	1.07E-06	**3.57E-06**
Avg. Stack Vol. Flow Rate				
ACFM	132,739	134,292	131,593	132,875
DSCFM	119,764	113,724	116,697	116,728
Avg. Stack Temp	118.6	152.0	127.1	132.5
Stack Gas Velocity	44.01	44.53	43.63	44.06
Avg. Velocity Head	0.559	0.539	0.541	0.547
Avg. Sq. Rt of Delta P	0.748	0.734	0.736	0.739
	ISOKINETIC TESTING SUMMARY			
Allowable isokinetic 90-110%	94.34	98.21	95.70	96.08
% Moisture of Stack Gas	1.76%	2.25%	2.09%	2.03%
Sample Volume	45.975	45.449	45.446	45.623

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	LEAD - Castrip
Date:	10/03/06
Run Number:	2

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20
Md (g/gmol) = 28.8

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 22.2
Vw (scf) = 1.04495

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 91.229
Vm (ft^3) = 47.478
Pb (in Hg) = 30.06
delta H (in H2O) = 1.946
gamma = 0.99
Vm (dscf) = 45.45

Moisture Content of Stack Gas, Bwo
Bwo = 2.25%
1-Bwo = 97.75%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.56

Area of Stack (enter diameter in inches), As
L = 0
W = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 30.04

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.734
Ts (F) = 151.96
Vs (fps) = 44.53

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 134,292

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 113,724
Qstd (dscf/hr) = 6,823,431

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.25
Time of Run (min) = 60
Vn (fps) = 43.73

Area of Nozzle, An
An (ft^2) = 0.00034

% Isokinetic, %I
%I = 98.21
% Isokinetic measured from intermediate values
%I = 98.21

Pollutant Mass Emission Rate, PMR
Mn (g) = 0.00000109
PMR (lbs/hr) = 0.0004
PMR (lbs/ton) = 3.38E-06
Lead Total

Grains per acf
gr/acf = 0.0000

Grains per dscf
gr/dscf = 3.70E-07

FIELD DATA

K' Factor	3.6

Start Time	14:32
Stop Time	15:36

Run 2	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.60	0.775		2.16	142	86	85
2	0.58	0.762		2.09	142	86	85
3	0.58	0.762		2.09	143	86	85
4	0.58	0.762		2.09	144	87	86
5	0.52	0.721		1.87	146	88	86
6	0.48	0.693		1.73	144	88	86
7	0.58	0.762		2.09	149	89	87
8	0.58	0.762		2.09	150	89	87
9	0.55	0.742		1.98	151	91	88
10	0.60	0.775		2.16	151	92	88
11	0.50	0.707		1.80	151	92	88
12	0.46	0.678		1.66	147	93	89
13	0.58	0.762		2.09	155	94	90
14	0.54	0.735		1.94	155	94	90
15	0.54	0.735		1.94	155	95	90
16	0.54	0.735		1.94	156	95	90
17	0.47	0.686		1.69	156	96	91
18	0.42	0.648		1.51	156	97	92
19	0.58	0.762		2.09	156	97	93
20	0.60	0.775		2.16	158	98	93
21	0.55	0.742		1.98	159	99	93
22	0.58	0.762	183.578	2.09	160	99	94
23	0.54	0.735	136.1	1.94	160	100	95
24	0.42	0.648		1.51	161	101	96

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.540	0.734	47.478	1.946	152.0	91.2

Production Rate

LMS Tons	114
Process Time (min)	64
Tons/hr	**106.88**

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	LEAD - Castrip
Date:	10/2/06
Run Number:	1

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20
Md (g/gmol) = 28.8

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 17.5
Vw (scf) = 0.82373

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 71.500
Vm (ft^3) = 46.200
Pb (in Hg) = 30.13
delta H (in H2O) = 1.960
gamma = 0.99
Vm (dscf) = 45.97

Moisture Content of Stack Gas, Bwo
Bwo = 1.76%
1-Bwo = 98.24%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.61

Area of Stack (enter diameter in inches), As
Depth = 0
Width = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 30.11

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.748
Ts (F) = 118.58
Vs (fps) = 44.01

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 132,739

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 119,764
Qstd (dscf/hr) = 7,185,818

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.25
Time of Run (min) = 60.00
Vn (fps) = 41.52

Area of Nozzle, An
An (ft^2) = 0.0003409

% Isokinetic, %I
%I = 94.34
% Isokinetic measured from intermediate values
%I = 94.34

Pollutant Mass Emission Rate, PMR
Mn (g) = 0.00000193
PMR (lb/hr) = 0.0007
PMR (lb/ton) = 6.28E-06
Lead Total

Grains per acf
gr/acf = 0.0000

Grains per dscf
gr/dscf = 6.48E-07

FIELD DATA

K' Factor	3.5

Start Time	9:01
Stop Time	10:09

Run 1	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.65	0.806		2.28	95	66	64
2	0.65	0.806		2.28	95	66	64
3	0.62	0.787		2.17	96	66	64
4	0.62	0.787		2.17	103	67	64
5	0.62	0.787		2.17	104	68	65
6	0.60	0.775		2.10	105	69	65
7	0.60	0.775		2.10	110	70	66
8	0.61	0.781		2.14	111	70	66
9	0.59	0.768		2.07	112	71	66
10	0.58	0.762		2.04	115	72	67
11	0.52	0.721		1.82	120	74	68
12	0.52	0.721		1.82	120	74	68
13	0.54	0.735		1.89	126	74	69
14	0.53	0.728		1.86	127	76	70
15	0.52	0.721		1.82	128	76	70
16	0.52	0.721		1.82	129	78	71
17	0.51	0.714		1.79	132	79	72
18	0.51	0.714		1.79	132	80	73
19	0.52	0.721		1.82	132	81	73
20	0.50	0.707		1.75	132	81	73
21	0.52	0.721		1.82	131	81	73
22	0.51	0.714	123.4	1.79	131	81	73
23	0.50	0.707	77.2	1.75	130	81	73
24	0.59	0.768		2.03	130	81	73

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.560	0.748	46.2	1.960	118.6	71.5

Production Rate

LMS Tons	115
Process Time (min)	65
Tons/hr	**106.15**

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	LEAD - Castrip
Date:	10/05/06
Run Number:	3

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20
Md (g/gmol) = 28.8

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 20.6
Vw (scf) = 0.96964

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 55.4
Vm (ft^3) = 44.25
Pb (in Hg) = 30.15
delta H (in H2O) = 2.010
gamma = 0.99
Vm (dscf) = 45.45

Moisture Content of Stack Gas, Bwo
Bwo = 2.09%
1-Bwo = 97.91%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.57

Area of Stack (enter diameter in inches), As
L = 0
W = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 30.13

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.736
Ts (F) = 127.1
Vs (fps) = 43.63

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 131,593

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 116,697
Qstd (dscf/hr) = 7,001,810

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.25
Time of Run (min) = 60
Vn (fps) = 41.76

Area of Nozzle, An
An (ft^2) = 0.00034

% Isokinetic, %I
%I = 95.70
% Isokinetic measured from intermediate values
%I = ~~95.70~~

Pollutant Mass Emission Rate, PMR
Mn (g) = 0.00000032
PMR (lbs/hr) = 0.0001
PMR (lbs/ton) = 1.07E-06
Lead Total

Grains per acf
gr/acf = 0.0000

Grains per dscf
gr/dscf = 1.09E-07

FIELD DATA

K' Factor	3.7

Start Time	8:59
Stop Time	10:07

Run 3	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.50	0.707		1.85	106	54	54
2	0.50	0.707		1.85	107	54	54
3	0.48	0.693		1.78	108	54	54
4	0.44	0.663		1.63	112	55	54
5	0.42	0.648		1.55	119	55	54
6	0.42	0.648		1.55	121	55	54
7	0.48	0.693		1.78	123	55	54
8	0.56	0.748		2.07	128	55	54
9	0.56	0.748		2.07	132	56	54
10	0.58	0.762		2.15	130	56	54
11	0.60	0.775		2.22	134	56	55
12	0.62	0.787		2.29	138	56	55
13	0.52	0.721		1.92	140	56	55
14	0.52	0.721		1.92	145	56	55
15	0.54	0.735		2.00	146	56	55
16	0.54	0.735		2.00	142	56	55
17	0.55	0.742		2.04	140	57	56
18	0.56	0.748		2.07	138	57	56
19	0.56	0.748		2.07	125	57	56
20	0.58	0.762		2.15	123	57	56
21	0.60	0.775		2.22	125	57	56
22	0.62	0.787	228.35	2.29	124	57	56
23	0.64	0.800	184.1	2.37	122	57	56
24	0.65	0.806		2.41	122	57	56

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.543	0.736	44.25	2.010	127.1	55.4

Production Rate

LMS Tons	115
Process Time (min)	68
Tons/hr	**101.47**

APPENDIX C

FIELD DATA

Particulate & Gas Emissions

VELOCITY TRAVERSE POINT DETERMINATION
(EPA Method 1)

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	**PM/PM10 - Castrip**
Date:	10-2-06 to 10-5-06

Circular Stack
Traverse Points on Diameter:
Stack Diameter (inches): 96

Point	**4**	**6**	**8**	**10**	**12**
1	6.43	4.22	3.07	2.50	**2.02**
2	24.00	14.02	10.08	7.87	**6.43**
3	72.00	28.42	18.62	14.02	**11.33**
4	89.57	67.58	31.01	21.70	**16.99**
5		81.98	64.99	32.83	**24.00**
6		91.78	77.38	63.17	**34.18**
7			85.92	74.30	**61.82**
8			92.93	81.98	**72.00**
9				88.13	**79.01**
10				93.50	**84.67**
11					**89.57**
12					**93.98**

AIR TES ROFESSIONALS FIELD DATA SHEET PM/PM10 TESTIN EPA METHOD 1-5/202/9 RUN 1 PAGE ___ ___

CLIENT	Nucor Steel	METER BOX ID	A-2	K FACTOR	3.5	DUCT DIMENSIONS (in.)	96"
LOCATION	Crawfordsville, IN	METER γ	0.99	METER $\Delta H@$	1.81	PORT LENGTH (in.)	5"
UNIT	Cast Strip	PITOT C_p	0.84	PROBE LINER	Teflon	FILTER ID	R1-B; SILICA ID 6
DATE	10-2-06; PROJECT #	PROBE ID	12'1	NOZZLE ID	0.244	TEDLAR BAG ID	
METER OPERATOR	Carlos Brown	BAROMETRIC	30.13	AMBIENT TEMP (°F)		PITOT CHECK	O_2 20.0
PROBE OPERATOR	Marcus Allen	STATIC PRESSURE (in. H_2O)	-0.25			PASS ☒ FAIL ☐	CO_2 0.0
VISIBLE EMISSIONS READER	Nita Greenburg	LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	10"	H_2O (mL)	4.0
CLIENT CONTACT	Trevor Beers	LEAK RATE AFTER (cfm)	0.000	@ (in. Hg)	9"	SILICA GEL (g)	13.0
AGENCY CONTACT	David Harrison	START TIME	0901	STOP TIME	1009	TOTAL Vlc	17.0

Diagram of Test Location

Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F) (Set Points)	Filter Tf (°F) (Set Points)	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				859.60								
1	2.5	0.65	2.28	861.6	96	249	249	57	66	64	3.5	
2	5.0	0.65	2.28	863.6	96	249	250	57	66	64	3.5	
3	7.5	0.62	2.17	865.6	98	250	251	57	66	64	3.5	
4	10.0	0.62	2.17	867.7	102	250	251	57	66	65	3.5	
5	12.5	0.62	2.17	869.7	104	250	252	58	67	65	3.5	
6	15.0	0.60	2.10	871.8	107	250	253	58	68	65	3.5	ph = 5.5
7	17.5	0.58	2.04	873.6	113	251	252	58	68	65	3.5	
8	20.0	0.58	2.04	875.8	115	251	252	58	69	66	3.5	
9	22.5	0.57	1.99	877.4	118	250	249	60	70	66	3.5	
10	25.0	0.57	1.99	880.6	118	249	250	61	71	67	3.5	
11	27.5	0.50	1.75	881.7	120	250	254	61	71	68	3.5	
12	30	0.50	1.75	883.1	126	250	250	64	71	68	3.5	
13	32.5	0.54	1.89	885.0	130	251	254	63	73	68	3.5	
14	35.0	0.52	1.82	887.1	131	251	252	63	73	68	3.5	
15	37.5	0.52	1.82	888.8	134	252	248	63	73	68	3.5	
16	40.0	0.54	1.89	890.7	134	251	247	64	75	70	3.5	
17	42.5	0.50	1.75	892.5	137	251	251	65	77	71	3.5	
18	45.0	0.50	1.75	894.3	138	251	251	65	78	71	3.5	
19	47.5	0.52	1.82	896.4	138	250	248	65	79	72	3.5	
20	50.0	0.52	1.82	898.3	137	250	249	65	80	73	3.5	
21	52.5	0.52	1.82	900.1	137	249	250	65	81	74	3.5	
22	55.0	0.52	1.82	902.1	137	249	250	65	81	74	3.5	
23	57.5	0.48	1.68	904.0	136	249	250	65	81	74	3.5	
24	60	0.62	2.17	906.001	136	249	249	65	81	74	3.5	

AIR TES[illegible] [illegible]ROFESSIONALS FIELD DATA SHEET PM/PM10 TESTIN[illegible] EPA METHOD 1-4/12/9 RUN 2 PAGE ___ ___

CLIENT	Nucor Steel	METER BOX ID	A-2	K FACTOR		DUCT DIMENSIONS (in.)	96"
LOCATION	Crawfordsville IN	METER γ	0.99	METER ΔH@	1.81	PORT LENGTH (in.)	5"
UNIT	CAST STRIP	PITOT C_p	0.84	PROBE LINER	TEFLON	FILTER ID	R2 — SILICA ID #7
DATE	10-3-06 PROJECT #	PROBE ID	12'	NOZZLE ID	0.244	TEDLAR BAG ID	
METER OPERATOR	CARLOS BROWN	BAROMETRIC	30.06	AMBIENT TEMP (°F)		PITOT CHECK	O_2 20.0
PROBE OPERATOR	ANDY YOUNG	STATIC PRESSURE (in. H_2O)	-0.25			PASS ☒ FAIL ☐	CO_2 0.0
VISIBLE EMISSIONS READER	NITA GREENBERG	LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	10"	H_2O (mL)	10
CLIENT CONTACT	TREVOR BEERS	LEAK RATE AFTER (cfm)	0.000	@ (in. Hg)	6"	SILICA GEL (g)	10.5
AGENCY CONTACT	DAVID HARRISON	START TIME	1432	STOP TIME	1536	TOTAL Vlc	20.5

Diagram of Test Location

Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F) Set Points	Filter Tf (°F) Set Points	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				916.70								
1	2.5	0.60	2.10	918.9	149	251	247	68	86	85	5	
2	5.0	0.55	1.93	920.9	149	248	249	66	87	86	5	
3	7.5	0.55	1.93	922.9	150	249	253	66	87	86	5	
4	10.0	0.52	1.82	924.8	151	248	247	65	88	87	5	
5	12.5	0.46	1.61	926.5	152	249	249	65	89	87	4	
6	15.0	0.46	1.61	928.6	153	249	252	65	89	87	4	
7	17.5	0.46	1.61	930.3	155	250	248	64	91	89	4	ph = 5.5
8	20.0	0.44	1.54	932.2	156	250	253	64	92	89	4	
9	22.5	0.42	1.47	933.8	157	249	252	64	92	89	4	
10	25.0	0.46	1.40	935.5	157	251	250	63	93	90	4	
11	27.5	0.40	1.40	937.1	152	250	251	63	93	90	4	
12	30	0.40	1.40	938.7	144	251	254	63	94	91	4	
13	32.5	0.50	1.75	940.5	159	250	250	64	95	92	4	
14	35.0	0.54	1.89	942.5	160	250	252	64	96	92	4	
15	37.5	0.54	1.89	944.3	161	250	252	64	96	93	4	
16	40.0	0.54	1.89	946.4	156	250	248	64	96	93	4	
17	42.5	0.48	1.68	948.3	156	251	255	65	97	93	4	
18	45.0	0.48	1.68	950.0	155	250	250	65	98	94	4	
19	47.5	0.45	1.58	951.6	155	249	252	65	98	94	4	
20	50.0	0.48	1.68	953.3	156	249	247	65	98	94	4	
21	52.5	0.52	1.82	955.5	155	250	250	65	99	95	4	
22	55.0	0.54	1.89	957.3	155	252	254	65	99	95	4	
23	57.5	0.54	1.89	959.6	154	251	249	65	100	95	4	
24	60	0.54	1.89	961.297	154	250	250	65	101	96	4	

AIR TES PROFESSIONALS FIELD DATA SHEET PM/PM10 TESTIN · EPA METHOD 1-5/202/9 · RUN 3 · PAGE ___ ___

CLIENT	Nucor Steel	METER BOX ID	A-2	K FACTOR	3.5	DUCT DIMENSIONS (in.)	96"
LOCATION	Crawfordsville, IN	METER γ	0.99	METER ΔH@	1.81	PORT LENGTH (in.)	5"
UNIT	Cast Strip	PITOT C_P	0.84	PROBE LINER	Teflon	FILTER ID	R3 · SILICA ID 8
DATE 10-5-06	PROJECT #	PROBE ID	12'	NOZZLE ID	0.244	TEDLAR BAG ID	
METER OPERATOR	Carlos Brown	BAROMETRIC	30.15	AMBIENT TEMP (°F)		PITOT CHECK	O_2 20.0
PROBE OPERATOR	Andy Young	STATIC PRESSURE (in. H_2O)	-0.25			PASS ☒ FAIL ☐	CO_2 0.0
VISIBLE EMISSIONS READER	Eric Ferguson	LEAK RATE BEFORE (cfm)	0.006	@ (in. Hg)	12"	H_2O (mL)	6
CLIENT CONTACT	Trevor Beers	LEAK RATE AFTER (cfm)	0.000	@ (in. Hg)	8"	SILICA GEL (g)	11.0
AGENCY CONTACT	David Harrison	START TIME	0859	STOP TIME	1007	TOTAL Vlc	17.0

Diagram of Test Location

Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F) Set Points	Filter Tf (°F) Set Points	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				963.5								
1	2.5	0.50	1.75	965.5	106	249	248	51	57	56	3	
2	5.0	0.50	1.75	967.4	108	250	250	50	57	56	3	
3	7.5	0.48	1.68	969.2	109	250	251	50	57	56	3	
4	10.0	0.48	1.68	971.1	110	251	250	50	57	56	3	
5	12.5	0.46	1.61	973.0	110	250	253	50	57	56	3	
6	15.0	0.44	1.54	974.8	115	252	250	51	58	56	3	
7	17.5	0.50	1.75	976.6	123	250	251	51	58	56	3	pl = 5.5
8	20.0	0.51	1.79	978.5	130	249	253	51	59	57	3	
9	22.5	0.54	1.89	980.2	137	249	252	51	59	57	3	
10	25.0	0.55	1.93	982.0	142	248	254	52	61	57	3	
11	27.5	0.57	2.00	984.0	140	250	255	52	61	57	3	
12	30	0.60	2.10	985.6	138	251	251	52	62	57	3	
13	32.5	0.55	1.93	987.2	144	251	250	52	61	57	3	
14	35.0	0.55	1.93	989.0	148	252	250	52	61	57	3	
15	37.5	0.52	1.82	990.8	146	250	251	52	62	58	3	
16	40.0	0.52	1.82	992.5	144	250	251	53	62	58	3	
17	42.5	0.51	1.79	994.4	140	251	250	53	63	58	3	
18	45.0	0.52	1.82	996.2	139	249	250	53	63	58	3	
19	47.5	0.58	2.03	998.0	131	249	248	53	63	58	3	
20	50.0	0.60	2.10	1000.1	127	247	246	54	63	58	3	
21	52.5	0.60	2.10	1001.9	124	249	248	53	64	59	3	
22	55.0	0.58	2.03	1003.8	120	249	249	53	64	59	3	
23	57.5	0.60	2.10	1005.7	116	251	248	53	64	59	3	
24	60	0.60	2.10	1007.60	110	250	246	53	64	59	3	

ANALYZER FIELD DATA

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10/2/2006
Run Number:	1

Date/Time	CO ppm	SO2 ppm	NOx ppm	INITIAL CALS
10/2/2006 8:06	**181.6**	0	-0.3	**CO gas (182.0)**
10/2/2006 8:07	120.4	0	-0.3	
10/2/2006 8:08	0.7	0	0.1	
10/2/2006 8:09	0.3	0	0.2	
10/2/2006 8:10	0.3	0	0.2	
10/2/2006 8:11	0.2	0	0.2	
10/2/2006 8:12	0.3	0	0.2	
10/2/2006 8:13	0.2	72	0.2	
10/2/2006 8:14	0.2	149	0.2	
10/2/2006 8:15	0.3	**150**	0.3	**SO2 gas (150.1)**
10/2/2006 8:16	0.3	20.3	0.3	
10/2/2006 8:17	**-0.1**	**0**	**0**	**Zero gas (0)**
10/2/2006 8:18	-0.1	0.5	0	
10/2/2006 8:19	-0.1	57.4	0	
10/2/2006 8:20	-0.1	60.5	0.2	
10/2/2006 8:21	-0.1	60.9	0.2	
10/2/2006 8:22	-0.1	7.9	0.2	
10/2/2006 8:23	-0.1	0.1	5.2	
10/2/2006 8:24	0	0.1	44.6	
10/2/2006 8:25	0	0.1	11.1	
10/2/2006 8:26	0	-0.1	78.4	
10/2/2006 8:27	0	-0.2	**87.8**	**NOx gas (87.1)**
10/2/2006 8:28	0	0.1	15.1	
10/2/2006 8:29	0	0	47.5	
10/2/2006 8:30	0	-0.1	**49.8**	**NOx gas (49.08)**
10/2/2006 8:31	0	0.2	36.5	
10/2/2006 8:32	0.2	43.2	4.6	
10/2/2006 8:33	0.2	60.1	0.7	
10/2/2006 8:34	0.2	**60.8**	0.3	**SO2 gas (62.09)**
10/2/2006 8:35	0.2	10.5	0.2	
10/2/2006 8:36	79.5	-0.1	-0.1	
10/2/2006 8:37	88.6	-0.1	-0.1	
10/2/2006 8:38	93	-0.1	-0.1	
10/2/2006 8:39	**93.4**	-0.1	-0.1	**CO gas (94.36)**
10/2/2006 8:40	45.2	0.2	-0.1	
10/2/2006 8:41	6.1	49.6	0.1	**BIAS CHECKS**
10/2/2006 8:42	0.2	**57.8**	0.2	**SO2 gas (62.09)**
10/2/2006 8:43	0.3	58	0.2	
10/2/2006 8:44	0.2	37.3	0.2	
10/2/2006 8:45	65.1	0.5	-0.1	
10/2/2006 8:46	**90.5**	**-0.1**	**-0.1**	**CO gas (94.36)**
10/2/2006 8:47	90.5	-0.1	-0.1	
10/2/2006 8:48	25.2	0.9	10.2	
10/2/2006 8:49	0.3	0	45	
10/2/2006 8:50	**0.1**	-0.1	**48.9**	**NOx gas (49.08)**
10/2/2006 8:51	1.5	1.8	32.5	
10/2/2006 8:52	5.2	1.1	4	
10/2/2006 8:53	5.3	0.7	0.4	
10/2/2006 8:54	5.2	0.6	0	
10/2/2006 8:55	5.2	0.6	-0.1	
10/2/2006 8:56	5.3	0.6	-0.1	
10/2/2006 8:57	5.2	0.5	-0.2	
10/2/2006 8:58	5.2	0.5	-0.2	
10/2/2006 8:59	5.3	14.6	0	
10/2/2006 9:00	5.3	14.4	0.9	
10/2/2006 9:01	0.4	10.7	3.5	
10/2/2006 9:02	5.1	9.8	6.3	
10/2/2006 9:03	5.2	14	4.7	
10/2/2006 9:04	5.3	13.7	3.6	
10/2/2006 9:05	5.3	10.5	3.5	
10/2/2006 9:06	5.3	11.5	3.4	
10/2/2006 9:07	9.8	34.1	3.7	
10/2/2006 9:08	10.2	19.1	3.3	
10/2/2006 9:09	10.2	11.6	4.7	
10/2/2006 9:10	10.2	9.1	5.6	
10/2/2006 9:11	10.2	7	5.7	
10/2/2006 9:12	10.3	5.7	5.8	
10/2/2006 9:13	10.3	5.4	6.1	
10/2/2006 9:14	10.3	5.5	6.8	

ANALYZER FIELD DATA

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10/2/2006
Run Number:	1

Date/Time	CO ppm	SO2 ppm	NOx ppm	
10/2/2006 9:15	10.3	9.7	7.9	
10/2/2006 9:16	10.3	10.4	6	
10/2/2006 9:17	10.3	10.3	8.6	
10/2/2006 9:18	19.6	10.4	4.7	
10/2/2006 9:19	20.3	6.6	1.5	
10/2/2006 9:20	20.3	5.1	1.1	
10/2/2006 9:21	20.3	3.4	0.9	
10/2/2006 9:22	20.3	2.6	0.8	
10/2/2006 9:23	16.1	3.2	0.9	
10/2/2006 9:24	10.3	11.5	2.2	
10/2/2006 9:25	10.3	12.7	3.4	
10/2/2006 9:26	10.3	8.7	7.3	
10/2/2006 9:27	10.3	8.5	10.2	
10/2/2006 9:28	10.3	10.6	8.4	
10/2/2006 9:29	10.3	67.5	25.9	
10/2/2006 9:30	7.1	88.2	45	
10/2/2006 9:31	9.9	38.8	37.4	
10/2/2006 9:32	10.3	18.6	23.3	
10/2/2006 9:33	19.6	10.8	8.4	
10/2/2006 9:34	20.4	8.5	3.5	
10/2/2006 9:35	16.1	7.3	4.4	
10/2/2006 9:36	14.7	10.9	13.2	
10/2/2006 9:37	29.9	9.7	4.8	
10/2/2006 9:38	28.5	13.6	1.8	
10/2/2006 9:39	32	15.7	1.3	
10/2/2006 9:40	17.2	8.2	1.8	
10/2/2006 9:41	15.4	7.6	5.3	
10/2/2006 9:42	10.5	7.8	13.3	
10/2/2006 9:43	23.6	8.7	5.6	
10/2/2006 9:44	15.8	7.7	10.4	
10/2/2006 9:45	10.7	8.7	18.4	
10/2/2006 9:46	15.2	8.6	20.4	
10/2/2006 9:47	10.5	8.2	21.6	
10/2/2006 9:48	19.7	8.3	10.1	
10/2/2006 9:49	25.3	9.7	2.6	
10/2/2006 9:50	33.8	6.8	1.7	
10/2/2006 9:51	45.2	7.4	1.7	
10/2/2006 9:52	30.7	6.2	1.1	
10/2/2006 9:53	30.4	4.6	1	
10/2/2006 9:54	25.6	4.3	1.1	
10/2/2006 9:55	28.8	3.5	1	
10/2/2006 9:56	30.4	2.6	0.9	
10/2/2006 9:57	30.4	2.2	1	
10/2/2006 9:58	25.8	2.3	1.1	
10/2/2006 9:59	20.5	4.6	1.9	
10/2/2006 10:00	25.3	6.6	2.1	
10/2/2006 10:01	25.4	5.7	1.2	
10/2/2006 10:02	25.4	5	1.3	
10/2/2006 10:03	25.4	4	1.2	
10/2/2006 10:04	25.4	2.7	1	
10/2/2006 10:05	20.6	2	0.8	
10/2/2006 10:06	12	1.6	0.9	
10/2/2006 10:07	5.8	1.3	1	
10/2/2006 10:08	5.5	1.2	1	
10/2/2006 10:09	5.4	1	0.8	
10/2/2006 10:10	5.4	0.9	0.8	
10/2/2006 10:11	5.4	0.8	0.6	
10/2/2006 10:12	5.4	0.7	0	
10/2/2006 10:13	1	0.6	27.1	
10/2/2006 10:14	0.3	0.5	46.9	
10/2/2006 10:15	0.3	0.4	48.8	
10/2/2006 10:16	0.3	0.3	49.2	
10/2/2006 10:17	0.4	0.2	**49.2**	**NOx gas (49.08)**
10/2/2006 10:18	4	0.3	33.6	
10/2/2006 10:19	90.5	0.1	4.5	
10/2/2006 10:20	**90.5**	**0.1**	**0**	**CO gas (94.36)**
10/2/2006 10:21	90.5	0.1	0	
10/2/2006 10:22	55.5	0.2	0	
10/2/2006 10:23	1	47.7	0.1	
10/2/2006 10:24	0.4	55.1	0.2	
10/2/2006 10:25	0.4	56.9	0.2	
10/2/2006 10:26	0.4	57.7	0.3	
10/2/2006 10:27	0.4	58.2	0.3	
10/2/2006 10:28	**0.4**	**58.3**	0.3	**SO2 gas (62.09)**

Run 1 Averages	
CO	16.64
NOx	6.27
SO2	10.58

ANALYZER FIELD DATA

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10/3/2006
Run Number:	**2**

	CO	SO_2	NO_x	**INITIAL CALS**
10/3/2006 9:50	**0.1**	**151.2**	-0.2	**SO2 gas (150.1)**
10/3/2006 9:51	0.4	32.1	-0.1	
10/3/2006 9:52	160.5	0.7	-0.2	
10/3/2006 9:53	184.3	0.6	-0.2	
10/3/2006 9:54	**181.4**	**-0.1**	**-0.2**	**CO gas (182.0)**
10/3/2006 9:55	135.5	14.7	-0.2	
10/3/2006 9:56	1	60.3	0.2	
10/3/2006 9:57	0.3	**60.7**	0.3	**SO2 gas (62.09)**
10/3/2006 9:58	3.8	6	0.2	
10/3/2006 9:59	88.8	0	-0.1	
10/3/2006 10:00	92.5	-0.1	-0.2	
10/3/2006 10:01	**93.1**	-0.1	-0.2	**CO gas (94.36)**
10/3/2006 10:02	15.7	0.2	22.5	
10/3/2006 10:03	0.4	-0.1	82.3	
10/3/2006 10:04	0.3	-0.1	89	
10/3/2006 10:05	0.3	-0.1	88.6	
10/3/2006 10:06	0.3	-0.2	**88.1**	**NOx gas (87.1)**
10/3/2006 10:07	0.4	0.1	77.5	
10/3/2006 10:08	0.3	0.1	11.7	
10/3/2006 10:09	0.3	0.1	1.4	
10/3/2006 10:10	0.3	-0.1	36.9	
10/3/2006 10:11	0.4	-0.1	**49.7**	**NOx gas (49.08)**
10/3/2006 10:12	0.4	0	42.5	
10/3/2006 10:13	0.4	0	6.1	

				BIAS CHECKS
10/3/2006 13:39	**0.3**	**58.4**	**0.2**	**SO2 gas (62.09)**
10/3/2006 13:40	0.3	39	0.2	
10/3/2006 13:41	85.5	7.1	0.2	
10/3/2006 13:42	90.4	3.8	0.1	
10/3/2006 13:43	**91.2**	2.3	-0.1	**CO gas (94.36)**
10/3/2006 13:44	12.1	6.9	5.5	
10/3/2006 13:45	0.7	3	43.4	
10/3/2006 13:46	0.3	1	49.1	
10/3/2006 13:47	0.3	0.6	49.8	
10/3/2006 13:48	0.3	**0.5**	**49.9**	**NOx gas (49.08)**
10/3/2006 13:49	13.8	18.6	15.1	
10/3/2006 13:50	15.4	40.8	3.2	

10/3/2006 14:32	15.4	1.3	1.1
10/3/2006 14:33	10.5	1.2	1.1
10/3/2006 14:34	11.7	2.3	1.1
10/3/2006 14:35	10.4	56.6	1.4
10/3/2006 14:36	15.3	44.2	2.4
10/3/2006 14:37	15.4	36.7	4.2
10/3/2006 14:38	11.6	30.1	5.4
10/3/2006 14:39	10.3	25.8	5.9
10/3/2006 14:40	10.3	24.3	7
10/3/2006 14:41	10.3	25.4	7
10/3/2006 14:42	10.3	26.2	6.6
10/3/2006 14:43	10.3	25.3	6.5
10/3/2006 14:44	10.3	33.2	6.3
10/3/2006 14:45	10.3	51.1	5.6
10/3/2006 14:46	10.3	33.7	5
10/3/2006 14:47	10.4	23.7	7.3
10/3/2006 14:48	10.4	22	7.9
10/3/2006 14:49	10.3	22.6	7.3
10/3/2006 14:50	10.3	16.9	9.7
10/3/2006 14:51	10.4	17.2	10.3
10/3/2006 14:52	10.3	15.6	11
10/3/2006 14:53	10.3	13.7	13.8
10/3/2006 14:54	14.2	12.6	13.5
10/3/2006 14:55	25.1	13.2	4.2
10/3/2006 14:56	21.5	10.9	2.2
10/3/2006 14:57	15.5	13.6	7.6
10/3/2006 14:58	15.4	12.5	12.2
10/3/2006 14:59	29.1	19.4	3.4
10/3/2006 15:00	25.6	40.9	1.6

ANALYZER FIELD DATA

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10/3/2006
Run Number:	2

	CO	SO2	NOx	
10/3/2006 15:01	25.4	51.1	1.2	
10/3/2006 15:02	25.9	46.8	1.2	
10/3/2006 15:03	25.3	36.7	1.4	
10/3/2006 15:04	25.3	22.3	1.6	
10/3/2006 15:05	25.3	15.4	1.3	
10/3/2006 15:06	29.2	10.1	1.2	
10/3/2006 15:07	25.9	32	1.2	
10/3/2006 15:08	25.4	22.9	1.1	
10/3/2006 15:09	15.7	29.4	2.2	
10/3/2006 15:10	19.8	14.4	1.8	
10/3/2006 15:11	25.3	9	1.3	
10/3/2006 15:12	25.3	11.8	1.1	
10/3/2006 15:13	25.3	11.4	1.1	
10/3/2006 15:14	25.3	10.8	1.1	
10/3/2006 15:15	25.3	8.2	1.2	
10/3/2006 15:16	16.6	19.6	1.5	
10/3/2006 15:17	10.4	30.1	3	
10/3/2006 15:18	10.3	29.9	3.8	
10/3/2006 15:19	10.3	26.1	4.8	
10/3/2006 15:20	24.3	17.8	2.3	
10/3/2006 15:21	25.3	13.4	1.7	
10/3/2006 15:22	25.3	20.4	2	
10/3/2006 15:23	25.4	13.5	1.3	
10/3/2006 15:24	25.3	8.8	1.2	
10/3/2006 15:25	11.3	25.1	2.3	
10/3/2006 15:26	20.1	11.8	1.7	
10/3/2006 15:27	25.3	7.4	1.2	
10/3/2006 15:28	25.3	8	1.3	
10/3/2006 15:29	15.9	18	1.8	
10/3/2006 15:30	10.4	22.6	4.1	
10/3/2006 15:31	10.3	21.1	6.7	
10/3/2006 15:32	20.1	12.9	3	
10/3/2006 15:33	20.4	7.4	1.5	
10/3/2006 15:34	20.4	4.7	1.2	
10/3/2006 15:35	20.4	3.6	1.1	
10/3/2006 15:36	20.4	3	1.1	
10/3/2006 15:37	20.4	2.5	1.1	
10/3/2006 15:38	20.4	2.2	1.1	
10/3/2006 15:39	11.3	1.9	0.9	
10/3/2006 15:40	5.9	1.8	0.6	
10/3/2006 15:41	5.3	1.6	0.4	
10/3/2006 15:42	5.3	1.4	0.4	
10/3/2006 15:43	5.3	1.3	0.3	
10/3/2006 15:44	5.3	1.2	0.3	
10/3/2006 15:45	5.3	1.2	0.3	
10/3/2006 15:46	5.4	1.1	10	
10/3/2006 15:47	0.4	0.9	45	
10/3/2006 15:48	**0.3**	**0.7**	**49.5**	**NOx gas (49.08)**
10/3/2006 15:49	0.3	0.6	50	
10/3/2006 15:50	50.4	0.6	17.1	
10/3/2006 15:51	90.3	0.6	1.8	
10/3/2006 15:52	**90.3**	0.5	**0.1**	**CO gas (94.36)**
10/3/2006 15:53	1.3	44.4	0.4	
10/3/2006 15:54	0.4	52.7	0.4	
10/3/2006 15:55	0.4	55.6	0.4	
10/3/2006 15:56	0.4	57	0.3	
10/3/2006 15:57	0.3	**57.8**	0.3	**SO2 gas (62.09)**

Run 2 Averages	
CO	17.76
NOx	3.80
SO2	20.46

ANALYZER FIELD DATA

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10/5/2006
Run Number:	3

	CO	SO_2	NOx	
				INITIAL CALS
10/5/2006 8:27	0.2	152	-0.1	SO2 gas (150.1)
10/5/2006 8:28	0.2	34.1	-0.1	
10/5/2006 8:29	22.3	3.4	-0.1	
10/5/2006 8:30	176.4	3.2	0.3	
10/5/2006 8:31	182.2	3.5	2.3	CO gas (182.0)
10/5/2006 8:32	0.8	-0.3	66.2	
10/5/2006 8:33	0.4	-0.2	61.9	
10/5/2006 8:34	0.4	-0.2	62.1	
10/5/2006 8:35	0.4	-0.2	56.1	
10/5/2006 8:36	0.4	-0.2	84.8	
10/5/2006 8:37	0.4	-0.2	87.3	NOx gas (87.1)
10/5/2006 8:38	25.3	-0.2	33.8	
10/5/2006 8:39	93.2	-0.2	3.1	
10/5/2006 8:40	94	-0.3	-0.3	CO gas (94.36)
10/5/2006 8:41	10.4	60.4	-0.3	
10/5/2006 8:42	0.5	60.8	-0.2	SO2 gas (62.09)
10/5/2006 8:43	0.4	0.3	9.7	
10/5/2006 8:44	0.4	-0.1	45.5	
10/5/2006 8:45	0.4	-0.1	49.9	NOx gas (49.08)
10/5/2006 8:46	0.4	0.1	21.8	
10/5/2006 8:47	31.2	0.1	14.3	
10/5/2006 8:48	0.8	0	45.8	BIAS CHECKS
10/5/2006 8:49	0.3	0	49.6	NOx gas (49.08)
10/5/2006 8:50	4.6	0.1	39.8	
10/5/2006 8:51	90.5	-0.1	4.9	
10/5/2006 8:52	93.6	-0.1	-0.2	CO gas (94.36)
10/5/2006 8:53	93.7	-0.1	-0.2	
10/5/2006 8:54	5.5	33.6	-0.1	
10/5/2006 8:55	0.5	48.7	0.1	
10/5/2006 8:56	0.4	60.1	0	SO2 gas (62.09)
10/5/2006 8:57	0.4	42.1	-0.1	
10/5/2006 8:58	12.7	58	15.9	
10/5/2006 8:59	20.2	65.8	27.6	
10/5/2006 9:00	23.8	67.3	41.3	
10/5/2006 9:01	20.5	84.8	50.3	
10/5/2006 9:02	11.2	16.3	31.1	
10/5/2006 9:03	7.1	25.9	9.9	
10/5/2006 9:04	30.1	33.6	17.9	
10/5/2006 9:05	32.1	36.4	19.5	
10/5/2006 9:06	35.4	43.3	19.6	
10/5/2006 9:07	35.5	56.6	22.3	
10/5/2006 9:08	26.2	51.3	28.2	
10/5/2006 9:09	27.5	33.6	22.4	
10/5/2006 9:10	38.1	40.1	25.9	
10/5/2006 9:11	25.8	52.2	17.1	
10/5/2006 9:12	32.5	29.1	7.2	
10/5/2006 9:13	35.4	33.4	8.9	
10/5/2006 9:14	33.1	25.6	6.2	
10/5/2006 9:15	37.7	18.9	5.2	
10/5/2006 9:16	36.2	17.6	5.3	
10/5/2006 9:17	37.8	18.6	4.9	
10/5/2006 9:18	59.7	12.2	1.4	
10/5/2006 9:19	52.5	8.8	0.8	
10/5/2006 9:20	48	7.2	0.9	
10/5/2006 9:21	58.1	5.6	0.6	
10/5/2006 9:22	47.5	4.8	0.6	
10/5/2006 9:23	35.6	10.9	4.2	
10/5/2006 9:24	44.7	9.8	9.6	
10/5/2006 9:25	32.3	33.6	35.6	
10/5/2006 9:26	30.4	45.9	65	
10/5/2006 9:27	35.4	51.2	65.7	
10/5/2006 9:28	30.5	44	51.1	
10/5/2006 9:29	43.5	38.4	38.7	
10/5/2006 9:30	69.6	21.6	9.7	

ANALYZER FIELD DATA

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	10/5/2006
Run Number:	3

	CO	SO_2	NOx	
10/5/2006 9:31	60.6	12.3	1.9	
10/5/2006 9:32	65.4	12.9	0.9	
10/5/2006 9:33	55.7	17.3	0.7	
10/5/2006 9:34	58.6	16.4	0.7	
10/5/2006 9:35	57.4	12.6	0.6	
10/5/2006 9:36	60.2	7.5	0.6	
10/5/2006 9:37	59.7	5.6	0.6	
10/5/2006 9:38	65.2	4.6	0.5	
10/5/2006 9:39	62.3	4.1	0.6	
10/5/2006 9:40	60.4	3.7	0.6	
10/5/2006 9:41	70	3.6	0.5	
10/5/2006 9:42	65.8	4.2	0.5	
10/5/2006 9:43	69.6	4.2	0.6	
10/5/2006 9:44	67.2	3.7	0.6	
10/5/2006 9:45	69.7	3.2	0.5	
10/5/2006 9:46	52.1	4	0.7	
10/5/2006 9:47	40.6	15.6	3.1	
10/5/2006 9:48	40.4	10.7	9.1	
10/5/2006 9:49	40	11.7	18.7	
10/5/2006 9:50	58.7	7.4	4.2	
10/5/2006 9:51	60.4	14.4	2.4	
10/5/2006 9:52	60.4	10.3	1.5	
10/5/2006 9:53	51	9.7	1.6	
10/5/2006 9:54	40.8	9.9	3.4	
10/5/2006 9:55	54.7	6.9	1.2	
10/5/2006 9:56	41.1	9	2.3	
10/5/2006 9:57	44.7	8.9	6.8	
10/5/2006 9:58	50.3	6.4	1.7	
10/5/2006 9:59	41	7.2	3.3	
10/5/2006 10:00	36.1	6.9	4.8	
10/5/2006 10:01	45.2	4.6	1	
10/5/2006 10:02	41.1	3.7	0.6	
10/5/2006 10:03	16.1	3.1	0.4	
10/5/2006 10:04	30.1	2.6	-0.1	
10/5/2006 10:05	39.7	2.5	-0.3	
10/5/2006 10:06	36.1	2.3	-0.3	
10/5/2006 10:07	40.4	2.2	-0.3	
10/5/2006 10:08	45	2.1	-0.3	
10/5/2006 10:09	40.6	2	-0.3	
10/5/2006 10:10	40.2	2	-0.4	
10/5/2006 10:11	40.4	1.9	-0.3	
10/5/2006 10:12	36.1	1.8	-0.4	
10/5/2006 10:13	12	35	-0.1	
10/5/2006 10:14	0.5	51	0.1	
10/5/2006 10:15	0.4	54.4	0	
10/5/2006 10:16	0.4	56.1	0	
10/5/2006 10:17	0.4	56.9	0	
10/5/2006 10:18	0.4	57.5	0	
10/5/2006 10:19	0.4	58.1	0	SO2 gas (62.09)
10/5/2006 10:20	9	30.7	0	
10/5/2006 10:21	91.1	9.2	-0.1	
10/5/2006 10:22	93.5	5.5	-0.1	CO gas (94.36)
10/5/2006 10:23	86.9	4.2	2	
10/5/2006 10:24	6.9	3.7	29.3	
10/5/2006 10:25	0.4	2.8	48.2	
10/5/2006 10:26	0.4	2.3	50	
10/5/2006 10:27	0.4	2	50.1	
10/5/2006 10:28	0.4	1.3	50.1	NOx gas (49.08)

Run 3 Averages	
CO	44.10
NOx	10.59
SO2	19.13

APPENDIX C

FIELD DATA

Lead Emissions

VELOCITY TRAVERSE POINT DETERMINATION
(EPA Method 1)

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	**LEAD - Castrip**
Date:	10-2-06 to 10-5-06

Circular Stack
Traverse Points on Diameter:
Stack Diameter (inches): **96**

Point	4	6	8	10	12
1	6.43	4.22	3.07	2.50	**2.02**
2	24.00	14.02	10.08	7.87	**6.43**
3	72.00	28.42	18.62	14.02	**11.33**
4	89.57	67.58	31.01	21.70	**16.99**
5		81.98	64.99	32.83	**24.00**
6		91.78	77.38	63.17	**34.18**
7			85.92	74.30	61.82
8			92.93	81.98	72.00
9				88.13	79.01
10				93.50	84.67
11					89.57
12					93.98

AIR TEST PROFESSIONALS FIELD DATA SHEET — LEAD TESTING

EPA METHOD 1-4/12/9 RUN 1 PAGE ___ - ___

CLIENT	Nucor Steel	METER BOX ID	A-1	K FACTOR	3.5	DUCT DIMENSIONS (in.)	96"
LOCATION	Crawfordsville, IN	METER γ	0.99	METER ΔH@	1.74	PORT LENGTH (in.)	5"
UNIT	Cast Strip	PITOT C_p	0.84	PROBE LINER	Glass	FILTER ID	R1 — SILICA ID #1
DATE 10-2-06	PROJECT #	PROBE ID	5' 1	NOZZLE ID	0.25	TEDLAR BAG ID	
METER OPERATOR	Carlos Brown	BAROMETRIC	30.13	AMBIENT TEMP (°F)		PITOT CHECK PASS ☒ FAIL ☐	O_2 20.0
PROBE OPERATOR	Marcus Allen	STATIC PRESSURE (in. H_2O)	-0.25				CO_2 0.0
VISIBLE EMISSIONS READER	Nita Greenburg	LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	13"	H_2O (mL)	4.0
CLIENT CONTACT	Trevor Beers	LEAK RATE AFTER (cfm)	0.000	@ (in. Hg)	7"	SILICA GEL (g)	13.5
AGENCY CONTACT	David Harrison	START TIME	0901	STOP TIME	1009	TOTAL Vic	17.5

Diagram of Test Location

Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F) Set Points	Filter Tf (°F) Set Points	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				77.20								
1	2.5	0.65	2.28	79.10	95	250	249	54	66	64	2	
2	5.0	0.65	2.28	81.1	95	251	252	55	66	64	2	
3	7.5	0.62	2.17	83.0	96	250	250	56	66	64	2	
4	10.0	0.62	2.17	85.0	103	250	248	57	67	64	2	
5	12.5	0.62	2.17	87.0	104	249	248	58	68	65	2	
6	15.0	0.60	2.10	88.8	105	248	249	59	69	65	2	
7	17.5	0.60	2.10	90.8	110	251	253	59	70	66	2	
8	20.0	0.61	2.14	93.0	111	253	250	59	70	66	2	
9	22.5	0.59	2.07	94.9	112	250	250	60	71	66	2	
10	25.0	0.58	2.04	97.0	115	250	250	61	72	67	2	
11	27.5	0.52	1.82	98.8	120	250	251	62	74	68	2	
12	30	0.52	1.82	1007.6	120	250	250	62	74	68	2	
13	32.5	0.54	1.89	1002.6	126	245	246	62	74	69	2	
14	35.0	0.53	1.86	104.6	127	249	245	62	76	70	2	
15	37.5	0.52	1.82	106.4	128	249	250	62	76	70	2	
16	40.0	0.52	1.82	108.4	129	249	252	63	78	71	2	
17	42.5	0.51	1.79	110.1	132	249	254	64	79	72	2	
18	45.0	0.51	1.79	112.0	132	249	244	64	80	73	2	
19	47.5	0.52	1.82	114.0	132	249	248	64	81	73	2	
20	50.0	0.50	1.75	115.8	132	250	248	64	81	73	2	
21	52.5	0.52	1.82	117.7	131	251	251	65	81	73	2	
22	55.0	0.51	1.79	119.7	131	250	251	65	81	73	2	
23	57.5	0.50	1.75	121.6	130	250	252	66	81	73	2	
24	60	0.59	2.03	123.40	130	250	250	66	81	73	2	

AIR TEST ..OFESSIONALS FIELD DATA SHEET

LEAD TESTING EPA METHOD 1-4/12/9 RUN 2 PAGE ___ ___

CLIENT Nucor Steel	METER BOX ID A-1	K FACTOR 3.60	DUCT DIMENSIONS (in.) 96"		Diagram of Test Location
LOCATION Crawfordsville, IN	METER γ 0.99	METER ΔH@ 1.74	PORT LENGTH (in.) 5"		
UNIT Cast Strip	PITOT C_p 0.84	PROBE LINER Glass	FILTER ID R2	SILICA ID #2	
DATE 10-3-06 PROJECT #	PROBE ID 5'	NOZZLE ID 0.25	TEDLAR BAG ID		
METER OPERATOR Carlos Brown	BAROMETRIC 30.06	AMBIENT TEMP (°F)	PITOT CHECK	O_2 20.0	
PROBE OPERATOR Andy Young	STATIC PRESSURE (in. H_2O) -0.25		PASS ☒ FAIL ☐	CO_2 0.0	
VISIBLE EMISSIONS READER Nita Greenburg	LEAK RATE BEFORE (cfm) 0.000	@ (in. Hg) 12"	H_2O (mL) 12.0		
CLIENT CONTACT Trevor Beers	LEAK RATE AFTER (cfm) 0.000	@ (in. Hg) 8"	SILICA GEL (g) 10.2		
AGENCY CONTACT David Harrison	START TIME 1432	STOP TIME 1536	TOTAL Vlc 22.2		

Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F) Set Points	Filter Tf (°F) Set Points	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				136.10								
1	2.5	0.60	2.16	138.2	142	250	261	66	86	85	4	
2	5.0	0.58	2.09	140.3	142	254	254	65	86	85	4	
3	7.5	0.58	2.09	142.2	143	254	251	65	86	85	4	
4	10.0	0.58	2.09	144.5	144	252	251	65	87	86	4	
5	12.5	0.52	1.87	146.2	146	248	253	64	88	86	3.5	
6	15.0	0.48	1.73	148.1	144	247	250	64	88	86	3.5	
7	17.5	0.58	2.09	150.2	149	251	256	64	89	87	4.0	
8	20.0	0.58	2.09	152.2	150	251	247	64	89	87	4.0	
9	22.5	0.55	1.98	154.2	151	249	245	64	91	88	4.0	
10	25.0	0.60	2.16	156.3	151	249	255	64	92	88	4	
11	27.5	0.50	1.80	158.2	151	251	250	63	92	88	4	
12	30	0.46	1.66	160.1	147	252	252	63	93	89	4	
13	32.5	0.58	2.09	162.1	155	249	256	64	94	90	4	
14	35.0	0.54	1.94	164.1	155	253	251	64	94	90	4	
15	37.5	0.54	1.94	166.0	155	253	251	64	95	90	4	
16	40.0	0.54	1.94	168.1	156	251	244	64	95	90	4	
17	42.5	0.47	1.69	170.0	156	249	252	64	96	91	4	
18	45.0	0.42	1.51	171.7	156	248	245	64	97	92	4	
19	47.5	0.58	2.09	173.7	156	248	246	65	97	93	4	
20	50.0	0.60	2.16	175.7	158	249	253	65	98	93	4	
21	52.5	0.55	1.98	177.7	159	250	250	65	99	93	4	
22	55.0	0.58	2.09	179.8	160	251	251	66	99	94	4	
23	57.5	0.54	1.94	181.8	160	252	255	66	100	95	4	
24	60	0.42	1.51	183.578	161	252	250	66	101	96	4	

AIR TES PROFESSIONALS FIELD DATA SHEET LEAD TEST EPA METHOD 1-4/12/9 RUN 3 PAGE _ OF ___

CLIENT	Nucor Steel	METER BOX ID	A-1	K FACTOR	3.70	DUCT DIMENSIONS (in.)	96"
LOCATION	Crawfordsville, IN	METER γ	0.99	METER ΔH@	1.74	PORT LENGTH (in.)	5"
UNIT	CAST STRIP	PITOT C_P	0.84	PROBE LINER	GLASS	FILTER ID	R3 — SILICA ID 3
DATE 10-5-06	PROJECT #	PROBE ID	5'1	NOZZLE ID	0.25	TEDLAR BAG ID	
METER OPERATOR	CARLOS BROWN	BAROMETRIC	30.15	AMBIENT TEMP (°F)		PITOT CHECK PASS ☒ FAIL ☐	O_2 20.0
PROBE OPERATOR	ANDY YOUNG	STATIC PRESSURE (in. H_2O)		-0.25			CO_2 0.0
VISIBLE EMISSIONS READER		LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	11"	H_2O (mL)	7.0
CLIENT CONTACT	TREVOR BEERS	LEAK RATE AFTER (cfm)	0.000	@ (in. Hg)	8"	SILICA GEL (g)	13.6
AGENCY CONTACT	DAVID HARRISON	START TIME	0855	STOP TIME	1007	TOTAL Vic	20.6

Diagram of Test Location

Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F) Set Points	Filter Tf (°F) Set Points	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				184.100								
1	2.5	0.50	1.85	185.9	106	257	250	50	54	54	3	
2	5.0	0.50	1.85	188.0	107	254	250	50	54	54	3	
3	7.5	0.48	1.78	190.0	108	254	248	50	54	54	3	
4	10.0	0.44	1.63	19[illegible]	112	252	248	51	55	54	3	
5	12.5	0.42	1.55	193.2	119	254	250	51	55	54	3	
6	15.0	0.42	1.55	195.0	121	252	250	52	55	54	3	
7	17.5	0.48	1.78	197.0	123	250	250	52	55	54	3	
8	20.0	0.56	2.07	199.0	128	250	252	53	55	54	3	
9	22.5	0.56	2.07	201.0	132	252	250	53	56	54	3	
10	25.0	0.58	2.15	203.0	130	252	252	54	56	55	3	
11	27.5	0.60	2.22	205.0	134	252	254	54	56	55	3	
12	30	0.62	2.29	207.0	138	252	254	54	56	55	3	
13	32.5	0.52	1.92	208.8	140	254	254	54	56	55	3	
14	35.0	0.52	1.92	210.6	145	254	256	54	56	55	3	
15	37.5	0.54	2.00	212.4	146	252	254	55	56	55	3	
16	40.0	0.54	2.00	214.2	142	252	256	55	57	56	3	
17	42.5	0.55	2.04	216.0	140	252	256	55	57	56	3	
18	45.0	0.56	2.07	217.8	138	252	258	55	57	56	3	
19	47.5	0.56	2.07	219.6	125	254	256	55	57	56	3	
20	50.0	0.58	2.15	221.3	123	254	256	56	57	56	3	
21	52.5	0.60	2.22	223.1	125	252	257	56	57	56	3	
22	55.0	0.62	2.29	224.8	124	252	256	56	57	56	3	
23	57.5	0.64	2.37	226.6	122	250	256	56	57	56	3	
24	60	0.65	2.41	228.350	122	250	257	56	57	56	3	

APPENDIX D

LABORATORY DATA

Particulate Emissions

LABORATORY DATA

PARTICULATE WEIGHT SHEET

Source: Nucor Steel – Cast Strip Stack

Date:		10/02/06	10/03/06	10/05/06
Acetone	**Blank**	**1**	**2**	**3**
Run ID#	A-10	A7	A5	A9
Tare Wt	63.8189	65.7294	64.2841	64.7773
Gross Wt	63.8189	65.7333	64.2874	64.7796
Correction	0.0000	0.0000	0.0000	0.0000
Net Wt	0.0000	0.0039	0.0033	0.0023
Filter		**1**	**2**	**3**
Run ID#		#460	#458	#465
Tare Wt		0.4087	0.4016	0.4013
Gross Wt		0.4099	0.4033	0.4025
Net Wt		0.0012	0.0017	0.0012

Total Gain		**0.0051**	**0.0050**	**0.0035**

Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, IN 46219

Nucor Steel– Strip Caster

PO# 183

Analytical Report
(1106-17)

HPLC Analysis

Sulfate

EPA Method 202

Condensible particulate

Enthalpy Analytical, Inc.

Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road Durham, NC 27703 - 5518

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)
- This analytical report was prepared in Portable Document Format (.PDF) and contains 53 pages.

Michael Steven Schapira

QA Review Performed by: Michael Steven Schapira

Summary of Results

EPA Method 202 - Condensible Particulate Determination - Data Analysis

Company	Air Test Professionals, Inc.
Analyst	SLG
Parameters	EPA Method 202
# Samples	3 Runs and 1 Blank

Client #	Nucor Steel-Strip Caster
Job #	1106-17
PO #	183
Report Date	11/10/06

Analysis of Particulate Recovery

Sample ID Number	*Run-1*	*Run-2*	*Run-3*
Organic			
Beaker Number	*9337*	*9316*	*9269*
Final Weight, g	1.0111	0.9698	1.0185
Reweigh, Final, g	1.0111	0.9699	1.0185
Beaker Tare Weight, g	1.0099	0.9682	1.0171
Beaker Tare Reweigh, Initial, g	1.0099	0.9682	1.0172
Solvent Blank, g	0.0016	0.0017	0.0015
MeCl2 FV, mL	220	226	212
Net Organic Catch, mg	-0.4	0.0	-0.2
Inorganic			
Beaker Number	*9366*	*9346*	*9342*
Final Weight, g	1.0047	1.0644	1.0437
Reweigh, Final, g	1.0046	1.0645	1.0437
Beaker Tare Weight, g	0.9971	1.0497	1.0134
Beaker Tare Reweigh, Initial, g	0.9972	1.0495	1.0133
Water Blank, g	0.0007	0.0009	0.0009
Sample Final Volume, mL	401	485	475
Charge and Rinse Vol, mL	397	475	469
Sulfate aliquot, mL	5.00	5.00	5.00
Sulfate aliquot CF	1.01	1.01	1.01
Net Inorganic CF	1.09	1.09	1.09
Net Inorganic, mg	7.4	15.7	32.6
Sulfate Catch, ug	6,380	13,619	12,978
Sulfate Correction, mg	2.3	4.9	4.6
Corrected Inorganic, mg	5.2	10.8	28.0
Condensible Particulate, mg	5.2	10.8	28.0

Blank Analysis

Sample ID Number	*MeCl Blank*
Beaker Number	*9282*
Final Weight, g	0.9908
Reweigh, Final, g	0.9908
Initial Weight, g	0.9896
Reweigh, Initial, g	0.9896
MeCl2 Residue, g	0.0012
MeCl2 Volume, mL	78.0
Max. MeCl2 Residue, g	0.0010

Sample ID Number	*H2O Blank*
Beaker Number	*9386*
Final Weight, g	0.9961
Reweigh, Final, g	0.9961
Initial Weight, g	0.9954
Reweigh, Initial, g	0.9955
Water Residue, g	0.0006
Water Volume, mL	323
Max. Water Residue, g	0.0032

In-House Blank Analysis

Sample ID Number	*MeCl Blank*
Beaker Number	*9329*
Final Weight, g	0.9912
Reweigh, Final, g	0.9913
Initial Weight, g	0.9903
Reweigh, Initial, g	0.9903
MeCl2 Residue, g	0.0010
MeCl2 Volume, mL	225
Max. MeCl2 Residue, g	0.0030

Sample ID Number	*H2O Blank*
Beaker Number	*9392*
Final Weight, g	0.9953
Reweigh, Final, g	0.9953
Initial Weight, g	0.9948
Reweigh, Initial, g	0.9948
Water Residue, g	0.0005
Water Volume, mL	250
Max. Water Residue, g	0.0025

Company	ATP, Inc.
Analyst	KEH
Parameters	HPLC Analysis
# Samples	3 runs & 1 blank

Client #	Nucor Steel
Job #	1106-17
PO #	183
Report Date	11/10/2006

Compound	Sample ID / Catch Weight (ug)		
	Run 1	***Run 2***	***Run 3***
Sulfate	6,380	13,619	12,978
	Blank		
Sulfate	450		

Results

Company	ATP, Inc.
Analyst	KEH
Parameters	HPLC Analysis
# Samples	3 runs & 1 blank

Client #	Nucor Steel
Job #	1106-17
PO #	183
Report Date	11/10/2006

MDL 0.0622 (ug/mL)
LOQ 0.372 (ug/mL)
Compound Sulfate

Lower Curve Limit 0.372 (ug/mL)
Upper Curve Limit 13.0 (ug/mL)

Sample ID	Lab ID # 1	Lab ID # 2	Analysis Method	Ret Time (min)	Ret Time (min)	% Diff Ret	Conc # 1 (ug/mL)	Conc # 2 (ug/mL)	% Diff Conc	Avg Conc (ug/mL)	DF	Vol (mL)	Catch Weight (ug)	Qual
Run 1	021-1201.D	021-1202.D	1106-17R.	7.38	7.38	0.1	5.31	5.32	0.2	5.32	20	60.0	6,380	
Run 2	022-1301.D	022-1302.D	1106-17R.	7.38	7.40	0.3	2.28	2.25	0.7	2.27	100	60.0	13,619	
Run 3	023-1401.D	023-1402.D	1106-17R.	7.39	7.39	0.0	2.17	2.16	0.1	2.16	100	60.0	12,978	
Blank	024-1501.D	024-1502.D	1106-17R.	7.38	7.38	0.1	7.50	7.50	0.0	7.50	1	60.0	450	
IHB	025-1601.D	025-1602.D	1106-17R.	7.39	7.39	0.0	3.38	3.38	0.0	3.38	1	60.0	203	
DIUF H2O	008-0901.D	008-0902.D	1106-17R.	NA	NA	NA	0.0622	0.0622	0.0	0.0622	1	1.00	0.0622	ND
MS / Run 1	026-1701.D	026-1702.D	1106-17R.	7.38	7.38	0.0	7.41	7.44	0.2	7.43	1	0.525	3.90	

Spike Amount (ug)	1.25
Native Amount (ug)	2.66
Spike Recovery (%)	99.3%

Narrative Summary

Enthalpy Analytical Narrative Summary

Company:	ATP, Inc.
Client #:	Nucor Steel
PO #	183

Enthalpy #:	1106-17
Analyst:	SLG
Parameters:	EPA Method 202

Custody

Erin Ortiz of Enthalpy Analytical, Inc. received the samples at ambient temperature on 11/3/06 after being relinquished by Air Test Professionals, Inc. There were no visible container problems noted upon receipt. Prior to and during analysis they were kept under lock with access only to authorized personnel of Enthalpy Analytical, Inc.

Methodology

All samples were analyzed in accordance to the requirements and specifications of EPA Method 202.

Instrumentation

All samples were weighed on Mettler AB265-S (SN-1125163272) certified by Precision Weighing, Inc. through October 2, 2007 (NIST Test Number 1132850A).

Labeling

OK

Reporting Notes

The inorganic and organic catch weights are adjusted by a blank correction value. A mathematically determined (theoretical) maximum value is calculated and compared with the actual value measured for each blank. The lower of the two values is used as the blank correction value, which is then factored by the sample volume divided by the blank volume, and subtracted from the sample's catch weight.

Enthalpy considers gravimetric analyses for Method 202 ±0.5 mg at best. Therefore, negative catch weights between 0 and –0.5 mg are treated as zero when determining the total catch weight and no investigation is undertaken. Negative catch weights < -0.5 mg are investigated. None of the catch results for this data set were <-0.5 mg. The organic fraction of ***Run 1*** and ***Run 3*** were both slightly negative, due to the blank correction.

We have reported the sulfate result fom the analysis of the post-(resuspended liquid) fraction of the samples, rather then the pre-(initial liquid) fraction. This gives the more scientifically correct number.

Enthalpy Analytical Narrative Summary

Company:	ATP, Inc.
Client #:	Nucor Steel
PO #:	183

Enthalpy #:	1106-17
Analyst:	KEH
Parameters:	HPLC Analysis

Custody Erin Ortiz of Enthalpy Analytical, Inc. received the samples at ambient temperature on 11/3/06 after being relinquished by Air Test Professionals, Inc. Prior to analysis the samples were kept under lock with access only by authorized personnel of Enthalpy Analytical, Inc.

Analysis The samples were analyzed for sulfate using a Hewlett-Packard series 1100 High Performance Liquid Chromatograph with a Dionex ED40 conductivity detector and a Dionex ASRS suppressor.

Separation Separation was accomplished by a Dionex IonPac AS14 250 x 4.0 mm analytical column using 8.0 *mM* Na_2CO_3/1.0 *mM* $NaHCO_3$ as the eluent at 1.2 mL per minute. A copy of the analytical method (1006-38.M) is included.

Before and after sample analysis, a calibration curve was prepared and analyzed.

Sulfate eluted at approximately 7.4 minutes, separated well, and was easily identified.

Matrix Spike A matrix spike was prepared by spiking a 0.500-mL aliquot of a 20-fold diluted sample ***Run 1*** with 1.25µg of sulfate (25.0 µL of a 50.0 µg/mL solution). The spiked samples were analyzed in the same manner as the other samples. The calculated spike recovery was 99.3%.

Blanks One blank sample was submitted for analysis. No blank adjustments were made to any of the data.

Reproducibility OK

Quality of Data OK

Reporting Notes None.

General Reporting Notes

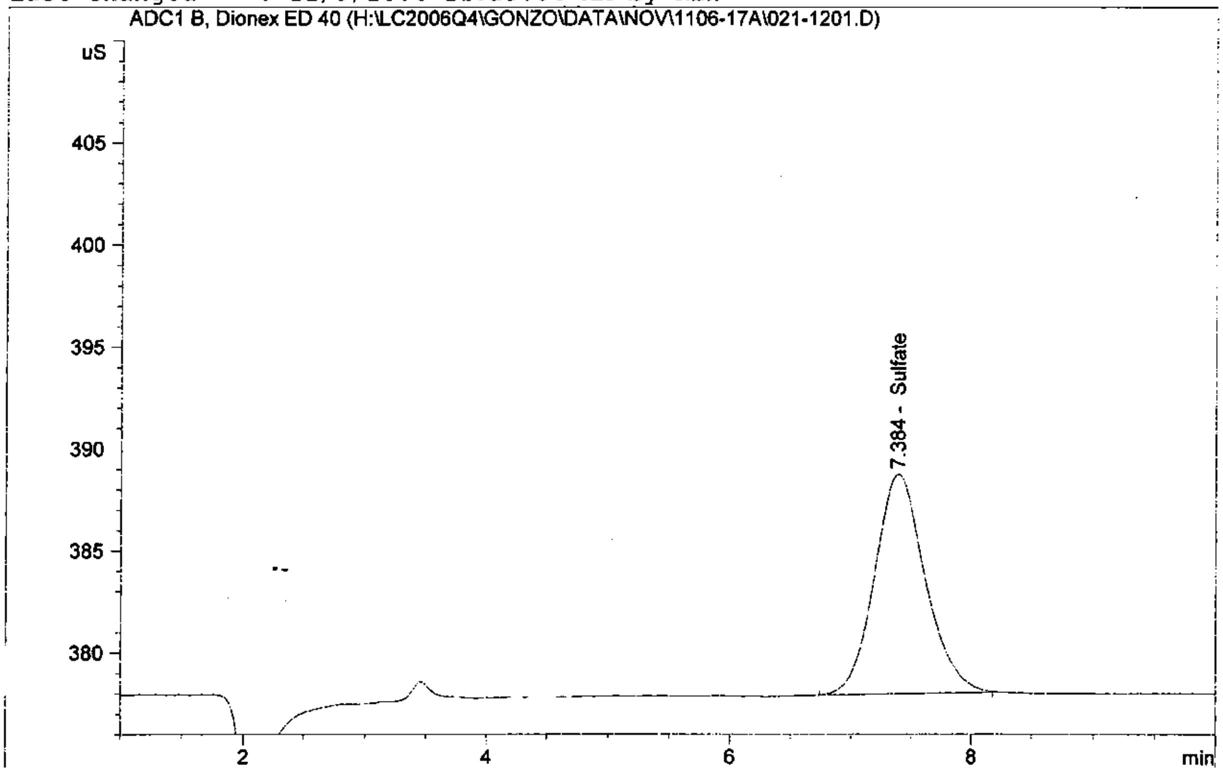
The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. reports, unless specifically noted otherwise.

- The symbol ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot confirm the presence of the analyte of interest reliably.
- The symbol ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The symbol ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The symbol ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The symbol ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point.
- The symbol ***DF*** represents a Dilution Factor. This number represents dilutions during the extraction and/or laboratory stages of sample treatment. The analytical result taken from a laboratory instrument is multiplied by the DF to get final results.
- The Sample ID ***MS*** represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix prohibits analysis for the analyte(s).
- The Sample ID ***MSD*** represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times. Most methods performed by Enthalpy do not require analysis of an MSD.
- The Sample ID ***BS*** represents a Blind Spike. A member of the Quality Assurance department has created BS samples for many of the analytes Enthalpy tests for, and only QA and the Enthalpy Analytical ownership have access to the actual values of these samples. The laboratory analyzes them without knowledge of the actual value, and the spreadsheets get completed for these samples solely by the QA group.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Whenever spikes are prepared for our clients more spikes are prepared than needed. The extras (randomly chosen) are kept in-house at the appropriate temperature conditions. When the spike samples come back from the client for analysis, the LCSs (usually two are saved) are analyzed to confirm that the analyte could be recovered from the media, separate from the spike samples which were used on the project and which may have had issues caused during collection and/or transport.
- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed (specifically values of 1,000 or greater), the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits reported, but no confidence should be placed on more than three significant digits.

Sample Chromatograms

1106-17

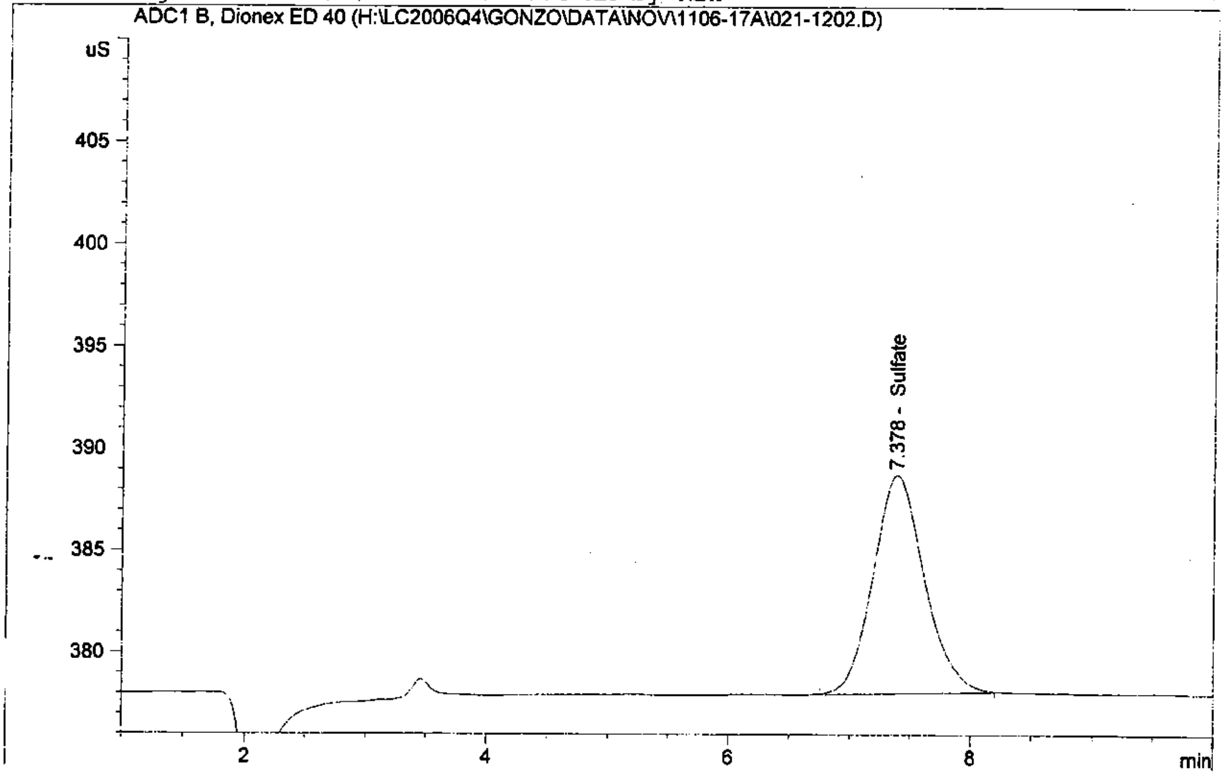
```
=====================================================================
Injection Date  : 11/8/2006 9:21:43 PM          Seq. Line :  12
Sample Name     : Run 1 post*20                  Location : Vial 21
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```




```
=====================================================================
                        External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type    Area      Amt/Area     Amount    Grp   Name
 [min]          [uS*s]                  [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.384 BB     316.40921 1.67775e-2    5.30856    Sulfate

Totals :                               5.30856

 Results obtained with enhanced integrator!
=====================================================================
                          *** End of Report ***
```

1106-17

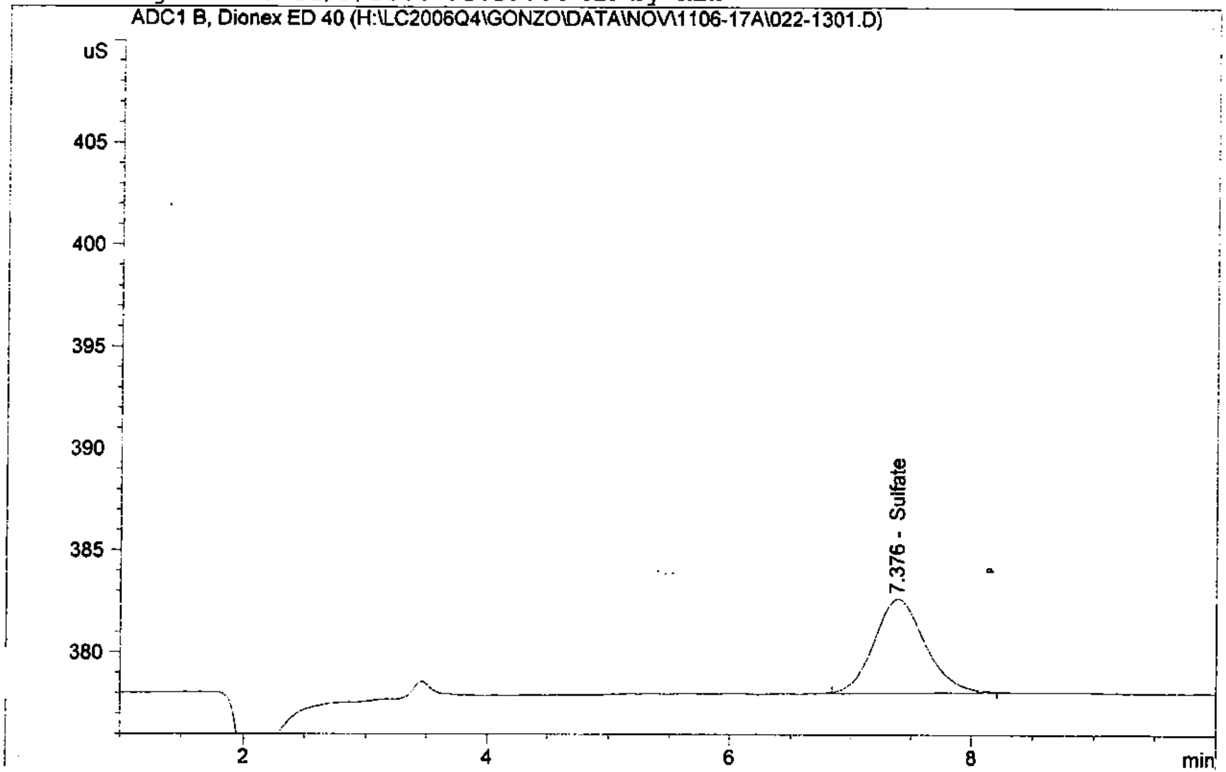
```
=====================================================================
Injection Date  : 11/8/2006 9:33:44 PM          Seq. Line :  12
Sample Name     : Run 1 post*20                  Location : Vial 21
Acq. Operator   : KEH                                 Inj :  2
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```




```
=====================================================================
                     External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type    Area      Amt/Area    Amount   Grp   Name
 [min]         [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.378 BB     317.36676 1.67779e-2    5.32475    Sulfate

Totals :                               5.32475

 Results obtained with enhanced integrator!
=====================================================================
                       *** End of Report ***
```

1106-17

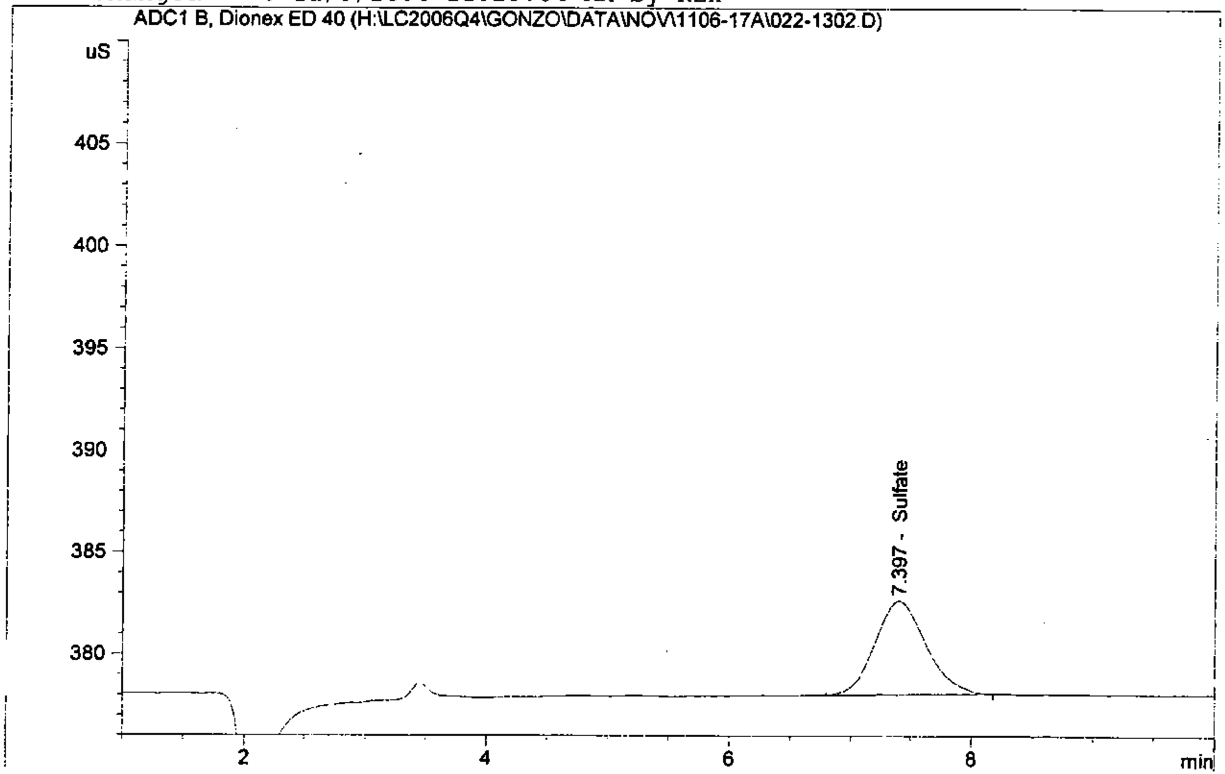
```
=====================================================================
Injection Date  : 11/8/2006 9:45:35 PM          Seq. Line :  13
Sample Name     : Run 2 post*100                  Location : Vial 22
.cq. Operator   : KEH                                  Inj :  1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```




```
=====================================================================
                     External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.376 BB    137.62202 1.66024e-2    2.28485     Sulfate

Totals :                              2.28485

 Results obtained with enhanced integrator!
=====================================================================
                        *** End of Report ***
```

1106-17

Injection Date	: 11/8/2006 9:57:26 PM	Seq. Line :	13
Sample Name	: Run 2 post*100	Location :	Vial 22
Acq. Operator	: KEH	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



External Standard Report

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.397	BB	135.83621	1.65983e-2	2.25465		Sulfate

Totals : 2.25465

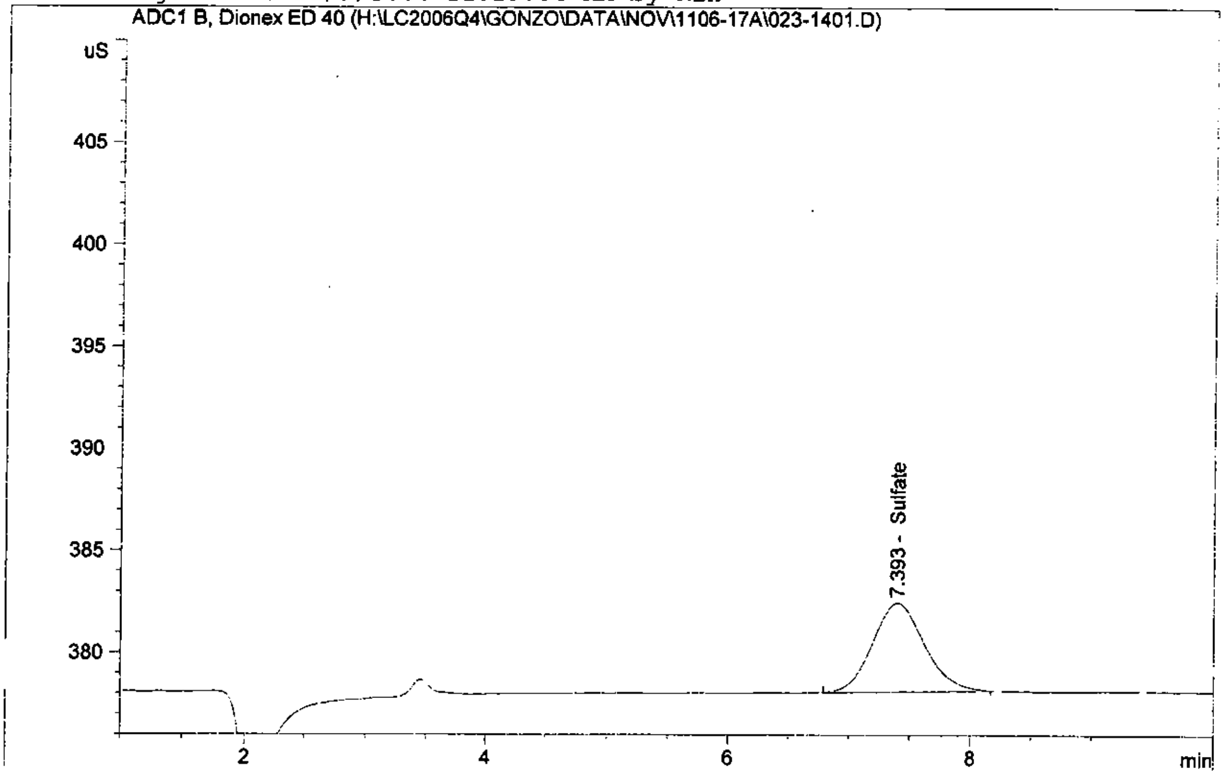
Results obtained with enhanced integrator!

*** End of Report ***

1106-17

Injection Date	: 11/8/2006 10:09:18 PM
Sample Name	: Run 3 post*100
Acq. Operator	: KEH
Acq. Instrument	: Gonzo
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed	: 10/9/2006 11:51:11 AM by KAM
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed	: 11/9/2006 11:29:04 AM by KEH

Seq. Line : 14
Location : Vial 23
Inj : 1
Inj Volume : 25 µl



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Thursday, November 09, 2006 11:28:59 AM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.393	BB	130.55305	1.65856e-2	2.16530		Sulfate

Totals : 2.16530

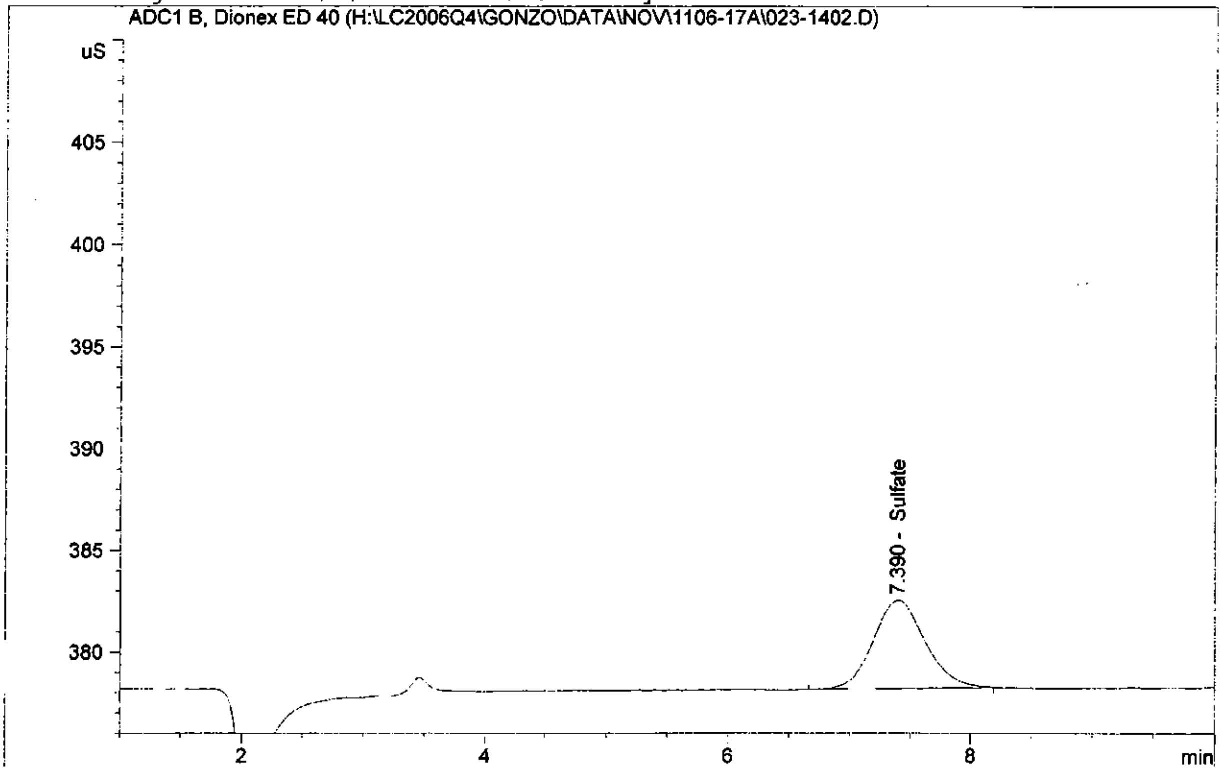
Results obtained with enhanced integrator!

*** End of Report ***

1106-17

===

Injection Date : 11/8/2006 10:21:11 PM Seq. Line : 14
Sample Name : Run 3 post*100 Location : Vial 23
Acq. Operator : KEH Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed : 11/9/2006 11:29:04 AM by KEH



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.390	BB	130.28017	1.65849e-2	2.16069		Sulfate

Totals : 2.16069

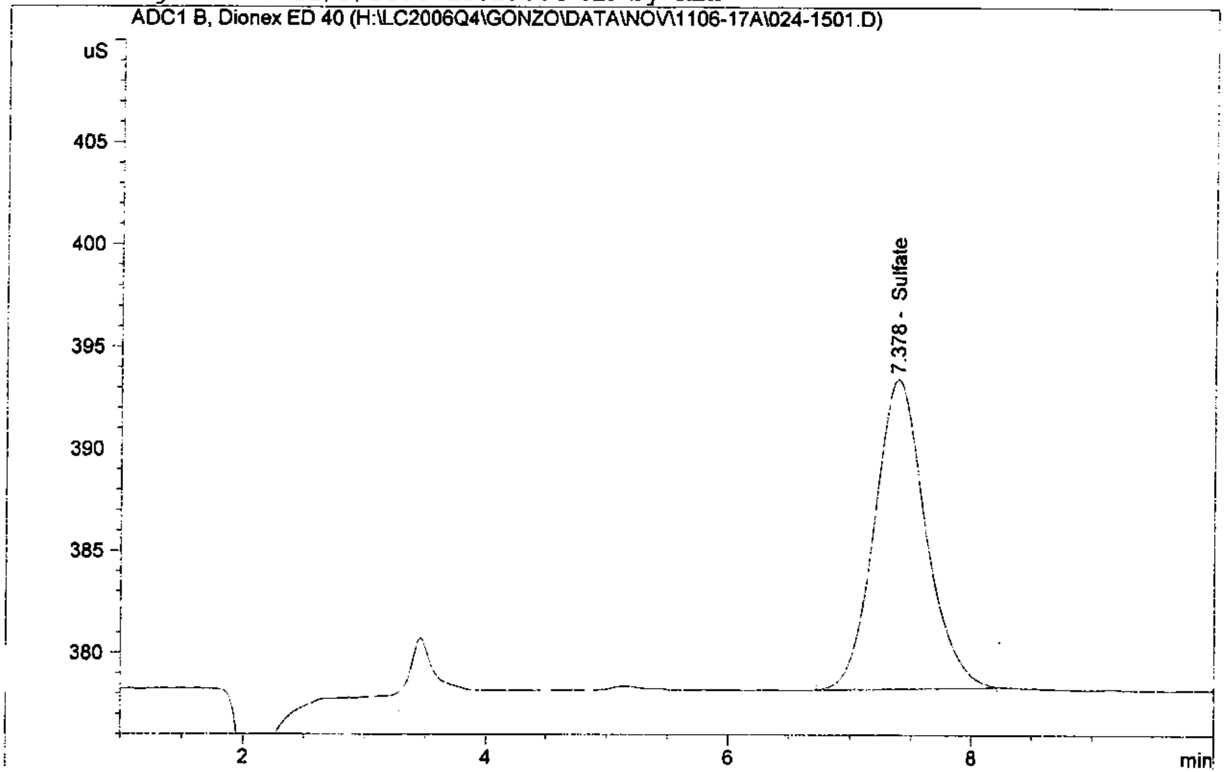
Results obtained with enhanced integrator!

===

*** End of Report ***

1106-17 Sample Blank

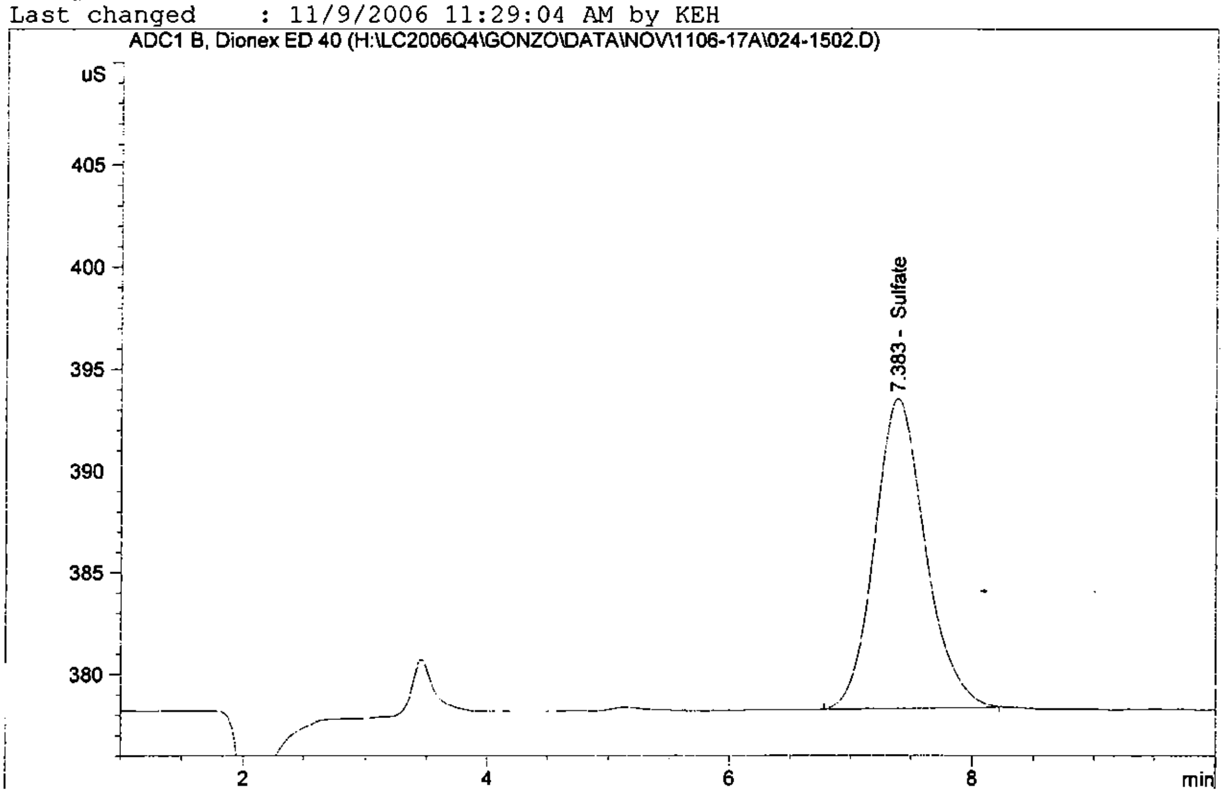
```
=====================================================================
Injection Date  : 11/8/2006 10:33:00 PM          Seq. Line :  15
Sample Name     : Blank post                      Location : Vial 24
Acq. Operator   : KEH                                  Inj :   1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```




```
=====================================================================
                    External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type    Area      Amt/Area    Amount   Grp   Name
 [min]         [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.378 BB     445.85361 1.68167e-2    7.49776    Sulfate

Totals :                               7.49776

 Results obtained with enhanced integrator!
=====================================================================
                          *** End of Report ***
```

1106-17 Sample Blank

Injection Date	: 11/8/2006 10:44:51 PM	Seq. Line :	15
Sample Name	: Blank post	Location :	Vial 24
Acq. Operator	: KEH	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



External Standard Report

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.383	BB	446.11011	1.68167e-2	7.50210		Sulfate

Totals : 7.50210

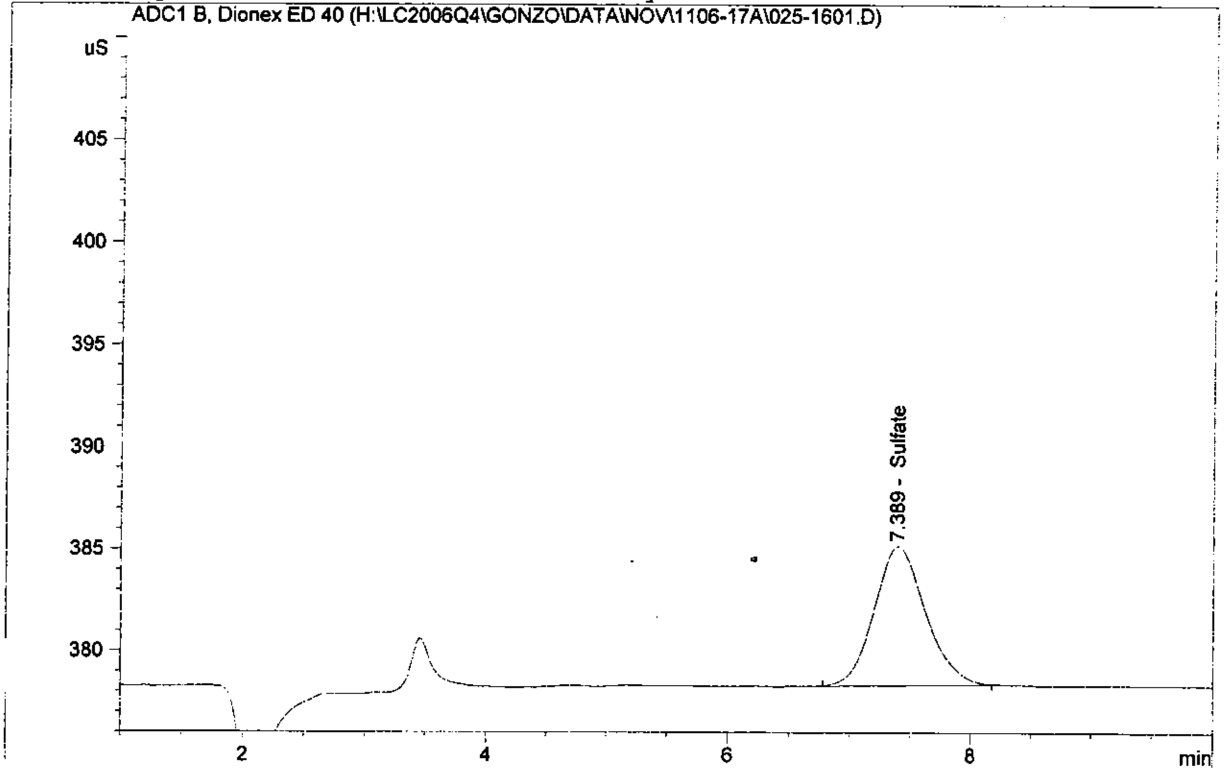
Results obtained with enhanced integrator!

