White Star
ENVIRONMENTAL CONSULTING

Air Quality Test Report

EPA Compliance Testing for Particulate Matter and Volatile Organic Compound Emissions

EAF #1 (SN-01)
EAF #2 (SN-12)

Quanex Corp. - MacSteel Division
Ft. Smith, Arkansas

April 17 - 20, 2007

ADEQ Permit # 693-AOP-R4; 66-0274

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INTRODUCTION

MacSteel located in Ft. Smith, Arkansas is operating a steel mill facility in the production of various steel products. As part of the air quality control system, two positive pressure baghouses are operated to limit the air pollution emissions from the electric arc furnace (EAF) utilized in the scrap melting process. The facility performed emissions testing to demonstrate air quality compliance established in the operating permit (#693-AOP-R4). Sampling and analysis was performed for particulate matter, (PM), total hydrocarbons (excluding methane), and volumetric flow rate.

The particulate matter determination was performed utilizing EPA Reference Methods 5 and 5D for SN-01 and SN-12 respectively. The test result values are provided in grains per dry standard cubic foot (gr/dscf) and pounds per hour (lb/hr). These samples were collected over three 4-hour periods.

Volatile organic compound (VOC) emissions were determined from each EAF exhaust. The results for the VOC's were obtained over three (3) sixty minute periods simultaneously from each source. The pollutant values are provided in parts per million (ppm) and pounds per hour (lb/hr). Additionally, methane analysis was performed on each point source to provide a total non-methane hydrocarbon result. Samples were gathered during each VOC run using tedlar bags to obtain an integrated sample. The emissions determination was performed according to EPA Reference Methods 25A. The testing procedures were performed on April 17-20, 2007.

SUMMARY OF RESULTS

Particulate Matter (PM)

EAF # 1 (SN-01)			
Date/Time	**Isokinetics**	**gr/dscf**	**lb/hr**
4/19;08:40-13:05	105.49	0.00046	1.50
4/19;13:50-18:05	106.52	0.00041	1.45
4/20;08:25-12:40	104.39	0.00048	1.69
Average:	**105.47**	**0.00045**	**1.55**
EAF # 2 (SN-12)			
Date/Time	**Isokinetics**	**gr/dscf**	**lb/hr**
4/17;09:05-13:20	106.53	0.0003	1.84
4/17;14:20-18:35	103.72	0.0005	3.29
4/18;09:30-13:45	101.16	0.0003	1.76
Average:	**103.8**	**0.0004**	**2.30**

PM Compliance Summary		
Test	**CST*, gr/dscf**	**lb/hr**
1	0.00035	3.34
2	0.00047	4.74
3	0.00036	3.45
Average	**0.00039**	**3.84**
Limit	**0.0018**	**27.4**

Based upon the emission results, the processes designated as SN-01 and SN-12 are operating within the allowable limit for particulate matter emissions.

SUMMARY OF RESULTS

Total Non-Methane Hydrocarbon Compounds (TNMHC)
Emissions Summary
April 17-20 , 2007

EAF # 1 (SN-01)				
Run	**Time**	**TNMHC, ppm** ($THC-CH_4$)	**Vol. Flow** (SCFM)	**Emission** (lb/hr)
1	11:30-12:30	(7.6–7.4) = 0.2	383,798	0.19
2	14:30-15:30	(7.8-7.2) = 0.6	415,235	0.62
3	09:15-10:15	(9.7-9.6) = 0.1	408,634	0.10
Average	-	**0.3**	**402,556**	**0.30**
EAF # 2 (SN-12)				
Run	**Time**	**TNMHC, ppm** ($THC-CH_4$)	**Vol. Flow** (SCFM)	**Emission** (lb/hr)
1	09:05-10:05	(12.2-12.0) = 0.0	789,044	0.00
2	14:00-15:00	(9.8-9.4) = 0.4	761,383	0.76
3	09:30-10:30	(10.7-10.6) = 0.1	763,273	0.19
Average	-	**0.2**	**771,233**	**0.32**
			Combined lb/hr:	**0.62**
			Limit:	**11.2**

Based upon the emission results, the processes designated as SN-01 and SN-12 are operating within the allowable emission rates for total hydrocarbons emissions.

CALCULATIONS

The following section provides a detailed description of all calculations used in the determination of emission rates. Also listed are all of the intermediate values associated with these calculations.