*** End of Report ***

1106-17 In-House Blank

===

Injection Date	: 11/8/2006 10:56:44 PM	Seq. Line :	16
Sample Name	: IHB post	Location :	Vial 25
Acq. Operator	: KEH	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



===

External Standard Report

===

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.389	BB	202.45164	1.67016e-2	3.38127		Sulfate

Totals : 3.38127

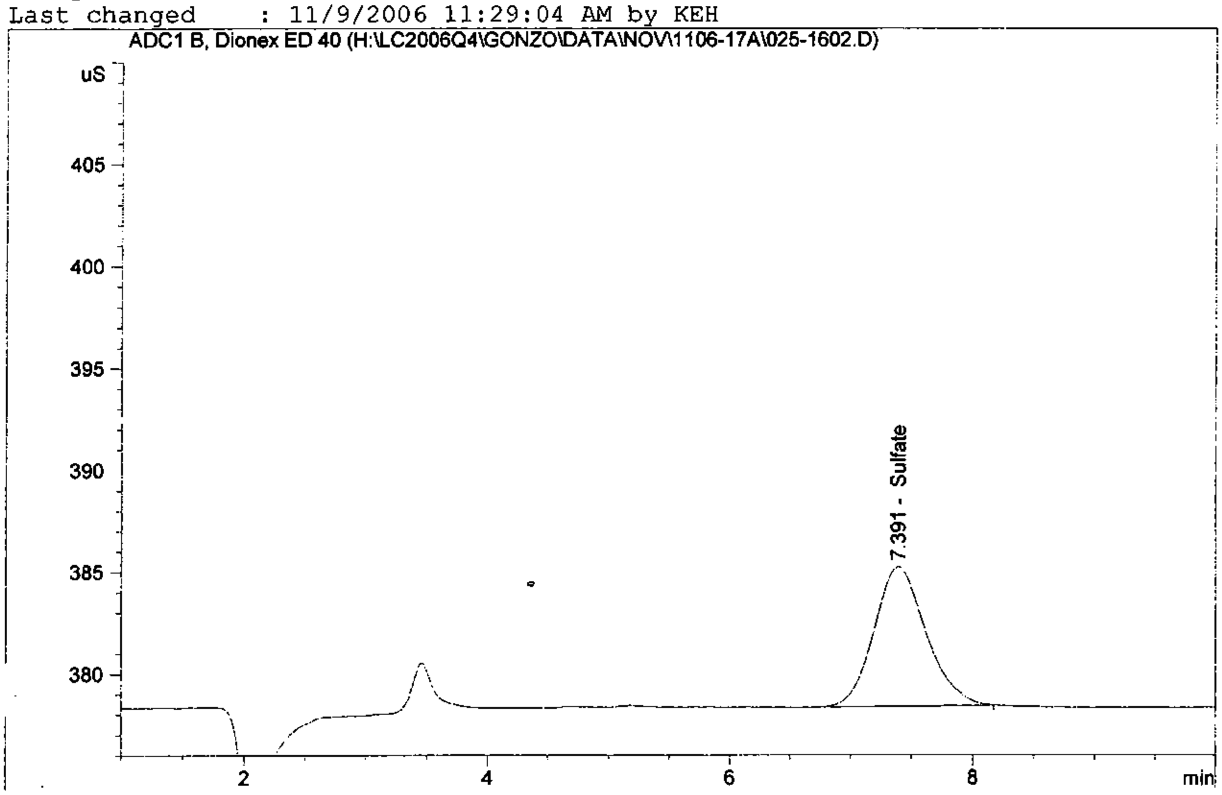
Results obtained with enhanced integrator!

===

*** End of Report ***

1106-17 In-House Blank

```
=====================================================================
Injection Date   : 11/8/2006 11:08:37 PM          Seq. Line :  16
Sample Name      : IHB post                        Location : Vial 25
Acq. Operator    : KEH                                  Inj :   2
Acq. Instrument  : Gonzo                         Inj Volume : 25 µl
Acq. Method      : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed     : 10/9/2006 11:51:11 AM by KAM
Analysis Method  : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed     : 11/9/2006 11:29:04 AM by KEH
```

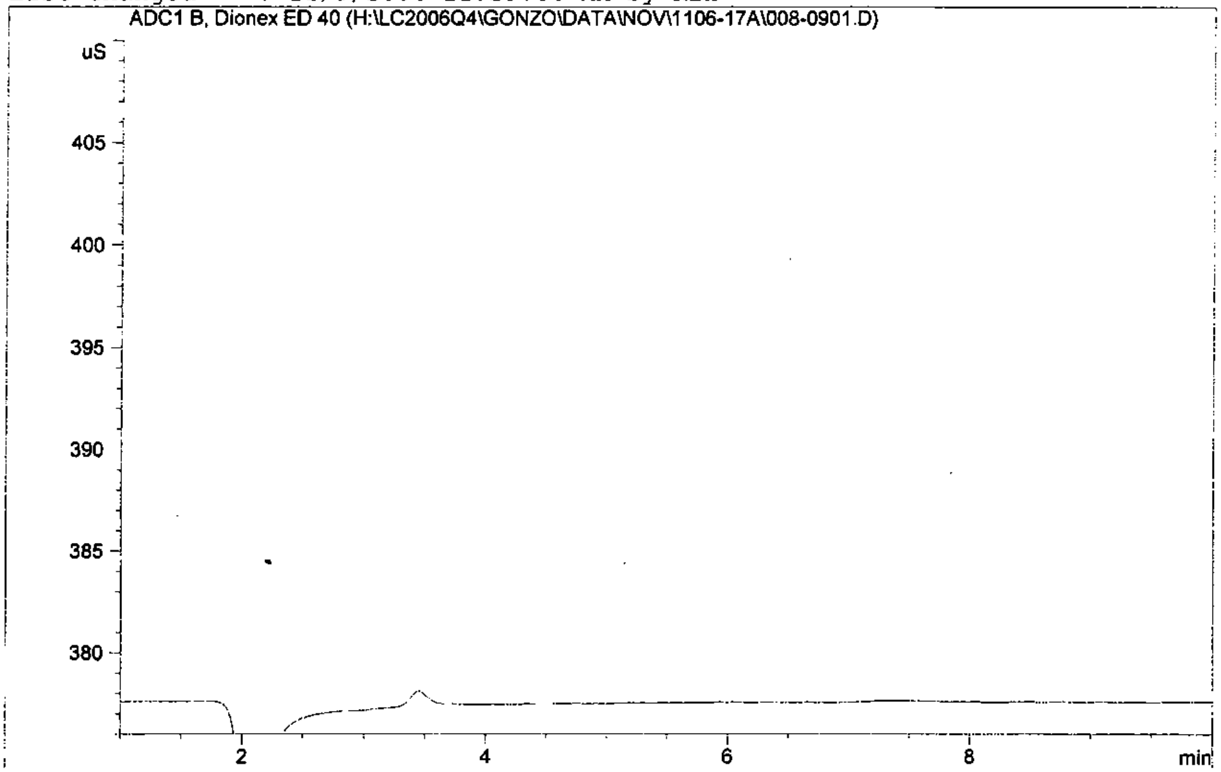



```
=====================================================================
                     External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type    Area      Amt/Area     Amount    Grp   Name
 [min]         [uS*s]                   [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.391 BB      202.31219 1.67015e-2    3.37891    Sulfate

Totals :                                3.37891

 Results obtained with enhanced integrator!
=====================================================================
                          *** End of Report ***
```

Lab Blank DIUF H2O

===

Injection Date : 11/8/2006 8:10:24 PM Seq. Line : 9
Sample Name : DIUF H2O Location : Vial 8
Acq. Operator : KEH Inj : 1
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed : 11/9/2006 11:29:04 AM by KEH



===

External Standard Report

===

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.356		-	-	-		Sulfate

Totals : 0.00000

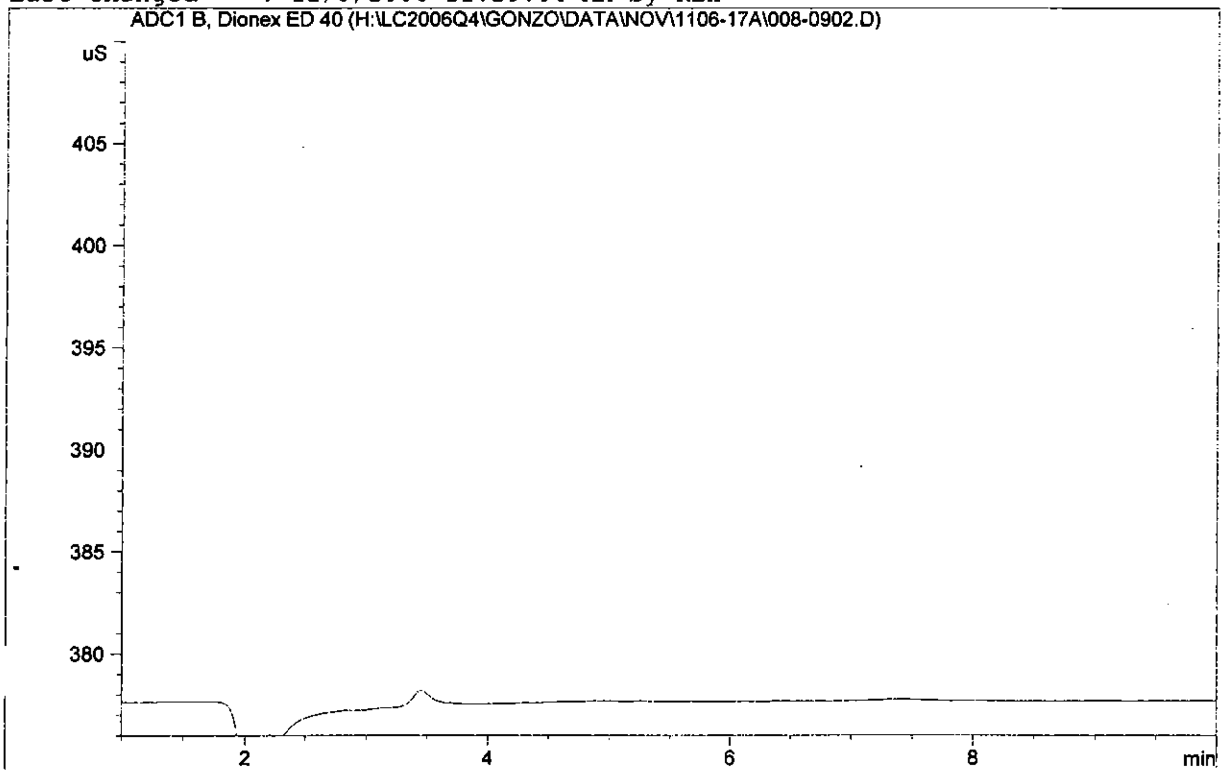
Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

===

Lab Blank DIUF H2O

Injection Date	: 11/8/2006 8:22:14 PM	Seq. Line :	9
Sample Name	: DIUF H2O	Location :	Vial 8
Acq. Operator	: KEH	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



External Standard Report

Sorted By	:	Signal
Calib. Data Modified	:	Thursday, November 09, 2006 11:28:59 AM
Multiplier	:	1.0000
Dilution	:	1.0000

Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.356		-	-	-		Sulfate

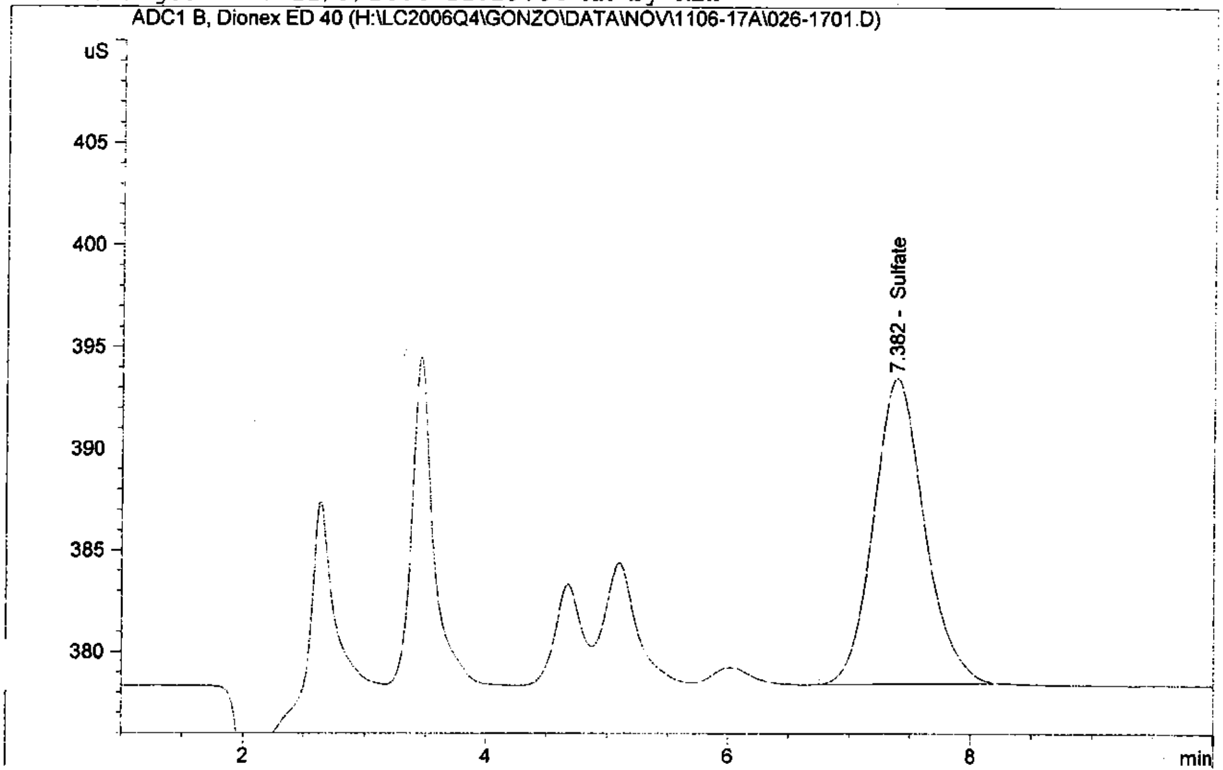
Totals : 0.00000

Results obtained with enhanced integrator!
1 Warnings or Errors :

Warning : Calibrated compound(s) not found

1106-17 Matrix Spike

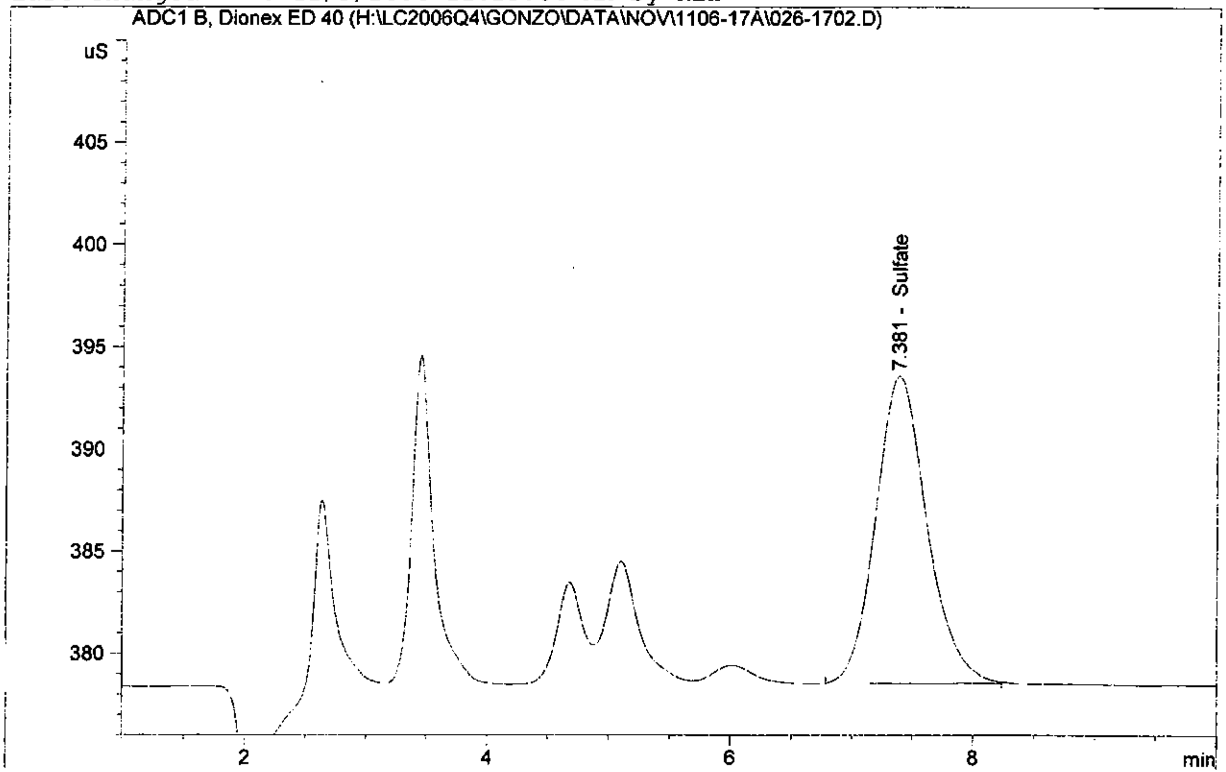
```
=====================================================================
Injection Date  : 11/8/2006 11:20:27 PM          Seq. Line :  17
Sample Name     : MS/Run 1 post                   Location : Vial 26
Acq. Operator   : KEH                                  Inj :  1
Acq. Instrument : Gonzo                         Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```




```
=====================================================================
                    External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type    Area      Amt/Area     Amount    Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.382 BB     440.71875 1.68155e-2    7.41092    Sulfate

Totals :                               7.41092

 Results obtained with enhanced integrator!
=====================================================================
                       *** End of Report ***
```

1106-17 Matrix Spike

Injection Date	: 11/8/2006 11:32:16 PM	Seq. Line :	17
Sample Name	: MS/Run 1 post	Location :	Vial 26
Acq. Operator	: KEH	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



External Standard Report

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.381	BB	442.64655	1.68160e-2	7.44353		Sulfate

Totals : 7.44353

Results obtained with enhanced integrator!

*** End of Report ***

Curve(s)/QA Point(s) Chromatograms

Calibration Table

Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM

Calculate : External Standard
Based on : Peak Area

Rel. Reference Window : 15.000 %
Abs. Reference Window : 0.000 min
Rel. Non-ref. Window : 15.000 %
Abs. Non-ref. Window : 0.000 min
Use Multiplier & Dilution Factor with ISTDs
Uncalibrated Peaks : not reported
Partial Calibration : Yes, identified peaks are recalibrated
Correct All Ret. Times: No, only for identified peaks

Curve Type : Linear
Origin : Connected
Weight : Linear (Amnt)

Recalibration Settings:
Average Response : Average all calibrations
Average Retention Time: Floating Average New 75%

Calibration Report Options :
    Printout of recalibrations within a sequence:
        Calibration Table after Recalibration
        Normal Report after Recalibration
    If the sequence is done with bracketing:
        Results of first cycle (ending previous bracket)

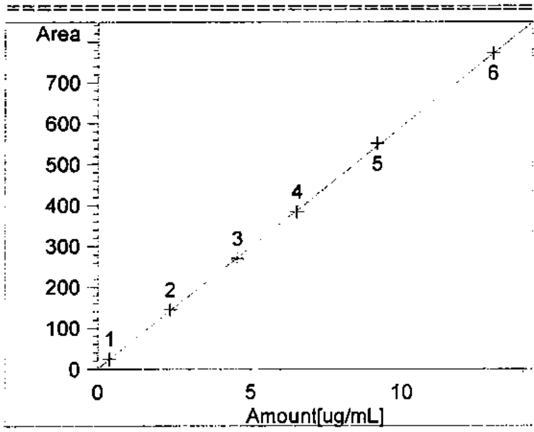
Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Sig	Lvl	Amount [ug/mL]	Area	Amt/Area	Ref	Grp	Name
7.356	1	1	3.72000e-1	24.59510	1.51250e-2			Sulfate
		2	2.38000	144.21933	1.65026e-2			
		3	4.55000	268.76852	1.69291e-2			
		4	6.52000	383.97714	1.69802e-2			
		5	9.18000	550.74869	1.66682e-2			
		6	13.00000	771.56766	1.68488e-2			

Peak Sum Table

No Entries in table

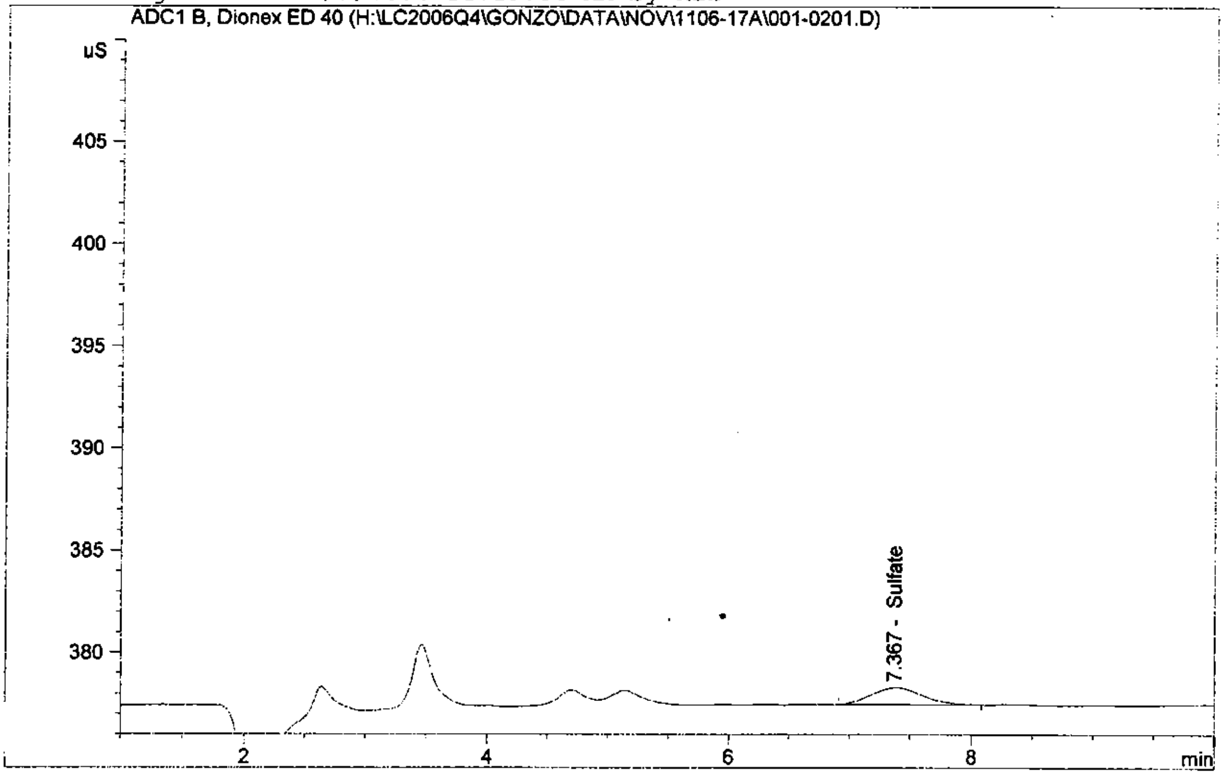
Calibration Curves



Sulfate at exp. RT: 7.356
ADC1 B, Dionex ED 40
Correlation: 0.99996
Residual Std. Dev.: 3.70212
Formula: y = mx + b
    m: 59.12850
    b: 2.52204
    x: Amount[ug/mL]
    y: Area
Calibration Level Weights:
    Level 1 : 1
    Level 2 : 0.156303
    Level 3 : 0.081758
    Level 4 : 0.057055
    Level 5 : 0.040523
    Level 6 : 0.028615

===

Injection Date	: 11/8/2006 5:24:13 PM	Seq. Line :	2
Sample Name	: Standard 1	Location :	Vial 1
Acq. Operator	: KEH	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
.cq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.367	BP	24.07130	1.51726e-2	3.65225e-1		Sulfate

Totals : 3.65225e-1

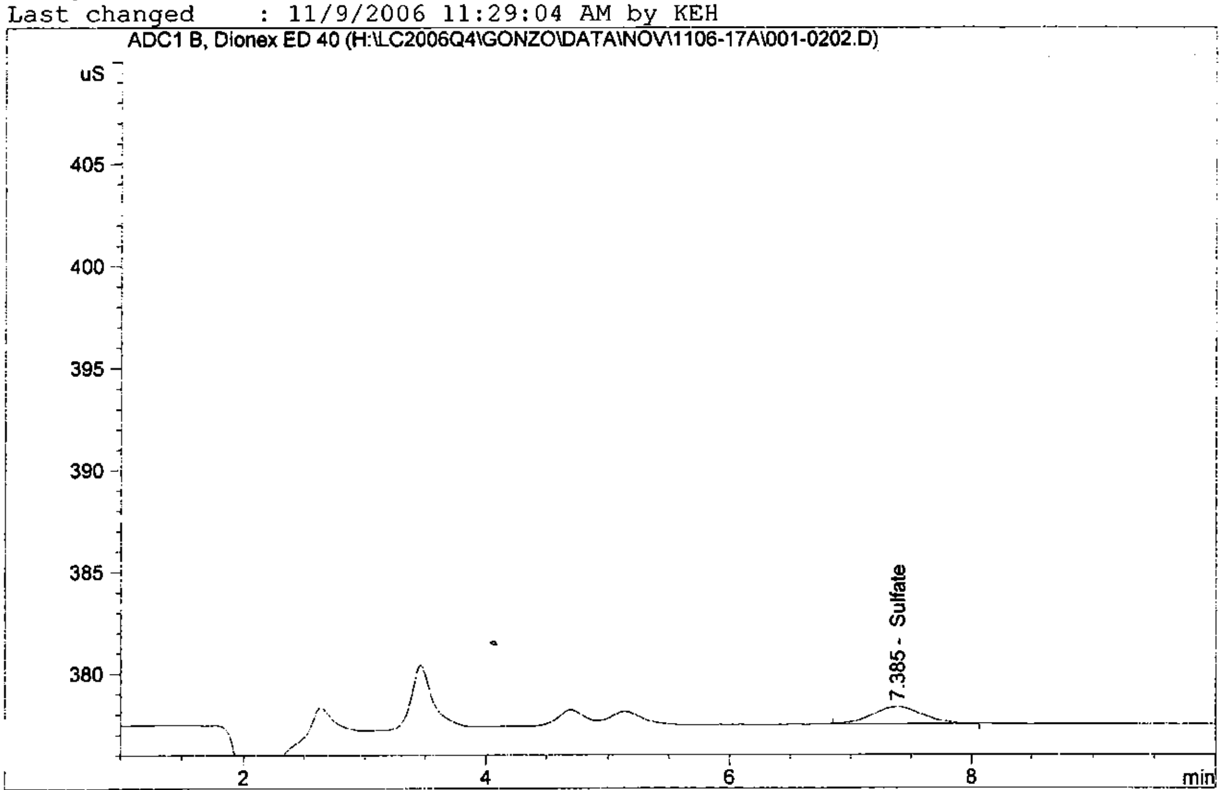
Results obtained with enhanced integrator!

===

*** End of Report ***

===

```
Injection Date  : 11/8/2006 5:36:06 PM          Seq. Line :   2
Sample Name     : Standard 1                     Location : Vial 1
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```



===

External Standard Report

===

```
Sorted By            :      Signal
Calib. Data Modified :      Thursday, November 09, 2006 11:28:59 AM
Multiplier           :      1.0000
Dilution             :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.385	BV	25.11889	1.52143e-2	3.82165e-1		Sulfate

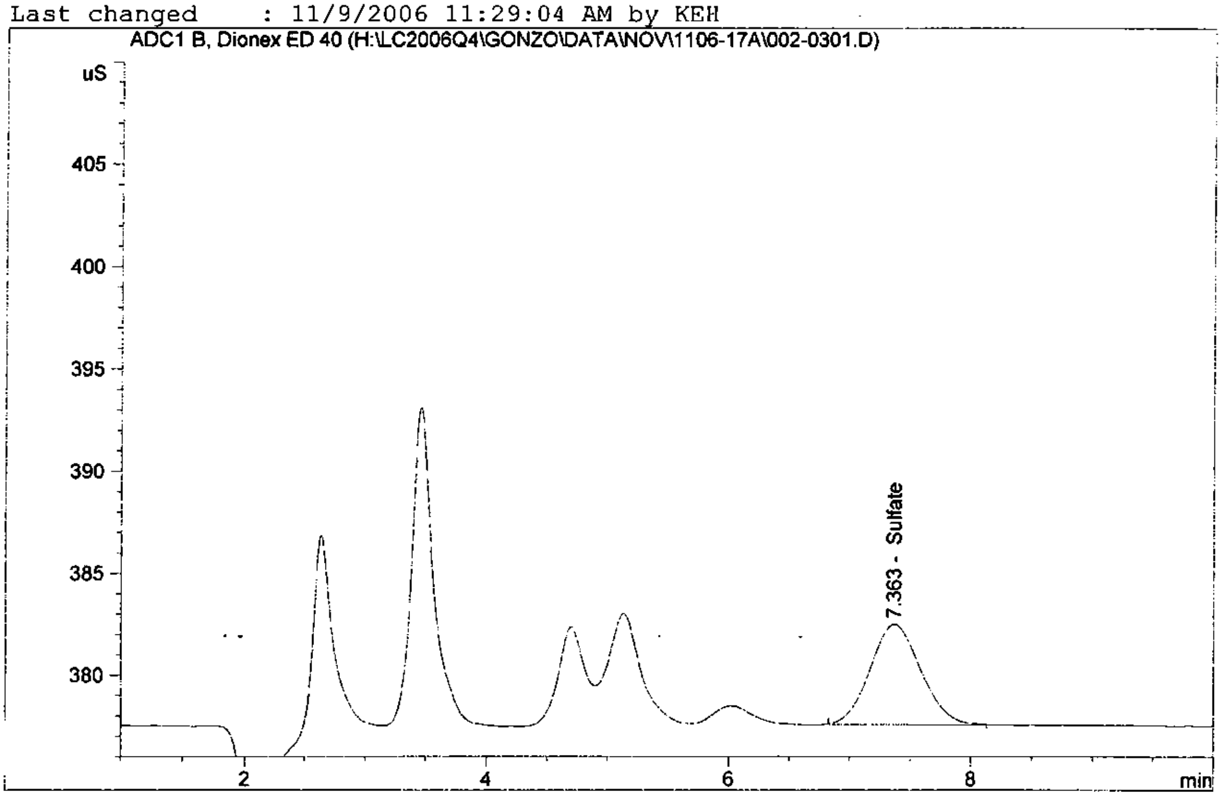
Totals : 3.82165e-1

Results obtained with enhanced integrator!

===

*** End of Report ***

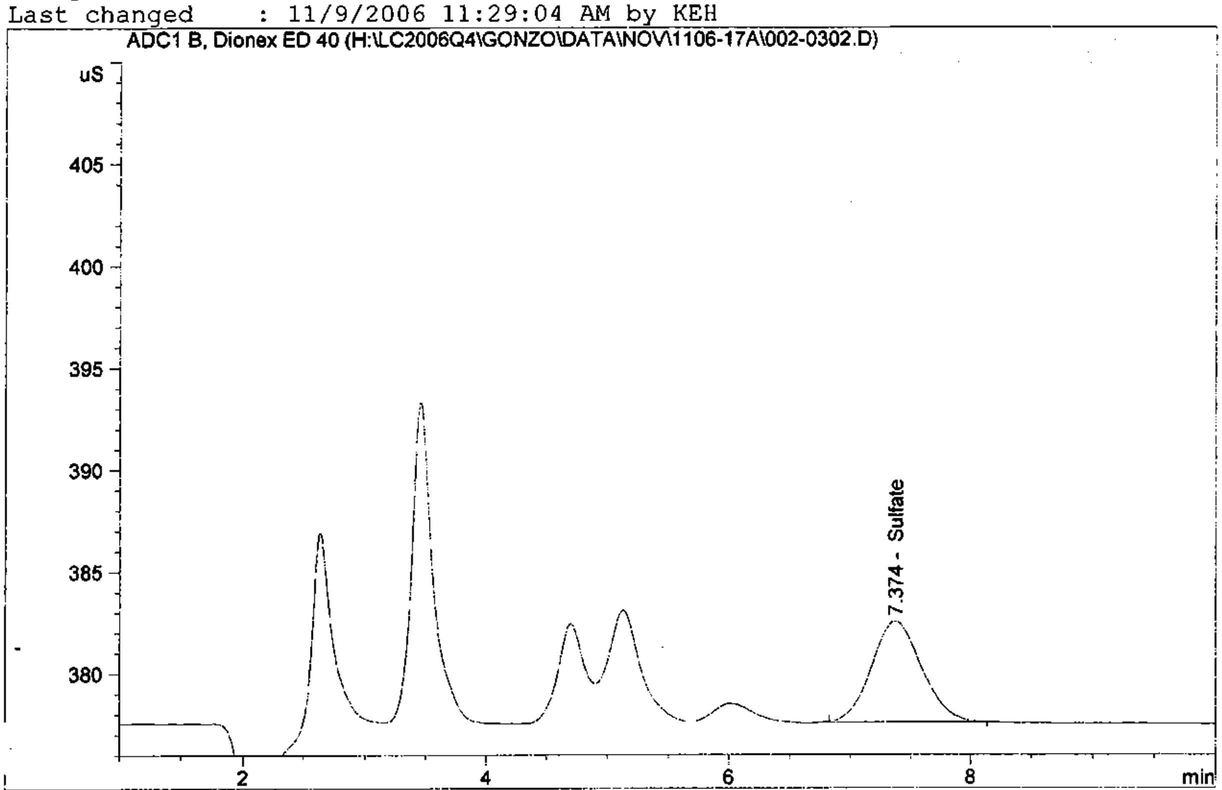
```
==================================================================
Injection Date   : 11/8/2006 5:47:56 PM          Seq. Line :   3
Sample Name      : Standard 2                     Location : Vial 2
Acq. Operator    : KEH                                 Inj :   1
Acq. Instrument  : Gonzo                        Inj Volume : 25 µl
Acq. Method      : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed     : 10/9/2006 11:51:11 AM by KAM
Analysis Method  : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed     : 11/9/2006 11:29:04 AM by KEH
```




```
==================================================================
                    External Standard Report
==================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type    Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.363 BB     143.65038 1.66154e-2    2.38681     Sulfate

Totals :                               2.38681

 Results obtained with enhanced integrator!
==================================================================
                      *** End of Report ***
```

===

Injection Date : 11/8/2006 5:59:53 PM Seq. Line : 3
Sample Name : Standard 2 Location : Vial 2
Acq. Operator : KEH Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed : 11/9/2006 11:29:04 AM by KEH



===
External Standard Report
===

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.374	BB	144.78828	1.66177e-2	2.40605		Sulfate

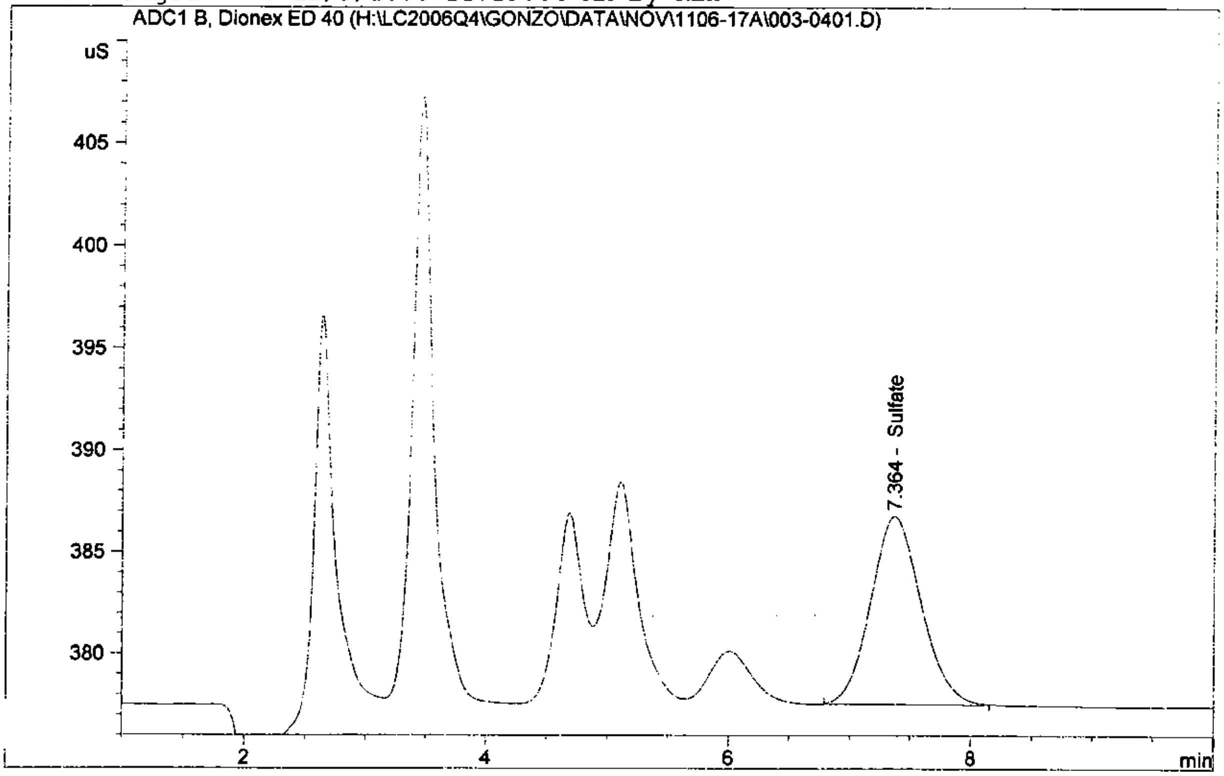
Totals : 2.40605

Results obtained with enhanced integrator!

===
*** End of Report ***

===

```
Injection Date   : 11/8/2006 6:11:45 PM          Seq. Line :   4
Sample Name      : Standard 3                      Location : Vial 3
Acq. Operator    : KEH                                  Inj :   1
Acq. Instrument  : Gonzo                         Inj Volume : 25 µl
Acq. Method      : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed     : 10/9/2006 11:51:11 AM by KAM
Analysis Method  : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed     : 11/9/2006 11:29:04 AM by KEH
```



===

External Standard Report

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```
Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.364	BB	269.13486	1.67538e-2	4.50904		Sulfate

Totals : 4.50904

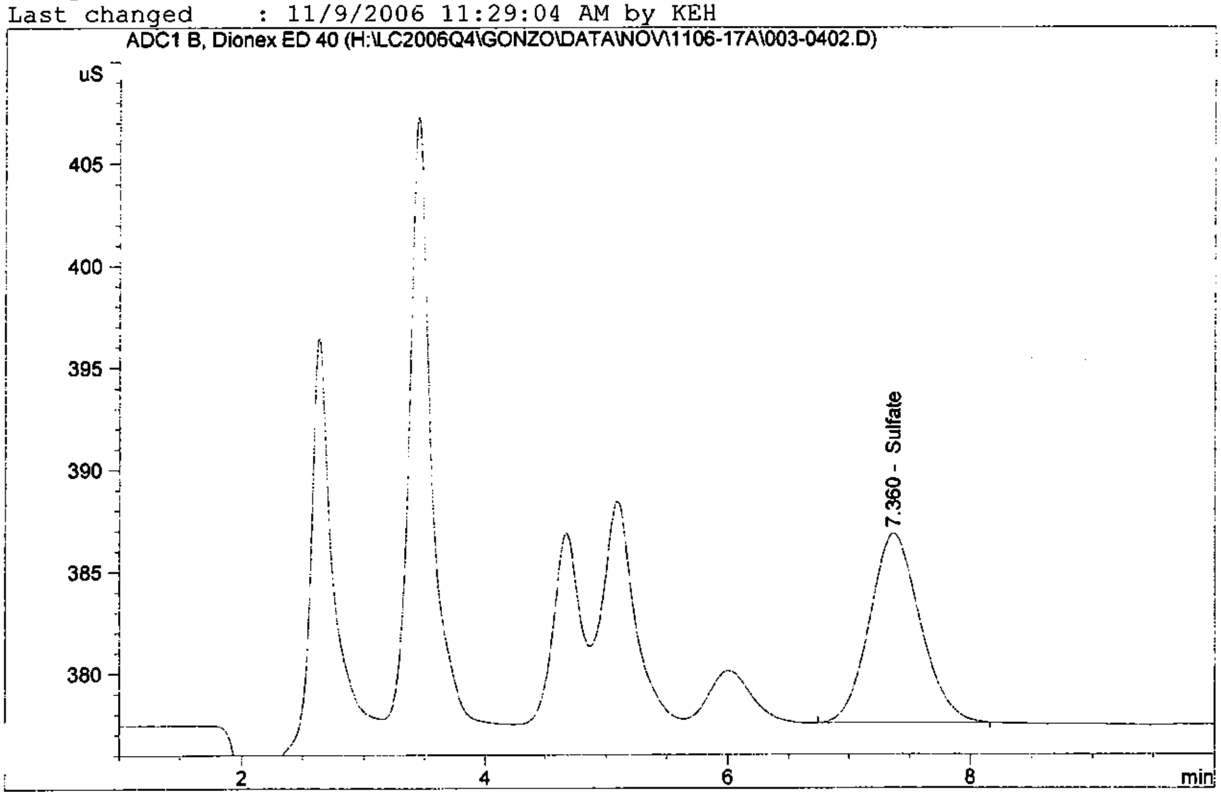
Results obtained with enhanced integrator!

===

*** End of Report ***

===

Injection Date : 11/8/2006 6:23:39 PM Seq. Line : 4
Sample Name : Standard 3 Location : Vial 3
Acq. Operator : KEH Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed : 11/9/2006 11:29:04 AM by KEH



===

External Standard Report

===

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.360	BB	268.40219	1.67534e-2	4.49665		Sulfate

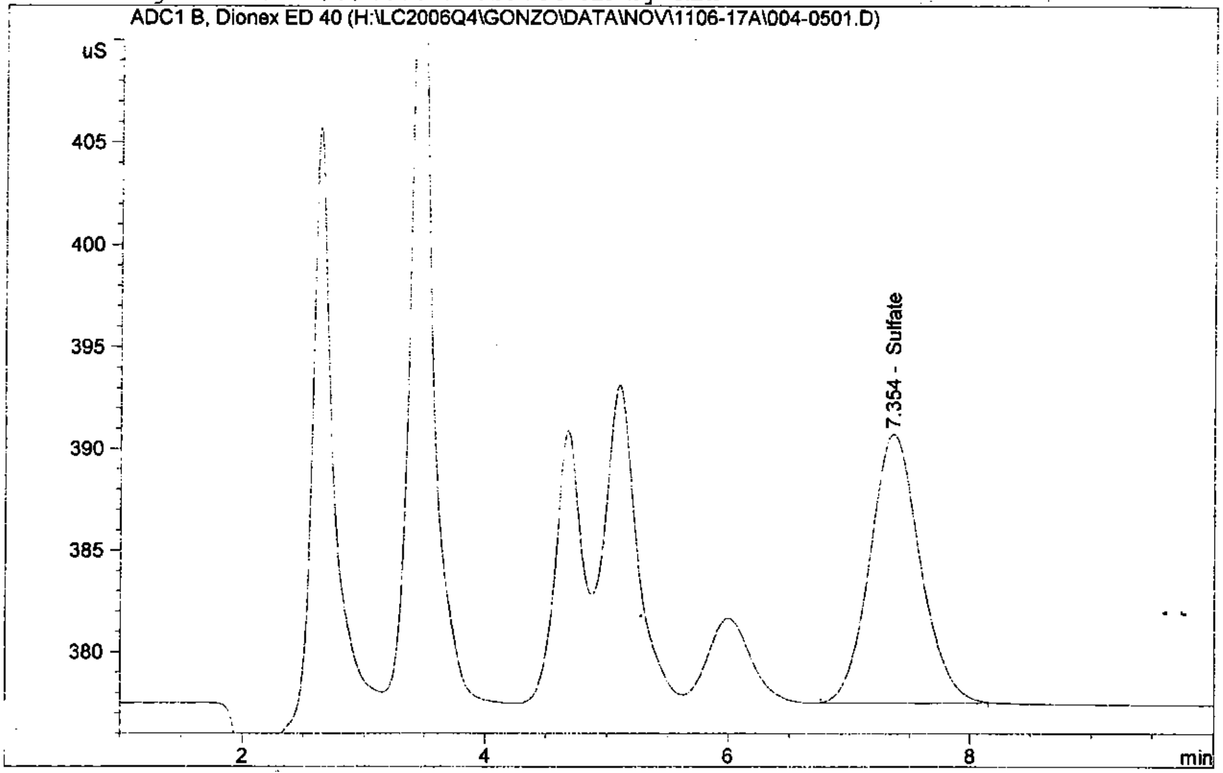
Totals : 4.49665

Results obtained with enhanced integrator!

===

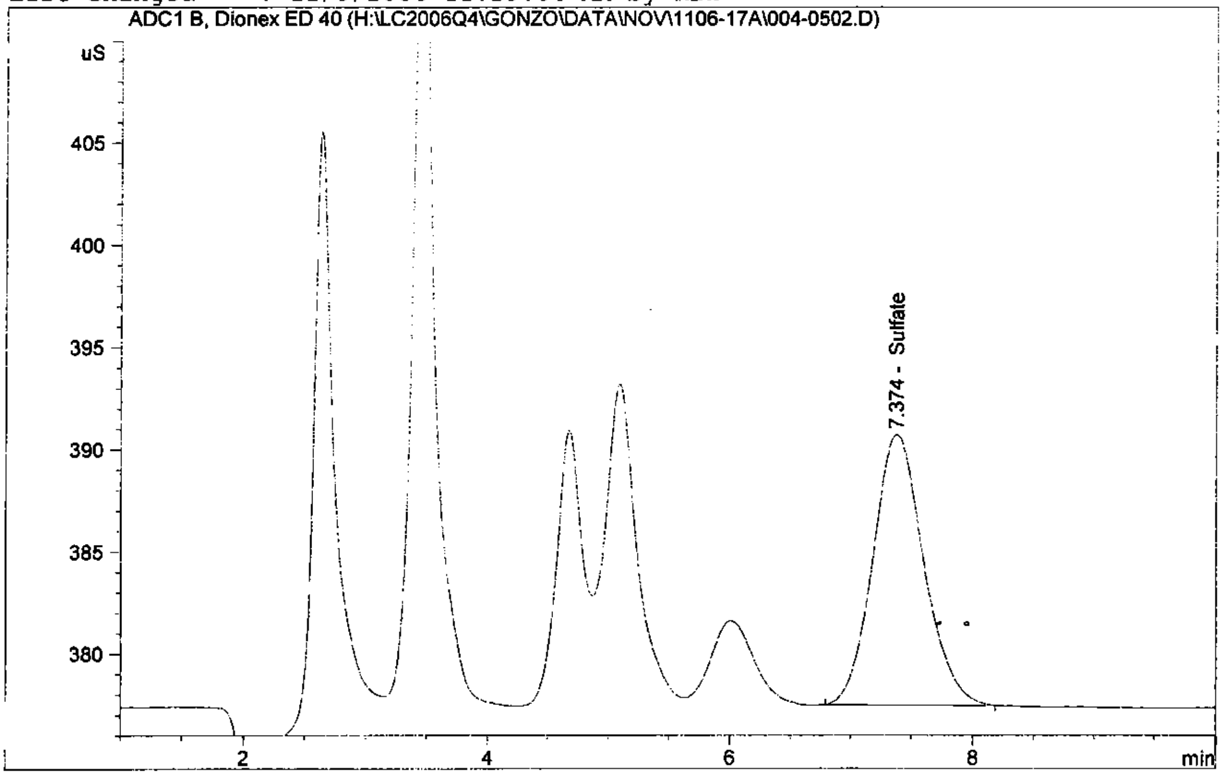
*** End of Report ***

```
=====================================================================
Injection Date  : 11/8/2006 6:35:28 PM          Seq. Line :   5
Sample Name     : Standard 4                     Location : Vial 4
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
.cq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```



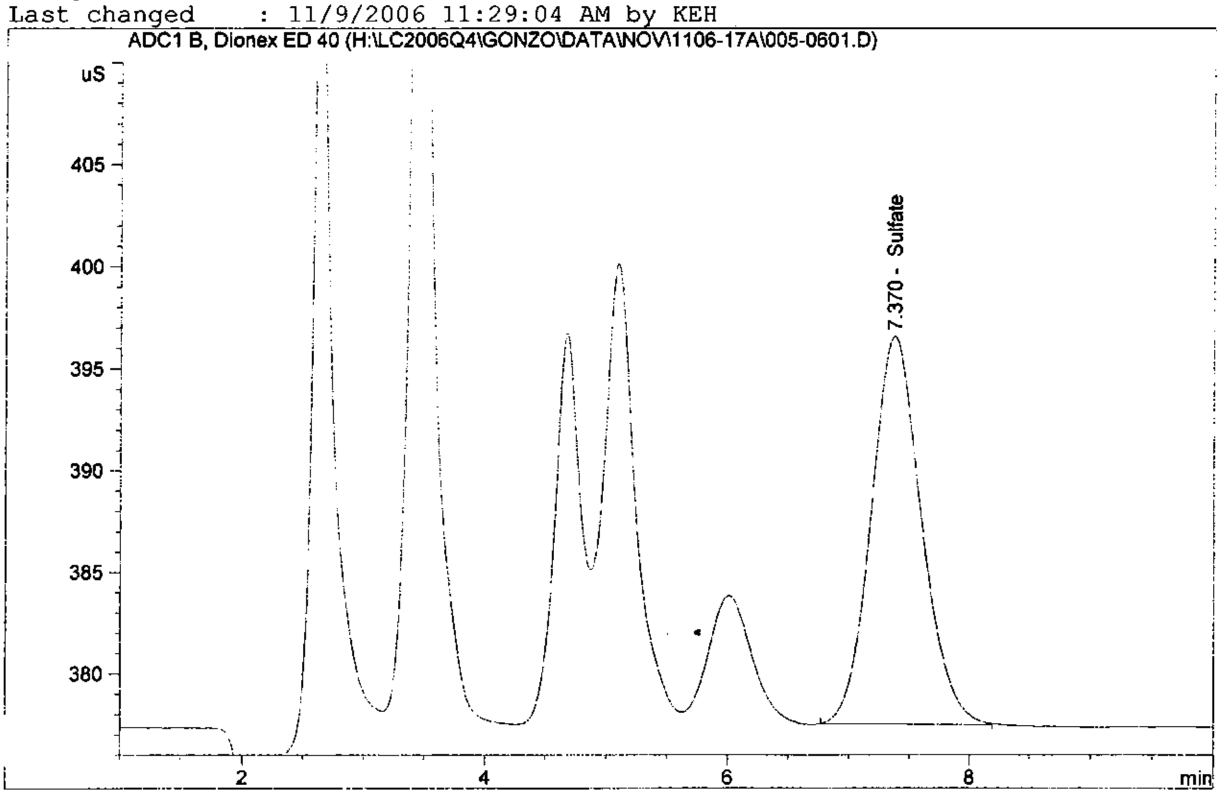

```
=====================================================================
                      External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area     Amount   Grp   Name
 [min]          [uS*s]                  [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.354 BB      383.49753 1.68011e-2    6.44318    Sulfate

Totals :                                6.44318

 Results obtained with enhanced integrator!
=====================================================================
                      *** End of Report ***
```

```
=====================================================================
Injection Date  : 11/8/2006 6:47:22 PM          Seq. Line :   5
Sample Name     : Standard 4                     Location : Vial 4
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```



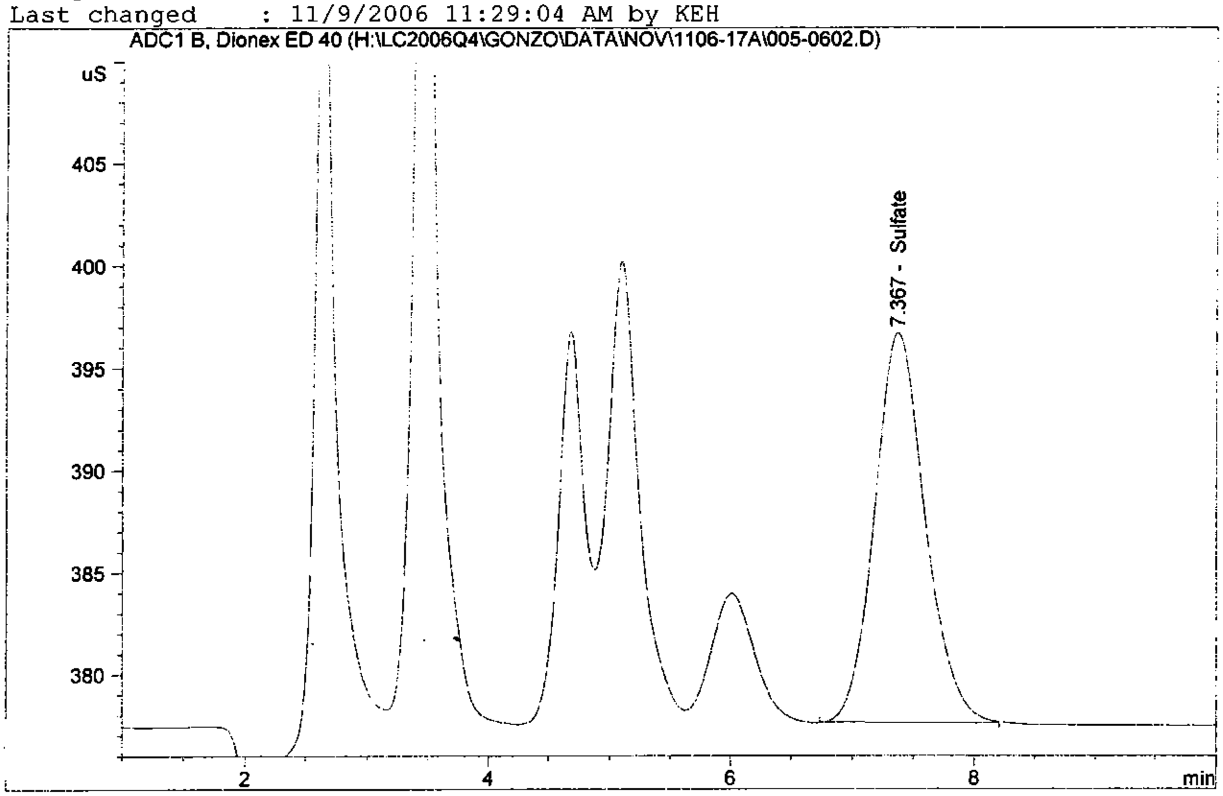

```
=====================================================================
                     External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area     Amount    Grp   Name
 [min]          [uS*s]                   [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.374 BB     384.45676 1.68014e-2   6.45940    Sulfate

Totals :                              6.45940

 Results obtained with enhanced integrator!
=====================================================================
                         *** End of Report ***
```

```
=====================================================================
Injection Date   : 11/8/2006 6:59:16 PM           Seq. Line :   6
Sample Name      : Standard 5                      Location : Vial 5
Acq. Operator    : KEH                                  Inj :   1
Acq. Instrument  : Gonzo                         Inj Volume : 25 µl
Acq. Method      : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed     : 10/9/2006 11:51:11 AM by KAM
Analysis Method  : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed     : 11/9/2006 11:29:04 AM by KEH
```



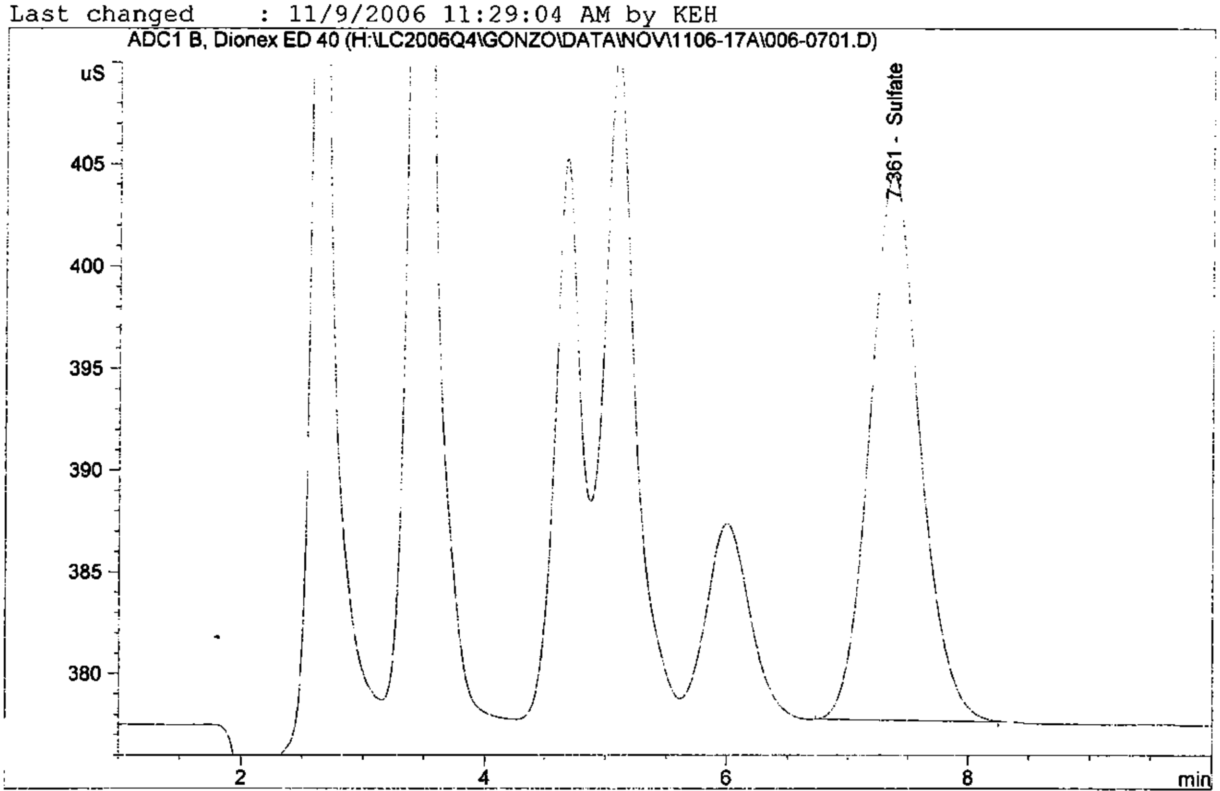

```
=====================================================================
                     External Standard Report
=====================================================================

Sorted By            :      Signal
Calib. Data Modified :      Thursday, November 09, 2006 11:28:59 AM
Multiplier           :      1.0000
Dilution             :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type    Area      Amt/Area    Amount   Grp   Name
 [min]         [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.370 BB      550.07312 1.68348e-2    9.26036    Sulfate

Totals :                                9.26036

 Results obtained with enhanced integrator!
=====================================================================
                         *** End of Report ***
```

```
=====================================================================
Injection Date  : 11/8/2006 7:11:07 PM          Seq. Line :   6
Sample Name     : Standard 5                     Location : Vial 5
Acq. Operator   : KEH                                 Inj :   2
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```




```
=====================================================================
                    External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area    Amount   Grp   Name
 [min]          [uS*s]                 [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.367 PB     551.42426 1.68350e-2    9.28321    Sulfate

Totals :                               9.28321

 Results obtained with enhanced integrator!
=====================================================================
                       *** End of Report ***
```

Injection Date	: 11/8/2006 7:22:54 PM	Seq. Line :	7
Sample Name	: Standard 6	Location :	Vial 6
Acq. Operator	: KEH	Inj :	1
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



External Standard Report

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.361	PB	772.01758	1.68571e-2	13.01395		Sulfate

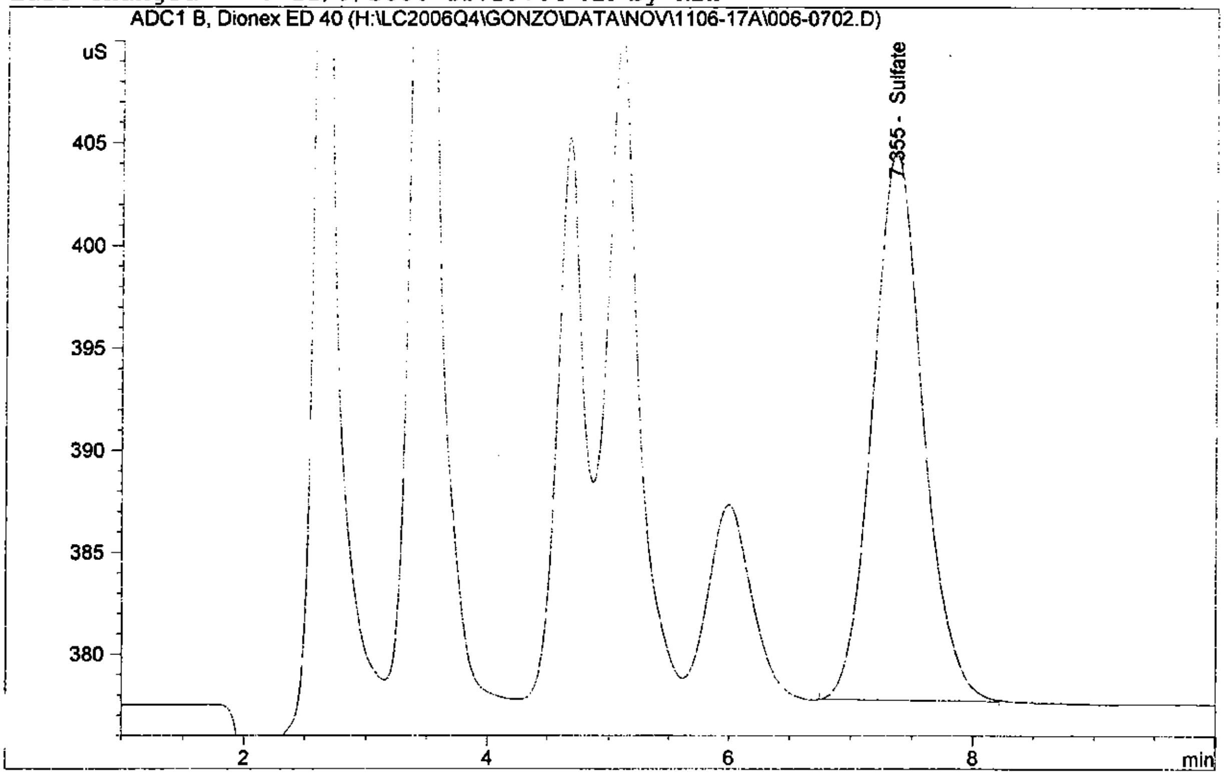
Totals : 13.01395

Results obtained with enhanced integrator!

*** End of Report ***

===

Injection Date : 11/8/2006 7:34:44 PM Seq. Line : 7
Sample Name : Standard 6 Location : Vial 6
Acq. Operator : KEH Inj : 2
Acq. Instrument : Gonzo Inj Volume : 25 µl
Acq. Method : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed : 11/9/2006 11:29:04 AM by KEH



===

External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.355	PB	771.11774	1.68570e-2	12.99874		Sulfate

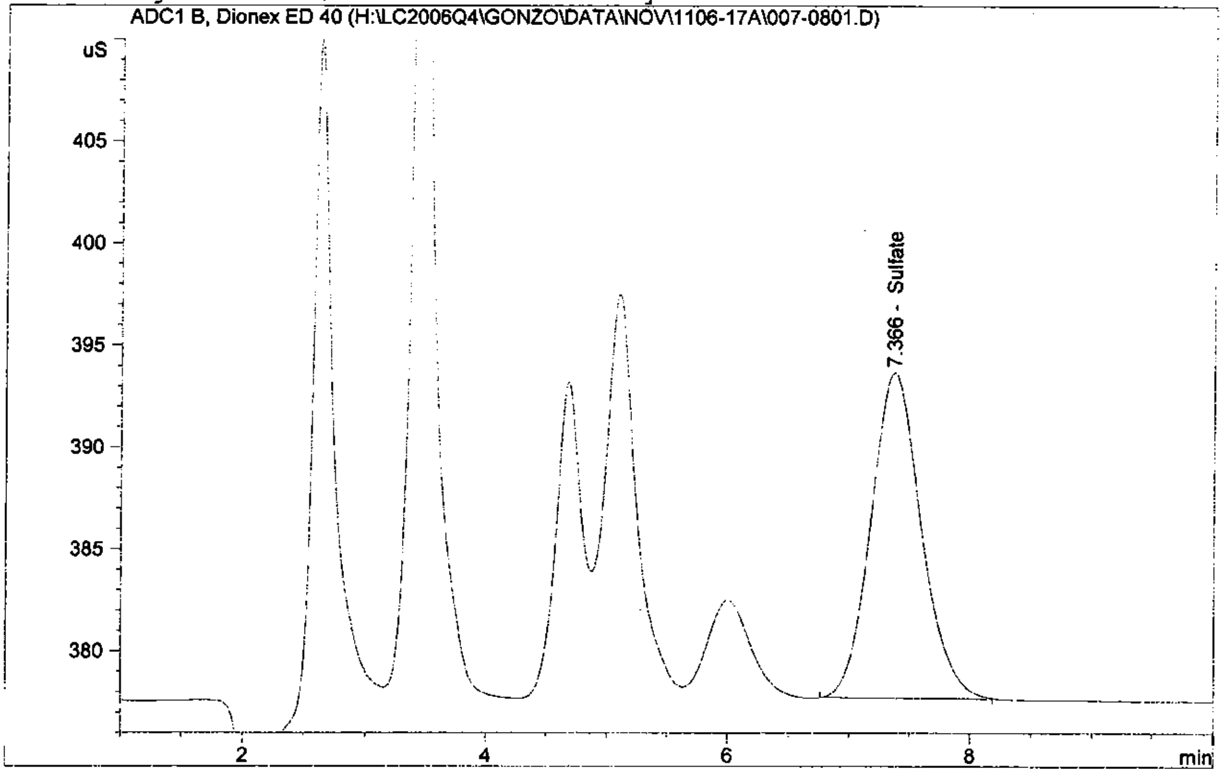
Totals : 12.99874

Results obtained with enhanced integrator!

===

*** End of Report ***

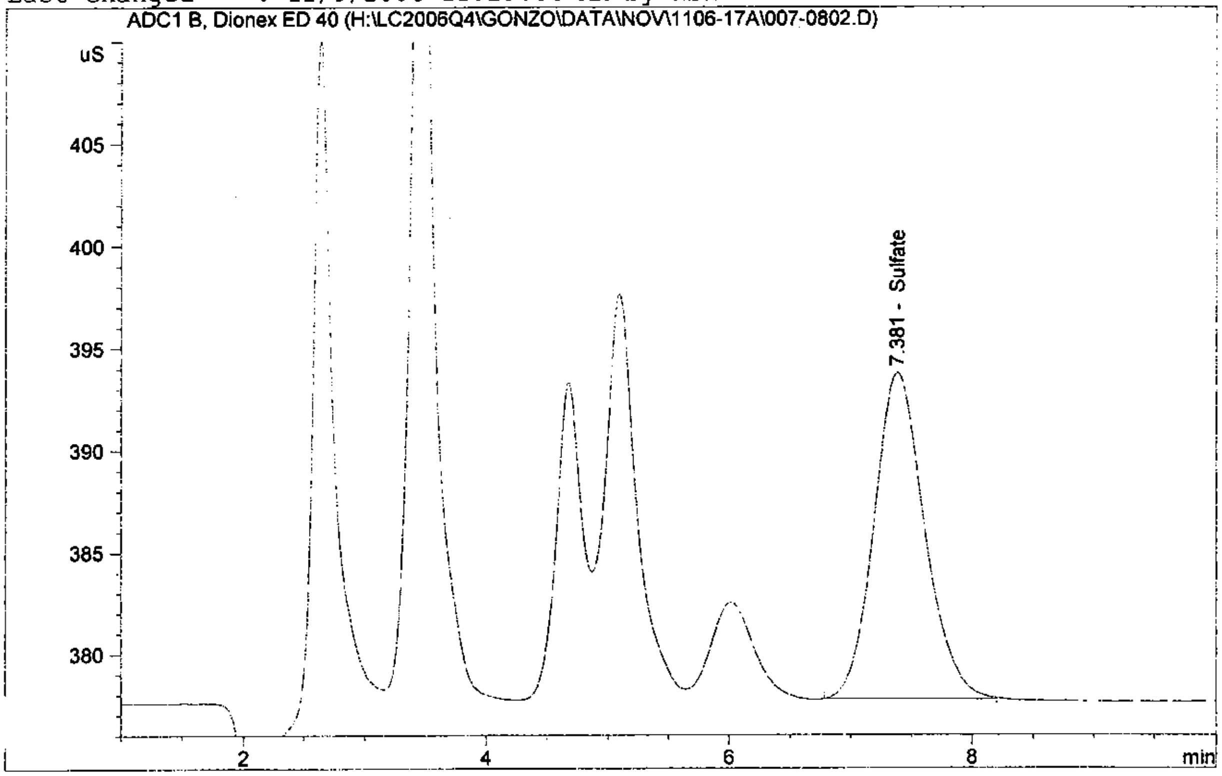
```
Injection Date   : 11/8/2006 7:46:38 PM          Seq. Line :   8
Sample Name      : Second Source                  Location : Vial 7
Acq. Operator    : KEH                                 Inj :   1
Acq. Instrument  : Gonzo                        Inj Volume : 25 µl
Acq. Method      : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed     : 10/9/2006 11:51:11 AM by KAM
Analysis Method  : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed     : 11/9/2006 11:29:04 AM by KEH
```




```
=====================================================================
                    External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime  Type     Area      Amt/Area     Amount    Grp   Name
 [min]          [uS*s]                  [ug/mL]
-------|------|----------|----------|----------|--|------------------
  7.366 BB     463.54498 1.68203e-2    7.79697     Sulfate

Totals :                               7.79697

 Results obtained with enhanced integrator!
=====================================================================
                      *** End of Report ***
```

===

Injection Date	: 11/8/2006 7:58:32 PM	Seq. Line :	8
Sample Name	: Second Source	Location :	Vial 7
Acq. Operator	: KEH	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



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External Standard Report

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Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.381	PB	464.95905	1.68206e-2	7.82088		Sulfate

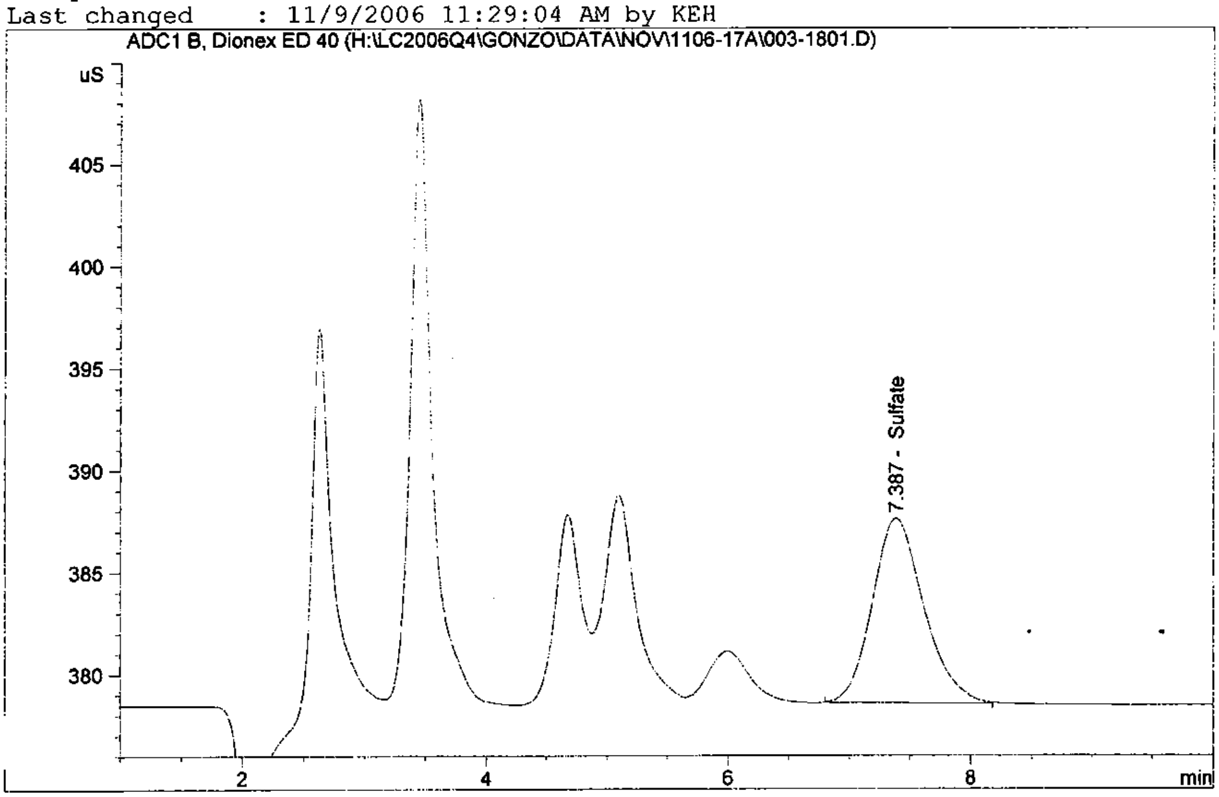
Totals : 7.82088

Results obtained with enhanced integrator!

===

*** End of Report ***

```
=====================================================================
Injection Date  : 11/8/2006 11:44:10 PM        Seq. Line :  18
Sample Name     : Standard 3                    Location : Vial 3
Acq. Operator   : KEH                                Inj :   1
Acq. Instrument : Gonzo                       Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```




```
=====================================================================
                     External Standard Report
=====================================================================

Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40
```

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.387	BB	265.43634	1.67516e-2	4.44649		Sulfate

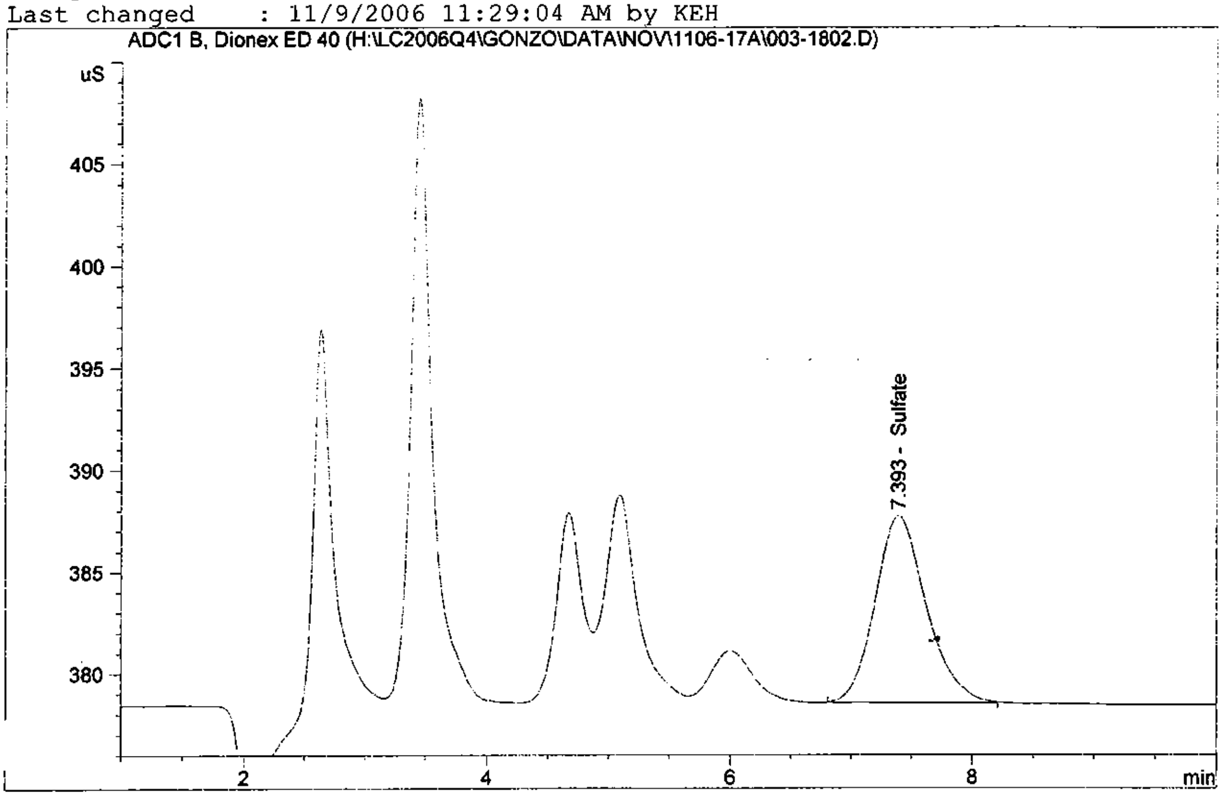
Totals : 4.44649

Results obtained with enhanced integrator!

```
=====================================================================
```

*** End of Report ***

Injection Date	: 11/8/2006 11:56:04 PM	Seq. Line :	18
Sample Name	: Standard 3	Location :	Vial 3
Acq. Operator	: KEH	Inj :	2
Acq. Instrument	: Gonzo	Inj Volume :	25 µl
Acq. Method	: H:\LC2006Q4\GONZO\METHODS\1006-38.M		
Last changed	: 10/9/2006 11:51:11 AM by KAM		
Analysis Method	: H:\LC2006Q4\GONZO\METHODS\1106-17R.M		
Last changed	: 11/9/2006 11:29:04 AM by KEH		



External Standard Report

Sorted By : Signal
Calib. Data Modified : Thursday, November 09, 2006 11:28:59 AM
Multiplier : 1.0000
Dilution : 1.0000
Use Multiplier & Dilution Factor with ISTDs

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.393	BB	269.65012	1.67541e-2	4.51776		Sulfate

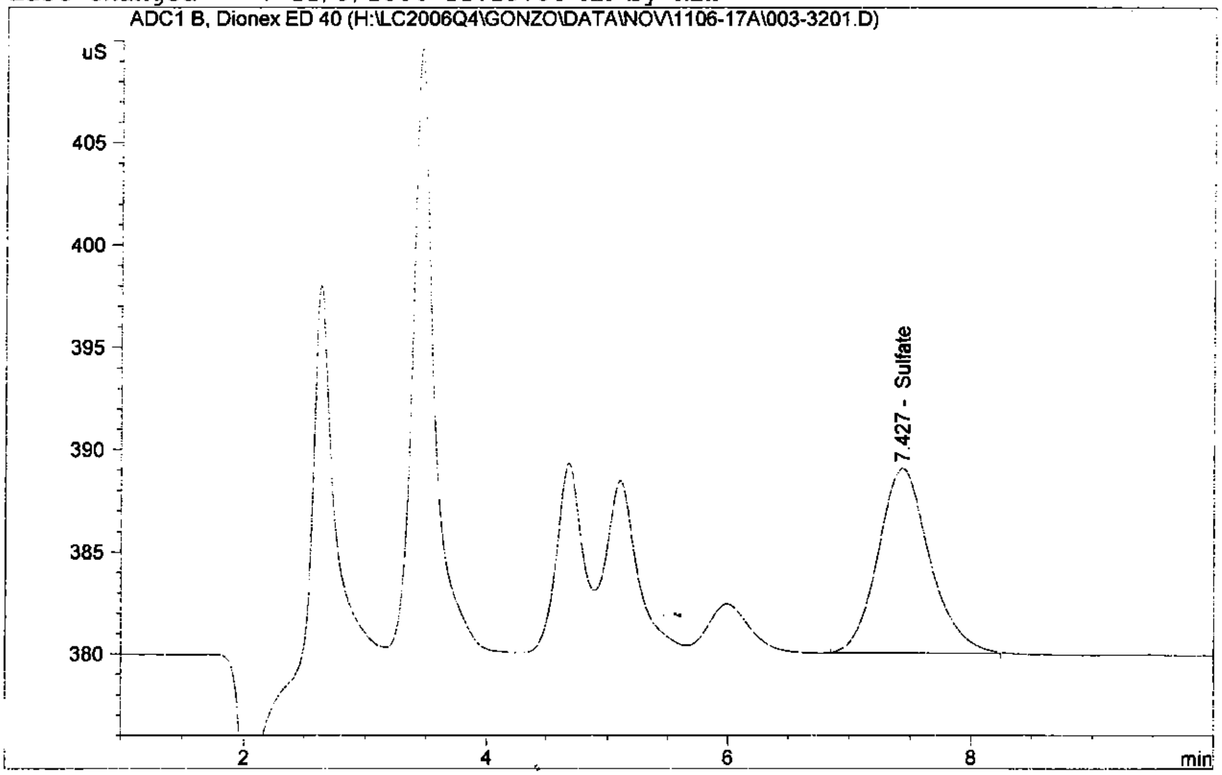
Totals : 4.51776

Results obtained with enhanced integrator!

*** End of Report ***

===

```
Injection Date  : 11/9/2006 6:15:11 AM          Seq. Line :  32
Sample Name     : Standard 3                     Location : Vial 3
Acq. Operator   : KEH                                 Inj :   1
Acq. Instrument : Gonzo                        Inj Volume : 25 µl
Acq. Method     : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed    : 10/9/2006 11:51:11 AM by KAM
Analysis Method : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed    : 11/9/2006 11:29:04 AM by KEH
```



===

External Standard Report

===

```
Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.427	BB	265.79144	1.67518e-2	4.45250		Sulfate

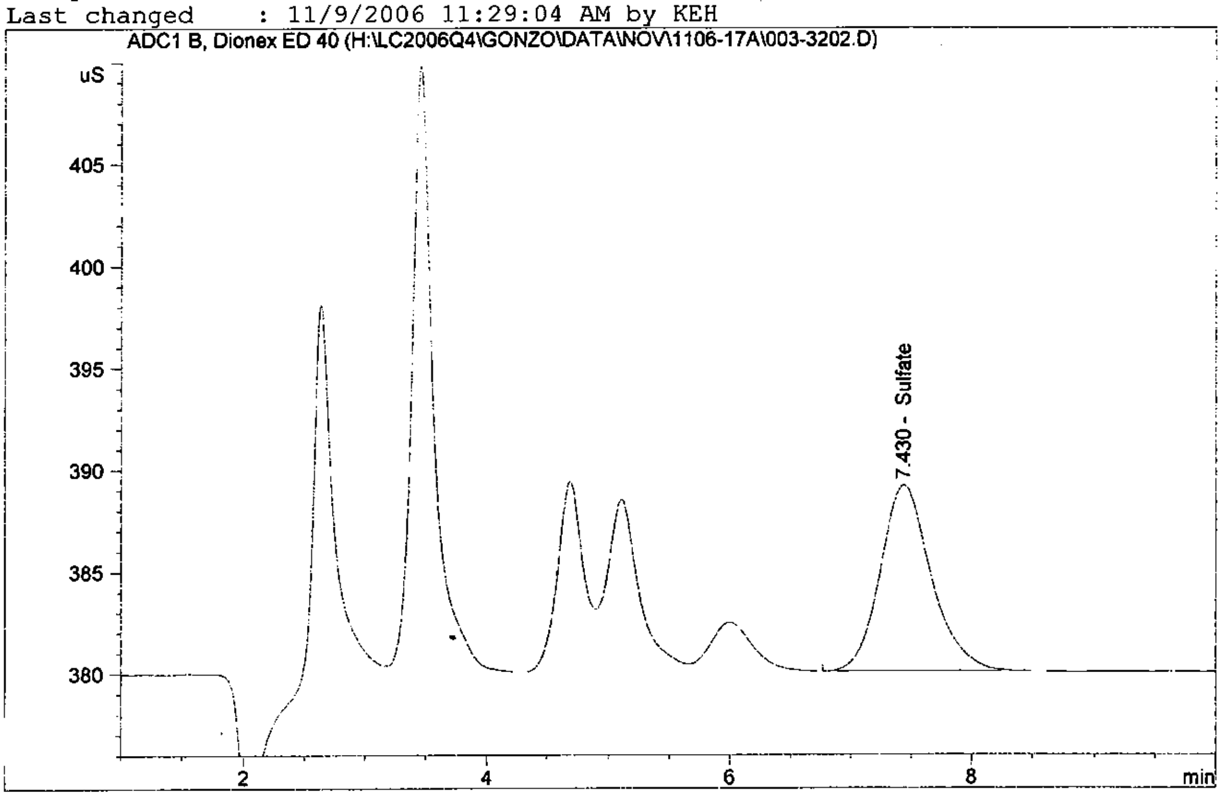
Totals : 4.45250

Results obtained with enhanced integrator!

===

*** End of Report ***

```
Injection Date   : 11/9/2006 6:27:04 AM          Seq. Line :  32
Sample Name      : Standard 3                     Location : Vial 3
Acq. Operator    : KEH                                 Inj :  2
Acq. Instrument  : Gonzo                        Inj Volume : 25 µl
Acq. Method      : H:\LC2006Q4\GONZO\METHODS\1006-38.M
Last changed     : 10/9/2006 11:51:11 AM by KAM
Analysis Method  : H:\LC2006Q4\GONZO\METHODS\1106-17R.M
Last changed     : 11/9/2006 11:29:04 AM by KEH
```



External Standard Report

```
Sorted By             :      Signal
Calib. Data Modified  :      Thursday, November 09, 2006 11:28:59 AM
Multiplier            :      1.0000
Dilution              :      1.0000
Use Multiplier & Dilution Factor with ISTDs
```

Signal 1: ADC1 B, Dionex ED 40

RetTime [min]	Type	Area [uS*s]	Amt/Area	Amount [ug/mL]	Grp	Name
7.430	PB	266.56104	1.67523e-2	4.46551		Sulfate

Totals : 4.46551

Results obtained with enhanced integrator!

*** End of Report ***

Method Information

Dionex IonPac AS-14A 4-mm analytical (4x250mm) column.
Flow rate 1.2 mL/min
8mM Na_2CO_3/1mM $NaHCO_3$ mobile phase
Suppressed anion conductivity detection

ANALOG DIGITAL CONVERTER

	Signal 1
Description:	Dionex ED 40
Source:	Signal
Unit:	uS
Units/Volt:	1000.000
Peakwidth (Data Rate):	0.027 Min (10.00 Hz)
Stop Time:	No Limit
Data Storage:	All

Start Signal Source: External Device Will Start 35900

Timed Event Table:
<no events>

```
=====================================================================
                      1100 Quaternary Pump 1
=====================================================================

ontrol
    Column Flow             :      1.200 ml/min
    Stoptime                :         10.00 min
    Posttime                :      Off

Solvents
    Solvent A               :        0.0 % ( )
    Solvent B               :      Off
    Solvent C               :      100.0 % (8.0mM Na2CO3/1.0mM NaHCO3)
    Solvent D               :      Off

PressureLimits
    Minimum Pressure        :        0 bar
    Maximum Pressure        :      400 bar


Auxiliary
    Maximal Flow Ramp       :      100.00 ml/min^2
    Primary Channel         :      Auto
    Compressibility         :       83*10^-6/bar
    Minimal Stroke          :      Auto

Store Parameters
    Store Ratio A           :      Yes
    Store Ratio B           :      Yes
    Store Ratio C           :      Yes
    Store Ratio D           :      Yes
    Store Flow              :      Yes
    Store Pressure          :      Yes


=====================================================================
                      1100 Quaternary Pump 2
=====================================================================

Control
    Column Flow             :      0.000 ml/min
    Stoptime                :         18.00 min
    Posttime                :      Off

Solvents
    Solvent A               :        0.0 % ( )
    Solvent B               :      Off
    Solvent C               :      Off
    Solvent D               :      100.0 % (8mMNa2CO3\1mMNaHCO3)

PressureLimits
    Minimum Pressure        :        0 bar
    Maximum Pressure        :      400 bar


Auxiliary
    Maximal Flow Ramp       :      100.00 ml/min^2
    Primary Channel         :      Auto
    Compressibility         :      100*10^-6/bar
    Minimal Stroke          :      Auto

Store Parameters
    Store Ratio A           :      Yes
    Store Ratio B           :      Yes
    Store Ratio C           :      Yes
    Store Ratio D           :      Yes
    Store Flow              :      Yes
    Store Pressure          :      Yes
```

```
=====================================================================
                    Agilent 1100 Autosampler 1
=====================================================================

Injection
    Injection Mode          :    Needle Wash
    Injector volume         :         25.00 µl
    Wash Vial               :       100
    Optimization            :       none

Auxiliary
    Drawspeed               :          100 µl/min
    Ejectspeed              :         1000 µl/min
    Draw position           :          2.0 mm

Time
    Stoptime                :      As Pump
    Posttime                :      Off


=====================================================================
                   Agilent 1100 Column Thermostat 1
=====================================================================

Temperature settings
    Left temperature        :      30.0°C
    Right temperature       :      Same as left
    Enable analysis         :      When Temp. is within setpoint +/-  0.8°C
    Store left temperature  :      No
    Store right temperature:       No

Time
    Stoptime                :      As pump
    Posttime                :      Off

 olumn Switching Valve      :      Column 1
```

Sequence: H:\LC2006Q4\GONZO\SEQUENCE\1106-17A.S

Sequence Table:

Method and Injection Info Part:

Line	Location	SampleName	Method	Inj	SampleType	InjVolume	DataFile
1	Vial 1	Standard 1	1006-38	2	Sample		
2	Vial 1	Standard 1	1006-38	2	Sample		
3	Vial 2	Standard 2	1006-38	2	Sample		
4	Vial 3	Standard 3	1006-38	2	Sample		
5	Vial 4	Standard 4	1006-38	2	Sample		
6	Vial 5	Standard 5	1006-38	2	Sample		
7	Vial 6	Standard 6	1006-38	2	Sample		
8	Vial 7	Second Source	1006-38	2	Sample		
9	Vial 8	DIUF H2O	1006-38	2	Sample		
10	Vial 11	M2571*10	1006-38	2	Sample		
11	Vial 12	M2814*100	1006-38	2	Sample		
12	Vial 21	Run 1 post*20	1006-38	2	Sample		
13	Vial 22	Run 2 post*100	1006-38	2	Sample		
14	Vial 23	Run 3 post*100	1006-38	2	Sample		
15	Vial 24	Blank post	1006-38	2	Sample		
16	Vial 25	IHB post	1006-38	2	Sample		
17	Vial 26	MS/Run 1 post	1006-38	2	Sample		
18	Vial 3	Standard 3	1006-38	2	Sample		
19	Vial 4	Standard 4	1006-38	2	Sample		
20	Vial 27	Run 1 pre	1006-38	2	Sample		
21	Vial 28	Run 2 pre	1006-38	2	Sample		
22	Vial 29	Run 3 pre	1006-38	2	Sample		
23	Vial 30	Blank pre	1006-38	2	Sample		
24	Vial 31	IHB pre	1006-38	2	Sample		
25	Vial 32	D19	1006-38	2	Sample		
26	Vial 33	D20	1006-38	2	Sample		
27	Vial 34	C11	1006-38	2	Sample		
28	Vial 35	C12	1006-38	2	Sample		
29	Vial 13	Standard 1	1006-38	7	Sample		
30	Vial 1	Standard 1	1006-38	2	Sample		
31	Vial 2	Standard 2	1006-38	2	Sample		
32	Vial 3	Standard 3	1006-38	2	Sample		
33	Vial 4	Standard 4	1006-38	2	Sample		
34	Vial 5	Standard 5	1006-38	2	Sample		
35	Vial 6	Standard 6	1006-38	2	Sample		

APPENDIX D

LABORATORY DATA

Lead Emissions

Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, IN 46219

Project Name: Nucor Steel

Lead

EPA Method 12 Analysis

Analytical Report
8231

el1

Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX: 910-792-6853 e1lab@e1lab.com

The following data for Analytical Report 8231
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Review by:

Melissa Lawrence, QA Officer
November 7, 2006

Report Reviewed and Finalized By:

Ken Smith, Laboratory Director
November 7, 2006

SUMMARY OF RESULTS

Summary of Analysis

Summary of Method 12 Lead Analysis

Element	Run 1 e8231-1 Total µg	Run 2 e8231-2 Total µg	Run 3 e8231-3 Total µg	Blank e8231-4 Total µg	Run 3 Spike e8231-3 Recovery
Lead, Average	1.93	1.09	0.32	0.50	108%
Triplicate RSD	1.1%	1.3%	1.0%	2.1%	

elementOne

ANALYTICAL NARRATIVE

elementOne

Element One Analytical Narrative

Client:	Air Test Professionals, Inc.	Element One #:	8231
Client ID:	Nucor Steel-Strip Caster	Analyst:	DBW
Method:	M12	Date Received:	11/03/06
Analytes:	Lead	Date Analyzed:	11/06/06

Summary of Analysis

The Method 12 samples were prepared and analyzed according to method protocol. After digestion the samples were brought to a final volume of 100 ml. The digested samples were then analyzed for lead on a PerkinElmer ELAN 6100 ICP-MS.

Detection Limit

The instrument reporting limit was 1.0μg/L for lead.

Analysis QA/QC

The spike recovery data and triplicate analyses relative standard deviations, RSD, are summarized with the results. All QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank or spike recovery values. The ICP-MS analysis of the Blank sample revealed detectable concentrations of lead. Subsequent analysis produced equivalent results. Nothing unusual was noticed with any of the other samples or analysis.

ANALYTICAL DATA

One **AIR TESTING SAMPLE SUBMISSION FORM** **Lab ID 8231**

RUSH-3 Day TAT

Analysis Due Date 11.08.06
QA/QC/Report Due Date 11.08.06

Client:	Air Test Professionals
Project No.:	

Date Rec:	11.03.06
Time Rec:	1140

HNO_3 Lot: 110605D Volume Marked (Y) / N	~~HF Lot:~~ Volume Loss Y / (N) ?	~~HCl Lot:~~ pH < 2.0 (Y) / N	**Ref. Method** **12**

Sample Identification

1	Run 1		
2	Run 2		
3	Run 3		
4	Blank		

Analyses Requested: Samples 1-4 Pb
Spike All Run 3s

Run/FB/RB	BV	FV	Spike	Comments
LRB		100		
LRB+		100		
1	260	100		
2	310	↓		
3-S	295	↓		
4	300	↓		

Lab Notes / Communications

S Page 1 of 1
SS by__________
11/3/2006 12:56:39 PM

BV Prep By / Date DBL 11/6/06
FV Prep By / Date DBL 11/6/06
Verification By / Date SE 11-03-06

Sample/Batch Report

Daph Wdm
11/7/06

'ser Name: daphne.woodman
Computer Name: ICPMS1
Sample File: C:\elandata\Sample\Method 12.sam
Report Date/Time: Monday, November 06, 2006 14:55:06

A/S Loc.	Batch ID	Sample ID	Description	Sample Type	Init. Quant.	Prep. Vol.	Aliquot Vol.	Diluted Vol.	Solids Ratio
12		8231-1	ATP						
13		8231-2	ATP						
14		8231-3	ATP						
15	S	8231-3	ATP	Spike - 1					
16		8231-4	ATP						
17		8231-4	ATP						

Dataset Report

ser Name: daphne.woodman
Computer Name: ICPMS1
Dataset File Path: C:\elandata\Dataset\110606-2\
Report Date/Time: Monday, November 06, 2006 14:55:03

Daph W 11/7/06

Autosampler Position: 3

The Dataset

Time	Sample ID	Batch ID	Read Type	Description	Init. Quant	Prep. Vol.	Aliquot. Vol.	Diluted \
13:57:16 Mon 06-Nov-06	Blank		Blank					
13:59:17 Mon 06-Nov-06	Standard 1		Standard #1					
14:01:19 Mon 06-Nov-06	Standard 2		Standard #2					
14:03:21 Mon 06-Nov-06	Standard 3		Standard #3					
14:05:23 Mon 06-Nov-06	Standard 4		Standard #4					
14:07:24 Mon 06-Nov-06	QC Std 1		QC Std #1					
14:09:26 Mon 06-Nov-06	QC Std 2		QC Std #2					
14:11:28 Mon 06-Nov-06	QC Std 3		QC Std #3					
14:13:29 Mon 06-Nov-06	QC Std 4		QC Std #4					
14:15:31 Mon 06-Nov-06	QC Std 9		QC Std #9					
14:17:34 Mon 06-Nov-06	QC Std 10		QC Std #10					
14:19:40 Mon 06-Nov-06	✓8231-1		Sample	ATP				
14:21:46 Mon 06-Nov-06	✓8231-2		Sample	ATP				
14:23:51 Mon 06-Nov-06	✓8231-3		Sample	ATP				
14:25:54 Mon 06-Nov-06	✓8231-3	S	Spike - 1	ATP				
1:27:58 Mon 06-Nov-06	✓8231-4		Sample	ATP				
14:29:58 Mon 06-Nov-06	QC Std 1		QC Std #1					
14:31:59 Mon 06-Nov-06	QC Std 4		QC Std #4					
14:49:48 Mon 06-Nov-06	8231-4		Sample	ATP → Blank Read Same				
14:51:49 Mon 06-Nov-06	QC Std 1		QC Std #1					
14:53:50 Mon 06-Nov-06	QC Std 4		QC Std #4					

elementOne **ICP-MS RUN SHEET** **8231**

Analyst: __DBW____ Date: 11-06-06 **Solid Samples** ☐ / *Liquid Samples*

11/7/06

A/S Loc	Batch # for sample sets	Sample Lab ID	Sample Description	Type Sample QC Spike QC Dup QC Reg Blank	Spike concentration	Prep Volume (ml)	Weight (g)	Aliquot (ml)	Diluted to Volume (ml)
10			LRB	S		100			
11			LRB	SS	Table #1	100			
12			8231-1	S		100			
13			8231-2	S		100			
14			8231-3	S		100			
15			8231-3	SS	Table #1	100			
16			8231-4	S		100			
Dilutions and Rechecks									
17			8231-4	S		100			

Spikes are post at 0.02 mL of 25ppm spiking solution lot 021406-A in a final volume of 10ml.

Submitted for QC:	Date: 11/7/06	Time: 7:30	By: DBW	QC Review:	Date: 11.7.06	Time: 13.00	By: C
Re-Test Required:	No: C	Yes:	Comments: CC				
Resubmitted for QC:	Date:	Time:	By:	QC Review:	Date:	Time:	By:

AN Instrument Control Session - [Quantitative Analysis Method - C:\elandata\Method\Trigon Method 12.mth]

ile Edit A Options Window Help

Timing | Processing | Equation | Calibration | Sampling | Devices | QC...

Analyte	Mass (amu)	Spike Table 1 (Conc.)	Spike Table 1 Det. Limit (Conc.)	Spike Table 2 (Conc.)	Spike Table 2 Det. Limit (Conc.)	Spike Table 3 (Conc.)	Spike Table 3 Det. Limit (Conc.)	Spike Table 4 (Conc.)	D
Rh	102.905								
Pb	207.977	50	0.001	25	1	100	1		
Kr	82.9141						1		

Report | Notes

requency | QC Std Int Stds | Calibration Stds | Sample Int Stds | Sample | Spike | Dilution | Duplicate | Spike Tables | QC Action Controls | Autosampler

elp Press F1

Start | GpibManager | ELAN Instrument Con... | Microsoft Word - ICPMS ru...