EAF #1 (SN-01)

Dry Gas Meter Volume

$$V_{m(std)} = Vm\left[\frac{T_{STD}}{T_m}\right]\left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{P_{std}}\right] = 17.64[Y][V_m]\left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right]$$

Parameter	Run 1	Run 2	Run 3
Vm	165.925	180.832	175.087
Tm	517	516	518
Pbar	29.98	29.98	29.98
ΔH avg	1.56	1.79	1.74
C Factor (Y)	1.012	1.012	1.012
Vm std	172.589	188.563	181.845

Nomenclature

ΔH = Average pressure drop across orifice, in. H_2O.
P_{bar} = Barometric pressure, in. Hg.
T_m = Absolute gas meter temperature, °R
V_m = Dry gas volume measured, ft^3
Y = Dry gas meter calibration factor
$V_{m(std)}$ = Dry gas volume corrected to dry, standard conditions, ft^3

Water Vapor Condensed

Moisture Content

Parameter	Run 1	Run 2	Run 3
V_{wc}	0.235	0.235	0.235
V_{wsg}	1.415	1.650	0.943
Bws, %	0.95	0.99	0.64

Nomenclature:

B_{ws} = Water vapor, by volume, in gas stream, %
ΔH = Average pressure drop across orifice, in. H_2O.
P_{bar} = Barometric pressure, in. Hg.
T_m = Absolute gas meter temperature, °R
V_f, V_i = Impinger system volume, final & initial, ml
V_m = Dry gas volume measured, ft^3
$V_{m(std)}$ = Dry gas volume corrected to dry, standard conditions, ft^3
$V_{wc(std)}$ = Water vapor condensed, ml
$V_{wsg(std)}$ = Water vapor captured in silica gel, g
W_f, W_i = Silica gel weight, final & initial, g
Y = Dry gas meter calibration factor
0.04707 = Conversion factor, ft^3/ml
0.04715 = Conversion factor, ft^3/g

Dry Molecular Weight

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

Molecular Weight of Gas Stream

Parameter	Run 1	Run 2	Run 3
O2, %	20.0	20	20
CO2, %	0.5	0.5	0.5
CO + N2, %	79.5	79.5	79.5
Bws, %	0.95	0.99	0.64
Md, lb/lb-mole	28.88	28.88	28.88
Ms, lb/lb-mole	28.78	28.77	28.81

Nomenclature

B_{ws} = Water vapor, by volume, in gas stream, %
M_d = Dry molecular weight of gas stream, lb/lb-mole
M_s = Molecular weight of gas stream actual conditions, (lb/lb-mole)
$\%CO_2$ = Carbon dioxide concentration, by volume, %
$\%O_2$ = Oxygen concentration, by volume, %
$\%N_2$ = Nitrogen concentration, by volume, %
%CO = Carbon monoxide concentration, by volume, %
18 = Molecular weight of H_2O vapor, lb/lb-mole

Linear Velocity of Gas Stream

Parameter	Run 1	Run 2	Run 3
Kp	85.49	85.49	85.49
Cp	0.84	0.84	0.84
SQRT (dP) avg	0.67	0.72	0.71
Ts, R	561	557	563
Ps	29.98	29.98	29.98
Vs	38.75	41.65	41.28

Volumetric Flow Rate of Gas Stream

Parameter	Run 1	Run 2	Run 3
Bws, %	0.95	0.99	0.64
As, ft^2	176.71	176.71	176.71
Ts, R	561	557	563
Ps	29.98	29.98	29.98
Qsd, SCFH	23,027,851	24,914,113	24,518,057

Nomenclature

A = Cross sectional area of gas stream, ft^2
B_{ws} = Water vapor, by volume, in gas stream, %
C_p = Calibration factor of pitot tube device, dimensionless
ΔP = Pressure differential of gas stream, in H_2O
K_p = 85.49 ft/sec[(lb/lb-mole•in. Hg)/(°K•in. H_2O)]$^{1/2}$
M_s = Molecular weight of gas stream actual conditions, (lb/lb-mole)
P_{bar} = Barometric pressure, in. Hg
P_g = Static pressure of gas stream, in Hg
P_s = Absolute pressure of gas stream, in. Hg (P_{bar}+P_g)
P_{std} = Absolute standard pressure, 29.92 in. Hg
Q_{sd} = Volumetric flow rate of gas stream, dry basis, std cond., ft^3/hr
T_s = Absolute temperature of gas stream, ° R
T_{std} = Absolute standard temperature, 528° R
V_s = Linear velocity of gas stream, ft/sec.
3600 = Conversion factor, sec/hr.