NUM | LOG

2:57 PM

Analytical Calculations

Method 12 Lead-

Lead Results (µg) =ICP Results (µg/L)*Dilution*Final Volume (L)

Where-

ICP Results= Raw sample concentration (ppb)--*ICP-Data Sheet*

Dilution= $\frac{\text{Diluted Volume}}{\text{Aliquot}}$--*ICP-MS Run Sheet*

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

PerkinElmer ELAN 6100 ICP-MS

Method 6020 Multi Metals Summary Report
Sample ID: Blank
Sample Date/Time: Monday, November 06, 2006 13:57:16
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	137652.8		ppb
|>	Ho	165	358120.2		ppb
|-	Pb	208	849.7		ppb
	Kr	83	87.2		ppb

Replicates
Concentration

Concentration

Concentration

Method 6020 Multi Metals Summary Report
Sample ID: Standard 1
Sample Date/Time: Monday, November 06, 2006 13:59:17
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	132809.9		ppb
|>	Ho	165	359689.6		ppb
|-	Pb	208	17090.1	1.01132	ppb
	Kr	83	76.3		ppb

Replicates
Concentration

1.024507

Concentration

1.012432

Concentration

0.997009

Method 6020 Multi Metals Summary Report
Sample ID: Standard 2
Sample Date/Time: Monday, November 06, 2006 14:01:19
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	129259		ppb
|>	Ho	165	362280.6		ppb
|-	Pb	208	1671587.9	103.3042	ppb
	Kr	83	68		ppb

Replicates
Concentration

103.848671

Concentration

103.946937

Concentration

102.117012

PerkinElmer ELAN 6100 ICP-MS

Method 6020 Multi Metals Summary Report
Sample ID: Standard 3
Sample Date/Time: Monday, November 06, 2006 14:03:21
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	126749.8		ppb
|>	Ho	165	365520.2		ppb
|-	Pb	208	8285653.5	507.7147	ppb
	Kr	83	74.8		ppb

Replicates
Concentration

499.305598

Concentration

511.403213

Concentration

512.435375

Method 6020 Multi Metals Summary Report
Sample ID: Standard 4
Sample Date/Time: Monday, November 06, 2006 14:05:23
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	129870.3		ppb
|>	Ho	165	373276.6		ppb
|-	Pb	208	16596826	995.8122	ppb
	Kr	83	98.3		ppb

Replicates
Concentration

985.212471

Concentration

1000.74935

Concentration

1001.474791

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date/Time: Monday, November 06, 2006 14:07:24
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	114299.2		ppb
|>	Ho	165	324311.3		ppb
|-	Pb	208	13904.1	0.90802	ppb
	Kr	83	59.8		ppb

Replicates
Concentration

1.191833

Concentration

0.811755

Concentration

0.72046

PerkinElmer ELAN 6100 ICP-MS

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 2
Sample Date/Time: Monday, November 06, 2006 14:09:26
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	109240		ppb
|>	Ho	165	315395.2		ppb
|-	Pb	208	16825.6	1.1418	ppb
	Kr	83	61		ppb

Replicates
Concentration

1.124544

Concentration

1.139862

Concentration

1.160999

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 3
Sample Date/Time: Monday, November 06, 2006 14:11:28
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	104099.1		ppb
|>	Ho	165	310759		ppb
|-	Pb	208	3557102.1	256.3451	ppb
	Kr	83	74.3		ppb

Replicates
Concentration

253.792805

Concentration

254.718299

Concentration

260.524286

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/Time: Monday, November 06, 2006 14:13:29
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	103896.3		ppb
|>	Ho	165	306370.2		ppb
|-	Pb	208	1458652.6	106.5886	ppb
	Kr	83	59.2		ppb

Replicates
Concentration

106.384703

Concentration

106.921711

Concentration

106.459461

PerkinElmer ELAN 6100 ICP-MS

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 9
Sample Date/Time: Monday, November 06, 2006 14:15:31
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	88485.5		ppb
|>	Ho	165	276640.9		ppb
|-	Pb	208	13877.4	1.0747	ppb
	Kr	83	54.7		ppb

Replicates
Concentration

1.428481

Concentration

0.980398

Concentration

0.81521

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 10
Sample Date/Time: Monday, November 06, 2006 14:17:34
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	92779.5		ppb
|>	Ho	165	291384.5		ppb
|-	Pb	208	681281	52.31466	ppb
	Kr	83	44.8		ppb

Replicates
Concentration

51.962292

Concentration

51.922582

Concentration

53.059094

Method 6020 Multi Metals Summary Report
Sample ID: 8231-1
Sample Date/Time: Monday, November 06, 2006 14:19:40
Sample Description: ATP
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	89145.4		ppb
|>	Ho	165	291459		ppb
|-	Pb	208	251605.6	19.28124	ppb
	Kr	83	66		ppb

Replicates
Concentration

19.137131

Concentration

19.172056

Concentration

19.534535

PerkinElmer ELAN 6100 ICP-MS

Method 6020 Multi Metals Summary Report
Sample ID: 8231-2
Sample Date/Time: Monday, November 06, 2006 14:21:46
Sample Description: ATP
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	89081		ppb
|>	Ho	165	288253.6		ppb
|-	Pb	208	141348.4	10.93316	ppb
	Kr	83	55.7		ppb

Replicates
Concentration

11.057874

Concentration

10.956309

Concentration

10.785297

Method 6020 Multi Metals Summary Report
Sample ID: 8231-3
Sample Date/Time: Monday, November 06, 2006 14:23:51
Sample Description: ATP
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	97700.2		ppb
|>	Ho	165	308087.5		ppb
|-	Pb	208	44397.6	3.17507	ppb
	Kr	83	59.3		ppb

Replicates
Concentration

3.211094

Concentration

3.162813

Concentration

3.151301

Method 6020 Multi Metals Summary Report
Sample ID: 8231-3
Sample Date/Time: Monday, November 06, 2006 14:25:54
Sample Description: ATP
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	96989.4		ppb
|>	Ho	165	307893.9		ppb
|-	Pb	208	788911.9	57.33564	ppb
	Kr	83	58.3		ppb

Replicates
Concentration

56.911027

Concentration

57.549436

Concentration

57.546458

PerkinElmer ELAN 6100 ICP-MS

Method 6020 Multi Metals Summary Report
Sample ID: 8231-4
Sample Date/Time: Monday, November 06, 2006 14:27:58
Sample Description: ATP
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	83236.4		ppb
|>	Ho	165	278965.4		ppb
|-	Pb	208	62604.2	4.97622	ppb
	Kr	83	70.7		ppb

Replicates
Concentration

5.090658

Concentration

4.949066

Concentration

4.888945

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date/Time: Monday, November 06, 2006 14:29:58
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	97348.9		ppb
|>	Ho	165	292295		ppb
|-	Pb	208	1302.4	0.04678	ppb
	Kr	83	46.5		ppb

Replicates
Concentration

0.055172

Concentration

0.048334

Concentration

0.036818

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/Time: Monday, November 06, 2006 14:31:59
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	94129.6		ppb
|>	Ho	165	295730.7		ppb
|-	Pb	208	1398492.7	105.8687	ppb
	Kr	83	52.3		ppb

Replicates
Concentration

105.54911

Concentration

105.684569

Concentration

106.372282

PerkinElmer ELAN 6100 ICP-MS

Method 6020 Multi Metals Summary Report
Sample ID: 8231-4
Sample Date/Time: Monday, November 06, 2006 14:49:48
Sample Description: ATP
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	76047.7		ppb
|>	Ho	165	253864.5		ppb
|-	Pb	208	57731.9	5.04294	ppb
	Kr	83	67.3		ppb

Replicates
Concentration

5.115791

Concentration

5.036078

Concentration

4.976955

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date/Time: Monday, November 06, 2006 14:51:49
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	96050.7		ppb
|>	Ho	165	287295.2		ppb
|-	Pb	208	1056.4	0.02921	ppb
	Kr	83	48.3		ppb

Replicates
Concentration

0.028403

Concentration

0.030365

Concentration

0.02887

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/Time: Monday, November 06, 2006 14:53:50
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Inten:	Conc. Mea	Report Unit
	Rh	103	93948.6		ppb
|>	Ho	165	294596.3		ppb
|-	Pb	208	1386630.3	105.3808	ppb
	Kr	83	53.5		ppb

Replicates
Concentration

105.398598

Concentration

104.073074

Concentration

106.670783

APPENDIX E

ATP - Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, Indiana 46219

Phone (317) 345-1723
Fax (317) 351-0411
Email: atp_stack@sbcglobal.net

CHAIN OF COUSTODY RECORD

COMPANY:	ATP	PROJECT NAME/NUMBER:	NUCOR - Castrip / 183
SEND REPORT TO:	Carlos Brown	BILLING INFORMATION	
ADDRESS:	1201 N. Graham Ave.	BILL TO:	
	Indianapolis, Indiana 46219	ADDRESS:	Same
PHONE:	(317) 345-1723	PHONE:	
FAX:	(317) 351-0411	FAX:	PO NO: 183

LAB JOB NO.

															REMARKS/PRECAUTIONS
Run 1	Filter	10/02/06			Petri		1	X							
Run 2	Filter	10/03/06			Petri		1	X							
Run 3	Filter	10/05/06			Petri		1	X							
Run 1	Acetone Rinse	10/02/06		AQ	4 oz		1	X							
Run 2	Acetone Rinse	10/03/06		AQ	4 oz		1	X							
Run 3	Acetone Rinse	10/05/06		AQ	4 oz		1	X							
BLANK	Acetone	10/05/06		AQ	4 oz		1	X							

SAMPLER: Andrew Young | SHIPMENT METHOD: | AIRBILL NO:

REQUIRED TURNAROUND: *

1. RELINQUISHED BY:	DATE 10/5/06	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: Andrew Young		SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY ATP	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME
1. RECEIVED BY:	DATE 10/5/06	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE: Andrew Young		SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY ATP	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME

ATP - Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, Indiana 46219

Phone (317) 345-1723
Fax (317) 351-0411
Email: atp_stack@sbcglobal.net

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION		PROJECT INFORMATION	
COMPANY	ATP	PROJECT NAME/NUMBER	Nucor Steel - Strip Caster
SEND REPORT TO	Carlos Brown	BILLING INFORMATION	
ADDRESS	1201 N. Graham Ave.	BILL TO	
	Indianapolis, Indiana 46219	ADDRESS	Same
PHONE	(317) 345-1723	PHONE	
FAX	(317) 351-0411	FAX	PO NO 183

LAB JOB NO.

SAMPLE NO	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV	No. of Containers	EPA Method 202		Sulfate Correction				REMARKS / PRECAUTIONS
Run 1	DI H2O / Rinse	10/05/06		AQ	500 ml		1	X		X				
Run 2	DI H2O / Rinse	10/05/06		AQ	500 ml		1	X		X				
Run 3	DI H2O / Rinse	10/05/06		AQ	500 ml		1	X		X				* Analyze for
														M202
Run 1	MeCl2 Rinse	10/05/06		AQ	4 OZ		1	X		X				
Run 2	MeCl2 Rinse	10/05/06		AQ	4 OZ		1	X		X				* Perform Sulfate
Run 3	MeCl2 Rinse	10/05/06		AQ	4 OZ		1	X		X				Correction
BLANK	DI H2O Blank	10/05/06		AQ	500 ml		1	X		X	?			
BLANK	MeCl2 Blank	10/05/06		AQ	4 OZ		1	X		X	?			

SAMPLER: Carlos Brown | SHIPMENT METHOD: | AIRBILL NO:

REQUIRED TURNAROUND: RUSH

1. RELINQUISHED BY:	DATE	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: [signature]	11/2/06	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: ATP	TIME	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME
1. RECEIVED BY: ERIN ORTIZ	DATE 11/3/06	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE: [signature]		SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: ENTHALPY	TIME 1200	PRINTED NAME/COMPANY:	TIME	PRINTED NAME/COMPANY:	TIME

T=Ambient

ATP - Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, Indiana 46219

Phone (317) 345-1723
Fax (317) 351-0411
Email: atp_stack@sbcglobal.net

8331

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION

COMPANY: ATP
SEND REPORT TO: Carlos Brown
ADDRESS: 1201 N. Graham Ave.
Indianapolis, Indiana 46219
PHONE: (317) 345-1723
FAX: (317) 351-0411

PROJECT INFORMATION

PROJECT NAME/NUMBER: Nucor Steel - Strip Caster

BILLING INFORMATION

BILL TO:
ADDRESS: Same
PHONE:
FAX:
PO NO: 183

LAB JOB NO.:

SAMPLE NO	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV	No. of Containers	EPA Methods 12							REMARKS / PRECAUTIONS
Run 1	Sample Filter	10/05/06		Filter	Petri		1	X							
Run 2	Sample Filter	10/05/06		Filter	Petri		1	X							Analyze for Pb
Run 3	Sample Filter	10/05/06		Filter	Petri		1	X							
															Rush (3-Day)
Run 1	0.1N HNO3 / Rinse	10/05/06		AQ	500 ml		1	X							
Run 2	0.1N HNO3 / Rinse	10/05/06		AQ	500 ml		1	X							
Run 3	0.1N HNO3 / Rinse	10/05/06		AQ	500 ml		1	X							
BLANK	BLANK Filter	10/05/06		Filter	Petri		1	X							
BLANK	0.1N HNO3	10/05/06		AQ	500 ml	,	1	X							

SAMPLER: Carlos Brown
SHIPMENT METHOD:
AIRBILL NO:

REQUIRED TURNAROUND: RUSH (3-DAY)

1. RELINQUISHED BY:	DATE	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: [signature]	11/2/06	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: ATP	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME
1. RECEIVED BY:	DATE	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE: [signature]	11/3/06	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: Element One, Inc	TIME 11:40	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME

APPENDIX F

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-26

Company:	Nucor Steel
Date:	10/02/06 - 10/05/06
Source:	**PM - Castrip**
Location:	Crawfordsville, Indiana

	Run 1	Run 2	Run 3	Average
Y qa =	0.986	0.986	1.007	0.993

Average result must be within 5% of Y

Result (%) **0.30**

PASSED POST CAL

Dry Gas Meter Box:

ID:	A-2
Y:	0.99
Delta H:	1.81

Run 1	Volume	Delta H	DGM Inlet	DGM Outlet
1		2.28	66	64
2		2.28	66	64
3		2.17	66	64
4		2.17	66	65
5		2.17	67	65
6		2.10	68	65
7		2.03	68	65
8		2.03	69	66
9		2.00	70	66
10		2.00	71	67
11		1.75	71	68
12		1.75	71	68
13		1.89	73	68
14		1.82	73	68
15		1.82	73	68
16		1.89	75	70
17		1.75	77	71
18		1.75	78	71
19		1.82	79	72
20		1.82	80	73
21		1.82	81	74
22		1.82	81	74
23	906.001	1.68	81	74
24	859.6	2.17	81	74

Volume	Delta H	Meter Temp
46.401	1.948	70.7

Barometric Pressure	Test Time
30.13	60.0

Y qa: 0.986

Run 2	Volume	Delta H	DGM Inlet	DGM Outlet
1		2.10	86	85
2		1.93	87	86
3		1.93	87	86
4		1.82	88	87
5		1.61	89	87
6		1.61	89	87
7		1.61	91	89
8		1.54	92	89
9		1.47	92	89
10		1.40	93	90
11		1.40	93	90
12		1.40	94	91
13		1.75	95	92
14		1.89	96	92
15		1.89	96	93
16		1.89	96	93
17		1.68	97	93
18		1.68	98	94
19		1.58	98	94
20		1.68	98	94
21		1.82	99	95
22		1.89	99	95
23	961.297	1.89	100	95
24	916.7	1.89	101	96

Volume	Delta H	Meter Temp
44.597	1.722	92.4

Barometric Pressure	Test Time
30.06	60.0

Y qa: 0.986

Run 3	Volume	Delta H	DGM Inlet	DGM Outlet
1		1.75	57	56
2		1.75	57	56
3		1.68	57	56
4		1.68	57	56
5		1.61	57	56
6		1.54	58	56
7		1.75	58	56
8		1.79	59	57
9		1.89	59	57
10		1.93	61	57
11		2.00	61	57
12		2.10	62	57
13		1.93	61	57
14		1.93	61	57
15		1.82	62	58
16		1.82	62	58
17		1.79	63	58
18		1.82	63	58
19		2.03	63	58
20		2.10	63	58
21		2.10	64	59
22		2.03	64	59
23	1007.60	2.10	64	59
24	963.5	2.10	64	59

Volume	Delta H	Meter Temp
44.1	1.875	59.0

Barometric Pressure	Test Time
30.15	60.0

Y qa: 1.007

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-26

Company: Nucor Steel
Date: 10/2/06 - 10/5/06
Source: LEAD - Castrip
Location: Crawfordsville, Indiana

	Run 1	Run 2	Run 3	Average
Y qa =	1.014	1.002	1.056	1.024

Average result must be within 5% of Y

Result (%) **3.41**

PASSED POST CAL

Dry Gas Meter Box:

ID: A-1
Y: 0.99
Delta H: 1.74

Run 1	Volume	Delta H	DGM Inlet	DGM Outlet
1		2.28	66	64
2		2.28	66	64
3		2.17	66	64
4		2.17	67	64
5		2.17	68	65
6		2.10	69	65
7		2.10	70	66
8		2.14	70	66
9		2.07	71	66
10		2.04	72	67
11		1.82	74	68
12		1.82	74	68
13		1.89	74	69
14		1.86	76	70
15		1.82	76	70
16		1.82	78	71
17		1.79	79	72
18		1.79	80	73
19		1.82	81	73
20		1.75	81	73
21		1.82	81	73
22	123.4	1.79	81	73
23	77.2	1.75	81	73
24		2.03	81	73

Volume	Delta H	Meter Temp
46.2	1.960	71.50

Barometric Pressure 30.13

Test Time 60.00

Y qa: 1.014

Run 2	Volume	Delta H	DGM Inlet	DGM Outlet
1		2.16	86	85
2		2.09	86	85
3		2.09	86	85
4		2.09	87	86
5		1.87	88	86
6		1.73	88	86
7		2.09	89	87
8		2.09	89	87
9		1.98	91	88
10		2.16	92	88
11		1.80	92	88
12		1.66	93	89
13		2.09	94	90
14		1.94	94	90
15		1.94	95	90
16		1.94	95	90
17		1.69	96	91
18		1.51	97	92
19		2.09	97	93
20		2.16	98	93
21		1.98	99	93
22	183.578	2.09	99	94
23	136.1	1.94	100	95
24		1.51	101	96

Volume	Delta H	Meter Temp
47.478	1.946	91.23

Barometric Pressure 30.06

Test Time 60.00

Y qa: 1.002

Run 3	Volume	Delta H	DGM Inlet	DGM Outlet
1		1.85	54	54
2		1.85	54	54
3		1.78	54	54
4		1.63	55	54
5		1.55	55	54
6		1.55	55	54
7		1.78	55	54
8		2.07	55	54
9		2.07	56	54
10		2.15	56	54
11		2.22	56	55
12		2.29	56	55
13		1.92	56	55
14		1.92	56	55
15		2.00	56	55
16		2.00	56	55
17		2.04	57	56
18		2.07	57	56
19		2.07	57	56
20		2.15	57	56
21		2.22	57	56
22	228.35	2.29	57	56
23	184.1	2.37	57	56
24		2.41	57	56

Volume	Delta H	Meter Temp
44.25	2.010	55.40

Barometric Pressure 30.15

Test Time 60.00

Y qa: 1.056

APEX INSTRUMENTS
EPA Method 5
522 Series Meter Box Calibration
Post-Test Orifice Method
English Meter Box Units, English K' Factor

Filename: Orifice Calibration

Serial #: **A1**

Date: -------------------> 05/26/06
Barometric Pressure: ---> 29.66 in Hg
Critical Orifice Vacuum:-> 19 in Hg

IMPORTANT!!! For valid test results, the Critical Orifice Vacuum must be equal to or higher than the value shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

---------- DRY GAS METER READINGS ---------- CRITICAL ORIFICE READINGS

dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Vacuum (in Hg)	Ambient Temperature Initial (deg F)	Ambient Temperature Final (deg F)	Ambient Temperature Average (deg F)
0.38	14.20	295.5	300.5	5	68	68	69	68	**AT-15**	**0.269**	19	68	68	68
0.38	14.20	300.5	305.5	5	69	68	70	68	**AT-15**	**0.269**	19	68	68	68
0.38	14.20	305.5	310.5	5	70	68	71	69	**AT-15**	**0.269**	19	68	68	68

*** RESULTS ***

DRY GAS METER VOLUME CORRECTED Vm(std) (cu ft)	DRY GAS METER VOLUME CORRECTED Vm(std) (liters)	ORIFICE VOLUME CORRECTED Vcr(std) (cu ft)	ORIFICE VOLUME CORRECTED Vm(std) (liters)	DRY GAS METER CALIBRATION FACTOR Y Value (number)	DRY GAS METER CALIBRATION FACTOR Y Variation (number)	ORIFICE CALIBRATION FACTOR dH@ Value (in H2O)	ORIFICE CALIBRATION FACTOR dH@ Value (mm H2O)	ORIFICE CALIBRATION FACTOR dH@ Variation (in H2O)
4.95688862	140.379	4.93054367	139.633	0.9946852	-0.0011	1.748119091	44.402225	0.004398
4.95220125	140.246	4.93054367	139.633	0.9956267	-0.00016	1.744814518	44.318289	0.001094
4.9451868	140.048	4.93054367	139.633	0.9970389	0.001255	1.738229151	44.15102	-0.00549
			Average Y ---->	**0.996**		**1.744**	44.290511	<---- Average dH@

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

Calibrated by: Carlos Brown Date: May 26, 2006

APEX INSTRUMENTS
EPA Method 5
522 Series Meter Box Calibration
Post-Test Orifice Method
English Meter Box Units, English K' Factor

Filename: Orifice Calibration

Serial #: **A2**

Date: ——————> 05/26/06
Barometric Pressure: ---> 29.66 in Hg
Critical Orifice Vacuum:-> 20 in Hg

IMPORTANT!!! For valid test results, the Critical Orifice Vacuum must be equal to or higher than the value shown above. The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).

		DRY GAS METER READINGS							CRITICAL ORIFICE READINGS					
					Initial Temps.		Final Temps.					Ambient Temperature		
dH (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Inlet (deg F)	Outlet (deg F)	Inlet (deg F)	Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Vacuum (in Hg)	Initial (deg F)	Final (deg F)	Average (deg F)
0.72	10.38	288	293	5	68	68	68	68	**AT-15**	**0.37**	20	69	69	69
0.72	10.39	293	298	5	68	68	69	68	**AT-15**	**0.37**	20	69	69	69
0.72	10.38	298	303	5	69	68	69	69	**AT-15**	**0.37**	20	69	69	69

** RESULTS **

DRY GAS METER		ORIFICE		DRY GAS METER		ORIFICE		
VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	VOLUME CORRECTED	CALIBRATION FACTOR Y		CALIBRATION FACTOR dH@		
Vm(std) (cu ft)	Vm(std) (liters)	Vcr(std) (cu ft)	Vm(std) (liters)	Value (number)	Variation (number)	Value (in H2O)	Value (mm H2O)	Variation (in H2O)
4.96341176	140.564	4.88577574	138.36517	0.9843583	-0.00094	1.814037606	46.076555	0.002857
4.96106278	140.497	4.89048265	138.49847	0.9857732	0.000477	1.812320987	46.032953	0.00114
4.95637146	140.364	4.88577574	138.36517	0.9857566	0.000461	1.807183702	45.902466	-0.004
		Average Y ------>		**0.99**		**1.811**	46.003991	<------ Average dH@

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

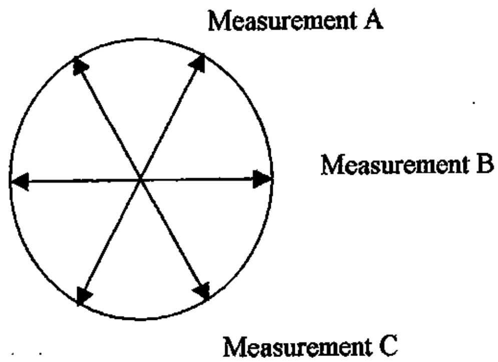
Calibrated by: Carlos Brown Date: May 26, 2006

ATP - AIR TEST PROFESSIONALS, INC.
Nozzle Calibration

Nozzle Type: Glass

NOZZLE DIAMETER MEASUREMENT

A = 0.250 inches
B = 0.250 inches
C = 0.250 inches



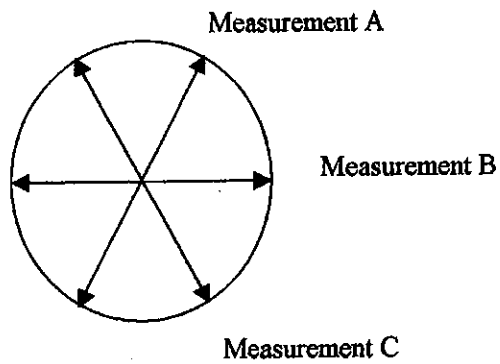
Calibrated by: Andrew Young Date Calibrated: October 2, 2006

ATP - AIR TEST PROFESSIONALS, INC.
Nozzle Calibration

Nozzle Type: Stainless Steel

NOZZLE DIAMETER MEASUREMENT

A = 0.244 inches
B = 0.244 inches
C = 0.244 inches



Calibrated by: Andrew Young Date Calibrated: October 2, 2006

ATP - Air Test Professionals, Inc.

Thermocouple Calibration

Probe Length/ID: **5 ft. Type-S** Dry Gas Meter ID: **A-1**

Standard Used: Mercury Thermometer Temperature Scale: Degrees F

Temperature Range	**Mercury Thermometer**	**Probe Thermometer**
Hot Bath	490 deg	491 deg
Room Temperature	67 deg	67 deg
Ice Bath	33 deg	33 deg

Calibrated By: Carlos Brown Date Calibrated: April 2006

ATP - Air Test Professionals, Inc.

Thermocouple Calibration

Probe Length/ID: **12 ft. Type-S** Dry Gas Meter ID: **A-1**

Standard Used: Mercury Thermometer Temperature Scale: Degrees F

Temperature Range	Mercury Thermometer	Probe Thermometer
Hot Bath	424 deg	425 deg
Room Temperature	58 deg	58 deg
Ice Bath	34 deg	34 deg

Calibrated By: Carlos Brown Date Calibrated: April 2006

ATP - Air Test Professionals, Inc.

Pitot Tube Calibration

Reference: 40 CFR 60, Appendix A, Method 2, Section 2.1

Probe Length/ID.: **5 ft. Type-S (w/probe)**

External Tubing Diameter: 0.250" inches

Base to Opening Plane Distance (Pa): 0.370" inches

Base to Opening Plane Distance (Pa): 0.370" inches

	Measured	**Allowable**
Pa/Dt	1.478"	1.05 – 1.50 inches
Pb/Dt	1.478"	1.05 – 1.50 inches
Angle α 1	1 deg	$\alpha 1$ and $\alpha 2 \leq 10.0$
Angle α 2	1 deg	$\alpha 1$ and $\alpha 2 \leq 10.0$
Angle β 1	0 deg	$\beta 1$ and $\beta 2 \leq 10.0$
Angle β 2	0 deg	$\beta 1$ and $\beta 2 \leq 10.0$
Z (inches)	0.010"	0.125 inches
W (inches)	0.000"	0.031 inches
	If all criteria are met, Pitot Coefficient is 0.84	Pitot Coefficient: **0.84**

Calibrated By: Carlos Brown Date Calibrated: April 2006

ATP – Air Test Professionals, Inc.

Pitot Tube Calibration

Reference: 40 CFR 60, Appendix A, Method 2, Section 2.1

Probe Length/ID.: **12 ft. Type-S**

External Tubing Diameter: 0.375" inches

Base to Opening Plane Distance (Pa): 0.470" inches

Base to Opening Plane Distance (Pa): 0.470" inches

	Measured	**Allowable**
Pa/Dt	1.25"	1.05 – 1.50 inches
Pb/Dt	1.25"	1.05 – 1.50 inches
Angle α 1	0 deg	α1 and α2 ≤ 10.0
Angle α 2	0 deg	α1 and α2 ≤ 10.0
Angle β 1	0 deg	β1 and β2 ≤ 10.0
Angle β 2	0 deg	β1 and β2 ≤ 10.0
z (inches)	0.0"	0.125 inches
w (inches)	0.0"	0.031 inches
	If all criteria are met, Pitot Coefficient is 0.84	Pitot Coefficient: **0.84**

Calibrated By: Carlos Brown   Date Calibrated: April 2006

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY, MI 48083

P.O. No.: 54265-71-65000
Project No.: 05-32658-003

Customer

CLEAN AIR INSTRUMENT RENTAL
GARY ZAPEL
500 WEST WOOD STREET
PALATINE IL 60067

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM002866 **Certification Date:** 14Jul2005 **Exp. Date:** 13Jul2008

Cylinder Pressure*:** 1917 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON MONOXIDE	94.36 PPM	+/- 1%	Direct NIST and NMi
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1679	02Apr2007	ALM040697	94.90 PPM	CARBON MONOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//09286 21	20Jun2005	FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

CARBON MONOXIDE

First Triad Analysis

Date: 06Jul2005	Response Unit: PPM	
Z1 = -0.01447	R1 = 95.64342	T1 = 94.64726
R2 = 95.66893	Z2 = 0.00629	T2 = 94.67961
Z3 = 0.06052	T3 = 94.78347	R3 = 95.68381
Avg. Concentration:	93.95	PPM

Second Triad Analysis

Date: 14Jul2005	Response Unit: PPM	
Z1 = -0.00218	R1 = 94.72713	T1 = 94.64809
R2 = 94.73702	Z2 = 0.00792	T2 = 94.59821
Z3 = 0.03069	T3 = 94.70185	R3 = 94.74591
Avg. Concentration:	94.78	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 9.99991E-1	
Constants:	A = 0.00000E+0
B = 9.80863E-1	C = 7.32000E-4
D = 1.00000E-6	E = 0.00000E+0

APPROVED BY: JEFF CROTEAU

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 55023-71-65000
Project No.: 05-44820-001

Customer

CLEAN AIR INSTRUMENT RENTAL

500 WEST WOOD STREET
PALATINE IL 60067

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM048771 **Certification Date:** 14Jul2006 **Exp. Date:** 13Jul2009
Cylinder Pressure*:** 1962 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
CARBON MONOXIDE	182.0	PPM	+/- 1%	Direct NIST and NMI
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.
** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 2636	02Oct2008	AAL7022	248.5 PPM	CARBON MONOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0928621	26Jun2006	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

CARBON MONOXIDE

First Triad Analysis

Date: 07Jul2006	Response Unit:PPM	
Z1=-0.00220	R1=251.3061	T1=184.2558
R2=251.4409	Z2=0.05403	T2=184.4522
Z3=0.05900	T3=184.6303	R3=251.4937
Avg. Concentration:	182.3	PPM

Second Triad Analysis

Date: 14Jul2006	Response Unit: PPM	
Z1=-0.03688	R1=251.4314	T1=183.7341
R2=251.6482	Z2=-0.00870	T2=184.2585
Z3=0.11361	T3=184.5140	R3=252.1969
Avg. Concentration:	181.8	PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4	
r=9.99989E-1	
Constants:	A=0.00000E+0
B=6.70122E-1	C=1.40000E-4
D=0.00000E+0	E=0.00000E+0

APPROVED BY: ______________________
Scott King

cott's Customer Online Information SystemClose Window | Save As | Print

RATA CLASS

Dual-Analyzed Calibration Standard

9810 BAY AREA BLVD, PASADENA, TX 77507 Phone: 281-474-5800 Fax: 31-474-5857

CERTIFICATE_OF_ACCURACY:_EPA_Protocol_Gas

Assay_Laboratory		Customer_
	P.O. No.: 53907-71-65000	CLEAN AIR INSTRUMENT RENTALS
SCOTT SPECIALTY GASES	Project No.: 04-31834-020	NANCY DAVIS
9810 BAY AREA BLVD		321 CENTURY PLAZA
PASADENA, TX 77507		SUITE 110
		HOUSTON TX 77073

_ANALYTICAL_INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & ertification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM030321 Certification Date: 16Feb2005 Exp. Date: 16Feb2007

Cylinder Pressure***: 2015 PSIG

COMPONENT___	CERTIFIED_CONCENTRATION_(Moles)_	ANALYTICAL ACCURACY**_	TRACEABILITY__
NITRIC OXIDE	87.1 PPM	+/- 1%	Direct NIST and NMi
NITROGEN - OXYGEN FREE	BALANCE		
TOTAL OXIDES OF NITROGEN	87.1 PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

**_Analytical_accuracy_is_based_on_the_requirements_of_EPA_Protocol_Procedure_G1,_September 997.

REFERENCE_STANDARD_____

TYPE/SRM_NO.	_EXPIRATION_DATE	CYLINDER_NUMBER__	CONCENTRATION____	COMPONENT____
NTRM 1684	04Jul2008	AAL070287	97.00PM	NITRIC OXIDE

INSTRUMENTATION____

NSTRUMENT/MODEL/SERIAL#_____	DATE_LAST_CALIBRATED____	ANALYTICAL_PRINCIPLE__
KS Online/2030/0929061	24Jan2005	FTIR

_ANALYZER_READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis	Second Triad Analysis	Calibration Curve	
NITRIC OXIDE			
Date: 08Feb2005Resp Unit:PPM	Date: 16Feb2005Resp Unit: PPM		
oncentration=A+Bx+Cx2+Dx3+Ex4			
Z1=0.163371=97.062341=87.08656	Z1=0.114941=96.59197=87.04693	r=9.99991E-1	
R2=97.19909=0.22082T2=87.12320	R2=96.60682=0.162182=87.05434	Constants:	A=0.00000E+0
Z3=0.251343=87.206763=97.27835	Z3=0.164583=87.10065=96.73040	B=9.98287E-1	C=2.04000E-4
Avg. Conc: 86.95 PPM	Avg. Conc: 87.37 PPM	D=0.00000E+0	E=0.00000E+0

APPROVED BY: (signature on file)
GARY WRIGHT

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET, TROY, MI 48083 Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY, MI 48083

P.O. No.: 54685-71-65000
05-39648-017

Customer

CLEAN AIR INSTRUMENT RENTAL
GARY ZAPEL
500 WEST WOOD STREET
PALATINE IL 60067

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM057888 **Certification Date:** 31Jan2006 **Exp. Date:** 31Jan2008

Cylinder Pressure*:** ~~1884 PSIG~~

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
NITRIC OXIDE	49.08	PPM	+/- 1%	Direct NIST and NMi
NITROGEN - OXYGEN FREE		BALANCE		
TOTAL OXIDES OF NITROGEN	49.10	PPM		Reference Value Only

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1683	15Aug2009	AAL070681	49.82 PPM	NITRIC OXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0928621	09Jan2006	FTIR

ANALYZER READINGS

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

NITRIC OXIDE

Date: 24Jan2006	Response Unit:PPM	
Z1 = -0.17728	R1 = 97.14961	T1 = 49.05994
R2 = 97.21331	Z2 = 0.26575	T2 = 49.43356
Z3 = 0.28894	T3 = 49.52723	R3 = 97.50117
Avg. Concentration:	49.13	PPM

Second Triad Analysis

Date: 31Jan2006	Response Unit: PPM	
Z1 = -0.32533	R1 = 50.07219	T1 = 49.32755
R2 = 50.36399	Z2 = -0.24991	T2 = 49.37923
Z3 = -0.14477	T3 = 49.98800	R3 = 50.69381
Avg. Concentration:	49.02	PPM

Calibration Curve

Concentration = A + Bx + Cx2 + Dx3 + Ex4	
r = 9.99998E-1	
Constants:	A = 0.00000E+0
B = 9.99660E-1	C = 1.86000E-4
D = 0.00000E+0	E = 0.00000E+0

APPROVED BY: JEFF CROTEAU

RATA CLASS

Scott Specialty Gases

1290 COMBERMERE STREET,TROY,MI 48083

Dual-Analyzed Calibration Standard

Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 53691-71-65000
Project No.: 05-23984-031

Customer
CLEAN AIR INSTRUMENT RENTAL
GARY ZAPEL
500 WEST WOOD STREET
PALATINE IL 60067

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM009211 **Certification Date:** 22Oct2004 **Exp. Date:** 15Oct2006

Cylinder Pressure*:** 1753 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
SULFUR DIOXIDE *	62.09 PPM	+/- 1%	Direct NIST and NMi
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.
Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

* This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected Protocols.

REFERENCE STANDARD

YPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1694	01Sep2007	ALM051641	98.10 PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
MKS Online/2030/0928621	28Sep2004	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

SULFUR DIOXIDE *

First Triad Analysis

Date: 15Oct2004	Response Unit:PPM	
Z1=-0.00242	R1=99.34406	T1=62.83456
R2=99.39227	Z2=0.05579	T2=62.88644
Z3=0.05988	T3=62.92573	R3=99.40588
Avg. Concentration:	62.06	PPM

Second Triad Analysis

Date: 22Oct2004	Response Unit: PPM	
Z1=-0.00893	R1=98.72887	T1=62.51701
R2=98.75321	Z2=0.03114	T2=62.55223
Z3=0.03375	T3=62.57860	R3=98.75853
Avg. Concentration:	62.13	PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4	
r=9.99995E-1	
Constants:	A=0.00000E+0
B=9.97040E-1	C=0.00000E+0
D=0.00000E+0	E=0.00000E+0

APPROVED BY: Dave Babcock

RATA CLASS

Scott Specialty Gases

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET,TROY,MI 48083

Phone: 248-589-2950 Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
1290 COMBERMERE STREET
TROY,MI 48083

P.O. No.: 55166-71-65000
Project No.: 05-46952-003

Customer

CLEAN AIR INSTRUMENT RENTAL

500 WEST WOOD STREET
PALATINE IL 60067

ANALYTICAL INFORMATION

This certification was performed according to EPA Traceability Protocol For Assay & Certification of Gaseous Calibration Standards; Procedure G-1; September, 1997.

Cylinder Number: ALM058090 **Certification Date:** 13Sep2006 **Exp. Date:** 12Sep2008

Cylinder Pressure*:** 1816 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)		ANALYTICAL ACCURACY**	TRACEABILITY
SULFUR DIOXIDE *	150.1	PPM	+/- 1%	Direct NIST and NMi
NITROGEN		BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

* This Protocol has been certified using corrected NIST SO2 standard values, per EPA guidance dated 7/24/96 and will not correlate with uncorrected P

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 0260	01May2008	ALM019186	254.4 PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0928621	22Aug2006	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

SULFUR DIOXIDE *

First Triad Analysis

Date: 06Sep2006	Response Unit:PPM	
Z1=-0.00120	R1=256.2494	T1=151.4877
R2=256.6201	Z2=0.00218	T2=151.5950
Z3=0.03731	T3=151.8651	R3=256.6377
Avg. Concentration:	150.4	PPM

Second Triad Analysis

Date: 13Sep2006	Response Unit: PPM	
Z1=0.02749	R1=256.4774	T1=151.1583
R2=256.6410	Z2=0.04677	T2=151.1978
Z3=0.06748	T3=151.4039	R3=256.8676
Avg. Concentration:	149.9	PPM

Calibration Curve

Concentration=A+Bx+Cx2+Dx3+Ex4	
r=9.99992E-1	
Constants:	A=0.00000E+0
B=9.96543E-1	C=9.00000E-6
D=0.00000E+0	E=0.00000E+0

APPROVED BY: ______________________ JEFF CROTEAU

APPENDIX G

CARL KOONTZ ASSOCIATES

of Nashville, Tennessee

This is to acknowledge that

Nita Greenburg

successfully participated in Visible Emissions training on 9/21/2006

and is qualified to evaluate Visible Emissions for a period of six (6) months from the date of certification.

Carl Koontz

Instructor

RUN NUMBER	1

Visible Emissions Observations Form

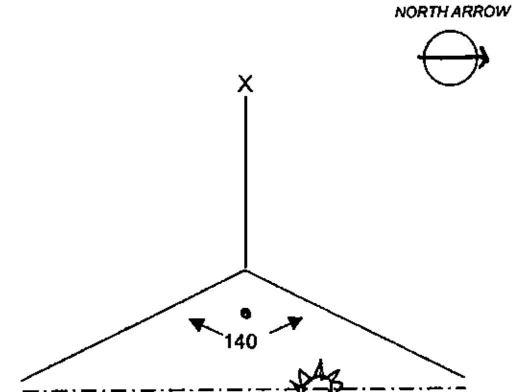
SOURCE NAME	NUCOR Steel
ADDRESS	
CITY	
STATE	
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Castrip
OPERATING MODE	
CONTROL EQUIPMENT	
OPERATING MODE	
DESCRIBE EMISSION POINT (Stack Exit Dimensions)	
HEIGHT ABOVE GROUND LEVEL	START 100' STOP 100'
HEIGHT RELATIVE TO OBSERVER	START 100' STOP 100'
DISTANCE FROM OBSERVER	START 350' STOP 350'
DIRECTION FROM OBSERVER	START W STOP W
DESCRIBE EMISSIONS	START N/A STOP N/A
EMISSION COLOR	START N/A STOP
PLUME TYPE:	CONTINUOUS FUGITIVE INTERMITTENT
WATER DROPLETS PRESENT	NO ~~YES~~
IF WATER DROPLET PLUME:	ATTACHED DETACHED
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START At Stack STOP At stack
DESCRIBE BACKGROUND	START Blue Sky STOP Cloudy
BACKGROUND COLOR	START Blue STOP
SKY CONDITIONS	START Clear STOP Cloudy
WIND SPEED (MPH)	START STOP
WIND DIRECTION	START NE STOP
AMBIENT TEMPERATURE (F)	START 65° STOP
WET BULB TEMP.	
R.H. PERCENT	

OBSERVATION DATE	START TIME	STOP TIME
10-2-06	9:02	10:02

min \ sec	0	15	30	45	min \ sec	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD	
NUMBER OF READINGS ABOVE ___ WERE	
RANGE OF OPACITY READINGS	MINIMUM MAXIMUM
OBSERVER'S NAME (PRINT)	Nita Greenburg
OBSERVER'S SIGNATURE	Nita Greenburg
DATE	10-2-06
ORGANIZATION	Air Test Professionals, Inc. (ATP)
CERTIFIED BY	Carl Koontz Associates
DATE	
Comments:	

SOURCE LAYOUT SKETCH



X = Emission Point
• = Observer's Position
☼ = Sun
= Wind →
= Plume

RUN NUMBER	2

Visible Emissions Observations Form

SOURCE NAME: NUCOR Steel

ADDRESS:

CITY	STATE	ZIP

PHONE:

SOURCE ID NUMBER:

PROCESS EQUIPMENT: Castrip — **OPERATING MODE:**

CONTROL EQUIPMENT: — **OPERATING MODE:**

DESCRIBE EMISSION POINT (Stack Exit Dimensions):

HEIGHT ABOVE GROUND LEVEL: START 100' STOP 100'

HEIGHT RELATIVE TO OBSERVER: START 100' STOP 100'

DISTANCE FROM OBSERVER: START 350' STOP 350'

DIRECTION FROM OBSERVER: START NW STOP NW

DESCRIBE EMISSIONS: START N/A STOP

EMISSION COLOR: START N/A STOP

PLUME TYPE: CONTINUOUS FUGITIVE INTERMITTENT

WATER DROPLETS PRESENT: NO YES

IF WATER DROPLET PLUME: ATTACHED DETACHED

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START At Stack STOP At Stack

DESCRIBE BACKGROUND: START Sky STOP At Stack

BACKGROUND COLOR: START Blue STOP

SKY CONDITIONS: START Clear STOP

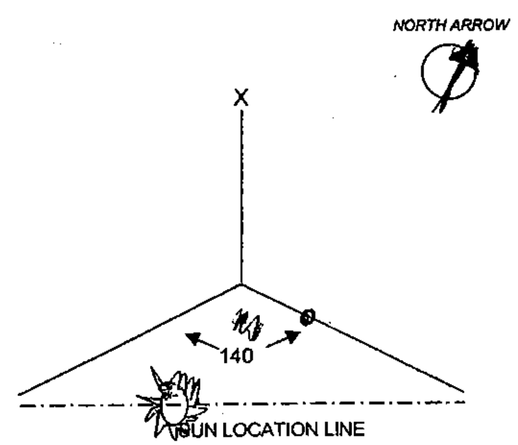
WIND SPEED (MPH): START STOP

WIND DIRECTION: START STOP

AMBIENT TEMPERATURE (F): START 74° STOP

WET BULB TEMP. R.H. PERCENT

SOURCE LAYOUT SKETCH



X	=	Emission Point	=	Wind
•	=	Observer's Position	=	Plume
☼	=	Sun		

OBSERVATION DATE: 10-3-06 **START TIME:** 2:32 pm **STOP TIME:** 3:32

min \ sec	0	15	30	45	min \ sec	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

AVERAGE OPACITY FOR HIGHEST PERIOD:

NUMBER OF READINGS ABOVE ___ WERE:

RANGE OF OPACITY READINGS: MINIMUM MAXIMUM

OBSERVER'S NAME (PRINT): Nita Greenburg

OBSERVER'S SIGNATURE: Nita Greenburg **DATE:** 10-3-06

ORGANIZATION: Air Test Professionals, Inc. (ATP)

CERTIFIED BY: Carl Koontz Associates **DATE:**

Comments:

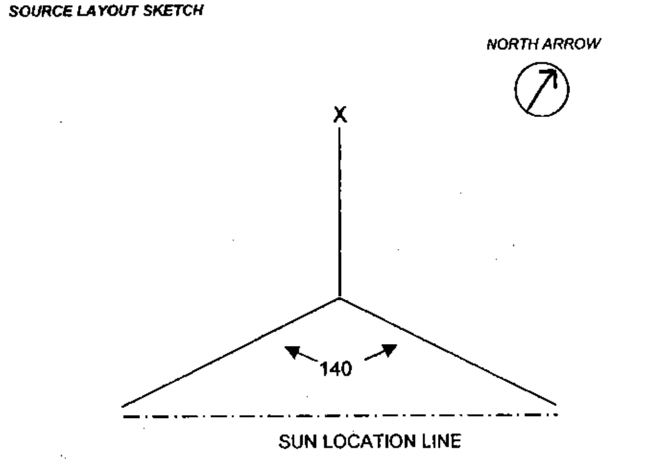
RUN NUMBER	3

Visible Emissions Observations Form

SOURCE NAME	Nucor Steel
OBSERVATION DATE	10-05-06
START TIME	9:04 a.m.
STOP TIME	10:04 a.m.
ADDRESS	
CITY	
STATE	
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	Castrip
OPERATING MODE	
CONTROL EQUIPMENT	
OPERATING MODE	
DESCRIBE EMISSION POINT (Stack Exit Dimensions)	
HEIGHT ABOVE GROUND LEVEL	START 100' STOP 100'
HEIGHT RELATIVE TO OBSERVER	START 100' STOP 100'
DISTANCE FROM OBSERVER	START 350' STOP 350'
DIRECTION FROM OBSERVER	START NW STOP NW
DESCRIBE EMISSIONS	START N/A STOP N/A
EMISSION COLOR	START N/A STOP N/A
PLUME TYPE: CONTINUOUS / FUGITIVE / INTERMITTENT	
WATER DROPLETS PRESENT	NO (circled) YES
IF WATER DROPLET PLUME: ATTACHED / DETACHED	
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START STOP
DESCRIBE BACKGROUND	START Sky STOP Sky
BACKGROUND COLOR	START Gray STOP Gray
SKY CONDITIONS	START cloudy STOP cloudy
WIND SPEED (MPH)	START 17 mph STOP 17 mph
WIND DIRECTION	START NE STOP NE
AMBIENT TEMPERATURE (F)	START 54° STOP 54°

min \ sec	0	15	30	45	min \ sec	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

SOURCE LAYOUT SKETCH



AVERAGE OPACITY FOR HIGHEST PERIOD	
NUMBER OF READINGS ABOVE ___ WERE	
RANGE OF OPACITY READINGS	MINIMUM MAXIMUM
OBSERVER'S NAME (PRINT)	Eric Ferguson
OBSERVER'S SIGNATURE	Eric Ferguson
DATE	10-05-06
ORGANIZATION	Air Test Professionals, Inc. (ATP)
CERTIFIED BY	Whitlow Enterprises ~~Carl Koontz Associates~~
DATE	9-8-06
Comments:	

X = Emission Point
• = Observer's Position
☼ = Sun
→ = Wind
= Plume

Whitlow Enterprises, LLC

www.smokeschool.net

Certifies that

Eric Ferguson of Nucor Steel

Has met all of the requirements of EPA Reference Method 9 and 22

And is qualified as a Visible Emissions Observer

Date: September 8, 2006

This certificate is valid for 6 months after the above date

George Artie "Butch" Whitlow

APPENDIX H

COMPLIANCE TEST PROTOCOL
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Date Prepared: 8/15/2006 **Proposed Test Date** ______

Plant Address and Location: 4537 S. Nucor Road, Crawfordsville, Indiana 47933

1. Source Information

AFS: ______ **Id Number:** ______ **Permit Number:** F 107-12143-00038
Company: Nucor Steel
Mail Address: 4537 S. Nucor Road
City: Crawfordsville, Indiana **Zip:** 47933
Co.Contact: Mark Washer **Phone:** (765) 364-1323

Check program if applicable:
FESOP: ______
Title V: X
SSOA: ______

AGENCY USE ONLY **Date Rec'd:** ______
Inspector: Reviewer: Date Appr: ______

2. Tester Information

Name: Air Test Professionals, Inc.
Address: 1201 N. Graham Ave.
Contact: Carlos M. Brown **Phone:** 317-345-1723
Pre-Test Inspection Complete? Yes

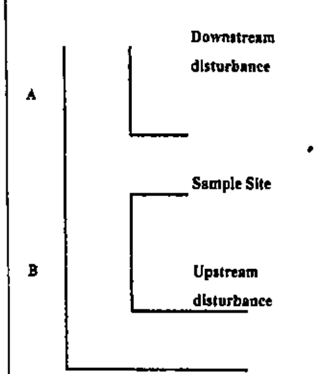
3. Process Information

Unit to Test: Strip Caster Line
Max. Rated Capacity: 135 tons per hour
Proposed Operating Speed: As close to mas as possible
Pollution Control Equipment: LMS Baghouse
Process Description: Molds molten grades of carbon steel into rolled steel of various widths and thicknesses.

Fuel Type: Natural Gas

4. Test Information

		# Runs	Time/Run
Methods 1-4	Moisture/Flow	3	60 min
Method 5	Particulate	3	60 min
Method 6C	SO2	3	60 min
Method 7	NOx	3	60 min
Method 9	Opacity	3	60 min
Method 10	CO	3	60 min
Method 12	Lead	3	60 min
Other Testing:	M202	3	60 min



Distance A: > 1/2 diameters
Distance B: > 2 diameters

5. Sampling Strategy

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

b. Describe method used to determine quantity of raw materials
Plant personnel will maintain and record production via heat-sheets

6. Sample Site Location

Does sample port location meet 40 CFR 60, Appx A, Method 1 Section 1.2 requirements: Yes/No: YES If No, Explain ______

Number of sample points for M5: 24
Diameter at sample site: 96" **Stack height:** 100 ft
Approx. stack gas flow (ACFM): 120,000
Approx. gas temp. (degF): 100 F
Approx. gas moisture (%): 1.5%

Reason for test:
State Agreed Order: Yes/No: ______ **Operating permit:** Yes/No: YES
Construction Permit: Yes/No: ______ **Compliance w 326** ______
NSPS 40 CFR 60 Subpart: ______ **Other** ______
Title V: ______
Other (i.e. EPA, CD, state, 114) ______

326 IAC 3-2.1 requires this completed form and fee to be submitted 35 days prior to proposed test date to:
(FEE NOT APPLICABLE IF FESOP OR TITLE V)

Compliance Data Section
Office of Air Management
Indiana Department of Environmental Management
100 North Senate
PO BOX 6015
Indianpolis, IN 46206-6015

Questions may be directed to 317-232-8338, FAX : 317-233-6865

APPENDIX I

Castrip

10/2/06

	8:50 AM	9:05	9:20	9:35	9:50	10:05
Amp	94	94	94	92	91	95
Delta	5.21	5.21	5.72	5.72	6.76	7.10

	10:10 AM
Amp	96
Delta	7.10

NUCOR STEEL - CRAWFORDSVILLE

LMF HEAT RECORD

Caster #______ Seq# 3108 Aim Grade: 1005 S 4 Date: 10/2/06 2nd OP:______

Heat No.: 162393 Liquidus:______ Melter: TT Utility:______

LMF: (E or W):______ Finish Grade: S 4 1st OP: RD

Ladle No.: 18 Wt. tapped: 115 Tap Time:______ Power on time:______

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	Nb	Ti	Sb	B	N	TOTAL RESID
LMF-1		0269	.58	0113	0032	.22								0050					.46	
LMF-2		0351	.60	0116	0036	.19							0022	0033					.48	
LMF-3																				
LMF-4																				

LADLE ADDITION	TIME	AMOUNTS
Lime		1200 #
L.C.SiMn		1250 #
MED C FeMn		600 # / 75 #
STD FeMn		
CARBON		
75% FeSi		
NITRO VAN		
PHOS		
LC FeCr		
ANTIMONY		
FeNb		
Nickel		
COPPER		
FE VAN		
FeMo		
AL SHOT		
AL WIRE		
FeTi WIRE		
SPONGE Ti		
Fe BORON		
C WIRE		125'
FeCa WIRE		
CaSi		350

DESULF

	Flow	No Flow	TIME
Plug			
Lance			
Lance Change #			

HYDROGEN

TIME	TEMP	PPM
7:08	2934	8.1 - 109

DEPARTURE TIME TEMP

3019 623 14m

REMARKS

QF-0019 12/8/2005

NUCOR STEEL - CRAWFORDSVILLE

LMF HEAT RECORD

Caster #______ Seq# 3108-2 Aim Grade: 100554 Date: 10/2 2nd OP:______

Heat No.: 162395 Liquidus:______ Melter: T T Utility:______

LMF: (E or W):______ Finish Grade: 100554 1st OP: RD

Ladle No.: 15 Wt. tapped: 115 Tap Time:______ Power on time:______

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	Nb	Ti	Sb	B	N	TOTAL RESID
LMF-1		0332	.54	0117	.0020	.13								0052					.56	
LMF-2		034	56	012	002	13								25					53	
LMF-3			+			+							+							
LMF-4																				

LADLE ADDITION	TIME	AMOUNTS
Lime		1200# / 300
L.C.SiMn		1000# / 225
MED C FeMn		500# / 150#
STD FeMn		
CARBON		
75% FeSi		135#
NITRO VAN		
PHOS		
LC FeCr		
ANTIMONY		
FeNb		
Nickel		
COPPER		
FE VAN		
FeMo		
AL SHOT		
AL WIRE		
FeTi WIRE		
SPONGE Ti		
Fe BORON		
C WIRE		
FeCa WIRE		
CaSi		250

DESULF

	Flow	No Flow	TIME
Plug			
Lance			
Lance Change #			

HYDROGEN

TIME	TEMP	PPM
9:18	2871	
9:43	2949	
9:59	3069	73.9
10:04	3003	43.8

DEPARTURE TIME 10:05 TEMP 3003

REMARKS

QF-0019 12/8/2005

NUCOR STEEL - CRAWFORDSVILLE

LMF HEAT RECORD

Caster #______ Seq# 3110   Aim Grade: 93   Date: 10/3   2nd OP: ______

Heat No.: 162424   Liquidus: ______   Melter: GH   Utility: ______

LMF: (E or W): ______   Finish Grade: ______   1st OP: Dm

Ladle No.: 20   Wt. tapped: 117   Tap Time: 11:50   Power on time: 1:07

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	Nb	Ti	Sb	B	N	TOTAL RESID
LMF-1		024	65	009	0035	30								010					37	
LMF-2		034	64 +	009	005	28								25					45	
LMF-3													+							
LMF-4																				

LADLE ADDITION	TIME	AMOUNTS
Lime		1000/500
L.C.SiMn		2300
~~MED~~ C FeMn		100/50
STD FeMn		
CARBON		
75% FeSi		125
NITRO VAN		
PHOS		
LC FeCr		
ANTIMONY		
FeNb		
Nickel		
COPPER		
FE VAN		
FeMo		
AL SHOT		1 BAG
AL WIRE		
FeTi WIRE		
SPONGE Ti		
Fe BORON		
C WIRE		125'
FeCa WIRE		
CaSi		300'

DESULF

	Flow	No Flow	TIME
Plug			
Lance			
Lance Change #			

HYDROGEN

TIME	TEMP	PPM
1:37	2910	
1:52	2948	
2:10	2999	61.4 19.
2:16	3012	49.8 0

DEPARTURE TIME TEMP

2:19 3025 49.8 0.

REMARKS

QF-0019 12/8/2005

NUCOR STEEL CRAWFORDSVILLE
LMF HEAT RECORD

Caster #_____ Seq# 3010-2 Aim Grade: 54 60 15 Date: 10/3 2nd OP: _____
Heat No.: 162426 Liquidus: _____ Melter: 6H Utility: _____
LMF: (E or W): _____ Finish Grade: _____ 1st OP: Dm
Ladle No.: 15 Wt. tapped: 114 Tap Time: 1:15 Power on time: 2:35

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	Nb	Ti	Sb	B	N	TOTAL RESID
LMF-1		031	53	01	004	17								46					31	
LMF-2		030	60	01	004	15								25					41	
LMF-3		+											+							
LMF-4																				

LADLE ADDITION	TIME	AMOUNTS
Lime		1500
L.C.SiMn		1100
~~MED~~ Low C FeMn		500/300
STD FeMn		
CARBON		
75% FeSi		50
NITRO VAN		
PHOS		
LC FeCr		
ANTIMONY		
FeNb		
Nickel		
COPPER		
FE VAN		
FeMo		
AL SHOT		
AL WIRE		
FeTi WIRE		
SPONGE Ti		
Fe BORON		
C WIRE		50
FeCa WIRE		
CaSi		225

DESULF

	Flow	No Flow	TIME
Plug			
Lance			
Lance Change #			

HYDROGEN

TIME	TEMP	PPM	
2:56	2966		
3:05	2975		
3:20	3004	65.9	23
3:29	3010	50.6	2

DEPARTURE TIME 3:35 TEMP 3020

REMARKS

60mn 15 si Trial

QF-0019 12/8/2005

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

60-15
mn Si

Caster #______ Seq# 3014-2 Aim Grade: S-4 Date: 10/5 2nd OP:______

Heat No.: 162467 Liquidus: 8 Melter: TM Utility:______

LMF: (E or W):______ Finish Grade: S-4 1st OP: KO

Ladle No.: 15 Wt. tapped: 115 Tap Time:______ Power on time:______

					CHEMISTRY															TOTAL
SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	Nb	Ti	Sb	B	N	RESID
LMF-1		0208	.58	0093	0027	.20								0052					.45	
LMF-2		034	58	009	004	17								23					44	
LMF-3																				
LMF-4																				

LADLE ADDITION	TIME	AMOUNTS
Lime		1200#
L.C.SiMn		1200#
MED C FeMn		600# / 175# / 40#
STD FeMn		
CARBON		
75% FeSi		
NITRO VAN		
PHOS		
LC FeCr		
ANTIMONY		
FeNb		
Nickel		
COPPER		
FE VAN		
FeMo		
AL SHOT		
AL WIRE		
FeTi WIRE		
SPONGE Ti		
Fe BORON		
C WIRE		175'
FeCa WIRE		
CaSi		275/35/10

DESULF

	Flow	No Flow	TIME
Plug			
Lance			
Lance Change #			

HYDROGEN

TIME	TEMP	PPM	
9:20	2906	10.7	-81
9:50	3003	73.9	31
9:55	3011	59.0	13
9:59	3019	56.7	7

DEPARTURE TIME 10:01 TEMP 3020

REMARKS

QF-0019 12/8/2005

NUCOR STEEL - CRAWFORDSVILLE

LMF HEAT RECORD

Caster #______ Seq# 3014 Aim Grade: 100553 Date: 10/5 2nd OP:______

Heat No.: 162465 Liquidus:______ Melter: TM Utility:______

LMF: (E or W):______ Finish Grade: 100553 1st OP: RJ

Ladle No.: 16 Wt. tapped: 115 Tap Time:______ Power on time:______

CHEMISTRY

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	Nb	Ti	Sb	B	N	TOTAL RESID
LMF-1		.0264	.61	.0099	.0038	.28								.0078					.53	
LMF-2		.0263	.66	.0105	.0049	.26							.0019	.0007					.54	
LMF-3			+			+														
LMF-4																				

LADLE ADDITION	TIME	AMOUNTS
Lime		1200#
L.C.SiMn		2200#
MED C FeMn		175# / 50#
STD FeMn		
CARBON		
75% FeSi		135# / 100#
NITRO VAN		
PHOS		
LC FeCr		
ANTIMONY		
FeNb		
Nickel		
COPPER		
FE VAN		
FeMo		
AL SHOT		1 BAG
AL WIRE		
FeTi WIRE		
SPONGE Ti		
Fe BORON		
C WIRE		150'
FeCa WIRE		
CaSi		300'

DESULF

	Flow		No Flow	TIME
Plug				
Lance				
Lance Change #				

HYDROGEN

TIME	TEMP	PPM
7:47	2874	

DEPARTURE TIME ______ TEMP ______

REMARKS

QF-0019 12/8/2005

~~43.2~~ ~~DAC~~ ~~EAA~~ HUD-REV

4.3 16.2

ATP – Air Test Professionals, Inc.

1201 North Graham Avenue, Indianapolis, Indiana 46219

(317) 345-1720 FAX (317) 351-0411

REPORT on COMPLIANCE TESTING for SO2, NOx, CO, Pb and PM/PM10

Performed for:

Nucor Steel

Crawfordsville, Indiana

Strip Caster

on November 20 & 21, 2003

ATP – Air Test Professionals, Inc. 1201 North Graham Avenue, Indianapolis, Indiana 46219

(317) 345-1720 FAX (317) 351-0411

REPORT on COMPLIANCE TESTING
for ~~SO2, NOx, CO~~, Pb and PM/PM10

Performed for:
Nucor Steel
Crawfordsville, Indiana
Strip Caster
on November 20 & 21, 2003

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Andrew Young, Project Manager

TABLE OF CONTENTS

1-1 PROJECT OVERVIEW

Air Test Professionals, Inc. was contracted by Nucor Steel to perform air emissions sampling at the LMS Baghouse that controls emissions from the LMS and Strip Caster. The sampling was performed in Crawfordsville, Indiana on November 20-21, 2003. The objective of the testing was to determine compliance with permit requirements for the pollutants listed below. The following personnel were involved with the testing program:

ATP	Andrew Young
ATP	Carlos Brown
ATP	Ron Stapert
Nucor Steel	Mark Washer
IDEM	Steve Friend

The testing program included flow determination (US EPA Methods 1-2), gas analysis (US EPA Method 3), moisture content (US EPA Method 4), PM/PM10 emissions (US EPA Method 5/202), SO2 emissions (US EPA Method 6C), NOx emissions (US EPA Method 7E), CO emissions (US EPA Method 10), and visible emissions (US EPA Method 9). Listed below is a summary of the results.

Test Summary
Table 1-1

Pollutant	PM/PM10 (filterable)	PM/PM10 (filterable & condensible)	PM (filterable)
Particulate Matter	0.0010 (gr/dscf)	0.0043 (gr/dscf)	0.9232 (lb/hr)

Pollutant	Lead	Total Lead
Lead	0.000000 (gr/dscf)	0.0005 (lb/hr)

Pollutant	Emissions (lb/hr)	Emissions (lb/ton)
Sulfur Dioxide	10.50 (lb/hr)	0.0510 (lb/ton)
Nitrogen Oxide	3.8294 (lb/hr) 3.810	0.0181 (lb/ton)
Carbon Monoxide	11.7834 (lb/hr)	0.0567 (lb/ton)

2-1 RESULTS

PM/PM10, SO2, NOx, CO Emissions
Strip Caster Baghouse Stack

Table 2-1

Gas Conditions		1	2	3	Avg
Ts	Stack Temperature	99.38	101.33	111.33	104.01
Bwo	Moisture (volume %)	1.39	1.05	1.32	1.25
O2	Oxygen (dry volume %)	20.9	20.9	20.9	20.9
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	124,327	115,915	111,894	117,482
Qstd	Standard Conditions (dscfm)	116,055	107,871	102,032	108,652
PM/PM10					
E_{TSP}	Filterable (gr/dscf)	0.0008	0.0008	0.0013	0.0010
E	Filterable & Condensible (gr/dscf)	0.0050	0.0024	0.0053	0.0043
PM					
E_{TSP}	Filterable (lbs/hr)	0.8454	0.7723	1.1518	0.9232
SULFUR DIOXIDE					
E	Emission (lb/ton)	0.0299	0.0240	0.0990	0.0510
NITROGEN OXIDE					
E	Emission (lb/ton)	0.0040	0.0226	0.0279	0.0181
CARBON MONOXIDE					
E	Emission (lb/ton)	0.0476	0.0670	0.0554	0.0567

2-2 RESULTS

Lead Emissions
Strip Caster Baghouse Stack

Table 2-2

Gas Conditions		**1**	**2**	**3**	**Avg**
Ts	Stack Temperature	101.13	102.33	112.17	105.21
Bwo	Moisture (volume %)	1.39	0.86	0.83	1.03
O2	Oxygen (dry volume %)	20.9	20.9	20.9	20.9
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	125,926	118,177	115,974	120,026
Qstd	Standard Conditions (dscfm)	116,887	109,941	106,072	110,966
LEAD EMISSIONS					
E_{TSP}	Emission Rate (gr/dscf)	0.000001	0.000001	0.000000	0.000000
E	Emission Rate (lbs/hr)	0.0005	0.0005	0.0003	**0.0005**

2-3 RESULTS

VISIBLE EMISSIONS - OPACITY

LMS Stack
Table 2-3

Run No.	1	2	3	Average
Date	November 20, 2003	November 21, 2003	November 21, 2003	
Start Time (approx)	11:23	08:50	16:38	
Stop Time (approx)	12:23	09:50	17:38	
Visible Emissions				
Opacity (EPA RM 9)	0.0	0.0	0.0	**0.0 %**

Roof Monitors

Run No.	1	2	3	Average
Date	November 20, 2003	November 21, 2003	November 21, 2003	
Start Time (approx)	11:23	08:50	16:38	
Stop Time (approx)	12:23	09:50	17:38	
Visible Emissions				
Opacity (EPA RM 9)	0.0	0.0	0.0	**0.0 %**

3-1 PROCESS DESCRIPTION

Nucor Steel of Crawfordsville, Indiana operates the units listed below:

A Strip Caster Line rated at a maximum steel production rate of 135 tons per hour from the existing electric arc furnace (EAF) and is capable of producing several grades of steel at various widths and thicknesses:

1. One (1) ladle metallurgy station (LMS) identified as LMS-2. Particulate emissions are controlled by the LMS baghouse with the remaining emissions exhausted through the roof monitor. The LMS stack and roof monitor are identified as S-20 and S-21, respectively.

2. One (1) tundish that feeds the molten metal from the LMS ladle to one (1) continuous strip caster. Particulate emissions are controlled by the LMS baghouse with the remaining emissions exhausted through the roof monitor. The LMS stack and roof monitor are identified as S-20 and S-21, respectively.

3. One (1) hot rolling stand. The stand rolls the steel strips from the continuous strip caster to a desired gauge.

4. Two (2) coilers. After the strip passes the rolling mill it is then rolled into coils.

The testing reported in this document was performed at the LMS baghouse stack, with additional visible emissions read at the roof monitor.

4-1 METHODOLOGY

The sampling procedures utilized by Air Test Professionals, Inc. were as follows:

Title 40 CFR Part 60 Appendix A

Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determining of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Determination of Oxygen and Carbon Dioxide Percentages"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 5	"Determination of Particulate Emissions from Stationary Sources"
Method 6C	"Determination of Sulfur Dioxide Emissions from Stationary Sources"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide from Stationary Sources"
Method 12	"Determination of Lead Emissions from Stationary Sources"
Method 9	"Visual Determination of the Opacity from Stationary Sources"

Title 40 CFR Part 51 Appendix M

Method 202	"Determination of Condensible Particulate Emissions from Stationary Sources"

SAMPLE POINT DETERMINATION

Sampling point locations were determined according to EPA Reference Method 1.

Sampling Points
Table 4-1

Location	Dimensions	Points / Port	Total Points
LMS Baghouse Stack	96.0" ID	6	24

4-2 METHODOLOGY

SAMPLE AND VELOCITY TRAVERSE – EPA METHOD 1
Method 1 was utilizes for the representative measurement of pollutant emissions and/or total volumetric flow rate. A measurement site where the effluent gas stream, flowing in a known direction, is selected and divided into a sample grid according to the published percentages of the diameter. A traverse point is then located at each of these percentage points. Sampling or velocity measurement is performed at a site located at least two stack or duct diameters downstream and one-half diameter upstream from a disturbance such as a bend, expansion, contraction, or visible flame.

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

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

MOISTURE CONTENT – EPA METHOD 4
The gas moisture was determined by quantitatively condensing moisture in the chilled impingers and silica absorption. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

PARTICULATE/CONDENSIBLE DETERMINATION – EPA METHOD 5/202
Stack gas is withdrawn isokinetically and particulate matter is collected on the nozzle, probe and filter. Condensible particulate is captured in the first three impingers; each impinger contains 100 mls of deionized water. A fourth and final impinger contains an amount of approximately 200 grams of silica gel. The probe and filter temperatures are maintained at temperatures of 248 degrees F(+/- 25 deg F). The impinger temperature exit gas is maintained at or below 68 degrees Fahrenheit.

The nozzle, probe liner and glass filter holder are rinsed with acetone and captured in a sealed glass container. The impingers and connecting glassware are rinsed twice with deionized water and captured in a sealed container. Two rinses of methylene chloride were captured and stored in a sealed container.

SULFUR DIOXIDE CONCENTRATION – EPA METHOD 6C
A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to a NDIR or fluorescence analyzer for SO2 concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

NITROGEN OXIDE CONCENTRATION – EPA METHOD 7E
A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to a chemiluminescent analyzer for NOx concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

4-2 METHODOLOGY, cont.

CARBON MONOXIDE CONCENTRATION – EPA METHOD 10

A continuous gas sample is drawn from the stack and a portion of the sample is conveyed to an NDIR analyzer for carbon monoxide concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol gases are used to calibrate the instrument as well as run system bias and drift checks.

LEAD EMISSIONS DETERMINATION – EPA METHOD 12

Stack gas is withdrawn isokinetically and lead particulate matter is collected on the nozzle, probe and filter. Lead particulate matter is also captured in the first two impingers; each impinger contains 100 mls of 0.1 N Nitric Acid. A fourth and final impinger contains an amount of approximately 200 grams of silica gel. The probe and filter temperatures are maintained at temperatures of 248 degrees F(+/- 25 deg F). The impinger temperature exit gas is maintained at or below 68 degrees Fahrenheit. The probe, nozzle, filter holder, impingers, and connecting glassware are rinsed with approximately 100 mls of 0.1 N nitric acid and collected in a sealed container.

VISIBLE EMISSIONS – EPA METHOD 9

Stack opacity readings were taken for 60-minutes at 15-second intervals by a certified visible emissions reader. The visible emissions readings were conducted during each of the particulate test runs ate both the LMS baghouse stack and the LMS Roof Monitors. The results are reported as an average emissions percentage for each hour period. A copy of the visible emissions certification card is included in Appendix G.

APPENDIX A

SAMPLE CALCULATIONS

1. Volume of water collected (wstd)

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

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

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

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

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

3. Sample gas pressure (in Hg)

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

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

4. Actual vapor pressure (in Hg)

$$P_v = P_s$$

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

5. Moisture content (%)

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

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

6. Saturated moisture content (%)

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

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

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

$$M_d = M_{CO_2}\left(\frac{CO_2}{100}\right) + M_{O_2}\left(\frac{O_2}{100}\right) + M_{CO+N_2}\left(\frac{CO+N_2}{100}\right)$$

M_d	dry molecular weight of sample gas (lb/lb-mole)
M_{CO2}	molecular weight of carbon dioxide (lb/lb-mole)
M_{O2}	molecular weight of oxygen (lb/lb-mole)
M_{CO+N2}	molecular weight of carbon monoxide and nitrogen (lb/lb-mole)
CO_2	portion of carbon dioxide in the gas stream by volume (%)
O_2	portion of oxygen in the gas stream by volume (%)
$CO+N_2$	portion of carbon monoxide and nitrogen in gas stream by volume (%)
100	conversion factor (%)

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

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

M_d	dry molecular weight of sample gas (lb/lb-mole)
B_{wo}	portion of water vapor in the gas stream by volume (%)
M_{H2O}	molecular weight of water (lb/lb-mole)
M_s	molecular weight of sample gas, wet basis (lb/lb-mole)

9. Velocity of sample gas (ft/sec)

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

V_s	average sample gas velocity (ft/sec)
K_p	velocity pressure coefficient (dimensionless)
C_p	pitot tube constant
ΔP	average differential pressure in the gas stream (in H_2O)
t_s	average sample gas temperature (°F)
M_s	molecular weight of sample gas, wet basis (lb/lb-mole)
P_s	absolute sample gas pressure (in Hg)
460	conversion constant, °F to °R

10. Total flow of sample gas (acfm)

$$Q_a = (60)(A_s)(V_s)$$

Q_a	volumetric flow rate at actual conditions (acfm)
A_s	cross-sectional area of sampling location (ft^2)
V_s	average sample gas velocity (ft/sec)
60	conversion factor (seconds/minute)

11. Total flow of sample gas (dscfm)

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

Q_{std}	volumetric flow rate at standard conditions (dscfm)
Q_a	volumetric flow rate at actual conditions (acfm)
P_s	absolute sample gas pressure (in Hg)
B_{wo}	portion of water vapor in the gas stream by volume (%)
t_s	average sample gas temperature (°F)
17.64	conversion factor (°R/in Hg)
460	conversion constant, °F to °R

12. Percent isokinetic (%)

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

I	percent relative to isokinetic sampling (%)
T_s	absolute sample gas temperature (°R)
V_{mstd}	volume of sample gas through dry gas meter at standard conditions (ft^3)
P_s	absolute sample gas pressure (in Hg)
V_s	average sample gas velocity (ft/sec)
D_n	diameter of nozzle (inches)
B_{wo}	portion of water vapor in the gas stream by volume (%)
θ	total sample time (minutes)
0.09450	conversion constant

13. Particulate concentration (gr/dscf)

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

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

14. Particulate emissions, mass emission rate (lbs/hr)

$$E_{lb/hr} = \frac{(M_n)(Q_{std})}{(7.567)(V_{mstd})}$$

$E_{lbs/hr}$	mass emission rate (lbs/hr)
M_n	particulate collected, corrected for reagent blank (grams)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
V_{mstd}	volume of sample gas through dry gas meter at standard conditions (ft^3)
7.567	conversion factor (grams/pound)

15. Gas emission concentration (ppm)

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

C_{gas}	effluent gas concentration (ppm)
C	average gas concentration indicated by gas analyzer (ppm)
C_o	average of initial and final system bias checks for zero gas (ppm)
C_{ma}	actual concentration of the upscale gas (ppm)
C_m	average of initial and final system bias check for upscale cal gas (ppm)

16. Carbon Monoxide emission rate (lbs/hr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(1.3762x10^7)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$1.3762x10^7$	CO conversion factor (ppm to lbs/dscf)

17. Nitrogen Oxide emission rate (lbs/hr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(8.3752x10^6)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$8.3752x10^6$	NOx conversion factor (ppm to lbs/dscf)

18. Sulfur Dioxide emission rate (lbs/hr)

$$E = \frac{(C_{gas})(Q_{std})(60)}{(6.0151x10^6)}$$

E	pollutant emission rate (lbs/hr)
C_{gas}	effluent gas concentration (ppm)
Q_{std}	volumetric flow rate at standard conditions (dscfm)
60	conversion factor (seconds/minute)
$6.0151x10^6$	SO2 conversion factor (ppm to lbs/dscf)

19. Pollutant emission rate (lbs/ton)

$$E_{lbs/ton} = \frac{(E)}{(P_{tons/hr})}$$

$E_{lbs/ton}$	emission rate (lbs/ton)
E	pollutant emission rate (lbs/hr)
$P_{tons/hr}$	facility production rate (tons/hr)

APPENDIX B

Particulate Field Data Summaries

STACK EMISSION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/20/03-11/21/03

	Run 1	Run 2	Run 3	Average
Particulate Concentration				
Filterable PM/PM10 (gr/dscf)	0.0008	0.0008	0.0013	**0.0010**
Filterable and Condensible PM/PM10 (gr/dscf)	0.0050	0.0024	0.0053	**0.0043**
Filterable (lbs/hr)	0.8454	0.7723	1.1518	**0.9232**
Condensible (lbs/hr)	4.1256	1.4775	3.5230	3.0420
Filterable + Condensible (lbs/hr)	4.9710	2.2498	4.6748	3.9652
Gas Concentration				
Sulfur Dioxide (lbs/ton)	0.0299	0.0240	0.0990	**0.0510**
Nitrogen Oxide (lbs/ton)	0.0040	0.0226	0.0279	**0.0181**
Carbon Monoxide (lbs/ton)	0.0476	0.0670	0.0554	**0.0567**
Avg. Stack Vol. Flow Rate				
ACFM	124,637	115,915	111,894	117,482
DSCFM	116,055	107,871	102,032	108,652
Avg. Stack Temp	99.38	101.33	111.33	104.01
Stack Gas Velocity	41.326	38.434	37.101	38.954
Avg. Velocity Head	0.508	0.438	0.401	0.449
Avg. Sq. Rt of Delta P	0.713	0.662	0.633	0.669
	ISOKINETIC TESTING SUMMARY			
Allowable isokinetic 90-110%	100.91	101.62	100.74	101.09
% Moisture of Stack Gas	1.39%	1.05%	1.32%	1.25%
Sample Volume	45.396	42.492	39.842	42.576

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/20/03
Run Number:	1

FIELD DATA

K' Factor	3.6

Start Time	11:44
Stop Time	12:54

	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.43	0.656		1.55	90	71	71
2	0.43	0.656		1.55	91	71	71
3	0.45	0.671		1.62	93	73	71
4	0.42	0.648		1.51	98	73	71
5	0.41	0.640		1.48	99	75	71
6	0.40	0.632		1.44	99	74	71
7	0.46	0.678		1.66	101	75	72
8	0.51	0.714		1.84	101	76	73
9	0.50	0.707		1.80	101	79	73
10	0.50	0.707		1.80	101	79	74
11	0.46	0.678		1.66	101	81	74
12	0.49	0.700		1.76	101	83	75
13	0.46	0.678		1.66	103	82	76
14	0.46	0.678		1.66	103	82	76
15	0.47	0.686		1.69	103	84	77
16	0.47	0.686		1.69	102	84	77
17	0.45	0.671		1.62	101	86	78
18	0.41	0.640		1.48	100	87	78
19	0.44	0.663		1.58	103	86	79
20	0.39	0.624		1.40	102	86	79
21	0.42	0.648		1.51	101	88	80
22	1.05	1.025		3.78	99	88	81
23	1.08	1.039	591.945	3.89	96	91	82
24	0.97	0.985	546.105	3.49	96	92	83

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.522	0.713	45.84	1.880	99.4	78.3

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2 = 0
%O2 = 20.9
Md (g/gmol) = 28.836

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

Vlc (mL) = 13.6
Vw (scf) = 0.64015

Volume of Dry Gas Collected @ STD. COND., Vm

Tm (F) = 78.3
Vm (ft^3) = 45.840
Pb (in Hg) = 29.95
delta H (in H2O) = 1.880
gamma = 1.004
Vm (dscf) = 45.40

Moisture Content of Stack Gas, Bwo

Bwo = 1.39%
1-Bwo = 98.61%

Molecular Weight of Stack Gas, Ms

Ms (g/gmol) = 28.69

Area of Stack (enter diameter in inches), As

Depth = 0
Width = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps

Static (in H2O) = -0.25
Ps (in Hg) = 29.93

Stack Gas Velocity, Vs

Cp = 0.84
sqr(delta p) = 0.713
Ts (F) = 99.4
Vs (fps) = 41.33

Stack Gas Flowrate, Qs

As (ft^2) = 50.27
Qs (acfm) = 124,637

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

Qstd (dscf/m) = 116,055
Qstd (dscf/hr) = 6,963,288

Velocity at the Nozzle, Vn — Area of Nozzle, An

Dia. of Nozzle (in) = 0.244 An (ft^2) = 0.00032472
Time of Run (min) = 60.00
Vn (fps) = 41.70

% Isokinetic, %I

%I = 100.91
% Isokinetic measured from intermediate values
%I = 100.91

PM FILTERABLE

Pollutant Mass Emission Rate, PMR

	Filterable	Condensible	Total
Mn (g) =	0.0025	0.0122	
PMR (lb/hr) =	0.8454	4.1256	4.9710

Grains per acf

gr/acf = 0.0008

PM/PM10 FILTERABLE (AND + CONDENSIBLE)

Grains per dscf

gr/dscf = 0.0008 0.0041 0.0050

Pollutant Mass Emission Rate, PMR

	CO	NOx	SO2
C (dry, corrected) (PPM) =	18.137	0.919	4.976
PMR (lb/hr) =	9.1769	0.7641	5.7604
PMR (lb/ton) =	0.0476	0.0040	0.0299

Production Rate

LMS tons	106
Caster tons	119
Total tons	225
Process Time (min)	70
Tons/hr	192.86

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/21/03
Run Number:	2

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20.9
Md (g/gmol) = 28.836

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 9.6
Vw (scf) = 0.45187

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 73.1
Vm (ft^3) = 42.563
Pb (in Hg) = 29.92
delta H (in H2O) = 1.581
gamma = 1.004
Vm (dscf) = 42.49

Moisture Content of Stack Gas, Bwo
Bwo = 1.05%
1-Bwo = 98.95%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.72

Area of Stack (enter diameter in inches), As
L = 0
W = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.05
Ps (in Hg) = 29.92

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.662
Ts (F) = 101.3
Vs (fps) = 38.43

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 115,915

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 107,871
Qstd (dscf/hr) = 6,472,232

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.244
Time of Run (min) = 60
Vn (fps) = 39.06

Area of Nozzle, An
An (ft^2) = 0.00032472

% Isokinetic, %I
%I = 101.62
% Isokinetic measured from intermediate values
%I = 101.62

PM FILTERABLE
Pollutant Mass Emission Rate, PMR

	Filterable	Condensible	Total
Mn (g) =	0.0023	0.0044	
PMR (lb/hr) =	0.7723	1.4775	2.2498

Grains per acf
gr/acf = 0.0008

PM/PM10 FILTERABLE (AND + CONDENSIBLE)
Grains per dscf
gr/dscf = **0.0008** 0.0016 **0.0024**

Pollutant Mass Emission Rate, PMR

	CO	NOx	SO2
C (dry, corrected) (PPM) =	31.304	6.417	4.904
PMR (lb/hr) =	14.7222	4.9590	5.2767
PMR (lb/ton) =	0.0670	0.0226	0.0240

FIELD DATA

K' Factor	3.6

Start Time	8:49
Stop Time	9:54

	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.45	0.671		1.62	86	68	67
2	0.44	0.663		1.58	87	68	67
3	0.43	0.656		1.55	87	68	67
4	0.41	0.640		1.48	90	69	67
5	0.41	0.640		1.48	93	71	67
6	0.38	0.616		1.37	94	71	67
7	0.47	0.686		1.69	95	71	68
8	0.47	0.686		1.69	98	72	68
9	0.43	0.656		1.55	99	73	69
10	0.40	0.632		1.44	101	73	69
11	0.40	0.632		1.44	103	74	69
12	0.38	0.616		1.37	104	74	69
13	0.45	0.671		1.62	108	76	69
14	0.46	0.678		1.66	108	77	71
15	0.49	0.700		1.76	109	78	71
16	0.47	0.686		1.69	109	79	72
17	0.49	0.700		1.76	108	79	72
18	0.48	0.693		1.73	108	80	73
19	0.47	0.686		1.69	108	80	73
20	0.45	0.671		1.62	108	81	74
21	0.45	0.671		1.62	108	82	75
22	0.45	0.671		1.62	107	83	76
23	0.44	0.663	634.878	1.58	107	84	76
24	0.37	0.606	592.315	1.33	107	84	76

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.439	0.662	42.563	1.581	101.3	73.1

Production Rate

LMS tons	119
Caster tons	119
Total tons	**238**
Process Time (min)	65
Tons/hr	219.69

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/21/03
Run Number:	3

FIELD DATA

K' Factor	3.5

Start Time	16:33
Stop Time	17:38

	Delta P	Squ Δ P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.45	0.671		1.58	96	73	71
2	0.38	0.616		1.33	98	74	71
3	0.40	0.632		1.40	102	76	72
4	0.37	0.608		1.30	106	77	72
5	0.35	0.592		1.23	107	78	73
6	0.37	0.608		1.30	109	79	74
7	0.41	0.640		1.44	111	79	74
8	0.44	0.663		1.54	112	81	75
9	0.44	0.663		1.54	113	82	75
10	0.43	0.656		1.51	114	84	76
11	0.41	0.640		1.44	115	85	77
12	0.39	0.624		1.37	117	85	77
13	0.45	0.671		1.58	117	85	78
14	0.45	0.671		1.58	119	86	78
15	0.43	0.656		1.51	118	87	80
16	0.40	0.632		1.40	115	88	80
17	0.43	0.656		1.51	115	88	81
18	0.34	0.583		1.19	111	89	81
19	0.40	0.632		1.40	114	88	81
20	0.39	0.624		1.37	114	89	82
21	0.39	0.624		1.37	113	90	83
22	0.38	0.616		1.33	112	90	83
23	0.37	0.608	710.803	1.30	112	90	83
24	0.37	0.608	670.305	1.30	112	90	84

	Squ Δ P	Volume	Delta H	Stack T	Meter Temp
0.402	0.633	40.498	1.406	111.3	80.7

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20.9
Md (g/gmol) = 28.836

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 11.3
Vw (scf) = 0.53189

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 80.7
Vm (ft^3) = 40.498
Pb (in Hg) = 29.92
delta H (in H2O) = 1.406
gamma = 1.004
Vm (dscf) = 39.84

Moisture Content of Stack Gas, Bwo
Bwo = 1.32%
1-Bwo = 98.68%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.69

Area of Stack (enter diameter in inches), As
L = 0
W = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.05
Ps (in Hg) = 29.92

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.633
Ts (F) = 111.3
Vs (fps) = 37.10

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 111,894

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 102,032
Qstd (dscf/hr) = 6,121,920

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.244
Time of Run (min) = 60
Vn (fps) = 37.37

Area of Nozzle, An
An (ft^2) = 0.00032472

% Isokinetic, %I
%I = 100.74
% Isokinetic measured from intermediate values
%I = 100.74

PM FILTERABLE
Pollutant Mass Emission Rate, PMR

	Filterable	Condensible	Total
Mn (g) =	0.0034	0.0104	
PMR (lb/hr) =	**1.1518**	3.5230	4.6748

Grains per acf
gr/acf = 0.0012

PM/PM10 FILTERABLE (AND + CONDENSIBLE)
Grains per dscf
gr/dscf = **0.0013** 0.0040 **0.0053**

Pollutant Mass Emission Rate, PMR

	CO	NOx	SO2
C (dry, corrected) (PPM) =	25.742	7.887	20.120
PMR (lb/hr) =	11.4511	5.7651	20.4773
PMR (lb/ton) =	**0.0554**	**0.0279**	**0.0990**

3.042

Production Rate

LMS tons	104
Caster tons	120
Total tons	**224**
Process Time (min)	65
Tons/hr	206.77

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/20/2003

Pollutant Gas Type:	**SO2**
Instrument Span:	350
Upscale Calibration Gas:	149

ANALYZER CALIBRATION DATA

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.00	-0.95	0.95	0.27%	Pass
Mid-range gas	149.00	148.89	0.11	0.03%	Pass
High-range gas	309.00	309.21	0.21	0.06%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Run # 1								
Zero gas	2.07	0.86%	Pass	0.85	0.51%	Pass	0.35%	Pass
Upscale gas	144.59	1.23%	Pass	145.19	1.06%	Pass	0.17%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (corrected ppm)
Run # 1	6.250	4.976

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/21/2003

Pollutant Gas Type:	**SO2**
Instrument Span:	350
Upscale Calibration Gas:	149

ANALYZER CALIBRATION DATA

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	-2.15	2.15	0.61%	Pass
Mid-range gas	149.0	147.07	1.93	0.55%	Pass
High-range gas	309.0	308.01	0.99	0.28%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Run # 2								
Zero gas	-2.15	0.00%	Pass	-1.55	0.17%	Pass	0.17%	Pass
Upscale gas	145.21	0.53%	Pass	142.77	1.23%	Pass	0.70%	Pass
Run # 3								
Zero gas	-2.77	0.18%	Pass	-4.61	0.70%	Pass	0.53%	Pass
Upscale gas	143.37	1.06%	Pass	139.11	2.27%	Pass	1.22%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (corrected ppm)
Run # 2	2.950	4.904
Run # 3	15.880	20.120

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/20/2003

Pollutant Gas Type:	NOx
Instrument Span:	80
Upscale Calibration Gas:	30.1

ANALYZER CALIBRATION DATA

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.00	-0.01	0.01	0.01%	Pass
Mid-range gas	30.10	30.13	0.03	0.04%	Pass
High-range gas	64.20	64.34	0.14	0.18%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Run # 1								
Zero gas	0.02	0.04%	Pass	0.02	0.04%	Pass	0.00%	Pass
Upscale gas	30.51	0.48%	Pass	30.44	0.39%	Pass	0.09%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (corrected ppm)
Run # 1	0.95	0.919

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/21/2003

Pollutant Gas Type:	**NOx**
Instrument Span:	80
Upscale Calibration Gas:	30.1

ANALYZER CALIBRATION DATA

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.00	0.02	0.02	0.03%	Pass
Mid-range gas	30.10	30.22	0.12	0.15%	Pass
High-range gas	64.20	64.04	0.16	0.20%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Run # 2								
Zero gas	0.02	0.00%	Pass	0.02	0.00%	Pass	0.00%	Pass
Upscale gas	30.01	0.26%	Pass	30.16	0.07%	Pass	0.19%	Pass
Run # 3								
Zero gas	0.06	0.05%	Pass	0.00	0.03%	Pass	0.08%	Pass
Upscale gas	29.98	0.30%	Pass	30.38	0.20%	Pass	0.50%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (corrected ppm)
Run # 2	6.430	6.417
Run # 3	7.930	7.887

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/20/2003

Pollutant Gas Type:	CO
Instrument Span:	350
Upscale Calibration Gas:	133

ANALYZER CALIBRATION DATA

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	-0.71	0.71	0.20%	Pass
Low-range gas	133.0	131.81	1.19	0.34%	Pass
Mid-range gas	181.0	179.24	1.76	0.50%	Pass
High-range gas	316.0	316.00	0.00	0.00%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

	Initial Values			Final Values				
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Run # 1								
Zero gas	0.08	0.23%	Pass	0.39	0.31%	Pass	0.09%	Pass
Upscale gas	131.44	0.11%	Pass	131.78	0.01%	Pass	0.10%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (corrected ppm)
Run # 1	18.15	18.137

ANALYZER AND SYSTEM CALIBRATION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/21/2003

Pollutant Gas Type:	**CO**
Instrument Span:	350
Upscale Calibration Gas:	133

ANALYZER CALIBRATION DATA

	Cylinder Gas Value (ppm)	Analyzer Calibration Response (ppm)	Absolute Difference (ppm)	Difference (% of span)	Analyzer Calibration Error Check
Zero gas	0.0	0.00	0.00	0.00%	Pass
Low-range gas	133.0	131.61	1.39	0.40%	Pass
Mid-range gas	181.0	180.20	0.80	0.23%	Pass
High-range gas	316.0	313.00	3.00	0.86%	Pass

SYSTEM CALIBRATION BIAS AND DRIFT DATA

		Initial Values			Final Values			
	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	System Calibration Response (ppm)	System Calibration Bias (% of span)	System Bias Error Check	Drift (% of span)	Drift Error Check
Run # 2								
Zero gas	-0.28	0.08%	Pass	0.48	0.14%	Pass	0.22%	Pass
Upscale gas	131.09	0.15%	Pass	131.76	0.04%	Pass	0.19%	Pass
Run # 3								
Zero gas	-0.16	0.05%	Pass	1.18	0.34%	Pass	0.38%	Pass
Upscale gas	131.31	0.09%	Pass	132.90	0.37%	Pass	0.45%	Pass

EMISSION CALCULATION

	Average Analyzer Gas Concentration (ppm)	Effluent Gas Concentration (corrected ppm)
Run # 2	31.010	31.304
Run # 3	25.980	25.742

APPENDIX B

Lead Field Data Summaries

STACK EMISSION SUMMARY

Company:	Nucor Steel
Location:	Crawfordsville, Indiana
Source:	Castrip
Date:	11/20/03-11/21/03

	Run 1	Run 2	Run 3	Average
Lead Concentration				
Lead (gr/dscf)	0.000001	0.000001	0.000000	0.000000
Total Lead (lbs/hr)	0.0006	0.0005	0.0003	**0.0005**
Avg. Stack Vol. Flow Rate				
ACFM	125,926	118,177	115,974	120,026
DSCFM	116,887	109,941	106,072	110,966
Avg. Stack Temp	101.13	102.33	112.17	105.21
Stack Gas Velocity	41.754	39.184	38.454	39.797
Avg. Velocity Head	0.517	0.455	0.431	0.468
Avg. Sq. Rt of Delta P	0.719	0.675	0.656	0.683
ISOKINETIC TESTING SUMMARY				
Allowable isokinetic 90-110%	100.19	102.31	102.46	101.65
% Moisture of Stack Gas	1.39%	0.86%	0.83%	1.03%
Sample Volume	55.999	53.781	51.968	53.916

Company:	Nucor Steel	
Location:	Crawfordsville, Indiana	
Source:	Castrip	
Date:	11/20/03	
Run Number:	1	Lead

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20.9
Md (g/gmol) = 28.836

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 16.8
Vw (scf) = 0.79078

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 63.9
Vm (ft^3) = 54.597
Pb (in Hg) = 29.95
delta H (in H2O) = 2.678
gamma = 1.01
Vm (dscf) = 56.00

Moisture Content of Stack Gas, Bwo
Bwo = 1.39%
1-Bwo = 98.61%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.69

Area of Stack (enter diameter in inches), As
Depth = 0
Width = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 29.93

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.719
Ts (F) = 101.1
Vs (fps) = 41.75

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 125,926

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 116,887
Qstd (dscf/hr) = 7,013,233

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.271
Time of Run (min) = 60.00
Vn (fps) = 41.83

Area of Nozzle, An
An (ft^2) = 0.0004006

% Isokinetic, %I
%I = 100.19
% Isokinetic measured from intermediate values
%I = 100.19

Pollutant Mass Emission Rate, PMR
Mn (g) = 2.10E-06
PMR (lb/hr) = 0.00058
Lead

Grains per acf
gr/acf = 0.0000

Grains per dscf
gr/dscf = 0.000001

FIELD DATA

K' Factor	5.1

Start Time	11:44
Stop Time	12:51

	Delta P	Squ D P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.42	0.648		2.14	91	60	60
2	0.53	0.728		2.70	92	61	60
3	0.48	0.693		2.45	96	62	60
4	0.48	0.693		2.45	99	62	60
5	0.53	0.728		2.70	99	63	61
6	0.53	0.728		2.70	100	63	61
7	0.50	0.707		2.55	101	62	61
8	0.48	0.693		2.45	102	63	62
9	0.53	0.728		2.70	102	64	62
10	0.53	0.728		2.70	102	65	62
11	0.52	0.721		2.65	102	65	62
12	0.47	0.686		2.40	102	66	63
13	0.47	0.686		2.40	103	66	63
14	0.43	0.656		2.19	104	66	64
15	0.45	0.671		2.30	105	67	64
16	0.45	0.671		2.30	105	67	64
17	0.45	0.671		2.30	105	67	64
18	0.45	0.671		2.30	105	67	64
19	0.48	0.693		2.45	104	67	64
20	0.50	0.707		2.55	104	67	65
21	0.46	0.678		2.35	104	67	65
22	0.46	0.678		2.35	104	67	65
23	1.00	1.000	332.558	5.10	99	68	65
24	1.00	1.000	277.961	5.10	97	68	65

	Squ D P	Volume	Delta H	Stack T	Meter Temp
0.525	0.719	54.597	2.678	101.1	63.9

Company:	Nucor Steel	
Location:	Crawfordsville, Indiana	
Source:	Castrip	
Date:	11/21/03	
Run Number:	2	Lead

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20.9
Md (g/gmol) = 28.836

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 9.9
Vw (scf) = 0.46599

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 58.6
Vm (ft^3) = 52
Pb (in Hg) = 29.92
delta H (in H2O) = 2.325
gamma = 1.01
Vm (dscf) = 53.78

Moisture Content of Stack Gas, Bwo
Bwo = 0.86%
1-Bwo = 99.14%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.74

Area of Stack (enter diameter in inches), As
L = 0
W = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 29.90

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.675
Ts (F) = 102.3
Vs (fps) = 39.18

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 118,177

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 109,941
Qstd (dscf/hr) = 6,596,436

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.271
Time of Run (min) = 60
Vn (fps) = 40.09

Area of Nozzle, An
An (ft^2) = 0.000401

% Isokinetic, %I
%I = 102.31
% Isokinetic measured from intermediate values
%I = 102.31

Pollutant Mass Emission Rate, PMR
Mn (g) = 2.00E-06
PMR (lbs/hr) = 0.00054
Lead

Grains per acf
gr/acf = 0.0000

Grains per dscf
gr/dscf = 0.000001

FIELD DATA

K' Factor	5.1

Start Time	8:50
Stop Time	9:55

	Delta P	Squ D P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.46	0.678		2.35	87	54	53
2	0.50	0.707		2.55	88	54	53
3	0.53	0.728		2.70	88	56	53
4	0.48	0.693		2.45	90	57	53
5	0.43	0.656		2.19	93	57	54
6	0.41	0.640		2.09	93	58	54
7	0.47	0.686		2.40	98	58	54
8	0.47	0.686		2.40	101	59	55
9	0.43	0.656		2.19	102	59	65
10	0.43	0.656		2.19	104	60	55
11	0.40	0.632		2.04	106	60	55
12	0.40	0.632		2.04	107	60	56
13	0.45	0.671		2.30	106	60	56
14	0.43	0.656		2.19	110	61	57
15	0.48	0.693		2.45	111	61	57
16	0.45	0.671		2.30	110	62	57
17	0.40	0.632		2.04	110	63	58
18	0.40	0.632		2.04	108	63	58
19	0.47	0.686		2.40	104	63	59
20	0.50	0.707		2.55	110	65	60
21	0.51	0.714		2.60	109	65	60
22	0.50	0.707		2.55	108	66	61
23	0.47	0.686	384.91	2.40	107	67	61
24	0.47	0.686	332.91	2.40	106	67	62

	Squ D P	Volume	Delta H	Stack T	Meter Temp
0.456	0.675	52.00	2.325	102.3	58.6

Company:	Nucor Steel	
Location:	Crawfordsville, Indiana	
Source:	Castrip	
Date:	11/21/03	
Run Number:	3	Lead

Molecular Weight of Stack Gas, Dry Basis, Md
%CO2 = 0
%O2 = 20.9
Md (g/gmol) = 28.836

Volume of Water Vapor Collected @ STD. COND., Vw
Vlc (mL) = 9.2
Vw (scf) = 0.43304

Volume of Dry Gas Collected @ STD. COND., Vm
Tm (F) = 65.4
Vm (ft^3) = 50.93
Pb (in Hg) = 29.92
delta H (in H2O) = 2.156
gamma = 1.01
Vm (dscf) = 51.97

Moisture Content of Stack Gas, Bwo
Bwo = 0.83%
1-Bwo = 99.17%

Molecular Weight of Stack Gas, Ms
Ms (g/gmol) = 28.75

Area of Stack (enter diameter in inches), As
L = 0
W = 0
diameter (in) = 96
No. of Stacks = 1
As(L*W) (ft^2) = 0.000
As(dia.) (ft^2) = 50.3

Absolute Pressure, Ps
Static (in H2O) = -0.25
Ps (in Hg) = 29.90

Stack Gas Velocity, Vs
Cp = 0.84
sqr(delta p) = 0.656
Ts (F) = 112.2
Vs (fps) = 38.45

Stack Gas Flowrate, Qs
As (ft^2) = 50.27
Qs (acfm) = 115,974

Stack Gas Flowrate @ STD. COND., Dry Basis, Qstd
Qstd (dscf/m) = 106,072
Qstd (dscf/hr) = 6,364,295

Velocity at the Nozzle, Vn
Dia. of Nozzle (in) = 0.271
Time of Run (min) = 60
Vn (fps) = 39.40

Area of Nozzle, An
An (ft^2) = 0.000401

% Isokinetic, %I
%I = 102.46
% Isokinetic measured from intermediate values
%I = 102.46

Pollutant Mass Emission Rate, PMR
Mn (g) = 1.10E-06
PMR (lbs/hr) = 0.00030
Lead

Grains per acf
gr/acf = 0.0000

Grains per dscf
gr/dscf = 0.000000

FIELD DATA

K' Factor	5

Start Time	16:32
Stop Time	17:39

	Delta P	Squ D P	Volume	Delta H	Stack T	DGM Inlet	DGM Outlet
1	0.48	0.693		2.40	96	65	63
2	0.45	0.671		2.25	98	64	63
3	0.48	0.693		2.40	102	64	63
4	0.45	0.671		2.25	105	65	63
5	0.42	0.648		2.10	107	65	63
6	0.43	0.656		2.15	108	65	63
7	0.42	0.648		2.10	109	65	63
8	0.43	0.656		2.15	114	66	63
9	0.43	0.656		2.15	114	66	63
10	0.40	0.632		2.00	116	67	64
11	0.40	0.632		2.00	117	67	64
12	0.39	0.624		1.95	119	67	64
13	0.48	0.693		2.40	118	67	64
14	0.48	0.693		2.40	120	68	64
15	0.40	0.632		2.00	119	68	64
16	0.40	0.632		2.00	118	68	65
17	0.45	0.671		2.25	116	68	65
18	0.40	0.632		2.00	115	69	65
19	0.40	0.632		2.00	113	67	65
20	0.40	0.632		2.00	115	68	65
21	0.45	0.671		2.25	114	68	65
22	0.43	0.656		2.15	114	68	65
23	0.43	0.656	482.54	2.15	113	69	65
24	0.45	0.671	431.61	2.25	112	69	65

	Squ D P	Volume	Delta H	Stack T	Meter Temp
0.431	0.656	50.93	2.156	112.2	65.4

APPENDIX C

Particulate Field Data

VELOCITY TRAVERSE POINT DETERMINATION

(EPA Method 1)

Company:	Nucor Steel
Date:	11/20/03-11/21/03
Source:	Castrip
Location:	Crawfordsville, Indiana

Circular Stack

Traverse Points on Diameter

Stack Diameter (inches) 96

Point	4	6	8	10	12
1	6.43	4.22	3.07	2.50	**2.02**
2	24.00	14.02	10.08	7.87	**6.43**
3	72.00	28.42	18.62	14.02	**11.33**
4	89.57	67.58	31.01	21.70	**16.99**
5		81.98	64.99	32.83	**24.00**
6		91.78	77.38	63.17	**34.18**
7			85.92	74.30	**61.82**
8			92.93	81.98	**72.00**
9				88.13	**79.01**
10				93.50	**84.67**
11					**89.57**
12					**93.98**

AIR TES. . ROFESSIONALS FIELD DATA SHEET PM/PM10 TESTING EPA METHOD 1-5/202/9 RUN 1 PAGE ___ OF ___

CLIENT	Nucor Steel	METER BOX ID	A2	K FACTOR	3.80
LOCATION	Crawfordsville IN	METER γ	1.004	METER ΔH@	1.83
UNIT	Castrip	PITOT C_p	0.84	PROBE LINER	Glass
DATE	11-20-03 PROJECT #	PROBE ID	6' 1	NOZZLE ID	0.244
METER OPERATOR	Andrew Young	BAROMETRIC	29.95	AMBIENT TEMP (°F)	50
PROBE OPERATOR	Carlos Brown	STATIC PRESSURE (in. H_2O)	-0.25		
VISIBLE EMISSIONS READER	Ron Stapert	LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	8
CLIENT CONTACT	Dave Sulc / Mark Washer	LEAK RATE AFTER (cfm)	0.004	@ (in. Hg)	17
AGENCY CONTACT	Steve Friend	START TIME	1144	STOP TIME	1254

DUCT DIMENSIONS (in.)	96"		
PORT LENGTH (in.)	6"		
FILTER ID	K	SILICA ID	#5
TEDLAR BAG ID			
PITOT CHECK: PASS ☒ FAIL ☐		O_2	20.9
		CO_2	0.0
H_2O (mL)	0.0		
SILICA GEL (g)	13.6		
TOTAL Vic	13.6		

Diagram of Test Location

Traverse Point Number	Min/Point 2.5 / Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F)	Filter Tf (°F)	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				546.105		250 (Set Point)	250 (Set Point)					
1	2.5	0.43	1.55	547.9	90	251	250	61	71	71	4	
2	5	0.43	1.55	549.6	91	251	251	58	71	71	4	
3	7.5	0.45	1.62	551.5	93	250	249	58	73	71	4	pH 6.0
4	10	0.42	1.51	553.1	98	249	250	58	73	71	4	
5	12.5	0.41	1.48	554.8	99	250	249	57	75	71	4	
6	15	0.40	1.44	556.55	99	250	248	57	74	71	4	
1	17.5	0.46	1.66	558.4	101	250	252	54	75	72	4	
2	20	0.51	1.84	560.3	101	250	247	54	76	73	4.5	
3	22.5	0.50	1.80	562.3	101	250	251	56	79	73	4.5	
4	25	0.50	1.80	564.2	101	250	252	57	79	74	4.5	
5	27.5	0.46	1.66	566.0	101	250	254	57	81	74	4	
6	30	0.49	1.76	567.80	101	250	256	59	83	75	4	
1	32.5	0.46	1.66	569.6	103	250	252	58	82	76	4	
2	35	0.46	1.66	571.4	103	250	250	58	82	76	4	
3	37.5	0.47	1.69	573.3	103	250	250	59	84	77	4	
4	40	0.47	1.69	575.2	102	250	250	60	84	77	4	
5	42.5	0.45	1.62	577.1	101	250	253	60	86	78	4	
6	45	0.41	1.48	578.74	100	250	254	61	87	78	4	
1	47.5	0.44	1.58	580.6	103	247	243	61	86	79	4	
2	50	0.39	1.40	582.3	102	248	252	61	86	79	4	
3	52.5	0.42	1.51	584.0	101	249	251	61	88	80	4	
4	55	1.05	3.78	586.4	99	250	252	61	88	81	7	
5	57.5	1.08	3.89	589.0	96	250	254	62	91	82	9	
6	60	0.97	3.49	591.945	96	251	249	64	92	83	7	

AIR TES. ROFESSIONALS FIELD DATA SHEET PM/PM10 TESTING EPA METHOD 5/202/9 RUN 2 PAGE ___ OF ___

CLIENT	Nucor Steel	METER BOX ID	A2	K FACTOR	3.6	DUCT DIMENSIONS (in.)	96"
LOCATION	Crawfordsville IN	METER γ	1.004	METER ΔH@	1.83	PORT LENGTH (in.)	6"
UNIT	Castrip	PITOT C_p	0.84	PROBE LINER	Glass	FILTER ID	R2 SILICA ID 6
DATE	11-21-03 PROJECT #	PROBE ID	6'1	NOZZLE ID	0.244"	TEDLAR BAG ID	
METER OPERATOR	Andrew Young	BAROMETRIC	29.92	AMBIENT TEMP (°F)	50	PITOT CHECK	O_2 20.9
PROBE OPERATOR	Carlos Brown	STATIC PRESSURE (in. H_2O)	-0.05			PASS ☒ FAIL ☐	CO_2 0.0
VISIBLE EMISSIONS READER	Ron Stapert	LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	12	H_2O (mL)	0.0
CLIENT CONTACT	Dave Sulc / Mark Washer	LEAK RATE AFTER (cfm)	0.001	@ (in. Hg)	9	SILICA GEL (g)	9.6
AGENCY CONTACT	Steve Friend	START TIME	0849	STOP TIME	0954	TOTAL Vlc	9.6

Diagram of Test Location

Traverse Point Number	Min/Point 2.5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F)	Filter Tf (°F)	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				592.315		Set Points 250	250					
1	2.5	0.45	1.62	594.2	86	251	248	50	68	67	4	
2	5	0.44	1.58	595.9	87	251	252	47	68	67	4	pH = 5.5
3	7.5	0.43	1.55	597.7	87	250	247	49	68	67	4	
4	10	0.41	1.48	599.6	90	250	250	49	69	67	4	
5	12.5	0.41	1.48	601.1	93	250	250	50	71	67	4	
6	15	0.38	1.37	602.75	94	250	250	51	71	67	4	
1	17.5	0.47	1.69	604.5	95	252	255	50	71	68	4	
2	20	0.47	1.69	606.4	98	253	253	50	72	68	4	
3	22.5	0.43	1.55	608.0	99	252	251	51	73	69	4	
4	25	0.40	1.44	609.9	101	251	250	52	73	69	4	
5	27.5	0.40	1.44	611.5	103	250	249	52	74	69	4	
6	30	0.38	1.37	613.21	104	249	249	53	74	69	4	
1	32.5	0.45	1.62	615.0	108	249	247	52	76	69	4	
2	35	0.46	1.66	616.8	108	248	250	53	77	71	4	
3	37.5	0.49	1.76	618.7	109	249	254	54	78	71	4	
4	40	0.47	1.69	620.5	109	250	250	55	79	72	4	
5	42.5	0.49	1.76	622.4	108	250	249	55	79	72	4	
6	45	0.48	1.73	624.22	108	250	248	56	80	73	4	
1	47.5	0.47	1.69	626.0	108	250	249	55	80	73	4	
2	50	0.45	1.62	627.9	108	250	249	55	81	74	4	
3	52.5	0.45	1.62	630.1	108	251	250	56	82	75	4	
4	55	0.45	1.62	631.5	107	250	251	57	83	76	4	
5	57.5	0.44	1.58	633.2	107	250	249	58	84	76	4	
6	60	0.37	1.33	634.878	107	250	252	58	84	76	4	

AIR TEST PROFESSIONALS FIELD DATA SHEET PM/PM_{10} TESTING EPA METHOD 5/202/9 RUN 3 PAGE ___ OF ___

CLIENT Nucor Steel	METER BOX ID 42	K FACTOR 3.5	DUCT DIMENSIONS (in.) 96"		Diagram of Test Location
LOCATION Crawfordsville IN	METER γ 1.004	METER ΔH@ 1.83	PORT LENGTH (in.) 6"		
UNIT Castrip	PITOT C_p 0.84	PROBE LINER Glass	FILTER ID	SILICA ID 7	
DATE 11-21-03 PROJECT #	PROBE ID 6'	NOZZLE ID 0.244"	TEDLAR BAG ID		
METER OPERATOR A Young	BAROMETRIC 29.92	AMBIENT TEMP (°F) 60	PITOT CHECK	O_2 20.9	
PROBE OPERATOR C Brown	STATIC PRESSURE (in. H_2O) -0.05		PASS ☒ FAIL ☐	CO_2 0.0	
VISIBLE EMISSIONS READER R Stapert	LEAK RATE BEFORE (cfm) 0.000 @ (in. Hg) 10		H_2O (mL) 0.0		
CLIENT CONTACT D Sulc / M Washer	LEAK RATE AFTER (cfm) 0.001 @ (in. Hg) 13		SILICA GEL (g) 11.3		
AGENCY CONTACT S Friend	START TIME 1633	STOP TIME 1738	TOTAL Vlc 11.3		

Traverse Point Number	Min/Point 2.5 Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F)	Filter Tf (°F)	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				670.305		Set Points 250	250					
1	2.5	0.45	1.58	672.2	96	252	250	63	73	71	4	
2	5	0.38	1.33	673.8	98	251	250	63	74	71	4	
3	7.5	0.40	1.40	675.4	102	251	250	62	76	72	4	pH=5.5
4	10	0.37	1.30	677.0	106	251	250	61	77	72	4	
5	12.5	0.35	1.23	678.6	107	250	251	62	78	73	4	
6	15	0.37	1.30	680.22	109	249	250	63	79	74	4	
1	17.5	0.41	1.44	682.0	111	252	254	63	79	74	4	
2	20	0.44	1.54	683.6	112	252	251	63	81	75	4	
3	22.5	0.44	1.54	685.4	113	251	251	63	82	75	4	
4	25	0.43	1.51	687.2	114	251	251	64	84	76	4	
5	27.5	0.41	1.44	688.9	115	250	250	64	85	77	4	
6	30	0.39	1.37	690.52	117	250	249	64	85	77	4	
1	32.5	0.45	1.58	692.2	117	249	251	64	85	78	4	
2	35	0.45	1.58	694.3	119	249	250	64	86	78	4	
3	37.5	0.43	1.51	696.0	118	250	249	65	87	80	4	
4	40	0.40	1.40	697.6	115	251	250	65	88	80	4	
5	42.5	0.43	1.51	699.4	115	250	250	65	88	81	4	
6	45	0.34	1.19	700.91	111	250	249	65	89	81	3.5	
1	47.5	0.40	1.40	702.6	114	250	249	65	88	81	4	
2	50	0.39	1.37	704.2	114	250	250	65	89	82	4	
3	52.5	0.39	1.37	705.9	113	250	248	65	90	83	4	
4	55	0.38	1.33	707.6	112	251	249	65	90	83	4	
5	57.5	0.37	1.30	709.0	112	250	250	66	90	83	4	
6	60	0.37	1.30	710.803	112	250	250	66	90	84	4	

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: Castrip
Date: 11/20/03 - 11/21/03

07:03:41 11/20/03
CO 1 -001.41 PPM
NOx 3 000.08
SO2 5 309.21 309 SO2

******** OFF ********

******** ON ********
******** RUN ********

07:05:42 11/20/03
1 Voltage overrange 316
3 -000.01 zero NOx
5 -000.95 zero SO2

*** ON (RUNNING) ***

07:06:42 11/20/03
1 -000.71 PPM Zero CO
3 -000.02
5 -000.33

*** ON (RUNNING) ***
******** RUN ********

07:07:27 11/20/03
1 -000.68 PPM
3 000.00
5 148.89 149 SO2

******** RUN ********

07:11:34 11/20/03
1 131.81 PPM 133 CO
3 -000.01
5 -000.95

******** OFF ********

******** ON ********
******** RUN ********

07:13:42 11/20/03
1 179.24 PPM 181 CO
3 -000.01
5 -000.95

******** OFF ********

******** ON ********
******** RUN ********

07:15:04 11/20/03
1 000.33 PPM
3 064.34 64.2 NOx
5 -000.95

******** OFF ********

******** ON ********
******** RUN ********

07:17:12 11/20/03
1 -001.15 PPM
3 030.13 30.1 NOx
5 -000.95

******** RUN ********

11:13:30 11/20/03
1 000.08 PPM zero
3 000.02 zero
5 144.59 149 SO2

******** OFF ********

******** ON ********
******** RUN ********

11:15:20 11/20/03
1 131.44 PPM 133 CO
3 000.00
5 008.79

******** OFF ********

******** ON ********
******** RUN ********

11:18:32 11/20/03
1 000.33 PPM
3 030.51 30.1 NOx
5 002.07 zero SO2

******** OFF ********

******** ON ********
******** RUN 1 ********

11:44:22 11/20/03
1 004.77 PPM
3 000.25
5 000.31

11:45:22 11/20/03
1 005.17 PPM
3 000.67
5 002.67

11:46:22 11/20/03
1 007.24 PPM
3 001.22
5 007.57

11:47:22 11/20/03
1 015.28 PPM
3 005.21
5 019.83

11:48:22 11/20/03
1 021.00 PPM
3 008.53
5 034.49

11:49:22 11/20/03
1 015.97 PPM
3 010.36
5 054.07

11:50:22 11/20/03
1 014.69 PPM
3 013.23
5 084.03

11:51:22 11/20/03
1 017.17 PPM
3 001.49
5 036.35

11:52:22 11/20/03
1 017.77 PPM
3 000.44
5 011.23

11:53:22 11/20/03
1 017.77 PPM
3 000.50
5 012.61

11:54:22 11/20/03
1 017.77 PPM
3 000.38
5 005.71

11:55:22 11/20/03
1 017.61 PPM
3 000.35
5 005.13

11:56:22 11/20/03
1 017.48 PPM
3 000.29
5 003.27

11:57:22 11/20/03
1 017.18 PPM
3 000.26
5 002.67

11:58:22 11/20/03
1 017.18 PPM
3 000.29
5 002.07

11:59:22 11/20/03
1 015.32 PPM
3 000.28
5 001.45

12:00:22 11/20/03
1 015.40 PPM
3 000.26
5 001.45

12:01:22 11/20/03
1 015.41 PPM
3 000.22
5 001.47

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: Castrip
Date: 11/20/03 - 11/21/03

12:02:22 11/20/03
1 015.42 PPM
3 000.20
5 001.45

12:03:22 11/20/03
1 015.42 PPM
3 000.33
5 002.05

12:04:22 11/20/03
1 015.59 PPM
3 000.28
5 002.07

12:05:22 11/20/03
1 017.33 PPM
3 000.25
5 001.47

12:06:22 11/20/03
1 017.62 PPM
3 000.22
5 000.85

12:07:22 11/20/03
1 017.63 PPM
3 000.21
5 000.85

12:08:22 11/20/03
1 017.80 PPM
3 000.22
5 000.85

12:09:22 11/20/03
1 017.93 PPM
3 000.20
5 000.85

12:10:22 11/20/03
1 018.19 PPM
3 000.20
5 000.85

12:11:22 11/20/03
1 019.77 PPM
3 000.19
5 000.85

12:12:22 11/20/03
1 019.99 PPM
3 000.19
5 000.85

12:13:22 11/20/03
1 020.27 PPM
3 000.18
5 000.85

12:14:22 11/20/03
1 020.40 PPM
3 000.19
5 000.85

12:15:22 11/20/03
1 020.40 PPM
3 000.19
5 000.85

12:16:22 11/20/03
1 020.75 PPM
3 000.20
5 000.85

12:17:22 11/20/03
1 021.28 PPM
3 000.18
5 000.85

12:18:22 11/20/03
1 021.29 PPM
3 000.16
5 000.85

12:19:22 11/20/03
1 021.34 PPM
3 000.17
5 000.85

12:20:22 11/20/03
1 017.94 PPM
3 001.40
5 019.23

12:21:22 11/20/03
1 016.67 PPM
3 004.04
5 021.65

12:22:22 11/20/03
1 015.73 PPM
3 008.09
5 032.65

12:23:22 11/20/03
1 019.74 PPM
3 000.40
5 010.03

12:24:22 11/20/03
1 019.79 PPM
3 000.20
5 003.89

12:25:22 11/20/03
1 019.81 PPM
3 000.17
5 002.69

12:26:22 11/20/03
1 019.81 PPM
3 000.16
5 002.07

12:27:22 11/20/03
1 019.80 PPM
3 000.14
5 001.47

12:28:22 11/20/03
1 022.55 PPM
3 000.16
5 003.27

12:29:22 11/20/03
1 022.54 PPM
3 000.17
5 [illegible]

12:30:22 11/20/03
1 022.60 PPM
3 000.17
5 004.51

12:31:22 11/20/03
1 022.61 PPM
3 000.16
5 004.51

12:32:22 11/20/03
1 022.13 PPM
3 000.19
5 002.69

12:33:22 11/20/03
1 022.13 PPM
3 000.15
5 001.45

12:34:22 11/20/03
1 022.13 PPM
3 000.29
5 002.07

12:35:22 11/20/03
1 022.26 PPM
3 000.24
5 002.69

12:36:22 11/20/03
1 022.51 PPM
3 000.17
5 002.07

12:37:22 11/20/03
1 024.13 PPM
3 000.15
5 001.47

12:38:22 11/20/03
1 024.56 PPM
3 000.14
5 001.47

12:39:22 11/20/03
1 024.57 PPM
3 000.14
5 001.47

12:40:22 11/20/03
1 024.57 PPM
3 000.14
5 000.85

12:41:22 11/20/03
1 024.45 PPM
3 000.13
5 000.85

12:42:22 11/20/03
1 025.04 PPM
3 000.13
5 000.85

12:43:22 11/20/03
1 022.94 PPM
3 000.14

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: Castrip
Date: 11/20/03 - 11/21/03

```
12:44:22  11/20/03
1  022.48 PPM
3  000.14
5  000.85

12:45:22  11/20/03
1  020.56 PPM
3  000.20
5  000.85

12:46:22  11/20/03
1  016.01 PPM
3  000.26
5  000.85

12:47:22  11/20/03
1  013.57 PPM
3  000.25
5  000.85

12:48:22  11/20/03
1  012.64 PPM
3  000.24
5  000.85

12:49:22  11/20/03
1  012.25 PPM
3  000.20
5  000.85

12:50:22  11/20/03
1  012.25 PPM
3  000.20
5  000.85

12:51:22  11/20/03
1  012.25 PPM
3  000.19
5  000.85

12:52:22  11/20/03
1  012.25 PPM
3  000.16
5  000.85

12:53:22  11/20/03
1  012.25 PPM
3  000.19
5  000.85

12:54:22  11/20/03
1  012.25 PPM
3  000.17
5  000.85

********  STOP  ********
12:54:29  11/20/03
Run statistics      N=00071
   Min     Avg     Max
1  004.77  018.15  025.04
3  000.13  000.95  013.23
5  000.31  006.25  084.03
```

```
12:59:07  11/20/03
1  -001.10 PPM
3  030.44          30.1 NOx
5  000.85

********  OFF  ********

********  ON   ********
********  RUN  ********

13:00:23  11/20/03
1  131.78 PPM         133 CO
3  000.02  zero      NOx
5  000.85  zero      SO2

********  OFF  ********

********  ON   ********
********  RUN  ********

13:02:56  11/20/03
1  000.39 PPM  zero CO
3  000.14
5  145.19          149 SO2

********  OFF  ********
```

11/21/03 Initial Cals

```
********  RUN  ********

07:14:30  11/21/03
CO  1  -001.97 PPM
NOx 3  000.02      zero NOx
SO2 5  308.01      309 SO2

********  OFF  ********

********  ON   ********
********  RUN  ********

07:16:08  11/21/03
1  Voltage overrange  313 CO
3  -000.01
5  -002.15        zero SO2

********  OFF  ********

********  ON   ********
********  RUN  ********

07:17:27  11/21/03
1  000.00 PPM  zero CO
3  000.00
5  147.07       149
```

```
07:19:06  11/21/03
1  180.20 PPM  181 CO
3  -000.01
5  -002.15

07:20:10  11/21/03
1  000.36 PPM
3  064.04     64.2 NOx
5  -002.15

********  OFF  ********

********  ON   ********
********  RUN  ********

07:22:08  11/21/03
1  131.61 PPM  133 CO
3  000.00
5  -002.17

********  OFF  ********

********  ON   ********
********  RUN  ********

07:22:58  11/21/03
1  000.09 PPM
3  030.22      30.1 NOx
5  -002.15

********  OFF  ********

********  ON   ********
********  RUN  ********
BIAS
07:26:06  11/21/03
1  -000.28 PPM  zero
3  030.01       30.1 NOx
5  -002.15      zero

********  OFF  ********

********  ON   ********
********  RUN  ********

07:27:34  11/21/03
1  131.09 PPM  133 CO
3  000.02      zero
5  -002.15

********  OFF  ********

********  ON   ********
********  RUN  ********

07:32:08  11/21/03
1  -000.56 PPM
3  000.02
5  145.21       149 SO2
```

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: Castrip
Date: 11/20/03 - 11/21/03

******** ON ********
******** RUN 2 ********

08:50:55 11/21/03
1 014.66 PPM
3 000.24
5 -005.85

08:51:55 11/21/03
1 014.62 PPM
3 000.32
5 -005.85

08:52:55 11/21/03
1 014.75 PPM
3 000.28
5 -005.85

08:53:55 11/21/03
1 014.80 PPM
3 000.29
5 -005.85

08:54:55 11/21/03
1 014.80 PPM
3 000.62
5 -005.21

08:55:55 11/21/03
1 014.79 PPM
3 003.70
5 -000.95

08:56:55 11/21/03
1 014.32 PPM
3 006.35
5 008.17

08:57:55 11/21/03
1 014.31 PPM
3 006.61
5 008.17

08:58:55 11/21/03
1 014.31 PPM
3 007.24
5 011.25

08:59:55 11/21/03
1 014.30 PPM
3 006.98
5 011.85

09:00:55 11/21/03
1 014.77 PPM
3 006.89
5 008.19

09:01:55 11/21/03
1 015.32 PPM
3 007.20
5 008.79

09:02:55 11/21/03
1 016.09 PPM
3 008.17
5 009.43

09:03:55 11/21/03
1 022.35 PPM
3 000.94
5 002.71

09:04:55 11/21/03
1 022.83 PPM
3 000.62
5 -000.95

09:05:55 11/21/03
1 023.12 PPM
3 002.62
5 001.45

09:06:55 11/21/03
1 021.79 PPM
3 004.89
5 006.95

09:07:55 11/21/03
1 021.49 PPM
3 007.10
5 006.97

09:08:55 11/21/03
1 021.38 PPM
3 013.65
5 017.37

09:09:55 11/21/03
1 022.24 PPM
3 017.10
5 011.23

09:10:55 11/21/03
1 022.58 PPM
3 018.03
5 013.07

09:11:55 11/21/03
1 023.18 PPM
3 019.20
5 013.07

09:12:55 11/21/03
1 023.90 PPM
3 020.29
5 013.07

09:13:55 11/21/03
1 023.90 PPM
3 021.36
5 013.69

09:14:55 11/21/03
1 024.83 PPM
3 021.50
5 014.31

09:15:55 11/21/03
1 025.00 PPM
3 021.62
5 016.77

09:16:55 11/21/03
1 025.51 PPM
3 023.14

09:17:55 11/21/03
1 026.40 PPM
3 022.09
5 011.25

09:18:55 11/21/03
1 028.07 PPM
3 022.39
5 010.63

09:19:55 11/21/03
1 029.74 PPM
3 025.21
5 008.79

09:20:55 11/21/03
1 036.13 PPM
3 009.41
5 006.33

09:21:55 11/21/03
1 039.96 PPM
3 000.82
5 000.29

09:22:55 11/21/03
1 039.29 PPM
3 004.04
5 000.29

09:23:55 11/21/03
1 034.22 PPM
3 017.18
5 002.07

09:24:55 11/21/03
1 032.92 PPM
3 023.75
5 004.51

09:25:55 11/21/03
1 032.69 PPM
3 028.78
5 005.13

09:26:55 11/21/03
1 040.63 PPM
3 004.03
5 003.91

09:27:55 11/21/03
1 043.17 PPM
3 001.08
5 000.31

09:28:55 11/21/03
1 043.30 PPM
3 000.34
5 -002.15

09:29:55 11/21/03
1 043.30 PPM
3 000.23
5 -003.41

09:30:55 11/21/03
1 045.10 PPM
3 000.23
5 -002.77

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: Castrip
Date: 11/20/03 - 11/21/03

09:31:55 11/21/03
1 044.09 PPM
3 000.41
5 -002.77

09:32:55 11/21/03
1 050.79 PPM
3 000.74
5 -002.77

09:33:55 11/21/03
1 043.91 PPM
3 000.26
5 -001.55

09:34:55 11/21/03
1 042.02 PPM
3 000.18
5 -002.15

09:35:55 11/21/03
1 042.92 PPM
3 000.15
5 -001.55

09:36:55 11/21/03
1 042.50 PPM
3 000.13
5 -000.95

09:37:55 11/21/03
1 043.61 PPM
3 000.12
5 -000.95

09:38:55 11/21/03
1 043.62 PPM
3 000.11
5 -001.57

09:39:55 11/21/03
1 043.62 PPM
3 000.11
5 -000.95

09:40:55 11/21/03
1 043.61 PPM
3 000.11
5 -000.95

09:41:55 11/21/03
1 043.61 PPM
3 000.10
5 -000.33

09:42:55 11/21/03
1 043.87 PPM
3 000.10
5 -000.33

09:43:55 11/21/03
1 043.87 PPM
3 000.10
5 -000.33

09:44:55 11/21/03
1 033.98 PPM
3 000.34
5 -001.55

09:45:55 11/21/03
1 032.32 PPM
3 000.83
5 -001.55

09:46:55 11/21/03
1 036.19 PPM
3 000.38
5 -000.95

09:47:55 11/21/03
1 036.92 PPM
3 000.24
5 -000.95

09:48:55 11/21/03
1 038.07 PPM
3 000.14
5 -002.15

09:49:55 11/21/03
1 038.71 PPM
3 000.10
5 -002.77

09:50:55 11/21/03
1 039.31 PPM
3 000.16
5 -002.77

09:51:55 11/21/03
1 039.56 PPM
3 000.08
5 -002.77

09:52:55 11/21/03
1 046.71 PPM
3 000.08
5 -003.39

09:53:55 11/21/03
1 038.98 PPM
3 000.07
5 -003.39

*** ON (RUNNING) ***
******** STOP ********
09:54:48 11/21/03
Run statistics N=00064

	Min	Avg	Max
1	014.30	031.01	050.79
3	000.07	006.43	028.78
5	-005.85	002.95	017.37

09:57:31 11/21/03
1 000.48 PPM zero
3 000.02 zero
5 142.77 149

******** ON ********
******** RUN ********

09:58:42 11/21/03
1 131.76 PPM 133
3 000.90
5 006.97

******** RUN ********

10:01:14 11/21/03
1 000.49 PPM
3 030.16 30.1
5 -001.55 zero

******** OFF ********

******** RUN ********

14:59:07 11/21/03
1 -000.16 PPM
3 029.98 30.1 NO_x
5 -002.77

******** OFF ********

******** ON ********
******** RUN ********

15:01:09 11/21/03
1 131.31 PPM 133 CO
3 000.06 zero NO_x
5 -002.77 zero SO_2

******** RUN ********

15:05:02 11/21/03
1 000.18 PPM
3 000.07
5 143.37 149 SO_2

******** OFF ********

******** ON ********
******** RUN 3 ********

16:33:46 11/21/03
CO 1 012.28 PPM
NO_x 3 000.07
SO_2 5 -001.55

16:34:46 11/21/03
1 012.76 PPM
3 000.14
5 -001.55

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: Castrip
Date: 11/20/03 - 11/21/03

```
16:35:46  11/21/03
1  010.30 PPM
3  047.11
5  035.09

16:36:46  11/21/03
1  007.97 PPM
3  021.43
5  045.49

16:37:46  11/21/03
1  007.81 PPM
3  007.55
5  024.71

16:38:46  11/21/03
1  007.51 PPM
3  005.51
5  049.19

16:39:46  11/21/03
1  007.52 PPM
3  004.27
5  051.63

16:40:46  11/21/03
1  007.01 PPM
3  007.81
5  051.01

16:41:46  11/21/03
1  005.87 PPM
3  018.45
5  039.99

16:42:46  11/21/03
1  005.74 PPM
3  020.99
5  055.29

16:43:46  11/21/03
1  005.74 PPM
3  021.89
5  065.69

16:44:46  11/21/03
1  005.74 PPM
3  019.83
5  068.15

16:45:46  11/21/03
1  005.74 PPM
3  014.98
5  047.33

16:46:46  11/21/03
1  005.75 PPM
3  015.66
5  038.19

16:47:46  11/21/03
1  005.75 PPM
3  021.35
5  033.89

16:48:46  11/21/03
1  005.91 PPM
3  022.63
5  039.39

16:49:46  11/21/03
1  006.25 PPM
3  022.10
5  058.97

16:50:46  11/21/03
1  009.19 PPM
3  009.90
5  058.99

16:51:46  11/21/03
1  015.15 PPM
3  002.22
5  035.09

16:52:46  11/21/03
1  017.32 PPM
3  000.37
5  008.79

16:53:46  11/21/03
1  017.80 PPM
3  001.99
5  002.69

16:54:46  11/21/03
1  012.66 PPM
3  007.21
5  021.03

16:55:46  11/21/03
1  011.38 PPM
3  015.63
5  020.43

16:56:46  11/21/03
1  011.38 PPM
3  021.70
5  035.11

16:57:46  11/21/03
1  011.37 PPM
3  021.04
5  048.57

16:58:46  11/21/03
1  019.23 PPM
3  020.89
5  047.33

16:59:46  11/21/03
1  027.10 PPM
3  017.74
5  043.69

17:00:46  11/21/03
1  029.45 PPM
3  020.05
5  043.05

17:01:46  11/21/03
1  031.87 PPM
3  020.71
5  038.01

17:02:46  11/21/03
1  033.20 PPM
3  020.71
5  041.23

17:03:46  11/21/03
1  038.65 PPM
3  012.46
5  038.81

17:04:46  11/21/03
1  046.66 PPM
3  000.41
5  007.57

17:05:46  11/21/03
1  048.64 PPM
3  000.29
5  000.87

17:06:46  11/21/03
1  042.43 PPM
3  003.06
5  000.85

17:07:46  11/21/03
1  038.98 PPM
3  003.33
5  003.29

17:08:46  11/21/03
1  043.64 PPM
3  000.42
5  000.85

17:09:46  11/21/03
1  044.63 PPM
3  000.22
5 -000.95

17:10:46  11/21/03
1  037.77 PPM
3  000.17
5 -002.15

17:11:46  11/21/03
1  036.24 PPM
3  000.12
5 -002.15

17:12:46  11/21/03
1  036.26 PPM
3  000.10
5 -002.79

17:13:46  11/21/03
1  036.26 PPM
3  000.08
5 -002.77

17:14:46  11/21/03
1  036.26 PPM
3  000.07
5 -002.79

17:15:46  11/21/03
1  036.24 PPM
3  000.07
5 -003.39
```

ANALYZER FIELD DATA

Company: Nucor Steel
Location: Crawfordsville, Indiana
Source: Castrip
Date: 11/20/03 - 11/21/03

```
17:16:46  11/21/03
1  044.14 PPM
3  000.05
5 -003.39

17:17:46  11/21/03
1  044.26 PPM
3  000.05
5 -003.41

17:18:46  11/21/03
1  044.30 PPM
3  000.05
5 -003.39

17:19:46  11/21/03
1  038.69 PPM
3  000.05
5 -004.01

17:20:46  11/21/03
1  038.69 PPM
3  000.05
5 -004.01

17:21:46  11/21/03
1  030.72 PPM
3  002.45
5 -004.01

17:22:46  11/21/03
1  021.23 PPM
3  028.40
5  002.71

17:23:46  11/21/03
1  020.81 PPM
3  028.19
5  004.53

17:24:46  11/21/03
1  021.88 PPM
3  017.98
5  012.47

17:25:46  11/21/03
1  031.27 PPM
3  000.32
5  000.31

17:26:46  11/21/03
1  032.31 PPM
3  000.19
5 -002.15

17:27:46  11/21/03
1  032.99 PPM
3  000.14
5 -003.41

17:28:46  11/21/03
1  033.29 PPM
3  003.59
5 -003.41

17:29:46  11/21/03
1  033.43 PPM
3  000.07
5 -003.39

17:30:46  11/21/03
1  035.54 PPM
3  000.07
5 -003.39

17:31:46  11/21/03
1  035.65 PPM
3  000.06
5 -004.01

17:32:46  11/21/03
1  036.73 PPM
3  000.05
5 -004.01

17:33:46  11/21/03
1  036.88 PPM
3  000.05
5 -004.59

17:34:46  11/21/03
1  036.59 PPM
3  000.06
5 -004.59

17:35:46  11/21/03
1  034.24 PPM
3  000.04
5 -004.61

17:36:46  11/21/03
1  034.23 PPM
3  000.05
5 -004.01

17:37:46  11/21/03
1  034.27 PPM
3  000.05
5 -004.01

17:38:46  11/21/03
1  034.27 PPM
3  000.05
5 -004.01

17:39:46  11/21/03
1  034.27 PPM
3  000.06
5 -004.01

17:40:46  11/21/03
1  034.27 PPM
3  000.04
5 -004.01

17:41:46  11/21/03
1  034.27 PPM
3  000.07
5 -004.61

17:42:46  11/21/03
1  034.10 PPM
3  000.04
5 -004.61

***  ON   (RUNNING)  ***
********  STOP  ********
17:43:26  11/21/03
Run statistics     N=00070
         Min    Avg    Max
CO  1   005.74 025.98 048.64
NOx 3   000.04 007.93 047.11
SO2 5  -004.61 015.68 068.15

17:43:27  11/21/03
RUN  starts logging
STOP stops logging
PROG starts programming

18:17:42  11/21/03
1  001.18 PPM   zero CO
3  000.02
5  139.11       149 SO2

********  OFF  ********

********  ON   ********
********  RUN  ********

18:10:40  11/21/03
1  132.90 PPM   133 CO
3  000.00       zero NOx
5  006.97

********  OFF  ********

********  ON   ********
********  RUN  ********

18:20:27  11/21/03
1  000.67 PPM
3  030.38       30.1 NOx
5 -004.61       zero SO2

********  OFF  ********
```

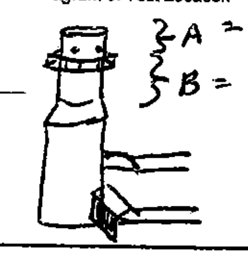
APPENDIX C

Lead Field Data

AIR TES_ ROFESSIONALS FIELD DATA SHEET Pb (LEAD) TESTING EPA METHOD 1-4/12/9 RUN 1 PAGE ___ OF ___

CLIENT	Nucor Steel	METER BOX ID	A-1	K FACTOR	4.7	DUCT DIMENSIONS (in.)	
LOCATION	Crawfordsville, IN	METER γ	1.01	METER ΔH@	1.744	PORT LENGTH (in.)	4"
UNIT	Strip Caster	PITOT C_P	0.84	PROBE LINER	Glass	FILTER ID	R2 / SILICA ID #16
DATE	11/20/03 PROJECT #	PROBE ID	4' 1	NOZZLE ID	0.271	TEDLAR BAG ID	
METER OPERATOR	Carlos Brown	BAROMETRIC	29.95	AMBIENT TEMP (°F)		PITOT CHECK	O_2 20.9
PROBE OPERATOR	Carlos Brown	STATIC PRESSURE (in. H_2O)		-0.25		PASS ☒ FAIL ☐	CO_2 0.0
VISIBLE EMISSIONS READER	Ron Stapert	LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	10.5	H_2O (mL)	0.00
CLIENT CONTACT	Mark Washler	LEAK RATE AFTER (cfm)	0.001	@ (in. Hg)	20"	SILICA GEL (g)	16.8
AGENCY CONTACT	Steve Friend	START TIME	1144	STOP TIME	1251	TOTAL Vlc	16.8

Diagram of Test Location



Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F)	Filter Tf (°F)	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				277.961		Set Points						
1	2.5	0.42	2.14	280.2	91	230	236	62	60	60	3.0	
2	5.0	0.53	2.70	282.6	92	237	243	62	61	60	4.0	
3	7.5	0.48	2.45	285.0	96	236	257	62	62	60	4.0	
4	10.0	0.48	2.45	287.2	99	232	251	63	62	60	4.0	
5	12.5	0.53	2.70	289.1	99	237	253	63	63	61	4.0	
6	15.0	0.53	2.70	291.3	100	237	250	63	63	61	4.0	
7	17.5	0.50	2.55	293.8	101	232	255	63	62	61	4.0	
8	20.0	0.48	2.45	295.9	102	261	251	63	63	62	4.0	
9	22.5	0.53	2.70	298.1	102	255	251	64	64	62	4.0	
10	25.0	0.53	2.70	300.5	102	248	250	64	65	62	4.0	
11	27.5	0.52	2.65	302.8	102	248	252	64	65	62	4.0	
12	30.0	0.47	2.40	305.1	102	247	247	64	66	63	4.0	
13	32.5	0.47	2.40	307.4	103	236	252	64	66	63	4.0	
14	35.0	0.43	2.19	309.3	104	236	259	64	66	64	3.5	
15	37.5	0.45	2.30	311.5	105	237	243	63	67	64	3.5	
16	40.0	0.45	2.30	313.6	105	240	259	63	67	64	3.5	
17	42.5	0.45	2.30	315.8	105	243	252	63	67	64	3.5	
18	45.0	0.45	2.30	318.6	105	246	247	64	67	64	3.5	
19	47.5	0.48	2.45	320.4	104	246	245	63	67	64	4.0	
20	50.0	0.50	2.55	322.6	104	246	244	62	67	65	4.0	
21	52.5	0.46	2.35	325.0	104	257	250	62	67	65	4.0	
22	55.0	0.46	2.35	327.1	104	250	250	62	67	65	4.0	
23	57.5	1.0	5.1	329.3	99	249	252	63	68	65	8.0	
24	60.0	1.0	5.1	332.558	97	253	254	63	68	65	8.0	

AIR TES ROFESSIONALS FIELD DATA SHEET LEAD TESTING EPA METHOD 1-4/12/9 RUN 2 PAGE ___ OF ___

CLIENT	Nucor Steel	METER BOX ID	A-1	K FACTOR	5.1	DUCT DIMENSIONS (in.)	96"
LOCATION	Crawfordsville, IN	METER γ	1.01	METER ΔH@	1.744	PORT LENGTH (in.)	4"
UNIT	Strip Caster	PITOT C_p	0.84	PROBE LINER	Glass	FILTER ID	22 — SILICA ID #17
DATE 11/21/03	PROJECT #	PROBE ID	4'	NOZZLE ID	2.71	TEDLAR BAG ID	
METER OPERATOR	Carlos Brown	BAROMETRIC	29.92	AMBIENT TEMP (°F)	50°F	PITOT CHECK PASS ☒ FAIL ☐	O_2 20.9 / CO_2 0.0
PROBE OPERATOR	Carlos Brown	STATIC PRESSURE (in. H_2O)	-0.25			H_2O (mL)	0.0
VISIBLE EMISSIONS READER	Ron Stapert	LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	15"	SILICA GEL (g)	9.9
CLIENT CONTACT	Mark Nasher	LEAK RATE AFTER (cfm)	0.001	@ (in. Hg)	10"	TOTAL Vlc	9.9
AGENCY CONTACT	Steve Friend	START TIME	0850	STOP TIME	0955		

Diagram of Test Location

Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F)	Filter Tf (°F)	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				332.91		Set Points						
1	2.5	0.46	2.35	335.1	87	247	249	54	54	53	3.5	
2	5.0	0.50	2.55	337.4	88	266	250	50	54	53	3.5	
3	7.5	0.53	2.70	339.7	88	258	250	50	56	53	3.5	
4	10.0	0.48	2.45	341.8	90	247	250	54	57	53	3.5	
5	12.5	0.43	2.19	343.9	93	244	250	57	57	54	3.0	
6	15.0	0.41	2.09	346.1	93	248	249	58	58	54	3.0	
7	17.5	0.47	2.40	348.3	98	237	245	58	58	54	3.0	
8	20.0	0.47	2.40	350.4	101	243	253	59	59	55	3.0	
9	22.5	0.43	2.19	352.5	102	242	253	60	59	55	3.0	
10	25.0	0.43	2.19	354.6	104	250	250	60	60	55	3.0	
11	27.5	0.40	2.04	356.6	106	251	251	61	60	55	2.5	
12	30.0	0.40	2.04	358.7	107	252	253	61	60	56	2.5	
13	32.5	0.45	2.30	360.8	106	245	255	61	60	56	2.5	
14	35.0	0.43	2.19	362.9	116	263	253	61	61	57	2.5	
15	37.5	0.48	2.45	364.9	111	267	251	62	61	57	3.0	
16	40.0	0.45	2.30	367.2	110	249	252	62	62	57	3.0	
17	42.5	0.40	2.04	369.4	110	244	253	63	63	58	2.5	
18	45.0	0.40	2.04	371.4	108	249	251	64	63	58	2.5	
19	47.5	0.47	2.40	373.6	104	238	248	64	63	59	3.0	
20	50.0	0.50	2.55	375.8	110	238	252	64	65	60	3.0	
21	52.5	0.51	2.60	378.1	109	244	249	65	65	60	3.0	
22	55.0	0.50	2.55	380.5	108	252	251	65	66	61	3.0	
23	57.5	0.47	2.40	382.7	107	251	251	66	67	61	3.0	
24	60.0	0.47	2.40	384.91	106	251	251	66	67	62	3.0	

AIR TEST PROFESSIONALS FIELD DATA SHEET LEAD (Pb) TESTING EPA METHOD 1-4/12/9 RUN 3 PAGE ___ OF ___

CLIENT	NUCOR STEEL	METER BOX ID	A-1	K FACTOR	5.0	DUCT DIMENSIONS (in.)	96"
LOCATION	CRAWFORDSVILLE, IN	METER γ	1.01	METER ΔH@	1.744	PORT LENGTH (in.)	4"
UNIT	1 STRIP CASTER	PITOT C_p	0.84	PROBE LINER	GLASS	FILTER ID	R3 — SILICA ID 18#
DATE	11/21/03 — PROJECT #	PROBE ID	4' 1	NOZZLE ID	0.271	TEDLAR BAG ID	
METER OPERATOR	CARLOS BROWN	BAROMETRIC	29.92	AMBIENT TEMP (°F)		PITOT CHECK	O_2 20.9
PROBE OPERATOR	CARLOS BROWN	STATIC PRESSURE (in. H_2O)	-0.25			PASS ☒ FAIL ☐	CO_2 0.0
VISIBLE EMISSIONS READER	RON STAPERT	LEAK RATE BEFORE (cfm)	0.000	@ (in. Hg)	11"	H_2O (mL)	0.0
CLIENT CONTACT	MARK WARTHER	LEAK RATE AFTER (cfm)	0.000	@ (in. Hg)	8"	SILICA GEL (g)	9.2
AGENCY CONTACT	STEVE FRIEND	START TIME	1632	STOP TIME	1739	TOTAL Vlc	-9.2

Diagram of Test Location

Traverse Point Number	Min/Point Elapsed Time	Velocity Head ΔP's (in. H_2O)	Orifice Setting ΔH (in. H_2O)	Sample Volume Vm (ft³)	Stack Temp. Ts (°F)	Probe Tp (°F) Set Points	Filter Tf (°F) Set Points	Cond. Temp. Tc (°F)	DGM Inlet Tm (°F)	DGM Outlet Tm (°F)	Pump Vacuum (in. Hg)	Notes
				431.61								
1	2.5	0.48	2.4	433.8	96	237	250	61	65	63	3.0	
2	5.0	0.45	2.25	436.1	98	235	249	56	64	63	3.0	
3	7.5	0.48	2.4	438.0	102	241	249	53	64	63	3.0	
4	10.0	0.45	2.25	440.3	105	243	252	57	65	63	3.0	
5	12.5	0.42	2.10	442.4	107	247	249	59	65	63	3.0	
6	15.0	0.43	2.15	444.5	108	248	250	62	65	63	3.0	
7	17.5	0.42	2.16	446.6	109	242	253	62	65	63	3.0	
8	20.0	0.43	2.15	448.6	114	248	246	62	66	63	3.0	
9	22.5	0.43	2.15	450.7	114	253	251	63	66	63	3.0	
10	25.0	0.40	2.0	452.7	116	253	253	63	67	64	3.0	
11	27.5	0.40	2.0	454.8	117	251	253	63	67	64	3.0	
12	30.0	0.39	1.95	456.8	119	250	251	63	67	64	3.0	
13	32.5	0.48	2.4	459.0	118	244	254	63	67	64	3.0	
14	35.0	0.48	2.4	461.2	120	264	250	63	68	64	3.0	
15	37.5	0.40	2.0	463.3	119	261	250	63	68	64	3.0	
16	40.0	0.40	2.0	465.6	118	252	251	63	68	65	3.0	
17	42.5	0.45	2.25	467.8	116	246	251	63	68	65	3.0	
18	45.0	0.40	2.0	469.8	115	248	247	63	69	65	3.0	
19	47.5	0.40	2.0	472.1	113	248	247	62	67	65	3.0	← CHANGE K's = [illegible]
20	50.0	0.40	2.0	474.0	115	250	249	62	68	65	3.0	
21	52.5	0.45	2.25	476.1	114	252	251	61	68	65	3.0	
22	55.0	0.43	2.15	478.2	114	251	250	62	68	65	3.0	
23	57.5	0.43	2.15	480.3	113	248	248	62	69	65	3.0	
24	60.0	0.45	2.25	482.54	112	250	251	63	69	65	3.0	

APPENDIX D

Particulate (condensible) Laboratory Data

LABORATORY DATA

PARTICULATE WEIGHT SHEET

Source: Nucor Steel – LMS Baghouse Stack

Date:		11/20/03	11/21/03	11/21/03	
Acetone	**Blank**	**1**	**2**	**3**	**Avg.**
Run ID#	A-12	A1	A2	A3	
Tare Wt	63.8493	66.3626	64.2683	64.5864	
Gross Wt	63.8493	66.3651	64.2705	64.5898	
Correction	0.0000	0.0000	0.0000	0.0000	
Net Wt	0.0000	0.0025	0.0022	0.0034	
Filter		**1**	**2**	**3**	**Avg.**
Run ID#		R1	R2	R3	
Tare Wt		0.2984	0.2940	0.3460	
Gross Wt		0.2984	0.2941	0.3460	
Net Wt		0.0000	0.0001	0.0000	

Total Gain		**0.0025**	**0.0023**	**0.0034**	

Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, IN 46219

Nucor Steel / Strip Caster

PO# 051

Analytical Report

(1103-99)

EPA Method 202

Condensible particulate

Enthalpy Analytical, Inc.

Phone: (919) 850 - 4392 / Fax: (919) 850 - 9012 / www.enthalpy.com
2202 Ellis Road Durham, NC 27703 - 5518

I certify that to the best of my knowledge all analytical data presented in this report:

- Have been checked for completeness
- Are accurate, error-free, and legible
- Have been conducted in accordance with approved protocol, and that all deviations and analytical problems are summarized in the appropriate narrative(s)
- This analytical report was prepared in Portable Document Format (.PDF) and contains 10 pages.

QA Review Performed by: Michael Steven Schapira

Summary of Results

EPA Method 202 - Condensible Particulate Determination - Data Analysis

Company	ATP, Inc.
Analyst	SLG
Parameters	Method 202
# Samples	3 Runs and 1 Blank

Client #	Nucor Steel-Strip Caster
Job #	1103-99
PO #	051
Report Date	12/12/2003

Analysis of Particulate Recovery

Run Number	1	2	3	
Sample ID Number	Run # 1	Run # 2	Run # 3	
Organic				
Beaker Number	5011	5003	5002	
Final Weight, g	0.9741	0.9708	0.9701	
Reweigh, Final, g	0.9741	0.9708	0.9702	
Beaker Tare Weight, g	0.9680	0.9678	0.9681	
Beaker Tare Reweigh, Initial, g	0.9679	0.9677	0.9681	
Solvent Blank, g	0.0013	0.0013	0.0011	
MeCl2 FV, mL	202	196	168	
Net Organic Catch, mg	4.9	1.8	1.0	2.57 => 0.286
Inorganic				
Beaker Number	5017	5018	5014	
Final Weight, g	0.9779	0.9721	0.9796	
Reweigh, Final, g	0.9778	0.9720	0.9795	
Beaker Tare Weight, g	0.9702	0.9691	0.9696	
Beaker Tare Reweigh, Initial, g	0.9699	0.9689	0.9695	
Water Blank, g	0.0006	0.0006	0.0006	
H2O FV, mL	392	358	406	
Net Inorganic, mg	7.3	2.5	9.4	6.40 => 0.714
Condensible Particulate, mg	12.2	4.4	10.4	

Blank Analysis

Sample ID Number	MeCl Blank
Beaker Number	5013
Final Weight, g	0.9687
Reweigh, Final, g	0.9685
Initial Weight, g	0.9673
Reweigh, Initial, g	0.9671
MeCl2 Residue, g	0.0014
MeCl2 Volume, mL	212
Max. MeCl2 Residue, g	0.0028

Sample ID Number	H2O Blank
Beaker Number	5016
Final Weight, g	0.9696
Reweigh, Final, g	0.9694
Initial Weight, g	0.9691
Reweigh, Initial, g	0.9688
Water Residue, g	0.0006
Water Volume, mL	388
Max. Water Residue, g	0.0039

Narrative Summary

Enthalpy Analytical Narrative Summary

Company:	ATP, Inc.
Client #:	Nucor Steel-Strip Caster
PO #	051

Enthalpy #:	1103-99
Analyst:	SLG
Parameters:	EPA Method 202

Custody

Scott Grosshandler of Enthalpy Analytical, Inc. received the samples at ambient temperature on 11/26/03 after being relinquished by Air Test Professionals, Inc. There were no visible container problems noted upon receipt. Prior to and during analysis they were kept under lock with access only to authorized personnel of Enthalpy Analytical, Inc.

Methodology

All samples were analyzed in accordance to the requirements and specifications of EPA Method 202.

Instrumentation

All samples were weighed on a Sartorius Model BP 110 S (SN-40707606), certified by Precision Weighing, Inc. through November 4, 2004 (NIST Test # 846895).

Labeling

OK

Additional Reporting Notes

The inorganic and organic catch weights are adjusted by a blank correction value. A mathematically determined (theoretical) maximum value is calculated and compared with the actual value measured for each blank. The lower of the two values is used as the blank correction value, which is then factored by the sample volume divided by the blank volume, and subtracted from the sample's catch weight.

General Reporting Notes

The following are general reporting notes that are applicable to all Enthalpy Analytical, Inc. reports, unless specifically noted otherwise.

- The symbol ***MDL*** represents the Minimum Detection Limit. Below this value the laboratory cannot confirm the presence of the analyte of interest reliably.
- The symbol ***LOQ*** represents the Limit of Quantification. Below this value the laboratory cannot quantitate the analyte of interest within the criteria of the method.
- The symbol ***ND*** following a value indicates a non-detect or analytical result below the MDL.
- The symbol ***J*** following a value indicates an analytical result between the MDL and the LOQ. A J flag indicates that the laboratory can positively identify the analyte of interest as present, but the value should be considered an estimate.
- The symbol ***E*** following a value indicates an analytical result exceeding 100% of the highest calibration point.
- The symbol ***DF*** represents a Dilution Factor. This number represents dilutions during the extraction and/or laboratory stages of sample treatment. The analytical result taken from a laboratory instrument is multiplied by the DF to get final results.
- The Sample ID ***MS*** represents a Matrix Spike. An aliquot of an actual sample is spiked with a known amount of analyte so that a percent recovery value can be determined. This shows what effect the sample matrix may have on the target analyte, i.e. whether or not anything in the sample matrix prohibits analysis for the analyte(s).
- The Sample ID ***MSD*** represents a Matrix Spike Duplicate. Prepared in the same manner as an MS, the use of duplicate matrix spikes allows further confirmation of laboratory quality by showing the consistency of results gained by performing the same steps multiple times. Most methods performed by Enthalpy do not require analysis of an MSD.
- The Sample ID ***BS*** represents a Blind Spike. A member of the Quality Assurance department has created BS samples for many of the analytes Enthalpy tests for, and only QA and the Enthalpy Analytical ownership have access to the actual values of these samples. The laboratory analyzes them without knowledge of the actual value, and the spreadsheets get completed for these samples solely by the QA group.
- The Sample ID ***LCS*** represents a Laboratory Control Sample. Whenever spikes are prepared for our clients more spikes are prepared than needed. The extras (randomly chosen) are kept in-house at the appropriate temperature conditions. When the spike samples come back from the client for analysis, the LCSs (usually two are saved) are analyzed to confirm that the analyte could be recovered from the media, separate from the spike samples which were used on the project and which may have had issues caused during collection and/or transport.
- **Significant Figures**: Where the reported value is much greater than unity (1.00) in the units expressed (specifically values of 1,000 or greater), the number is rounded to a whole number of units, rather than to 3 significant figures. For example, a value of 10,456.45 ug catch is rounded to 10,456 ug. There are five significant digits reported, but no confidence should be placed on more than three significant digits.

APPENDIX D

Lead Laboratory Data

Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, IN 46219

Project ID: Nucor Steel Strip Caster

Lead

EPA Method 12 Analysis

Analytical Report
2555

Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX:910-792-6853 e1lab@hotmail.com

I have reviewed the following data for completeness, accuracy, adherence to method protocol, and compliance with quality assurance guidelines.

Quality assurance review by Bruce Hawks

SUMMARY OF RESULTS

Summary of Analysis

Summary of Lead Analysis

Element	Run 1 Total µg	Run 2 Total µg	Run 3 Total µg	Blank Total µg	Run 3 Spike Recovery
Lead Average	2.1	2.0	1.1	2.0	99%
Triplicate RSD	0.2%	0.2%	1.3%	1.8%	

ANALYTICAL NARRATIVE

el1

Element One Analytical Narrative

Client	Air Test Professionals, Inc.	Element One #:	2555
Client ID:	Nucor Steel Strip Caster	Analyst:	KMS
Date Received	11/26/03	Method:	M12
Analytes	Pb	Dates Analyzed	12/08/03

Summary of Analysis

The Method 12 samples were prepared and analyzed according to the method protocol. Digested samples were analyzed for on a PerkinElmer ELAN 6100 ICP-MS.

Detection Limits

The instrument reporting limit was for 2.5 µg/L for lead.

Analysis QA/QC

The spike recovery data and triplicate analyses relative standard deviations are summarized with the results. All QC was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank or spike recovery values. Nothing unusual was noticed with any of the analyses.

ANALYTICAL DATA

elementOne **AIR TESTING SAMPLE SUBMISSION FORM** Lab ID **e2555**

Client ID/PO: 051 – Nucor Steel Strip Caster	Date Received: 11/26/03	Page: 1	of 1
Customer: Air Test Professionals, Inc.	Results Requested: 12/12/03	Time Rec: 1130	
Address: 1201 N. Graham Av.	Contact: Carlos Brown	Rec by: BGH	
Indianapolis, IN 46219	Email: atp_stack@sbcglobal.net	Via:	
	Phone: 317-345-1723	Fax:	

HNO_3 Lot:	HF Lot:	HCl Lot:	
Volume Marked Y / N	Volume Loss Y / N / ?	pH < 2.0 Y / N	Ref. Method: 12

	Sample Identification		Sample Identification
1	Run 1		
2	Run 2		
3	Run 3		
4	Run 3 Spike		
5	Blank		

Elements to Analyze: Pb – **METHOD 12**

	Front Half		Back Half			HNO_3 (A)		$KMnO_4$ (B)		HCl (C)	
SAMPLE	BV, ml	FV, ml	BV, ml	Used	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml	BV, ml	FV, ml
1	293	100									
2	309										
3/4	317										
5	262										
	-										

Comments:

Element One, Inc. Form 118 - Revision 6.0

LRB spike = 20ug / F.V. 100ml

Lot A9055057

Dataset Report

r Name: ksmith
Computer Name: ICPMS1
Dataset File Path: c:\elandata\dataset\120803-1\
Report Date/Time: Monday, December 08, 2003 17:41:12

Ken Smith
12-8-03

Autosampler Position: 13

The Dataset

Time	Sample ID	Batch ID	Read Type	Description	Init. Quant	Prep. Vol.	Aliquot. Vol.	Diluted V
15:59:26 Mon 08-Dec-03	Blank		Blank					
16:01:26 Mon 08-Dec-03	Standard 1		Standard #1					
16:03:27 Mon 08-Dec-03	Standard 2		Standard #2					
16:05:29 Mon 08-Dec-03	Standard 3		Standard #3					
16:07:31 Mon 08-Dec-03	Standard 4		Standard #4					
16:09:33 Mon 08-Dec-03	Standard 5		Standard #5					
16:11:36 Mon 08-Dec-03	QC Std 1		QC Std #1					
16:13:37 Mon 08-Dec-03	QC Std 2		QC Std #2					
16:15:37 Mon 08-Dec-03	QC Std 3		QC Std #3					
16:17:37 Mon 08-Dec-03	QC Std 4		QC Std #4					
16:19:38 Mon 08-Dec-03	QC Std 5		QC Std #5					
16:54:27 Mon 08-Dec-03	2555-1		Sample	Ait T Prof				
16:56:30 Mon 08-Dec-03	2555-2		Sample	Ait T Prof				
16:58:33 Mon 08-Dec-03	2555-3		Sample	Ait T Prof				
17:00:37 Mon 08-Dec-03	2555-3		Spike - 1	Ait T Prof				
:02:40 Mon 08-Dec-03	2555-5		Sample	Ait T Prof				
.04:40 Mon 08-Dec-03	QC Std 3		QC Std #3					
17:06:40 Mon 08-Dec-03	QC Std 4		QC Std #4					
17:32:08 Mon 08-Dec-03	LRB		Sample	Ait T Prof				
17:34:14 Mon 08-Dec-03	LRB		Spike - 1	Ait T Prof				
17:36:15 Mon 08-Dec-03	QC Std 3		QC Std #3					
17:38:15 Mon 08-Dec-03	QC Std 4		QC Std #4					

Sample/Batch Report

Ken Smith
12-8-03

r Name: ksmith
Computer Name: ICPMS1
Sample File: C:\elandata\Sample\Method 12.sam
Report Date/Time: Monday, December 08, 2003 17:40:21

A/S Loc.	Batch ID	Sample ID	Description	Sample Type	Init. Quant.	Prep. Vol.	Aliquot Vol.	Diluted Vol.	Solids Ratio
12		LRB	Alt T Prof						
13		LRB	Alt T Prof	Spike - 1					
14		2555-1	Alt T Prof						
15		2555-2	Alt T Prof						
16		2555-3	Alt T Prof						
17		2555-3	Alt T Prof	Spike - 1					
18		2555-5	Alt T Prof						

elementOne

ICP-MS RUN SHEET

2555 K. Sm[illegible] 12-8-03

Analyst: __KMS____ Date: 12-08-03 **Solid Samples** ☐ / *Liquid Samples*

A/S Loc	Batch # for sample sets	Sample Lab ID	Sample Description	Type Sample QC Spike QC Dup QC Reg Blank	Spike concentratio	Prep Volume (ml)	Aliquot (ml)	Diluted to Volume (ml)	Units
14			2555-1	S		100			
15			2555-2	S		100			
16			2555-3	S		100			
17			2555-3	SS	Table #1	100			
18			2555-5	S		100			
12			LRB	S		100			
13			LRB	SS	Table #2	100			

Spikes are post at 0.02ml of 25ppm spiking solutions lot 021403-ABC or F in a final volume of 10ml.

Element One, Inc. Form 126 - Revision 0.0

File Edit Analysis Options Window Help

Timing | Processing | Equation | Calibration | Sampling | Devices... | QC...

	Analyte	Mass (amu)	Spike Table 1 (Conc.)	Spike Table 1 Det. Limit (Conc.)	Spike Table 2 (Conc.)	Spike Table 2 Det. Limit (Conc.)	Spike Table 3 (Conc.)	Spike Table 3 Det. Limit (Conc.)	Spike Table 4 (Conc.)	D
1	Rh	102.905								
2	Pb	207.977	50	0.001	200	1	100	1		
3	Kr	82.9141						1		

Report | Notes

Frequency | QC Std Int Stds | Calibration Stds | Sample Int Stds | Sample | Spike | Dilution | Duplicate | Spike Tables | QC Action Controls | Autosampler

Start | GpibManager | ELAN Instrument Control S... | ELAN Edit/Reproces...

NUM

5:45 PM

Method 6020 Multi Metals Summary Report
Sample ID: Blank
Sample Date/Time: Monday, December 08, 2003 15:59:26
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	643850.7		ppb
|>	Ho	165	1176247.9		ppb
|-	Pb	208	1169.7		ppb
	Kr	83	386.3		ppb

Replicates
Concentration

Concentration

Concentration

Method 6020 Multi Metals Summary Report
Sample ID: Standard 1
Sample Date/Time: Monday, December 08, 2003 16:01:26
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	661757.3		ppb
|>	Ho	165	1198718.9		ppb
|-	Pb	208	454796	10.19038	ppb
	Kr	83	374.2		ppb

Replicates
Concentration

10.092839

Concentration

10.251392

Concentration

10.226909

Method 6020 Multi Metals ~~Summary~~ Report
Sample ID: Standard 2
Sample Date/Time: Monday, December 08, 2003 16:03:27
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	653595.9		ppb
|>	Ho	165	1204607.5		ppb
|-	Pb	208	913023.3	20.38672	ppb
	Kr	83	397.2		ppb

Replicates
Concentration

20.537286

Concentration

20.519772

Concentration

20.103095

Method 6020 Multi Metals Summary Report
Sample ID: Standard 3
Sample Date/Time: Monday, December 08, 2003 16:05:29
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	649636.9		ppb
|>	Ho	165	1191972.6		ppb
|-	Pb	208	4422531.4	99.89572	ppb
	Kr	83	363.5		ppb

Replicates
Concentration

100.401369

Concentration

100.291191

Concentration

98.994602

Method 6020 Multi Metals ~~Summary~~ Report
Sample ID: Standard 4
Sample Date/Time: Monday, December 08, 2003 16:07:31
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	685063.9		ppb
|>	Ho	165	1238880.4		ppb
|-	Pb	208	22852225.8	496.71054	ppb
	Kr	83	363.7		ppb

Replicates
Concentration

492.875851

Concentration

498.074888

Concentration

499.180883

Method 6020 Multi Metals Summary Report
Sample ID: Standard 5
Sample Date/Time: Monday, December 08, 2003 16:09:33
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	670331.4		ppb
|>	Ho	165	1218656.9		ppb
|-	Pb	208	45327940.9	1001.64552	ppb
	Kr	83	361		ppb

Replicates
Concentration

987.29896

Concentration

1005.61773

Concentration

1012.019869

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date/Time: Monday, December 08, 2003 16:11:36
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	627766.4		ppb
|>	Ho	165	1151434.4		ppb
|-	Pb	208	441374.6	10.29698	ppb
	Kr	83	351.3		ppb

Replicates
Concentration

10.400215

Concentration

10.202207

Concentration

10.288525

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 2
Sample Date/Time: Monday, December 08, 2003 16:13:37
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	645607.2		ppb
|>	Ho	165	1183583.8		ppb
|-	Pb	208	48010.4	1.06561	ppb
	Kr	83	364.3		ppb

Replicates
Concentration

1.065851

Concentration

1.067207

Concentration

1.063767

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 3
Sample Date/Time: Monday, December 08, 2003 16:15:37
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	645918.6		ppb
|>	Ho	165	1181440.2		ppb
|-	Pb	208	2915.4	0.03968	ppb
	Kr	83	392.7		ppb

Replicates
Concentration

0.046034

Concentration

0.037916

Concentration

0.035098

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/Time: Monday, December 08, 2003 16:17:37
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	660191.4		ppb
|>	Ho	165	1203658.8		ppb
|-	Pb	208	2387516.3	53.39288	ppb
	Kr	83	391.3		ppb

Replicates
Concentration

53.794696

Concentration

53.132741

Concentration

53.251214

Method 6020 Multi Metals Summary Report

Sample ID: QC Std 5

Sample Date/Time: Monday, December 08, 2003 16:19:38

Sample Description:

Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	667287.2		ppb
|>	Ho	165	1206702.9		ppb
|-	Pb	208	23222229.7	518.23285	ppb
	Kr	83	397.3		ppb

Replicates

Concentration

512.400533

Concentration

518.768175

Concentration

523.529837

Method 6020 Multi Metals Summary Report

Sample ID: 2555-1

Sample Date/Time: Monday, December 08, 2003 16:54:27

Sample Description: Ait T Prof

Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	625550		ppb
|>	Ho	165	1215046.3		ppb
|-	Pb	208	938863.9	20.78227	ppb
	Kr	83	516.4		ppb

Replicates

Concentration

20.832783

Concentration

20.747675

Concentration

20.76635

Method 6020 Multi Metals Summary Report
Sample ID: 2555-2
Sample Date/Time: Monday, December 08, 2003 16:56:30
Sample Description: Ait T Prof
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	634014.6		ppb
|>	Ho	165	1219181.3		ppb
|-	Pb	208	911057.8	20.09742	ppb
	Kr	83	583.2		ppb

Replicates
Concentration

20.125641

Concentration

20.046318

Concentration

20.120296

Method 6020 Multi Metals Summary Report
Sample ID: 2555-3
Sample Date/Time: Monday, December 08, 2003 16:58:33
Sample Description: Ait T Prof
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	630593.1		ppb
|>	Ho	165	1217341.1		ppb
|-	Pb	208	478940.8	10.5698	ppb
	Kr	83	713.7		ppb

Replicates
Concentration

10.73271

Concentration

10.473648

Concentration

10.503042

Method 6020 Multi Metals Summary Report
Sample ID: 2555-3
Sample Date/Time: Monday, December 08, 2003 17:00:37
Sample Description: Ait T Prof
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	614963.7		ppb
|>	Ho	165	1174413.2		ppb
|-	Pb	208	2627281	60.22004	ppb
	Kr	83	695		ppb

Replicates
Concentration

60.389044

Concentration

60.413925

Concentration

59.857149

Method 6020 Multi Metals Summary Report
Sample ID: 2555-5
Sample Date/Time: Monday, December 08, 2003 17:02:40
Sample Description: Ait T Prof
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	668807.3		ppb
|>	Ho	165	1205999.4		ppb
|-	Pb	208	910657.4	20.31049	ppb
	Kr	83	1482.8		ppb

Replicates
Concentration

19.951594

Concentration

20.287117

Concentration

20.692749

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 3
Sample Date/Time: Monday, December 08, 2003 17:04:40
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
|>	Rh	103	676606.8		ppb
|-	Ho	165	1197046.9		ppb
	Pb	208	1914.6	0.01628	ppb
	Kr	83	388		ppb

Replicates
Concentration

0.021078

Concentration

0.014028

Concentration

0.013737

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date/Time: Monday, December 08, 2003 17:06:40
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
|>	Rh	103	680608.1		ppb
|-	Ho	165	1190861.9		ppb
	Pb	208	2358797.2	53.31615	ppb
	Kr	83	402.8		ppb

Replicates
Concentration

52.666056

Concentration

53.544031

Concentration

53.738359

Method 6020 Multi Metals Summary Report
Sample ID: LRB
Sample Date/Time: Monday, December 08, 2003 17:32:08
Sample Description: Ait T Prof
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	670337.3		ppb
|>	Ho	165	1189861.5		ppb
|-	Pb	208	45689.3	1.00731	ppb
	Kr	83	348.3		ppb

Replicates
Concentration

1.009163

Concentration

0.999721

Concentration

1.013055

Method 6020 Multi Metals Summary Report
Sample ID: LRB
Sample Date/Time: Monday, December 08, 2003 17:34:14
Sample Description: Ait T Prof
Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	683454.2		ppb
|>	Ho	165	1210496.3		ppb
|-	Pb	208	9276208.5	206.35104	ppb
	Kr	83	356.2		ppb

Replicates
Concentration

206.065381

Concentration

207.650821

Concentration

205.33691

Method 6020 Multi Metals Summary Report

Sample ID: QC Std 3

Sample Date/Time: Monday, December 08, 2003 17:36:15

Sample Description:

Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	669881.2		ppb
|>	Ho	165	1193001		ppb
|-	Pb	208	5122.3	0.08907	ppb
	Kr	83	373.7		ppb

Replicates

Concentration

0.118173

Concentration

0.079753

Concentration

0.069283

Method 6020 Multi Metals Summary Report

Sample ID: QC Std 4

Sample Date/Time: Monday, December 08, 2003 17:38:15

Sample Description:

Concentration Results

	Analyte	Mass	Meas. Intens. Mean	Conc. Mean	Report Unit
	Rh	103	663487.5		ppb
|>	Ho	165	1187007.3		ppb
|-	Pb	208	2360258.6	53.52427	ppb
	Kr	83	381.7		ppb

Replicates

Concentration

53.425472

Concentration

54.058424

Concentration

53.088906

APPENDIX E

ATP - Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, Indiana 46219

Phone (317) 345-1723
Fax (317) 351-0411
Email: atp_stack@sbcglobal.net

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION		PROJECT INFORMATION	
COMPANY:	ATP	PROJECT NAME/NUMBER:	Nucor Steel - Strip Caster
SEND REPORT TO:	Carlos Brown	BILLING INFORMATION	
ADDRESS:	1201 N. Graham Ave.	BILL TO:	
	Indianapolis, Indiana 46219	ADDRESS:	Same
PHONE:	(317) 345-1723	PHONE:	
FAX:	(317) 351-0411	FAX: / PO NO:	051

LAB JOB NO.:

SAMPLE NO	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV	No. of Containers	EPA Method 5						REMARKS / PRECAUTIONS
Run 1	Sample Filter	11/20/03			Petri		1	X						
Run 2	Sample Filter	11/21/03			Petri		1	X						
Run 3	Sample Filter	11/21/03			Petri		1	X						
Run 1	Acetone Rinse	11/20/03		AQ	4 oz		1	X						
Run 2	Acetone Rinse	11/21/03		AQ	4 oz		1	X						
Run 3	Acetone Rinse	11/21/03		AQ	4 oz		1	X						
BLANK	Acetone Blank			AQ	4 oz		1	X						

SAMPLER: Carlos Brown | SHIPMENT METHOD: | AIRBILL NO:

REQUIRED TURNAROUND:

1. RELINQUISHED BY:	DATE	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: [signature]	11/21/03	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: ATP	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME

1. RECEIVED BY:	DATE	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE:		SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME

ATP - Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, Indiana 46219

Phone (317) 345-1723
Fax (317) 351-0411
Email: atp_stack@sbcglobal.net

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION		PROJECT INFORMATION	
COMPANY:	ATP	PROJECT NAME/NUMBER:	Nucor Steel - Strip Caster
SEND REPORT TO:	Carlos Brown	BILLING INFORMATION	
ADDRESS:	1201 N. Graham Ave.	BILL TO:	
	Indianapolis, Indiana 46219	ADDRESS:	Same
PHONE:	(317) 345-1723	PHONE:	
FAX:	(317) 351-0411	FAX:	PO NO: 051

LAB JOB NO.

SAMPLE NO.	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV.	Number of Containers	EPA METHOD 12						REMARKS / PRECAUTIONS
Run 1	HNO3 Rinse	11/20/03		AQ	500 ml		1	X						
Run 2	HNO3 Rinse	11/21/03		AQ	500 ml		1	X						
Run 3	HNO3 Rinse	11/21/03		AQ	500 ml		1	X						
Run 1	Sample Filter	11/20/03			Petri		1	X						
Run 2	Sample Filter	11/21/03			Petri		1	X						
Run 3	Sample Filter	11/21/03			Petri		1	X						
BLANK	HNO3 BLANK			AQ	500 ml		1	X						
BLANK	Filter BLANK				Petri		1	X						

SAMPLER: Carlos Brown
SHIPMENT METHOD:
AIRBILL NO:

REQUIRED TURNAROUND:

1. RELINQUISHED BY	DATE	2. RELINQUISHED BY	DATE	3. RELINQUISHED BY	DATE
SIGNATURE: [signature]	11/21/03	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: ATP	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME
1. RECEIVED BY	DATE 11/26/03	**2. RECEIVED BY**	DATE	**3. RECEIVED BY**	DATE
SIGNATURE: [signature]		SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: Bruce Hawks, Element One	TIME 1130	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME

e2555

ATP - Air Test Professionals, Inc.

1201 North Graham Avenue
Indianapolis, Indiana 46219

Phone (317) 345-1723
Fax (317) 351-0411
Email: atp_stack@sbcglobal.net

CHAIN OF CUSTODY RECORD

CUSTOMER INFORMATION		PROJECT INFORMATION	
COMPANY:	ATP	PROJECT NAME/NUMBER:	Nucor Steel - Stip Caster (STRIP)
SEND REPORT TC	Carlos Brown	BILLING INFORMATION	
ADDRESS:	1201 N. Graham Ave.	BILL TO:	
	Indianapolis, Indiana 46219	ADDRESS:	Same
PHONE:	(317) 345-1723	PHONE:	
FAX:	(317) 351-0411	FAX:	PO NO: 051

LAB JOB NO.

SAMPLE NO	SAMPLE DESCRIPTION	SAMPLE DATE	SAMPLE TIME	SAMPLE MATRIX	CONTAINER	PRESERV	No. of Containers	EPA Method 202	REMARKS / PRECAUTIONS
Run 1	MeCl2 Rinse	11/20/03		AQ	4 oz		1	X	
Run 2	MeCl2 Rinse	11/21/03		AQ	4 oz		1	X	
Run 3	MeCl2 Rinse	11/21/03		AQ	4 oz		1	X	
Run 1	DI H2O Rinse	11/20/03		AQ	500 ml		1	X	Sulfate Correction
Run 2	DI H2O Rinse	11/21/03		AQ	500 ml		1	X	"If Required"
Run 3	DI H2O Rinse	11/21/03		AQ	500 ml		1	X	
BLANK	MeCl2			AQ	4 oz		1	X	
BLANK	DI H2O			AQ	500 ml		1	X	

SAMPLER: Carlos Brown | SHIPMENT METHOD: | AIRBILL NO:

REQUIRED TURNAROUND: *

1. RELINQUISHED BY:	DATE	2. RELINQUISHED BY:	DATE	3. RELINQUISHED BY:	DATE
SIGNATURE: [signature]	11/21/03	SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: ATP - Carlos Brown	TIME	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME
1. RECEIVED BY: [signature]	DATE 11-26-03	2. RECEIVED BY:	DATE	3. RECEIVED BY:	DATE
SIGNATURE: Scott Grosshandler		SIGNATURE:		SIGNATURE:	
PRINTED NAME/COMPANY: Enthalpy	TIME 10:00AM	PRINTED NAME/COMPANY	TIME	PRINTED NAME/COMPANY	TIME

APPENDIX F

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-26

Company:	Nucor Steel
Date:	11/20/03-11/21/03
Source:	Castrip
Location:	Crawfordsville, Indiana

	Run 1	Run 2	Run 3	Average
Y qa =	0.997	0.971	0.961	0.976

Average result must be within 5% of Y

Result (%) **3.36**

PASSED POST CAL

Dry Gas Meter Box:

ID:	A-1
Y:	1.01
Delta H:	1.744

Run 1	Volume	Delta H	DGM Inlet	DGM Outlet
1		2.14	60	60
2		2.70	61	60
3		2.45	62	60
4		2.45	62	60
5		2.70	63	61
6		2.70	63	61
7		2.55	62	61
8		2.45	63	62
9		2.70	64	62
10		2.70	65	62
11		2.65	65	62
12		2.40	66	63
13		2.40	66	63
14		2.19	66	64
15		2.30	67	64
16		2.30	67	64
17		2.30	67	64
18		2.30	67	64
19		2.45	67	64
20		2.55	67	65
21		2.35	67	65
22		2.35	67	65
23	332.558	5.10	68	65
24	277.961	5.10	68	65

Volume	Delta H	Meter Temp
54.597	2.678	63.86

Barometric Pressure	Test Time
29.95	60.00

Y qa: 0.997

Run 2	Volume	Delta H	DGM Inlet	DGM Outlet
1		2.35	54	53
2		2.55	54	53
3		2.70	56	53
4		2.45	57	53
5		2.19	57	54
6		2.09	58	54
7		2.40	58	54
8		2.40	59	55
9		2.19	59	55
10		2.19	60	55
11		2.04	60	55
12		2.04	60	56
13		2.30	60	56
14		2.19	61	57
15		2.45	61	57
16		2.30	62	57
17		2.04	63	58
18		2.04	63	58
19		2.40	63	59
20		2.55	65	60
21		2.60	65	60
22		2.55	66	61
23	384.91	2.40	67	61
24	332.91	2.40	67	62

Volume	Delta H	Meter Temp
52	2.325	58.56

Barometric Pressure	Test Time
29.92	60.00

Y qa: 0.971

Run 3	Volume	Delta H	DGM Inlet	DGM Outlet
1		2.40	65	63
2		2.25	64	63
3		2.40	64	63
4		2.25	65	63
5		2.10	65	63
6		2.15	65	63
7		2.10	65	63
8		2.15	66	63
9		2.15	66	63
10		2.00	67	64
11		2.00	67	64
12		1.95	67	64
13		2.40	67	64
14		2.40	68	64
15		2.00	68	64
16		2.00	68	65
17		2.25	68	65
18		2.00	69	65
19		2.00	67	65
20		2.00	68	65
21		2.25	68	65
22		2.15	68	65
23	482.54	2.15	69	65
24	431.61	2.25	69	65

Volume	Delta H	Meter Temp
50.93	2.156	65.40

Barometric Pressure	Test Time
29.92	60.00

Y qa: 0.961

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-26

Company:	Nucor Steel
Date:	11/20/03-11/21/03
Source:	Castrip
Location:	Crawfordsville, Indiana

	Run 1	Run 2	Run 3	Average
Y qa =	0.985	0.969	0.968	0.974

Average result must be within 5% of Y

Result (%) 2.99

PASSED POST CAL

Dry Gas Meter Box:

ID:	A-2
Y:	1.004
Delta H:	1.83

Run 1	Volume	Delta H	DGM Inlet	DGM Outlet
1		1.55	71	71
2		1.55	71	71
3		1.62	73	71
4		1.51	73	71
5		1.48	75	71
6		1.44	74	71
7		1.66	75	72
8		1.84	76	73
9		1.80	79	73
10		1.80	79	74
11		1.66	81	74
12		1.76	83	75
13		1.66	82	76
14		1.66	82	76
15		1.69	84	77
16		1.69	84	77
17		1.62	86	78
18		1.48	87	78
19		1.58	86	79
20		1.40	86	79
21		1.51	88	80
22		3.78	88	81
23	591.945	3.89	91	82
24	546.105	3.49	92	83

Volume	Delta H	Meter Temp
45.84	1.880	78.31

Barometric Pressure	Test Time
29.95	60.00

Y qa: 0.985

Run 2	Volume	Delta H	DGM Inlet	DGM Outlet
1		1.62	68	67
2		1.58	68	67
3		1.55	68	67
4		1.48	69	67
5		1.48	71	67
6		1.37	71	67
7		1.69	71	68
8		1.69	72	68
9		1.55	73	69
10		1.44	73	69
11		1.44	74	69
12		1.37	74	69
13		1.62	76	69
14		1.66	77	71
15		1.76	78	71
16		1.69	79	72
17		1.76	79	72
18		1.73	80	73
19		1.69	80	73
20		1.62	81	74
21		1.62	82	75
22		1.62	83	76
23	634.878	1.58	84	76
24	592.315	1.33	84	76

Volume	Delta H	Meter Temp
42.563	1.581	73.06

Barometric Pressure	Test Time
29.92	60.00

Y qa: 0.969

Run 3	Volume	Delta H	DGM Inlet	DGM Outlet
1		1.58	73	71
2		1.33	74	71
3		1.40	76	72
4		1.30	77	72
5		1.23	78	73
6		1.30	79	74
7		1.44	79	74
8		1.54	81	75
9		1.54	82	75
10		1.51	84	76
11		1.44	85	77
12		1.37	85	77
13		1.58	85	78
14		1.58	86	78
15		1.51	87	80
16		1.40	88	80
17		1.51	88	81
18		1.19	89	81
19		1.40	88	81
20		1.37	89	82
21		1.37	90	83
22		1.33	90	83
23	710.80	1.30	90	83
24	670.305	1.30	90	84

Volume	Delta H	Meter Temp
40.498	1.406	80.71

Barometric Pressure	Test Time
29.92	60.00

Y qa: 0.968

Meter Box Full Test Calibration

DATE: 5/28/03 Operator: Joe Ward

Meter Box Nc 2027				Meter Box H@:	1.7441					Meter Box Yd	1.0096					Barometric Pressure:	29.40	
A-1				Standard Meter Gas Volume			Meter Box Gas Volume (ft( )			Std. Meter Temperature (ÞF)			Meter Box Temperature (ÞF)					
Q	P	H	Yds	Initial	Final	Vf	Initial	Final	Vf	Inlet	Outlet	Avg.	Inlet	Outlet	Avg.	Time	Yd	H@
0.98	-0.70	3.00	1.0000	0.0	10.000	10.000	143.148	153.257	10.109	73.0	73.0	73.0	87.0	79.0	83.0	9.96	1.0171	1.7020
0.98	-0.70	3.00	1.0000	0.0	10.000	10.000	153.257	163.383	10.126	73.0	73.0	73.0	88.0	80.0	84.0	9.93	1.0173	1.6886
0.69	-0.50	1.50	1.0000	0.0	10.000	10.000	206.632	216.708	10.076	68.0	68.0	68.0	79.0	72.0	75.5	14.24	1.0116	1.7295
0.68	-0.50	1.50	1.0000	0.0	10.000	10.000	216.708	226.830	10.122	68.0	68.0	68.0	80.0	73.0	76.5	14.34	1.0089	1.7505
0.39	-0.40	0.50	1.0000	0.0	5.000	5.000	237.933	243.028	5.095	68.0	68.0	68.0	78.0	77.0	77.5	12.66	1.0013	1.8057
0.39	-0.40	0.50	1.0000	0.0	5.000	5.000	243.028	248.122	5.094	68.0	68.0	68.0	78.0	77.0	77.5	12.60	1.0015	1.7886
																AVERAGE	1.0096	1.7441

Millennium Instruments Inc.
2402 Springridge Drive unit A
Spring Grove IL. 60081
PHONE#(815)675-3225
FAX#(815)675-6965
E-mail millennium@interaccess.com
www.millinst.com

Vacuum Gauge

(in. Hg)	Gauge
5.0	5.0
10.0	10.0
15.0	15.0
20.0	20.0
25.0	23.5

Meter Box Full Test Calibration

DATE: 9/5/03 Operator: Joe Ward

Meter Box Nc 2031				Meter Box H@: 1.8306						Meter Box Yd 1.0043						Barometric Pressure: 29.84		
A-2				Standard Meter Gas Volume			Meter Box Gas Volume (ft3)			Std. Meter Temperature (ºF)			Meter Box Temperature (ºF)					
Q	P	H	Yds	Initial	Final	Vf	Initial	Final	Vf	Inlet	Outlet	Avg.	Inlet	Outlet	Avg.	Time	Yd	H@
0.96	-0.60	3.00	1.0000	0.0	10.000	10.000	125.809	136.103	10.294	77.0	77.0	77.0	99.0	81.0	90.0	10.22	1.0038	1.7855
0.95	-0.60	3.00	1.0000	0.0	10.000	10.000	136.103	146.394	10.291	77.0	77.0	77.0	98.0	79.0	88.5	10.27	1.0014	1.8097
0.38	-0.40	0.50	1.0000	0.0	5.000	5.000	155.942	161.056	5.114	78.0	78.0	78.0	98.0	86.0	92.0	12.86	1.0054	1.8745
0.38	-0.40	0.50	1.0000	0.0	5.000	5.000	161.056	166.163	5.107	78.0	78.0	78.0	98.0	86.0	92.0	12.79	1.0068	1.8541
0.67	-0.50	1.50	1.0000	0.0	10.000	10.000	204.510	214.751	10.241	78.0	78.0	78.0	99.0	83.0	91.0	14.70	1.0050	1.8471
0.67	-0.50	1.50	1.0000	0.0	10.000	10.000	214.751	224.995	10.244	78.0	78.0	78.0	99.0	82.0	90.5	14.55	1.0038	1.8129
																AVERAGE	1.0043	1.8306

Millennium Instruments Inc.
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Spring Grove IL. 60081
PHONE#(815)675-3225
FAX#(815)675-6965
E-mail millennium@interaccess.com
www.millinst.com

Vacuum Gauge

(in. Hg)	Gauge
5.0	5.0
10.0	10.0
15.0	15.0
20.0	20.0
25.0	25.0

ATP - Air Test Professionals, Inc.

Pitot Tube Calibration

Reference: 40 CFR 60, Appendix A, Method 2, Section 2.1

Probe Length/ID.: **7 ft. Type-S (w/probe)**

External Tubing Diameter: 0.250" inches

Base to Opening Plane Distance (Pa): 0.370" inches

Base to Opening Plane Distance (Pa): 0.370" inches

	Measured	**Allowable**
Pa/Dt	1.478"	1.05 – 1.50 inches
Pb/Dt	1.478"	1.05 – 1.50 inches
Angle α 1	1 deg	α1 and α2 ≤ 10.0
Angle α 2	1 deg	α1 and α2 ≤ 10.0
Angle β 1	0 deg	β1 and β2 ≤ 10.0
Angle β 2	0 deg	β1 and β2 ≤ 10.0
z (inches)	0.013"	0.125 inches
w (inches)	0.000"	0.031 inches
	If all criteria are met, Pitot Coefficient is 0.84	Pitot Coefficient: **0.84**

Calibrated By: Carlos Brown Date Calibrated: May 27, 2003

Pyrometer Calibration Sheet

Pyrometer No.:001

Office: Spring Grove
Client: Air Testing Professionals
Job or Reference No.: 2027

Temperature Scale Used ☑ Fahrenheit ☐ Celsius

☑ Full Test
☐ Post Test

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading	Calibration Reference Settings for Celsius Scale
50° F	50° F	
100° F	100° F	
150° F	150° F	
200° F	200° F	
250° F	250° F	
300° F	300° F	
350° F	350° F	
400° F	400° F	
450° F	450° F	
500° F	500° F	
550° F	550° F	
600° F	600° F	

ATP - Air Test Professionals, Inc.

Pitot Tube Calibration

Reference: 40 CFR 60, Appendix A, Method 2, Section 2.1

Probe Length/ID.: **5 ft. Type-S (w/probe)**

External Tubing Diameter: 0.250" inches

Base to Opening Plane Distance (Pa): 0.370" inches

Base to Opening Plane Distance (Pa): 0.370" inches

	Measured	**Allowable**
Pa/Dt	1.478"	1.05 – 1.50 inches
Pb/Dt	1.478"	1.05 – 1.50 inches
Angle α 1	1 deg	α1 and α2 ≤ 10.0
Angle α 2	1 deg	α1 and α2 ≤ 10.0
Angle β 1	0 deg	β1 and β2 ≤ 10.0
Angle β 2	0 deg	β1 and β2 ≤ 10.0
Z (inches)	0.010"	0.125 inches
W (inches)	0.000"	0.031 inches
	If all criteria are met, Pitot Coefficient is 0.84	Pitot Coefficient: **0.84**

Calibrated By: Carlos Brown Date Calibrated: September 30, 2003

Pyrometer Calibration Sheet

Pyrometer No.:001

Office: Spring Grove
Client: Air Testing Professionals
Job or Reference No.: 2032

Temperature Scale Used ☑ Fahrenheit ☐ Celsius

☑ Full Test ☐ Post Test

Calibration Reference Settings for Fahrenheit Scale	Pyrometer Reading	Calibration Reference Settings for Celsius Scale
50° F	50° F	
100° F	100° F	
150° F	150° F	
200° F	200° F	
250° F	250° F	
300° F	300° F	
350° F	350° F	
400° F	400° F	
450° F	450° F	
500° F	500° F	
550° F	550° F	
600° F	600° F	

IEM (800) 532-7474
www.iemiinc.com

Linde

CERTIFICATE OF ANALYSIS
EPA PROTOCOL
PERFORMED ACCORDING TO EPA-600/R-97/121, PROCEDURE G1

NOTICE: THIS CYLINDER IS NOT TO BE USED WHEN PRESSURE IS UNDER 150 psig

MANUFACTURED AND CERTIFIED AT:

AGA Gas inc.
Specialty Gas Division
6421 Monclova Road
Maumee, Ohio 43537
419-893-7226

ANALYTICAL AND CYLINDER DATA:

Certified Component	Concentration and Uncertainty	Date of Certification
Carbon Monoxide	133 ± 1 ppm	1/28/2002

Analyzed for Reference Use Only	Concentration	Date of Analysis
N/A - Not Applicable for this Mixture	N/A	N/A

Production Number: 100046348
Cylinder Number: CC23930 B158113
Expiration Date: 1/28/2005

Cylinder Pressure (psi): 2000
Balance Gas: Nitrogen
CGA: 350

REFERENCE STANDARDS DATA (TRACEABLE TO NIST AND NMI STANDARDS):

Reference Standard Number	Cylinder Number	Concentration and Component	Expiration Date
GMIS	CC73603	507.7 ppm Carbon Monoxide	3/21/2002
GMIS	CC100557	50.56 ppm Carbon Monoxide	3/21/2002

INSTRUMENTATION DATA:

Instrument Model	Serial Number	Date of Last Calibration	Analytical Principle
Horiba VIA-510	569466011	1/28/2002	Non-Dispersive Infrared (NDIR)

Analytical Report Approved By: [signature]

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CERTIFICATE OF ANALYSIS
EPA PROTOCOL
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NOTICE: THIS CYLINDER IS NOT TO BE USED WHEN PRESSURE IS UNDER 150 psig

MANUFACTURED AND CERTIFIED AT:
AGA Gas inc.
Specialty Gas Division
6421 Monclova Road
Maumee, Ohio 43537
419-893-7226

ANALYTICAL AND CYLINDER DATA:

Certified Component	Concentration and Uncertainty	Date of Certification
Carbon Monoxide	181 ± 2 ppm	1/28/2002

Analyzed for Reference Use Only	Concentration	Date of Analysis
N/A - Not Applicable for this Mixture	N/A	N/A

Production Number: 100046349
Cylinder Number: CC7389 0158128
Expiration Date: 1/28/2005

Cylinder Pressure (psi): 2000
Balance Gas: Nitrogen
CGA: 350

REFERENCE STANDARDS DATA (TRACEABLE TO NIST AND NMI STANDARDS):

Reference Standard Number	Cylinder Number	Concentration and Component	Expiration Date
GMIS	CC73603	507.7 ppm Carbon Monoxide	3/21/2002
GMIS	CC100557	50.56 ppm Carbon Monoxide	3/21/2002

INSTRUMENTATION DATA:

Instrument Model	Serial Number	Date of Last Calibration	Analytical Principle
Horiba VIA-510	569466011	1/28/2002	Non-Dispersive Infrared (NDIR)

Analytical Report Approved By:

AGA
Member of the Linde Gas Group

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www.iemiinc.com

Linde

CERTIFICATE OF ANALYSIS
EPA PROTOCOL
PERFORMED ACCORDING TO EPA-600/R-97/121, PROCEDURE G1

NOTICE: THIS CYLINDER IS NOT TO BE USED WHEN PRESSURE IS UNDER 150 psig

MANUFACTURED AND CERTIFIED AT:

AGA Gas inc.
Specialty Gas Division
6421 Monclova Road
Maumee, Ohio 43537
419-893-7226

ANALYTICAL AND CYLINDER DATA:

Certified Component	Concentration and Uncertainty	Date of Certification
Carbon Monoxide	316 ± 3 ppm	1/28/2002

Analyzed for Reference Use Only	Concentration	Date of Analysis
N/A - Not Applicable for this Mixture	N/A	N/A

Production Number: 100046344
Cylinder Number: CC64182 8158158
Expiration Date: 1/28/2005

Cylinder Pressure (psi): 2000
Balance Gas: Nitrogen
CGA: 350

REFERENCE STANDARDS DATA (TRACEABLE TO NIST AND NMI STANDARDS):

Reference Standard Number	Cylinder Number	Concentration and Component	Expiration Date
GMIS	CC73603	507.7 ppm Carbon Monoxide	3/21/2002
GMIS	CC100557	50.56 ppm Carbon Monoxide	3/21/2002

INSTRUMENTATION DATA:

Instrument Model	Serial Number	Date of Last Calibration	Analytical Principle
Horiba VIA-510	569466011	1/28/2002	Non-Dispersive Infrared (NDIR)

Analytical Report Approved By: Kathy Lendway

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Certificate of Analysis

EPA Protocol

B160828

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6232	**Blend Tolerance:**	5 % Relative
EPA NO/N2 2-49 PPM		**Store/Use Temp:**	35 to 90 F
Production #:	100053732	**Blend Type:**	EPA Protocol
Batch #:	02499G2060YG	**Cyl. Pressure:**	2000 psig
Cylinder #:	CC148344	**Balance Gas:**	Nitrogen
Expiration Date:	7/23/2004	**CGA:**	660
Shelf Life:	24 months	**Analytical Accuracy:**	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
10102-43-9	Nitric Oxide	30	30.1 +/- 0.3 ppm	07/23/2002
7727-37-9	Nitrogen		Balance	07/23/2002

CAS #	Analyzed (For Ref Use Only)	Concentration	Analysis Date
N/A 2	NOx	30.3 ppm	07/23/2002

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
10102-43-9	Nitric Oxide	CC34715 , GMIS	48.58 ppm	08/01/2003
10102-43-9	Nitric Oxide	CC120197 , GMIS	18.84 ppm	04/22/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba CLA-510SS	568093024	Chemiluminescence	07/22/2002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Roy Yoder

Roy Yoder

HiQ Analysis Certificate

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Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

B164078

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6599 EPA NO/N2 50-499 PPM	**Blend Tolerance:**	5 % Relative
Production #:	100061999	**Store/Use Temp:**	35 to 90 F
Lot #:	02499A3080EI	**Blend Type:**	EPA Protocol
Cylinder #:	CC35117	**Cyl. Pressure:**	2000 psig
Expiration Date:	1/20/2005	**Balance Gas:**	Nitrogen
Shelf Life:	24 months	**CGA:**	660
		Analytical Accuracy:	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
10102-43-9	Nitric Oxide	62	64.2 +/- 0.6 ppm	01/20/2003
7727-37-9	Nitrogen		Balance	01/20/2003

CAS #	Analyzed (For Ref Use Only)	Concentration	Analysis Date
N/A 2	NOx	64.2 ppm	01/20/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
10102-43-9	Nitric Oxide	ND11377 , LS	100.9 ppm	11/21/2007
10102-43-9	Nitric Oxide	CC120225 , GMIS	20.35 ppm	11/22/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba CLA-510SS	568093024	Chemiluminescence	12/30/2002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Jim Healy

James R Healy

HiQ Analysis Certificate

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P 16150B

Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6681 EPA SO2/N2 100-3500 PPM	**Blend Tolerance:**	5 % Relative
Production #:	100056268	**Store/Use Temp:**	35 to 90 F
Batch #:	02499H2260BI	**Blend Type:**	EPA Protocol
Cylinder #:	CC150566	**Cyl. Pressure:**	2000 psig
Expiration Date:	9/6/2004	**Balance Gas:**	Nitrogen
Shelf Life:	24 months	**CGA:**	660
		Analytical Accuracy:	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
7446-09-5	Sulfur Dioxide	150	149 +/- 1 ppm	09/06/2002
7727-37-9	Nitrogen		Balance	09/06/2002

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7446-09-5	Sulfur Dioxide	CC130050 , GMIS	101.6 ppm	07/26/2004
7446-09-5	Sulfur Dioxide	CC113475 , GMIS	500.4 ppm	06/20/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568279012	Non-Dispersive Infrared	08/05/2002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Jim Healy

James R Healy

HiQ Analysis Certificate

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Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

r 1615 ДB

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6681	**Blend Tolerance:**	5 % Relative
EPA SO2/N2 100-3500 PPM		**Store/Use Temp:**	35 to 90 F
Production #:	100056261	**Blend Type:**	EPA Protocol
Batch #:	02499H2260BH	**Cyl. Pressure:**	2000 psig
Cylinder #:	CC150552	**Balance Gas:**	Nitrogen
Expiration Date:	9/6/2004	**CGA:**	660
Shelf Life:	24 months	**Analytical Accuracy:**	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
7446-09-5	Sulfur Dioxide	300	309 +/- 3 ppm	09/06/2002
7727-37-9	Nitrogen		Balance	09/06/2002

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7446-09-5	Sulfur Dioxide	CC130050 , GMIS	101.6 ppm	07/26/2004
7446-09-5	Sulfur Dioxide	CC113475 , GMIS	500.4 ppm	06/20/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568279012	Non-Dispersive Infrared	08/05/2002

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Jim Healy

James R Healy

HiQ Analysis Certificate

APPENDIX G

CARL KOONTZ ASSOCIATES

of Nashville, Tennessee

This is to acknowledge that

RONALD STAPERT

successfully participated in Visible Emissions training on SEP. 1 8 2003

and is qualified to evaluate Visible Emissions for a period of six (6) months from the date of certification.