Isokinetic Variation

$$I = 100 \bullet T_s \left[\frac{(0.002669)\left\{ V_{ic} + \left(\frac{Y_i \bullet V_m}{T_m} \right) \left(P_{bar} + \frac{\Delta H}{13.6} \right) \right\}}{60 \bullet \Theta \bullet V_s \bullet P_s \bullet A_n} \right]$$

Parameter	Run 1	Run 2	Run 3
Ts, R	561	557	563
Vic	35	40	25
Yi	1.012	1.012	1.012
Vm	165.925	180.832	175.087
Tm	517	516	518
Pbar	29.98	29.98	29.98
dH avg	1.56	1.79	1.74
sampling time, min.	240	240	240
An	0.000314	0.000314	0.000314
I	105.49	106.52	104.39

Nomenclature

I = Isokinetic variation, %
T_s = Absolute temperature of gas stream, ° R
V_{ic} = Water vapor condensed from gas stream, ml
Y = Dry gas meter calibration factor
V_m = Dry gas volume measured, ft^3
T_m = Absolute gas meter temperature, °R
P_{bar} = Barometric pressure, in. Hg.
ΔH = Average pressure drop across orifice, in. H_2O.
13.6 = Inches of water per Hg.
V_s = Linear velocity of gas stream, ft/sec.
P_s = Absolute pressure of gas stream, in. Hg ($P_{bar}+P_g$)
A_n = Cross sectional area of nozzle, ft^2

Particulate Emission Rate Determination

$$Cs,gr/dscf = (0.0154\ gr/mg)(m_n)/(V_{m\ std})$$

$$E,\ lb/hr = (Cs)(Qsd)/(7000\ gr/lb)$$

Particulate Matter & Lead

Parameter	Run 1	Run 2	Run 3
Particulate Matter			
m_n, mg	5.3	3.7	4.5
$V_{m\ std}$, dscf	172.589	188.563	181.845
C_s, gr/dscf	0.00047	0.00030	0.00038
Q_{sd}, dscf/hr	23,027,851	24,914,113	24,518,057
E, lb/hr	1.56	1.08	1.33
Lead			
m_n, mg	0.0050	0.0050	0.0050
$V_{m\ std}$, dscf	172.589	188.563	181.845
C_s, gr/dscf	4.46E-07	4.08E-07	4.23E-07
Q_{sd}, dscf/hr	23,027,851	24,914,113	24,518,057
E, lb/hr	0.0015	0.0015	0.0015

Nomenclature

m_n = Particulate matter collected, mg
$V_{m(std)}$ = Dry gas volume corrected to dry, standard conditions, ft^3
C = Concentration, grains per dry standard cubic foot (gr/dscf)
E = Pollutant emission rate, pounds per hour (lb/hr)
Q_{sd} = Gas stream volumetric flow rate, standard cubic feet per hour.

Gaseous Pollutant Emission Rate

$$E = (2.59 \times 10^{-9}) (MW) (ppm_d) (Q_{sd})$$

Run	TNMHC, ppm ($THC-CH_4$)	Vol. Flow (SCFM)	Emission (lb/hr)
1	(7.6–7.4) = 0.2	383,798	0.19
2	(7.8-7.2) = 0.6	415,235	0.62
3	(9.7-9.6) = 0.1	408,634	0.10

Nomenclature

E = Pollutant emission rate, pounds per hour (lb/hr)
$2.59x10^{-9}$ = Conversion factor
MW = Pollutant molecular weight, lb/lb-mole 16.04
ppm_d = Pollutant concentration, parts per million, dry basis
Q_{sd} = Gas stream volumetric flow rate, standard cubic feet per hour.

CALCULATIONS

The following section provides a detailed description of all calculations used in the determination of emission rates. Also listed are all of the intermediate values associated with these calculations.