Carl Koontz

Instructor

Visible Emissions Observations Form

RUN NUMBER	1

0

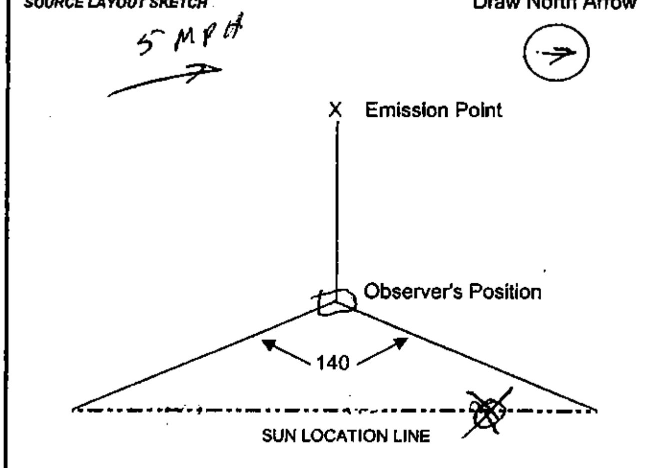
Field	Entry
SOURCE NAME	NUCOR
ADDRESS	
CITY	CRAWFORDSVILLE
STATE	IN
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	CASTRIP
OPERATING MODE	MAX
CONTROL EQUIPMENT	BAG HOUSE
OPERATING MODE	MAX
DESCRIBE EMISSION POINT (Stack Exit Dimensions)	96" DIA
HEIGHT ABOVE GROUND LEVEL	START 120 STOP
HEIGHT RELATIVE TO OBSERVER	START 120 STOP
DISTANCE FROM OBSERVER	START 360 STOP
DIRECTION FROM OBSERVER	START 45° STOP
DESCRIBE EMISSIONS	~~CLEAR~~ START ✓ STOP ✓
EMISSION COLOR	CLEAR START ✓ STOP ✓
PLUME TYPE:	CONTINUOUS FUGITIVE INTERMITTENT
WATER DROPLETS PRESENT	NO YES
IF WATER DROPLET PLUME:	ATTACHED DETACHED
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 10' STOP 30
DESCRIBE BACKGROUND	LIGHT BLUE START ✓ STOP ✓
BACKGROUND COLOR	LIGHT BLUE START ✓ STOP
SKY CONDITIONS	LIGHT BLUE START ✓ STOP ✓
WIND SPEED (MPH)	5 START ✓ STOP
WIND DIRECTION	S to N START ✓ STOP ✓
AMBIENT TEMPERATURE (F)	START 38 STOP 39
WET BULB TEMP.	
RH PERCENT	

OBSERVATION DATE	START TIME	STOP TIME
11 20 03	Am 11:23	Pm 12 23

min \ sec	0	15	30	45	min \ sec	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

SOURCE LAYOUT SKETCH

Draw North Arrow



X = Emission Point
☐ = Observer's Position
Sun symbol = Sun
→ = Wind
Plume symbol = Plume

Field	Entry
AVERAGE OPACITY FOR HIGHEST PERIOD	0
NUMBER OF READINGS ABOVE 0 WERE	0
RANGE OF OPACITY READINGS	MINIMUM 0 MAXIMUM 0
OBSERVER'S NAME (PRINT)	RONALD STAPERT
OBSERVER'S SIGNATURE	Ronald Stapert
DATE	11-20-03
ORGANIZATION	ATP - Air Test Professionals, Inc.
CERTIFIED BY	CARL KOONTZ
DATE	9-18-03
Comments:	STACK RAN CLEAR

Visible Emissions Observations Form

RUN NUMBER 1

SOURCE NAME: NUCOR

ADDRESS:

CITY: CRAWFORDSVILLE | **STATE:** IN | **ZIP:**

PHONE: | **SOURCE ID NUMBER:**

PROCESS EQUIPMENT: ROOF MONITOR | **OPERATING MODE:**

CONTROL EQUIPMENT: | **OPERATING MODE:**

DESCRIBE EMISSION POINT (Stack Exit Dimensions): RBC, ROOF VENTS 10 X 40 & 10 X 22

HEIGHT ABOVE GROUND LEVEL: START 130 STOP ✓ | **HEIGHT RELATIVE TO OBSERVER:** START 130 STOP ✓

DISTANCE FROM OBSERVER: START 350 STOP ✓ | **DIRECTION FROM OBSERVER:** START 45° STOP ✓

DESCRIBE EMISSIONS: CLEAR — START ✓ STOP

EMISSION COLOR: CLEAR — START ✓ STOP ✓ | **PLUME TYPE:** CONTINUOUS FUGITIVE INTERMITTENT

WATER DROPLETS PRESENT: NO YES | **IF WATER DROPLET PLUME:** ATTACHED DETACHED

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 10 STOP 30

DESCRIBE BACKGROUND: LIGHT BLUE — START ✓ STOP ✓

BACKGROUND COLOR: LIGHT BLUE — START ✓ STOP ✓ | **SKY CONDITIONS:** LIGHT BLUE — START ✓ STOP ✓

WIND SPEED (MPH): 5 — START ✓ STOP ✓ | **WIND DIRECTION:** S – N — START ✓ STOP ✓

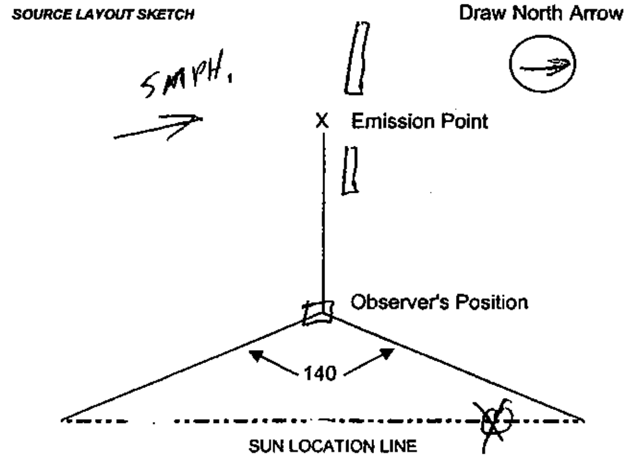
AMBIENT TEMPERATURE (F): START 38 STOP 39 | WET BULB TEMP | RH PERCENT

OBSERVATION DATE: 11-20-03 | **START TIME:** 11:23 AM | **STOP TIME:** 12:25 PM

12 19

min	0	15	30	45	min	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

SOURCE LAYOUT SKETCH



X = Emission Point; ☐ = Observer's Position; ⊕ = Sun; → = Wind; = Plume

AVERAGE OPACITY FOR HIGHEST PERIOD: 0 | **NUMBER OF READINGS ABOVE** 0 **WERE** 0

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 0

OBSERVER'S NAME (PRINT): RONALD STAPERT

OBSERVER'S SIGNATURE: Ronald Stapert | **DATE:** 11-20-03

ORGANIZATION: ATP - Air Test Professionals, Inc.

CERTIFIED BY: CARL KOONTZ | **DATE:** 9-18-03

Comments: ROOF VENTS WERE CLEAR

Visible Emissions Observations Form

RUN NUMBER 2

SOURCE NAME: NUCOR

OBSERVATION DATE: 11 21-03

START TIME: 8:50 Am

STOP TIME: 9 50 Am

ADDRESS:

CITY: CRAWFORDSVILLE

STATE: IN

ZIP:

PHONE:

SOURCE ID NUMBER:

PROCESS EQUIPMENT: CASTRIP

OPERATING MODE: MAX

CONTROL EQUIPMENT: BAG HOUSE

OPERATING MODE: MAX

DESCRIBE EMISSION POINT (Stack Exit Dimensions): 9' DIA

HEIGHT ABOVE GROUND LEVEL: START 120' STOP ✓

HEIGHT RELATIVE TO OBSERVER: START 120' STOP

DISTANCE FROM OBSERVER: START 360 STOP ✓

DIRECTION FROM OBSERVER: START 30° STOP ✓

DESCRIBE EMISSIONS: CLEAR

START ✓ STOP ✓

EMISSION COLOR: CLEAR

START ✓ STOP

PLUME TYPE: CONTINUOUS FUGITIVE INTERMITTENT

WATER DROPLETS PRESENT: NO YES

IF WATER DROPLET PLUME: ATTACHED DETACHED

POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED: START 0 STOP 30

DESCRIBE BACKGROUND: LIGHT BLUE

START ✓ STOP ✓

BACKGROUND COLOR: LIGHT BLUE

START ✓ STOP

SKY CONDITIONS: LIGHT BLUE

START ✓ STOP

WIND SPEED (MPH): 5

START ✓ STOP ✓

WIND DIRECTION: SE TO NE

START ✓ STOP ✓

AMBIENT TEMPERATURE (F): START 48° STOP 49°

WET BULB TEMP | R.H. PERCENT

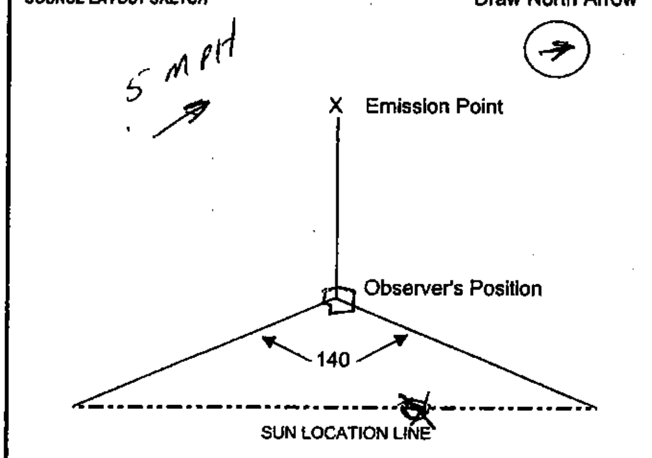
min	0	15	30	45	min	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

9:20

Stake

SOURCE LAYOUT SKETCH

Draw North Arrow



X = Emission Point

= Observer's Position

= Sun

= Wind

= Plume

AVERAGE OPACITY FOR HIGHEST PERIOD: 0

NUMBER OF READINGS ABOVE 0 WERE 0

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 0

OBSERVER'S NAME (PRINT): RONALD STAPERT

OBSERVER'S SIGNATURE: Ronald Stapert

DATE: 10-21-03

ORGANIZATION: ATP - Air Test Professionals, Inc.

CERTIFIED BY: CARL KOONTZ

DATE: 9-18-03

Comments: STACK RAN CLEAR

Visible Emissions Observations Form

RUN NUMBER	2

SOURCE NAME	NUCOR
ADDRESS	
CITY	CRAWFORDSVILLE
STATE	IN
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	ROOF MONITOR
OPERATING MODE	
CONTROL EQUIPMENT	
OPERATING MODE	
DESCRIBE EMISSION POINT (Stack Exit Dimensions)	ROOF VENTS 10'X60' AND 10X20
HEIGHT ABOVE GROUND LEVEL	START 130 STOP ✓
HEIGHT RELATIVE TO OBSERVER	START 130 STOP ✓
DISTANCE FROM OBSERVER	START 350 STOP ✓
DIRECTION FROM OBSERVER	START 60° STOP ✓
DESCRIBE EMISSIONS	CLEAR START ✓ STOP ✓
EMISSION COLOR	CLEAR START ✓ STOP ✓
PLUME TYPE:	CONTINUOUS (circled) FUGITIVE INTERMITTENT
WATER DROPLETS PRESENT	NO (circled) YES
IF WATER DROPLET PLUME:	ATTACHED (circled) DETACHED
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 0 STOP 30'
DESCRIBE BACKGROUND	LIGHT BLUE START ✓ STOP ✓
BACKGROUND COLOR	LIGHT BLUE START ✓ STOP
SKY CONDITIONS	LIGHT BLUE START ✓ STOP ✓
WIND SPEED (MPH)	START 5 STOP ✓
WIND DIRECTION	SE TO NE START ✓ STOP ✓
AMBIENT TEMPERATURE (F)	START 48° STOP 50°
WET BULB TEMP	
R.H. PERCENT	

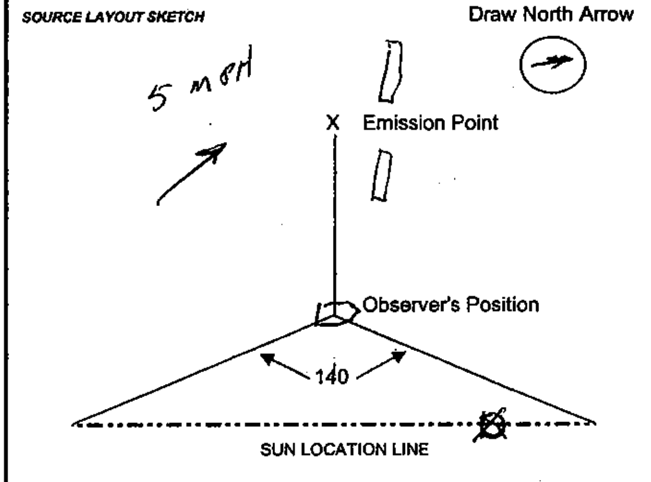
OBSERVATION DATE	START TIME	STOP TIME
11 21 03	AM 8:50	AM 9:50

min	0	15	30	45	min	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

92.0

SOURCE LAYOUT SKETCH

Draw North Arrow



X = Emission Point; Wind; Observer's Position; Plume; Sun

AVERAGE OPACITY FOR HIGHEST PERIOD	0
NUMBER OF READINGS ABOVE 0 WERE	0
RANGE OF OPACITY READINGS	MINIMUM 0 MAXIMUM 0
OBSERVER'S NAME (PRINT)	RONALD STAPERT
OBSERVER'S SIGNATURE	Ronald Stapert
DATE	11-21-03
ORGANIZATION	ATP - Air Test Professionals, Inc.
CERTIFIED BY	CARL KOONTZ
DATE	9-15-05
Comments:	VENTS WERE CLEAR

Visible Emissions Observations Form

RUN NUMBER	3

SOURCE NAME	NUCOR
ADDRESS	
CITY	CRAWFORDSVILLE
STATE	IN
ZIP	
PHONE	
SOURCE ID NUMBER	
PROCESS EQUIPMENT	CAST RIP
OPERATING MODE	MAX
CONTROL EQUIPMENT	BAGHOUSE
OPERATING MODE	MAX
DESCRIBE EMISSION POINT (Stack Exit Dimensions)	96"DIA
HEIGHT ABOVE GROUND LEVEL	START 120 STOP ✓
HEIGHT RELATIVE TO OBSERVER	START 120 STOP ✓
DISTANCE FROM OBSERVER	START 400 STOP ✓
DIRECTION FROM OBSERVER	START 30 STOP ✓
DESCRIBE EMISSIONS	CLEAR START ✓ STOP ✓
EMISSION COLOR	CLEAR START ✓ STOP ✓
PLUME TYPE:	CONTINUOUS FUGITIVE INTERMITTENT
WATER DROPLETS PRESENT	NO YES
IF WATER DROPLET PLUME:	ATTACHED DETACHED
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 0 STOP 30
DESCRIBE BACKGROUND	LIGHT BLUE START ✓ STOP GRAY
BACKGROUND COLOR	LIGHT BLUE START ✓ STOP GRAY
SKY CONDITIONS	LIGHT BLUE START ✓ STOP GRAY
WIND SPEED (MPH)	5 START ✓ STOP ✓
WIND DIRECTION	570 N START ✓ STOP
AMBIENT TEMPERATURE (F)	START 60 STOP 56
WET BULB TEMP.	
RH PERCENT	

OBSERVATION DATE	START TIME	STOP TIME
11-21-03	4:38 PM	5:38 PM

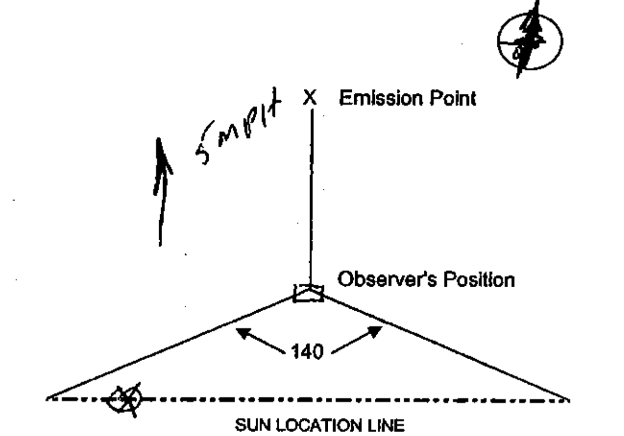
min \ sec	0	15	30	45	min \ sec	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

5:08

0 STAR

SOURCE LAYOUT SKETCH

Draw North Arrow



X = Emission Point
= Wind
= Observer's Position
= Plume
= Sun

AVERAGE OPACITY FOR HIGHEST PERIOD	0
NUMBER OF READINGS ABOVE 0 WERE	0
RANGE OF OPACITY READINGS	MINIMUM 0 MAXIMUM 0
OBSERVER'S NAME (PRINT)	RONALD STAPERT
OBSERVER'S SIGNATURE	Ronald Stapert
DATE	11-21-03
ORGANIZATION	ATP - Air Test Professionals, Inc.
CERTIFIED BY	CARL KOONTZ
DATE	9-18-03
Comments:	STACK RAN CLEAR

Visible Emissions Observations Form

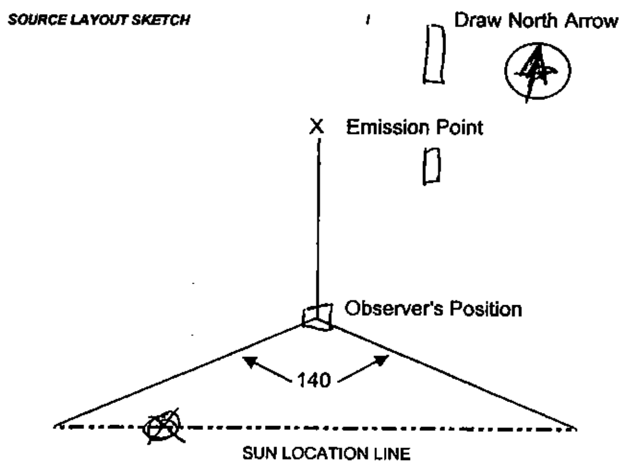
RUN NUMBER	3

SOURCE NAME	NUCOR
ADDRESS	
CITY	CRAWFORDSVILLE
STATE	IN
ZIP	
PHONE	~~CRAWFORDSVILLE~~
SOURCE ID NUMBER	
PROCESS EQUIPMENT	ROOF MONITOR
OPERATING MODE	
CONTROL EQUIPMENT	—
OPERATING MODE	
DESCRIBE EMISSION POINT (Stack Exit Dimensions)	ROOF VENTS 10' X 60' AND 10' X 20'
HEIGHT ABOVE GROUND LEVEL	START 150 STOP ✓
HEIGHT RELATIVE TO OBSERVER	START 150 STOP ✓
DISTANCE FROM OBSERVER	START 400 STOP ✓
DIRECTION FROM OBSERVER	START 30 STOP ✓
DESCRIBE EMISSIONS	CLEAR START ✓ STOP ✓
EMISSION COLOR	CLEAR START ✓ STOP ✓
PLUME TYPE:	CONTINUOUS (circled) FUGITIVE INTERMITTENT
WATER DROPLETS PRESENT	NO (circled) YES
IF WATER DROPLET PLUME:	ATTACHED (circled) DETACHED
POINT IN THE PLUME AT WHICH OPACITY WAS DETERMINED	START 0 STOP 30
DESCRIBE BACKGROUND	LIGHT BLUE START ✓ STOP GRAY
BACKGROUND COLOR	LIGHT BLUE START ✓ STOP GRAY
SKY CONDITIONS	LIGHT BLUE START ✓ STOP GRAY
WIND SPEED (MPH)	5 START ✓ STOP
WIND DIRECTION	S - N START ✓ STOP
AMBIENT TEMPERATURE (F)	START 60 STOP 56
WET BULB TEMP.	
RH PERCENT	

OBSERVATION DATE	START TIME	STOP TIME
11 21 03	4:38 PM	5:38 PM

min \ sec	0	15	30	45	min \ sec	0	15	30	45
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0
30	0	0	0	0	60	0	0	0	0

SOURCE LAYOUT SKETCH



X = Emission Point
= Observer's Position
= Sun
= Wind
= Plume

AVERAGE OPACITY FOR HIGHEST PERIOD	0
NUMBER OF READINGS ABOVE 0 WERE	0
RANGE OF OPACITY READINGS	MINIMUM 0 MAXIMUM 0
OBSERVER'S NAME (PRINT)	RONALD STAPERT
OBSERVER'S SIGNATURE	Ronald Stapert
DATE	11-21-03
ORGANIZATION	ATP - Air Test Professionals, Inc.
CERTIFIED BY	CARL KOONTZ
DATE	9-18-03
Comments:	VENTS WERE CLEAR

APPENDIX H

COMPLIANCE TEST PROTOCOL
INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

Date Prepared: Oct 6, 2003 **Proposed Test Date** November 10-12, 2003 **Plant Address and Location:** 4537 S. Nucor Road, Crawfordsville, Indiana

1. Source Information

AFS: ____ **Id Number:** ____ **Permit Number:** 107-12143-00038
Company: Nucor Steel
Mail Address: 4537 S. Nucor Road
City: Crawfordsville, Indiana **Zip:** 47933
Co.Contact: Mark Washer **Phone:** (812) 364-1323

Check program if applicable:
FESOP: ____
Title V: X
SSOA: ____

AGENCY USE ONLY **Date Rec'd:** ____
Inspector: Reviewer: Date Appr: ____

2. Tester Information

Name: Air Test Professionals, Inc.
Address: 1201 N. Graham Ave.
Contact: Carlos M. Brown **Phone:** 317-345-1723
Pre-Test Inspection Complete? Yes

3. Process Information

Unit to Test: Strip Caster Line
Max. Rated Capacity: 135 tons per hour
Proposed Operating Speed: 95% of max
Pollution Control Equipment: LMS Baghouse
Process Description: Molds molten grades of carbon steel into rolled steel of various widths and thicknesses.

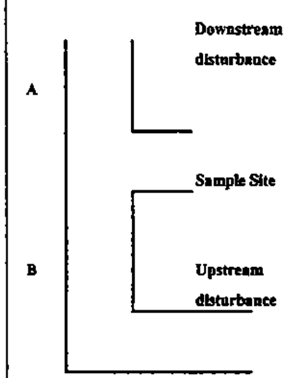
Fuel Type: Natural Gas

4. Test Information

		# Runs	Time/Run
Methods 1-4	Moisture/Flow	3	60 min
Method 5	Particulate	3	60 min
Method 6C	SO2	3	60 min
Method 7E	NOx	3	60 min
Method 9	Opacity	3	60 min
Method 10	CO	3	60 min
Method 12	Lead	3	60 min
Other Testing:	M202	3	60 min

326 IAC 3-2.1 requires this completed form and fee to be submitted 35 days prior to proposed test date to:
(FEE NOT APPLICABLE IF FESOP OR TITLE V)

Questions may be directed to 317-232-8338, FAX: 317-233-6865



Distance A: > 1/2 diameters
Distance B: > 2 diameters

Compliance Data Section
Office of Air Management
Indiana Department of Environmental Management
100 North Senate
PO BOX 6015
Indianapolis, IN 46206-6015

5. Sampling Strategy

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

b. Describe method used to determine quantity of raw materials
Plant personnel will keep record production

6. Sample Site Location

Does sample port location meet 40 CFR 60, Appx A, Method 1 Section 1.2 requirements: Yes/No: YES If No, Explain ____

Number of sample points for M5: 24
Diameter at sample site: ____ **Stack height:** ____
Approx. stack gas flow (ACFM): ____
Approx. gas temp. (degF): ____
Approx. gas moisture (%): approx 2%

Reason for test:
State Agreed Order: Yes/No: ____ **Operating permit:** Yes/No: Yes
Construction Permit: Yes/No: ____ **Compliance w 326** ____
NSPS 40 CFR 60 Subpart: ____ **Other** ____
Title V: ____
Other (i.e. EPA, CD, state, 114) ____

APPENDIX I

1st Stack Test (1 hour)
Sequence # 1323 Heat # 137005 + 432783
119 + 106

2nd Stack Test (1 hour)
Sequence # 1325 Heat # 232808
119 + 119
3rd attempt later in cast was aborted

3rd Stack Test (1 hour)
Sequence # 1326 Heat # 432812

LMF HEAT RECORD

137005

HEAT NO: ~~932785~~ AIM GRADE: 100551 DATE: 11/19

[illegible]E (E OR W): LIQUIDUS: MELTER: G A

LADLE NO: 17 FINISH GRADE: 1st OP: [illegible]

WEIGHT TAPPED: 119 392 2nd OP:

POWER

KWH INITIAL:

KWH FINAL:

KWH USED:

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESI[illegible]
LMF -1		61	46	005	002	26								0051	52	
LMF -2		014	65	006	003	35								0059	0049	
LMF -3		054	61	006	006	29								0013	0057	
LMF -4																

SLAG

DEPTH

ARRIVE: DEPART:

COLOR

ARRIVE: DEPART:

TEXTURE

ARRIVE: DEPART:

EVENT	TIME START	TIME END		
FINISH TAP				
LADLE ON CAR				
IND STIR ON				
UNDER ROOF				
POWER ON	805	808	3	TAP NO.
	809	819	1	TAP NO.
	824	839		TAP NO.
	844	851		TAP NO.
	10:02	10:06		TAP NO.
	10:26	10:30		TAP NO.
	10:42	10:46		TAP NO.
	11:10	11:13		TAP NO.

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
MnSi	8:25	600
FeSi		
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		600

TIME/TEMP/OXYGEN

821	2820 °F	P[illegible]
841	2968 °F	P[illegible]
10:10	~~3051~~ 2965 °F	13.3 P
11:09	3019 °F	79.9 P
11:15	3030 °F	79.5 P
	°F	P
	°F	F
	°F	F
	°F	F

DEPARTURE

TIME 11:20 11:20 TEMPERATURE 3025

REMARKS

~~Seq 1322 # 2~~ 1323 #1 8 pipes 2657 oxy

H = 2.5 8:43

8:55 Set out 3000

DRAINED

QF-0019 9/12-97

LMF HEAT RECORD

HEAT NO: 432783
FCE (E OR W): ____
LADLE NO: 15

AIM GRADE: 10055 (
LIQUIDUS: ____
FINISH GRADE: ____
WEIGHT TAPPED: 106

DATE: 11/20
MELTER: SG
1st OP: DC
2nd OP: ____

POWER
KWH INITIAL: ____
KWH FINAL: ____
KWH USED: ____

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RES
LMF -1		051	63	011	007	27								0015	0056	
LMF -2																
LMF -3																
LMF -4																

SLAG

DEPTH
ARRIVE: ____ DEPART: ____

COLOR
ARRIVE: ____ DEPART: ____

TEXTURE
ARRIVE: ____ DEPART: ____

EVENT	TIME START	TIME END		
FINISH TAP				
LADLE ON CAR				
IND STIR ON				
UNDER ROOF				
POWER ON	9:13	9:16	1	TAP NO.
	9:21	9:28		TAP NO.
	11:44	11:50		TAP NO.
	12:15	12:18		TAP NO.
				TAP NO.
				TAP NO.
				TAP NO.
				TAP NO.

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
FESI		100
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		

TIME/TEMP/OXYGEN

TIME	TEMP	OXYGEN
9 20	2968 °F	49.9 PPM
9:30	3047 °F	55.5 PPM
11:51	2992 °F	38.4 PPM
12:33	3013 °F	72.5 PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM

DEPARTURE
TIME 12:50 TEMPERATURE 3009

REMARKS

H 3.2 9:19 — Hyd 3.5 @ 12:02 2pipes 613 oxy

Slag 1323 #2

Out At 9:35 3050

Tailed out 65 Ton LEFT BACK TO M

QF-0019 9/12-97

1325-1

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

HEAT NO: 232808
FCE (E OR W): 16
LADLE NO: 16

AIM GRADE: Mo551
LIQUIDUS:
FINISH GRADE:
WEIGHT TAPPED: 119 378,500

DATE: 11/20
MELTER: 6 A
1st OP: Dane
2nd OP:

POWER
KWH INITIAL:
KWH FINAL:
KWH USED:

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1		008	48	009	005	25								0055	54	
LMF -2		048	61	009	007	29								0010	52	
LMF -3		+ 50'														
LMF -4																

SLAG

DEPTH
ARRIVE: DEPART:
COLOR
ARRIVE: DEPART:
TEXTURE
ARRIVE: DEPART:

EVENT	TIME START	TIME END		
FINISH TAP				
LADLE ON CAR				
IND STIR ON				
UNDER ROOF				
POWER ON	549	552	3	TAP NO.
	554	604	1	TAP NO.
	606	626		TAP NO.
	631	636		TAP NO.
	720	733		TAP NO.
	735	738		TAP NO.
	741	749		TAP NO.
	800	802		TAP NO.
	815	817		

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
MAS:		500
Fes:		
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		600/50

TIME/TEMP/OXYGEN

TIME	TEMP		OXYGEN	
605	2809	°F		PPM
630	2934	°F		PPM
6.46	2966	°F		PPM
7135	2991	°F		PPM
7139	3008	°F	73.3	PPM Z
7.58	3019	°F	22.7	PPM Z1
814	3010	°F	674	PPM Z.
		°F		PPM
		°F		PPM

TIME ~~752~~ 810
DEPARTURE TEMPERATURE 3020

REMARKS AOD 35

1325-1
OXY 2520

Dained

QF-0019 8/12-97

1325-2

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

HEAT NO: 2328 | AIM GRADE: 1005S1 | DATE: 11/20 | POWER
FCE (E OR W): | LIQUIDUS: | MELTER: 6 A | KWH INITIAL:
LADLE NO: 15 | FINISH GRADE: | 1st OP: | KWH FINAL:
WEIGHT TAPPED: 119 408,000 | 2nd OP: | KWH USED:

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1		007	45	007	002	25								067	0044	
LMF -2		045	61	007	003	29								016	46	
LMF -3		+														
LMF -4		75														

SLAG

DEPTH
ARRIVE: DEPART:

COLOR
ARRIVE: DEPART:

TEXTURE
ARRIVE: DEPART:

EVENT	TIME START	TIME END	
FINISH TAP			
LADLE ON CAR			
IND STIR ON			
UNDER ROOF			
POWER ON	848	851	3 TAP NO.
	852	902	1 TAP NO.
	904	919	TAP NO.
	921	925	TAP NO.
	943	945	TAP NO.
			TAP NO.
			TAP NO.
			TAP NO.

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
MnSi	9:07	600
FeSi		
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE	9:26 9:49	650 / 75

TIME/TEMP/OXYGEN

TIME	TEMP	OXYGEN
903	2826 °F	6.6 PPM
928	2964 °F	PPM
947	3041 °F	82.2 PPM Z
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM

DEPARTURE
TIME 952 TEMPERATURE 3030

REMARKS

1325-2 A0036

oxy 2513

Diane

QF-0019 9/12-97

1325-3

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

1325-3

HEAT NO: 232812
FCE (E OR W):
LADLE NO: 17

AIM GRADE: 100551
LIQUIDUS:
FINISH GRADE:
WEIGHT TAPPED: 119

DATE: 11/20
MELTER: 6 B
1st OP:
2nd OP:

POWER
KWH INITIAL:
KWH FINAL:
KWH USED:

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1		010	.45	008	009	.19								0045	.48	
LMF -2		049	.60	008	004	28								0040	.50	
LMF -3		055	.61	008	005	.34								0026	56	
LMF -4																

SLAG

DEPTH
ARRIVE: DEPART:
COLOR
ARRIVE: DEPART:
TEXTURE
ARRIVE: DEPART:

EVENT	TIME START	TIME END	
FINISH TAP			
LADLE ON CAR			
IND STIR ON			
UNDER ROOF			
POWER ON	10:18	10:23	3 TAP NO.
	10:24	10:28	1 TAP NO.
	10:28	10:33	TAP NO.
	10:36	10:48	1 TAP NO.
	10:55	11:00	1 TAP NO.
	11:02½	11:06½	TAP NO.
			TAP NO.
			TAP NO.

LADLE ADDITION	TIME	AMOUNT
MnSi		800
FeSi		200/150
Lime		500
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		700'

ARGON LANCE ON

TIME/TEMP/OXYGEN

TIME	°F	PPM
10:34	2832	6.6
10:54	2942	10.2
11:00	2964	12.8
11:08	2990	13.2

DEPARTURE
TIME TEMPERATURE

3021 .73.2 25mv
Oxy 2.613

REMARKS

1325-3 A0037

104 TONS TO Retreat

QF-0019 9/12-97

1326-1

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

Retreat

HEAT NO: 432812
FCE (E OR W): ____
LADLE NO: 17

AIM GRADE: 100551
LIQUIDUS: ____
FINISH GRADE: ____
WEIGHT TAPPED: 104

DATE: 11/20
MELTER: T.M
1st OP: RD.
2nd OP: ____

POWER
KWH INITIAL: ____
KWH FINAL: ____
KWH USED: ____

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1	2:50	057	.63	008	.005	.31								0019	.54	
LMF -2		058	.62	008	006	30								0014	.55	
LMF -3																
LMF -4																

SLAG

DEPTH
ARRIVE: ____ DEPART: ____

COLOR
ARRIVE: ____ DEPART: ____

TEXTURE
ARRIVE: ____ DEPART: ____

EVENT	TIME START	TIME END		
FINISH TAP				
LADLE ON CAR				
IND STIR ON				
UNDER ROOF				
POWER ON	12:22	12:30	1	TAP NO.
	1:05	1:08	1	TAP NO.
	1:54	1:57	1	TAP NO.
	1:58	2:01	1	TAP NO.
	2:44	2:48	1	TAP NO.
	3:53	3:58	1	TAP NO.
	4:07	4:10	1	TAP NO.
	4:11½	4:14½	1	TAP NO.

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		

TIME/TEMP/OXYGEN

TIME	TEMP		OXYGEN	
12:31	3009	°F	56.7	PPM
1:14	3005	°F	48.9	PPM
1:58	2979	°F	38.7	PPM
2:02	3001	°F	41.8	PPM
2:50	2996	°F	38.8	PPM
3:59	2989	°F	32.7	PPM
4:11	2993	°F	35.5	PPM
		°F		PPM
		°F		PPM

DEPARTURE
TIME ____ TEMPERATURE ____

3040 83.9 29 mv

REMARKS

OXY ~~605 580~~ 1054

Drained

QF-0019 9/12-97

1326-2 18

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

HEAT NO: 232819
FCE (E OR W):
LADLE NO: 16

AIM GRADE: 1005S1
LIQUIDUS:
FINISH GRADE:
WEIGHT TAPPED: 120

DATE: 11/20
MELTER: TIM
1st OP: RD.
2nd OP:

POWER
KWH INITIAL:
KWH FINAL:
KWH USED:

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1		013	.42	010	.007	.24								0048	.71	
LMF -2	5:20	053	.65	010	008	.35								0048	70	
LMF -3		[illegible]	.63	010	008	.30								0014	73	
LMF -4																

SLAG N-41

DEPTH
ARRIVE: DEPART:
COLOR
ARRIVE: DEPART:
TEXTURE
ARRIVE: DEPART:

EVENT	TIME START	TIME END	
FINISH TAP			
LADLE ON CAR			
IND STIR ON			
UNDER ROOF			
POWER ON	4:46	4:49	3 TAP NO.
	4:50	5:02	8 TAP NO.
	5:05	5:15	1 TAP NO.
	5:33	5:56	1 TAP NO.
	6:00	6:04	1 TAP NO.
			TAP NO.
			TAP NO.
			TAP NO.

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
LCFeMnSi		750#
FeSi		50#
Lime		580#
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		650'

TIME/TEMP/OXYGEN

TIME	TEMP °F	OXYGEN PPM
5:08	2892	9.9
5:20	2982	15.1

DEPARTURE
TIME
TEMPERATURE

3008 72.6 28mv

REMARKS

Oxy 2663

105 TON TO Retreat

TUNDISH SLideGate WAshed Out

QF-0019 9/12-97

1327

NUCOR STEEL - CRAWFORDSVILLE (RETREAT 3)
LMF HEAT RECORD

HEAT NO: 452819
FCE (E OR W): ________
LADLE NO: 16

AIM GRADE: 1005S1
LIQUIDUS: ________
FINISH GRADE: ________
WEIGHT TAPPED: 108

DATE: 11/20
MELTER: T.M
1st OP: RD.
2nd OP: ________

POWER
KWH INITIAL: ________
KWH FINAL: ________
KWH USED: ________

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1	7:44	062	.66	010	007	.29								0025	77	
LMF -2		077	63	01	007	26								001	76	
LMF -3																
LMF -4																

SLAG

DEPTH
ARRIVE: ________ DEPART: ________

COLOR
ARRIVE: ________ DEPART: ________

TEXTURE
ARRIVE: ________ DEPART: ________

EVENT	TIME START	TIME END		
FINISH TAP				
LADLE ON CAR				
IND STIR ON				
UNDER ROOF				
POWER ON	7:15	7:25	1	TAP NO.
	7:39	7:42	1	TAP NO.
	8:37	8:40	1	TAP NO.
	9:12	9:16	1	TAP NO.
	9:44	9:48	1	TAP NO.
				TAP NO.
				TAP NO.
				TAP NO.

ARGON LANCE ON
6 @ 60 SCFM

LADLE ADDITION	TIME	AMOUNT
Fesi		100#
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		

TIME/TEMP/OXYGEN

TIME	TEMP	OXYGEN
7:40	3033 °F	25.5 PPM
8:42	2986 °F	20.9 PPM
9:17	2998 °F	18.6 PPM
9:49	2972 °F	17.5 PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM

TIME 1015 DEPARTURE TEMPERATURE 3000 71.

30 m.

REMARKS

(SLIPPED ALL 3 STICKS)

18 tons in pot

QF-0019 9/12-97

1328-1

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

HEAT NO: 232832 AIM GRADE: 1005 SI DATE: 11/21 POWER

FCE (E OR W): ______ LIQUIDUS: ______ MELTER: RW KWH INITIAL: ______

LADLE NO: 16 FINISH GRADE: ______ 1st OP: KA KWH FINAL: ______

WEIGHT TAPPED: 118 397500 2nd OP: ______ KWH USED: ______

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1		044	62	006	002	32								013	77	
LMF -2		054	61	006	004	24								001	68	
LMF -3																
LMF -4																

SLAG

DEPTH
ARRIVE: ______ DEPART: ______

COLOR
ARRIVE: ______ DEPART: ______

TEXTURE
ARRIVE: ______ DEPART: ______

EVENT	TIME START	TIME END	
FINISH TAP			
LADLE ON CAR			
IND STIR ON			
UNDER ROOF			
POWER ON			TAP NO.
			TAP NO.
			TAP NO.
			TAP NO.
			TAP NO.
			TAP NO.
			TAP NO.
			TAP NO.

ARGON LANCE ON
3 min @ 60

LADLE ADDITION	TIME	AMOUNT
LCFeMnSi	400	
Lime	500	
Al SHOT		
STD FeMn		
MED C FeMn	275	
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE	500'	

TIME/TEMP/OXYGEN

	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM

TIME 7:00 DEPARTURE TEMPERATURE 3021
75.8
28mV

REMARKS

DRAINED

QF-0019 9/12-97

1328-V

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

HEAT NO: 137050
FCE (E OR W):
LADLE NO:

AIM GRADE: 100551
LIQUIDUS:
FINISH GRADE:
WEIGHT TAPPED: 120
400650

DATE: 11/21
MELTER: RH
1st OP: KA
2nd OP:

POWER
KWH INITIAL:
KWH FINAL:
KWH USED:

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1		042	67	008	005	34								006	72	
LMF -2		046	66	008	006	31								0036	89	
LMF -3																
LMF -4																

SLAG

DEPTH
ARRIVE: ______ DEPART: ______

COLOR
ARRIVE: ______ DEPART: ______

TEXTURE
ARRIVE: ______ DEPART: ______

EVENT	TIME START	TIME END
FINISH TAP		
LADLE ON CAR		
IND STIR ON		
UNDER ROOF		
POWER ON		

TAP NO.
TAP NO.
TAP NO.
TAP NO.
TAP NO.
TAP NO.
TAP NO.
TAP NO.

LADLE ADDITION	TIME	AMOUNT
LCFeMnSi	700	
Lime	500	
FeSi	400	
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE	575'	

ARGON LANCE ON
4 min @ 60

TIME/TEMP/OXYGEN

	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM

TIME 830 DEPARTURE TEMPERATURE 3007
69.6
26mv

REMARKS

62 tons

QF-0019 9/12-97

1326

NUCOR STEEL - CRAWFORDSVILLE
CASTRIP HEAT RECORD

HEAT NUMBER: 232819 # IN SEQUENCE: 2 SUPERVISOR: TM
GRADE: 100581 LIQUIDUS: PULPIT OPER: BB
DATE: 11-21-03

Lot - 17:54

	C	Mn	S	AL	SI	TEMP.
LAST LMF CHEM:						

LADLE NUMBER: 16
TARE WEIGHT: 75
INITIAL WEIGHT: 116
FINAL WEIGHT: 10.5

OPEN TIME: 18:05
CLOSE TIME: 18:15

FREE OPEN: YES / NO
SHROUD ON: YES / NO
OF PIPES USED:

TUNDISH # 7-A
TUNDISH CAR # 2

CASSETTE # 2 N
CASSETTE ROLL # 18
C/N PLATE # 2 S

TUNDISH CLOSE TIME: 18:15
SKULL WEIGHT: 13

Cast - 104 Coiled - 104

CAST FEET	CAST SPEED	EVENT LOG TIME / TUND TEMP	SHEAR CUT	REMARKS	
Pool	Speed	Time	Temp / DLY	Forces DS/OS	SD OS DS
173	79	18:06	2949-50-1	925/975	63/83
	80				

H
4.0

REASON FOR TERMINATION OF CAST: Shut off
~~Tundish Gate leaking steel~~

TOTAL CAST: 80

QF-0260, 08/27/02

OS DS
SD [illegible] 2 49 724 -

1327

NUCOR STEEL - CRAWFORDSVILLE
CASTRIP HEAT RECORD

HEAT NUMBER: 432819 # IN SEQUENCE: ______ SUPERVISOR: RH
GRADE: 1005 Si LIQUIDUS: ______ PULPIT OPER: CP
DATE: 11-21-03

	C	Mn	S	AL	SI	TEMP.
LAST LMF CHEM:	.055	.63	.008	.0014	.30	

N=.0073

LOT 22:17
TOG 22:18

LADLE NUMBER: 16
TARE WEIGHT: 75
INITIAL WEIGHT: 109
FINAL WEIGHT: 34
OPEN TIME: 22:22
CLOSE TIME: 23:21
FREE OPEN: YES/NO
SHROUD ON: YES/NO
OF PIPES USED: 2 Rod

TUNDISH #: 4-F
TUNDISH CAR #: 1
CASSETTE #: 2
CASSETTE ROLL #: 13
C/N PLATE #: 2
TUNDISH CLOSE TIME: 23:21
SKULL WEIGHT:

Cast 63 Coiled 60

CAST FEET	CAST SPEED	EVENT LOG TIME / TUND TEMP	SHEAR CUT	REMARKS		
POOL LEVEL	SPEED	TIME	TEMP/OXY	FORCES	OS	OP
					500	550
173	64					
			2929/50.9	6.6 Hydr		
			21mV		400	375
		22:46	2924/44.7			
			19mV			
		22:48		5.3 Hydris		
					300	375
		23:01	2912/43.3			
			20mV			
					300	425
		23:15	2895/40.0			
			19mV			
					4,658	4,060

REASON FOR TERMINATION OF CAST: Washed out TP sonic failed out

TOTAL CAST: 56min

INTERRUPT

QF-0260, 08/27/02

SEQ 1326

NUCOR STEEL - CRAWFORDSVILLE

CASTRIP HEAT RECORD

HEAT NUMBER: 432812 | # IN SEQUENCE: 1 | SUPERVISOR: TM
GRADE: 100SSi | LIQUIDUS: | PULPIT OPER: BB
DATE: 11-21-03

	C	Mn	S	AL	SI	TEMP.
LAST LMF CHEM:						

Lot 16:37
TOG 16:41

N .005
S .0056

LADLE NUMBER:	17
TARE WEIGHT:	89
INITIAL WEIGHT:	106
FINAL WEIGHT:	
OPEN TIME:	16:45
CLOSE TIME:	18:03
FREE OPEN:	YES / NO
SHROUD ON:	YES / NO
# OF PIPES USED:	2

TUNDISH #	7 - A
TUNDISH CAR #	2
CASSETTE #	2
CASSETTE ROLL #	18
C/N PLATE #	2
TUNDISH CLOSE TIME:	
SKULL WEIGHT:	

Cast - 97 Coiled - 97

CAST FEET	CAST SPEED	EVENT LOG TIME / TUND TEMP	SHEAR CUT	REMARKS
Pool	Speed	Time	Temp 10x4	Forces DS/OS SD's OS/DS
173	64	16:46	2950 - 49.2	500/500 60/85
173	75	16:55		375/450
		(Exhaust fan off)		350/450
173	75	17:14	2958 - 47.4	325/450
173	75	17:33	2953 - 48.0	325/475 63/85
173	79	17:51	2944 - 48.9	325/475 63/90
				425/575

Hyd. 4.1

REASON FOR TERMINATION OF CAST: 58/PB

TOTAL CAST: 74

QF-0260, 08/27/02

OS DS

1325

NUCOR STEEL - CRAWFORDSVILLE

CASTRIP HEAT RECORD

HEAT NUMBER: 232812 | # IN SEQUENCE: 3 | SUPERVISOR: TM

GRADE: 1006SL | LIQUIDUS: | PULPIT OPER: AB

DATE: 11-21-03

Lot 11:20

	C	Mn	S	AL	SI	TEMP.
LAST LMF CHEM:						

LADLE NUMBER:	17
TARE WEIGHT:	79
INITIAL WEIGHT:	115
FINAL WEIGHT:	864
OPEN TIME:	11:27
CLOSE TIME:	11:34
FREE OPEN:	YES / NO
SHROUD ON:	YES / NO
# OF PIPES USED:	

TUNDISH #	3-E
TUNDISH CAR #	1
CASSETTE #	2
CASSETTE ROLL #	18
C/N PLATE #	2
TUNDISH CLOSE TIME:	11:34
SKULL WEIGHT:	13

CAST FEET	CAST SPEED	EVENT LOG TIME / TUND TEMP	SHEAR CUT	REMARKS	
feet	Speed	Time	Temp / oxy	Forces DS / OS	50' os/ds
174	80	11:28	2942-44.2	410 420	60-90

H 4.0

REASON FOR TERMINATION OF CAST: a piece stuck in Pinch roll so we had to tail-out

TOTAL CAST: 174

QF-0260, 06/27/02

OS DS

1325
#2

NUCOR STEEL - CRAWFORDSVILLE
CASTRIP HEAT RECORD

HEAT NUMBER: 232811
GRADE: 1008SW
IN SEQUENCE:
LIQUIDUS:
SUPERVISOR: TM
PULPIT OPER: BB
DATE: 11-21-03
CF 9:50

	C	Mn	S	AL	SI	TEMP.
LAST LMF CHEM:						

Al 0046
S 0041

LADLE NUMBER: 15
TARE WEIGHT:
INITIAL WEIGHT: 124
FINAL WEIGHT:
OPEN TIME: 10:02
CLOSE TIME: 11:26
FREE OPEN: (YES) NO
SHROUD ON: (YES) NO
OF PIPES USED:

TUNDISH #: 3-E
TUNDISH CAR #: 1
CASSETTE #: 2
CASSETTE ROLL #: 18
C/N PLATE #: 2
TUNDISH CLOSE TIME:
SKULL WEIGHT:

Cast - 220 Crc - 220

CAST FEET	CAST SPEED	EVENT LOG TIME / TUND TEMP	SHEAR CUT	REMARKS			
	Speed		Temp / Cln	D/S	Force o/s	O/S	Force D/S
Pool		Time		325	325	65	90
173	80						
		10:05	2949-51.6	450	425		
	78						
		10:22	2950-52.4	410	425		
		10:49	2939-45.0				
		Argon on 10 70 scfm					
	79						
	95	11:14	2936-47.1				
194							

Hyd. 3.9

REASON FOR TERMINATION OF CAST: 50 / BB

TOTAL CAST: 166

QF-0200, 06/27/02

Load
525

NUCOR STEEL - CRAWFORDSVILLE
CASTRIP HEAT RECORD

HEAT NUMBER: 232808 — # IN SEQUENCE: 1 — SUPERVISOR: GH
GRADE: 1005 — LIQUIDUS: — PULPIT OPER:
DATE:

	C	Mn	S	AL	SI	TEMP.
LAST LMF CHEM.						

LOT 0837
TEK 0850

LADLE NUMBER: 10 — TUNDISH #: 3-2 — N 0051
TARE WEIGHT: — TUNDISH CAR #: — S 0071
INITIAL WEIGHT:
FINAL WEIGHT: — CASSETTE #: 2
CASSETTE ROLL #:
C/N PLATE #:
OPEN TIME: 0849
CLOSE TIME: 10:00 — TUNDISH CLOSE TIME:
FREE OPEN: YES / NO — SKULL WEIGHT:
SHROUD ON: YES / NO
OF PIPES USED:

Cast - 105 Com - 105

CAST FEET	CAST SPEED	EVENT LOG TIME / TUND TEMP	SHEAR CUT		REMARKS			
Time	Speed							
3	80		2930	47.2	450	500		
41	77				40			
49	77		2522	41.9	40	325	105	90
82	79		2641	47.1	32.5	310		

REASON FOR TERMINATION OF CAST: 50 / 80

TOTAL CAST: 82

QF-0250, 06/17/02

Run #	Time	Fan Amps	Damper Position	Overall ΔP	
2	[illegible]	92	96	-5.77	cleaning
	9:04	95	97	-4.32	
	9:09	93	94	-4.71	
	9:14	92	96	-5.26	
	9:24	92	98	-5.50	
	9:29	93	98	-6.52	
	[illegible]	93	98	-5.52	
					Cleaned in between
3	10:24	92	98	-5.74	
	10:39	90	98	-5.62	
	10:44	89	98	-5.82	
	[illegible]	90	98	[illegible]	
	11:09	91	98	-7.09	
	11:14	91	98	-6.14	ladle went to caster
	[illegible]	94	[illegible]	-10.82	
	11:29	94	56	-13.92	cleaning
	11:35	94	55	-11.75	stopped
3	4:37	91	97	-5.82	cleaning
	4:47	91	98	-6.72	
	[illegible]	[illegible]	98	[illegible]	
	5:02	90	98	-4.77	
	5:12	90	98	-4.62	
	[illegible]	[illegible]	[illegible]	[illegible]	cleaning
	5:32	89	98	-5.38	
	5:37	90	98	-5.27	

Date 11/20/03

830 started casting

8:01 AM ladle on Car at LMF

Run # 1

Time	Fan Amps	Damper Position	Overall ΔP	
7:56 AM	95	51	-4.[illegible]	cleaning
[illegible] AM	93	86	-4.56	cleaning
8:16 AM	91	48	-6.27	cleaning
[illegible]	91	48	-4.36	
8:34 AM	91	48	-4.80	

started casting 11:44 AM
LMF started 11:45 AM

Run # 1

Time	Fan Amps	Damper Position	Overall ΔP	
11:44 AM	93	[illegible]	-5.[illegible]	cleaning
[illegible] AM	94	48	-4.3[illegible]	cleaning
12:14 PM	95	48	-4.47	
12:[illegible] PM	92	48	-4.[illegible]	
12:34 PM	94	48	-4.35	
12:34 PM	94	48	-4.35	
[illegible]	93	48	[illegible]	
12:44 PM	95	54	-7.77	Took ladle off LMF cart so LMF damper closed at Caster canopy damper went to 85%
[illegible]	95	57	-11.12	cleaning

Run #

Hand Delivered

4.4

~~433~~ ~~163~~

HDV

Indiana Air Permit Compliance Testing

ΔAir Analysis, Inc.

Report on:
Particulates/ PM10, Lead, Sulfur Dioxide, Nitrogen Oxides, Carbon Monoxide and Visible Emissions Testing

Performed for
Nucor Steel Corporation
Castrip Operations

December 21, 2004

Air Analysis Inc. Project Number: 272

(IDEM copy)

ΔAir Analysis, Inc.
3904 Clarks Creek Road * Plainfield, Indiana* 46168 877-683-TEST

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

Certification Page

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

Sincerely,

Michael M. Dicen, President
Air Analysis, Inc.

Date: 2-3-05

TABLE OF CONTENTS

Executive Summary

Air Analysis, Inc. was contracted by Nucor Steel Corporation to perform air emissions sampling of their Castrip Baghouse Stack in Crawfordsville, Indiana, on December 21, 2004. The objective of the test program was to determine compliance to Indiana air permit requirements for particulate matter/(PM/10), lead, sulfur dioxide, nitrogen oxides, carbon monoxide and visible emissions. The following personnel were involved with the testing program:

Air Analysis	Mike Dicen
Air Analysis	Terry Kauffman
Air Analysis	Marcus Allen
Air Analysis	Ron Stapert
Nucor Steel	Mark Washer
IDEM	Doug VanDemark

Three sets of one-hour test runs were performed for PM/PM10, lead, SO2, NOX, CO and Visible Emissions. Air Analysis, Inc. encountered several power outages during Run 3. Pollutant averages for Run 3 are calculated on a time weighted average. Lead analysis filters and aqueous samples were shipped to Severn Trent Laboratories (STL). STL Valparaiso shipped the lead samples to STL Knoxville. Prior to shipment, STL Valparaiso filled a cooler with ice. The ice melted during shipment to Knoxville and thus contaminated the filters. There was no contamination of the aqueous solution. Air Analysis, Inc. is utilizing the filters used from particulate/PM10 test for lead analysis. Lead analyzed from the particulate filters will be used in the lead analysis total. Element One Laboratories are analyzing the filters and aqueous solution for lead. Please find an STL letter explaining the problem in the Appendix (Lab Section).

Per Mr. Dave Cline of IDEM, testing was to be performed while one ladle is cast at the Caster and another being processed at the LMS. Therefore, total tons on both the Caster and LMS were added since both add to emissions to the baghouse. Please review Section 3 for further details.

Table 1.
Test Summary

Pollutant	Date	Runs	Concentration	Mass Emissions Rate	*Emissions Rate* Per Tons of Metal
PM PM/PM10	12/21/04	1-3	0.0015 gr/dscf 0.0044 gr/dscf	1.2 lbs/hr 3.5 lbs/hr	0.0069 lbs/ton 0.02 lbs/ton
Lead	12/21/04	1-3	0.0000094 gr/dscf	0.0078 lbs/hr	0.00004 lbs/ton
NOX	12/21/04	1-3	14.47 ppm	9.66 lbs/hr	0.056 lbs/ton
SO2	12/21/04	1-3	20.9 ppm	19.3 lbs/hr	0.11 lbs/ton
CO	12/21/04	1-3	23.19 ppm	9.46 lbs/hr	0.055 lbs/ton
Visible Emissions	12/21/04	1-3	0 %	NA	NA

**Based on three run average of 171.9 Tons/hr

Results

Table 2

STACK EMISSION SUMMARY				
Gaseous Emissions	**Run 1**	**Run 2**	**Run 3**	**Average**
NOx lbs/hr	8.05	6.1	14.8	9.66
SO2 lbs/hr	16.77	18.65	22.57	19.3
CO lbs/hr	11.19	7.09	10.1	9.46
PM/PM10 Emissions	**Run 1**	**Run 2**	**Run 3**	**Average**
Filterable (gr/dscf)	0.0009	0.0014	0.0023	0.0015
Filterable + Condensible (gr/dscf)	0.0058	0.0035	0.0039	0.0044
Filterable (lbs/hr)	0.75	1.04	1.8	1.2
Condensible (lbs/hr)	4.1	1.6	1.3	2.34
Total (lbs/hr)	4.87	2.66	3.13	3.55
Avg. Stack Vol. Flow Rate				
ACFM	101,702.3	92,744.79	93,928.6	96,125.23
DSCFM	97,737.42	88,195.62	93,101.3	93,011.45
Avg. Stack Temp.	87.46	96.3	75.1	86.3
Stack Gas Velocity	33.7	30.7	31.1	31.87

Lead Emissions	**Run 1**	**Run 2**	**Run 3**	Average
Filterable (gr/dscf)	0.000019	0.0000062	0.0000025	0.0000094
Lead(lbs/hr)	0.0168	0.0046	0.0019	0.0078
Avg. Stack Vol. Flow Rate				
ACFM	106,156	91,100	90,320	95,858
DSCFM	101,199	86,063	88,854	92,039
Avg. Stack Temp.	89.1	97.2	76.9	87.7
Stack Gas Velocity	35.2	30.2	29.9	31.8

Description of Source Processes and Field Notes

Nucor Steel Corporation operates a steel mill facility in Crawfordsville, Indiana. The facility required to determine compliance to permit conditions is the recently built Castrip. At this facility, molten metal is cast into thin metal sheets.

Two sources have an effect on air emissions according to the Indiana Department of Environmental Management; process emissions from LMS and Caster. Production levels were kept for both metal sheets produced and the ladle on standby.

Production rates follows as described above.

200.6 tons	TEST 1	
135.8 tons	TEST 2	Avg 171.9
179.4 tons	TEST 3	

Emissions pass through a baghouse prior to exiting a stack.

Actual recorded production material information is in Appendix.

Methodology

The sampling procedures used by Air Analysis, Inc. are as follows:

Title 40 CFR Part 60 Appendix A
Method 1 "Sampling of Velocity Traverses for Stationary Sources"
Method 2 "Determining of Stack Gas Velocity and Volumetric Flow Rate"
Method 3 "Gas Analysis for the Determination of Molecular Weight"
Method 4 "Determination of Moisture Content in Stack Gas"
Method 5 "Determination of Particulate Emissions"
Method 9 "Visual Determination of the Opacity of Emissions"
Method 202 "Determination of Condensible Emissions from Stationary Sources"
Method 6C "Determination of Sulfur Dioxide Emissions"
Method 7E "Determination of Nitric Oxide Emissions"
Method 10 "Determination of Carbon Monoxide Emissions"

SAMPLE POINT DETERMINATION-EPA METHOD 1

Sampling point locations were determined according to EPA Reference Method 1.

Locations	Dimensions	Sampling Points Ports	Points Per Port	Total Points
Castrip Stack	96" Diameter	4	6	24

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

VELOCITY AND VOLUMETRIC FLOW RATE – EPA METHOD 2

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

GAS COMPOSITION AND MOLECULAR WEIGHT – EPA METHOD 3

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

MOISTURE CONTENT – EPA METHOD 4

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

PARTICULATE DETERMINATION – EPA METHOD 5/202
Stack gas is withdrawn isokinetically and particulate matter is collected on the nozzle, probe and filter. The probe temperature and filter are maintained at temperatures of 248 degrees F (+/- 25 deg. F). The impinger temperature exit gas is maintained at temperatures at or below 68 degrees F.

The nozzle, probe and glass filter containers are rinsed with acetone and the rinse is captured in a sealed glass container. The impingers and connecting glassware are rinsed twice with de-ionized water and captured in a sealed container. Two rinses of methylene chloride are captured and stored in a sealed glass container.

OPACITY – METHOD 9
Stack opacity readings are taken for 60 minutes at 15 second intervals *for NSPS* and 30 minutes at 15 second intervals for *state permitted, non-federal sources*, by a certified visible emissions reader. The visible emissions readings are conducted during each of the particulate test runs. The results are reported as an average opacity reading for the half an hour period. A copy of the visible reader's current certification is included in the Appendix.

SO2 DETERMINATION – EPA METHOD 6C
Stack gas is withdrawn from the stack and conditioned (moisture is removed) before being analyzed by infrared detection. Sulfur Dioxide molecules are " excited " by specific wavelengths. Molecular excitement is directly proportional to the concentration of SO2. Quality assurance of the analyzer is determined by first determined by direct injection of known EPA protocol 1 gas concentrations. A system check of the probe, connection lines and conditioner is also determined prior to and after each sample period to determine drift bias.

NOX DETERMINATION – EPA METHOD 7E
Stack gas is withdrawn from the stack and conditioned (moisture is removed) before being analyzed by chemiluminescent detection. NOX molecules are " excited " by specific wavelengths. Molecular excitement is directly proportional to the concentration of NOX. Quality assurance of the analyzer is first determined by direct injection of known EPA protocol 1 gas concentrations. A system check of the probe, connection lines and conditioner is also determined prior to and after each sample period to determine drift bias.

CO DETERMINATION – EPA METHOD 10
Stack gas is withdrawn from the stack and conditioned (moisture is removed) before being analyzed by infrared detection. CO molecules are " excited " by specific wavelengths. Molecular excitement is directly proportional to the concentration of CO. Quality assurance of the analyzer is first determined by direct injection of known EPA protocol 1 gas concentrations. A system check of the probe, connection lines and conditioner is also determined prior to and after each sample period to determine drift bias

APPENDIX I

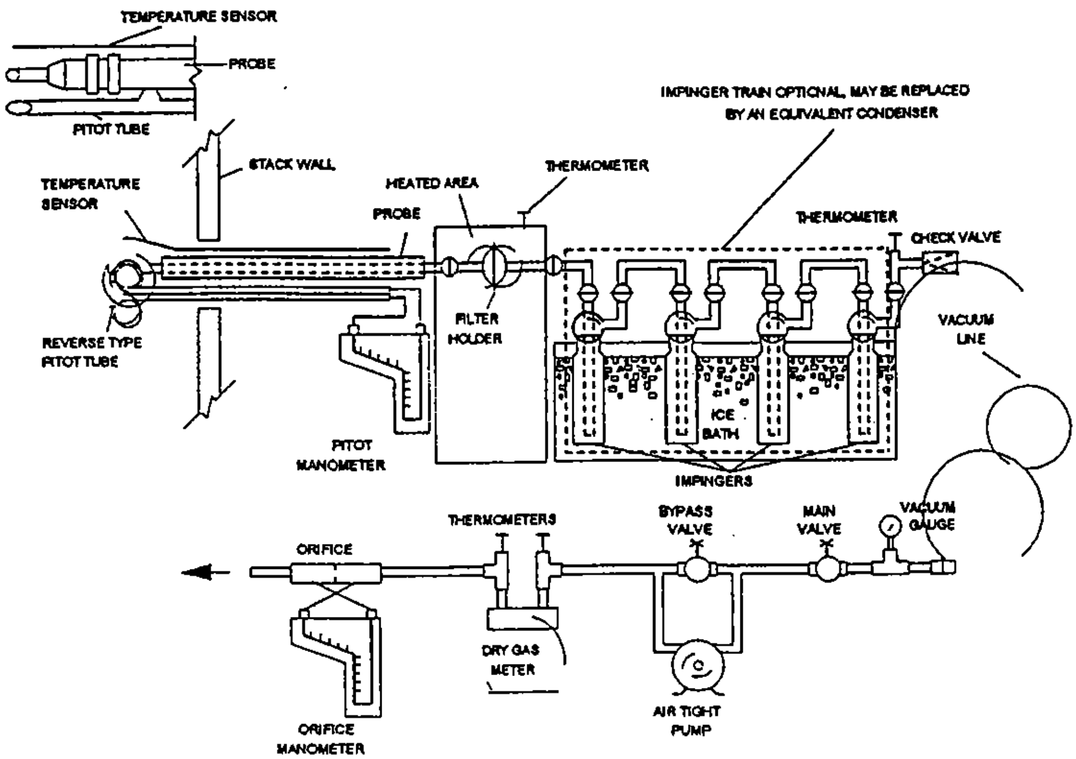


Figure 5-1. Metals & Particulate Sampling Train

SAMPLE CALCULATIONS

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

1. Volume of water collected (wscf)

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

Where:

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

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

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

Where:

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

3. Sample gas pressure (in Hg)

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

Where:

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

4. Actual vapor pressure (in Hg)

$$P_v = P_s$$

Where:

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

5. Moisture Content (%)

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

Where:

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

6. Saturated moisture content (%)

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

Where:

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

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

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

Where:

Md	dry molecular weight of sample gas (lb/lb-mole)
M_{CO2}	molecular weight of carbon dioxide (lb/lb-mole)
M_{O2}	molecular weight of oxygen (lb/lb-mole)
M_{CO+N2}	molecular weight of carbon monoxide and nitrogen (lb/lb-mole)
CO_2	proportion of carbon dioxide in the gas stream by volume (%)
O_2	proportion of oxygen in the gas stream by volume (%)
$CO + N_2$	proportion of carbon monoxide and nitrogen in gas stream by volume (%)
100	conversion factor, %

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

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

Where:

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

9. Velocity of sample gas (ft/sec)

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

Where:

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

10. Total flow of sample gas (acfm)

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

Where:

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

11. Total flow of sample gas (dscfm)

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

Where:

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

12. Percent Isokinetic (%)

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

Where:

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

13. Particulate concentration (gr/dscf)

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

Where:

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

14. Particulate Emissions, lb/MMBtu

$$E_{lb/MMBtu} = \frac{(C_{gr/dscf})(F_d)(20.9)}{(7000)(20.9-\%O_2)}$$

Where:

$E_{lb/MMBtu}$	emission rate, pounds per million Btu
$C_{gr/dscf}$	concentration in gas stream, gr/dscf
Fd	fuel factor, dscf/MMbtu
Qstd	volumetric flow rate at standard conditions, dry basis (dscfm)
$20.9\text{-}\%O_2$	ambient conditions minus O2 (%CO2)
7000	conversion factor, grains to pound

15. Particulate Emissions, Mass Emissions Rate lbs/hr

$$E_{lb/hr} = \frac{(G_{pm})(Q_{std})}{(7.567)(V_{std})}$$

Where:

$E_{lbs/hr}$	Mass emissions rate, pounds per hour
Gpm	Grams of particulate emissions
Qstd	volumetric flow rate at standard conditions, dry basis (dscfm)
Vstd	Volume Standard conditions
7.567	conversion factor, grams to pound

APPENDIX II

STACK EMISSION SUMMARY

SOURCE TESTED: **Castrip**
COMPANY NAME: Nucor Steel
DATE OF TEST: 12/21/04

Lead Emissions	**Run 1**	**Run 2**	**Run 3**	**Average**
Filterable (gr/dscf)	0.0000193	0.0000062	0.0000025	0.0000094
Filterable (lbs/hr)	0.0168	0.0046	0.0019	0.0078
Condensible (lbs/hr)	0.0000	0.0000	0.0000	0.0000
Filterable + Condensible (lbs/hr)	0.0168	0.0046	0.0019	0.0078
Avg. Stack Vol. Flow Rate				
ACFM	106,156	91,100	90,320	95,858
DSCFM	101,199	86,063	88,854	92,039
Avg. Stack Temp.	89.1	97.2	76.9	87.7
Stack Gas Velocity	35.198	30.206	29.948	31.7840
Avg. Velocity Head	0.3770	0.2743	0.2801	0.3105
Avg. Sq. Rt of Delta P	0.6140	0.5237	0.5292	0.5557

ISOKINETIC TESTING SUMMARY

%Isokinetics:	103.62	101.16	100.87	101.89
Allowable isokinetic 90-110%				
% Moisture of Stack Gas	1.68%	1.18%	0.79%	1.22%
Sample Volume	42.656	35.416	36.459	38.177

** Particulate Filters were analyzed for lead. Original lead filters were contaminated by STL Element One Lab performed analysis on filter and HNO3 solutions.

COMPANY NAME:	Nucor Steel
LOCATION:	Crawfordsville, IN
SOURCE TESTED:	Castrip
DATE OF TEST:	12/21/04
RUN NO.:	1
	Lead

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2	0
%O2	21
Md	28.84

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

Vlc	15.5
Vw(std)	0.729

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

Tm(F)	83.396
Vm	45.732
Pb(inches Hg)	30.080
delta H	1.920
gamma	0.947
Vm(std)	42.856

Moisture Content of Stack Gas, Bwo

Bwo	1.68%
1-Bwo	98.32%

Molecular Weight of Stack Gas, Ms

Ms	28.66

Area of Stack (enter diameter in inches), As

Depth-in	0
Width-in	0
diameter	96
No. of Stacks	1
As(L*W)	0
As(dia.)	50.26544

Static Pressure, Ps

Static	-0.250
Ps	30.06

Stack Gas Velocity, Vs, fps

Cp	0.84
sqr(delta p)	0.614
Ts	89.083
Vs	35.198

Stack Gas Flowrate, Qs, acfm

As	50.26544
Qs	106156

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

Qstd (dscf/m) =	101198.83
Qstd (dscf/hr) =	6071929.65

Velocity at the Nozzle, Vn

Dia. of Nozzle	0.25	An(nozzle):	0.000341
Time of Run	60		
Vn	36.47		

% Isokinetic, %I

%I	103.62

% Isokinetic measured from intermediate values

%I	104.02

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

Mn (g) =	0.000053392	0.0000	5.339E-05
PMR (lb/hr) =	0.0168	0.0000	0.0168
	Filterable	*Condensible*	*Total*

Grains per acf

gr/acf = 0.00001862

Grains per dscf

gr/dscf = 0.00001931

FIELD DATA

K - Factor =	4.50
Start Time	12:00
Stop Time	13:12

Run	Delta P	Square Delta P	Volume	Delta H	Stack Temp	[illegible]	[illegible]
1	0.410	0.640		1.85	81	77	77
2	0.380	0.616		1.71	83	77	77
3	0.400	0.632		1.80	87	78	76
4	0.400	0.632		1.80	92	80	76
5	0.280	0.529		1.26	92	82	77
6	0.180	0.424		0.81	91	83	77
7	0.440	0.663		1.98	98	83	77
8	0.450	0.671		2.03	98	87	77
9	0.410	0.640		1.85	99	90	77
10	0.190	0.436		0.86	96	89	78
11	0.190	0.436		0.86	96	90	79
12	0.180	0.424		0.81	94	90	78
13	0.140	0.374		0.63	93	84	80
14	0.120	0.346		0.54	93	89	80
15	0.120	0.346		0.54	91	89	80
16	0.110	0.332		0.50	90	89	80
17	0.120	0.346		0.54	89	89	80
18	0.290	0.539		1.31	90	92	81
19	0.900	0.949		4.05	84	91	81
20	0.900	0.949		4.05	82	94	81
21	0.880	0.938		3.96	81	95	81
22	0.900	0.949	498.815	4.05	80	96	82
23	0.900	0.949	453.083	4.05	80	96	82
24	0.950	0.975		4.28	78	96	83

Avg Del P	Avg Sqrt Dp	Volume	Delta H	Avg Ts (F)	[illegible]	Avg Meter Temp (F)
0.427	0.614	45.732	1.920	89.083		83.396

COMPANY NAME:	Nucor Steel
LOCATION:	Crawfordsville, IN
SOURCE TESTED:	Castrip
DATE OF TEST:	12/21/04
RUN NO.:	2
POLLUTANT:	Lead

Enter Data

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2	0
%O2	21
Md	28.84

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

Vlc	9
Vw(std)	0.423

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

Tm(F)	84.375
Vm	36.103
Pb(inches Hg)	30.060
delta H	1.215
gamma	0.947
Vm(std)	35.416

Moisture Content of Stack Gas, Bwo

Bwo	1.18%
1-Bwo	98.82%

Molecular Weight of Stack Gas, Ms

Ms	28.71

Area of Stack (enter diameter in inches), As

Depth-In	0
Width-In	0
diameter	96
No. of Stacks	1
As(L*W)	0
As(dia.)	50.26544

Static Pressure, Ps

Static	-0.020
Ps	30.06

Stack Gas Velocity, Vs, fps

Cp	0.84
sqr(delta p)	0.524
Ts	97.208
Vs	30.206

Stack Gas Flowrate, Qs, acfm

As	50.26544
Qs	91100

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

Qstd (dscf/m) =	86062.53
Qstd (dscf/hr) =	5163751.78

Velocity at the Nozzle, Vn

Dia. of Nozzle	0.25	An(nozzle): 0.000341
Time of Run	60	
Vn	30.56	

%Isokinetic, %I

%I	101.16

%Isokinetic measured from intermediate values

%I	101.55

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

Mn (g) =	0.000014342	0.0000	1.43E-05
PMR (lb/hr) =	0.0046	0.0000	0.0046
	Filterable	*Condensible*	*Total*

Grains per acf

gr/acf = 0.0000059

Grains per dscf

gr/dscf = 0.0000062

FIELD DATA
Colonial Brick

K - Factor = 4.30

Start Time	14:00
Stop Time	15:07

Run	Delta P	Square Delta P	Volume	Delta H2	Stack Temp	DGM In	DGM Out
1	0.200	0.447		0.86	90	80	80
2	0.310	0.557		1.33	92	81	80
3	0.400	0.632		1.72	91	83	80
4	0.380	0.616		1.63	95	85	80
5	0.380	0.616		1.63	98	87	80
6	0.360	0.600		1.55	99	88	80
7	0.250	0.500		1.08	101	86	80
8	0.260	0.510		1.12	102	87	80
9	0.280	0.529		1.20	104	88	80
10	0.280	0.529		1.20	102	89	80
11	0.120	0.346		0.52	100	89	80
12	0.120	0.346		0.52	99	87	80
13	0.140	0.374		0.60	95	85	80
14	0.290	0.539		1.25	95	88	80
15	0.370	0.608		1.59	96	90	80
16	0.360	0.600		1.55	97	92	81
17	0.370	0.608		1.59	98	92	81
18	0.370	0.608		1.59	98	92	81
19	0.290	0.539		1.25	95	90	81
20	0.180	0.424		0.77	97	91	81
21	0.140	0.374		0.60	97	91	81
22	0.240	0.490	538.093	1.03	96	92	81
23	0.340	0.583	499.990	1.46	98	93	81
24	0.350	0.592		1.51	98	94	82

Avg Dp	Avg Sqr Dp	Volume	Delta H	Avg Ts (F)	[illegible]	Avg Meter T (F)
0.283	0.524	36.103	1.215	97.208		84.375

COMPANY NAME:	Nucor Steel
LOCATION:	Crawfordsville, IN
SOURCE TESTED:	Castrip
DATE OF TEST:	12/21/04
RUN NO.:	3
POLLUTANT:	Lead

Enter Data

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2	0
%O2	21
Md	28.84

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

Vlc	6.2
Vw(std)	0.292

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

Tm(F)	73.854
Vm	38.484
Pb(inches Hg)	30.060
delta H	1.254
gamma	0.947
Vm(std)	36.459

Moisture Content of Stack Gas, Bwo

Bwo	0.79%
1-Bwo	99.21%

Molecular Weight of Stack Gas, Ms

Ms	28.75

Area of Stack (enter diameter in inches), As

Depth-in	0.0
Width-in	0.0
diameter	96.0
No. of Stacks	1
As(L*W)	0
As(dia.)	50.26544

Static Pressure, Ps

Static	-0.250
Ps	30.06

Stack Gas Velocity, Vs, fps

Cp	0.84
sqr(delta p)	0.529
Ts	76.875
Vs	29.946

Stack Gas Flowrate, Qs, acfm

As	50.26544
Qs	90320

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

Qstd (dscf/m)	=	88854.44
Qstd (dscf/hr)	=	5331266.16

Velocity at the Nozzle, Vn

Dia. of Nozzle	0.25	An(nozzle):	0.000341
Time of Run	60		
Vn	30.21		

% Isokinetic, % I

%I	100.87

% Isokinetic measured from intermediate values

%I	101.26

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

Mn (g) =	0.000005892	0.0000	5.89E-06
PMR (lb/hr) =	0.0019	0.0000	0.0019
	Filterable	*Condensible*	*Total*

Grains per acf

gr/acf	=	0.0000025

Grains per dscf

gr/dscf	=	0.0000025

FIELD DATA
Colonial Brick

K - Factor = 4.30

Start Time	16:25
Stop Time	17:27

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1	0.150	0.387		0.86	65	70	71
2	0.340	0.583		1.45	70	68	71
3	0.400	0.632		1.72	69	69	70
4	0.170	0.412		0.73	69	71	70
5	0.280	0.529		1.20	69	72	70
6	0.330	0.574		1.42	72	74	70
7	0.370	0.608		1.59	77	74	70
8	0.450	0.671		1.94	77	77	70
9	0.500	0.707		2.16	80	79	71
10	0.490	0.700		2.11	81	80	71
11	0.480	0.693		2.06	83	80	71
12	0.450	0.671		1.94	86	81	71
13	0.150	0.387		0.68	82	75	71
14	0.200	0.447		0.86	82	76	72
15	0.220	0.469		0.95	81	77	71
16	0.220	0.469		0.95	80	77	71
17	0.210	0.458		0.90	79	78	72
18	0.220	0.469		0.86	78	78	71
19	0.280	0.529		1.20	78	76	72
20	0.160	0.400		0.69	78	78	72
21	0.160	0.400		0.69	77	80	72
22	0.280	0.529	576.688	1.20	77	81	72
23	0.330	0.574	539.224	1.42	78	83	72
24	0.160	0.400		0.69	77	83	72

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
0.292	0.529	38.484	1.254	76.875		73.854

STACK EMISSION SUMMARY

SOURCE TESTED: **Castrip**
COMPANY NAME: Nucor Steel Corporation
DATE OF TEST: 12/21/04

Pollutant Emissions	Run 1	Run 2	Run 3	Average
PM Filterable (gr/dscf)	0.0009	0.0014	0.0023	0.0015
PMFilterable (lbs/hr)	0.7493	1.0439	1.8238	1.2057
PM10 Condensible (lbs/hr)	4.1213	1.6133	1.3027	2.3458
PM Filterable + Consensible (lbs/hr)	4.8706	2.6572	3.1266	3.5515
PM Filterable /condensible (gr/dscf)	0.0058	0.0035	0.0039	0.0044
NOx ppm	11.5000	9.7000	22.2000	14.4667
NOx lbs/hr	8.0519	6.1286	14.8064	9.6623
SO2 ppm	17.2000	21.2000	24.3000	20.9000
SO2 lbs/hr	16.7686	18.6505	22.5668	19.3287
CO ppm	26.2500	18.4300	24.9000	23.1933
CO lbs/hr	11.1856	7.0867	10.1071	9.4598
Avg. Stack Vol. Flow Rate				
ACFM	101,702.30	92,744.79	93,928.60	96,125.23
DSCFM	97,737.42	88,195.62	93,101.30	93,011.45
Avg. Stack Temp.	87.458	96.304	75.125	86.296
Stack Gas Velocity	33.722	30.752	31.144	31.873
Avg. Velocity Head	0.3477	0.2852	0.3044	0.3124
Avg. Sq. Rt of Delta P	0.5897	0.5340	0.5517	0.5585

ISOKINETIC TESTING SUMMARY

%Isokinetics:	104.15	102.80	99.85	102.26
Allowable isokinetic 90-110%				
% Moisture of Stack Gas	1.18%	0.63%	0.37%	0.73%
Sample Volume	41.408	36.879	37.813	38.700

COMPANY NAME:	Nucor Steel Corporation
LOCATION:	Crawfordsville, IN
SOURCE TESTED:	Castrip
DATE OF TEST:	12/21/04
RUN NO.:	1

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2	0
%O2	21
Md	28.84

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

Vlc	10.5
Vw(std)	0.494

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

Tm(F)	89.167
Vm	43.920
Pb(inches Hg)	30.080
delta H	1.652
gamma	0.968
Vm(std)	41.408

Moisture Content of Stack Gas, Bwo

Bwo	1.18%
1-Bwo	98.82%

Molecular Weight of Stack Gas, Ms

Ms	28.71

Area of Stack (enter diameter in inches), As

Depth-in	0
Width-in	0
diameter	96
No. of Stacks	1
As(L*W)	0
As(dia.)	50.26544

Static Pressure, Ps

Static	(0.250)
Ps	30.06

Stack Gas Velocity, Vs, fps

Cp	0.84
sqr(delta p)	0.590
Ts	87.458
Vs	33.722

Stack Gas Flowrate, Qs, acfm

As	50.26544
Qs	101702

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

Qstd (dscf/m) =	97737.42
Qstd (dscf/hr) =	5864245.40

Velocity at the Nozzle, Vn

Dia. of Nozzle	0.25	An(nozzle):	0.000341
Time of Run	60		
Vn	35.12		

%Isokinetic, %I

%I	104.15

%Isokinetic measured from intermediate values

%I	104.55

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

Mn (g) =	0.0024	0.0132	0.0156
PMR (lb/hr) =	0.7493	4.1213	4.8706

	Filterable	*Condensible*	*Total*
Grains per acf			
gr/acf =	0.0009	0.0048	
Grains per dscf			
gr/dscf =	0.0009	0.0049	0.0058
Grains per mg/dscf			
mg/dscf =	0.8750		

NOx ppm	11.5
NOx lbs/hr	8.05191596
SO2 ppm	17.2
SO2 lbs/hr	16.76863575
CO ppm	26.25
CO lbs/hr	11.18561559

FIELD DATA

K - Factor = 4.50

Start Time: 12:00
Stop Time:

Run #	Delta P	Sqrt(Delta P)	Volume	Delta H	Stack Temp	DGM In	DGM Out
1	0.360	0.600		1.620	79	83	81
2	0.400	0.632		1.800	81	80	81
3	0.400	0.632		1.800	86	81	81
4	0.370	0.608		1.665	89	81	81
5	0.200	0.447		0.900	90	82	82
6	0.190	0.436		0.855	89	86	82
7	0.460	0.678		2.070	95	89	83
8	0.470	0.686		2.115	97	92	83
9	0.270	0.520		1.215	96	93	84
10	0.210	0.458		0.945	95	93	84
11	0.210	0.458		0.945	94	93	85
12	0.210	0.458		0.945	93	95	86
13	0.200	0.447		0.900	90	93	87
14	0.200	0.447		0.900	91	95	88
15	0.200	0.447		0.900	90	95	87
16	0.200	0.447		0.900	89	96	86
17	0.210	0.458		0.945	89	97	87
18	0.310	0.557		1.395	89	98	89
19	0.660	0.812		2.970	83	98	90
20	0.650	0.806		2.925	81	99	91
21	0.550	0.742		2.475	80	99	91
22	0.670	0.819	345.320	3.015	78	99	92
23	0.610	0.781	301.400	2.745	78	99	92
24	0.600	0.775		2.700	77	99	92

Avg Delta P	Avg Sqrt(Delta P)	Volume	Delta H	Avg Ts (F)		Avg Tm (F)
0.367	0.590	43.920	1.652	87.458		89.167

COMPANY NAME:	Nucor Steel Corporation
LOCATION:	Crawfordsville, IN
SOURCE TESTED:	Castrip
DATE OF TEST:	12/21/04
RUN NO.:	2
POLLUTANT:	

Enter Data

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2	0
%O2	21
Md	28.84

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

Vlc	5
Vw(std)	0.235

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

Tm(F)	90.804
Vm	39.270
Pb(inches Hg)	30.080
delta H	1.265
gamma	0.968
Vm(std)	36.879

Moisture Content of Stack Gas, Bwo

Bwo	0.63%
1-Bwo	99.37%

Molecular Weight of Stack Gas, Ms

Ms	28.77

Area of Stack (enter diameter in inches), As

Depth-in	0
Width-in	0
diameter	96
No. of Stacks	1
As(L*W)	0
As(dia.)	50.26544

Static Pressure, Ps

Static	(0.250)
Ps	30.06

Stack Gas Velocity, Vs, fps

Cp	0.84
sqr(delta p)	0.534
Ts	96.304
Vs	30.752

Stack Gas Flowrate, Qs, acfm

As	50.26544
Qs	92745

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

Qstd.	88195.62
Qstd (dscf/hr) =	5291737.10

Velocity at the Nozzle, Vn

Dia. of Nozzle	0.25	An(nozzle) 0.000341
Time of Run	60	
Vn	31.61	

% Isokinetic, %I

%I	102.80

% Isokinetic measured from intermediate values

%I	103.19

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

Mn (g) =	0.0033	0.0051	0.0084
PMR (lb/hr) =	1.0439	1.6133	2.6572
	Filterable	*Condensible*	*Total*
Grains per acf			
	0.0013	0.0020	
Grains per dscf			
gr/dscf =	0.0014	0.0021	0.0035
Grains per mg/dscf			
mg/dscf =	1.3222		

NOx ppm	9.7
NOx lbs/hr	6.128571419
SO2 ppm	21.2
SO2 lbs/hr	18.65053393
CO ppm	18.43
CO lbs/hr	7.086667261

FIELD DATA

K - Factor = 4.30

Start Time	14:00
Stop Time	15:07

Run#	Delta P	Sqrt Delta P	Volume	Delta H2	Stack Temp	DGM In	DGM Out
1	0.130	0.361		0.559	90	85	87
2	0.130	0.361		0.559	90	89	87
3	0.330	0.574		1.419	92	87	87
4	0.290	0.539		1.247	94	89	87
5	0.250	0.500		1.075	96	90	86
6	0.250	0.500		1.075	99	91	87
7	0.430	0.656		1.849	101	90	86
8	0.420	0.648		1.806	101	93	86
9	0.420	0.648		1.806	101	93	86
10	0.430	0.656		1.849	101	95	87
11	0.210	0.458		0.903	98	95	87
12	0.210	0.458		0.903	96	94	87
13	0.140	0.374		0.602	95	93	87
14	0.300	0.548		1.290	95	95	89
15	0.400	0.632		1.720	95	96	89
16	0.380	0.616		1.634	95	96	89
17	0.380	0.616		1.634	96	96	89
18	0.380	0.616		1.634	96	96	89
19	0.300	0.548		1.290	96	96	89
20	0.220	0.469		0.946	96	96	89
21	0.150	0.387		0.645	95	96	89
22	0.270	0.520	384.890	1.161	95	96	89
23	0.340	0.583	345.620	1.462	95	97	89
24	0.300	0.548		1.290	97	98	90

Avg Del P	Avg Sqrt Del P	Volume	Delta H	Avg Ts(F)		Avg Meter T(F)
0.294	0.534	39.270	1.265	96.304		90.804

COMPANY NAME: Nucor Steel Corporation
LOCATION: Crawfordsville, IN
SOURCE TESTED: Castrip
DATE OF TEST: 12/21/04
RUN NO.: 3
POLLUTANT:

Enter Data

Molecular Weight of Stack Gas, Dry Basis, Md

%CO2	0
%O2	21
Md	28.84

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

Vlc	3
Vw(std)	0.141

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

Tm(F)	76.375
Vm	39.201
Pb(inches Hg)	30.080
delta H	1.358
gamma	0.968
Vm(std)	37.813

Moisture Content of Stack Gas, Bwo

Bwo	0.37%
1-Bwo	99.63%

Molecular Weight of Stack Gas, Ms

Ms	28.80

Area of Stack (enter diameter in inches), As

Depth-in	0
Width-in	0
diameter	96
No. of Stacks	1
As(L*W)	0
As(dia.)	50.26544

Static Pressure, Ps

Static	(0.250)
Ps	30.06

Stack Gas Velocity, Vs, fps

Cp	0.84
sqr(delta p)	0.552
Ts	75.125
Vs	31.144

Stack Gas Flowrate, Qs, acfm

As	50.26544
Qs	93929

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

Qstd.	93101.30
Qstd (dscf/hr) =	5586077.94

Velocity at the Nozzle, Vn

Dia. of Nozzle	0.25	An(nozzle)	0.000341
Time of Run	60		
Vn	31.10		

% Isokinetic, %I

%I	99.85

% Isokinetic measured from intermediate values

%I	100.23

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

Mn (g) =	0.0056	0.004	0.0096
PMR (lb/hr) =	1.8238	1.3027	3.12657
	Filterable	*Condensib.*	*Total*

Grains per acf

gr/acf =	0.0023

Grains per dscf

gr/dscf =	0.0023	0.0016	0.00392

Grains per mg/dscf

mg/dscf =	2.268698971	2.268699

Run 3

NOx ppm	22.2
NOx lbs/hr	14.8063913
SO2 ppm	24.3
SO2 lbs/hr	22.5668225
CO ppm	24.9
CO lbs/hr	10.10705863

FIELD DATA

K - Factor =	4.30

Start Time	9:28
Stop Time	10:38

Run #	Delta P	Sqrt Delta P	Volume	Delta H	Stack Temp	DGM In	DGM Out
1	0.150	0.387		0.645	65	73	74
2	0.370	0.608		1.591	68	72	74
3	0.370	0.608		1.591	68	71	73
4	0.150	0.387		0.645	68	72	74
5	0.310	0.557		1.333	68	75	72
6	0.400	0.632		1.720	71	77	73
7	0.370	0.608		1.591	72	77	73
8	0.450	0.671		1.935	76	79	74
9	0.480	0.693		2.064	78	80	73
10	0.480	0.693		2.064	80	81	73
11	0.460	0.678		1.978	82	83	74
12	0.460	0.678		1.978	83	83	74
13	0.200	0.447		0.860	76	79	74
14	0.300	0.548		1.290	81	81	74
15	0.310	0.557		1.333	80	82	74
16	0.310	0.557		1.333	80	81	74
17	0.320	0.566		1.376	78	82	74
18	0.320	0.566		1.376	78	83	75
19	0.430	0.656		1.849	75	80	73
20	0.150	0.387		0.645	75	81	75
21	0.150	0.387		0.645	75	81	74
22	0.140	0.374	424.248	0.602	75	80	75
23	0.300	0.548	385.047	1.290	76	80	75
24	0.200	0.447		0.860	75	80	75

Avg Dp	Avg Sqrt Dp	Volume	Delta H	Avg Ts (F)		Avg Tm (F)
0.316	0.552	39.201	1.358	75.125		76.376

APPENDIX III

VELOCITY TRAVERSE POINT DETERMINATION
(EPA Method 1)

Nucor Steel Corporation **@** **Crawfordsville, IN**

Circular Stack

Taverse Points on Diameter:

Stack Dia.(inches)? 96

Points:

	4	6	8	10	12
1	6.43	4.22	3.07	2.50	2.02
2	24.00	14.02	10.08	7.87	6.43
3	72.00	28.42	18.62	14.02	11.33
4	89.57	67.58	31.01	21.70	16.99
5		81.98	64.99	32.83	24.00
6		91.78	77.38	63.17	34.18
7			85.92	74.30	61.82
8			92.93	81.98	72.00
9				88.13	79.01
10				93.50	84.67
11					89.57
12					93.98

AIR ANALYSIS, INC

RUN NUMBER 1 | POLLUTANT TESTED Lead | EPA METHOD 12

Start Time: 12:00 pm
End Time: 1:03

#8C

Company:	Nucor
Location:	Crawfordsville
Unit Tested:	Caststrip
Meter Operator:	MD
Probe Operator:	MA
Client Contact:	MW
Agency Contact:	DV
V.E. Reader:	RS
AAI Project:	Date: 12-28-04
Barometric Pressure:	30.08
Ambient Temperature:	35

Diagram of Test Location

DIA 96"

	CO2	O2
1	0	21
2	0	21
3	0	21
Avg.	0	21

Silica ID	#10
Silica wt.	15.5 grams
Impingers	0 mls
Moisture Total	15.5 mls
Pretest Pitot Ch.	pass / fail
Postest Pitot Ch.	pass / fail

Nozzle size measurement
a
b
c
Avg. .250

Meter Y	0.947
Meter DeltaH@	1.87
Pretest Leak Ch.	0 cfm@ 11
Post test Leak Ch.	0 cfm@ 13

Static Pressure -0.25

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				453.088								
1	2.5	0.41	1.65	455.2	81	258	263	52	77	77	3	4.5K
2	5	0.38	1.71	457.2	83	264	266	51	77	77	3	
3	7.5	0.40	1.80	459.2	87	257	257	50	78	76	3	
4	10	0.40	1.80	461.1	92	256	258	51	80	76	3	
5	12.5	0.28	1.26	462.7	92	258	258	51	82	77	2	
6	15	0.18	0.81	464.02	91	255	261	51	83	77	1	
7	17.5	0.44	1.98	466.1	90	260	260	49	83	77	3	
8	20	0.45	2.03	468.0	98	257	259	49	87	77	3	
9	22.5	0.41	1.85	470.2	99	260	260	50	96	77	3	
10	25	0.19	0.86	471.4	96	258	260	51	89	78	1	
11	27.5	0.19	0.86	472.8	96	260	260	51	90	79	1	
12	30	0.18	0.81	474.213	94	263	262	51	90	78	1	
13	32.5	0.14	0.63	475.7	93	266	265	47	84	80	1	
14	35	0.12	0.54	476.6	93	249	259	46	85	80	1	
15	37.5	0.12	0.54	477.8	91	259	259	46	84	80	1	
16	40	0.11	0.50	478.9	90	240	261	46	85	80	1	
17	42.5	0.12	0.54	480.1	89	251	258	56	89	80	1	
18	45	0.29	1.31	481.663	90	257	260	54	92	81	2	
19	47.5	0.9	4.05	484.8	84	253	253	57	91	81	5.5	
20	50	0.9	4.05	487.4	82	252	257	55	94	81	5.5	
21	52.5	0.88	3.96	490.4	81	257	255	56	95	81	5.5	
22	55	0.9	4.05	493.1	80	251	257	57	96	82	5.5	
23	57.5	0.9	4.05	49[illegible]	80	257	255	57	96	82	5.5	
24	60	0.95	4.28	498.815	78	255	261	57	96	83	6	
25												
26												
27												
28												
29												
30												

Filter Number:
Filter preweight:
Filter postweight:
Total:
Beaker ID:
Beaker preweight:
Beaker postweight:
Total:

AIR ANALYSIS, INC

RUN NUMBER 2 POLLUTANT TESTED Lead EPA METHOD 12

Meter Box #80

Start Time: 2:00 pm

End Time: 3:07 pm

Company:	Nucor	Diagram of Test Location	
Location:	Crawfordsville		
Unit Tested:	Caststrip		
Meter Operator:	TK		
Probe Operator:	MA		
Client Contact:	M&W		
Agency Contact:	DV		
V.E. Reader:	RS		
AAI Project:	Date: 12-21-04		
Barometric Pressure:	30.08		
Ambient Temperature:	35		

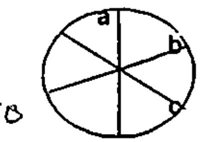
CO2		O2	
1	0	1	21
2	0	2	21
3	0	3	21
Avg.	0	Avg.	21
Silica ID		#11	
Silica wt.		.9 grams	
Impingers		0 mls	
Moisture Total		.9 mls	
Pretest Pitot Ch.		pass / fail	
Postest Pitot Ch.		pass/fail	

Nozzle size measurement

a

b

c



Avg. .250

Meter Y		0.947
Meter DeltaH@		1.867
Pretest Leak Ch.	0	cfm@ 15
Post test Leak Ch.	0	cfm@ 6

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Static Pressure: Stack Temp. (F)	Probe Temp. (F)	-0.25 Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (Inches)	NOTES
				499.99								
1	2.5	0.20	0.64	501.5	40	258	250	51	80	80	1	
2	5.0	0.20	0.86	503.1	97	258	257	51	81	80	1	K=4.3
3	7.5	0.40	1.72	504.6	91	256	255	53	83	80	3	
4	10.0	0.38	1.63	506.6	95	255	255	52	85	80	3	
5	12.5	0.38	1.63	508.4	98	254	248	52	87	80	3	
6	15.0	0.36	1.55	510.148	99	259	258	52	88	80	2	
7	17.5	0.25	1.08	511.9	101	260	251	52	86	80	2	
8	20.0	0.26	1.12	513.3	102	260	256	52	87	80	2	
9	22.5	0.28	1.20	515.1	104	263	260	54	88	80	2	
10	25.0	0.29	1.26	516.7	102	255	260	58	89	80	2	
11	27.5	0.12	0.52	517.6	106	263	262	62	89	80	1	
12	30.0	0.12	0.52	518.102	99	258	259	65	87	80	1	
13	32.5	0.14	0.60	519.8	95	263	264	65	85	80	1	
14	35.0	0.29	1.25	521.6	95	258	260	62	88	80	2.5	
15	37.5	0.37	1.59	523.5	96	261	260	61	96	80	3	
16	40.0	0.36	1.55	525.8	97	257	261	60	97	81	3	
17	42.5	0.37	1.59	527.3	98	260	260	60	97	81	3	
18	45.0	0.37	1.59	528.8	98	256	260	60	97	81	3	
19	47.5	0.29	1.25	531.0	95	263	262	58	90	81	3	
20	50.0	0.18	0.77	532.0	97	263	262	58	91	81	2	Filter Number:
21	52.5	0.14	0.60	533.3	97	260	261	58	91	81	2	Filter preweight:
22	55.0	0.24	1.03	535.2	96	260	258	59	92	81	2	Filter postweight:
23	57.5	0.34	1.46	536.5	98	260	261	60	93	81	3	Total:
24	60.0	0.35	1.51	538.093	98	258	260	61	94	82	3	Beaker ID:
25												Beaker preweight:
26												Beaker postweight:
27												Total:
28												
29												
30												

AIR ANALYSIS, INC

RUN NUMBER 3 **POLLUTANT TESTED** Lead **EPA METHOD** 12 **Start Time:** 9:25pm

Meter Box #80 **End Time:**

Company:	Nucor		
Location:	Crawfordsville, IN		
Unit Tested:	Caststrip		
Meter Operator:	TK		
Probe Operator:	MA		
Client Contact:	MW =		
Agency Contact:	DV		
V.E. Reader:	RS		
AAI Project:		**Date:**	12-21-04
Barometric Pressure:	30.08		
Ambient Temperature:			

Diagram of Test Location

CO2		O2	
1	0	1	21
2	0	2	21
3	0	3	21
Avg.	0	Avg.	21
Silica ID		12	
Silica wt.		6.2 grams	
Impingers		0 mls	
Moisture Total		6.2 mls	
Pretest Pitot Ch.		pass / fail	
Postest Pitot Ch.		pass /fail	

Nozzle size measurement
a
b
c
Avg. .250

Meter Y	0.947
Meter DeltaH@	1.867
Pretest Leak Ch. 0 cfm@	10
Post test Leak Ch. 0 cfm@	8

Traverse Point		Minutes per point	Δ P	ΔH	Meter Cu. ft.	Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
						Static Pressure		-0.25					
					538.224								
2.5	1	2.5	0.15	0.65	539.4	65	265	257	31	70	71	1	
5.0	2	5.0	0.34	1.46	541.3	70	257	258	32	68	71	2	K = 4.3
7.5	3	7.5	0.40	1.72	543.0	69	260	258	31	69	70	2.5	
10.0	4	10.0	0.17	0.73	544.4	69	258	254	31	71	70	1	
12.5	5	12.5	0.28	1.20	546.0	69	258	258	30	72	70	2	
15.0	6	15.0	0.33	1.42	547.569	72	263	256	31	74	70	2	
17.5	7	17.5	0.37	1.59	549.4	77	265	263	30	74	70	2.5	
20.0	8	20.0	0.45	1.94	551.7	77	266	261	30	77	70	3	
22.5	9	22.5	0.50	2.15	553.4	80	261	261	30	79	71	3	
25.0	10	25.0	0.49	2.11	555.5	81	259	263	31	80	71	3	
27.5	11	27.5	0.48	2.08	557.5	83	259	263	31	80	71	3	
30.0	12	30.0	0.45	1.94	559.6	86	261	265	31	81	71	3	
32.5	13	32.5	0.15	0.65	560.8	82	260	262	30	75	71	1	
35.0	14	35.0	0.20	0.86	561.9	82	263	261	30	78	72	1	
37.5	15	37.5	0.22	0.95	563.7	81	261	263	30	77	71	1	
40.0	16	40.0	0.22	0.95	565.2	80	265	261	31	77	71	1	
42.5	17	42.5	0.21	0.90	566.8	79	261	259	30	78	72	1	
45.0	18	45.0	0.22	0.95	567.927	78	262	263	30	78	71	1	
47.5	19	47.5	0.28	1.20	569.7	78	259	261	29	76	72	2	
50.0	20	50.0	0.16	0.69	570.8	78	258	265	30	78	72	1	**Filter Number:**
52.5	21	52.5	0.16	0.69	572.1	77	244	263	30	80	72	1	**Filter preweight:**
55.0	22	55.0	0.28	1.20	573.9	77	261	262	30	81	72	2	**Filter postweight:**
57.5	23	57.5	0.33	1.42	575.4	78	263	265	30	83	72	2	**Total:**
60.0	24	60.0	0.16	0.69	576.688	77	261	264	30	83	72	1	**Beaker ID:**
	25												**Beaker preweight:**
	26												**Beaker postweight:**
	27												**Total:**
	28												
	29												
	30												

AIR ANALYSIS, INC

SO2 NOx CO

RUN NUMBER 1 POLLUTANT TESTED PM/PM10 EPA METHOD 5/202

Start Time: 12:00

End Time: 1:23

Company:	Nucor
Location:	Crawfordsville
Unit Tested:	Cast Strip
Meter Operator:	M. Dixon
Probe Operator:	M. Allen
Client Contact:	M. Washer
Agency Contact:	D. VanderMolen
V.E. Reader:	R. Stoppert
AAI Project:	Date: 12-21-04
Barometric Pressure:	30.98
Ambient Temperature:	35

Diagram of Test Location

	CO2		O2
1	0	1	21
2	0	2	21
3	0	3	21
Avg.	0	Avg.	21
Silica ID		#A	
Silica wt.		10.5 grams	
Impingers		0 mls	
Moisture Total		10.5 mls	
Pretest Pitot Ch.		pass/fail	
Postest Pitot Ch.		pass/fail	

Nozzle size measurement
a 0.25
b 0.25
c 0.25
Avg. 0.25

Meter Y	0.968
Meter DeltaH@	1.87
Pretest Leak Ch.	0 cfm@ 10.0"
Post test Leak Ch.	0 cfm@ 1.80

Static Pressure -0.25

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)
				301.4							
1	2.5	0.36	1.62	303.3	79	250	254	42	83	81	3
2	5	0.40	1.80	305.4	81	248	257	42	80	81	3
3	75	0.40	1.8	306.8	86	250	254	41	81	81	3
4	10	0.37	1.67	309.7	89	245	255	42	82	81	3
5	125	0.22	0.9	310.5	90	247	254	44	85	82	1
6	15	0.19	0.855	311.9	89	249	254	45	86	82	1
7	175	0.46	2.0	313.8	95	247	260	46	89	83	3
8	20	0.47	2.1	316.3	97	247	252	44	92	83	3
9	225	0.27	1.2	317.8	96	252	252	44	93	84	2
10	25	0.21	0.95	319.3	95	248	253	44	93	84	1
11	275	0.21	0.95	320.9	94	257	255	44	93	85	1
12	30	0.21	0.95	322.3	93	251	252	44	95	86	1
13	325	0.20	0.90	323.7	90	251	256	43	93	87	1
14	35	0.20	0.90	324.9	91	255	254	44	95	88	1
15	375	0.20	0.90	326.5	90	252	255	44	95	87	1
16	40	0.20	0.90	327.6	89	249	257	44	96	86	1
17	425	0.21	0.95	329.3	88	248	278	44	97	89	1
18	45	0.31	1.4	330.9	81	254	249	44	98	89	1
19	475	0.66	2.97	333.2	83	257	246	43	99	90	6
20	50	0.65	2.92	335.6	81	249	247	45	99	91	5
21	525	0.55	2.48	338.1	80	246	244	46	99	91	4
22	55	0.67	3.0	340.6	78	246	245	48	99	[illegible]	6
23	575	0.61	2.75	343.1	78	246	250	49	99	92	5
24	60	0.60	2.7	345.32	77	248	246	50	99		5
25											
26											
27											
28											
29											
30											

NOTES

Linear
NOx SO2 CO
0 0 0
156 199 134
74.4 94 59.3
32.6

Bias
0 0 0
74.9 92 59

12-21-04

Bias
.75 0 -0.26
1.0 93 58.5

R1 and
-0.1 0 0
74.0 94 58.3

Filter Number:	R1
Filter preweight:	0.3252
Filter postweight:	0.3254
Total:	0.0002
Beaker ID:	
Beaker preweight:	54.2952
Beaker postweight:	54.2915
Total:	

Ph = 5

Blank McCl2
55.5913

Blank Acetone
54.1308
54.1297

MeCl2
54.7070
54.7043

DI
56.0021
55.9913

NOx Range 185
SO2 Range 235
CO Range 130

DI Blank
65.7912
65.7911

SO, NO, CO　　6C, 7E, 10

AIR ANALYSIS, INC

EPA METHOD 5

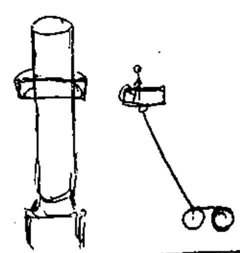
Start Time: 2:00

End Time: 3:01

RUN NUMBER 2　　POLLUTANT TESTED PM, PM10

Company:	Nucor Steel
Location:	Crawfordsville
Unit Tested:	Castrip
Meter Operator:	MD
Probe Operator:	MA
Client Contact:	MW
Agency Contact:	DV
V.E. Reader:	RS
AAI Project:	Date: 12-21-04
Barometric Pressure:	30.28
Ambient Temperature:	42

Diagram of Test Location



CO2		O2	
1	0	1	21
2	0	2	21
3	0	3	21
Avg.	0	Avg.	21
Silica ID		#B	
Silica wt.		3.2 grams	
Impingers		0 mls	
Moisture Total		3.2 mls	
Pretest Pitot Ch.		pass/fail	
Postest Pitot Ch.		pass/fail	

Nozzle size measurement	
a	
b	
c	
Avg.	0.25
Meter Y.	0.968
Meter DeltaH@	1.87
Pretest Leak Ch.	0 cfm@ 15"
Post test Leak Ch.	0 cfm@ 9"

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Static Pressure Stack Temp. (F)	Probe Temp. (F)	-0.25 Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				345.62				46	85	87	3	
1	2.5	0.13	0.56	347.2	90	220	233	47	89	87	1	
2	5	0.13	0.56	348.3	90	244	251	47	87	87	1	S C N
3	7.5	0.33	1.4	350.0	92	248	248	47	89	87	1	2 25 0
4	10	0.29	1.25	351.6	94	249	248	49	90	86	1	9 15 11
5	12.5	0.25	1.07	353.0	96	249	245	50	91	87	1	6 15 7
6	15	0.25	1.07	354.42	97	246	248	51	90	86	2	13 23 3
7	17.5	0.43	1.85	356.3	101	257	251	52	93	86	2	91 22 16
8	20	0.42	1.8	358.5	101	247	258	53	93	86	2	125 220 10
9	22.5	0.42	1.8	360.5	101	248	249	54	95	87	2	11 24 1
10	25	0.43	1.85	362.5	101	245	247	55	95	87	1	Ph=5
11	27.5	0.21	0.90	363.9	97	245	252	54	94	87	1	
12	30	0.21	0.90	365.24	96	246	252	53	93	87	0	
13	32.5	0.14	0.60	366.4	95	246	248	53	95	84	1	
14	35	0.3	1.29	368.1	96	252	249	53	96	89	1	10 15 1
15	37.5	0.40	1.72	370.1	95	250	237	53	96	89	2	3 17 0
16	40	0.38	1.6	372.5	95	252	258	53	96	89	2	13 15 0
17	42.5	0.38	1.6	374.2	96	250	247	53	96	89	2	118 16 1
18	45	0.38	1.6	376.1	96	249	260	54	94	89	1	174 16 1
19	47.5	0.30	1.29	377.4	96	250	247	53	96	89	1	Filter Number: R2
20	50	0.22	0.95	378.3	96	252	247	53	96	89	0	Filter preweight: 0.3207
21	52.5	0.15	0.65	380.1	95	246	250	54	96	89	1	Filter postweight: 0.3208
22	55	0.27	1.16	381.7	95	250	251	53	97	89	2	Total: 0.0001
23	57.5	0.34	1.46	383.2	95	250	248	55	97	90	2	Beaker ID:
24	60	0.30	1.29	384.869	97	251	252	55				Beaker preweight: 56.3113
25												Beaker postweight: 56.3010
26												Total:
27												
28												48 8 1
29												46 7 8
30												28 12 11

B MeCl　65.7912　65.7911

B Act　54.1308　54.1297

MeCl2　55.7326　55.7302

Dry ✓

59.3426

NO	SO	CO
0.07	0.0	0.1
74.3	94	59.0

SO_2 NO_x CO

AIR ANALYSIS, INC

RUN NUMBER 3 POLLUTANT TESTED PM, PM_{10} EPA METHOD 5, 10 6C 7E

Start Time: 9:28 PM

End Time: 10:38

Company:	NuwR
Location:	Civille
Unit Tested:	Castrip
Meter Operator:	MD
Probe Operator:	NA
Client Contact:	MW
Agency Contact:	DV
V.E. Reader:	Next Day
AAI Project:	Date: 12-21
Barometric Pressure:	30.08
Ambient Temperature:	33

Diagram of Test Location

CO2		O2	
1	0	1	21
2	0	2	21
3	0	3	21
Avg.	0	Avg.	21
Silica ID		#9	
Silica wt.		10.9	grams
Impingers		0	mls
Moisture Total		10.9	mls
Pretest Pitot Ch.		pass / fail	
Postest Pitot Ch.		pass / fail	

Nozzle size measurement

a

b

c

Avg. 0.25

Meter Y	0.968
Meter DeltaH@	1.87
Pretest Leak Ch.	0 cfm@ 10
Post test Leak Ch.	0 cfm@ 16

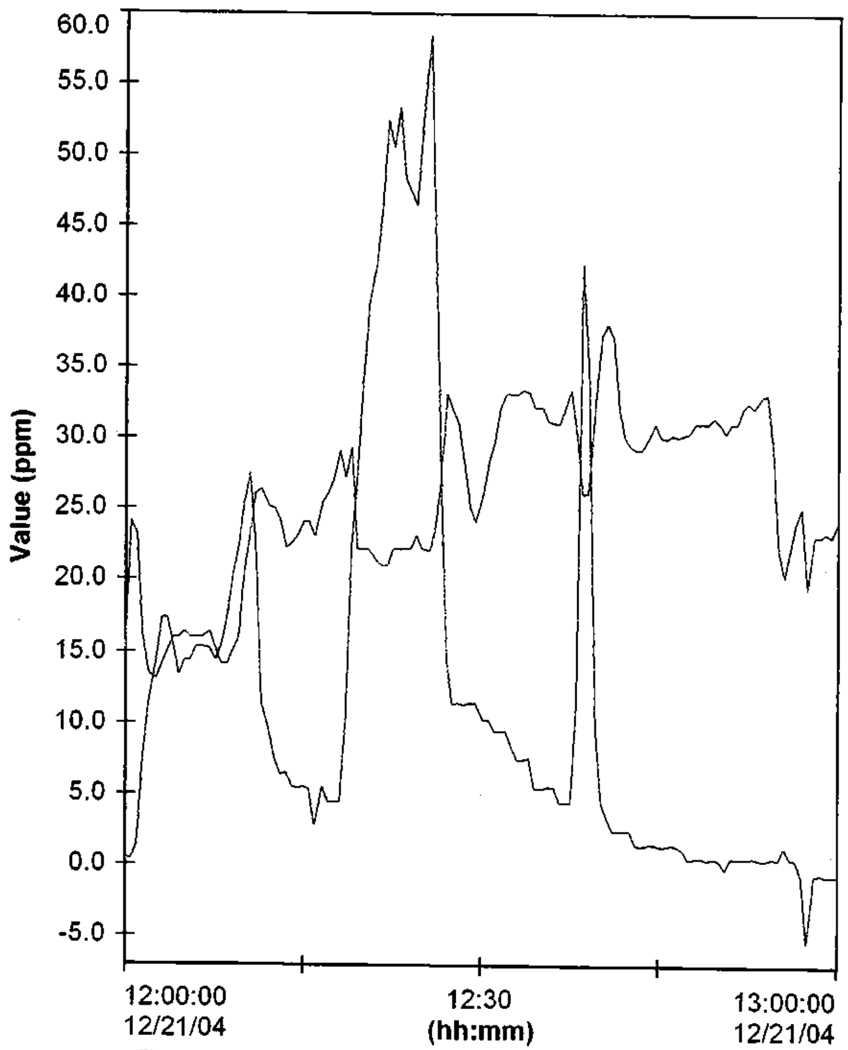
Static Pressure -0.25

Traverse Point	Minutes per point	Δ P	ΔH	Meter Cu. ft.	Stack Temp. (F)	Probe Temp. (F)	Filter Temp. (F)	Impinger Outlet Temp. (F)	Meter Inlet Temp. (F)	Meter Outlet Temp (F)	Vacuum (inches)	NOTES
				385.047								
1	2.5	0.15	0.65	386.2	65	260	264	31	73	74	1	Stop
2	5	0.37	1.59	387.0	68	257	265	31	72	74	1	
3	7.5	0.37	1.59	388.9	68	258	266	35	71	73	1	S C N
4	10	0.15	0.65	391.0	68	255	264	38	72	74	1	52 5 45
5	12.5	0.31	1.3	392.8	68	257	267	38	75	73	1	6 8 2
6	15	0.40	1.7	394.5	71	254	267	36	77	73	1	2 8 2
7	17.5	0.37	1.59	396.4	72	257	277	33	77	73	1	32 6 17.4
8	20	0.45	1.9	398.3	76	257	270	33	79	74	1	67 5 53
9	22.5	0.48	2.06	400.0	78	249	269	33	80	73	1	100 5 88
10	25	0.48	2.04	402.0	80	250	266	33	81	73	1	90 26 88
11	27.5	0.46	1.98	404.1	82	250	267	33	83	74	1	81 8.7 81
12	30	0.46	1.98	406.2	83	252	268	33	83	74	1	16 16 15
13	32.5	0.20	0.86	407.5	76	253	259	31	79	74	1	59 22 65
14	35	0.30	1.29	409.1	81	254	260	31	81	74	1	24 42 16
15	37.5	0.31	1.33	411.2	80	227	246	31	82	74	1	23 42 14
16	40	0.31	1.33	412.8	80	223	240	31	81	74	1	2 48 1
17	42.5	0.32	1.38	414.9	78	246	259	31	82	74	1	4 39 1
18	45	0.32	1.38	416.7	78	252	257	31	83	76	1	1 30 1
19	47.5	0.43	1.85	417.2	75	252	257	31	80	73	1	Filter Number: RB
20	50	0.15	0.65	418.9	75	252	256	31	81	75	1	Filter preweight: 0.3253
21	52.5	0.15	0.65	419.8	75	257	255	31	81	74	1	Filter postweight: 0.3253
22	55	0.14	0.60	421.1	75	257	257	31	80	75	1	Total: 0.0000
23	57.5	0.3	1.29	422.8	76	242	259	32	80	75	1	Beaker ID:
24	60	0.2	0.86	424.248	75	255	257	33	80	76	1	Beaker preweight: 54.1171
25												Beaker postweight: 54.1104
26												Total:
27												
28												
29												
30												

Ph-5

Blank MeCl2	Blank Acet	DI	Mill	Drift	NOx	SO2	CO
65.7912	54.1308	54.9525	53.7386	✓	0.7	0.1	0.0
65.7911	54.1297	54.9506	53.7302		78	96	59.6

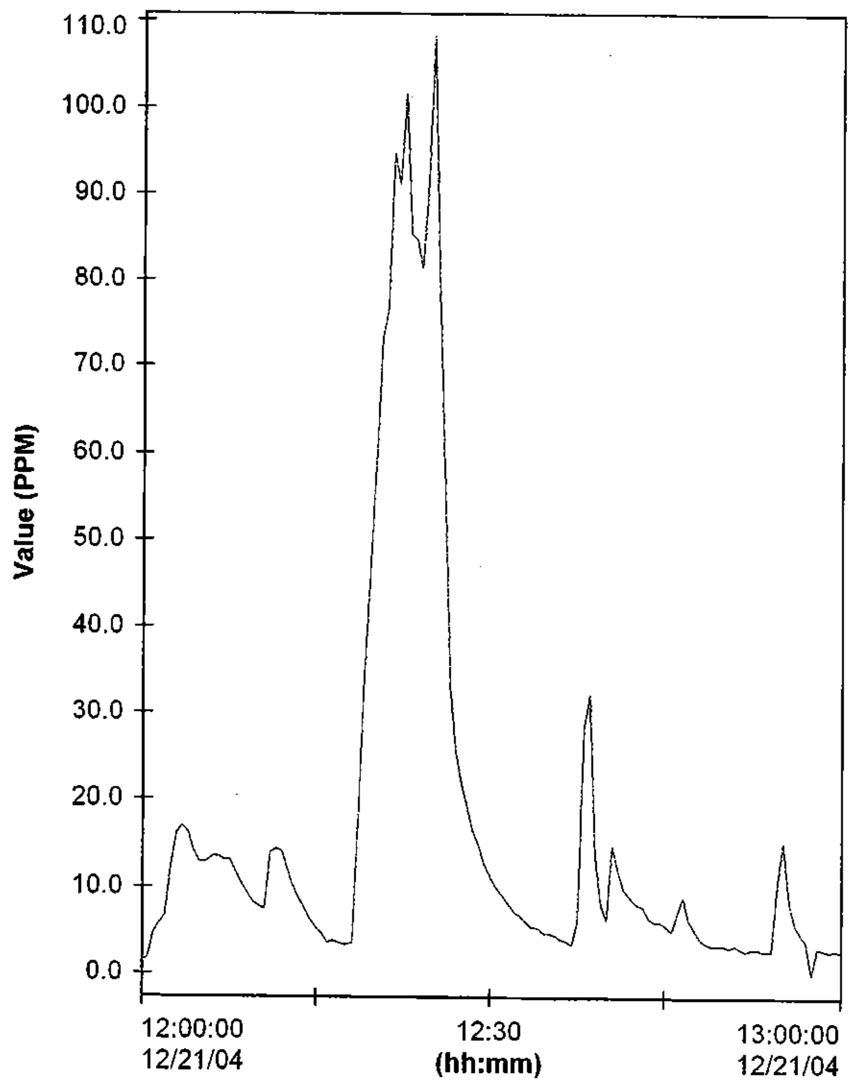
Nucor Steel
Castrip Stack Test Run 1



	Maximum	Minimum	Average
— ppm on Ch 1	58.3	-5.5	11.9
— ppm on Ch 3	38.1	13.0	25.8

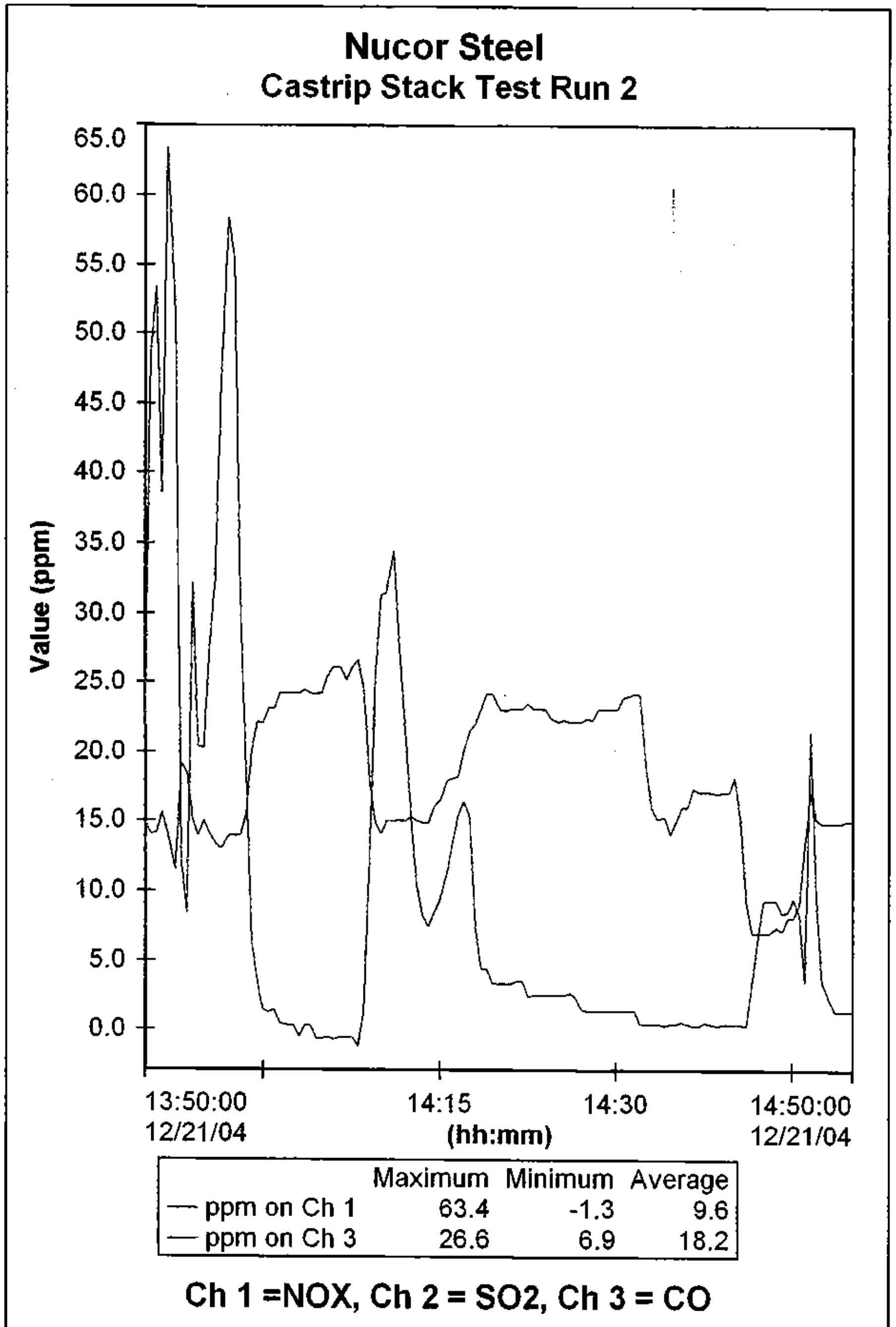
Ch 1 =NOX, Ch 2 = SO2, Ch 3 = CO

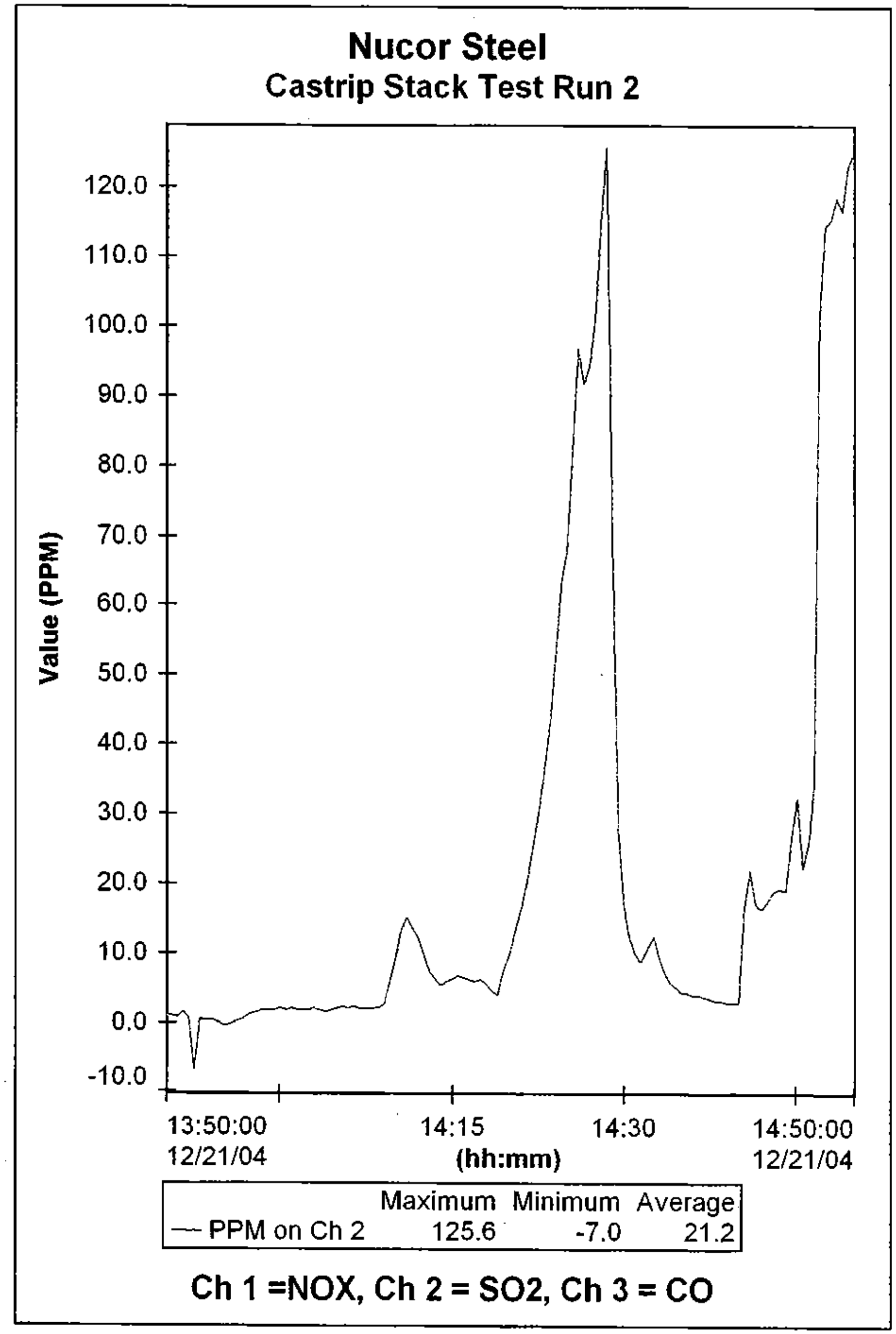
Nucor Steel
Castrip Stack Test Run 1



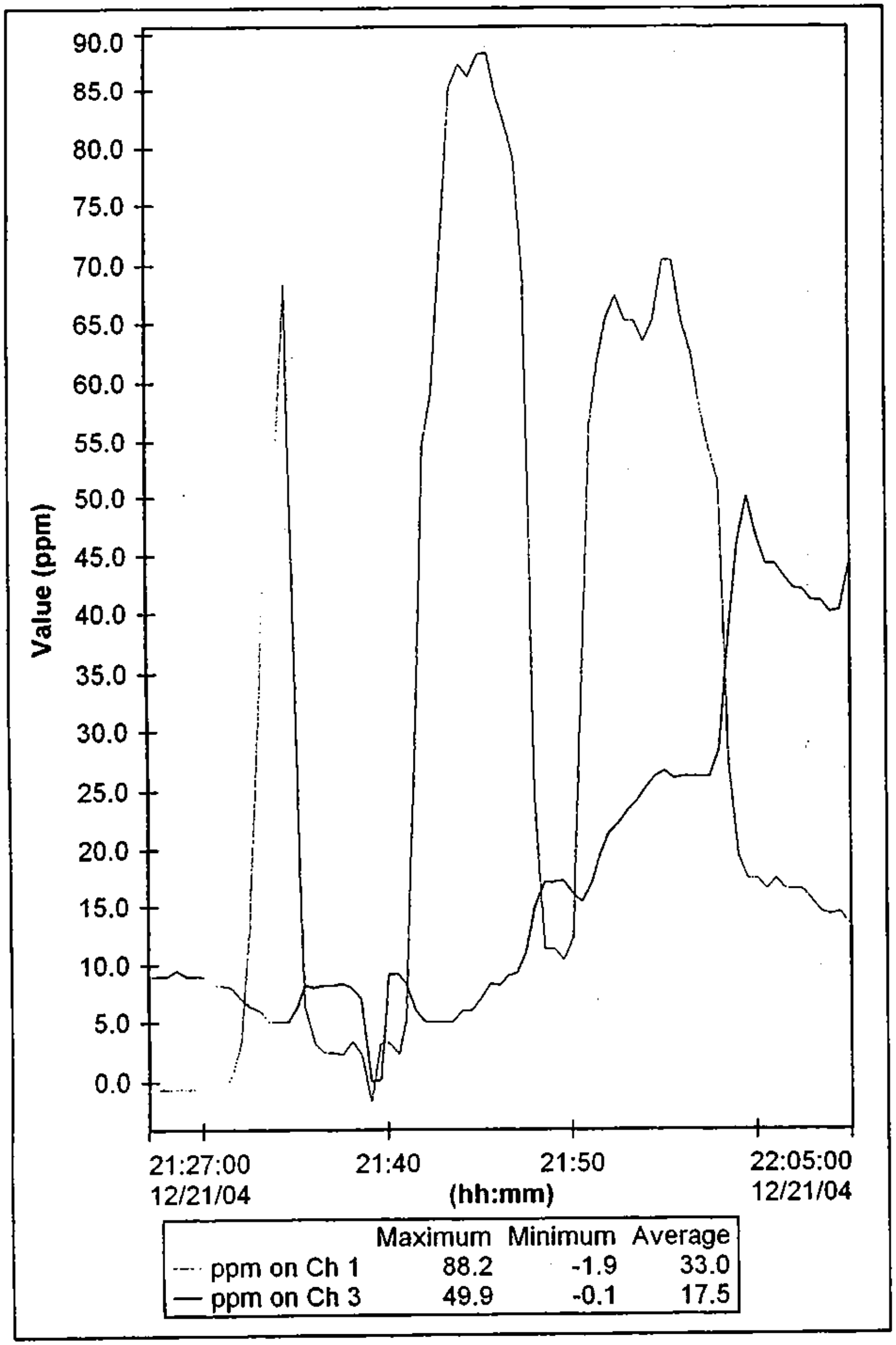
	Maximum	Minimum	Average
— PPM on Ch 2	108.0	-0.1	17.1

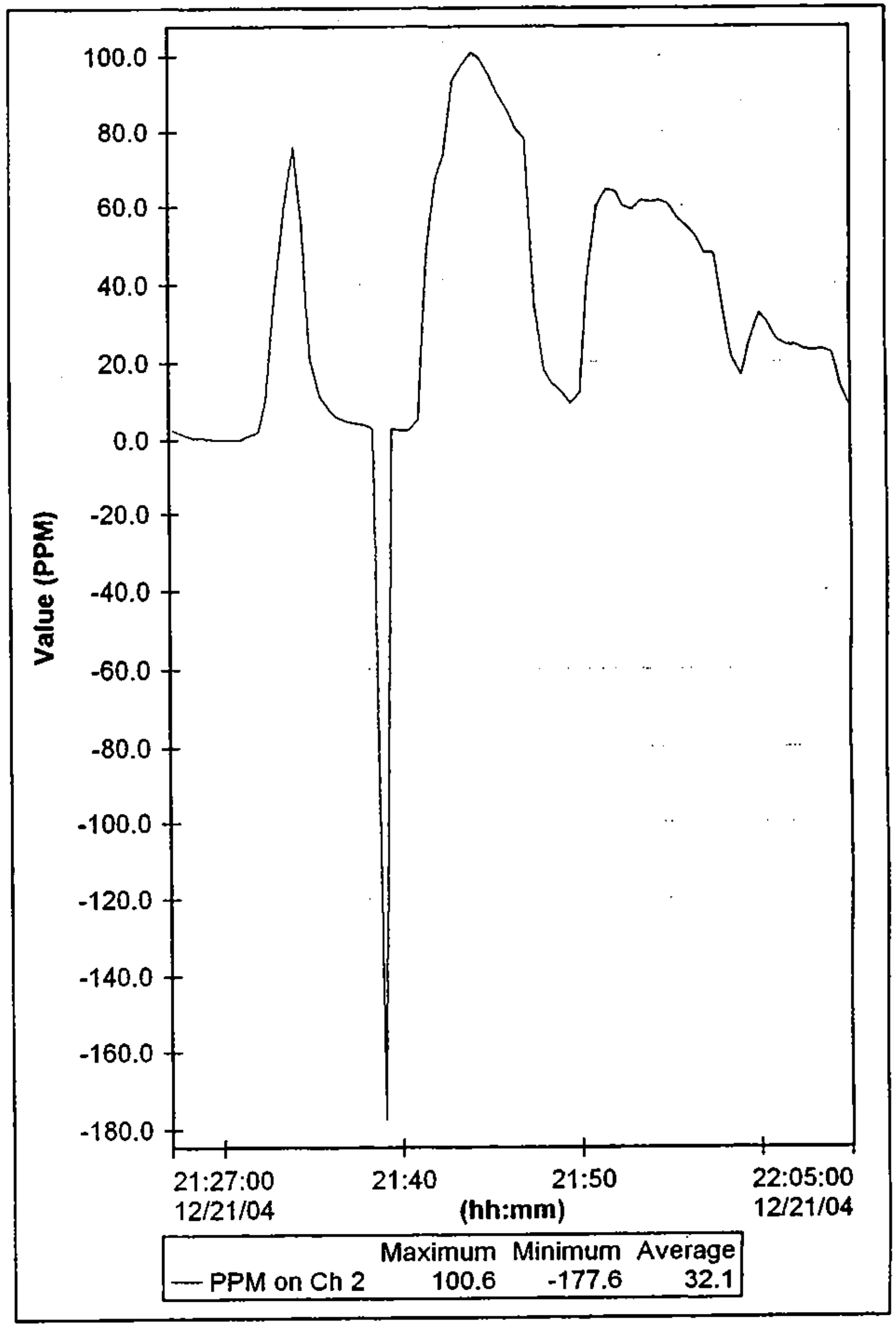
Ch 1 =NOX, Ch 2 = SO2, Ch 3 = CO


Nucor Steel
Castrip Stack Test Run 2
Value (ppm)
65.0
60.0
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
13:50:00
12/21/04
14:15
14:30
14:50:00
12/21/04
(hh:mm)
Maximum Minimum Average
ppm on Ch 1 63.4 -1.3 9.6
ppm on Ch 3 26.6 6.9 18.2
Ch 1 =NOX, Ch 2 = SO2, Ch 3 = CO


Nucor Steel
Castrip Stack Test Run 2
Value (PPM)
120.0
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
-10.0
13:50:00
12/21/04
14:15
14:30
14:50:00
12/21/04
(hh:mm)
Maximum Minimum Average
PPM on Ch 2 125.6 -7.0 21.2
Ch 1 =NOX, Ch 2 = SO2, Ch 3 = CO

View1



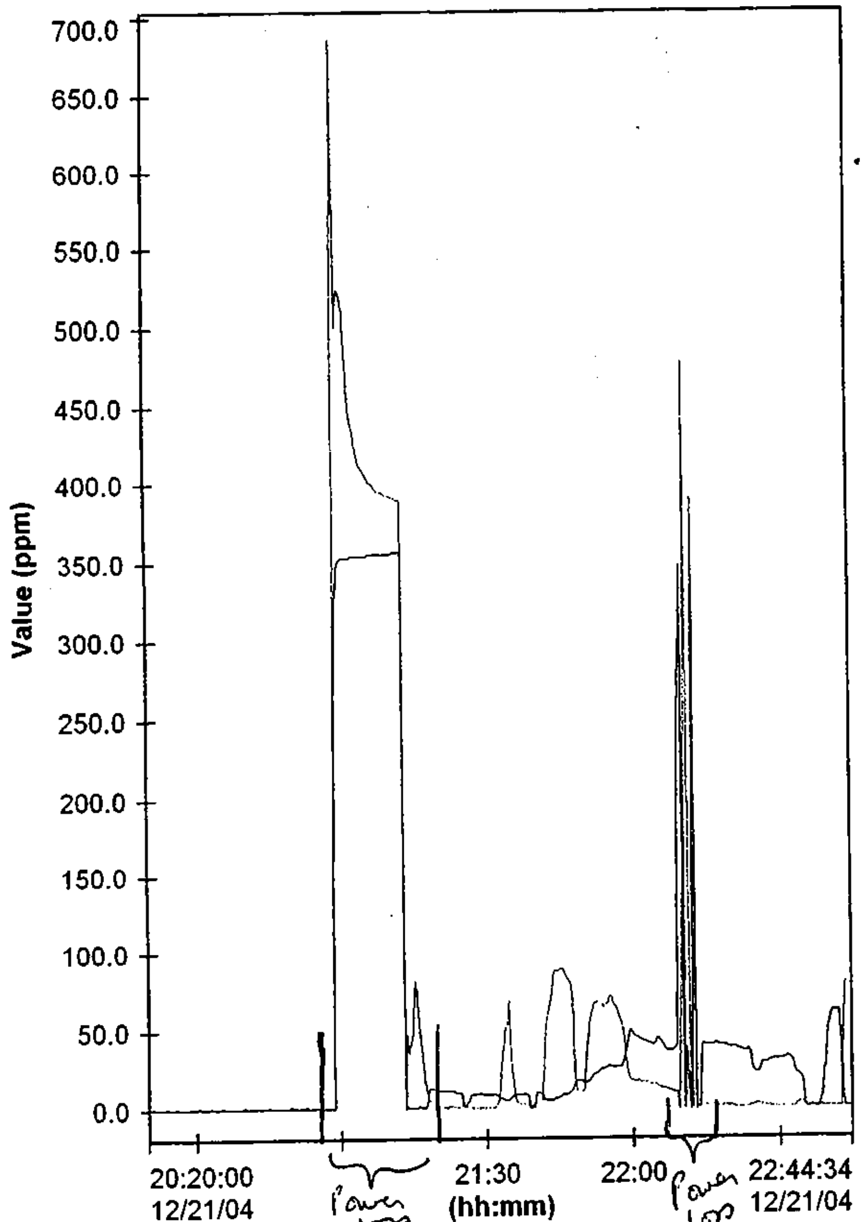


Rustra...anger

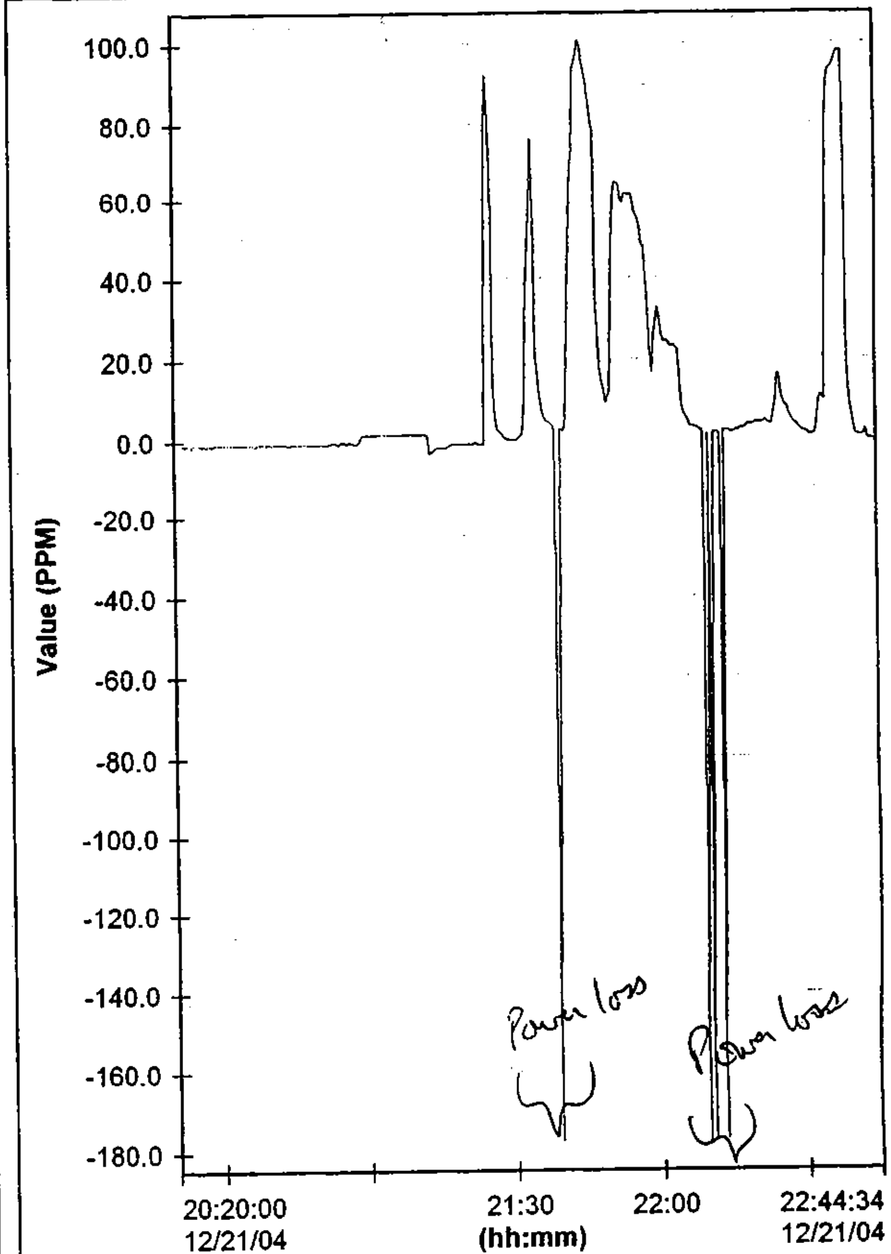
Run 3

'22/04

View1



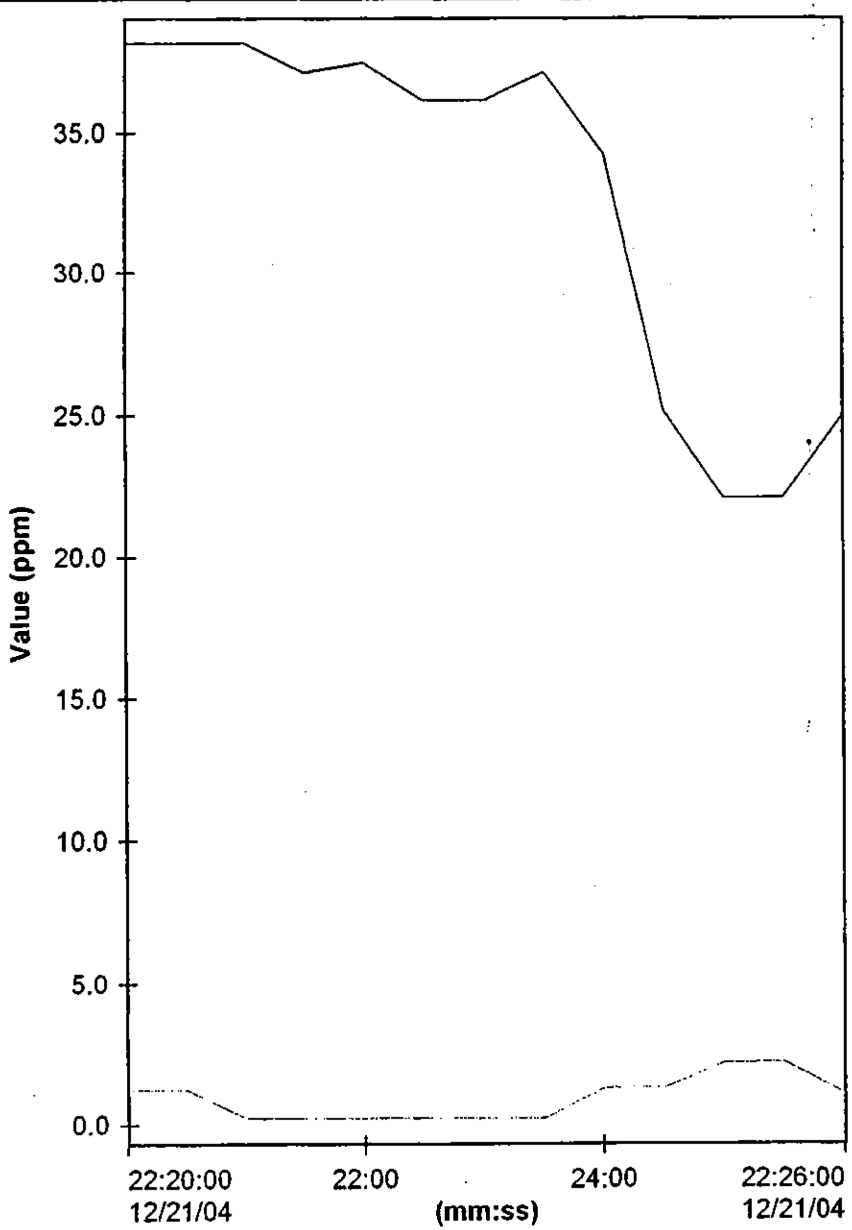
	Maximum	Minimum	Average
ppm on Ch 1	685.8	-1.9	56.7
ppm on Ch 3	362.8	-0.1	49.9



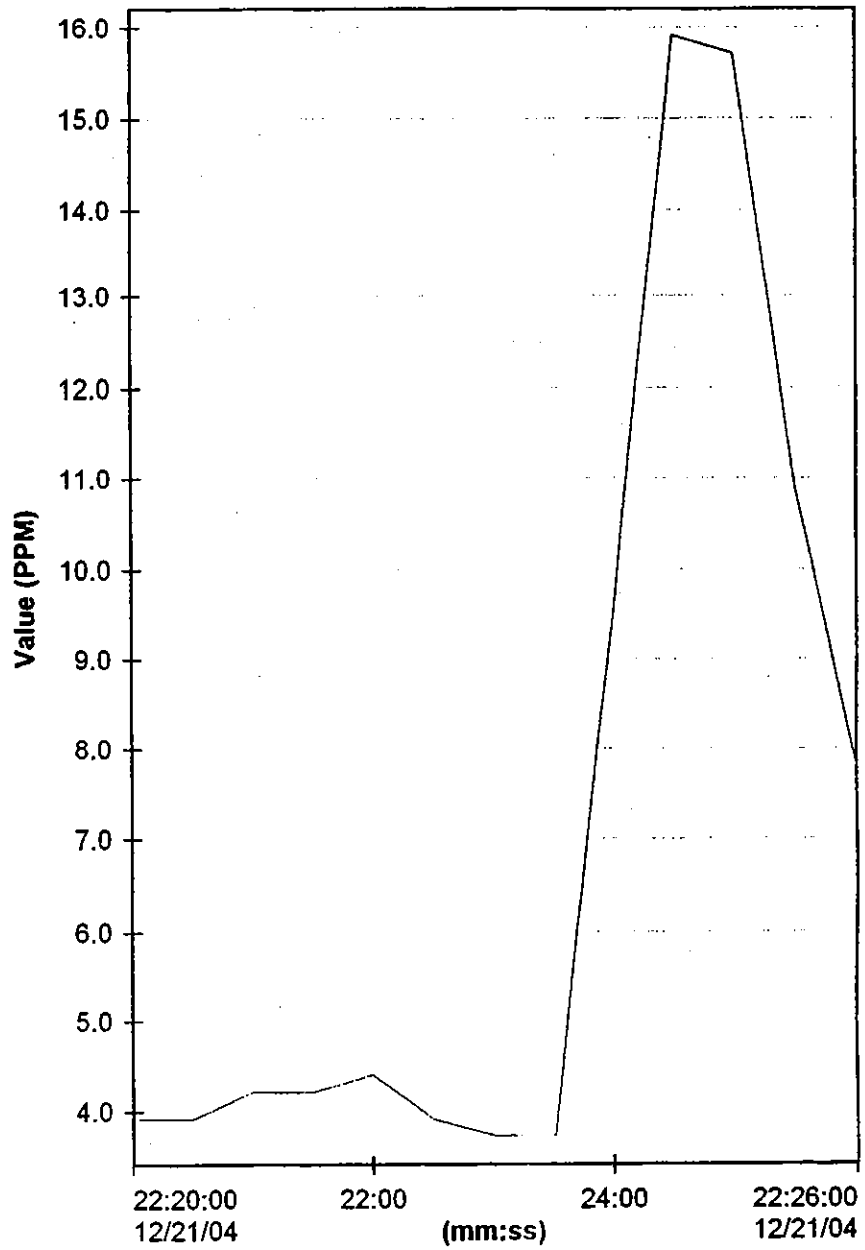
	Maximum	Minimum	Average
PPM on Ch 2	100.6	-177.6	10.6

Run 3

View1



	Maximum	Minimum	Average
ppm on Ch 1	2.2	0.2	0.9
ppm on Ch 3	38.0	22.0	32.8



	Maximum	Minimum	Average
PPM on Ch 2	15.9	3.7	7.2

Rustra. anger Run '22/04

Nucor Steel Castrip

RUN NUMBER	1	2	3
CO SPAN (%)	136.00	136.00	136.00
CO MEASURED (%)	25.80	18.20	24.86
CO SPAN GAS (%)	59.50	59.50	59.50
CO PRE-ZERO (%)	-0.26	0.00	0.10
CO POST ZERO (%)	0.00	0.10	0.00
CO PRE-SPAN (%)	59.00	58.30	59.00
CO POST SPAN (%)	58.30	59.00	59.60
INITIAL ZERO CAL BIAS (%)	-0.19	0.00	0.07
FINAL ZERO CAL BIAS (%)	0.00	0.07	0.00
ZERO DRIFT (%)	0.19	0.07	-0.07
INITIAL SPAN CAL BIAS (%)	-0.37	-0.88	-0.37
FINAL SPAN CAL BIAS (%)	-0.88	-0.37	0.07
SPAN DRIFT (%)	-0.51	0.51	0.44
CO CORRECTED (%)	**26.25**	**18.43**	**24.91**

Nucor Steel Castrip

RUN NUMBER	1	2	3
NOX SPAN (PPM)	185	185	185
NOX MEASURED (PPM)	11.9	9.6	23.0
NOX SPAN GAS (PPM)	74.5	74.5	74.5
NOX PRE-ZERO (PPM)	1.0	-0.1	0.1
NOX POST ZERO (PPM)	-0.1	0.1	0.7
NOX PRE-SPAN (PPM)	75.0	74.0	74.3
NOX POST SPAN (PPM)	74.0	74.3	78.0
INITIAL ZERO CAL BIAS (%)	0.54	-0.05	0.04
FINAL ZERO CAL BIAS (%)	-0.05	0.04	0.38
ZERO DRIFT (%)	-0.59	0.09	0.34
INITIAL SPAN CAL BIAS (%)	0.27	-0.27	-0.11
FINAL SPAN CAL BIAS (%)	-0.27	-0.11	1.89
SPAN DRIFT (%)	-0.54	0.16	2.00
NOX CORRECTED (PPM)	**11.5**	**9.7**	**22.2**

Nucor Steel Castrip

RUN NUMBER	1	2	3
SO2 SPAN (PPM)	235	235	235
SO2 MEASURED (PPM)	17.1	21.2	24.6
SO2 SPAN GAS (PPM)	94.1	94.1	94.1
S02 PRE-ZERO (PPM)	0.0	0.0	0.0
SO2 POST ZERO (PPM)	0.0	0.0	0.1
SO2 PRE-SPAN (PPM)	93.0	94.0	94.0
SO2 POST SPAN (PPM)	94.0	94.0	96.0
INITIAL ZERO CAL BIAS (%)	0.00	0.00	0.00
FINAL ZERO CAL BIAS (%)	0.00	0.00	0.04
ZERO DRIFT (%)	0.00	0.00	0.04
INITIAL SPAN CAL BIAS (%)	-0.47	-0.04	-0.04
FINAL SPAN CAL BIAS (%)	-0.04	-0.04	0.81
SPAN DRIFT (%)	0.43	0.00	0.85
SO2 CORRECTED (PPM)	**17.2**	**21.2**	**24.3**

Nucor Steel -- ANALYZER CALIBRATION DATA
Castrip
Crawfordsville, IN
December 21, 2004
8:00 AM

	TAG	ANALYZER RESPONSE	PERCENT DIFFERENCE
CO			
SPAN 0-136 ppm			
ZERO	0.00	0.00	0.00%
LOW	30.10	30.60	0.37%
MID	59.50	59.30	-0.15%
HIGH	134.00	134.00	0.00%
SPAN		136	
NOX			
SPAN 0-185 PPM			
ZERO	0.00	0.0	0.00%
MID	74.5	74.4	-0.05%
HIGH	156.00	156.0	0.00%
SPAN		185	

Nucor Steel -- ANALYZER CALIBRATION DATA
Castrip
Crawfordsville, IN
December 21, 2004
8:00 AM

	TAG	ANALYZER RESPONSE	PERCENT DIFFERENCE
SO2			
SPAN 0-235			
ZERO	0.00	0.00	0.00%
MID	94.10	94.00	-0.07%
HIGH	199.00	199.00	0.00%
SPAN		235	

Run 3

Time	Total Min	NOx	SO2	CO
9:28-9:38	10	13.2	14.7	7.4
9:41-10:09	28	41.5	41.6	25.7
10:15-10:34	19	0.8	4.8	32.8

Time weighted avg.

	0.175439	2.315789	2.578947	1.298246
	0.491228	20.38596	20.43509	12.62456
	0.333333	0.266667	1.6	10.93333
		22.96842	**24.61404**	**24.85614**

APPENDIX IV

SEVERN TRENT STL

STL Indianapolis Service Center
4299 W. 96th Street
Indianapolis, IN 46268

Tel: 317 228 9400 Fax: 317 228 9440
www.stl-inc.com

January 10, 2005

Mike Dicen
Air Analysis
3904 Clarks Creek Road
Plainfield, IN 46168

Re: Nucor Steel, Crawfordsville

Dear Mike:

It is with regret that I am detailing the Nucor Steel, Crawfordsville Lead project that you entrusted to STL. What should have been an opportunity to provide outstanding local service for a premier analytical laboratory has evolved into several unfortunate circumstances. On December 22, 2004, I received your samples on behalf of STL and forwarded them to STL Valparaiso at your request. The samples were received intact at STL Indianapolis and were couriered via STL employees to STL Valparaiso that same day.

Due to the Holidays, the STL Valparaiso team completed their review of this project on January 3, 2005. They concluded that they were no longer setup to complete this project as specified in EPA Method 12. Upon this conclusion, the samples were forwarded to STL Knoxville, which provided you with the quote detailing the analytical cost of this project. The quote highlighted a significant increase in costs and change of how the runs were analyzed. At your request, the quote was revised to reflect analyzing the filters and HNO3 solutions together. Even with this change, the price was still quite different due to the use of Hydrofluoric Acid in the digestion process by STL Knoxville to break down the filters adequately. STL Knoxville suggested that they forward the samples to Element One for you based on your requests and their capabilities.

Meanwhile, when STL Valparaiso had packaged the samples for shipment to STL Knoxville, they were incorrectly packed on ice. During shipment, some of the melted ice entered the Petri dishes containing the filters, thus compromising the integrity of the filter portion for all of the samples. Upon receipt, STL Knoxville contacted STL Valparaiso and STL Indianapolis to determine possible solutions. STL Knoxville called you on January 5, to inform you of the situation and STL Valparaiso's willingness to cover the cost of resampling, if necessary. You suggested the use of particulate filters in place of the initial filters. Upon further consideration, you requested that STL Knoxville forward the HNO3 solutions to Element One in Wilmington, NC. The solutions left STL Knoxville January 6, 2005 and were received at Element One on January 7, 2005.

If you need further explanation of these events or have questions about this event, please do not hesitate to contact me. I look forward to discuss STL's capabilities, how they fit your analytical needs and to learn from unfortunate circumstances.

Sincerely,

Sue Barto

Sue Barto
Service Center Manager

Air Analysis, Inc.

3904 Clarks Creek Road
Plainfield, IN 46168

Project - NUCOR STEEL

Lead

EPA Methods 12 Analysis

Analytical Report
4417

el1

Element One, Inc.
5022-C Wrightsville Av., Wilmington, NC 28403
910-793-0128 FAX:910-792-6853 e1lab@hotmail.com

The following data for Analytical Report 4417
has been reviewed for completeness, accuracy,
adherence to method protocol,
and compliance with quality assurance guidelines.

Quality Assurance Review by:

Melissa Lawrence, QA Officer
January 24, 2005

Report Reviewed and Finalized By:

Ken Smith, Laboratory Director
January 24, 2005

el1

SUMMARY OF RESULTS

el$_1$

SUMMARY OF RESULTS

Summary of Impinger Analysis

Element	Run 1 Total µg	Run 2 Total µg	Run 3 Total µg	Blank Total µg	Run 3 Spike Recovery
Lead, Average	47.7	9.32	0.590	< 0.3	105%
Triplicate RSD	0.7%	0.3%	0.5%	1.0%	

Summary of Filter Analysis

Element	Run 1 Total µg	Run 2 Total µg	Run 3 Total µg	Blank Total µg	Run 3 Spike Recovery
Lead, Average	6.82	5.85	6.13	0.528	98%
Triplicate RSD	3.5%	3.0%	2.7%	1.1%	

ANALYTICAL NARRATIVE

el$_1$

Element One Analytical Narrative

Client	Air Analysis, Inc	Element One #:	4417
Client ID:	Nucor Steel	Analyst:	DBW
Method:	12	Dates Received	1/7 & 13/05
Analytes	Lead	Dates Analyzed	1/24/05

Summary of Analysis

The Method 12 samples were prepared and analyzed according to the method protocol. After digestion the samples were brought to volume of 100 ml. The digested samples were analyzed for on a PerkinElmer ELAN 6100 ICP-MS.

Detection Limits

The ICP-MS instrument reporting limit was 2.5 µg/L for lead.

Analysis QA/QC

The spike recovery data and triplicate analyses relative standard deviations are summarized with the results. All QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. Nothing unusual was noticed with any of the samples or analyses.

SAMPLE CUSTODY

el$_1$

4417 5-3809

SEVERN TRENT **STL**

STL Valparaiso
2400 Cumberland Drive
Valparaiso, IN 46383
Phone: 219-464-2389
Fax: 219-462-2953

Report To:
Contact: M. Dx[illegible]
Company: Air Analysis
Address: 3304 Clark Creek
[illegible]
Phone: [illegible]
Fax: [illegible]
E-Mail: [illegible]

Bill To:
Contact: Same
Company:
Address:
Phone:
Fax:
PO#: Quote:

COPY

Shaded Areas For Internal Use Only ____ of ____

Package Sealed Yes No	Samples Sealed Yes No
Received on Ice Yes No	Samples Intact Yes No
Temperature °C of Cooler	
Within Hold Time Yes No	Preserv. Indicated Yes No NA
pH Check OK Yes No NA	Res Cl_2 Check OK Yes No NA
Sample Labels and COC Agree Yes No	COC not present

Sampler Name: Air Analysis
Signature: [illegible signature]
Project Name: Nucor Steel
Project Number:
Project Location: Crawfordsville
Date Required Hard Copy: __/__/__ Fax: __/__/__
Lab PM:

Refrg # / # / Cont. / Volume / Preserv

Analyses for lead

Laboratory ID	MS-MSD	Client Sample ID	Sampling Date	Sampling Time	Matrix	Comp/Grab	Analyses	Additional Analyses / Remarks
		Run 1	12 21	12P				Method 12
		Run 2	12 21	2P			0.1N HNO_3	EPA Stack Test
		Run 3	12 21	930P				Method
		Blank						40 CFR 60
								App B
		Run 1 Filter	12 21	12P				
		Run 2 Filter	"	2P			glass fiber filters	No Custody Seals
		Run 3 Filter	"	930P				Rec'd Temp. 3°C
								1 COOLER / UPS Ground
		Received for Element One Inc	1-7+3-05				Ken Smith	T#1276 8W 4203 4339 750
								ADF 01-05-05

Received by: Andrew D. Flores 01-05-05 Relinquished by: Andrew D. Flores 01-06-05 15:55

RELINQUISHED BY MD	COMPANY AAI	DATE 12.22	TIME 11A	RECEIVED BY Sue Banks	COMPANY STL	DATE 12/22/04	TIME 1230
RELINQUISHED BY Sue Banks	COMPANY STL	DATE 12/22/04	TIME 1910	RECEIVED BY	COMPANY STL	DATE 12/22/04	TIME 19:10

Matrix Key
WW = Wastewater
W = Water
S = Soil
SL = Sludge
MS = Miscellaneous
OL = Oil
A = Air
SE = Sediment
SO = Solid
DS = Drum Solid
DL = Drum Liquid
L = Leachate
WI = Wipe
O = A

STL

Container Key 1 L 22 4
1. Plastic
2. VOA Vial
3. Sterile Plastic
4. Amber Glass
5. Widemouth Glass
6. Other P

Preservative Key 3
1. HCl, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. Cool to 4°
7. None

COMMENTS
ONLY SENDING
NITRIC RINSES
FILTERS WILL BE SENT
FROM ANOTHER LAB
Andrew D. Flores 01-06-05

Date Received / /
Courier: Hand Delivered ☐
Bill of Lading

ANALYTICAL DATA

el_1

elementOne **AIR TESTING SAMPLE SUBMISSION FORM** Lab ID # 4417

Project ID: Nucor Steel

Reference Method **M-12**

DUE DATE: 1/24/05

Client Instructions:	Per Mike Dicen via phone: Analyze the impingers and filters **SEPARATELY**. Report total ug for each fraction

	Sample Identification		Sample Identification
1	Impinger Run 1	5	Filter Run 1
2	Impinger Run 2	6	Filter Run 2
3	Impinger Run 3	7	Filter Run 3
4	Impinger Blank	8	Filter Blank

Analyses Requested: Pb Spike all R-3's

HNO_3 Lot: 1164050	HF Lot:	HCl Lot:	Reference Method
Volume Marked Y / N	Volume Loss Y / N ?	pH < 2.0 Y / N	Method 12

SAMPLE	BV	FV	Spike	Comments
LRB	100	100		
LRB+	↓		5ug	Lot 021404-A
1	245			
2	258			
3	211			
4	219	↓		
5				
6				
7				
8				

Dataset Report

User Name: daphne.woodman
Computer Name: ICPMS1
Dataset File Path: c:\elandata\dataset\11905-2\
Report Date/Time: Monday, January 24, 2005 12:21:02

Daph Woodman
1-24-05

Autosampler Position: 3

The Dataset

Time	Sample ID	Batch ID	Read Type	Description	Init. Quant	Prep. Vol.	Aliquot. Vol.	Diluted \
14:14:09 Wed 19-Jan-05	Blank		Blank					
14:16:10 Wed 19-Jan-05	Standard 1		Standard #1					
14:18:11 Wed 19-Jan-05	Standard 2		Standard #2					
14:20:13 Wed 19-Jan-05	Standard 3		Standard #3					
14:22:14 Wed 19-Jan-05	Standard 4		Standard #4					
14:24:15 Wed 19-Jan-05	QC Std 1		QC Std #1					
14:26:17 Wed 19-Jan-05	QC Std 2		QC Std #2					
14:28:18 Wed 19-Jan-05	QC Std 3		QC Std #3					
14:30:19 Wed 19-Jan-05	QC Std 4		QC Std #4					
14:32:23 Wed 19-Jan-05	LRB		Sample	Air Analysis Inc.				
14:34:28 Wed 19-Jan-05	LRB	s	Spike - 1	Air Analysis Inc.				
14:36:34 Wed 19-Jan-05	4417-1		Sample	Air Analysis Inc.				
14:38:40 Wed 19-Jan-05	4417-2		Sample	Air Analysis Inc.				
14:40:44 Wed 19-Jan-05	4417-3		Sample	Air Analysis Inc.				
14:42:47 Wed 19-Jan-05	4417-3	s	Spike - 1	Air Analysis Inc.				
14:44:50 Wed 19-Jan-05	4417-4		Sample	Air Analysis Inc.				
14:46:54 Wed 19-Jan-05	4417-5		Sample	Air Analysis Inc.				
14:48:57 Wed 19-Jan-05	4417-6		Sample	Air Analysis Inc.				
14:51:00 Wed 19-Jan-05	4417-7		Sample	Air Analysis Inc.				
14:53:04 Wed 19-Jan-05	4417-7	s	Spike - 1	Air Analysis Inc.				
14:55:05 Wed 19-Jan-05	QC Std 1		QC Std #1					
14:57:05 Wed 19-Jan-05	QC Std 4		QC Std #4					
14:59:10 Wed 19-Jan-05	4417-8		Sample	Air Analysis Inc.				
15:01:10 Wed 19-Jan-05	QC Std 1		QC Std #1					
15:03:11 Wed 19-Jan-05	QC Std 4		QC Std #4					
15:11:30 Wed 19-Jan-05	Blank		Blank					
15:13:30 Wed 19-Jan-05	Standard 1		Standard #1					
15:15:31 Wed 19-Jan-05	Standard 2		Standard #2					
15:17:33 Wed 19-Jan-05	Standard 3		Standard #3					
15:19:35 Wed 19-Jan-05	Standard 4		Standard #4					
15:21:36 Wed 19-Jan-05	QC Std 1		QC Std #1					
15:23:37 Wed 19-Jan-05	QC Std 2		QC Std #2					
15:25:38 Wed 19-Jan-05	QC Std 3		QC Std #3					
15:27:39 Wed 19-Jan-05	QC Std 4		QC Std #4					
15:29:44 Wed 19-Jan-05	LRB		Sample	Air Analysis Inc.				
15:31:49 Wed 19-Jan-05	LRB	s	Spike - 1	Air Analysis Inc.				
15:33:54 Wed 19-Jan-05	4417-1		Sample	Air Analysis Inc.				
15:36:00 Wed 19-Jan-05	4417-2		Sample	Air Analysis Inc.				
15:38:04 Wed 19-Jan-05	4417-3		Sample	Air Analysis Inc.				
15:40:08 Wed 19-Jan-05	4417-3	s	Spike - 1	Air Analysis Inc.				
15:42:11 Wed 19-Jan-05	4417-4		Sample	Air Analysis Inc.				
15:44:14 Wed 19-Jan-05	4417-5		Sample	Air Analysis Inc.				
15:46:17 Wed 19-Jan-05	4417-6		Sample	Air Analysis Inc.				

15:48:21 Wed 19-Jan-05	4417-7		Sample	Air Analysis Inc.
15:50:25 Wed 19-Jan-05	4417-7	s	Spike - 1	Air Analysis Inc.
15:52:25 Wed 19-Jan-05	QC Std 1		QC Std #1	
15:54:26 Wed 19-Jan-05	QC Std 4		QC Std #4	
15:56:30 Wed 19-Jan-05	4417-8		Sample	Air Analysis Inc.
15:58:31 Wed 19-Jan-05	QC Std 1		QC Std #1	
16:00:31 Wed 19-Jan-05	QC Std 4		QC Std #4	
11:20:00 Mon 24-Jan-05	Blank		Blank	
11:22:00 Mon 24-Jan-05	Standard 1		Standard #1	
11:24:01 Mon 24-Jan-05	Standard 2		Standard #2	
11:26:03 Mon 24-Jan-05	Standard 3		Standard #3	
11:28:05 Mon 24-Jan-05	Standard 4		Standard #4	
11:30:05 Mon 24-Jan-05	QC Std 1		QC Std #1	
11:32:07 Mon 24-Jan-05	QC Std 2		QC Std #2	
11:34:08 Mon 24-Jan-05	QC Std 3		QC Std #3	
11:36:09 Mon 24-Jan-05	QC Std 4		QC Std #4	
11:38:14 Mon 24-Jan-05	LRB		Sample	Air Analysis
11:40:19 Mon 24-Jan-05	LRB	s	Spike - 1	Air Analysis
11:42:24 Mon 24-Jan-05	4417-1		Sample	Air Analysis
11:44:30 Mon 24-Jan-05	4417-2		Sample	Air Analysis
11:46:34 Mon 24-Jan-05	4417-3		Sample	Air Analysis
11:48:37 Mon 24-Jan-05	4417-3	s	Spike - 1	Air Analysis
11:50:40 Mon 24-Jan-05	4417-4		Sample	Air Analysis
11:52:44 Mon 24-Jan-05	4417-5		Sample	Air Analysis
11:54:47 Mon 24-Jan-05	4417-6		Sample	Air Analysis
11:56:50 Mon 24-Jan-05	4417-7		Sample	Air Analysis
11:58:54 Mon 24-Jan-05	4417-7	s	Spike - 1	Air Analysis
12:00:54 Mon 24-Jan-05	QC Std 1		QC Std #1	
12:02:55 Mon 24-Jan-05	QC Std 4		QC Std #4	
12:05:00 Mon 24-Jan-05	4417-8		Sample	Air Analysis
12:07:00 Mon 24-Jan-05	QC Std 1		QC Std #1	
12:09:01 Mon 24-Jan-05	QC Std 4		QC Std #4	
12:11:19 Mon 24-Jan-05	4417-7	X2	Sample	Air Analysis
12:13:24 Mon 24-Jan-05	4417-7	X2S	Spike - 1	Air Analysis
12:15:24 Mon 24-Jan-05	QC Std 1		QC Std #1	
12:17:25 Mon 24-Jan-05	QC Std 4		QC Std #4	

Sample/Batch Report

User Name: daphne.woodman
Computer Name: ICPMS1
Sample File: C:\elandata\Sample\Method 12.sam
Report Date/Time: Monday, January 24, 2005 12:21:07

Daph Wood
1-24-05

A/S Loc.	Batch ID	Sample ID	Description	Sample Type	Init. Quant.	Prep. Vol.	Aliquot Vol.	Diluted Vol.	Solids Ratio
10		LRB	Air Analysis						
11	s	LRB	Air Analysis	Spike - 1					
12		4417-1	Air Analysis						
13		4417-2	Air Analysis						
14		4417-3	Air Analysis						
15	s	4417-3	Air Analysis	Spike - 1					
16		4417-4	Air Analysis						
17		4417-5	Air Analysis						
18		4417-6	Air Analysis						
19		4417-7	Air Analysis						
20	s	4417-7	Air Analysis	Spike - 1					
21		4417-8	Air Analysis						
22	X2	4417-7	Air Analysis						
23	X2S	4417-7	Air Analysis	Spike - 1					

elementOne | ICP-MS RUN SHEET | 4417

Analyst: __DBW____ Date: 1-19-05 **Solid Samples** ☐ / *Liquid Samples*

Daph Wood
1-24-05

A/S Loc	Batch # for sample sets	Sample Lab ID	Sample Description	Type Sample QC Spike QC Dup QC Reg Blank	Spike concentratio	Prep Volume (ml)	Aliquot (ml)	Diluted to Volume (ml)	Units
10			LRB	S		100			
11			LRB	SS	Table #1	100			
12			4417-1	S		100			
13			4417-2	S		100			
14			4417-3	S		100			
15			4417-3	SS	Table #1	100			
16			4417-4	S		100			
17			4417-5	S		100			
18			4417-6	S		100			
19			4417-7	S		100			
20			4417-7	SS	Table #1	100			
21			4417-8	S		100			
Recheck on 1/24/05									
10			LRB	S		100			
11			LRB	SS	Table #1	100			
12			4417-1	S		100			
13			4417-2	S		100			
14			4417-3	S		100			
15			4417-3	SS	Table #1	100			
16			4417-4	S		100			
17			4417-5	S		100			

elementOne **ICP-MS RUN SHEET** **4417**

Analyst: __DBW____ Date: 1-19-05 **Solid Samples** ☐ / *Liquid Samples*

18			4417-6	S		100			
19			4417-7	S		100			
20			4417-7	SS	Table #1	100			
21			4417-8	S		100			
22			4417-7	S		100	5.0	10	
23			4417-7	SS	Table #1	100	5.0	10	

Spikes are post at 0.02mL of 25ppm spiking solutions lot 021404-ABC & F in a final volume of 10ml.

Submitted for QC:	Date: 1-24-05 DW	Time: 14:40	By: DW	QC Review:	Date:	Time:	By:
Re-Test Required:	No:	Yes:	Comments:				
Resubmitted for QC:	Date:	Time:	By:	QC Review:	Date:	Time:	By:

ELAN Instrum Control Session - [Quantitative Analysis Method - C:\elandata\Meth rigon Method 12.mth]

File Edit Analysis Options Window Help

Timing | Processing | Equation | Calibration | Sampling | Devices | QC...

	Analyte	Mass (amu)	Spike Table 1 (Conc.)	Spike Table 1 Det. Limit (Conc.)	Spike Table 2 (Conc.)	Spike Table 2 Det. Limit (Conc.)	Spike Table 3 (Conc.)	Spike Table 3 Det. Limit (Conc.)	Spike Table 4 (Conc.)	D
1	Rh	102.905								
2	Pb	207.977	50	0.001	25	1	100	1		
3	Kr	82.9141						1		

Report

Notes

Frequency | QC Std Int Stds | Calibration Stds | Sample Int Stds | Sample | Spike | Dilution | Duplicate | Spike Tables | QC Action Controls | Autosampler

For help, Press F1 NUM LOG

Start | Microsoft Word ... | GpibManager | ELAN Instru... | ELAN Edit/Repr... | Microsoft Excel -... 4:05 PM

Method 6020 Multi Metals Summary Report
Sample ID: Blank
Sample Date Monday, January 24, 2005 11:20:00
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	391480.9		ppb
|>	Ho	165	938511.3		ppb
|-	Pb	208	2909		ppb
	Kr	83	107.7		ppb

Replicates
Concentration

Concentration

Concentration

Method 6020 Multi Metals Summary Report
Sample ID: Standard 1
Sample Date Monday, January 24, 2005 11:22:00
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	394611		ppb
|>	Ho	165	928838.7		ppb
|-	Pb	208	44084.5	0.94342	ppb
	Kr	83	90.2		ppb

Replicates
Concentration

0.936532

Concentration

0.944347

Concentration

0.949393

Method 6020 Multi Metals Summary Report
Sample ID: Standard 2
Sample Date Monday, January 24, 2005 11:24:01
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	393694.6		ppb
|>	Ho	165	936654.2		ppb
|-	Pb	208	4346126.2	98.61091	ppb
	Kr	83	96.2		ppb

Replicates
Concentration

97.863184

Concentration

98.250378

Concentration

99.719171

Method 6020 Multi Metals Summary Report
Sample ID: Standard 3
Sample Date Monday, January 24, 2005 11:26:03
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	378395		ppb
|>	Ho	165	919401		ppb
|-	Pb	208	22340120	516.67433	ppb
	Kr	83	127.7		ppb

Replicates
Concentration

512.54341

Concentration

516.53282

Concentration

520.94676

Method 6020 Multi Metals Summary Report
Sample ID: Standard 4
Sample Date Monday, January 24, 2005 11:28:05
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	436937.7		ppb
|>	Ho	165	1036575.2		ppb
|-	Pb	208	48342772	991.8018	ppb
	Kr	83	96.3		ppb

Replicates
Concentration

994.36852

Concentration

993.28313

Concentration

987.75376

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date Monday, January 24, 2005 11:30:05
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	395817.2		ppb
|>	Ho	165	941154.7		ppb
|-	Pb	208	21569.5	0.42297	ppb
	Kr	83	85.7		ppb

Replicates
Concentration

0.579235

Concentration

0.36756

Concentration

0.322105

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 2
Sample Date Monday, January 24, 2005 11:32:07
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	392382.7		ppb
|>	Ho	165	936623.8		ppb
|-	Pb	208	47244.8	1.00689	ppb
	Kr	83	100		ppb

Replicates
Concentration

1.018207

Concentration

0.993799

Concentration

1.008649

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 3
Sample Date Monday, January 24, 2005 11:34:08
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	362856.5		ppb
|>	Ho	165	883614		ppb
|-	Pb	208	8102509.9	194.948	ppb
	Kr	83	97.3		ppb

Replicates
Concentration

195.06686

Concentration

195.08779

Concentration

194.68936

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date Monday, January 24, 2005 11:36:09
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	392875.1		ppb
|>	Ho	165	951467.6		ppb
|-	Pb	208	4416293.2	98.65591	ppb
	Kr	83	94.5		ppb

Replicates
Concentration

98.515932

Concentration

99.824741

Concentration

97.62707

Method 6020 Multi Metals Summary Report
Sample ID: LRB
Sample Date Monday, January 24, 2005 11:38:14
Sample Desc Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	414524.2		ppb
|>	Ho	165	1000601.3		ppb
|-	Pb	208	15361.6	0.26076	ppb
	Kr	83	76.7		ppb

Replicates
Concentration

0.304617

Concentration

0.244531

Concentration

0.233144

Method 6020 Multi Metals Summary Report
Sample ID: LRB
Sample Date Monday, January 24, 2005 11:40:19
Sample Desc Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	389035.4		ppb
|>	Ho	165	942638.3		ppb
|-	Pb	208	1940701	43.71831	ppb
	Kr	83	73.5		ppb

Replicates
Concentration

43.503338

Concentration

43.625372

Concentration

44.026227

Method 6020 Multi Metals Summary Report
Sample ID: 4417-1
Sample Date Monday, January 24, 2005 11:42:24
Sample Desc Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	399837		ppb
|>	Ho	165	978444.5		ppb
|-	Pb	208	21935323	476.68851	ppb
	Kr	83	80.7		ppb

Replicates
Concentration

473.3592

Concentration

476.80374

Concentration

479.9026

Method 6020 Multi Metals Summary Report
Sample ID: 4417-2
Sample Date Monday, January 24, 2005 11:44:30
Sample Desi Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	309756.3		ppb
|>	Ho	165	758882.7		ppb
|-	Pb	208	3327597	93.18662	ppb
	Kr	83	88		ppb

Replicates
Concentration

93.037188

Concentration

93.000283

Concentration

93.522375

Method 6020 Multi Metals Summary Report
Sample ID: 4417-3
Sample Date Monday, January 24, 2005 11:46:34
Sample Desi Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	402245.2		ppb
|>	Ho	165	959768.6		ppb
|-	Pb	208	269401.2	5.90363	ppb
	Kr	83	88.8		ppb

Replicates
Concentration

5.886636

Concentration

5.939818

Concentration

5.884443

Method 6020 Multi Metals Summary Report
Sample ID: 4417-3
Sample Date Monday, January 24, 2005 11:48:37
Sample Desi Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	368642.6		ppb
|>	Ho	165	876025.4		ppb
|-	Pb	208	2406986.5	58.37901	ppb
	Kr	83	75.7		ppb

Replicates
Concentration

59.461515

Concentration

57.945462

Concentration

57.730038

Method 6020 Multi Metals Summary Report
Sample ID: 4417-4
Sample Date Monday, January 24, 2005 11:50:40
Sample Desc Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	396443.5		ppb
|>	Ho	165	951891		ppb
|-	Pb	208	68047.5	1.45445	ppb
	Kr	83	81		ppb

Replicates
Concentration

1.465581

Concentration

1.458955

Concentration

1.438817

Method 6020 Multi Metals Summary Report
Sample ID: 4417-5
Sample Date Monday, January 24, 2005 11:52:44
Sample Desc Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	309814.4		ppb
|>	Ho	165	771514.6		ppb
|-	Pb	208	2477924.1	68.24394	ppb
	Kr	83	817.4		ppb

Replicates
Concentration

66.988611

Concentration

71.032855

Concentration

66.710354

Method 6020 Multi Metals Summary Report
Sample ID: 4417-6
Sample Date Monday, January 24, 2005 11:54:47
Sample Desc Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	301923.4		ppb
|>	Ho	165	744214.8		ppb
|-	Pb	208	2050327.8	58.51319	ppb
	Kr	83	653.7		ppb

Replicates
Concentration

57.143871

Concentration

57.917258

Concentration

60.478449

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date Monday, January 24, 2005 12:00:54
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	489937.9		ppb
|>	Ho	165	1097390.4		ppb
|-	Pb	208	13725.2	0.20162	ppb
	Kr	83	107.7		ppb

Replicates
Concentration

0.116055

Concentration

0.067009

Concentration

0.421791

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date Monday, January 24, 2005 12:02:55
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	464341.5		ppb
|>	Ho	165	1066882.6		ppb
|-	Pb	208	4855912.2	96.729	ppb
	Kr	83	108.3		ppb

Replicates
Concentration

96.455488

Concentration

96.695171

Concentration

97.036341

Method 6020 Multi Metals Summary Report
Sample ID: 4417-8
Sample Date Monday, January 24, 2005 12:05:00
Sample Des Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	396252.5		ppb
|>	Ho	165	1012304		ppb
|-	Pb	208	254475.2	5.28122	ppb
	Kr	83	238.3		ppb

Replicates
Concentration

5.328981

Concentration

5.298655

Concentration

5.216032

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date Monday, January 24, 2005 12:07:00
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	481903.9		ppb
|>	Ho	165	1096369		ppb
|-	Pb	208	4640.2	0.02411	ppb
	Kr	83	93.7		ppb

Replicates
Concentration

0.028399

Concentration

0.022128

Concentration

0.021812

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date Monday, January 24, 2005 12:09:01
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	456539.2		ppb
|>	Ho	165	1055692.2		ppb
|-	Pb	208	4909496.2	98.84661	ppb
	Kr	83	108.7		ppb

Replicates
Concentration

98.826993

Concentration

97.449819

Concentration

100.26302

Method 6020 Multi Metals Summary Report
Sample ID: 4417-7
Sample Date Monday, January 24, 2005 12:11:19
Sample Des Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	420935.3		ppb
|>	Ho	165	1022470.7		ppb
|-	Pb	208	1476955.9	30.65381	ppb
	Kr	83	391		ppb

Replicates
Concentration

29.817641

Concentration

31.498349

Concentration

30.64544

Method 6020 Multi Metals Summary Report
Sample ID: 4417-7
Sample Date Monday, January 24, 2005 12:13:24
Sample Desc Air Analysis
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	433709.7		ppb
|>	Ho	165	1061345.1		ppb
|-	Pb	208	3987005.1	79.82664	ppb
	Kr	83	443		ppb

Replicates
Concentration

80.931218

Concentration

78.134832

Concentration

80.413876

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 1
Sample Date Monday, January 24, 2005 12:15:24
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	481253.3		ppb
|>	Ho	165	1087546.5		ppb
|-	Pb	208	6778.7	0.06666	ppb
	Kr	83	102.3		ppb

Replicates
Concentration

0.080756

Concentration

0.065287

Concentration

0.053925

Method 6020 Multi Metals Summary Report
Sample ID: QC Std 4
Sample Date Monday, January 24, 2005 12:17:25
Sample Description:
Concentration Results

	Analyte	Mass	Meas. Intens	Conc. Mean	Report Unit
	Rh	103	467852.5		ppb
|>	Ho	165	1062876.2		ppb
|-	Pb	208	4851374.3	97.00291	ppb
	Kr	83	104.3		ppb

Replicates
Concentration

96.470626

Concentration

97.202264

Concentration

97.335828

Element One Analytical Narrative

Client	Air Analysis, Inc	Element One #:	4417
Client ID:	Nucor Steel	Analyst:	DBW
Method:	12	Dates Received	1/7 & 13/05
Analytes	Lead	Dates Analyzed	1/24/05

Summary of Analysis

The Method 12 samples were prepared and analyzed according to the method protocol. After digestion the samples were brought to volume of 100 ml. The digested samples were analyzed for on a PerkinElmer ELAN 6100 ICP-MS.

Detection Limits

The ICP-MS instrument reporting limit was 2.5 µg/L for lead.

Analysis QA/QC

The spike recovery data and triplicate analyses relative standard deviations are summarized with the results. All QA/QC data was within the criteria of the method.

Additional Comments

The reported results have not been corrected for any blank values or spike recovery values. Nothing unusual was noticed with any of the samples or analyses.

SUMMARY OF RESULTS

Summary of Impinger Analysis

Element	Run 1 Total µg	Run 2 Total µg	Run 3 Total µg	Blank Total µg	Run 3 Spike Recovery
Lead, Average	47.7	9.32	0.590	< 0.3	105%
Triplicate RSD	0.7%	0.3%	0.5%	1.0%	

Summary of Filter Analysis

Element	Run 1 Total µg	Run 2 Total µg	Run 3 Total µg	Blank Total µg	Run 3 Spike Recovery
Lead, Average	6.82	5.85	6.13	0.528	98%
Triplicate RSD	3.5%	3.0%	2.7%	1.1%	

PARTICULATE DETERMINATION

FILTER

Filter ID	Run #	Pre-Weight	Post-Weight	Net Gain
r1	1	0.3252	0.3254	0.0002
r2	2	0.3207	0.3208	0.0001
r3	3	0.3253	0.3253	0.0000

BEAKER

Beaker ID	Run #	Pre-Weight	Post-Weight	Net Gain
a	1	54.2952	54.2985	0.0033
b	2	56.3070	56.3113	0.0043
c	3	54.1104	54.1171	0.0067
Blank Beaker		**54.1297**	**54.1308**	**0.0011**

TOTAL

Run #	Filter Net Gain	Beaker Net Gain	Totals
1	0.0002	0.0022	0.0024
2	0.0001	0.0032	0.0033
3	0	0.0056	0.0056

ΔAir Analysis, Inc.

Nucor Steel
Project Number272

PM10 DETERMINATION

MECL2

beaker id	Run #	Pre-Weight	Post-Weight	Net Gain
ff	1	54.7043	54.7070	0.0027
gg	2	55.7302	55.7326	0.0024
hh	3	53.7302	53.7326	0.0024
Blank Beaker		**55.5913**	**55.5911**	**0.0002**

0.0025 ⇒ 0.325

H2O

Beaker ID	Run #	Pre-Weight	Post-Weight	Net Gain
ii	1	55.9913	56.0021	0.0108
jj	2	55.3396	55.3426	0.0030
kk	3	54.9506	54.9525	0.0019
Blank Beaker		**65.7911**	**65.7912**	**0.0001**

0.0052 ⇒ 0.675

TOTAL

Run #	MECL2	H2O	Totals
1	0.0025	0.0107	0.0132
2	0.0022	0.0029	0.0051
3	0.0022	0.0018	0.004

APPENDIX V

F 3809

SEVERN TRENT **STL**

STL Valparaiso
2400 Cumberland Drive
Valparaiso, IN 46383
Phone: 219-464-2389
Fax: 219-462-2953

Report To:
Contact: M, Dicen
Company: Air Analysis
Address: 3904 Clarks Creek
Plainfield IN 46168
Phone: 3178378514
Fax: 317 837 8518
E-Mail: airindy@ameritech.net

Bill To:
Contact: Same
Company:
Address:
Phone:
Fax:
PO#: Quote:

Shaded Areas For Internal Use Only ___ of ___

Package Sealed Yes No	Samples Sealed Yes No
Received on Ice Yes No	Samples Intact Yes No
Temperature °C of Cooler	
Within Hold Time Yes No	Preserv. Indicated Yes No NA
pH Check OK Yes No NA	Res Cl_2 Check OK Yes No NA
Sample Labels and COC Agree Yes No	COC not present

Sampler Name: Air Analysis
Signature: [signature]
Project Name: Nucor Steel
Project Number: 272
Project Location: Crawfordsville
Date Required Hard Copy: __/__/__ Fax: __/__/__
Lab PM:

Refrg # / # / Cont. / Volume / Preserv

Laboratory ID	MS-MSD	Client Sample ID	Sampling Date	Sampling Time	Matrix	Comp/Grab	Analysis for lead	Additional Analyses / Remarks
		Run 1	12-21	12P			0.1N HNO_3	Method 12
		Run 2	12-21	2P				EPA Stack Test
		Run 3	12-21	930P				Method
		Blank						40 CFR 60
								App B
		Run 1 Filter	12-21	12P			Glass fiber filters	
		Run 2 Filter	"	2P				
		Run 3 Filter	"	930P				

RELINQUISHED BY MJD	COMPANY AAI	DATE 12-22	TIME 11A	RECEIVED BY	COMPANY	DATE	TIME
RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME

Matrix Key
WW = Wastewater
W = Water
S = Soil
SL = Sludge
MS = Miscellaneous
OL = Oil
A = Air
SE = Sediment
SO = Solid
DS = Drum Solid
DL = Drum Liquid
L = Leachate
WI = Wipe
O = A

Container Key
1. Plastic
2. VOA Vial
3. Sterile Plastic
4. Amber Glass
5. Widemouth Glass
6. Other P

Preservative Key
1. HCl, Cool to 4°
2. H2SO4, Cool to 4°
3. HNO3, Cool to 4°
4. NaOH, Cool to 4°
5. NaOH/Zn, Cool to 4°
6. Cool to 4°
7. None

COMMENTS

Date Received / /
Courier: Hand Delivered ☐
Bill of Lading

APPENDIX VI

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-28
12/21/04

Nucor Steel Corporation
Crawfordsville, IN

	[illegible] Run 1	[illegible] Run 2	[illegible] Run 3	[illegible]
Y qa =	0.981	0.930	0.966	0.962

Average result must be within 5% of Y

Result (%):	1.56%

PASS POST CAL

[illegible]	
ID:	79
Y:	0.968
Delta H:	1.87

RUN 1	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1		1.820	83	81
2	Nucor Steel Corporation	1.800	80	81
3	12/21/04	1.800	81	81
4	(Post Test) per EMTIC Guideline GD-28	1.885	81	81
5		0.900	82	82
6		0.855	86	82
7		2.070	89	83
8		2.115	92	83
9		1.215	93	84
10		0.945	93	84
11		0.945	93	85
12		0.945	95	86
13		0.900	93	87
14		0.900	95	88
15		0.900	95	87
16		0.900	96	88
17		0.945	97	87
18		1.395	98	89
19		2.970	98	90
20		2.925	99	91
21		2.475	90	91
22	345.320	3.015	99	92
23	301.400	2.745	99	92
24		2.700	99	92

Volume	Avg. Dh		Avg. Meter T(F)
43.920	1.65		89.17

Barometric Pressure:	30.08	Meter Y:	0.968
Test Time:	60	Delta Hа:	1.87

Yqa =	0.981

RUN 2	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1	Nucor Steel Corporation	0.58	73	74
2	12/21/04	0.58	72	74
3	(Post Test) per EMTIC Guideline GD-28	1.42	71	75
4		1.25	72	74
5		1.08	75	72
6		1.08	77	73
7		1.65	77	73
8		1.61	79	74
9		1.81	80	73
10		1.65	81	73
11		0.90	83	74
12		0.90	83	74
13		0.60	79	74
14		1.29	81	74
15		1.72	82	74
16		1.68	81	74
17		1.63	82	74
18		1.63	83	75
19		1.29	80	73
20		0.95	81	75
21	384.890	0.65	81	74
22	345.620	1.18	80	75
23		1.48	80	75
24		1.29	80	75

Volume	Avg. Dh		Avg. Meter T(F)
39.270	1.28		76.38

Barometric Pressure:	30.08	Meter Y:	0.968
Test Time:	60	Delta Ha:	1.870

Yqa =	0.930

RUN 3	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1		0.65	73	74
2	Nucor Steel Corporation	1.59	72	74
3	12/21/04	1.59	71	73
4	Crawfordsville, IN	0.65	72	74
5		1.33	75	72
6		1.72	77	73
7		1.58	77	73
8		1.94	79	74
9		2.06	80	73
10		2.06	81	73
11		1.98	83	74
12		1.98	83	74
13		0.80	79	74
14		1.28	81	74
15		1.33	82	74
16		1.33	81	74
17		1.38	82	74
18		1.38	83	75
19		1.65	80	73
20		0.65	81	75
21	424.248	0.65	81	74
22	385.047	0.80	80	75
23		1.29	80	75
24		0.88	80	75

Volume	Avg. Dh		Avg. Meter T(F)
39.201	1.36		78.38

Barometric Pressure:	30.08	Meter Y:	0.968
Test Time:	60	Delta Ha:	1.870

Yqa =	0.966

CALIBRATION CHECK
(Post Test) per EMTIC Guideline GD-26
12/21/04

Nucor Steel
Crawfordsville, IN

	[illegible]	[illegible]	[illegible]	[illegible]
Y qa =	0.990	0.947	0.944	0.960

Average result must be within 5% of Y

Result (%):	-1.31%

PASS POST CAL

[illegible]	
ID :	80
Y :	0.947
Delta H :	1.87

RUN 1	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1		1.845	77	77
2	Nucor Steel	1.710	77	77
3	12/21/04	1.800	78	78
4	(Post Test) per EMTIC Guideline GD-26	1.800	80	78
5		1.260	82	77
6		0.810	83	77
7		1.980	83	77
8		2.025	87	77
9		1.845	80	77
10		0.855	89	79
11		0.855	90	79
12		0.810	90	78
13		0.630	84	80
14		0.540	89	80
15		0.540	89	80
16		0.495	89	80
17		0.540	89	80
18		1.305	92	81
19		4.050	91	81
20		4.050	94	81
21	Dry Gas Meter Box	3.060	95	81
22	499.815	4.050	96	82
23	453.083	4.050	98	82
24		4.275	98	83

Volume	Avg. Dh		Avg. Meter T(F)
45.732	1.92		89.40

Barometric Pressure:	30.08	Meter Y:	0.947
Test Time:	60	Delta Hg:	1.87

Yqa =	0.990

RUN 2	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1	Nucor Steel	0.86	80	80
2	12/21/04	1.33	81	80
3	(Post Test) per EMTIC Guideline GD-26	1.72	83	80
4		1.63	85	80
5		1.63	87	80
6		1.55	88	80
7		1.08	88	80
8		1.12	87	80
9		1.20	89	80
10		1.20	89	80
11		0.52	89	80
12		0.52	87	80
13		0.60	85	80
14		1.25	88	80
15		1.59	90	80
16		1.55	92	81
17		1.59	92	81
18		1.59	92	81
19		1.25	90	81
20		0.77	91	81
21	538.093	0.60	91	81
22	499.990	1.03	92	81
23		1.46	93	81
24		1.51	94	82

Volume	Avg. Dh		Avg. Meter T(F)
38.103	1.21		84.38

Barometric Pressure:	30.08	Meter Y:	0.947
Test Time:	60	Delta Hg:	1.870

Yqa =	0.947

RUN 3	Volume	Delta H	DGM(Inlet)	DGM(Outlet)
1		0.65	70	71
2	Nucor Steel	1.46	68	71
3	12/21/04	1.72	69	70
4	Crawfordsville, IN	0.73	71	70
5		1.20	72	70
6		1.42	74	70
7		1.59	74	70
8		1.94	77	70
9		2.15	79	71
10		2.11	80	71
11		2.08	80	71
12		1.94	81	71
13		0.65	75	71
14		0.86	78	72
15		0.95	77	71
16		0.95	77	71
17		0.90	78	72
18		0.95	78	71
19		1.20	76	72
20		0.69	78	72
21	578.688	0.69	80	72
22	538.224	1.20	81	72
23		1.42	83	72
24		0.69	83	72

Volume	Avg. Dh		Avg. Meter T(F)
38.484	1.25		73.85

Barometric Pressure:	30.08	Meter Y:	0.947
Test Time:	60	Delta Hg:	1.870

Yqa =	0.944

GRASEBY NUTECH
EPA Method 5
Meter Box Calibration
Post-Test Orifice Method
English Meter Box Units, English K' Factor

Filename: A:\3PTCQCAL.XLS
Revised: 8/1/97 Version: 1.01

Model #: mst
Serial #: 90679.00

Date: ---------------->
Barometric Pressure: -------> 30.10 (in. Hg)
Theoretical Critical Vacuum:--> 14.20 (in. Hg)

!!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!