EAF #2 (SN-12)

Dry Gas Meter Volume

$$V_{m(std)} = Vm\left[\frac{T_{STD}}{T_m}\right]\left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{P_{std}}\right] = 17.64[Y][V_m]\left[\frac{P_{bar} + \frac{\Delta H}{13.6}}{T_m}\right]$$

Parameter	Run 1	Run 2	Run 3
Vm	233.535	220.026	214.931
Tm	523	524	523
Pbar	30	30	30
ΔH avg	3.00	2.60	2.60
C Factor (Y)	0.997	0.997	0.997
Vm std	237.440	223.061	218.104

Nomenclature

ΔH = Average pressure drop across orifice, in. H_2O.
P_{bar} = Barometric pressure, in. Hg.
T_m = Absolute gas meter temperature, °R
V_m = Dry gas volume measured, ft^3
Y = Dry gas meter calibration factor
$V_{m(std)}$ = Dry gas volume corrected to dry, standard conditions, ft^3

Linear Velocity of Gas Stream

$$V_s = \frac{Q_i * T_s * P_{std}}{A_s * 60 * T_{std} * (1-B_{ws}) * P_s}$$

Parameter	Run 1	Run 2	Run 3
Inlet SCFM, Qi	789,087	761,383	763,273
T_s, R	692	578	584
B_{ws}, %	0.89	0.82	1.20
Ps	30	30	30
Vs	2.37	1.91	1.94

Nomenclature

A_s= Cross sectional area of measurement site, ft^2
Qi= Volumetric flow rate of inlet gas stream, scfm
Bws = Moisture content, %
P_s = Absolute pressure of gas stream, in. Hg (P_{bar}+P_g)
Ts= Absolute temperature of gas stream at measurement site, ° R
V_s= Linear velocity of gas stream at measurement site, ft/sec.

Isokinetic Variation

$$I = 100 \bullet T_s \left[\frac{(0.002669)\left\{ V_{ic} + \left(\frac{Y_i \bullet V_m}{T_m} \right) \left(P_{bar} + \frac{\Delta H}{13.6} \right) \right\}}{60 \bullet \Theta \bullet V_s \bullet P_s \bullet A_n} \right]$$

Parameter	Run 1	Run 2	Run 3
Ts, R	692	578	584
Yi	0.997	0.997	0.997
Vm	233.535	220.026	214.931
Tm	523	524	523
Pbar	30	30	30
dH avg	3.00	2.60	2.60
sampling time, min.	240	240	240
An	0.0085221	0.0085221	0.0085221
I	106.53	103.72	101.16

Nomenclature

I = Isokinetic variation, %
T_s = Absolute temperature of gas stream, ° R
V_{ic} = Water vapor condensed from gas stream, ml
Y = Dry gas meter calibration factor
V_m = Dry gas volume measured, ft^3
T_m = Absolute gas meter temperature, °R
P_{bar} = Barometric pressure, in. Hg.
ΔH = Average pressure drop across orifice, in. H_2O.
13.6 = Inches of water per Hg.
V_s = Linear velocity of gas stream, ft/sec.
P_s = Absolute pressure of gas stream, in. Hg ($P_{bar}+P_g$)
A_n = Cross sectional area of nozzle, ft^2

Particulate Emission Rate Determination

$$Cs,gr/dscf = (0.0154\ gr/mg)(m_n)/(V_{m\ std})$$

$$E,\ lb/hr = (Cs)(Qsd)/(7000\ gr/lb)$$

Parameter	Run 1	Run 2	Run 3
Particulate Matter			
m_n, mg	4.2	7.3	3.8
$V_{m\ std}$, dscf	237.440	223.061	218.104
C_s, gr/dscf	0.0003	0.0005	0.0003
Q_{sd}, dscf/min	789,087	761,383	763,273
E, lb/hr	1.84	3.29	1.76
Lead			
m_n, mg	0.014	0.024	0.009
$V_{m\ std}$, dscf	237.440	223.061	218.104
C_s, gr/dscf	9.08E-07	1.66E-06	6.35E-07
Q_{sd}, dscf/min	789,087	761,383	763,273
E, lb/hr	0.0061	0.0108	0.0042

Nomenclature

m_n = weight of particulate matter, mg
$V_{m(std)}$ = Dry gas volume corrected to dry, standard conditions, ft^3
Cs = Concentration of particulate matter, grains per dry standard cubic foot, gr/dscf
Q_{sd} = Volumetric flow rate of air being emitted, dry standard cubic feet per hour, dscf/hr
E = Pollutant emission rate, pounds per hour (lb/hr)