——— DRY GAS METER READINGS ——— -CRITICAL ORIFICE READINGS-

Delta H (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Ambient Temperature Initial (deg F)	Ambient Temperature Final (deg F)	Ambient Temperature Average (deg F)
1.62	5.00	143.000	146.691	3.691	77.0	69.0	71.0	70.0	3	0.533	17.5	71.0	71.0	71.0
1.62	5.00	146.691	150.178	3.487	71.0	70.0	72.0	71.0	3	0.533	17.5	71.0	71.0	71.0
1.62	5.00	150.178	153.773	3.595	72.0	71.0	72.0	71.0	3	0.533	18.0	71.0	71.0	71.0

** RESULTS **

— DRY GAS METER —		— ORIFICE —			— DRY GAS METER —		— ORIFICE —		
VOLUME CORRECTED Vm(std) (cu ft)	VOLUME CORRECTED Vm(std) (liters)	VOLUME CORRECTED Vcr(std) (cu ft)	VOLUME CORRECTED Vcr(std) (liters)	VOLUME NOMINAL Vcr (cu ft)	CALIBRATION FACTOR Y Value (number)	Variation (number)	CALIBRATION FACTOR Delta H@ Value (in H2O)	Value (mm H2O)	Variation (in H2O)
3.700	104.8	3.484	98.7	3.484	0.942	-0.026	1.883	47.83	0.003
3.501	99.1	3.484	98.7	3.484	0.995	0.028	1.879	47.74	-0.001
3.606	102.1	3.484	98.7	3.484	0.966	-0.001	1.878	47.69	-0.002
			Average Y ——>		0.968		1.880	47.75	<—— Average dH@

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

SIGNED: [signature] Date: Sept 9, 2004

GRASEBY NUTECH
EPA Method 5
Meter Box Calibration
Post-Test Orifice Method
English Meter Box Units, English K' Factor

Filename: A:\3PTCQCAL.XLS
Revised: 8/1/97 Version: 1.01

Model #: mst
Serial #: 90680.00

Date: ——————>
Barometric Pressure: ———> 29.99 (in. Hg)
Theoretical Critical Vacuum:—> 14.15 (in. Hg)

!!!!!!!!!
IMPORTANT For valid test results, the Actual Vacuum should be 1 to 2 in. Hg greater than the Theoretical Critical Vacuum shown above.
IMPORTANT -The Critical Orifice Coefficient, K', must be entered in English units, (ft)^3*(deg R)^0.5/((in.Hg)*(min)).
!!!!!!!!!

——— DRY GAS METER READINGS ——— -CRITICAL ORIFICE READINGS-

Delta H (in H2O)	Time (min)	Volume Initial (cu ft)	Volume Final (cu ft)	Volume Total (cu ft)	Initial Temps. Inlet (deg F)	Initial Temps. Outlet (deg F)	Final Temps. Inlet (deg F)	Final Temps. Outlet (deg F)	Orifice Serial# (number)	K' Orifice Coefficient (see above)	Actual Vacuum (in Hg)	Ambient Temperature Initial (deg F)	Ambient Temperature Final (deg F)	Ambient Temperature Average (deg F)
1.62	5.00	10.400	14.072	3.672	78.0	77.0	80.0	77.0	3	0.533	18.0	72.0	72.0	72.0
1.62	5.00	14.072	17.741	3.669	80.0	77.0	80.0	77.0	3	0.533	18.0	72.0	72.0	72.0
1.62	5.00	17.741	21.541	3.800	80.0	77.0	80.0	77.0	3	0.533	18.0	72.0	72.0	72.0

** RESULTS **

DRY GAS METER: VOLUME CORRECTED Vm(std) (cu ft)	DRY GAS METER: VOLUME CORRECTED Vm(std) (liters)	ORIFICE: VOLUME CORRECTED Vcr(std) (cu ft)	ORIFICE: VOLUME CORRECTED Vcr(std) (liters)	ORIFICE: VOLUME NOMINAL Vcr (cu ft)	DRY GAS METER CALIBRATION FACTOR Y Value (number)	DRY GAS METER CALIBRATION FACTOR Y Variation (number)	ORIFICE CALIBRATION FACTOR Delta H@ Value (in H2O)	ORIFICE CALIBRATION FACTOR Delta H@ Value (mm H2O)	ORIFICE CALIBRATION FACTOR Delta H@ Variation (in H2O)
3.625	102.7	3.468	98.2	3.487	0.957	0.010	1.867	47.42	0.000
3.619	102.5	3.468	98.2	3.487	0.958	0.012	1.867	47.42	0.000
3.748	106.1	3.468	98.2	3.487	0.925	-0.021	1.867	47.42	0.000
				Average Y ——>	0.947		1.867	47.42	<—— Average dH@

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

For Orifice Calibration Factor dH@, the orifice differential pressure in inches of H20 that equates to 0.75 cfm of air at 68 F and 29.92 inches of Hg, acceptable tolerance of individual values from the average is +-0.2.

SIGNED: [signature]

Date: Sept. 7, 2004

ΔAir Analysis, Inc.

3904 Clarks Creek Road
Plainfield, Indiana 46168
(317) 837-8514
(317) 837-8518 fax

Pitot Tube Calibration

Reference: 40CFR 60, Appendix A, Method 2, Section 2.1

Probe Length:	**4 feet**
External Tubing Diameter:	0.95 centimeters
Base to Opening Plane Distance (Pa):	1.2 centimeters
Base to Opening Plane Distance (Pb):	1.2 centimeters

	Measured	Allowable
Pa/Dt	1.26cm	1.05Dt ≤ P ≤ 1.50Dt (0.9975cm - 1.42cm)
Pb/Dt	1.26cm	1.05Dt ≤ P ≤ 1.50Dt (0.9975cm - 1.42cm)
Angle α 1	0 deg	α 1 and α 2 ≤ 10.0°
Angle α 2	0 deg	α 1 and α 2 ≤ 10.0°
Angle β 1	1 deg	β 1 and β 2 ≤ 5.0°
Angle β 2	1 deg	β 1 and β 2 ≤ 5.0°
z (cm)	0.0	z is less than 0.32cm (1/8th")
w (cm)	0.0	w is less than 0.08cm (1/32nd")
	If all criteria are met, Pitot Coefficient is 0.84	**Pitot Coefficient: 0.84**

Calibrated By: *[signature]* Date Calibrated: February 4, 2004

Thermocouple Test

Control factor	*Mercury Thermometer F*	*Probe Response*
ICE	33°	34°
AMBIENT	74°	72°
BOILING/ HOT H20	160°	160°

Test performed by: *[signature]* Date of test: February 4st, 2004

ΔAir Analysis, Inc.

3904 Clarks Creek Road
Plainfield, Indiana 46168
(317) 837-8514
(317) 837-8518 fax

Pitot Tube Calibration

Reference: 40CFR 60, Appendix A, Method 2, Section 2.1

[redacted]

External Tubing Diameter:	**0.95 centimeters**
Base to Opening Plane Distance (Pa):	**1.15 centimeters**
Base to Opening Plane Distance (Pb):	**1.15 centimeters**

	Measured	Allowable
Pa/Dt	1.21cm	1.05Dt ≤ P ≤ 1.50Dt (0.9975cm - 1.42cm)
Pb/Dt	1.21cm	1.05Dt ≤ P ≤ 1.50Dt (0.9975cm - 1.42cm)
Angle α 1	0 deg	α 1 and α 2 ≤ 10.0°
Angle α 2	0 deg	α 1 and α 2 ≤ 10.0°
Angle β 1	1 deg	β 1 and β 2 ≤ 5.0°
Angle β 2	1 deg	β 1 and β 2 ≤ 5.0°
z (cm)	0.0	z is less than 0.32cm (1/8th")
w (cm)	0.0	w is less than 0.08cm (1/32nd")
	If all criteria are met, Pitot Coefficient is 0.84	**Pitot Coefficient: 0.84**

Calibrated By: **Date Calibrated: February 5, 2004**

Thermocouple Test

Control factor	*Mercury Thermometer F*	*Probe Response*
ICE	25°	26°
AMBIENT	71°	72°
BOILING/ HOT H20	171°	172°

Test performed by: **Date of test: February 5, 2004**

MONITORING INSTRUMENTS (800) 532-7474

Linde Gas | Linde

Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
Linde Gas LLC
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
LINDE COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	2241	
EPA MISC 2 COMPONENT		A31
Production #:	100088590	
Lot #:	02499H4300YC	
Cylinder #:	CC136537	
Expiration Date:	9/17/2006	
Shelf Life:	24 months	

Blend Tolerance:	5 % Relative
Blend Type:	EPA Protocol
Cyl. Pressure:	2000 psig
Balance Gas:	Nitrogen
CGA:	660
Analytical Accuracy:	1.00 % Relative
Confidence:	95 %

CAS #	Certified Component	Requested Concentration	Concentration and +/- Uncertainty	Date of Certification
7446-09-5	Sulfur Dioxide	95	94.1 +/- 0.9 ppm	09/17/2004
7727-37-9	Nitrogen		Balance	09/17/2004

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7446-09-5	Sulfur Dioxide	CC13966 , GMIS	50.40 ppm	01/30/2006
7446-09-5	Sulfur Dioxide	CC7797 , GMIS	500.3 ppm	09/07/2006

Instrument	Serial #	Analytical Principle	Calibration Date
Thermo Nicolet AEM	AET0100218	FTIR	07/13/2004
Horiba VIA-510	4131546004	Non-Dispersive Infrared	07/16/2004

All analyses are performed under controlled environmental conditions.This product is manufactured using equipment which ha been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B177828

Analytical report approved by Roy Yoder

Roy Yoder

HiQ Analysis Certificate

1400

AGA
Member of the Linde Gas Group

Linde

MONITORING INSTRUMENTS

(800) 532-7474

Certificate of Analysis
EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
Linde Gas LLC
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
LINDE COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6651 EPA SO2/AIR 100-4500 PPM A31	**Blend Tolerance:**	5 % Relative
Production #:	100081509	**Blend Type:**	EPA Protocol
Lot #:	02499A2180GK1	**Cyl. Pressure:**	1450 psig
Cylinder #:	CC35190	**Balance Gas:**	Air
Expiration Date:	3/18/2006	**CGA:**	660
Shelf Life:	24 months	**Analytical Accuracy:**	1.00 % Relative
		Confidence:	95 %

* Recertification

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
7446-09-5	Sulfur Dioxide	199	199 +/- 2 ppm	03/18/2004
132259-10-0	Air		Balance	03/18/2004

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
7446-09-5	Sulfur Dioxide	CAL010533 , SRM 1661A	504.4 ppm	01/13/2009
7782-44-7	Oxygen	CC73601 , NTRM	20.89 %	05/29/2005

Instrument	Serial #	Analytical Principle	Calibration Date
Nicolet Magna 550	ACJ9300713	FTIR	03/15/2004

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B15842B

Analytical report approved by Jim Healy

James R Healy

HiQ Analysis Certificate

1150

AGA
Member of the Linde Gas Group

Linde

MONITORING INSTRUMENTS (800) 532-7474

Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6154	**Blend Tolerance:**	5 % Relative
EPA CO/N2 10-99 PPM		**Blend Type:**	EPA Protocol
Production #:	100076205	**Cyl. Pressure:**	2000 psig
Lot #:	02499K3280ZD	**Balance Gas:**	Nitrogen
Cylinder #:	CC175394	**CGA:**	350
Expiration Date:	11/12/2006	~~**Analytical Accuracy:**~~	~~1.00 % Relative~~
Shelf Life:	36 months	**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
630-08-0	Carbon Monoxide	59.8	59.5 +/- 0.6 ppm	11/12/2003
7727-37-9	Nitrogen		Balance	11/12/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
630-08-0	Carbon Monoxide	CC3839 , GMIS	25.08 ppm	06/04/2004
630-08-0	Carbon Monoxide	CC13630 , GMIS	99.53 ppm	09/12/2005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568384012	Non-Dispersive Infrared	09/26/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B1700SB

Analytical report approved by Jim Healy

James R Healy

HiQ Analysis Certificate

AGA
Member of the Linde Gas Group

Linde

IE MONITORING INSTRUMENTS (800) 532-7474

Certificate of Analysis

EPA Protocol

Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6154	**Blend Tolerance:**	5 % Relative
EPA CO/N2 10-99 PPM		**Blend Type:**	EPA Protocol
Production #:	100076206	**Cyl. Pressure:**	2000 psig
Lot #:	02499K3310UA	**Balance Gas:**	Nitrogen
Cylinder #:	CC167431	**CGA:**	350
Expiration Date:	11/12/2006	**Analytical Accuracy:**	1.00 % Relative
Shelf Life:	36 months	**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
630-08-0	Carbon Monoxide	30.3	30.1 +/- 0.3 ppm	11/12/2003
7727-37-9	Nitrogen		Balance	11/12/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
630-08-0	Carbon Monoxide	CC3859 , GMIS	25.08 ppm	06/04/2004
630-08-0	Carbon Monoxide	CC13630 , GMIS	99.53 ppm	09/12/2005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568384012	Non-Dispersive Infrared	09/26/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17004B

Analytical report approved by Jim Healy

Jim R Healy

HiQ Analysis Certificate

IE MONITORING INSTRUMENTS (800) 532-7474

Linde Gas | Linde

Certificate of Analysis
EPA Protocol
Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
Linde Gas LLC
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
LINDE COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6198		**Blend Tolerance:**	5 % Relative
EPA CO/N2 100-999 PPM		A31	**Blend Type:**	EPA Protocol
Production #:	100087549		**Cyl. Pressure:**	2000 psig
Lot #:	02499H4030ZH		**Balance Gas:**	Nitrogen
Cylinder #:	CC72257		**CGA:**	350
Expiration Date:	8/17/2007		**Analytical Accuracy:**	1.00 % Relative
Shelf Life:	36 months		**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
630-08-0	Carbon Monoxide	133	134 +/- 1 ppm	08/17/2004
7727-37-9	Nitrogen		Balance	08/17/2004

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
630-08-0	Carbon Monoxide	CC3813 , GMIS	501.8 ppm	09/05/2005
630-08-0	Carbon Monoxide	CC41779 , GMIS	99.58 ppm	09/12/2005

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba VIA-510	568384012	Non-Dispersive Infrared	07/16/2004

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17714B

Analytical report approved by Roy Yoder

Roy Yoder

HQ Analysis Certificate

AGA
Member of the Linde Gas Group

Linde

IE MONITORING INSTRUMENTS (800) 532-7474
www.iemlinc.com

Certificate of Analysis
EPA Protocol
Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
AGA Gas, Inc.
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

B16408B

Produced for customer:
AGA COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6599	**Blend Tolerance:**	5 % Relative
EPA NO/N2 50-499 PPM		**Store/Use Temp:**	35 to 90 F
Production #:	100062041	**Blend Type:**	EPA Protocol
Lot #:	02499A3090EE	**Cyl. Pressure:**	2000 psig
Cylinder #:	CC150105	**Balance Gas:**	Nitrogen
Expiration Date:	1/23/2005	**CGA:**	660
Shelf Life:	24 months	**Analytical Accuracy:**	1.00 % Relative

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
10102-43-9	Nitric Oxide	75	74.5 +/- 0.7 ppm	01/23/2003
7727-37-9	Nitrogen		Balance	01/23/2003

CAS #	Analyzed (For Ref Use Only)	Concentration	Analysis Date
N/A 2	NOx	74.6 ppm	01/23/2003

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
10102-43-9	Nitric Oxide	ND11377 , LS	100.9 ppm	11/21/2007
10102-43-9	Nitric Oxide	CC120225 , GMIS	20.35 ppm	11/22/2004

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba CLA-510SS	568093024	Chemiluminescence	01/21/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

Analytical report approved by Jim Healy

James R Healy

HiQ Analysis Certificate

AGA
Member of the Linde Gas Group

Linde

MONITORING INSTRUMENTS (800) 532-7474

Certificate of Analysis
EPA Protocol
Performed according to EPA-600/R-97/121, Procedure G1

Notice: This Cylinder is not to be used when pressure is under 150 psig.

Manufactured and certified at:
Linde Gas LLC
Maumee Specialty Gas Plant
6421 Monclova Road
MAUMEE OH 43537
419-893-7226

Produced for customer:
LINDE COLUMBUS INTERBRANCH
450 GREENLAWN AVE
COLUMBUS OH 43223
USA
614-443-7487

Material:	6599	**Blend Tolerance:**	5 % Relative
EPA NO/N2 50-499 PPM		**Blend Type:**	EPA Protocol
Production #:	100079435	**Cyl. Pressure:**	2000 psig
Lot #:	02499A4220JA	**Balance Gas:**	Nitrogen
Cylinder #:	CC150147	**CGA:**	660
Expiration Date:	2/4/2006	**Analytical Accuracy:**	1.00 % Relative
Shelf Life:	24 months	**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
10102-43-9	Nitric Oxide	150	156 +/- 2 ppm	02/04/2004
7727-37-9	Nitrogen		Balance	02/04/2004

CAS #	Analyzed (For Ref Use Only)	Concentration	Analysis Date
N/A	NOx	156 ppm	02/04/2004

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
10102-43-9	Nitric Oxide	CC52960 , GMIS	495.1 ppm	12/22/2005
10102-43-9	Nitric Oxide	CC99263 , GMIS	101.5 ppm	01/14/2006

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba CLA-510SS	568093024	Chemiluminescence	11/19/2003

This product is manufactured using equipment which has been calibrated with NIST traceable, or equivalent, standards, weights, or equipment.

B17202B

Analytical report approved by Jim Healy

James R Healy

HRQ Analysis Certificate

APPENDIX VII

CARL KOONTZ ASSOCIATES
SMOKE SCHOOL TRAINING FORM

NAME RONALD STAPERT RUN # 1 SUNGLASSES YES

COMPANY AIR ANALYSIS, INC COURSE LOCATION INDY, IN.

DATE 9-23-04 SKY CLEAR (Sunning) WIND 5 DISTANCE & DIRECTION TO STACK ____

WHITE

No.	Opacity scale		ERROR
1	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	1	1
2	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	2	0
3	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	3	1
4	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	4	2
5	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
6	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
7	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
8	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
9	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
10	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
11	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
12	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
13	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
14	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
15	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
16	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
17	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70		
18	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	19	1/2
19	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	20	0
20	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	21	0
21	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	22	0
22	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	23	0
23	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	24	1
24	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	25	0
25	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100		

CARL KOONTZ ASSOCIATES
of Nashville, Tennessee
This is to acknowledge that
RONALD STAPERT
successfully participated in Visible Emissions training on SEP 23 2004
and is qualified to evaluate Visible Emissions for a period of six (6) months from the date of certification.
Carl Koontz
Instructor

DEVIATION 16 3.2

BLACK

No.	Opacity scale		ERROR
26	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	26	1
27	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	27	1
28	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	28	0
29	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	29	0
30	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	30	0
31	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	31	0
32	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	32	0
33	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	33	2
34	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	34	1
35	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	35	0
36	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	36	0
37	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	37	0
38	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	38	0
39	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	39	1
40	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	40	1
41	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	41	0
42	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	42	1
43	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	43	1
44	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	44	3
45	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	45	2
46	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	46	0
47	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	47	1
48	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	48	1
49	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	49	0
50	0 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100	50	0

I hereby certify that the above readings are my own. [signature]

DEVIATION 17 3.4

CARL KOONTZ ASSOCIATES

of Nashville, Tennessee

This is to acknowledge that

DAN DAVIS

successfully participated in Visible Emissions training on SEP 2 3 2004

and is qualified to evaluate Visible Emissions for a period of six (6) months from the date of certification.

Carl Koontz

Instructor

CARL KOONTZ ASSOCIATES

SMOKE SCHOOL TRAINING FORM

NAME Ronald Stapert RUN # 1 SUNGLASSES Yes

COMPANY Air Analysis, Inc COURSE LOCATION Indy, IN.

DATE 9-23-04 SKY Clear Sunning WIND 5 DISTANCE & DIRECTION TO STACK ____

WHITE

																							ERROR
1	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	1	1
2	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	2	0
3	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	3	1
4	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	4	2
5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
6	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
7	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
8	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
9	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
10	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
11	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
12	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
13	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
14	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
15	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
16	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
17	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
18	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
19	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	19	1
20	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	20	2
21	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	21	0
22	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	22	0
23	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	23	0
24	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	24	1
25	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	25	0

CARL KOONTZ ASSOCIATES

of Nashville, Tennessee

This is to acknowledge that

Ronald Stapert

successfully participated in Visible Emissions training on SEP 2 3 2004

and is qualified to evaluate Visible Emissions for a period of six (6) months from the date of certification.

Carl Koontz

Instructor

DEVIATION 16 3.2

BLACK

26	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	26	1
27	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	27	1
28	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	28	0
29	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	29	0
30	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	30	0
31	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	31	0
32	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	32	0
33	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	33	2
34	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	34	1
35	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	35	0
36	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	36	0
37	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	37	0
38	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	38	0
39	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	39	1
40	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	40	1
41	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	41	0
42	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	42	1
43	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	43	1
44	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	44	3
45	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	45	2
46	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	46	0
47	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	47	1
48	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	48	1
49	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	49	1
50	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	50	0

I hereby certify that the above readings are my own. Ronald Stapert

DEVIATION 17 3.4

CARL KOONTZ ASSOCIATES

SMOKE SCHOOL TRAINING FORM

NAME RONALD STAPERT RUN # 1 SUNGLASSES YES

COMPANY AIR ANALYSIS, INC COURSE LOCATION INDY, IN.

DATE 9-23-04 SKY CLEAR (Sunning) WIND 5 DISTANCE & DIRECTION TO STACK

WHITE

																						ERROR
1	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	1 / 1
2	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	2 / 0
3	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	3 / 1
4	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	4 / 2
5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
6	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
7	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
8	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
9	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
10	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
11	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
12	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
13	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
14	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
15	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
16	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
17	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
18	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70							
19	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	19 / 1/2
20	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	20 / 0
21	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	21 / 0
22	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	22 / 0
23	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	23 / 0
24	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	24 / 1
25	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	25 / 0

CARL KOONTZ ASSOCIATES

of Nashville, Tennessee

This is to acknowledge that RONALD STAPERT successfully participated in Visible Emissions training on SEP 2 3 2004 and is qualified to evaluate Visible Emissions for a period of six (6) months from the date of certification.

Carl Koontz

Instructor

DEVIATION 16 3.2

BLACK

26	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	26 / 1
27	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	27 / 1
28	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	28 / 0
29	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	29 / 0
30	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	30 / 0
31	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	31 / 0
32	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	32 / 2
33	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	33 / 2
34	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	34 / 1
35	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	35 / 0
36	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	36 / 0
37	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	37 / 0
38	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	38 / 0
39	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	39 / 1
40	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	40 / 1
41	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	41 / 0
42	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	42 / 1
43	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	43 / 1
44	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	44 / 3
45	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	45 / 2
46	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	46 / 0
47	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	47 / 1
48	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	48 / 1
49	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	49 / 1
50	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	50 / 0

I hereby certify that the above readings are my own. Ronald Stapert

DEVIATION 17 3.4

CARL KOONTZ ASSOCIATES
SMOKE SCHOOL TRAINING FORM

NAME RONALD STAPERT RUN # 1 SUNGLASSES YES

COMPANY AIR ANALYSIS, INC COURSE LOCATION INDY, IN.

DATE 9-23-04 SKY ~~CLEAR~~ SUNNING WIND 5 DISTANCE & DIRECTION TO STACK ______

WHITE

1	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	1	1
2	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	2	0
3	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	3	1
4	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	4	2
5	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
6	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
7	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
8	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
9	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
10	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
11	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
12	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
13	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
14	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
15	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
16	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
17	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
18	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70								
19	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	19	1
20	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	20	2
21	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	21	0
22	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	22	0
23	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	23	0
24	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	24	1
25	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	25	0

CARL KOONTZ ASSOCIATES
of Nashville, Tennessee
This is to acknowledge that
RONALD STAPERT
successfully participated in Visible Emissions training on SEP 2 3 2004
and is qualified to evaluate Visible Emissions for a period of six (6) months from the date of certification.

Carl Koontz
Instructor

DEVIATION 16 3.2

BLACK

26	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	26	1
27	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	27	1
28	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	28	0
29	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	29	0
30	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	30	0
31	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	31	0
32	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	32	0
33	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	33	2
34	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	34	1
35	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	35	0
36	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	36	0
37	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	37	0
38	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	38	0
39	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	39	1
40	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	40	1
41	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	41	0
42	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	42	1
43	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	43	1
44	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	44	3
45	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	45	2
46	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	46	0
47	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	47	1
48	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	48	1
49	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	49	1
50	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	50	0

I hereby certify that the above readings are my own. Ronald Stapert

DEVIATION 17 3.4

APPENDIX VIII

Compliance Test Protocol

Indiana Department of Environmental Management
Office of Air Quality/Compliance Data Section
100 North Senate Avenue, Post Office Box 6015
Indianapolis, IN 46206-6015
Phone: 317/232-8338 Fax: 317/233-6865

Date Prepared: 11-12-04 Proposed Test Date: 12/20 & 21/04 Plant Address: 4537 S. Nucor Rd Plant Location: Crawfordsville, IN

1. SOURCE INFO: ID/Permit No.: 107-12143-00038

Company:	Nucor Steel
Mail Address:	4537 South Nucor Rd
City, State, Zip:	Crawfordsville IN 47933
Contact:	Dave Sulc — Phone: 765-361-2659

2. TEST COMPANY INFORMATION

Name:	To Be determined
Address:	
City, State, Zip:	
Contact:	Phone:

3. PROCESS INFORMATION (Submit a Separate Form for Each Unit)

Unit to Test: Castrip LMS Baghouse Stack
Max. Rated Capacity: 135 tons/hr
Proposed Operating Speed: As close to max as possible

3a. Describe Method Used to Determine Operating Level:

Production heat sheets

Pollution Control Equipment: Fabric Filter Baghouse

3b. Process Description:

Molten steel from EAF's refined prior to casting

Fuel Type: N/A

4. TEST INFORMATION

	No. Runs	Time
Method 1-4	3	1 hr
Method 5 ☑ 5A ☐ 5B ☐ 5D ☐ 5E ☐ 5I ☐	3	1 hr
Method 6 ☐ 6A ☐ 6B ☐ 6C ☑	3	1 hr
Method 7 ☐ 7A ☐ 7B ☐ 7C ☐ 7D ☐ 7E ☑	3	1 hr
Method 9	3	1 hr
Method 201 ☐ 201A ☐		
Method 202	3	hr
Other: Method 10, Method 12	3	hr

4a. Describe Any Deviations from Standard Test Method

5. Select Applicable Program:

Title V ● FESOP ●
SSOA ● MSOP ●
Other ●

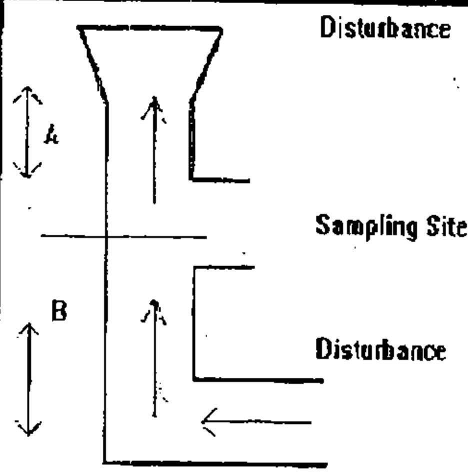
AGENCY USE ONLY:

Inspector: RTS
Reviewer: JCF

Date Received: 11-16-04
Approval Date: 12-13-04
Comments:

State of Indiana
Department of Environmental Management
Office of Air Quality

6. SAMPLE SITE LOCATION



Distance A > 1/2 Diameter
Distance B > 2 Diameters

No. of Method 5 Sample Points:	24
Diameter at Sample Site:	96 inches
Stack Height:	100 ft
Approximate Stack Gas Flow (ACFM):	120,000
Approximate Stack Gas Temp (deg. F):	105
Approximate Stack Gas Moisture (%):	1.5%

Does sample port location meet 40 CFR 60, Appx. A, Method 1, Sec. 1.2 Requirements: Yes ☑ No ☐
If No, explain:

326 IAC 3-6-2(a) requires this completed form to be submitted 35 days prior to the proposed test date to the above address. 326 IAC 2-1.1-7(6)(B) requires any applicable test fee to be submitted with the protocol. (FEE NOT APPLICABLE IF PROGRAM IS FESOP TITLE V OR VE TESTING ONLY)

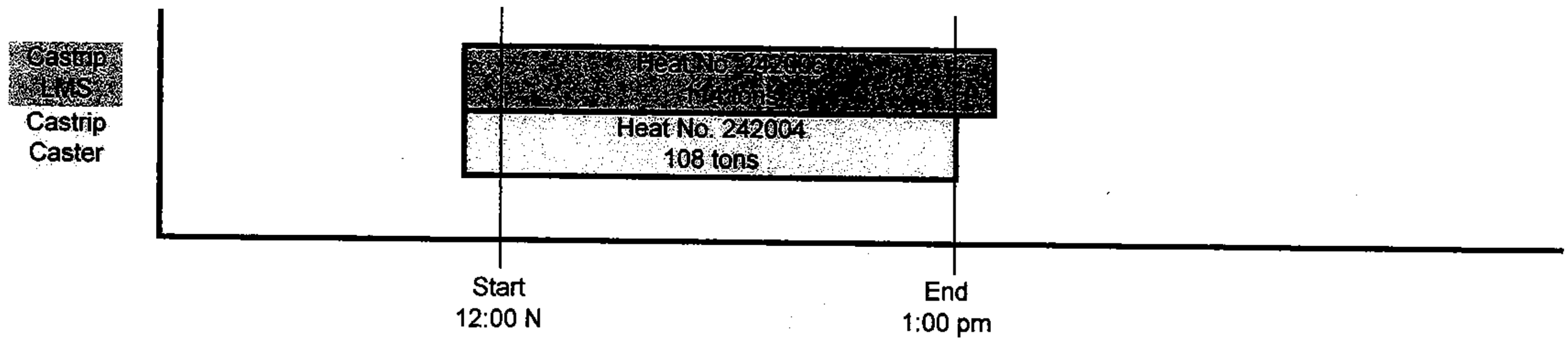
7. REASON FOR TEST

Operating Permit:	Yes ☑ No ☐
Construction Permit:	Yes ☐ No ☑
If yes, Unit Start Up Date:	
State Agreed Order No.:	
Title V:	Yes ☐ No ☑
Compliance with 326 IAC NSPS 40 CFR 60 Subpart ____:	Yes ☐ No ☑
Other (EPA, CD, State, 114):	

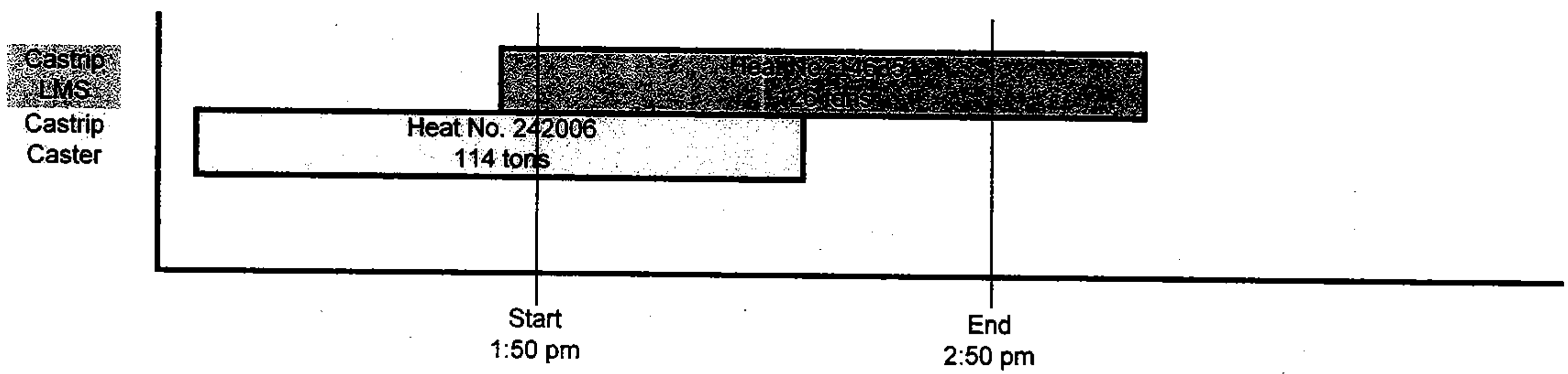
APPENDIX IX

Nucor Steel - Crawfordsville LMF Production Data 9/15/04 Stack Test

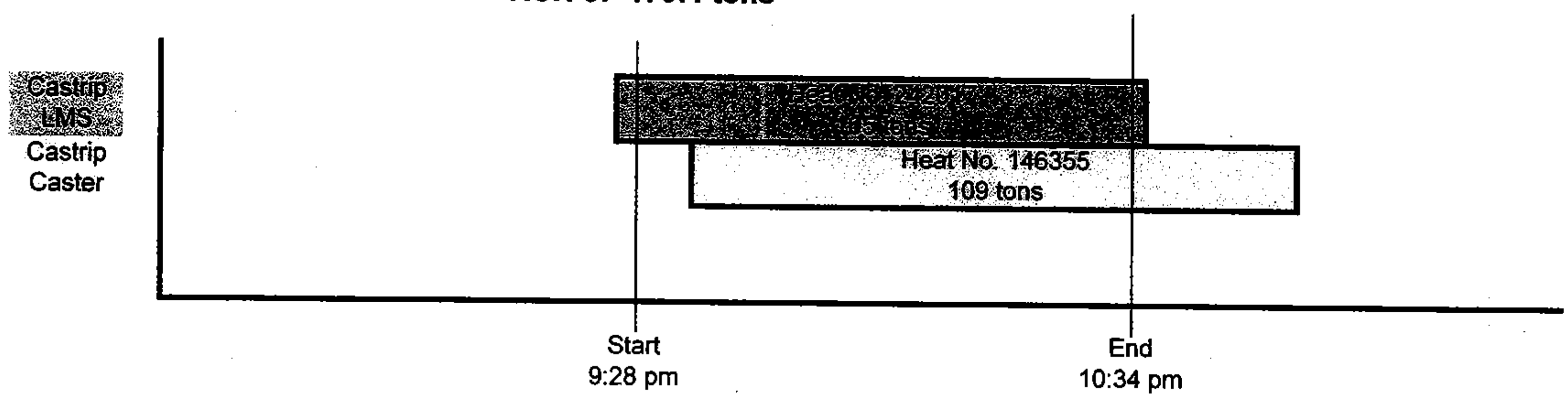
RUN 1: 200.6 tons



RUN 2: 135.8 tons



RUN 3: 179.4 tons



Nucor Steel - Crawfordsville, IN
Castrip LMS & Caster Stack Test Production Data
December 21, 2004

Run 1: 12:00 Noon - 1:00 pm

	Heat Number	Start	End	Net Ladle Tons	Total Minutes	Run Minutes	Tons During Run
Castrip LMS	242006	11:53 AM	12:54 PM	114.0	61.0	54.0	100.9
Castrip Caster	242004	11:56 AM	1:01 PM	108.0	65.0	60.0	99.7

TOTAL TONS: **222.0** **200.6**

Run 2: 1:50 pm - 2:50 pm

	Heat Number	Start	End	Net Ladle Tons	Total Minutes	Run Minutes	Tons During Run
Castrip LMS	146351	1:44 PM	3:10 PM	126.0	86.0	60.0	87.9
Castrip Caster	242006	1:03 PM	2:24 PM	114.0	81.0	34.0	47.9

TOTAL TONS: **240.0** **135.8**

Run 3: 9:28 pm - 10:34 pm

	Heat Number	Start	End	Net Ladle Tons	Total Minutes	Run Minutes	Tons During Run
Castrip LMS	242017	9:24 PM	10:35 PM	105.0	71.0	66.0	97.6
Castrip Caster	146355	9:37 PM	9:53 PM	109.0	76.0	57.0	81.8

TOTAL TONS: **214.0** **179.4**

ΔAIR ANALYSIS, INC
3904 CLARKS CREEK ROAD • PLAINFIELD, INDIANA 46168
TX: 317-837-8514
FAX: 317-837-8518

FACSIMILE TRANSMITTAL SHEET

TO: Mark Washer	FROM: M. Dicen
COMPANY: Nucor Steel	DATE: 12/13/04
FAX NUMBER: 765-364-5311 361-5720	TOTAL NO. OF PAGES INCLUDING COVER: 1
PHONE NUMBER: 765-364-1323	SENDER'S REFERENCE NUMBER:
REGARDING Information	YOUR REFERENCE NUMBER:

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

Mark:

Here's the information you requested:

Castrip Baghouse recorded every 15 minutes

	Fan Amps	Delta P
Run 1	86, 86, 72, 86	8.0, 7.0, 4.1, 6.7
Run 2	85.4, 73.2, 82.2, 71.1	7.7, 4.8, 7.2, 4.2
Run 3	79, 88, 73, 87	4.2, 6.6, 4.2, 7.7

Mike

RUN 1- LMF

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

HEAT NO: 242006 AIM GRADE: 100551 DATE: 12/21 04 POWER

FCE (E OR W): ____ LIQUIDUS: ____ MELTER: SG KWH INITIAL: ____

LADLE NO: 14 FINISH GRADE: ____ 1st OP: DC KWH FINAL: ____

WEIGHT TAPPED: 114 2nd OP: ____ KWH USED: ____

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1		035	54	013	047	32								0527	0055	
LMF -2		044	61	013	002	33								0184	0032	
LMF -3																
LMF -4																

SLAG

DEPTH
ARRIVE: ____ DEPART: ____

COLOR
ARRIVE: ____ DEPART: ____

TEXTURE
ARRIVE: ____ DEPART: ____

EVENT	TIME START	TIME END		
FINISH TAP				
LADLE ON CAR				
IND STIR ON				
UNDER ROOF				
POWER ON	10:06	10:11	3	TAP NO.
	10:12	10:17	1	TAP NO.
	10:21	10:31		TAP NO.
	10:40	10:51	VTD	TAP NO.
	11:53	12:03		TAP NO.
	12:11	12:18		TAP NO.
	12:30	12:31		TAP NO.
				TAP NO.

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
LCMNSI		1600/250
FESI		300
Al SHOT		1
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		160
LIME		400/2020
SPAR		800

TIME/TEMP/OXYGEN

TIME	TEMP	OXYGEN
10:18	2893 °F	2.4 PPM
10:38	2945 °F	PPM
12:04	2927 °F	PPM
12:41	3069 °F	87.1 PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM

DEPARTURE
TIME 12:54 TEMPERATURE 3060

REMARKS

Seq 1926-2 approx 2200 oxy

VTD DRAINED

QF-0019 9/12-97

Run 2 - LMF

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

HEAT NO: 146351 AIM GRADE: ______ DATE: 12/21/04 POWER
FCE (E OR W): ______ LIQUIDUS: ______ MELTER: SRG KWH INITIAL: ______
LADLE NO: 7 FINISH GRADE: ______ 1st OP: DC KWH FINAL: ______
WEIGHT TAPPED: 126 2nd OP: ______ KWH USED: ______

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1	1:59	029	39	017	059	01	08							0532	0072	
LMF -2	2:24	029	39	017	027	01	08							0251	0073	
LMF -3																
LMF -4																

SLAG

DEPTH
ARRIVE: ______ DEPART: ______

COLOR
ARRIVE: ______ DEPART: ______

TEXTURE
ARRIVE: ______ DEPART: ______

EVENT	TIME START	TIME END	
FINISH TAP			
LADLE ON CAR			
IND STIR ON			
UNDER ROOF			
POWER ON			TAP NO.
	1:44	1:48	3 TAP NO.
	1:54	1:59	1 TAP NO.
	2:10	2:20	1 TAP NO.
			TAP NO.
			TAP NO.
	2:50	3:00	1 TAP NO.
			TAP NO.

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
Al SHOT		
STD FeMn		
MED C FeMn		
Al WIRE (FT)		
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		

TIME/TEMP/OXYGEN

TIME	TEMP	OXYGEN
1:52	2885 °F	38.1 PPM
1:59	2896 °F	2.5 PPM
2:24	2925 °F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM

DEPARTURE
TIME 3:10 TEMPERATURE ______

REMARKS

hold + desulf for MS. Return @ 3:10 when cast complete.

QF-0019 9/12-97

Run 3 - LMF

NUCOR STEEL - CRAWFORDSVILLE
LMF HEAT RECORD

HEAT NO: 242017 AIM GRADE: 10055I DATE: 12/21/04 POWER

FCE (E OR W): ______ LIQUIDUS: ______ MELTER: SG KWH INITIAL: ______

LADLE NO: 17 FINISH GRADE: ______ 1st OP: DC KWH FINAL: ______

WEIGHT TAPPED: 105 2nd OP: ______ KWH USED: ______

SAMPLE	TIME	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	V	Ca	Al	N	TOTAL RESID
LMF -1		026	48	015	011	31								027	0056	
LMF -2		049	65	016	009	36								016	0050	
LMF -3																
LMF -4																

SLAG

DEPTH
ARRIVE: ______ DEPART: ______

COLOR
ARRIVE: ______ DEPART: ______

TEXTURE
ARRIVE: ______ DEPART: ______

EVENT	TIME START	TIME END		
FINISH TAP				
LADLE ON CAR				
IND STIR ON				
UNDER ROOF				
POWER ON	7:03	7:08	3	TAP NO.
	7:09	7:14	1	TAP NO.
	7:23	7:28		TAP NO.
	7:33	7:43	VTD	TAP NO.
	9:24			TAP NO.
	9:43	9:51		TAP NO.
	10:17	10:19		TAP NO.
	10:25	10:27		TAP NO.

ARGON LANCE ON

LADLE ADDITION	TIME	AMOUNT
LLMNSI		1600 / 500
FESI		300
Al SHOT		1
STD FeMn		
MED C FeMn		
Al WIRE (FT)		100
Ca Si WIRE (FT)		
Fe Ca WIRE (FT)		
C WIRE		300
Lime		400
SPAR		200

TIME/TEMP/OXYGEN

Time	Temp	Oxygen
7:15	2923 °F	4.4 PPM
	°F	PPM
9:42	2914 °F	PPM
	°F	PPM
10:20	3032 °F	74.4 PPM 23
	°F	PPM
	°F	PPM
	°F	PPM
	°F	PPM

DEPARTURE
TIME 10:35 TEMPERATURE 3025

REMARKS

1927-2

VTD

QF-0019 9/12-97

Run 1 · caster

NUCOR STEEL – CRAWFORDSVILLE
CASTRIP HEAT RECORD

SEQ #: 1926
HEAT #: 242004
GRADE: 1005S1

IN SEQUENCE: 1
LIQUIDUS:

SUPERVISOR: SG
PULPIT OPER: JG
DATE: 12-21-04

LAST LMF CHEM:

C	Mn	S	Si	AL	N	Temp

LOT: 11:43
TOG: 11:53

LADLE #: 17
TARE WEIGHT:
INITIAL WEIGHT: (106 LMF) 108
FINAL WEIGHT:
OPEN TIME: 11:56
CLOSE TIME: 13:01
FREE OPEN: Yes / No
OF PIPES USED:

TUNDISH #: 2-F
TUNDISH CAR #: 2
TUNDISH CLOSE TIME: —
SKULL WEIGHT: —

CASSETTE #: 2
CASSETTE ROLL #: 25
C/N PLATE #: 1

BRUSHES

PRECAST		POSTCAST	
EOS	16	EOS	
EDS	16	EDS	
DOS	16	DOS	
DDS	16	DDS	

S/D WEAR

	HMI	ACTUAL
D/S	4.9	
O/S	5.7	

			FLUX					ROLL FORCE		S/D FORCE			TP		BRUSH SPEED	
TIME	POOL	SPEED	ENT	DEL	TEMP	OXY	MV	D/S	O/S	D/S	O/S	HYDRO	CAL.	ACTUAL	DEL	ENT
	175	69						600	600	300	300				1150	1150
11	175	83	4.04	4.16	2944	52.4	24	475	550	95	80				1150	1150
27	175	83	4.07	4.17	2931	47.2	20	450	525	85	60				1150	1150
41	175	83	4.08	4.19				450	525	80	56				1150	1150
50	175	83	4.07	4.16	2931	44.6	16	450	525	80	56				1150	1150

Cast Comments:
Run 1 – CASTER

Top Hat Size: 10.6 / 19
Holes plugged: 0

Total cast: 62.5
Cast tons:
Coiled tons: 100.38

Reason for Termination of Cast: Drained

Run 2 - CASTER

NUCOR STEEL – CRAWFORDSVILLE
CASTRIP HEAT RECORD

SEQ #: 1926
HEAT #: 2470060
GRADE: 100551

IN SEQUENCE: 2
LIQUIDUS:

SUPERVISOR: SG
PULPIT OPER: JG
DATE: 12-21-04
LOT: 12:56
TOG: ——

	C	Mn	S	Si	AL	N	Temp
LAST LMF CHEM:							

LADLE #: 14
TARE WEIGHT:
INITIAL WEIGHT: (114 LMF) 113
FINAL WEIGHT:
OPEN TIME: 13:03
CLOSE TIME: 14:14
FREE OPEN: Yes / No
OF PIPES USED:

TUNDISH #: 2-F
TUNDISH CAR #: 2
TUNDISH CLOSE TIME: 14:24
SKULL WEIGHT: 5.00

CASSETTE #: 2
CASSETTE ROLL #: 25
C/N PLATE #: 1

BRUSHES

PRECAST		POSTCAST	
EOS	16	EOS	
EDS	16	EDS	
DOS	16	DOS	
DDS	16	DDS	

S/D WEAR

	HMI	ACTUAL
D/S	8.39	
O/S	9.95	

TIME	POOL	SPEED	FLUX ENT	FLUX DEL	TEMP	OXY	MV	ROLL FORCE D/S	ROLL FORCE O/S	S/D FORCE D/S	S/D FORCE O/S	HYDRO	TP CAL.	TP ACTUAL	BRUSH SPEED DEL	BRUSH SPEED ENT
72	175	82	4.09	4.22	2945	47.2	16	450	525	70	55				1150	1150
87	175	79	3.96	4.09				450	525	70	55				1150	1150
110	175	79	3.90	4.02				450	525	70	56				1150	1150
120	175	80	3.90	4.03	2976	51.1	13	450	515	70	56				1150	1150
130					2970											

Cast Comments: (Argon at 14% at 71 min off At 86 min – (No change)
Dropped Pool to 170 at 86 min (No profile change)
Upped MCW Temp from 60 to 75 (No profile change)

Top Hat Size: 10.6 / 9
Holes plugged: 0

Reason for Termination of Cast: Drained

Total cast: 142.9
Cast tons: 243.38
Coiled tons: 223.94

Run 3 - Caster

NUCOR STEEL – CRAWFORDSVILLE
CASTRIP HEAT RECORD

SEQ #: 1927
HEAT #: 146355
GRADE: 100531

IN SEQUENCE: 1
LIQUIDUS:

SUPERVISOR: SG/GH
PULPIT OPER: JG/JH
DATE: 12-21-04

	C	Mn	S	Si	AL	N	Temp
LAST LMF CHEM:							

LOT: 21:00
TOG:

LADLE #: 14
TARE WEIGHT:
INITIAL WEIGHT: (106LMF) 109
FINAL WEIGHT:
OPEN TIME: 21:31
CLOSE TIME: 21:53
FREE OPEN: Yes / No
OF PIPES USED: 2

TUNDISH #: 7-G
TUNDISH CAR #: 1
TUNDISH CLOSE TIME:
SKULL WEIGHT:

CASSETTE #: 1
CASSETTE ROLL #: 20
C/N PLATE #: 1

BRUSHES

PRECAST		POSTCAST	
EOS	16	EOS	
EDS	16	EDS	
DOS	16	DOS	
DDS	16	DDS	

S/D WEAR

	HMI	ACTUAL
D/S	4.5	
O/S	4.5	

TIME	POOL	SPEED	FLUX ENT	FLUX DEL	TEMP	OXY	MV	ROLL FORCE D/S	ROLL FORCE O/S	S/D FORCE D/S	S/D FORCE O/S	HYDRO	TP CAL.	TP ACTUAL	BRUSH SPEED DEL	BRUSH SPEED ENT
9	175	76	3.94	3.84	2966	51.5	16	425	650	110	110				1150	1150
23	175	73	3.8	3.8	2955	48.0	14	425	625	70	60	—	—	✓	1150	1150

Cast Comments: 4.75 Tundish Scale

Top Hat Size: 10.6/9
Holes plugged: 0

Total cast: 63
Cast tons:
Coiled tons: 87.2

Reason for Termination of Cast: drain

QF-0260 5/12/04

ΔAir Analysis, Inc.

Report on:
Particulates/ PM10, Lead, Sulfur Dioxide, Nitric Oxides,
Carbon Monoxide and Visible Emissions
Indiana Air Permit Compliance Testing

Performed for
Nucor Steel Corporation
Castrip Operations

January 3, 2003

Air Analysis Inc. Project Number: 129

ΔAir Analysis, Inc.
3904 Clarks Creek Road * Plainfield, Indiana* 46168 877-683-TEST

TABLE OF CONTENTS

Executive Summary

Air Analysis, Inc. was contracted by Nucor Steel Corporation to perform air emissions sampling of their Castrip Baghouse Stack in Crawfordsville, Indiana, on January 3, 2003. The objective of the test program was to determine compliance to Indiana air permit requirements for particulate matter /(PM/10), lead, sulfur dioxide, nitric oxides, carbon monoxide and visible emissions. The following personnel were involved with the testing program:

Air Analysis	Mike Dicen
Air Analysis	Chris Sgroi
Air Analysis	Doug Van Demark
Air Analysis	Ron Raynor
Nucor Steel	Dave Sulc
IDEM	Dave Cline

Three sets of one-hour test runs were performed for SO2, NOX, CO and Visible Emissions. Three runs were attempted for PM/PM10 and lead however only two runs were completed due to equipment failure. Run 2 of PM/PM10 was voided due to failed pitot leak check. In addition, a filter hot box short circuited thus sampling was limited to one complete Method 5 train. Since two lead runs were completed and performed within requirements, it was determined to complete one other run of PM/PM10.

Per Mr. Dave Cline of IDEM, testing was to be performed while one ladle is cast at the Caster and another being processed at the LMS. Therefore, total tons on both the Caster and LMS were added since both add to emissions to the baghouse. Please review Section 3 for further details.

Table 1.

Test Summary

Pollutant	Date	Runs	Concentration	Mass Emissions Rate
PM PM/PM10	1/03/03 1/03/03	1, 3 1,3	0.0003 gr/dscf 0.0055 gr/dscf	0.28 lbs/hr 5.0 lbs/hr
Lead	1/03/03	1, 2	0.0000 gr/dscf	0.0142 lbs/hr****
NOX	1/03/03	1-3	2.2 ppm	1.69 lbs/hr
SO2	1/03/03	1-3	6.59 ppm	7.06 lbs/hr
CO	1/03/03	1-3	20.37 ppm	9.55 lbs/hr
Visible Emissions	1/03/03	1-3	0 %	NA

**** Lead is non detect. Entered was the minimum laboratory detection limit.

Results

Table 2

STACK EMISSION SUMMARY				
Gaseous Emissions	**Run 1**	**Run 2**	**Run 3**	**Average**
NOx lbs/hr	1.6461	1.9805	1.4466	1.6911
SO2 lbs/hr	5.1299	4.6848	11.3606	7.0585
CO lbs/hr	8.5394	11.4482	8.6640	9.5506
Avg. Stack Vol. Flow Rate				
ACFM	111,880.86	109,793.71	111,165.98	110,946.85
DSCFM	109,422.08	106,741.68	106,840.87	107,668.21
Avg. Stack Temp.	74.333	81.652	84.375	80.120
Stack Gas Velocity	37.097	36.405	36.860	36.787
Avg. Velocity Head	0.4290	0.4083	0.4159	0.4177
Avg. Sq. Rt of Delta P	0.6549	0.6390	0.6449	0.6463
Lead Emissions	**Run 1**	**Run 2**	**Run 3**	**Average**
Filterable (gr/dscf)	0.0000	0.0000	No run	0.0000
Lead(lbs/hr)	0.0143	0.0141	Equipment Failure	0.0142
Avg. Stack Vol. Flow Rate				
ACFM	111,873.76	109,812.39		110,843.07
DSCFM	109,412.05	106,722.42		108,067.24
Avg. Stack Temp.	74.333	81.652		77.993
Stack Gas Velocity	37.094	36.411		36.753
Avg. Velocity Head	0.4290	0.4083		0.4186
Avg. Sq. Rt of Delta P	0.6549	0.6390		0.6469
****** PM/PM10 Emissions***	**Run 1**	**Run 2**	**Run 3**	**Average**
Filterable (gr/dscf)	0.0005	Void Run	0.0001	0.0003
Filterable + Condensible (gr/dscf)	0.0037	Failed pitot	0.0073	0.0055
Filterable (lbs/hr)	0.4876	Leak check	0.0776	0.2826
Condensible (lbs/hr)	2.8282		6.6191	4.7236
Total (lbs/hr)	3.3158		6.6967	5.0062
Avg. Stack Vol. Flow Rate				
ACFM	107,409.59	106,443.44	111,150.86	108,334.63
DSCFM	105,249.18	103,650.22	106,844.26	105,247.89
Avg. Stack Temp.	75.417	82.783	84.375	80.858
Stack Gas Velocity	35.614	35.294	36.855	35.921
Avg. Velocity Head	0.3951	0.3839	0.4159	0.3983
Avg. Sq. Rt of Delta P	0.6286	0.6196	0.6449	0.6310

Entered minimum detection limit of 0.055 mg

***** Note – Air purge of the Method 202 train was not performed**

Description of Source Processes and Field Notes

Nucor Steel Corporation operates a steel mill facility in Crawfordsville, Indiana. The facility required to determine compliance to permit conditions is the recently built Castrip. At this facility, molten metal is cast into thin metal sheets.

Two sources have an effect on air emissions according to the Indiana Department of Environmental Management; process emissions from LMS and Caster. Production levels were kept for both metal sheets produced and the ladle on standby.

Production rates follows as described above. The permitted capacity is 135 tons /hr of finished product which was not exceeded during the test.

123.3 tons
114.5 tons----------------237.8 tons TEST 1
125.2 tons----------------239.7 tons TEST 2
112.8 tons----------------238.0 tons TEST 3

Emissions pass through a baghouse prior to exiting a stack.

Actual recorded production material information is in Appendix.

Methodology

The sampling procedures used by Air Analysis, Inc. are as follows:

Title 40 CFR Part 60 Appendix A
Method 1 "Sampling of Velocity Traverses for Stationary Sources"
Method 2 "Determining of Stack Gas Velocity and Volumetric Flow Rate"
Method 3 "Gas Analysis for the Determination of Molecular Weight"
Method 4 "Determination of Moisture Content in Stack Gas"
Method 5 "Determination of Particulate Emissions"
Method 9 "Visual Determination of the Opacity of Emissions"
Method 202 "Determination of Condensible Emissions from Stationary Sources"
Method 6C "Determination of Sulfur Dioxide Emissions"
Method 7E "Determination of Nitric Oxide Emissions"
Method 10 "Determination of Carbon Monoxide Emissions"

SAMPLE POINT DETERMINATION-EPA METHOD 1

Sampling point locations were determined according to EPA Reference Method 1.

		Sampling Points		
Locations	**Dimensions**	**Ports**	**Points Per Port**	**Total Points**
Castrip Stack	96" Diameter	4	6	24

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

VELOCITY AND VOLUMETRIC FLOW RATE – EPA METHOD 2

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

GAS COMPOSITION AND MOLECULAR WEIGHT – EPA METHOD 3

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

MOISTURE CONTENT – EPA METHOD 4

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

PARTICULATE DETERMINATION – EPA METHOD 5/202
Stack gas is withdrawn isokinetically and particulate matter is collected on the nozzle, probe and filter. The probe temperature and filter are maintained at temperatures of 248 degrees F (+/- 25 deg. F). The impinger temperature exit gas is maintained at temperatures at or below 68 degrees F.

The nozzle, probe and glass filter containers are rinsed with acetone and the rinse is captured in a sealed glass container. The impingers and connecting glassware are rinsed twice with de-ionized water and captured in a sealed container. Two rinses of methylene chloride are captured and stored in a sealed glass container.

OPACITY – METHOD 9
Stack opacity readings are taken for 60 minutes at 15 second intervals *for NSPS* and 30 minutes at 15 second intervals for *state permitted, non-federal sources*, by a certified visible emissions reader. The visible emissions readings are conducted during each of the particulate test runs. The results are reported as an average opacity reading for the half an hour period. A copy of the visible reader's current certification is included in the Appendix.

SO2 DETERMINATION – EPA METHOD 6C
Stack gas is withdrawn from the stack and conditioned (moisture is removed) before being analyzed by infrared detection. Sulfur Dioxide molecules are " excited " by specific wavelengths. Molecular excitement is directly proportional to the concentration of SO2. Quality assurance of the analyzer is determined by first determined by direct injection of known EPA protocol 1 gas concentrations. A system check of the probe, connection lines and conditioner is also determined prior to and after each sample period to determine drift bias.

NOX DETERMINATION – EPA METHOD 7E
Stack gas is withdrawn from the stack and conditioned (moisture is removed) before being analyzed by chemiluminescent detection. NOX molecules are " excited " by specific wavelengths. Molecular excitement is directly proportional to the concentration of NOX. Quality assurance of the analyzer is first determined by direct injection of known EPA protocol 1 gas concentrations. A system check of the probe, connection lines and conditioner is also determined prior to and after each sample period to determine drift bias.

CO DETERMINATION – EPA METHOD 10
Stack gas is withdrawn from the stack and conditioned (moisture is removed) before being analyzed by infrared detection. CO molecules are " excited " by specific wavelengths. Molecular excitement is directly proportional to the concentration of CO. Quality assurance of the analyzer is first determined by direct injection of known EPA protocol 1 gas concentrations. A system check of the probe, connection lines and conditioner is also determined prior to and after each sample period to determine drift bias

Meltshop Baghouse #1 Testing for Emissions:

Test Date: 02/22 and 02/24/1995

Production Rate: Approximately 242.0 ton/hr, EAF's only

The process and air pollution control equipment were operating normally at the time of testing.

RAMCON

ENVIRONMENTAL CORPORATION

March 31, 1995

Mr. Dave Sulc
Nucor Steel
RR 2, Box 311
Crawfordsville, Indiana 47933

RE: Source Sampling — Acid Regeneration Unit, Pickle Line and EAF Baghouse

Dear Mr. Sulc:

Enclosed you will find four (4) copies of our report on the particulate, hydrogen chloride and carbon monoxide emissions testing conducted at your facility located in Crawfordsville, Indiana.

You will want to sign the report covers and send two copies to:

Mr. Ed Surla
Indiana Air Pollution Control
Department of Environmental Management
105 South Merdian Street
P. O. Box 6015
Indianapolis, Indiana 46206

You will need to keep one copy of the report at the plant.

We certainly have enjoyed working with you. Please let us know if we can be of further assistance.

Sincerely,

William Joseph Sewell, II
Vice President

WJSii:wpc
Enclosures

RAMCON BUILDING, 6707 FLETCHER CREEK COVE, MEMPHIS, TENNESSEE 38133
TELEPHONE 800/458-4567 IN TENNESSEE 901/387-0500 FAX 901/387-0400

TABLE OF CONTENTS

Table of Contents **Page**

I. INTRODUCTION

On February 21 through 24, 1995 personnel from RAMCON Environmental Corporation conducted air emissions testing at Nucor Steel located in Crawfordsville, Indiana. The scope of work involved testing the acid regeneration unit and pickle line exhaust for filterable particulate matter and hydrogen chloride. The EAF baghouse was subject to sampling for particulate matter, carbon monoxide, carbon dioxide and oxygen.

The carbon monoxide, oxygen and carbon dioxide were collected and analyzed by test methods that utilize "real-time" continuous emission monitor (CEM) instrumentation. This technology provides data with a high degree of reliability on-site. Reference Methods 3A and 10 were employed for the analysis of oxygen and carbon dioxide, and carbon monoxide, respectively.

These instrumental analyzer testing procedures set forth a sampling strategy to continuously extract sample gas from the source. This sample stream is routed to individual CEMs for analysis of the various targeted pollutants and diluent gases. The test results are based on the average value of one-minute averages generated by the CEM instrument data acquisition during the test periods. Three (3) sampling periods were performed in which the gaseous concentrations were continuously monitored for the listed target compounds.

The particulate matter emissions from the EAF baghouse were sampled according to Reference Method 5D. This procedure sets forth a strategy whereby the velocities at the sampling location are calculated from volumetric flow values determined at the inlet duct to the baghouse process.

The particulate matter and hydrogen chloride emissions from the acid regeneration unit and pickle line exhaust were sampled according to US EPA Reference Method 26A requirements. The stack gas moisture, velocity, and volumetric flow rates were also determined during this isokinetic sampling procedure. This data enabled conversion of flue gas pollutant concentrations to emission data values in pounds per hour (lb/hr).

The purpose of the testing project was to determine if the targeted pollutant emissions are equal to or below the allowable limitation set forth by the State of Indiana EPA in the facility's operating permit. Dave Kline and Steve Friend representing the State of Indiana was present during the testing procedure(s) conducted by RAMCON Environmental Corporation. The test results and supporting calculations are provided in the following sections.

II. TEST RESULTS

The test results are summarized in Tables A through D.

Table A summarizes the test results for the particulate matter and hydrogen chloride emissions from the acid regeneration unit. The first test run performed on the acid regeneration unit yielded particulate results which were significantly higher than subsequent tests. The majority of the excess particulate matter was obtained from the acetone wash of the sample probe. High levels of particulate matter collected in this portion of the sample train could possibly be collected due to scrapping of the probe against the stack or port wall during the test. Two test runs following the initial run were rejected due to failure of post test leak checks. Therefore test runs 4 and 5 were performed to provide three valid sampling runs. The last two particulate results provide consistent values and should be considered as demonstration of the levels of particulate matter emitted during process operation. Run 1 results are likely biased high due to sampling error.

Table B summarizes the test results for the particulate matter and hydrogen chloride emissions from the pickle line exhaust. Table C tabulates the particulate matter emissions obtained from the EAF baghouse process. These summary tables provide the test results in concentration values of grains per dry standard cubic feet (gr/dscf). The emission values of the targeted pollutants are listed in pounds per hour (lb/hr).

The isokinetics determined for the first test run of the Reference Method 5D was 132% which exceeds the tolerance established by EPA for acceptable test quality assurance. This initial test was followed by two additional runs which were performed near 100% and represent valid emissions results. Because the facility easily passes the allowable emission limitation for particulate matter and the spread of test results are consistent across the three test runs, it is requested that the emissions test be considered demonstration of compliance.

Table C — EAF Baghouse
Particulate Matter Test Summary
February 22 and 24, 1995

Run	Time	gr/dscf	lb/hr	Isokinetics
1	13:12 - 17:31	0.0020	14.47	132.60
2	19:29 - 23:08	0.0016	10.93	98.73
3	11:03 - 15:31	0.0015	12.18	100.90
	Average:	0.0017	12.53	

Table D — EAF Baghouse
CO Test Summary
February 22, 1995

Run	Time	O_2, %	CO_2, %	CO, ppm	CO, lb/hr
1	13:01 - 14:01	19.95	1.41	78.72	289.3
2	15:13 - 16:13	20.03	1.30	57.35	198.9
3	16:48 - 17:48	19.99	1.45	29.71	122.5
	Average:	19.99	1.39	55.26	203.6

AVG T/HR 241.97

CO lb/ton = 0.84

III. TEST PROCEDURES

The following is a description of each of the test method(s) that were conducted during the project. In this description, a discussion of the pertinent segments including preparation, sampling, and analysis is addressed. This section will provide information supporting the validity of the samples.

A. Determination of Hydrogen Chloride Emissions From Stationary Sources - US EPA Method 26.

This test procedure was coupled with the particulate determination for test location described above. This enables two test components involved in the scope of work to be collected simultaneously by one sample train. This practice is employed only when neither of the test components results will be altered or biased.

1. Preparation:

All glassware utilized in each sampling train was thoroughly cleaned and dried prior to each test series.

The impinger system was assembled using 100 ml of 0.1 N sulfuric acid in the first two impingers. The third and fourth impingers contained 100 ml each of 0.1 N sodium hydroxide. The fourth impinger contained a pre-weighed amount of silica gel. In assembling the sample train, a small amount of silicon grease was placed on the ball joints to ensure adequate sealing.

A glass probe liner and nozzle system was utilized for the hydrogen chloride collection train. The probe housed a set of calibrated S-type pitot tubes and a calibrated thermocouple for monitoring stack velocity and temperature respectively.

2. Sampling:

The probe and sample box were heated to an approximate temperature of 250°F. These temperatures were monitored throughout the testing to prevent moisture condensation and associated HCl losses.

An ice bath was prepared to submerse the impinger system into. The temperature of the last impinger was monitored throughout the testing to ensure adequate condensation of the water vapor in the flue gases.

A leak check was performed prior to each test run. The entire sample train system was subjected to a vacuum that did not exceed 0.02 cfm leakage rate. The vacuum that was established during the pre-test leak check was not exceeded during the test period.

Three sample runs were conducted to constitute a complete test. The sampling time was a minimum of one hour. The stack gas was extracted via the sampling system proportionally at a rate of approximately 1.0 liter per minute.

When a test run had been completed, a post-test leak check was conducted prior to any dismantling of the sampling train. Once this has been successfully achieved, the sample train was dismantled for sample recovery.

The contents of the impingers were volumetrically measured and transferred to a labeled sample container.

3. Hydrogen Chloride Analysis:

The absorbent solutions of 0.1 N sulfuric acid utilized in the collection of the hydrogen chloride were analyzed by ion chromatography. The sulfuric acid solution is used to capture the hydrogen chloride and the sodium hydroxide solution collects the chlorine.

A sample field blank of the absorption solution was collected, contained, labeled and analyzed in conjunction with the samples.

4. Particulate Matter Analysis:

The glass fiber filter was desiccated for 24 hours prior to any weighing. The acetone probe wash was transferred to a tared beaker and evaporated to dryness. The resultant residue was also desiccated prior to gravimetric analysis.

The first weighing was performed after this initial period of drying. The weights were recorded to 0.0001 g. After a minimum of six additional hours of desiccating, a second weighing was conducted. The weights must agree within 0.0005 g or further desiccation must be conducted until the weights stabilize.

Sample field blanks of acetone were collected, contained, labeled and analyzed in conjunction with the samples. The blank weight was deducted from the acetone probe wash residue weight determinations.

B. Determination of Particulate Matter Emissions from Positive Pressure Fabric Filters — US EPA Reference Methods 5D.

This method applies to the determination of particulate matter emissions from positive pressure fabric filters. Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter.

1. <u>Preparation</u>:

All glassware utilized in each sampling train was thoroughly cleaned and dried prior to each test series. A glass fiber filter was used that has been labeled, desiccated for a minimum of 24 hours and pre-weighed.

The impinger system was assembled using the modified Greenburg-Smith type. One hundred ml of deionized water was placed in the first two impingers. The third impinger was initially empty and the fourth impinger contained a pre-weighed amount of silica gel for complete moisture removal. This impinger train configuration is according to Reference Method 5 for particulate. In assembling the sample train, a small amount of silicon grease was placed on the ball joints to ensure adequate sealing.

A stainless steel probe liner and nozzle system is typically utilized for the particulate determinations at the sampling location. The probe system housed a set of calibrated S-type pitot tubes and a calibrated thermocouple for monitoring stack velocity and temperature.

2. <u>Sampling</u>:

The probe and sample box was heated to an approximate temperature of 250°F. These temperatures were monitored throughout the testing. An ice bath was prepared to submerse the impinger system into. The temperature of the last impinger was also monitored throughout the testing to ensure adequate condensation of the water vapor in the flue gases.

A leak check was performed prior to each test run. The entire sample train system was subjected to a vacuum that did not exceed 0.02 cfm leakage rate. The vacuum that is established during the pre-test leak check was not exceeded during the test period.

The variation of Reference Method 5 versus 5D is comprised of taking the velocity readings at an inlet location for the 5D versus at each sampling traverse point via Method 5.

Therefore velocity traverses were taken at the inlet duct(s) to the baghouse process. This data is utilized for the purpose of determining the volumetric flow rate of air through the baghouse. This value is utilized to determine the average velocity at each respective sampling location or compartment. With the average velocity through each compartment known, the test can then be performed according to Method 5 for sample nozzle selection and isokinetic sampling procedures.

Three sample runs were conducted to constitute a complete test of the baghouse process. Each test run consisted of sampling four (4) compartments in the baghouse. The sampling runs were conducted over a period of four hours each and at least 160 scf of stack gas was extracted via the sampling system.

When a test run has been completed, a post-test leak check was conducted prior to any dismantling of the sampling train. Once this has been successfully achieved, the sample train was dismantled for sample recovery.

The probe and connecting glassware was washed with acetone. The contents of the impingers was volumetrically measured for moisture gain and transferred to a labeled sample container. The glass fiber filter was carefully transferred to its sample container.

3. <u>Analysis</u>:

The glass fiber filter was desiccated for 24 hours prior to any weighing. The acetone probe wash was transferred to a tared beaker and evaporated to dryness. The resultant residue was also desiccated prior to gravimetric analysis.

The first weighing was performed after this initial period of drying. The weights were recorded to 0.0001 g. After a minimum of six additional hours of desiccating, a second weighing was conducted. The weights must agree within 0.0005 g or further desiccation must be conducted until the weights stabilize.

Sample field blanks of acetone were collected, contained, labeled and analyzed in conjunction with the samples. The blank weight was deducted from the acetone probe wash residue weight determinations.

C. Determination of Carbon Dioxide and Oxygen Emissions From Stationary Sources (Instrumental Analyzer Procedure) - US EPA Method 3A.

This method is applicable to the determination of oxygen (O_2) and carbon dioxide (CO_2) concentrations in emissions from stationary sources. A sample is continuously extracted from the effluent stream. A portion of the sample stream is conveyed to an instrumental analyzer(s) for determination of O_2 and CO_2 concentrations. These concentrations are provided in terms of percentage (%), dry basis.

The collection and analysis of diluent gases, carbon dioxide and oxygen, at the test location was performed by US EPA Reference Method 3A. This procedure utilizes continuous emissions monitors that provide the data results from the source on a "real-time" or instantaneous basis.

All of the CEM instrumental procedures that were conducted at the testing location(s) were extracted and analyzed with similar testing strategies. Because of this similarity, a detailed description of the calibration and operation procedures of the CEM testing is provided in the discussion of Method 3A and is referred to in the other sections concerning the additional CEM procedures.

1. Pre-Test Calibration:

The calibration of the instruments is performed using certified gas standards composed of a known concentration of carbon dioxide and oxygen in zero-grade nitrogen. These gas standards are prepared using partial pressure/volumetric and gravimetric methods.

The prepared gas mixture is analyzed providing a certification tolerance not greater than two percent (2%) of the target concentration. A copy of the analysis certificate for each of the certified gas mixtures used during the testing is included in the test report.

The oxygen instrument utilizes an paramagnetic detector and the carbon dioxide instrument utilizes a nondispersive infrared detector. The minimum detection limit for both gas analyzers is one-tenth of one percent (0.1%). The fullscale limitations of the oxygen and carbon dioxide analyzers is twenty-five percent (25%) and twenty percent (20%) respectively.

Immediately prior to each compliance test series, a complete multi-point calibration of the instrument is performed. Each instrument is introduced to a zero-grade nitrogen. The zero potentiometer on each analyzer is adjusted, if necessary, until the proper output from the analyzer is achieved.

Then a high-range pollutant gas mixture, that has been prepared in the specified range percentage of the span or fullscale, is injected. After the system stabilizes, the span or fullscale potentiometer is adjusted until the output from analyzer corresponds to the certification of analysis for the respective calibration gas.

When this procedure is complete and the system has responded properly to a zero and fullscale reading, a mid- and/or low-range certified calibration gas is introduced to the sampling system. No adjustments are made to the system except to achieve proper flow rate through the analyzer. The analyzer, after reaching a stable value, must correspond to the certified value of the calibration gas within the specified tolerance set forth in the test procedure.

This mid-range calibration gas serves two (2) purposes of quality control and quality assurance. The first is to demonstrate the instruments ability to analyze and output data on a linear scale. The second purpose is to validate that the zero and fullscale values of the instrument are properly set.

Prior to sampling, a system bias check is conducted. This quality control check is performed by introducing a single calibration standard into the sample probe inlet. This calibration gas is usually a mixture of oxygen and carbon dioxide in a balance of zero nitrogen. The system is not adjusted except to achieve proper flow through the analyzers. The calibration standard is allowed to traverse the sampling system under conditions identical to actual flue gas sampling. The response of the analyzer during this bias check must agree with the initial analyzer response of this standard within the specified tolerances set forth in the test method. This system bias check serves to demonstrate that the sample train is leak free and causes no interference to the integrity of the sample.

2. <u>Sampling</u>:

After the initial multi-point calibration, the system is purged with zero-grade nitrogen to remove any contaminants that were injected during calibration. Once the system indicates that the pollutant gases have been removed, the calibration valve assembly is positioned to allow stack gas to flow through the instrument.

The sample gas is filtered at the stack position to prevent all particulate matter from entering the sampling train. This provides the instruments with a filtered gas sample from the source.

All samples injected to the instruments are removed from the stack and delivered to the instruments via a heated probe and sample line. This prevents any condensation of water vapor and/or pollutant in the gas stream. Once the sample gas exits the sample line, the stream is separated in a sample gas manifold. The split stream enables analysis of the CEM instrumentation on both wet and dry basis as necessary.

The portion of the sample gas dedicated to the dry basis analyzers is directed into a gas conditioning system where the moisture content of the stream is removed. The sample gas that exits the gas conditioning system is then routed to the instruments for analysis on a dry basis.

3. Post-Test Calibration:

To demonstrate that the instrument did not exhibit any deviation from the calibrated values set at the beginning of a test period, a calibration standard is injected into the sampling system at the conclusion of each test run. The sample system must respond within specified tolerance limits according to the initial system bias check.

This post-test calibration serves two purposes: (1) it demonstrates that excessive calibration drift of the instrument(s) did not occur during the test period and, (2) that the system was not contaminated with any foreign material from the source to alter any results during the test period.

4. Data Acquisition:

The CEM monitors utilized in the testing project output a voltage signal corresponding to the pollutant concentration determined by the detector. This signal is relayed to a computerized datalogger system. This system retrieves the output signal from each monitor every ten (10) seconds. This data is then averaged on a per-minute basis and stored on the hard drive of the computer. Additionally, a back-up data acquisition device is employed. A strip chart recorder is utilized to record the digital value data points. This device records the instrument output on a one minute, instantaneous basis.

D. Determination of Carbon Monoxide Emissions From Stationary Sources (Instrumental Analyzer Procedure) — US EPA Method 10.

1. Calibration:

The calibration of the instrument(s) is performed using certified gas standards composed of a known concentration of carbon monoxide in zero-grade nitrogen. These gas standards are prepared using partial pressure/volumetric and gravimetric methods.

The prepared gas mixture is analyzed and the certification tolerance is not greater than 2% of the pollutant component. A copy of the analysis certificate for each of the certified gas mixtures used during the testing is included in the test report.

The instrument(s) use(s) a Luft-type nondispersive infrared detector. Immediately prior to each compliance test series, a complete calibration of the instrument(s) is performed. Each instrument has zero-grade nitrogen injected into it and the zero potentiometer is adjusted, if necessary, until the proper voltage output from the analyzer is achieved.

Then a high-range pollutant gas mixture that has been prepared in the specified range percentage of the span or fullscale is injected. After the system stabilizes, the span or fullscale potentiometer is adjusted until the voltage output from the analyzer corresponds to the certification of analysis for the respective calibration gas.

When this procedure is complete and the system has responded properly to a zero and fullscale reading, a mid- and low-range certified calibration gas is injected into the system. No adjustments are made to the system except to achieve proper flow rate through the analyzer. The analyzer, after reaching a stable value, must correspond to the certified value of the calibration gas within a specified percentage of the fullscale. This mid- and low-range calibration gas serves two purposes: quality control and quality assurance. The first is to show that the instrument analyzes and outputs data on a linear scale, the second is to validate that the zero and fullscale values of the instrument(s) are properly set.

2. Sampling.

After calibration of the instrument(s) has been completed, a sample bias check is performed. This involves injecting calibration gas into the sample probe inlet and allowing the calibration gas to traverse through the sample train to the analyzer(s) where it is analyzed. This analysis will correspond to the pre-test calibration analysis value of the standard within the tolerances set forth in the reference method.

Once the system indicates that the calibration gases have been removed, the calibration valve assembly is positioned to allow stack gas to flow through each instrument. The sample gas is filtered at the stack position to remove any particulate matter. This prevents instruments from being contaminated and ensures reliable data acquisition.

All samples injected to the instruments are removed from the stack and delivered to the instrument(s) via a heated probe and sample line. This prevents any condensation of water vapor and/or pollutant in the gas stream.

Three (3) test runs were conducted to determine the emission value of CO. Each test run was conducted over a minimum period of one hour.

To demonstrate that the instrument(s) did not exhibit any deviation from the calibrated values set at the beginning of a test period, a sample of certified calibration gas is injected into the sampling system at the conclusion of each test run. The sample system must respond within specified tolerance limits according to the initial system bias check.

This post-test calibration serves two purposes: first it demonstrates that excessive calibration drift of the instrument(s) did not occur during the test period, and second, it demonstrates that the system was not contaminated with any foreign material from the source to alter any results during the test period.

RAMCON
ENVIRONMENTAL CORPORATION

April 10, 1995

Mr. Dave Sulc
NUCOR STEEL
RR #2, Box 311
Crawfordsville, Indiana 47933

RE: Metals Analysis of EAF Baghouse Particulate Samples

Dear Mr. Sulc:

I have attached the multi-metals summary of results obtained from the particulate filters collected at your EAF Baghouse in February, 1995. The metals results are provided for each test run in terms of milligrams per cubic meter (mg/m^3) and pounds per hour (lb/hr).

If I can be of further assistance please do not hesitate to contact me.

Sincerely,

W J Sewell

William Joseph Sewell, II
Vice President

WJSii:wpc
Attachment

RAMCON BUILDING, 6707 FLETCHER CREEK COVE, MEMPHIS, TENNESSEE 38133
TELEPHONE 800/458-4567 IN TENNESSEE 901/387-0500 FAX 901/387-0400

AMERICAN INTERPLEX CORPORATION
LABORATORIES

8600 Kanis Road
Little Rock, AR 72204-2322
(501) 224-5060

RECEIVED MAR 28 1995

REPORT

Ramcon Environmental Corporation
6707 Fletcher Creek Cove
Memphis, TN 38134

March 28, 1995
Control No. 12742

ATTN: Mr. Joe Sewell

Project Description: Three (3) thimble filters received on March 27, 1995
Nucor Indiana
Baghouse

Sample Identification: Run #1 TS00291 2.6100
AIC No. 12742-1

Parameter	Method	Result	Batch	Time Analyzed By
Antimony	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1133 07/61
Arsenic	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1132 07/61
Barium	EPA 3051, 6010A	0.64 mg	S3293	27MAR95 1132 07/61
Beryllium	EPA 3051, 6010A	0.000054 mg	S3293	27MAR95 1132 07/61
Cadmium	EPA 3051, 6010A	0.00042 mg	S3293	27MAR95 1132 07/61
Chromium	EPA 3051, 6010A	0.0089 mg	S3293	27MAR95 1132 07/61
Copper	EPA 3051, 6010A	0.0060 mg	S3293	27MAR95 1132 07/61
Lead	EPA 3051, 6010A	0.013 mg	S3293	27MAR95 1133 07/61
Manganese	EPA 3051, 6010A	0.032 mg	S3293	27MAR95 1132 07/61
Nickel	EPA 3051, 6010A	0.011 mg	S3293	27MAR95 1132 07/61
Phosphorus	EPA 3051, 6010A	<0.005 mg	S3293	27MAR95 1133 07/61
Selenium	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1133 07/61
Silver	EPA 3051, 6010A	<0.0004 mg	S3293	27MAR95 1132 07/61
Thallium	EPA 3051, 6010A	<0.005 mg	S3293	27MAR95 1133 07/61
Zinc	EPA 3051, 6010A	0.52 mg	S3293	27MAR95 1133 07/61

Sample Identification: Run #2 TS00296 2.2578
AIC No. 12742-2

Parameter	Method	Result	Batch	Time Analyzed By
Antimony	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1133 07/61
Arsenic	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1133 07/61
Barium	EPA 3051, 6010A	0.61 mg	S3293	27MAR95 1133 07/61
Beryllium	EPA 3051, 6010A	0.000042 mg	S3293	27MAR95 1133 07/61
Cadmium	EPA 3051, 6010A	<0.0003 mg	S3293	27MAR95 1133 07/61
Chromium	EPA 3051, 6010A	0.0074 mg	S3293	27MAR95 1133 07/61
Copper	EPA 3051, 6010A	0.0043 mg	S3293	27MAR95 1133 07/61
Lead	EPA 3051, 6010A	<0.005 mg	S3293	27MAR95 1133 07/61
Manganese	EPA 3051, 6010A	0.014 mg	S3293	27MAR95 1133 07/61
Nickel	EPA 3051, 6010A	0.0030 mg	S3293	27MAR95 1133 07/61
Phosphorus	EPA 3051, 6010A	<0.005 mg	S3293	27MAR95 1133 07/61
Selenium	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1133 07/61
Silver	EPA 3051, 6010A	<0.0004 mg	S3293	27MAR95 1133 07/61
Thallium	EPA 3051, 6010A	<0.005 mg	S3293	27MAR95 1133 07/61
Zinc	EPA 3051, 6010A	0.20 mg	S3293	27MAR95 1133 07/61

AMERICAN INTERPLEX CORPORATION LABORATORIES

8600 Kanis Road
Little Rock, AR 72204-2322
(501) 224-5060

REPORT

Ramcon Environmental Corporation
6707 Fletcher Creek Cove
Memphis, TN 38134

March 28, 1995
Control No. 12742

Project Description: Three (3) thimble filters received on March 27, 1995
Nucor Indiana
Baghouse

Sample Identification: Run #3 TS00288 2.3513
AIC No. 12742-3

Parameter	Method	Result	Batch	Time Analyzed By
Antimony	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1133 07/61
Arsenic	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1133 07/61
Barium	EPA 3051, 6010A	0.48 mg	S3293	27MAR95 1133 07/61
Beryllium	EPA 3051, 6010A	0.000056 mg	S3293	27MAR95 1133 07/61
Cadmium	EPA 3051, 6010A	<0.0003 mg	S3293	27MAR95 1133 07/61
Chromium	EPA 3051, 6010A	0.0098 mg	S3293	27MAR95 1133 07/61
Copper	EPA 3051, 6010A	0.0085 mg	S3293	27MAR95 1133 07/61
Lead	EPA 3051, 6010A	0.010 mg	S3293	27MAR95 1133 07/61
Manganese	EPA 3051, 6010A	0.030 mg	S3293	27MAR95 1133 07/61
Nickel	EPA 3051, 6010A	0.038 mg	S3293	27MAR95 1133 07/61
Phosphorus	EPA 3051, 6010A	<0.005 mg	S3293	27MAR95 1133 07/61
Selenium	EPA 3051, 6010A	<0.01 mg	S3293	27MAR95 1133 07/61
Silver	EPA 3051, 6010A	<0.0004 mg	S3293	27MAR95 1133 07/61
Thallium	EPA 3051, 6010A	<0.005 mg	S3293	27MAR95 1133 07/61
Zinc	EPA 3051, 6010A	0.48 mg	S3293	27MAR95 1133 07/61

AMERICAN INTERPLEX CORPORATION

By Steven Lovell
Steven Lovell
Technical Director

SL/lims

Enclosure: Analysis Protocol

Nucor Steel — EAF Baghouse
Metal Analysis of Method 5D Filters
February 22 and 24, 1995

Metal	Concentration, mg/m³			Emission, lb/hr		
	Run 1	Run 2	Run 3	Run 1	Run 2	Run 3
Antimony	<0.0016	<0.0022	<0.0021	<0.0050	<0.0065	<0.0075
Arsenic	<0.0016	<0.0022	<0.0021	<0.0050	<0.0065	<0.0075
Barium	0.1017	0.1334	0.1022	0.3209	0.3974	0.3619
Beryllium	8.6×10^{-6}	9.2×10^{-6}	1.2×10^{-5}	2.7×10^{-5}	2.7×10^{-5}	4.2×10^{-5}
Cadmium	6.7×10^{-5}	$<6.6 \times 10^{-5}$	$<6.4 \times 10^{-5}$	0.0002	$<1.95 \times 10^{-4}$	$<2.3 \times 10^{-4}$
Chromium	0.0014	0.0016	0.0021	0.0045	0.0048	0.0074
Copper	0.0010	0.0009	0.0018	0.0030	0.0028	0.0064
Lead	0.0021	<0.0011	0.0021	0.0065	<0.0033	0.0075
Manganese	0.0051	0.0031	0.0064	0.0160	0.0091	0.0226
Nickel	0.0017	6.6×10^{-4}	0.0081	0.0055	0.0020	0.0286
Phophorus	<0.0008	<0.0011	<0.0011	<0.0025	<0.0033	<0.0038
Selenium	<0.0016	<0.0022	<0.0021	<0.0050	<0.0065	<0.0075
Silver	$<6.4 \times 10^{-5}$	$<8.7 \times 10^{-5}$	$<8.5 \times 10^{-5}$	<0.0002	$<2.6 \times 10^{-4}$	$<3.0 \times 10^{-4}$
Thallium	<0.0008	<0.0011	<0.0011	<0.0025	<0.0033	<0.0038
Zinc	0.0826	0.0437	0.1022	0.2607	0.1303	0.3619

Meltshop LMF testing for Lead:

Test Date: 08/14/2000

Production Rate: Approximately 241.1 ton/hr

The process and air pollution control equipment were operating normally at the time of testing.

Supreme
Environmental Service Company
SESCo Group

1426 West 29th Street *Indianapolis, Indiana 46208
(317)347-9590, FAX (317)347-9591

REPORT on IN-HOUSE
LEAD (*Pb*) TESTING
Performed for:
NUCOR Steel
Crawfordsville, Indiana
LMF
on 08/14/00

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Michael Dicen, Vice-President for

NUCOR Steel
Crawfordsville, Indiana

SESCO Project No. 4098

TABLE OF CONTENTS

NUCOR Steel
Crawfordsville, Indiana

SESCO Project No. 4098

1-1 PROJECT OVERVIEW

SESCo Group was contracted by Nucor Steel, to perform in-house air sampling of the LMF Line stack at Crawfordsville, Indiana on August 14, 2000. The objective of the testing was to determine Lead (Pb) emissions. The following personnel were involved with the testing program:

SESCo	Michael Dicen
SESCo	Andrew Young
NUCOR	David Sulc

The testing program included flow determination and lead emissions (Method 12). Below is a summary of the results:

Table 1-1:
Summary of Test Results

Pollutant	Runs	Date	Time	Filter (lbs/hr)	Acid Rinse (lbs/hr)
LEAD (Pb)	1	08/14/00	11:40-12:46	0.0019	0.0019
	2	08/14/00	13:05-14:12	0.0019	0.0019
	3	08/14/00	14:30-15:37	0.0019	0.0019

3-Run Avg (filterable & acid rinse)	**0.0038 (lbs/hr)**

NUCOR Steel
Crawfordsville, Indiana

SESCO Project No. 4098

2-1 RESULTS

Table 2-1:
LMF Emissions

		1	2	3	Avg
Gas Conditions					
Ts	Stack Temperature (°F)	157.70	157.29	155.87	156.95
Bwo	Moisture (volume %)	1.01	1.56	1.54	1.37
O2	Oxygen (dry volume %)	20.9	20.9	20.9	20.9
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	155248	152530	152531	153436
Qstd	Standard Conditions (dscfm)	132050	129113	129430	130198
Lead (Pb)					
ET	Emission Rate - filterable (lbs/hr)	0.0019	0.0019	0.0019	0.0019
ET	Emission Rate - acid rinse (lbs/hr)	0.0019	0.0019	0.0019	0.0019
ET	Emission Rate - total (lbs/hr)	0.0038	0.0038	0.0038	0.0038

3-1 METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1-4, 12. The following table summarizes the methods:

Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A

Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Gas Analysis for the Determination of Molecular Weight"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 12	"Determination of Lead Emissions"

SAMPLE POINT DETERMINATION

Sampling point locations were determined according to EPA Reference Method 1.

Table 3-1:
Sampling Points

Location	Dimensions	Ports	Points per Port	Total Points
LMF Line	102" ID	2	12	24

3-2 METHODOLOGY

SAMPLE AND VELOCITY TRAVERSE - EPA METHOD 1

Method 1 was used for the representative measurement of pollutant emissions and/or total volumetric flow rate. A measurement site where the effluent gas stream, flowing in a known direction is selected and divided into a equal number of areas. A traverse point is then located within each of these equal areas. Sampling or velocity measurement is performed at a site located at least eight stack or duct diameters downstream and two diameters up stream from any flow disturbance such as a bend, expansion, contraction, or visible flame. If necessary, an alternative location may be selected at a position at least two stack or duct diameters downstream and one half diameter upstream from any flow disturbance.

VELOCITY AND VOLUMETRIC FLOW RATE - EPA METHOD 2

EPA Method 2 was used to determine the gas velocity and flow rate at both the inlet and outlet locations. Each set of velocity determinations included the measurement of gas velocity pressure and gas temperature at each of the Method 1 determined traverse points. The velocity pressures were measured with a Type S pitot tube. Gas temperature measurements were made with a Type K thermocouple and digital pyrometer.

GAS COMPOSITION AND MOLECULAR WEIGHT - EPA METHOD 3

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

MOISTURE CONTENT - EPA METHOD 4

The flue gas moisture content at the testing locations was determined in accordance with EPA Method 4. The moisture was determined by quantitatively condensing moisture in the chilled impingers and silica absorbtion. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

LEAD DETERMINATION - EPA METHOD 12

Outlet stack gas is withdrawn isokinetically and particulate matter is collected on the nozzle, probe, and filter. Lead particulate is also captured in the first two impingers; these impingers contain nitric acid. A fourth and final impinger contains about 200 grams of silica gel. The probe and filter temperature are maintained at 248 degrees F(+/- 25 deg. F). The impinger gas temperature is maintained at temperatures at or below 68 deg. F.

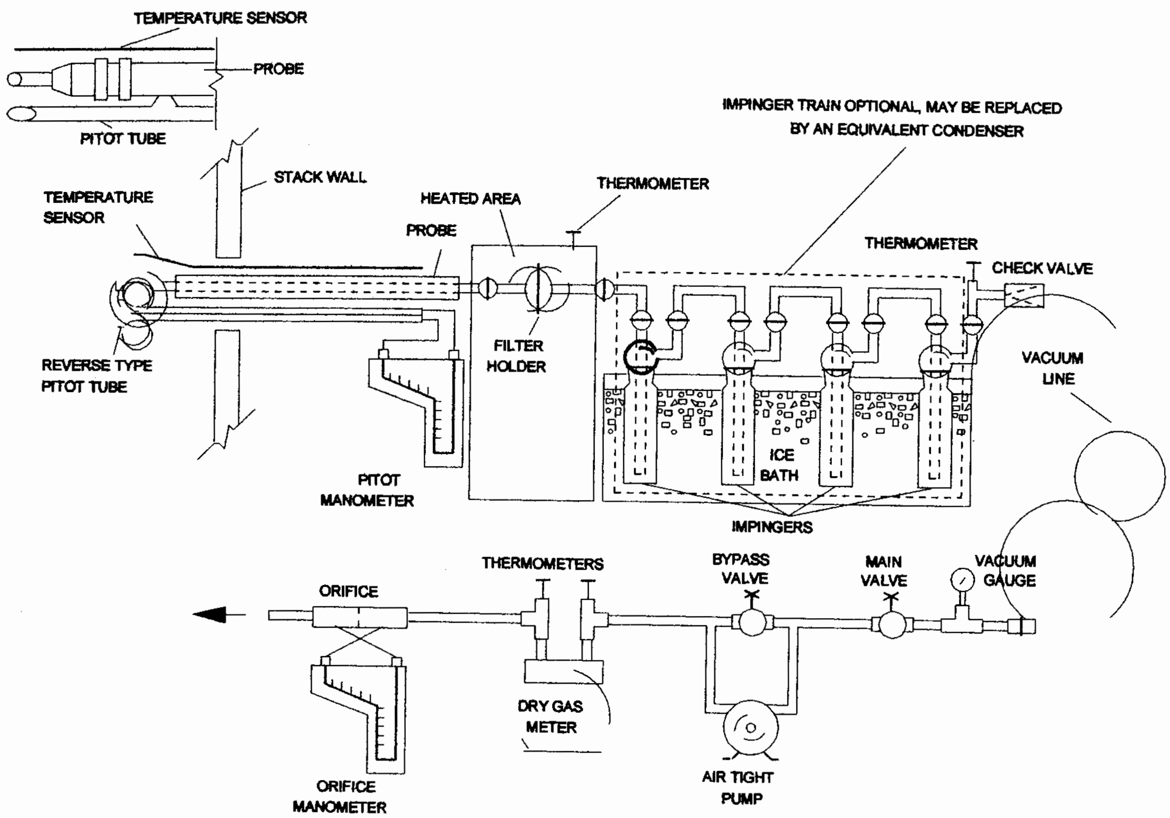


Figure 4-2. Particulate Sampling Train

Meltshop Baghouse #1 testing for Front-half Metals Emissions:

Test Date: 10/31/2001

Production Rate: Approximately 294 tph, EAF's only.

The process and air pollution control equipment were operating normally at the time of testing.

Supreme
Environmental Service Company
SESCo Group

1426 West 29st Street •Indianapolis, Indiana 46208
(317)347-9590, FAX (317)347-9591

REPORT on
METALS EMISSIONS
Performed for:
Nucor Steel
Crawfordsville, Indiana
Positive Pressure Baghouse
on October 31, 2001

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Michael Dicen, Vice-President for

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

TABLE OF CONTENTS

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

1-1 PROJECT OVERVIEW

SESCo Group was contracted by Nucor Steel to perform emissions sampling of the EAF Positive Pressure (PPFF) Baghouse on October 31, 2001. The objective of the testing was to determine Metals Emissions. The following personnel were involved with the testing program:

SESCo	Michael Dicen
SESCo	Carlos Brown
SESCo	Andrew Young
SESCo	Milo Hatfield
Nucor Steel	David Sulc

The testing program included flow and moisture determination (Methods 1-4) and metals emissions (Method 29). Below is a summary of the results:

Table 1-1:
Summary of Test Results

PM	Date	Mass Emission Rate * (lbs/hr)	Concentration * (gr/dscf)
Antimony	10/31/01	0.00e+00	0.00e+00
Arsenic		0.00e+00	0.00e+00
Barium		4.62e-04	5.07e-08
Beryllium		0.00e+00	0.00e+00
Cadmium		0.00e+00	0.00e+00
Chromium		1.11e-03	1.20e-07
Cobalt		0.00e+00	0.00e+00
Copper		1.52e-03	1.65e-07
Lead		1.11e-03	1.21e-07
Manganese		1.12e-01	1.22e-05
Mercury		3.03e-04	3.31e-08
Nickel		4.92e-04	5.40e-08
Phosphorus		3.93e-04	4.21e-08
Selenium		2.99e-05	3.29e-09
Silver		8.55e-05	9.39e-09
Thallium		1.73e-03	1.87e-07
Zinc		4.56e-02	4.98e-06

*** NOTE:** Test averages include only Sample Runs 1 & 2 due to a cross contamination of chemicals (KmnO4 mixed with HNO3/H2O2) during the 3rd Sample Run.

2-1 RESULTS

METALS EMISSIONS
EAF (PPFF) Baghouse

Table 2-1:

		1	2	3	Avg.
Gas Conditions					
Ts	Stack Temperature (°F)	204.50	198.75	172.83	192.03
Bwo	Moisture (volume %)	0.83	0.96	1.08	0.96
O2	Oxygen (dry volume %)	19.5	19.5	20.0	19.67
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	1,330,773	1,352,353	1,366,714	1,349,947
Qstd	Standard Conditions (dscfm)	1,063,403	1,088,649	1,135,898	1,095,983
METALS EMISSIONS		**1**	**2**		**Avg.**
E_r	Antimony (lbs/hr)	0.00e+00	0.00e+00		0.00e+00
E_r	Arsenic (lbs/hr)	0.00e+00	0.00e+00		0.00e+00
E_r	Barium (lbs/hr)	9.15e-04	8.53e-06		4.62e-04
E_r	Beryllium (lbs/hr)	0.00e+00	0.00e+00		0.00e+00
E_r	Cadmium (lbs/hr)	0.00e+00	0.00e+00		0.00e+00
E_r	Chromium (lbs/hr)	1.30e-03	9.13e-04		1.11e-03
E_r	Cobalt (lbs/hr)	0.00e+00	0.00e+00		0.00e+00
E_r	Copper (lbs/hr)	1.93e-03	1.10e-03		1.52e-03
E_r	Lead (lbs/hr)	1.98e-03	2.33e-04		1.11e-03

2-1 RESULTS, cont.

METALS EMISSIONS
EAF (PPFF) Baghouse

Table 2-1:

METALS EMISSIONS		**1**	**2**	**3**	*** Avg.**
E_r	Manganese (lbs/hr)	1.21e-01	1.04e-01		1.12e-01
E_r	Mercury (lbs/hr)	4.45e-04	1.62e-04		3.03e-04
E_r	Nickel (lbs/hr)	9.83e-04	0.00e+00		4.92e-04
E_r	Phosphorus (lbs/hr)	0.00e+00	7.85e-04		3.93e-04
E_r	Selenium (lbs/hr)	5.99e-05	0.00e+00		2.99e-05
E_r	Silver (lbs/hr)	1.71e-04	0.00e+00		8.55e-05
E_r	Thallium (lbs/hr)	1.73e-03	1.72e-03		1.73e-03
E_r	Zinc (lbs/hr)	6.41e-02	2.71e-02		4.56e-02

* **NOTE:** Test averages include only Sample Runs 1 & 2 due to a cross contamination of chemicals (KmnO4 mixed with HNO3/H2O2) during the 3rd Sample Run.

3-1 PROCESS DESCRIPTION

Nucor Steel operates a meltshop which is comprised of the following process units: two (2) EAF units, one (1) ladle metallurgy station, one (1) AOD and two (2) continuous casters. Of these, the two EAF units, the AOD and the two caster units are evacuated through the melt shop baghouse. The EAF units melt various grades of scrap metal, scrap substitutes, pebbled lime and coke into molten steel. The molten steel is refined into various grades of carbon steel at the ladle metallurgy station or refined into stainless steel at the AOD. The molten steel from the ladle metallurgy station or AOD is cast into continuous strips at the two continuous casters.

The emissions from the EAF units, AOD and casters are generated from melting, refining, charging, tapping and casting operations and are captured in a direct shell evacuation (DEC) system and overhead canopy hoods. All captured emissions are evacuated through the positive pressure (PPFF) baghouse for collection.

The testing reported in this document was performed at the EAF (PPFF) baghouse.

4-1 METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1-4, 29. The following table summarizes the methods:

Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A
Method 1 "Sampling of Velocity Traverses for Stationary Sources"
Method 2 "Determination of Stack Gas Velocity and Volumetric Flow Rate"
Method 3 "Gas Analysis for the Determination of Molecular Weight"
Method 4 "Determination of Moisture Content in Stack Gas"
Method 29 "Determination of Metals Emissions"

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

Table 4-1:
Sampling Points

Location	Dimensions	Points / Compartment
Baghouse	366" x 4160" ID	12

4-2 METHODOLOGY

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

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

MOISTURE CONTENT - EPA METHOD 4
The flue gas moisture content at the testing locations was determined in accordance with EPA Method 4. Figure 4-1 includes the Method 4 sampling components. The gas moisture was determined by quantitatively condensing moisture in the chilled impingers and silica absorbtion. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

DETERMINATION OF METALS EMISSIONS - EPA METHOD 29
Stack gas is withdrawn isokinetically and particulate matter is collected on the nozzle, probe liner and heated filter. Gaseous emissions are collected in an absorbing solution of HNO3/H2O2 (*0.1 N Nitric Acid & Hydrogen Peroxide*) in the 2nd and 3rd impingers and then in an aqueous acidic solution of KMnO4 (*Potassium Permanganate*) in the 5th and 6th impingers (*analyzed only for Hg*). The 1st and 4th impingers are empty and a 7th impinger contains approximately 200 grams of silica gel. High temperature borosilicate probe liner is used and the filter is maintained at temperatures at or above 248 degrees (+/- 25 F). Impinger temperature exit gas is maintained at or below 68 degrees F.

The nozzle, probe liner and front half of glass filter holder are rinsed with 100 ml of 0.1 N HNO3 and cleaned with a teflon brush and collected in a jar. Impingers 1, 2 and 3 are measured for moisture pick-up and then collected in a jar before rinsing the impingers with 100 ml of 0.1 N HNO3, along with the back half of the glass filter holder. Absorbing solutions are combined along with rinse solution. Impinger 4 is measured for moisture pick-up (individually), collected and then rinsed with 100 ml of 0.1 N HNO3 which is combined with moisture pick-up. Impingers 5 and 6 are measured for moisture pick-up, collected in an amber jar with teflon lid liner and rinsed with 100 ml KMnO4 followed by 100 ml of HPLC water which is combined with the absorbing solution. Impingers 5 and 6 are then rinsed with 25 ml 8 N HCl and collected in a jar. Silica gel is weighed for moisture.

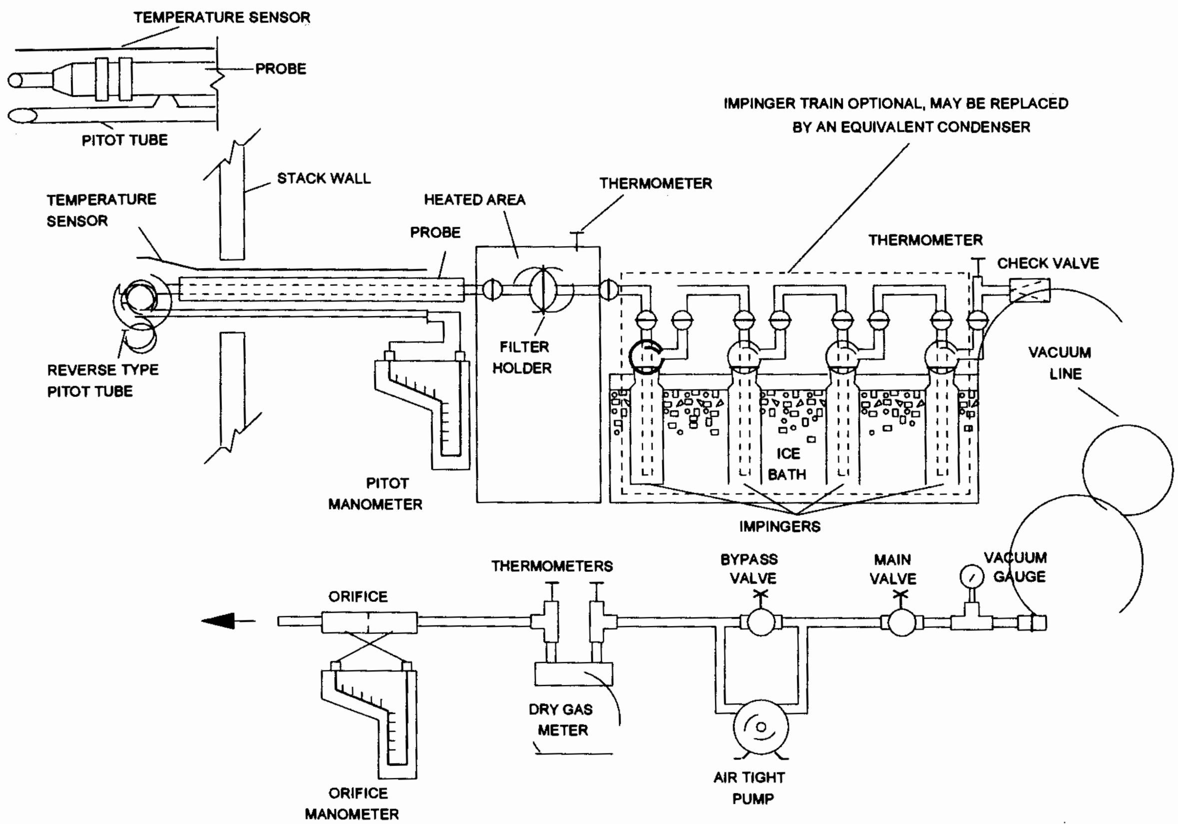


Figure 4-1. Particulate Sampling Train

Meltshop Baghouse #1 testing for Particulate:

Test Date: 10/31/2001

Production Rate: Approximately 294 tph, EAF's only.

The process and air pollution control equipment were operating normally at the time of testing.

Supreme
Environmental Service Company
SESCo Group

1426 West 29st Street •Indianapolis, Indiana 46208
(317)347-9590, FAX (317)347-9591

REPORT on PARTICULATE COMPLIANCE TESTING

Performed for:
Nucor Steel
Crawfordsville, Indiana
Positive Pressure Baghouse
by: SESCO
on October 31, 2001
SESCO Project No.: 4214

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Michael Dicen, Division Manager for

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

TABLE OF CONTENTS

SESCo Group

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

1-1 PROJECT OVERVIEW

SESCo Group, was contracted by Nucor Steel to perform air sampling at the EAF Positive Pressure Fabric Filter Baghouse and Melt Shop, in Crawfordsville, Indiana on October 31, 2001. The testing was performed in accordance with Paragraph 48 of the Consent Decree to establish operating baselines as required by NSPS at the Electric Arc Furnace. The following personnel were involved with the testing program:

SESCo	Carlos Brown
SESCo	Andy Young
SESCo	Michael Dicen
SESCo	Milo Hatfield
SESCo	Quentin Flory
Nucor	David Sulc
Nucor	Eric Ferguson
IDEM	Jarrod Fisher

The testing program included flow and gas analysis (Methods 1-4), particulate (Methods 5D) and visual emissions (Method 9). Below is a summary of the results:

Table 1-1
Summary of Test Results

Date	Runs	Time	Emissions	Emissions
10/31/01	1	12:36-18:17	**0.00030** (gr/dscf)	0.6840 lbs/hr
10/31/01	2	20:18-01:31	**0.00061** (gr/dscf)	1.4295 lbs/hr
11/01/01	3	08:41-13:47	**0.00074** (gr/dscf)	1.8109 lbs/hr

3-Run Averages	**0.00055** (gr/dscf)	1.3081 lbs/hr
Permitted Emission Rate	**0.0018** (gr/dscf)	

SESCo Group

1-2 PROJECT OVERVIEW

Test Program

Table 1-2

Parameter	Methods	Location	Unit
Gas Velocity / Vol. Flow Rate	EPA RM 1-2	Inlet	EAF Baghouse
Particulate	EPA RM 3-5D	Compartment	EAF Baghouse
Opacity	EPA RM 9	Roof Monitor	EAF Baghouse
Opacity	EPA RM 9	Roof Monitor	Melt Shop

The schedule of activities is summarized below:

Schedule of Activities

Date	*Run No.*	*Time*
Particulate Test (EAF Baghouse)		
10/31/01	1	12:36-18:17
10/31/01	2	20:18-01:31
11/01/01	3	08:41-13:47

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

1-2 PROJECT OVERVIEW, cont.

EAF (PPFF) Baghouse Diagram

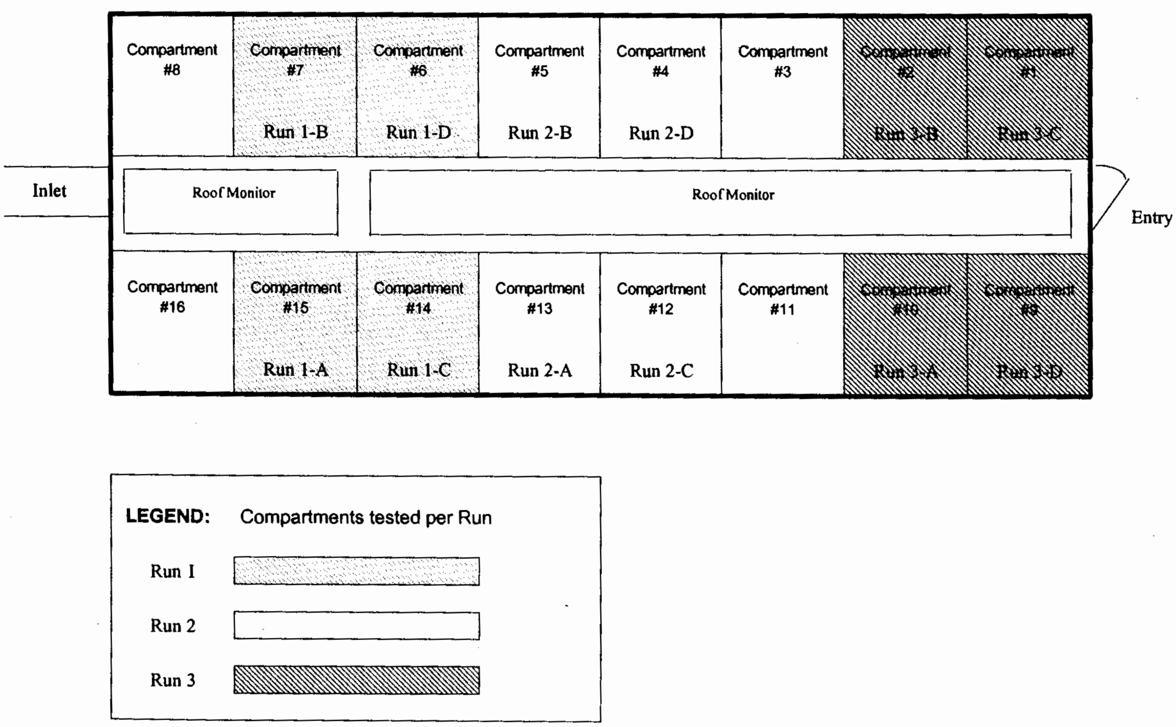
1.) Nucor Steel PPFF baghouse consists of 16 compartment housings with an area of 366"d x 260"w per compartment.

2.) Compliance testing was conducted at 12 of the 16 compartment housings (see Table: 1-3).

3.) Three (3) sample runs were conducted at four compartments (per sample run) resulting in a test area of 366"d x 1040"w.

4.) Compartment volumetric flow rates reflect approximately 25% of the total measured inlet flow rate (see 2-1 / 2-2 RESULTS for compartment and Inlet flow rates).

Table: 1-3



Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

2-1 RESULTS

PARTICULATE MATTER/ EMISSIONS

Compartment Housings

Table 2-1

		1	2	3	Avg.
Gas Conditions					
Ts	Stack Temperature (°F)	204.50	198.75	172.83	192.03
Bwo	Moisture (volume %)	0.83	0.96	1.08	0.96
O2	Oxygen (dry volume %)	19.5	19.5	20.0	19.67
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	332,693	338,088	341,678	337,487
Qstd	Standard Conditions (dscfm)	265,851	272,162	283,975	273,996
Particulate Results					
C_f	Concentration, filterable (gr/dscf)	0.00030	0.00061	0.00074	**0.00055**
E_{TSP}	Particulate Matter, filterable (lbs/hr)	0.6840	1.4295	1.8109	1.3081
		2.736	5.718	7.244	5.23
Fan Amps / Damper Positions					
	Average Fan Amps	149	141	139	**143**
	Average Damper Position	93%	100%	100%	**98%**

NOTE: Velocity head settings for Method 5D compartment test runs were derived from Inlet volumetric flow rates. Flow rate calculations were corrected for compartment conditions; temperature, moisture and gas analysis. A minimum of 160 dscf was sampled during each test period.

SESCo Group

2-2 RESULTS

INLET - VOLUMETRIC FLOW RATE

Inlet Duct

Table 2-2

		1	2	3	Avg.
Gas Conditions					
Ts	Stack Temperature (°F)	194.56	203.06	222.44	206.69
Bwo	Moisture (volume %)	0.83	0.96	1.08	0.96
O2	Oxygen (dry volume %)	19.5	19.5	20.0	19.67
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	1,331,074	1,352,652	1,367,028	1,350,251
Qstd	Standard Conditions (dscfm)	1,077,927	1,081,359	1,054,449	1,071,245

NOTE: Inlet flow rates (*initial*) were measured and calculated over the duct area of 278" x 176".

2-3 RESULTS

VISIBLE EMISSIONS
Positive Pressure Baghouse

Table 2-3

Run No.	1	2	3	4	Average
Date	10/31/01	10/31/01	10/31/01	11/01/01	
Start Time (approx.)	15:13	16:14	17:15	11:00	
Stop Time (approx.)	16:13	17:14	18:15	12:00	
Visible Emissions					
Opacity (EPA RM 9)	0.0	0.0	0.0	0.0	**0.0 %**

2-4 RESULTS

VISIBLE EMISSIONS
Melt Shop

Table 2-4

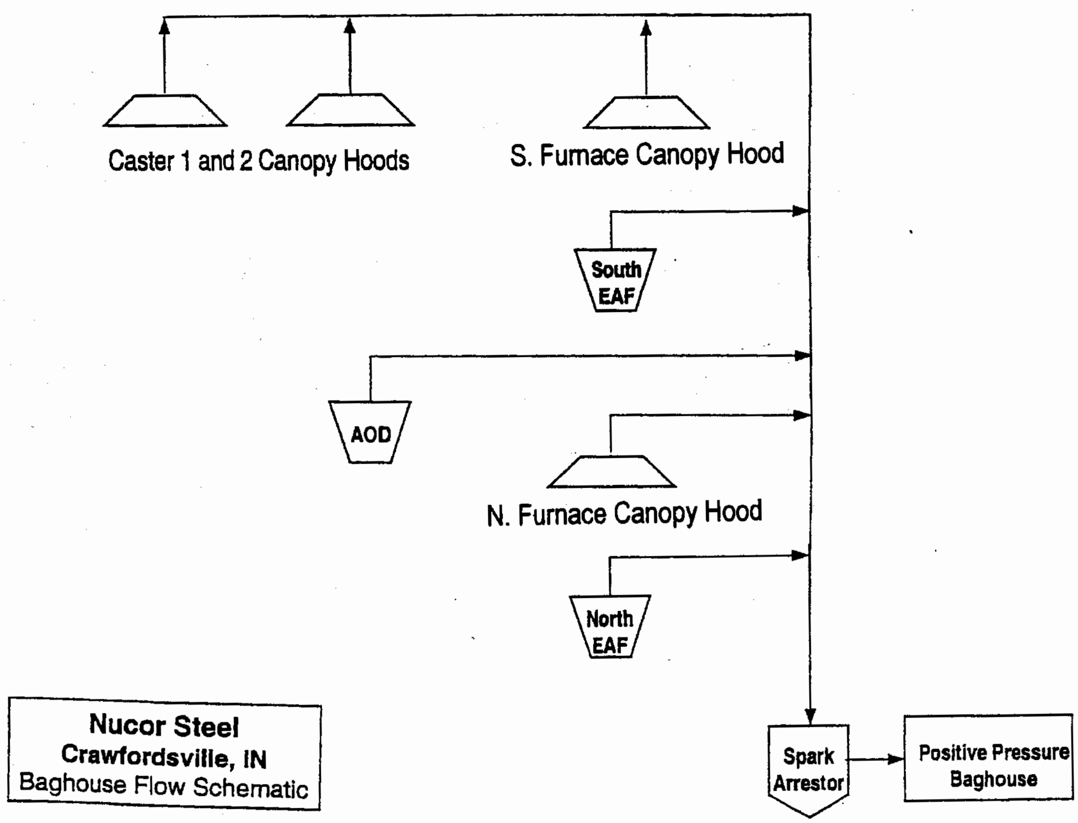
Run No.	1	2	3	4	Average
Date	10/31/01	10/31/01	10/31/01	11/01/01	
Start Time (approx.)	15:13	16:14	17:15	10:00	
Stop Time (approx.)	16:13	17:14	18:15	11:00	
Visible Emissions					
Opacity (EPA RM 9)	0.0	0.0	0.0	0.0	**0.0 %**

3-1 DESCRIPTION OF INSTALLATION

Nucor Steel operates a meltshop which is comprised of the following process units: two (2) EAF units, one (1) ladle metallurgy station, one (1) AOD and two (2) continuous casters. Of these, the two EAF units, the AOD and the two caster units are evacuated through the melt shop baghouse. The EAF units melt various grades of scrap metal, scrap substitutes, pebbled lime and coke into molten steel. The molten steel is refined into various grades of carbon steel at the ladle metallurgy station or refined into stainless steel at the AOD. The molten steel from the ladle metallurgy station or AOD is cast into continuous strips at the two continuous casters.

The emissions from the EAF units, AOD and casters are generated from melting, refining, charging, tapping and casting operations and are captured in a direct shell evacuation (DEC) system and overhead canopy hoods. All captured emissions are evacuated through the positive pressure (PPFF) baghouse for collection.

The testing reported in this document was performed at 12 of the 16 EAF (PPFF) baghouse compartments.



4-1 METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1-5D, 9. The following table summarizes the methods.

Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A
Method 1 " Sampling of Velocity Traverses for Stationary Sources"
Method 2 " Determination of Stack Gas Velocity and Volumetric Flow Rate"
Method 3 "Gas Analysis for the Determination of Molecular Weight"
Method 4 " Determination of Moisture Content in Stack Gas"
Method 5D " Determination of Particulate Emissions from PPFF"
Method 9 " Visual Determination of the Opacity of Emissions from Stationary Sources"

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

Table 4-1:
Sampling Points

Location	Dimensions	Ports	Points/Port	Total Points
Inlet	14.67' x 23.13' ID	8	4	32
Compartment (ea)	21.67' x 30.50' ID	3	4	12

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

4-2 METHODOLOGY

VELOCITY AND VOLUMETRIC FLOW RATE - EPA METHOD 2

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

GAS COMPOSITION AND MOLECULAR WEIGHT - EPA METHOD 3

In order to determine the oxygen and carbon dioxide concentrations, a sample of gas was obtained and analyzed in accordance with EPA Method 3. The gas samples were collected for each sample run and analyzed using a Fyrite analyzer. The results were used to determine gas molecular weight.

MOISTURE CONTENT - EPA METHOD 4

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

PARTICULATE DETERMINATION - EPA METHOD 5D

Velocity readings were taken at the inlet to the baghouse in accordance with EPA RM-1. The data was then utilized for the determination of the volumetric flow rate through the baghouse compartments. This value was then used to determine the average velocity at the respective compartments. After the compartment velocity was determined, the test was performed according to EPA RM-5. Stack gas was withdrawn isokinetically and particulate matter was collected on the in-stack nozzle and filter. Moisture was captured in an impingers set; the first two impingers contain 100 mls of water. The third impinger was empty and a fourth and final impinger contains about 200 grams of silica gel. The filter temperatures were maintained at in-stack flue gas tempertures. The impinger temperature exit gas was maintained at temperatures at or below 68 deg. F.

The nozzle and glass filter containers were rinsed with acetone and the rinse was captured in a sealed glass container. The filter was placed in a sealed container.

4-2 METHODOLOGY, cont.

VISIBLE EMISSIONS - METHOD 9

Baghouse Roof Monitor and Melt Shop Roof Monitor opacity readings were taken for 60 min. at 15 second intervals by a certified visible emissions reader. The visible emissions readings were conducted during each of the particulate test runs. The results are reported as an average opacity reading for the hour period. A copy of the visible emissions reader's current certification is included in the Appendix.

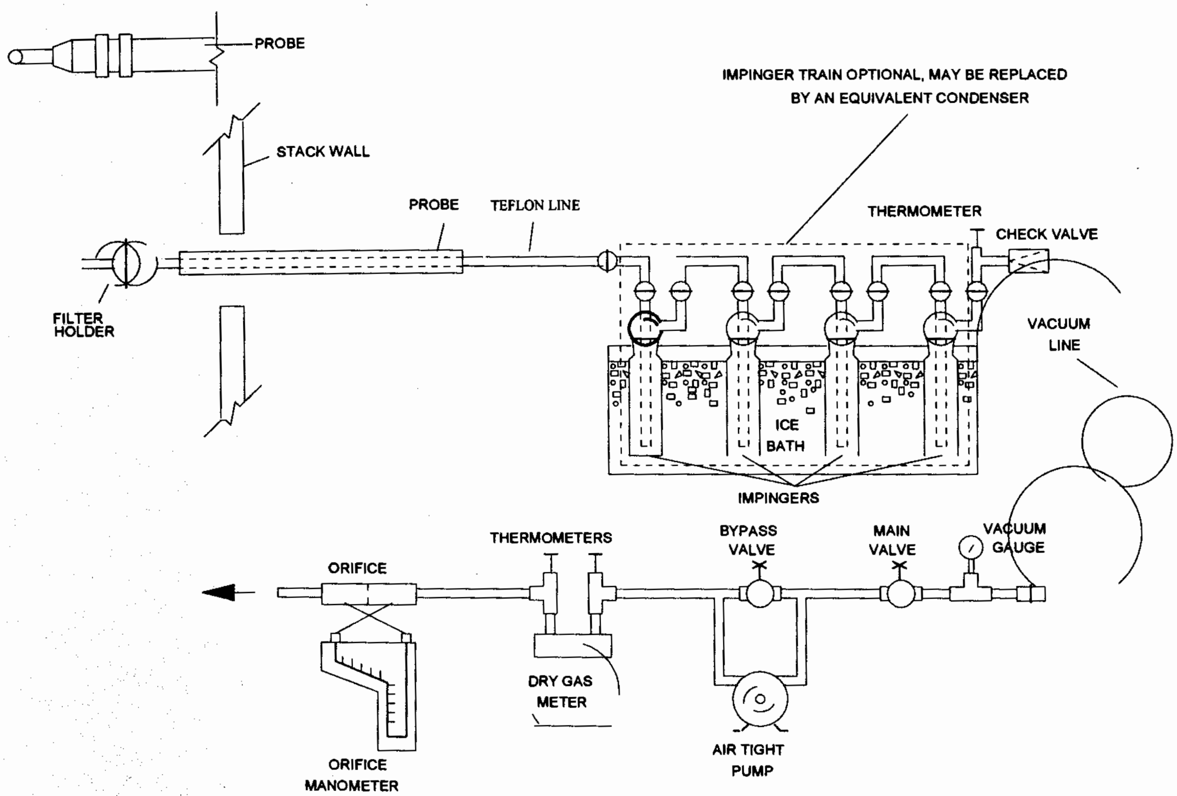


Figure 4-2. Particulate Sampling Train

Meltshop Baghouse #1 testing for Back-half Metals Emissions:

Test Date: 10/31/2001

Production Rate: Approximately 294 tph, EAF's only.

The process and air pollution control equipment were operating normally at the time of testing.

Supreme
Environmental Service Company
SESCo Group
1426 West 29st Street •Indianapolis, Indiana 46208
(317)347-9590, FAX (317)347-9591

REPORT on
METALS EMISSIONS
Performed for:
Nucor Steel
Crawfordsville, Indiana
Positive Pressure Baghouse
on October 31, 2001

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Michael Dicen, Vice-President

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

TABLE OF CONTENTS

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

1-1 PROJECT OVERVIEW

SESCo Group was contracted by Nucor Steel to perform emissions sampling of the EAF Positive Pressure (PPFF) Baghouse on October 31, 2001. The objective of the testing was to determine Metals Emissions. The following personnel were involved with the testing program:

SESCo	Michael Dicen
SESCo	Carlos Brown
SESCo	Andrew Young
SESCo	Milo Hatfield
Nucor Steel	David Sulc

The testing program included flow and moisture determination (Methods 1-4) and metals emissions (Method 29). Below is a summary of the results:

Table 1-1:
Summary of Test Results

PM	Date	Mass Emission Rate * (lbs/hr)	Concentration * (gr/dscf)
Antimony	10/31/01	9.10e-03	9.87e-07
Arsenic		0.00e+00	0.00e+00
Barium		3.88e-01	4.21e-05
Beryllium		8.53e-06	9.15e-10
Cadmium		4.27e-04	4.61e-08
Chromium		2.35e-02	2.53e-06
Cobalt		3.42e-04	3.71e-08
Copper		5.75e-03	6.23e-07
Lead		1.18e-02	1.28e-06
Manganese		1.60e-01	1.74e-05
Mercury		3.03e-04	3.31e-08
Nickel		2.80e-03	3.03e-07
Phosphorus		6.88e-03	7.45e-07
Selenium		1.74e-03	1.88e-07
Silver		2.14e-04	2.35e-08
Thallium		1.73e-03	1.87e-07
Zinc		1.65e+00	1.79e-04

*** NOTE:** Test averages include only Sample Runs 1 & 2 due to a cross contamination of chemicals (KmnO4 mixed with HNO3/H2O2) during the 3rd Sample Run.

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

2-1 RESULTS

METALS EMISSIONS
EAF (PPFF) Baghouse

Table 2-1:

		1	2	3	Avg.
Gas Conditions					
Ts	Stack Temperature (°F)	204.50	198.75	172.83	192.03
Bwo	Moisture (volume %)	0.83	0.96	1.08	0.96
O2	Oxygen (dry volume %)	19.5	19.5	20.0	19.67
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	1,330,773	1,352,353	1,366,714	1,349,947
Qstd	Standard Conditions (dscfm)	1,063,403	1,088,649	1,135,898	1,095,983

METALS EMISSIONS		1	2		Avg.
E_r	Antimony (lbs/hr)	8.55e-03	9.64e-03		9.10e-03
E_r	Arsenic (lbs/hr)	0.00e+00	0.00e+00		0.00e+00
E_r	Barium (lbs/hr)	3.65e-01	4.11e-01		3.88e-01
E_r	Beryllium (lbs/hr)	0.00e+00	1.71e-05		8.53e-06
E_r	Cadmium (lbs/hr)	2.57e-04	5.97e-04		4.27e-04
E_r	Chromium (lbs/hr)	1.23e-02	3.46e-02		2.35e-02
E_r	Cobalt (lbs/hr)	3.42e-04	3.41e-04		3.42e-04
E_r	Copper (lbs/hr)	4.41e-03	7.09e-03		5.75e-03
E_r	Lead (lbs/hr)	7.54e-03	1.61e-02		1.18e-02

2-1 RESULTS, cont.

METALS EMISSIONS
EAF (PPFF) Baghouse

Table 2-1:

METALS EMISSIONS		1	2	3	* Avg.
E_r	Manganese (lbs/hr)	1.44e-01	1.76e-01	[illegible]	1.60e-01
E_r	Mercury (lbs/hr)	4.45e-04	1.62e-04	[illegible]	3.03e-04
E_r	Nickel (lbs/hr)	2.61e-03	2.99e-03	[illegible]	2.80e-03
E_r	Phosphorus (lbs/hr)	5.99e-03	7.77e-03	[illegible]	6.88e-03
E_r	Selenium (lbs/hr)	1.26e-03	2.22e-03	[illegible]	1.74e-03
E_r	Silver (lbs/hr)	4.28e-04	0.00e+00	[illegible]	2.14e-04
E_r	Thallium (lbs/hr)	1.73e-03	1.72e-03	[illegible]	1.73e-03
E_r	Zinc (lbs/hr)	1.22e+00	2.08e+00	[illegible]	1.65e+00

*** NOTE:** Test averages include only Sample Runs 1 & 2 due to a cross contamination of chemicals (KmnO4 mixed with HNO3/H2O2) during the 3rd Sample Run.

3-1 PROCESS DESCRIPTION

Nucor Steel operates a meltshop which is comprised of the following process units: two (2) EAF units, one (1) ladle metallurgy station, one (1) AOD and two (2) continuous casters. Of these, the two EAF units, the AOD and the two caster units are evacuated through the melt shop baghouse. The EAF units melt various grades of scrap metal, scrap substitutes, pebbled lime and coke into molten steel. The molten steel is refined into various grades of carbon steel at the ladle metallurgy station or refined into stainless steel at the AOD. The molten steel from the ladle metallurgy station or AOD is cast into continuous strips at the two continuous casters.

The emissions from the EAF units, AOD and casters are generated from melting, refining, charging, tapping and casting operations and are captured in a direct shell evacuation (DEC) system and overhead canopy hoods. All captured emissions are evacuated through the positive pressure (PPFF) baghouse for collection.

The testing reported in this document was performed at the EAF (PPFF) baghouse.

4-1 METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1-4, 29. The following table summarizes the methods:

Summary of Sampling Procedures

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Method 2 "Determination of Stack Gas Velocity and Volumetric Flow Rate"
Method 3 "Gas Analysis for the Determination of Molecular Weight"
Method 4 "Determination of Moisture Content in Stack Gas"
Method 29 "Determination of Metals Emissions"

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

Table 4-1:
Sampling Points

Location	Dimensions	Points / Compartment
Baghouse	366" x 4160" ID	12

4-2 METHODOLOGY

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

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

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

DETERMINATION OF METALS EMISSIONS - EPA METHOD 29
Stack gas is withdrawn isokinetically and particulate matter is collected on the nozzle, probe liner and heated filter. Gaseous emissions are collected in an absorbing solution of HNO3/H2O2 (*0.1 N Nitric Acid & Hydrogen Peroxide*) in the 2nd and 3rd impingers and then in an aqueous acidic solution of KMnO4 (*Potassium Permanganate*) in the 5th and 6th impingers (*analyzed only for Hg*). The 1st and 4th impingers are empty and a 7th impinger contains approximately 200 grams of silica gel. High temperature borosilicate probe liner is used and the filter is maintained at temperatures at or above 248 degrees (+/- 25 F). Impinger temperature exit gas is maintained at or below 68 degrees F.

The nozzle, probe liner and front half of glass filter holder are rinsed with 100 ml of 0.1 N HNO3 and cleaned with a teflon brush and collected in a jar. Impingers 1, 2 and 3 are measured for moisture pick-up and then collected in a jar before rinsing the impingers with 100 ml of 0.1 N HNO3, along with the back half of the glass filter holder. Absorbing solutions are combined along with rinse solution. Impinger 4 is measured for moisture pick-up (individually), collected and then rinsed with 100 ml of 0.1 N HNO3 which is combined with moisture pick-up. Impingers 5 and 6 are measured for moisture pick-up, collected in an amber jar with teflon lid liner and rinsed with 100 ml KMnO4 followed by 100 ml of HPLC water which is combined with the absorbing solution. Impingers 5 and 6 are then rinsed with 25 ml 8 N HCl and collected in a jar. Silica gel is weighed for moisture.

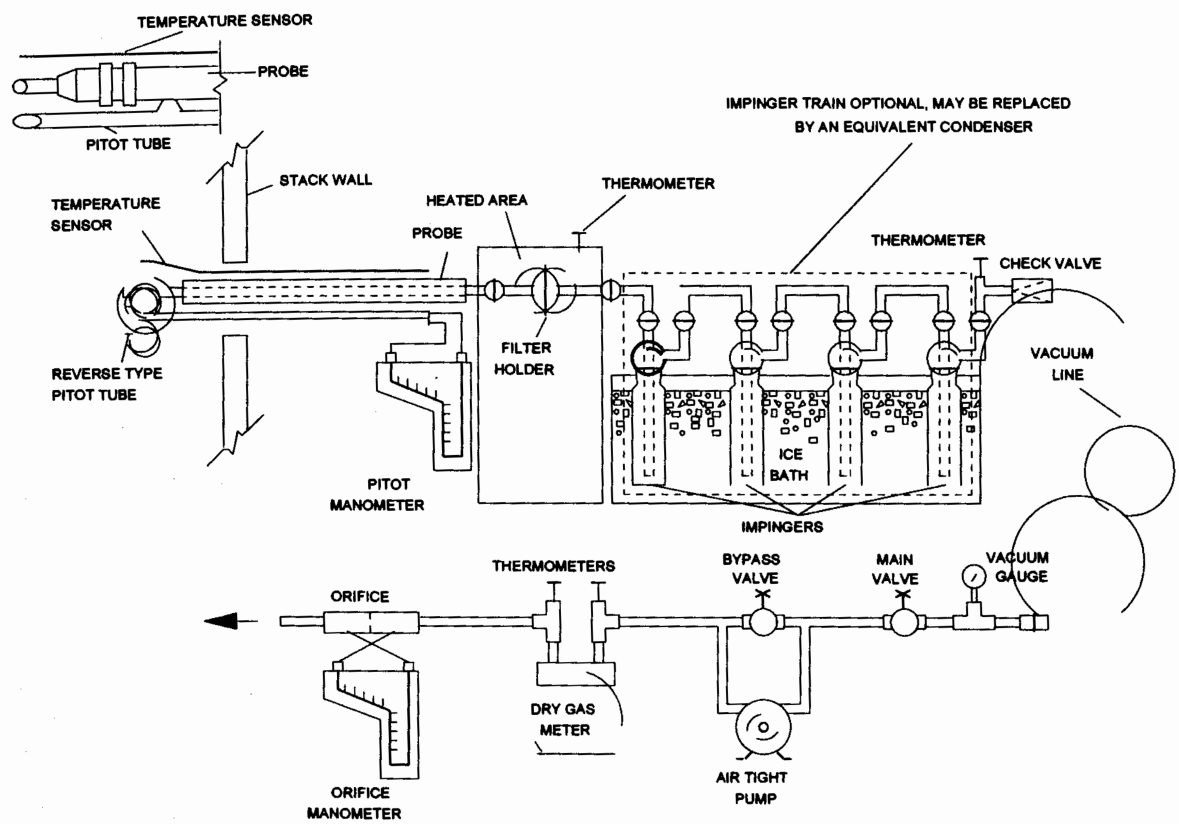

Figure 4-1. Particulate Sampling Train

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

1-1 PROJECT OVERVIEW

SESCo Group was contracted by Nucor Steel to perform emissions sampling of the EAF Positive Pressure (PPFF) Baghouse on October 31, 2001. The objective of the testing was to determine Metals Emissions. The following personnel were involved with the testing program:

SESCo	Michael Dicen
SESCo	Carlos Brown
SESCo	Andrew Young
SESCo	Milo Hatfield
Nucor Steel	David Sulc

The testing program included flow and moisture determination (Methods 1-4) and metals emissions (Method 29). Below is a summary of the results:

Table 1-1:
Summary of Test Results

PM	Date	Mass Emission Rate * (lbs/hr)	Concentration * (gr/dscf)
Antimony	10/31/01	9.10e-03	9.87e-07
Arsenic		0.00e+00	0.00e+00
Barium		3.88e-01	4.21e-05
Beryllium		8.53e-06	9.15e-10
Cadmium		4.27e-04	4.61e-08
Chromium		2.35e-02	2.53e-06
Cobalt		3.42e-04	3.71e-08
Copper		5.75e-03	6.23e-07
Lead		1.18e-02	1.28e-06
Manganese		1.60e-01	1.74e-05
Mercury		3.03e-04	3.31e-08
Nickel		2.80e-03	3.03e-07
Phosphorus		6.88e-03	7.45e-07
Selenium		1.74e-03	1.88e-07
Silver		2.14e-04	2.35e-08
Thallium		1.73e-03	1.87e-07
Zinc		1.65e+00	1.79e-04

* **NOTE:** Test averages include only Sample Runs 1 & 2 due to a cross contamination of chemicals (KmnO4 mixed with HNO3/H2O2) during the 3rd Sample Run.

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

2-1 RESULTS

METALS EMISSIONS
EAF (PPFF) Baghouse

Table 2-1:

		1	2	3	Avg.
Gas Conditions					
Ts	Stack Temperature (°F)	204.50	198.75	172.83	192.03
Bwo	Moisture (volume %)	0.83	0.96	1.08	0.96
O2	Oxygen (dry volume %)	19.5	19.5	20.0	19.67
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	1,330,773	1,352,353	1,366,714	1,349,947
Qstd	Standard Conditions (dscfm)	1,063,403	1,088,649	1,135,898	1,095,983

METALS EMISSIONS		1	2		Avg.
E_r	Antimony (lbs/hr)	8.55e-03	9.64e-03		9.10e-03
E_r	Arsenic (lbs/hr)	0.00e+00	0.00e+00		0.00e+00
E_r	Barium (lbs/hr)	3.65e-01	4.11e-01		3.88e-01
E_r	Beryllium (lbs/hr)	0.00e+00	1.71e-05		8.53e-06
E_r	Cadmium (lbs/hr)	2.57e-04	5.97e-04		4.27e-04
E_r	Chromium (lbs/hr)	1.23e-02	3.46e-02		2.35e-02
E_r	Cobalt (lbs/hr)	3.42e-04	3.41e-04		3.42e-04
E_r	Copper (lbs/hr)	4.41e-03	7.09e-03		5.75e-03
E_r	Lead (lbs/hr)	7.54e-03	1.61e-02		1.18e-02

Nucor Steel
Crawfordsville, Indiana

SESCO Project No. 4214

2-1 RESULTS, cont.

METALS EMISSIONS
EAF (PPFF) Baghouse

Table 2-1:

METALS EMISSIONS		**1**	**2**	**3**	*** Avg.**
E_r	Manganese (lbs/hr)	1.44e-01	1.76e-01		1.60e-01
E_r	Mercury (lbs/hr)	4.45e-04	1.62e-04		3.03e-04
E_r	Nickel (lbs/hr)	2.61e-03	2.99e-03		2.80e-03
E_r	Phosphorus (lbs/hr)	5.99e-03	7.77e-03		6.88e-03
E_r	Selenium (lbs/hr)	1.26e-03	2.22e-03		1.74e-03
E_r	Silver (lbs/hr)	4.28e-04	0.00e+00		2.14e-04
E_r	Thallium (lbs/hr)	1.73e-03	1.72e-03		1.73e-03
E_r	Zinc (lbs/hr)	1.22e+00	2.08e+00		1.65e+00

* **NOTE:** Test averages include only Sample Runs 1 & 2 due to a cross contamination of chemicals (KmnO4 mixed with HNO3/H2O2) during the 3rd Sample Run.

Total

Filters & Condensibles

STACK EMISSION SUMMARY

SOURCE TESTED:	**Positive Pressure Baghouse**
COMPANY NAME:	Nucor Steel
DATE OF TEST:	10/31/01 - 11/01/01

Metals / - blanks (lbs/hr)	**Run 1**	**Run 2**	**Run 3**	**Average**
Antimony	8.55E-003	9.64E-003		9.10E-003
Arsenic	0.00E+000	0.00E+000		0.00E+000
Barium	3.65E-001	4.11E-001		3.88E-001
Beryllium	0.00E+000	1.71E-005		8.53E-006
Cadmium	2.57E-004	5.97E-004		4.27E-004
Chromium	1.23E-002	3.46E-002		2.35E-002
Cobalt	3.42E-004	3.41E-004		3.42E-004
Copper	4.41E-003	7.09E-003		5.75E-003
Lead	7.54E-003	1.61E-002		1.18E-002
Manganese	1.44E-001	1.76E-001		1.60E-001
Mercury	4.45E-004	1.62E-004		3.03E-004
Nickel	2.61E-003	2.99E-003		2.80E-003
Phosphorus	5.99E-003	7.77E-003		6.88E-003
Selenium	1.26E-003	2.22E-003		1.74E-003
Silver	4.28E-004	0.00E+000		2.14E-004
Thallium	1.73E-003	1.72E-003		1.73E-003
Zinc	1.22E+000	2.08E+000		1.65E+000
Avg. Stack Vol. Flow Rate				
ACFM	1,330,773	1,352,353	1,366,714	1,349,947
DSCFM	1,063,403	1,088,649	1,135,898	1,095,983
Avg. Stack Temp.	204.50	198.75	172.83	192.03
Stack Gas Velocity	2.098	2.132	2.154	2.128
Avg. Velocity Head	0.0011	0.0012	0.0012	0.0012
Avg. Sq. Rt of Delta P	0.0334	0.0341	0.0350	0.0341

ISOKINETIC TESTING SUMMARY

	Run 1	Run 2	Run 3	Average
%Isokinetics:	104.07	104.27	101.96	103.43
Allowable isokinetic 90-110%				
% Moisture of Stack Gas	0.83%	0.96%	1.08%	0.96%
Sample Volume	164.364	168.581	172.009	168.318

Castrip LMS Baghouse testing for Emissions:

Test Date: 11/20 and 11/21/2003

Production Rate: Approximately 104.1tph, LMS only.

The process and air pollution control equipment were operating normally at the time of testing.

ATP – Air Test Professionals, Inc. 1201 North Graham Avenue, Indianapolis, Indiana 46219

(317) 345-1720 FAX (317) 351-0411

REPORT on COMPLIANCE TESTING for SO2, NOx, CO, Pb and PM/PM10

Performed for:

Nucor Steel

Crawfordsville, Indiana

Strip Caster

on November 20 & 21, 2003

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Andrew Young, Project Manager

TABLE OF CONTENTS

1-1 PROJECT OVERVIEW

Air Test Professionals, Inc. was contracted by Nucor Steel to perform air emissions sampling at the LMS Baghouse that controls emissions from the LMS and Strip Caster. The sampling was performed in Crawfordsville, Indiana on November 20-21, 2003. The objective of the testing was to determine compliance with permit requirements for the pollutants listed below. The following personnel were involved with the testing program:

ATP	Andrew Young
ATP	Carlos Brown
ATP	Ron Stapert
Nucor Steel	Mark Washer
IDEM	Steve Friend

The testing program included flow determination (US EPA Methods 1-2), gas analysis (US EPA Method 3), moisture content (US EPA Method 4), PM/PM10 emissions (US EPA Method 5/202), SO2 emissions (US EPA Method 6C), NOx emissions (US EPA Method 7E), CO emissions (US EPA Method 10), and visible emissions (US EPA Method 9). Listed below is a summary of the results.

Test Summary
Table 1-1

Pollutant	PM/PM10 (filterable)	PM/PM10 (filterable & condensible)	PM (filterable)
Particulate Matter	0.0010 (gr/dscf)	0.0043 (gr/dscf)	0.9232 (lb/hr)

Pollutant	Lead	Total Lead
Lead	0.000000 (gr/dscf)	0.0005 (lb/hr)

Pollutant	Emissions (lb/hr)	Emissions (lb/ton)
Sulfur Dioxide	10.50 (lb/hr)	0.0510 (lb/ton)
Nitrogen Oxide	3.8294 (lb/hr)	0.0181 (lb/ton)
Carbon Monoxide	11.7834 (lb/hr)	0.0567 (lb/ton)

2-1 RESULTS

PM/PM10, SO2, NOx, CO Emissions
Strip Caster Baghouse Stack

Table 2-1

Gas Conditions		**1**	**2**	**3**	**Avg**
Ts	Stack Temperature	99.38	101.33	111.33	104.01
Bwo	Moisture (volume %)	1.39	1.05	1.32	1.25
O2	Oxygen (dry volume %)	20.9	20.9	20.9	20.9
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	124,327	115,915	111,894	117,482
Qstd	Standard Conditions (dscfm)	116,055	107,871	102,032	108,652
PM/PM10					
E_{TSP}	Filterable (gr/dscf)	0.0008	0.0008	0.0013	0.0010
E	Filterable & Condensible (gr/dscf)	0.0050	0.0024	0.0053	0.0043
[redacted]					
E_{TSP}	Filterable (lbs/hr)	0.8454	0.7723	1.1518	0.9232
[redacted]					
E	Emission (lb/ton)	0.0299	0.0240	0.0990	0.0510
[redacted]					
E	Emission (lb/ton)	0.0040	0.0226	0.0279	0.0181
[redacted]					
E	Emission (lb/ton)	0.0476	0.0670	0.0554	0.0567

2-2 RESULTS

Lead Emissions
Strip Caster Baghouse Stack

Table 2-2

Gas Conditions		**1**	**2**	**3**	**Avg**
Ts	Stack Temperature	101.13	102.33	112.17	105.21
Bwo	Moisture (volume %)	1.39	0.86	0.83	1.03
O2	Oxygen (dry volume %)	20.9	20.9	20.9	20.9
CO2	Carbon Dioxide (dry volume %)	0.0	0.0	0.0	0.0
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	125,926	118,177	115,974	120,026
Qstd	Standard Conditions (dscfm)	116,887	109,941	106,072	110,966
LEAD EMISSIONS					
E_{TSP}	Emission Rate (gr/dscf)	0.000001	0.000001	0.000000	0.000000
E	Emission Rate (lbs/hr)	0.0005	0.0005	0.0003	**0.0005**

2-3 RESULTS

VISIBLE EMISSIONS - OPACITY

LMS Stack
Table 2-3

Run No.	1	2	3	Average
Date	November 20, 2003	November 21, 2003	November 21, 2003	
Start Time (approx)	11:23	08:50	16:38	
Stop Time (approx)	12:23	09:50	17:38	
Visible Emissions				
Opacity (EPA RM 9)	0.0	0.0	0.0	**0.0 %**

Roof Monitors

Run No.	1	2	3	Average
Date	November 20, 2003	November 21, 2003	November 21, 2003	
Start Time (approx)	11:23	08:50	16:38	
Stop Time (approx)	12:23	09:50	17:38	
Visible Emissions				
Opacity (EPA RM 9)	0.0	0.0	0.0	**0.0 %**

3-1 PROCESS DESCRIPTION

Nucor Steel of Crawfordsville, Indiana operates the units listed below:

A Strip Caster Line rated at a maximum steel production rate of 135 tons per hour from the existing electric arc furnace (EAF) and is capable of producing several grades of steel at various widths and thicknesses:

1. One (1) ladle metallurgy station (LMS) identified as LMS-2. Particulate emissions are controlled by the LMS baghouse with the remaining emissions exhausted through the roof monitor. The LMS stack and roof monitor are identified as S-20 and S-21, respectively.

2. One (1) tundish that feeds the molten metal from the LMS ladle to one (1) continuous strip caster. Particulate emissions are controlled by the LMS baghouse with the remaining emissions exhausted through the roof monitor. The LMS stack and roof monitor are identified as S-20 and S-21, respectively.

3. One (1) hot rolling stand. The stand rolls the steel strips from the continuous strip caster to a desired gauge.

4. Two (2) coilers. After the strip passes the rolling mill it is then rolled into coils.

The testing reported in this document was performed at the LMS baghouse stack, with additional visible emissions read at the roof monitor.

4-1 METHODOLOGY

The sampling procedures utilized by Air Test Professionals, Inc. were as follows:

Title 40 CFR Part 60 Appendix A

Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determining of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Determination of Oxygen and Carbon Dioxide Percentages"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 5	"Determination of Particulate Emissions from Stationary Sources"
Method 6C	"Determination of Sulfur Dioxide Emissions from Stationary Sources"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide from Stationary Sources"
Method 12	"Determination of Lead Emissions from Stationary Sources"
Method 9	"Visual Determination of the Opacity from Stationary Sources"

Title 40 CFR Part 51 Appendix M

Method 202	"Determination of Condensible Particulate Emissions from Stationary Sources"

SAMPLE POINT DETERMINATION

Sampling point locations were determined according to EPA Reference Method 1.

Sampling Points
Table 4-1

Location	Dimensions	Points / Port	Total Points
LMS Baghouse Stack	96.0" ID	6	24

4-2 METHODOLOGY

SAMPLE AND VELOCITY TRAVERSE – EPA METHOD 1
Method 1 was utilizes for the representative measurement of pollutant emissions and/or total volumetric flow rate. A measurement site where the effluent gas stream, flowing in a known direction, is selected and divided into a sample grid according to the published percentages of the diameter. A traverse point is then located at each of these percentage points. Sampling or velocity measurement is performed at a site located at least two stack or duct diameters downstream and one-half diameter upstream from a disturbance such as a bend, expansion, contraction, or visible flame.

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

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

MOISTURE CONTENT – EPA METHOD 4
The gas moisture was determined by quantitatively condensing moisture in the chilled impingers and silica absorption. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

PARTICULATE/CONDENSIBLE DETERMINATION – EPA METHOD 5/202
Stack gas is withdrawn isokinetically and particulate matter is collected on the nozzle, probe and filter. Condensible particulate is captured in the first three impingers; each impinger contains 100 mls of deionized water. A fourth and final impinger contains an amount of approximately 200 grams of silica gel. The probe and filter temperatures are maintained at temperatures of 248 degrees F(+/- 25 deg F). The impinger temperature exit gas is maintained at or below 68 degrees Fahrenheit.

The nozzle, probe liner and glass filter holder are rinsed with acetone and captured in a sealed glass container. The impingers and connecting glassware are rinsed twice with deionized water and captured in a sealed container. Two rinses of methylene chloride were captured and stored in a sealed container.

SULFUR DIOXIDE CONCENTRATION – EPA METHOD 6C
A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to a NDIR or fluorescence analyzer for SO2 concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

NITROGEN OXIDE CONCENTRATION – EPA METHOD 7E
A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to a chemiluminescent analyzer for NOx concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument as well as run system bias and drift checks.

4-2 METHODOLOGY, cont.

CARBON MONOXIDE CONCENTRATION – EPA METHOD 10

A continuous gas sample is drawn from the stack and a portion of the sample is conveyed to an NDIR analyzer for carbon monoxide concentration determination. The wet stack gas is "dried" before analysis by a chilled condenser. EPA protocol gases are used to calibrate the instrument as well as run system bias and drift checks.

LEAD EMISSIONS DETERMINATION – EPA METHOD 12

Stack gas is withdrawn isokinetically and lead particulate matter is collected on the nozzle, probe and filter. Lead particulate matter is also captured in the first two impingers; each impinger contains 100 mls of 0.1 N Nitric Acid. A fourth and final impinger contains an amount of approximately 200 grams of silica gel. The probe and filter temperatures are maintained at temperatures of 248 degrees F(+/- 25 deg F). The impinger temperature exit gas is maintained at or below 68 degrees Fahrenheit. The probe, nozzle, filter holder, impingers, and connecting glassware are rinsed with approximately 100 mls of 0.1 N nitric acid and collected in a sealed container.

VISIBLE EMISSIONS – EPA METHOD 9

Stack opacity readings were taken for 60-minutes at 15-second intervals by a certified visible emissions reader. The visible emissions readings were conducted during each of the particulate test runs ate both the LMS baghouse stack and the LMS Roof Monitors. The results are reported as an average emissions percentage for each hour period. A copy of the visible emissions certification card is included in Appendix G.

Meltshop Baghouse #1 testing for Emissions:

Test Date: 11/28/1995

Production Rate: Accurate data not readily available.

The process and air pollution control equipment were operating normally at the time of testing.

RAMCON

ENVIRONMENTAL CORPORATION

January 3, 1996

Mr. Dave Sulc
Nucor Steel
RR 2, Box 311
Crawfordsville, Indiana 47933

RE: Source Sampling — Acid Regeneration Unit and EAF Baghouse

Dear Mr. Sulc:

Enclosed you will find four (4) copies of our report on the particulate and hydrogen chloride emissions testing conducted at your facility located in Crawfordsville, Indiana.

You will want to sign the report covers and send two copies to:

Mr. Ed Surla
Indiana Air Pollution Control
Department of Environmental Management
105 South Meridian Street
P. O. Box 6015
Indianapolis, Indiana 46206

You will need to keep one copy of the report at the plant.

We certainly have enjoyed working with you. Please let us know if we can be of further assistance.

Sincerely,

Raymond R. Jenkins

Raymond R. Jenkins
Director Source Sampling

RRJ:wpc
Enclosures

RAMCON BUILDING
6707 FLETCHER CREEK COVE
MEMPHIS, TENNESSEE 38133
TELEPHONE: 800/458-4567
IN TENNESSEE: 901/387-0500
FAX: 901-387-0400

GULF COAST DIVISION
1920 TREBLE DRIVE A-1
HUMBLE, TEXAS 77347
TELEPHONE: 713/319-4183
FAX: 713/319-4185

TABLE OF CONTENTS

Table of Contents **Page**

I. INTRODUCTION

On November 28-29, 1995 personnel from RAMCON Environmental Corporation conducted air emissions testing at Nucor Steel located in Crawfordsville, Indiana. The scope of work involved testing the acid regeneration unit for particulate matter and hydrogen chloride. The EAF baghouse was subject to sampling for particulate matter.

The particulate matter emissions from the EAF baghouse were sampled according to Reference Method 5D. This procedure sets forth a strategy whereby the velocities at the sampling location are calculated from volumetric flow values determined at the inlet duct to the baghouse process.

The particulate matter and hydrogen chloride emissions from the acid regeneration unit were sampled according to US EPA Reference Method 26A requirements. The stack gas moisture, velocity, and volumetric flow rates were also determined during this isokinetic sampling procedure. This data enabled conversion of flue gas pollutant concentrations to emission data values in pounds per hour (lb/hr).

The purpose of the testing project was to determine if the targeted pollutant emissions are equal to or below the allowable limitation set forth by the State of Indiana EPA in the facility's operating permit. Steve Friend, representing the State of Indiana, was present during the testing procedure(s) conducted by RAMCON Environmental Corporation. The test results and supporting calculations are provided in the following sections.

II. TEST RESULTS

The test results are summarized in Tables A and B. Each summary table lists the test results in concentration and emission levels for each target pollutant. The concentrations are reported in terms of grains per dry standard cubic foot (gr/dscf). The emission levels are reported in terms of pounds per hour (lb/hr).

Table A — Acid Regeneration Unit
Particulate and HCl Test Summary
November 29, 1995

Run	Time	Particulate			Hydrogen Chloride	
		gr/dscf	lb/hr	Isokinetics	gr/dscf	lb/hr
1	18:05 - 19:07	0.0498	1.16	102.0	0.0290	0.67
2	19:36 - 20:40	0.0878	2.04	99.7	0.0351	0.81
3	21:05 - 22:08	0.0267	0.61	103.3	0.0537	1.22
	Average:	0.0548	1.27		0.0393	0.90
		Allowable:	2.00	Source is in compliance.		

Table B — EAF Baghouse
Particulate Matter Test Summary
November 28, 1995

Run	Time	gr/dscf	lb/hr	Isokinetics
1	12:39 - 17:02	0.0019	16.92	89.4
2	13:06 - 17:09	0.0016	14.20	88.8
3	17:51 - 21:56	0.0015	13.34	89.0
	Average:	0.0017	14.82	
	Allowable:	0.0018	Source is in compliance‡.	

‡The isokinetics on this source were determined to be fractionally below the ±10% established by EPA. Since low isokinetics bias the test results high and the facility is below the 0.0018 gr/dscf allowable, RAMCON Environmental recommends the test to be accepted.

III. TEST PROCEDURES

The following is a description of each of the test method(s) that were conducted during the project. In this description, a discussion of the pertinent segments including preparation, sampling, and analysis is addressed. This section will provide information supporting the validity of the samples.

A. Determination of Hydrogen Halide and Halogen Emissions From Stationary Sources — US EPA Method 26A.

This procedure is applicable for the collection of hydrogen halides and halogens in stack gas emission samples. This method collects the sample isokinetically and is, therefore, particularly suited for sampling at sources emitting acidic particulate matter.

This test procedure may also be coupled with the particulate matter determination at the sampling location. Two test components involved in the scope of work may be collected simultaneously by one sample train only when neither component sample results will be altered or biased.

1. Preparation:

All glassware components utilized in the sampling train were thoroughly cleaned and dried prior to each test series. The impinger system was assembled using 100 ml of 0.1 N sulfuric acid in the first two impingers. The third impinger contained 100 ml of 0.1 N sodium hydroxide. The fourth impinger contained silica gel. In assembling the sample train, a small amount of silicon grease was placed on the ball joints to ensure adequate sealing.

A glass probe liner and nozzle were utilized for the hydrogen chloride collection train. The probe housed a set of calibrated S-type pitot tubes and a calibrated thermocouple for monitoring stack velocity and temperature, respectively.

A quartz filter was utilized for the collection of particulate matter in the front-half of the sampling train. A teflon frit was utilized to support the quartz filter in the filter holder assembly. This configuration meets the specific requirements of the test procedure.

A leak check was performed prior to each test run. The entire sample train system was subjected to a vacuum which did not exceed 0.02 cfm leakage rate. The vacuum established during the pre-test leak check was not exceeded during the test period.

2. Sampling:

The probe and sample box were heated to an approximate temperature of 250°F. These temperatures were recorded for the duration of the testing to prevent moisture condensation and associated HCl/Cl_2 losses. An ice bath was utilized to condense the water vapor from the sample gas stream. The temperature of the last impinger was recorded throughout the testing to ensure adequate condensation of the water vapor in the flue gases.

Three sample runs were conducted to constitute a complete test. The sampling time was conducted over a period of two (2) hours. When a test run had been completed, a post-test leak check was conducted. Once this had been successfully achieved, the sample train was dismantled for sample recovery. The contents of the impingers were volumetrically measured for moisture gain and transferred to a labeled sample container.

3. Sample Recovery:

Sample recovery consisted of rinsing the probe and connecting glassware with acetone. This rinse solution was placed in a labeled sample container. The glass fiber filter was carefully removed and transferred to its original petri dish.

The 0.1 N H_2SO_4 absorbent solution contained in impingers 1 and 2 were placed into a labeled sample container(s). These impingers were then rinsed with D.I. water. The impinger solution and impinger rinse were combined into the same container(s).

The 0.1 N NaOH solution from impingers 3 and 4 was placed into a separately labeled sample container. The impingers were also rinsed with D.I. water. The rinsings again were placed into the sample container with the respective impinger catch.

4. Analysis:

The absorbent solutions utilized in the collection of the pollutant(s) will be analyzed by ion chromatography. The sulfuric acid solution is used to capture the hydrogen chloride and the sodium hydroxide solution collects the chlorine.

A sample field blank of the absorption solutions were collected, contained, labeled and analyzed in conjunction with the samples.

B. Determination of Particulate Matter Emissions from Positive Pressure Fabric Filters — US EPA Reference Methods 5D.

This method applies to the determination of particulate matter emissions from positive pressure fabric filters. Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter.

1. Preparation:

All glassware utilized in each sampling train was thoroughly cleaned and dried prior to each test series. A glass fiber filter was used that has been labeled, desiccated for a minimum of 24 hours and pre-weighed.

The impinger system was assembled using the modified Greenburg-Smith type. One hundred ml of deionized water was placed in the first two impingers. The third impinger was initially empty and the fourth impinger contained a pre-weighed amount of silica gel for complete moisture removal. This impinger train configuration is according to Reference Method 5 for particulate. In assembling the sample train, a small amount of silicon grease was placed on the ball joints to ensure adequate sealing.

A stainless steel probe liner and nozzle system is typically utilized for the particulate determinations at the sampling location. The probe system housed a set of calibrated S-type pitot tubes and a calibrated thermocouple for monitoring stack velocity and temperature.

2. Sampling:

The probe and sample box was heated to an approximate temperature of 250°F. These temperatures were monitored throughout the testing. An ice bath was prepared to submerse the impinger system into. The temperature of the last impinger was also monitored throughout the testing to ensure adequate condensation of the water vapor in the flue gases.

A leak check was performed prior to each test run. The entire sample train system was subjected to a vacuum that did not exceed 0.02 cfm leakage rate. The vacuum that is established during the pre-test leak check was not exceeded during the test period.

The variation of Reference Method 5 versus 5D is comprised of taking the velocity readings at an inlet location for the 5D versus at each sampling traverse point via Method 5. Therefore velocity traverses were taken at the inlet duct(s) to the baghouse process. This data is utilized for the purpose of determining the volumetric flow rate of air through the baghouse. This value is utilized to determine the average velocity at each respective sampling location or compartment. With the average velocity through each compartment known, the test can then be performed according to Method 5 for sample nozzle selection and isokinetic sampling procedures.

Three sample runs were conducted to constitute a complete test of the baghouse process. Each test run consisted of sampling four (4) compartments in the baghouse. The sampling runs were conducted over a period of four hours each and at least 160 scf of stack gas was extracted via the sampling system.

When a test run has been completed, a post-test leak check was conducted prior to any dismantling of the sampling train. Once this has been successfully achieved, the sample train was dismantled for sample recovery.

The probe and connecting glassware was washed with acetone. The contents of the impingers was volumetrically measured for moisture gain and transferred to a labeled sample container. The glass fiber filter was carefully transferred to its sample container.

3. Analysis:

The glass fiber filter was desiccated for 24 hours prior to any weighing. The acetone probe wash was transferred to a tared beaker and evaporated to dryness. The resultant residue was also desiccated prior to gravimetric analysis.

The first weighing was performed after this initial period of drying. The weights were recorded to 0.0001 g. After a minimum of six additional hours of desiccating, a second weighing was conducted. The weights must agree within 0.0005 g or further desiccation must be conducted until the weights stabilize.

Sample field blanks of acetone were collected, contained, labeled and analyzed in conjunction with the samples. The blank weight was deducted from the acetone probe wash residue weight determinations.

RAMCON
ENVIRONMENTAL CORPORATION

January 26, 1996

Mr. Dave Sulc
NUCOR STEEL
RR 2, Box 311
Crawfordsville, Indiana 47933

RE: EAF Baghouse — Metals Analysis

Dear Mr. Sulc:

Attached are the results and supporting data for the multi-metals sampling recently conducted on the above-referenced source at your facility.

If I can be of further assistance, please do not hesitate to contact me.

Sincerely,

Raymond R. Jenkins

Raymond R. Jenkins
Director Source Sampling

RRJ:wpc
Attachments

RAMCON BUILDING
6707 FLETCHER CREEK COVE
MEMPHIS, TENNESSEE 38133
TELEPHONE: 800/458-4567
IN TENNESSEE: 901/387-0500
FAX: 901-387-0400

GULF COAST DIVISION
1920 TREBLE DRIVE A-1
HUMBLE, TEXAS 77347
TELEPHONE: 713/319-4183
FAX: 713/319-4185

TEST DATE
11-28-95

Nucor Steel - Crawfordsville, Indiana
Metals Analysis

	Run 1 Results mg	Run 2 Results mg	Run 3 Results mg	Results gr/dscf	Results gr/dscf	Results gr/dscf	Results lb/hr	Results lb/hr	Results lb/hr
Antimony	<0.02	<0.02	<0.02	BDL	BDL	BDL	BDL	BDL	BDL
Arsenic	<0.02	<0.02	<0.02	BDL	BDL	BDL	BDL	BDL	BDL
Barium	**0.29**	**0.30**	**0.12**	**2.597E-05**	**2.755E-05**	**1.069E-05**	**2.31E-01**	**2.45E-01**	**9.52E-02**
Beryllium	<0.00006	<0.00006	<0.00006	BDL	BDL	BDL	BDL	BDL	BDL
Cadmium	<0.0004	<0.0004	<0.0004	BDL	BDL	BDL	BDL	BDL	BDL
Chromium	**0.004**	**0.010**	**0.007**	**3.223E-07**	**9.183E-07**	**6.238E-07**	**2.87E-03**	**8.18E-03**	**5.55E-03**
Cobalt	<0.002	<0.002	<0.002	BDL	BDL	BDL	BDL	BDL	BDL
Copper	**0.0017**	**0.0019**	<0.001	**1.522E-07**	**1.745E-07**	BDL	**1.36E-03**	**1.55E-03**	BDL
Lead	<0.01	<0.01	<0.01	BDL	BDL	BDL	BDL	BDL	BDL
Maganese	**0.0095**	**0.0170**	**0.0110**	**8.506E-07**	**1.561E-06**	**9.803E-07**	**7.57E-03**	**1.39E-02**	**8.72E-03**
Nickel	<0.003	**0.0056**	<0.003	BDL	**5.143E-07**	BDL	BDL	**4.58E-03**	BDL
Phosphorus	<0.01	<0.01	<0.01	BDL	BDL	BDL	BDL	BDL	BDL
Selenium	<0.02	<0.02	<0.02	BDL	BDL	BDL	BDL	BDL	BDL
Silver	<0.0007	<0.0007	<0.0007	BDL	BDL	BDL	BDL	BDL	BDL
Thallium	<0.03	<0.03	<0.03	BDL	BDL	BDL	BDL	BDL	BDL
Zinc	**0.13**	**0.21**	**0.14**	**1.164E-05**	**1.929E-05**	**1.248E-05**	**1.04E-01**	**1.72E-01**	**1.11E-01**

< = detection limit, results will be Below Detection Limit

Laboratory Analysis

AMERICAN INTERPLEX CORPORATION LABORATORIES

8600 Kanis Road
Little Rock, AR 72204-2322
(501) 224-5060

REPORT

Ramcon Environmental Corporation
6707 Fletcher Creek Cove
Memphis, TN 38134

January 16, 1996
Control No. 17199

ATTN: Mr. Sumner Buck

Project Description: Three (3) thimble received on January 11, 1996
NUCOR-Crawfordsville
BAGHOUSE
P.O. No. 081882

RECEIVED JAN 18 1996

Sample Identification: LM01018 1.8318 RUN 1
AIC No. 17199-1

Parameter	Method	Result	Batch	Time Analyzed By
Antimony	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Arsenic	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Barium	NIOSH 7300	0.29 mg	S4645	15JAN96 0913 65/155
Beryllium	NIOSH 7300	<0.00006 mg	S4645	15JAN96 0913 65/155
Cadmium	NIOSH 7300	<0.0004 mg	S4645	15JAN96 0913 65/155
Chromium	NIOSH 7300	0.0036 mg	S4645	15JAN96 0913 65/155
Cobalt	NIOSH 7300	<0.002 mg	S4645	15JAN96 0913 65/155
Copper	NIOSH 7300	0.0017 mg	S4645	15JAN96 0913 65/155
Lead	NIOSH 7300	<0.01 mg	S4645	15JAN96 0913 65/155
Manganese	NIOSH 7300	0.0095 mg	S4645	15JAN96 0913 65/155
Nickel	NIOSH 7300	<0.003 mg	S4645	15JAN96 0913 65/155
Phosphorus	ICP-AES	<0.01 mg	S4645	15JAN96 0913 65/155
Selenium	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Silver	NIOSH 7300	<0.0007 mg	S4645	15JAN96 0913 65/155
Thallium	NIOSH 7300	<0.03 mg	S4645	15JAN96 0913 65/155
Zinc	NIOSH 7300	0.13 mg	S4645	15JAN96 0913 65/155

Sample Identification: LM01039 2.2986 RUN 2
AIC No. 17199-2

Parameter	Method	Result	Batch	Time Analyzed By
Antimony	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Arsenic	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Barium	NIOSH 7300	0.30 mg	S4645	15JAN96 0913 65/155
Beryllium	NIOSH 7300	<0.00006 mg	S4645	15JAN96 0913 65/155
Cadmium	NIOSH 7300	<0.0004 mg	S4645	15JAN96 0913 65/155
Chromium	NIOSH 7300	0.010 mg	S4645	15JAN96 0913 65/155
Cobalt	NIOSH 7300	<0.002 mg	S4645	15JAN96 0913 65/155
Copper	NIOSH 7300	0.0019 mg	S4645	15JAN96 0913 65/155
Lead	NIOSH 7300	<0.01 mg	S4645	15JAN96 0913 65/155
Manganese	NIOSH 7300	0.017 mg	S4645	15JAN96 0913 65/155
Nickel	NIOSH 7300	0.0056 mg	S4645	15JAN96 0913 65/155
Phosphorus	ICP-AES	<0.01 mg	S4645	15JAN96 0913 65/155
Selenium	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Silver	NIOSH 7300	<0.0007 mg	S4645	15JAN96 0913 65/155
Thallium	NIOSH 7300	<0.03 mg	S4645	15JAN96 0913 65/155
Zinc	NIOSH 7300	0.21 mg	S4645	15JAN96 0913 65/155

AMERICAN INTERPLEX CORPORATION
LABORATORIES

8600 Kanis Road
Little Rock, AR 72204-2322
(501) 224-5060

REPORT

Ramcon Environmental Corporation
6707 Fletcher Creek Cove
Memphis, TN 38134

January 16, 1996
Control No. 17199

Project Description: Three (3) thimble received on January 11, 1996
NUCOR-Crawfordsville
BAGHOUSE
P.O. No. 081882

Sample Identification: LM01029 1.8154 RUN 3
AIC No. 17199-3

Parameter	Method	Result	Batch	Time Analyzed By
Antimony	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Arsenic	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Barium	NIOSH 7300	0.12 mg	S4645	15JAN96 0913 65/155
Beryllium	NIOSH 7300	<0.00006 mg	S4645	15JAN96 0913 65/155
Cadmium	NIOSH 7300	<0.0004 mg	S4645	15JAN96 0913 65/155
Chromium	NIOSH 7300	0.0070 mg	S4645	15JAN96 0913 65/155
Cobalt	NIOSH 7300	<0.002 mg	S4645	15JAN96 0913 65/155
Copper	NIOSH 7300	<0.001 mg	S4645	15JAN96 0913 65/155
Lead	NIOSH 7300	<0.01 mg	S4645	15JAN96 0913 65/155
Manganese	NIOSH 7300	0.011 mg	S4645	15JAN96 0913 65/155
Nickel	NIOSH 7300	<0.003 mg	S4645	15JAN96 0913 65/155
Phosphorus	ICP-AES	<0.01 mg	S4645	15JAN96 0913 65/155
Selenium	NIOSH 7300	<0.02 mg	S4645	15JAN96 0913 65/155
Silver	NIOSH 7300	<0.0007 mg	S4645	15JAN96 0913 65/155
Thallium	NIOSH 7300	<0.03 mg	S4645	15JAN96 0913 65/155
Zinc	NIOSH 7300	0.14 mg	S4645	15JAN96 0913 65/155

AMERICAN INTERPLEX CORPORATION

By Steven Lovell
Steven Lovell
Technical Director

KW/lims

Enclosure: Analysis Protocol

17199

RAMCON ENVIRONMENTAL CORPORATION

ANALYSIS PROTOCOL

P.O.# 081882 Per Quotation 2605

I. <u>Sample Labeling Information</u>

Plant: NUCOR - CRAWFORDSVILLE Source(s): BAGHOUSE

Date of Testing 11-28-95 ______

II. <u>Sample Quantity / Types(s)</u>:

Filter(s):	Quantity: 3	Description THIMBLE (GLASS FIBER)
Probe Wash(s):	Quantity: ______	Description ______
Back Half(s):	Quantity: ______	Description ______
______:	Quantity: ______	Description ______

III. <u>Analysis Description</u>:

Sample Type	Analysis Description	Method Used
FILTER	MULTI METALS	29

IV. <u>Special Instructions</u>:

FAX RESULTS ASAP.

F:\linda\analy.pro

14.11
14.12
14.13

Supreme
Environmental Service Company 1426 West 29" Street Indianapolis, Indiana 46208
SESCo Group (317)347-9590 FAX (317)347-9591

REPORT on
NO_x and CO EMISSIONS
Performed for:
Nucor Steel
Crawfordsville, IN
Annealing Furnace #9
on ***08/24/01***

RECEIVED
OCT 0 5 2001
State Of Indiana
Department of Environmental Management
Office of Air Quality

To the best of our knowledge, the data presented in this report is accurate and complete.

R p tfully S ~~bmitt~~ d by:

Michael Dicen, Division Manager

Nucor Steel
Crawfordsville, IN

SESCO Project No. 4190

1-1 PROJECT OVERVIEW

SESCo Group was contracted by Nucor Steel located in Crawfordsville, Indiana to perform compliance test air sampling of Annealing furnace #9 on August 24, 2001. The objective of the testing was to determine NOx and CO emissions. The following personnel were involved with the testing program:

SESCo	Andrew Young
SESCo	Milo Hatfield
SESCo	Michael Dicen
SESCo	Carlos Brown
Nucor Steel	David Sulc
IDEM	Jed Wolkins

The testing program included flow determination, nitrogen oxide (Method 7E), and carbon monoxide (Method 10). Below is a summary of the results:

Table 1-1:
Summary of Test Results

Pollutant	**Time 08/24/01**	**Emission (PPM)**	**Emission (lbs/hr)**	**Emission (lbs/MMbtu)**
NOx	09:02-10:06	46.43	0.2369	0.0801
NOx	10:16-11:16	52.23	0.2068	0.1081
NOx	11:25-12:25	47.75	0.1730	0.0912
	Averages	**48.80**	**0.2055**	**0.0931**

CO	09:02-10:06	2.60	0.0081	0.0027
CO	10:16-11:16	1.20	0.0029	0.0015
CO	11:25-12:25	2.60	0.0057	0.0030
	Averages	**2.13**	**0.0056**	**0.0024**

2-1 RESULTS

Table 2-1:
Annealing Furnace #9 Emissions

Gas Conditions		1	2	3	Average
Ts	Stack Temperature ("F)	720.62	670.63	637.38	676.21
Bwo	Moisture (volume %)	17.20	16.14	17.59	16.98
02	Oxygen (dry volume %)	10.2	11.1	9.8	10.4
C02	Carbon Dioxide (dry volume %)	7.2	6.0	6.5	6.6
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	1912.53	1403.41	1268.42	1528.12
Qstd	Standard Conditions (dscfm)	712.09	552.60	505.72	590.14
NITROGEN OXIDES					
ET	Emission Rate (PPM)	46.43	52.23	47.75	48.80
ET	Emission Rate (lbs/hr)	0.2369	0.2068	0.1730	0.2055
Er	Emission (lbs/MMbtu)	0.0801	0.1081	0.0912	0.0931
CARBON MONOXIDE					
ET	Emission Rate (PPM)	2.60	1.20	2.60	2.13
Er	Emission Rate (lbs/hr)	0.0081	0.0029	0.0057	0.0056
Er	Emission (lbs/MMbtu)	0.0027	0.0015	0.0030	0.0024

3-1 METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1-4, 7E, 10. The following table summarizes the methods:

Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A

Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Gas Analysis for the Determination of Molecular Weight"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide Emissions from Stationary Sources"

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

Table 3-1:
Sampling Points

Location	Dimensions	Ports	Points per Port	Total Points
Annealing Furnace	13" ID	2	8	16

Supreme
Environmental Service Company
SESCo Group

1426 West 29" Street Indianapolis, Indiana 46208
(317)347-9590 FAX (317)347-9591

REPORT on
NO_x and CO EMISSIONS
Performed for:
Nucor Steel
Crawfordsville, IN
Annealing Furnace #13
on 08/24/01

RECEIVED
OCT 0 5 2001
State Of Indiana
Department of Environmental Management
Office of Air Quality

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Michael Dicen, Division Manager

Nucor Steel
Crawfordsville, IN

SESCO Project No. 4191

1-1 PROJECT OVERVIEW

SESCo Group was contracted by Nucor Steel in Crawfordsville, Indiana to perform compliance test air sampling of Annealing furnace #13 on August 24, 2001. The objective of the testing was to determine NOx and CO emissions. The following personnel were involved with the testing program:

SESCo	Andrew Young
SESCo	Milo Hatfield
SESCo	Michael Dicen
SESCo	Carlos Brown
Nucor Steel	David Sulc
IDEM	Jed Wolkins

The testing program included flow determination, nitrogen oxide (Method 7E), and carbon monoxide (Method 10). Below is a summary of the results:

Table 1-1:
Summary of Test Results

Pollutant	Time 08/24/01	Emission (PPM)	Emission (lbs/hr)	Emission (lbs/MMbtu)
NOx	09:41-10:41	34.06	0.1164	0.0605
NOx	10:53-11:53	47.07	0.1954	0.0573
NOx	14:02-15:02	44.61	0.1903	0.0707
	Averages	**41.91**	**0.1674**	**0.0628**

CO	09:41-10:41	0.9	0.0019	0.0010
CO	10:53-11:53	0.2	0.0005	0.0001
CO	14:02-15:02	0.8	0.0021	0.0008
	Averages	**0.63**	**0.0015**	**0.0006**

2-1 RESULTS

Table 2-1:
Annealing Furnace Emissions

Gas Conditions		1	2	3	Avg
Ts	Stack Temperature ("F)	673.94	730.56	723.31	709.27
Bwo	Moisture (volume %)	15.10	17.73	14.83	15.89
0 2	Oxygen (dry volume %)	8.6	5.6	6.9	7.0
C02	Carbon Dioxide (dry volume %)	7.0	10.2	7.84	8.34
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	1201.03	1579.75	1558.44	1446.41
Qstd	Standard Conditions (dscfm)	477.23	579.42	595.37	550.67
NITROGEN OXIDES					
ET	Emission Rate (PPM)	34.06	47.07	44.61	**41.91**
ET	Emission Rate (lbs/hr)	0.1164	0.1954	0.1903	**0.1674**
Er	Emission (lbs/MMbtu)	0.0605	0.0573	0.0707	**0.0628**
CARBON MONOXIDE					
ET	Emission Rate (PPM)	0.90	0.20	0.80	**0.63**
Er	Emission Rate (lbsh)	0.0019	0.0005	0.0021	**0.0015**
Er	Emission (lbs/MMbtu)	0.0010	0.0001	0.0008	**0.0006**

3-1 METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1-4, 7E, 10. The following table summarizes the methods:

Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A	
Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Gas Analysis for the Determination of Molecular Weight"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide Emissions from Stationary Sources"

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

Table 3-1:
Sampling Points

Location	Dimensions	Ports	Points per Port	Total Points
Annealing Furnace	13" ID	2	8	16

Supreme
Environmental Service Company
1426 West 29st Street Indianapolis, Indiana 46208
SESCo Group
(317)347-9590 FAX (317)347-9591

RECEIVED
OCT 0 5 2001
State Of Indiana
Department of Environmental Management
Office of Air Quality

REPORT on
NO_x and CO EMISSIONS
Performed for:
Nucor Steel
Crawfordsville, IN
Annealing Furnace #15
on 08/23/01

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Michael Dicen, Division Manager

Nucor Steel
Crawfordsville, IN

SESCO Project No. 4192

1-1 PROJECT OVERVIEW

SESCo Group was contracted by Nucor Steel in Crawfordsville, Indiana to perform compliance test air sampling of Annealing furnace #15 on August 23, 2001. The objective of the testing was to determine NOx and CO emissions. The following personnel were involved with the testing program:

SESCo	Andrew Young
SESCo	Milo Hatfield
Nucor Steel	David Sulc
IDEM	Jed Wolkins

The testing program included flow determination, nitrogen oxide (Method 7E), and carbon monoxide (Method 10). Below is a summary of the results:

Table 1-1:
Summary of Test Results

Pollutant	Time 08/23/01	Emission (PPM)	Emission (lbs/hr)	Emission (lbs/MMbtu)
NOx	09:41-10:41	52.76	0.3202	0.0936
NOx	10:53-11:53	55.33	0.2310	0.0982
NOx	14:02-15:02	47.58	0.1174	0.0788
	Averages	***51.89***	***0.2229***	***0.0902***

CO	09:41-10:41	0.60	0.0022	0.0006
CO	10:53-11:53	0.50	0.0013	0.0005
CO	14:02-15:02	1.00	0.0015	0.0010
	Averages	**0.70**	**0.0017**	**0.0007**

Nucor Steel
Crawfordsville, IN

SESCO Project No. 4192

2-1 RESULTS

Table 2-1:
Annealing Furnace Emissions

Gas Conditions		1	2	3	Avg
Ts	Stack Temperature ("F)	718.50	707.81	560.63	662.31
Bwo	Moisture (volume %)	14.30	15.07	14.60	14.66
02	Oxygen (dry volume %)	8.5	8.5	8.5	8.5
C02	Carbon Dioxide (dry volume %)	7.0	7.0	7.5	7.2
Volumetric Flow Rate					
Qa	Actual Conditions (acfm)	2191.55	1507.71	774.59	1491.28
Qstd	Standard Conditions (dscfin)	847.07	582.88	344.54	591.50
NITROGEN OXIDES					
ET	Emission Rate (PPM)	52.76	55.33	47.58	**51.89**
ET	Emission Rate (lbs/hr)	0.3202	0.2310	0.1174	**0.2229**
Er	Emission (lbs/MMbtu)	0.0936	0.0982	0.0788	**0.0902**
CARBON MONOXIDE					
ET	Emission Rate (PPM)	0.60	0.50	1.00	**0.70**
Er	Emission Rate (lbs/hr)	0.0022	0.0013	0.0015	**0.0017**
Er	Emission (lbs/MMbtu)	0.0006	0.0005	0.0010	**0.0007**

Nucor Steel
Crawfordsville, IN

SESCO Project No. 4192

3-1 METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1-4, 7E, 10. The following table summarizes the methods:

Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A

Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Gas Analysis for the Determination of Molecular Weight"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide Emissions from Stationary Sources"

SAMPLE POINT DETERMINATION

Sampling point locations were determined according to EPA Reference Method 1

Table 3-1:
Sampling Points

Location	Dimensions	Ports	Points per Port	Total Points
Annealing Furnace	13" ID	2	8	16

14.14

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
Indianapolis

OFFICE MEMORANDUM

To: Jay Patterson

Date: December 17, 2001

From: Jarrod Fisher JCF
Marie Luce AML

Thru: Ed Surla

Subject: Nucor Steel
Crawfordsville, Indiana
Source ID No. 107-00038
Permit ID No. SSM 107-12143-00038

The subject company has submitted a report concerning the stack emissions testing at the subject source. The tests were conducted by Sesco Group, Inc. The purpose of the testing was to determine compliance status of the batch annealing furnaces with regards to the emission limitations stated below. The protocols were approved by Quentin Flory and Marie Luce and the field tests were observed by Marie Luce and Jed Wolkins. 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:

Annealing Furnace #1
Date of test: June 6, 2001
Identification and Unit No. of Facilities Tested: Batch Annealing Furnace #1
Pollution Control Equipment: Natural Gas fired burners use low-NOx technology
Operating Parameters: N/A
Pollutants: NOx, CO
Test methods: 1-4, 7E, 10

Maximum Rated Capacity: 4.8 MMBtu/hr
CP #107-12143 Condition No. D.6.7 (c) NOx Limit (326 IAC 2-2): 0.10 lbs/MMBtu
CP #107-12143 Condition No. D.6.7 (d) CO Limit (326 IAC 2-2): 0.084 lbs/MMBtu

	NOx Emissions (lb/MMBtu)	CO Emissions (lb/MMBtu)	Heat Input Rate (MMBtu/hr)
Run 1	0.0731	0.0035	3.77
Run 2	0.0837	0.0035	3.61
Run 3	0.0895	0.0029	3.21
Average	0.0821	0.0033	3.53

Annealing Furnace #9
Date of test: August 24, 2001
Identification and Unit No. of Facilities Tested: Batch Annealing Furnace #9
Pollution Control Equipment: Natural Gas fired burners use low-NOx technology
Operating Parameters: N/A
Pollutants: NOx, CO
Test methods: 1-4, 7E, 10

Maximum Rated Capacity: 4.8 MMBtu/hr
CP #107-12143 Condition No. D.6.7 (c) NOx Limit (326 IAC 2-2): 0.10 lbs/MMBtu
CP #107-12143 Condition No. D.6.7 (d) CO Limit (326 IAC 2-2): 0.064 lbs/MMBtu

	NOx Emissions (lb/MMBtu)	CO Emissions (lb/MMBtu)	Heat Input Rate (MMBtu/hr)
Run 1	0.0800	0.0027	3.85
Run 2	0.1083	0.0015	2.94
Run 3	0.0915	0.0030	2.02
Average	0.0932	0.0024	2.94

Annealing Furnace #13
Date of test: August 24, 2001
Identification and Unit No. of Facilities Tested: Batch Annealing Furnace #13
Pollution Control Equipment: Natural Gas fired burners use low-NOx technology
Operating Parameters: N/A
Pollutants: NOx, CO
Test methods: 1-4, 7E, 10

Maximum Rated Capacity: 4.8 MMBtu/hr
CP #107-12143 Condition No. D.6.7 (c) NOx Limit (326 IAC 2-2): 0.10 lbs/MMBtu
CP #107-12143 Condition No. D.6.7 (d) CO Limit (326 IAC 2-2): 0.084 lbs/MMBtu

	NOx Emissions (lb/MMBtu)	CO Emissions (lb/MMBtu)	Heat Input Rate (MMBtu/hr)
Run 1	0.0670	0.0008	4.00
Run 2	0.0636	0.0001	3.67
Run 3	0.0756	0.0008	2.98
Average	0.0687	0.0006	3.55

Annealing Furnace #15
Date of test: August 23, 2001
Identification and Unit No. of Facilities Tested: Batch Annealing Furnace #15
Pollution Control Equipment: Natural Gas fired burners use low-NOx technology
Operating Parameters: N/A
Pollutants: NOx, CO
Test methods: 1-4, 7E, 10

Maximum Rated Capacity: 4.8 MMBtu/hr
CP #107-12143 Condition No. D.6.7 (c) NOx Limit (326 IAC 2-2): 0.10 lbs/MMBtu
CP #107-12143 Condition No. D.6.7 (d) CO Limit (326 IAC 2-2): 0.084 lbs/MMBtu

	NOx Emissions (lb/MMBtu)	CO Emissions (lb/MMBtu)	Heat Input Rate (MMBtu/hr)
Run 1	0.0820	0.0006	3.64
Run 2	0.0925	0.0005	3.31
Run 3	0.0793	0.0010	1.79
Average	0.0846	0.0007	2.92

STATUS: In **Compliance**

Note: There are 18 identical natural gas-fired batch annealing furnaces at Nucor Steel in Crawfordsville. Permit Condition D.6.4 (a) requires Nucor to perform NOx and CO testing on "at least four (4) batch annealing furnaces within 60 days after achieving maximum capacity, but no later than 180 days after initial start-up".

cc: J. Fisher, IDEM
M. Luce, IDEM
D. Sekula, IDEM
M. Stuckey- IDEM office of Enforcement
WPS/General Files, Montgomery Co.

Supreme
Environmental Service Company
SESCo Group

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(317)347-9590 FAX (317)347-9591

REPORT on
NO_x and CO EMISSIONS
Performed for:
Nucor Steel
Crawfordsville, IN
Annealing Furnace
on 06/06/01

RECEIVED
JUL 17 2001
State Of Indiana
Department of Environmental Management
Office of Air Quality

To the best of our knowledge, the data presented in this report is accurate and complete.

Respectfully Submitted by:

Michael Dicen, Division Manager

STACK EMISSION SUMMARY

SOURCE TESTED:	Annealing Furnace
COMPANY NAME:	Nucor Steel
DATE OF TEST:	0610612001

NOx Emissions	Run 1	Run 2	Run 3	Average
PPM	47.11	53.95	57.69	52 91
lbs/hr	0.3749	0.3500	0.3520	0.3590
lbs/MMbtu	0.0731	0.0837	0.0895	0.0821
CO Emissions				
PPM	3.70	3.70	3.10	3.50
lbs/hr	0.0179	0.0146	0.0115	0.0147
lbs/MMbtu	0.0035	0.0035	0.0029	0.0033
Avg. Stack Vol. **Flow Rate**				
ACFM	2977.13	2457.27	2284.21	2572 87
DSCFM	1111.03	905.65	851.70	956 13
Avg. Stack Temp.	757.50	781.31	754.69	764 50
Stack Gas Velocity	53.83	44.43	41.30	46 52
Avg. Velocity Head	0.3865	0.2589	0.2279	0.2911
Avg. Sq. Rt of Delta P	0.6217	0.5088	0.4774	0.5360
% Moisture of Stack Gas	14.58%	13.99%	14.85%	14.48%
Sample Volume	21.110	21.466	21.555	21.377

2-1 RESULTS

Table 2-1:
Annealing Furnace Emissions

Gas Conditions		1	2	3	Avg
Ts	Stack Temperature ("F)	757.50	781.31	754.69	764.50
Bwo	Moisture (volume %)	14.58	13.99	14.85	14.48
0 2	Oxygen (dry volume %)	7.0	7.0	7.5	7.2
C02	Carbon Dioxide (dry volume %)	8.0	8.0	8.0	8.0
Volumetric Flow Rate					
Qa	Actual Conditions (a c h)	2977.13	2457.27	2284.21	2572.87
Qstd	Standard Conditions (d s c h)	1111.03	905.65	851.70	956.13
NITROGEN OXIDES					
ET	Emission Rate (PPM)	47.11	53.95	57.69	52.91
ET	Emission Rate (lbs/hr)	0.3749	0.3500	0.3520	0.3590
CARBON MONOXIDE					
ET	Emission Rate (PPM)	3.70	3.70	3.10	3.50
ET	Emission Rate (lbs/hr)	0.0179	0.0146	0.0115	0.0147

3-1 METHODOLOGY

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1-4, 7E, 10. The following table summarizes the methods:

Summary of Sampling Procedures

Title 40 CFR Part 60 Appendix A

Method 1	"Sampling of Velocity Traverses for Stationary Sources"
Method 2	"Determination of Stack Gas Velocity and Volumetric Flow Rate"
Method 3	"Gas Analysis for the Determination of Molecular Weight"
Method 4	"Determination of Moisture Content in Stack Gas"
Method 7E	"Determination of Nitrogen Oxide Emissions from Stationary Sources"
Method 10	"Determination of Carbon Monoxide Emissions from Stationary Sources"

SAMPLE POINT DETERMINATION

Sampling point locations were determined according to EPA Reference Method 1.

Table 3-1:
Sampling Points

Location	Dimensions	Ports	Points per Port	Total Points
Annealing Furnace	13" ID	2	8	16

3-2 METHODOLOGY

SAMPLE AND VELOCITY TRAVERSE - EPA METHOD 1

Method 1 was used for the representative measurement of pollutant emissions and/or total volumetric flow rate. A measurement site where the effluent gas stream, flowing in a known direction is selected and divided into a equal number of areas. A traverse point is then located within each of these equal areas. Sampling or velocity measurement is performed at a site located at least eight stack or duct diameters downstream and two diameters up stream from any flow disturbance such as a bend, expansion, contraction, or visible flame. If necessary, an alternative location may be selected at a position at least two stack or duct diameters downstream and one half diameter upstream from any flow disturbance.

VELOCITY AND VOLUMETRIC FLOW RATE - EPA METHOD 2

EPA Method 2 was used to determine the gas velocity and flow rate at both the inlet and outlet locations. Each set of velocity determinations included the measurement of gas velocity pressure and gas temperature at each of the Method 1 determined traverse points. The velocity pressures were measured with a Type S pitot tube. Gas temperature measurements were made with a Type K thermocouple and digital pyrometer.

GAS COMPOSITION AND MOLECULAR WEIGHT - EPA METHOD 3

In order to determine the oxygen and carbon dioxide concentrations, a sample of gas was obtained and analyzed in accordance with EPA Method 3. The gas sample was collected using an Orsat analyzer. The results were used to determine gas molecular weight.

MOISTURE CONTENT - EPA METHOD 4

The flue gas moisture content at the testing locations was determined in accordance with EPA Method 4. The moisture was determined by quantitatively condensing moisture in the chilled impingers and silica absorbtion. The amount of moisture condensed was determined gravimetrically. A dry gas meter was used to measure the volume of gas sampled. Moisture content is used to determine stack gas velocity.

NITROGEN OXIDE CONCENTRATION - EPA METHOD 7E

A gas sample is continuously drawn from the stack and a portion of the sample is conveyed to a chemiluminescent analyzer for NOx concentration determination. The wet stack gas is "dried," before analysis, by a chilled condenser. EPA protocol 1 gases are used to calibrate the instrument, as well as run system checks.

CARBON MONOXIDE CONCENTRATION - EPA METHOD 10

A continuous gas sample is drawn from the stack and a portion is conveyed to a tedlar bag for carbon monoxide concentration determination at a laboratory. The wet stack gas is "dried," before analysis, by a chilled condenser. EPA protocol 1 gases are used to calibrate the laboratory instrument.

SECTION D.6 FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(15)]

(f) Eighteen (18) natural gas-fired batch annealing furnaces, utilizing propane as a backup fuel. Each batch annealing furnace shall be equipped with low-NOx burners and shall not exceed a maximum heat input rate of 4.8 MMBtu per hour. These units can handle the product from both the existing continuous caster line and the continuous strip caster line to be installed as described above.

(The information describing the process contained in this facility description box is descriptive information and does not constitute enforceable conditions.)

Emission Limitations and Standards

D.6.1 Nitrogen Oxides (NO_x) and CO Emission Limitations

Pursuant to 326 IAC 2-2 (PSD Requirements), the eighteen (18) batch annealing furnaces shall comply with the following requirements:

(a) Each batch annealing furnace shall be equipped with low-NOx burners;

(b) Each batch annealing furnace shall utilize natural gas as the primary fuel and may utilize propane as a backup fuel;

NOX

(c) The NOx emissions from each batch annealing furnace shall not exceed 0.10 pounds per MMBtu; and

CO

(d) The CO emissions from each batch annealing furnace shall not exceed 0.084 pound per MMBtu.

D.6.2 Sulfur Dioxide (SO_2) Emission Limitations

Pursuant to 326 IAC 2-2 (PSD Requirements), the above-mentioned additional batch annealing furnaces shall utilize natural gas as the primary fuel and may utilize propane as a backup fuel.

Compliance Determination and Monitoring

D.6.4 Performance Testing

(a) Pursuant to 326 IAC 2-1.1-11 and 326 IAC 2-2, the Permittee shall perform NOx and CO compliance stack tests on at least four (4) batch annealing furnaces within 60 days after achieving maximum capacity, but no later than 180 days after initial start-up.

(b) All compliance stack tests shall be repeated at least annually until such time that the Part 70 permit for this source is in effect.

(c) IDEM, OAQ retains the authority under 326 IAC 2-1-4(f) to require the Permittee to perform additional and future compliance testing as necessary.

D.6.5 Vendor Certification

The Permittee shall submit with the affidavit of construction (Condition B.5(a)) the vendor guarantees for the above-mentioned batch annealing furnaces to demonstrate compliance with