Gaseous Pollutant Emission Rate

$$E = (2.59 \times 10^{-9})\ (\ MW\ )\ (\ ppm_d)\ (\ Q_{sd}\ )$$

Run	TNMHC, ppm ($THC-CH_4$)	Vol. Flow (SCFM)	Emission (lb/hr)
1	(12.2-12.0) = 0.0	789,044	0.00
2	(9.8-9.4) = 0.4	761,383	0.76
3	(10.7-10.6) = 0.1	763,273	0.19

Nomenclature

E = Pollutant emission rate, pounds per hour (lb/hr)
2.59×10^{-9} = Conversion factor
MW = Pollutant molecular weight, lb/lb-mole 16.04
ppm_d = Pollutant concentration, parts per million, dry basis
Q_{sd} = Gas stream volumetric flow rate, standard cubic feet per hour.

EQUIPMENT SPECIFICATIONS

Gaseous Analysis Equipment Specifications

The following section provides a general description of each CEM analyzer utilized in the monitoring system. Detector type utilized, span values, etc. are provided.

Reference Method Equipment
Component Listing

Component	Manufacturer
THC Analyzer	J.U.M. Model VE-7
THC Analyzer	J.U.M. Model VE-7

Total Hydrocarbon Analyzer

A J.U.M. Model VE-7 was utilized to conduct the testing procedures for total hydrocarbons. This instrument performs continuous wet analysis of total hydrocarbons in gas mixtures.

The J.U.M. Model VE-7 is a highly accurate flame ionization detection (FID) gas analyzer. This analyzer utilizes a flame to combust the gas stream, which in turn enables detection through the ionization process. An internally mounted sample pump is used to draw sample gas through the detection system. The span value of the instrument was established as 100 ppm during the test procedures.

Heated Sample Line

The purpose of the Heated Sample Line is to transport the gas sample from the Probe Assembly to the analyzer system components. The HSL also maintains the gas sample temperature above the dew point to ensure moisture present in the gas stream does not condense out and interfere with proper system operation.

The HSL contains two teflon tubes within the outer shell and heat trace material. One of the tubes is used to transport the gas sample from the Probe Assembly to the analyzer system components. This tube is designated as the Sample Line. The second tube is utilized to transfer calibration gas to the probe for remote calibration purposes.

Data Acquisition System

Data Acquisition is performed by an Advantech analog to digital converter and utilizes Genie Data Acquisition Software to convert the voltage readings to meaningful concentration values.

EQUIPMENT SPECIFICATIONS

Particulate Analysis Equipment Specifications

Metering Console
An APEX Model 522 Metering Console was used to monitor the collection of the particulate samples, ensuring an isokinetic representation. The unit contains a dry gas meter with direct read index and a resolution of 0.001 cubic feet, separate temperature controllers for the heated probe and the particulate filter box, and thermocouple connections (type K) to monitor the temperature of the sample gas at critical sampling points throughout the sample train. Furthermore, the unit employs a dual-column, inclined/vertical manometer for determination of stack gas velocity and sample pump flow rate. The manometer has a range of 0 to 10 inches of water on both columns, with a resolution of 0.01 inches of water from the 0 to 1 inch range, and a resolution of 0.1 inches of water from the 0 to 10 inch range.

Sample Pump
An APEX Model E-0523 sample pump was used to draw a representative sample of the process exhaust gas stream across the sample filter. The flow rate of the Gast vane pump is controlled by the dual column manometer on the metering console along with a combination of needle valves. This allows the operator to draw the sample at an isokinetic rate corresponding to the stack gas flow rate.

Impinger Sample Train
The sample train used for the collection of particulate matter and stack gas moisture consists of a series of glass impingers connected together in series, preceded by a glass filter holder. The filter holder is housed in a heated sample box, which is controlled from the metering console, and is positioned in-line between the extractive sample probe and the glass impinger train. The box is maintained at a temperature of approximately 250°F to prevent saturation of the filter due to the moisture of the sample gas. During sampling, the process exhaust gas is drawn across the filter, depositing all particulate matter, and proceeds through the impinger train, positioned in an ice bath, where the moisture contained in the process gas is extracted. The first and second impingers in the train are filled with approximately 200 ml of deionized water, while the third impinger remains empty, collecting any remaining uncombined moisture. The fourth and final impinger is filled with silica gel, which desiccates the sample, thereby removing all of the moisture.

Appendix A

Source Specifications

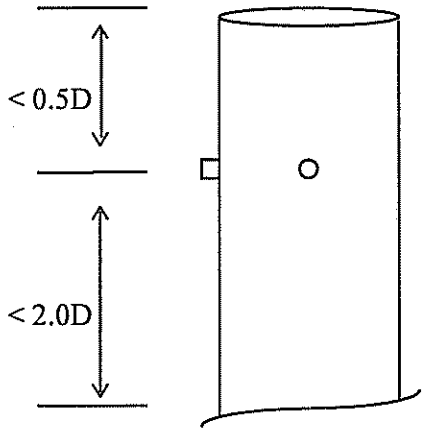
Source Dimensions / Testing Locations

Traverse Point Diagram

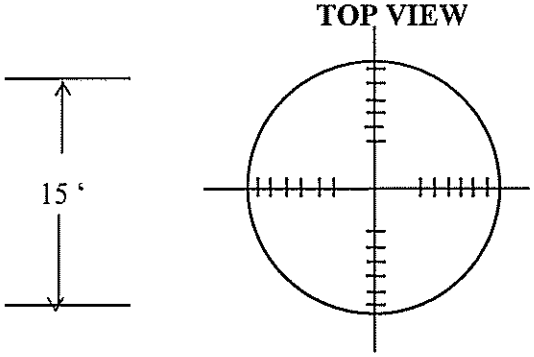
MacSteel Arkansas
Ft. Smith, AR

EAF Baghouse # 1
(SN-01)

SIDE VIEW



TOP VIEW



Point	% Diameter	Distance* in.
1	2.1	3.78
2	6.7	12.06
3	11.8	21.24
4	17.7	31.86
5	25.0	45.0
6	35.6	64.08

* Distance excludes port stand-off

Note: The EAF South Baghouse (# 1) has a round, vertical stack with a 15 ft. diameter. The duct is configured with four accessible ports. Six sampling traverse points were obtained from each port for a total of 24 traverse points as specified.

MacSteel Arkansas
Ft. Smith, AR

Baghouse # 2 (SN-12)
Compartment Size: 28.67' x 19.42'

1	2	3	4	5	6	7
8	9	10	11	12	13	14

The Electric Arc Furnace North Baghouse (# 2) is a positive pressure filter baghouse with 14 compartments with an inside area of 556.77 sq. ft. each. Three EPA Method 5D test runs were conducted consisting of sampling 4 compartments per test run. This strategy therefore included 12 total compartments. Each compartment was sampled for a sixty minute period across 8 traverse points on a 4x2 matrix. Each traverse point was sampled for 7.5 minutes for a total test time of 240 minutes. A minimum of 160 scf were collected per test run.

Appendix B

Field Data Records

Particulate Matter Field Data Records

REFERENCE METHOD 5D

Facility MACSTEEL
Location
Operator
Date 4-17-07
Run No. 1
Sample Box No. NILESH
Meter Box No.
Meter Δ H_a
C Factor

SN-12

Inlet SCFM:

Ambient Temp 60
Barometric Pressure 30.0
Nozzle Diameter 1.25
Leak Rate (cfm) .01 @ 10"
Static Pressure —
Filter No. 3268
Impinger Vol. (initial) 200
Impinger Vol. (final) 210
Silica Gel Wt. (initial) 505
Silica Gel Wt. (final) 540

Compartment #: 1

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	905	6	134	3.0	704.039	60	59		43
2		7	123	↓		58	58		35
3		8	115	↓		60	58		25
4		9	114			61	58		23
5		9	125			62	58		33
6		9	124			63	59		35
7		9	122			64	60		37
8	1005	9	121		760.9	63	59		38

Compartment #: 2

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1010	9	123	3.0	760.9	60	59		39
2		9	125	↓		61	58		33
3		9	123	↓		62	57		30
4		10	122	↓		63	57		29
5		10	115			62	55		29
6		10	114			61	53		25
7		10	119			62	55		34
8	1110	10	118		819.4	63	55		34

Compartment #: 3

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1215	10	111	3.0	819.4	61	57		38
2		10	115	↓		63	57		34
3		10	119	↓		62	55		34
4		10	124			63	56		35
5		10	125			63	56		36
6		10	123			64	57		38
7		10	122			65	57		39
8	1315	10	121		878.5	65	57		39

REFERENCE METHOD 5D

Facility MACSTEEL
Location
Operator
Date 4-17-07
Run No. 1 EDAT.
Sample Box No.
Meter Box No.
Meter Δ H_a
C Factor

SN-12

Inlet SCFM:

Ambient Temp
Barometric Pressure
Nozzle Diameter
Leak Rate (cfm)
Static Pressure
Filter No.
Impinger Vol. (initial)
Impinger Vol. (final)
Silica Gel Wt. (initial)
Silica Gel Wt. (final)

Compartment #: 4

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1220	10	122	3.0	878.5	62	59		44
2		10	124	"		64	60		39
3		10	124	"		64	59		42
4		10	120	"		64	59		44
5		10	121			64	58		45
6		10	119			64	58		46
7		10	126			64	58		47
8	1320	10	122		937.574	64	58		47

Compartment #:

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1									
2									
3									
4									
5									
6									
7									
8									

Compartment #:

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1									
2									
3									
4									
5									
6									
7									
8									

REFERENCE METHOD 5D

Facility: Mastec
Location: Ft. Smith, AR
Operator: TS
Date: 4-17-07
Run No.: 2
Sample Box No.:
Meter Box No.:
Meter Δ H_a:
C Factor:

Inlet SCFM:

Ambient Temp: 65
Barometric Pressure: 30.0
Nozzle Diameter:
Leak Rate (cfm): 0.01 @ 15"
Static Pressure:
Filter No.: R-3363
Impinger Vol. (initial): 200
Impinger Vol. (final): 204
Silica Gel Wt. (initial): 520
Silica Gel Wt. (final): 555

Compartment #: 6

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1420	8	114	2.6	937.715	54	53		56
2		8	116	↓		57	55		56
3		8	120	↓		59	55		55
4		8	116	↓		59	54		52
5		9	115			60	56		52
6		9				62			53
7		9				63			53
8	1520	9			992.8	64	57		54

Compartment #: 5

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1525	9	123	2.6	992.8	60	57		56
2		9	122	↓		63	60		54
3		9	127	↓		63	58		54
4		9	127	↓		64	61		54
5		9	125	↓		64	60		54
6		9	124			65	60		54
7		9	122			65	60		54
8	1625	9	121		1047.9	65	60		54

Compartment #: 13

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1630	9	120	2.6	1047.9	63	58		55
2	↓	9	121	↓		64	58		46
3	↓	9	121	↓		65	58		43
4		9	120			65	58		43
5		9	119			65	58		42
6		9	119			65	58		42
7		9	114			65	58		41
8	1730	9	113		1052.8	65	58		40

REFERENCE METHOD 5D

Facility MACSTEEL
Location
Operator
Date 4-17-07
Run No. 2 SHIFT
Sample Box No.
Meter Box No.
Meter Δ H_R
C Factor

SN-12

Inlet SCFM:

Ambient Temp
Barometric Pressure
Nozzle Diameter
Leak Rate (cfm)
Static Pressure
Filter No.
Impinger Vol. (initial)
Impinger Vol. (final)
Silica Gel Wt. (initial)
Silica Gel Wt. (final)

Compartment #: 12

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1735	9	106	2.6	1102.8	63	60		46
2		9	113	↓		65	58		41
3		9	114			65	58		40
4		9	114			65	58		42
5		9	110			65	58		44
6		9	112			65	58		46
7		9				65	58		47
8	1835	9			1157.741	65	58		49

Compartment #:

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1									
2									
3									
4									
5									
6									
7									
8									

Compartment #:

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1									
2									
3									
4									
5									
6									
7									
8									

REFERENCE METHOD 5D

Facility: Nucor Steel
Location: Fort Smith, AR
Operator: JS
Date: 4-18-07
Run No.: 3
Sample Box No.:
Meter Box No.:
Meter Δ H_g:
C Factor:

SN-12

Inlet SCFM:

Ambient Temp: 60
Barometric Pressure: 29.9
Nozzle Diameter: 1.25
Leak Rate (cfm): 0.01 @ 10"
Static Pressure: —
Filter No.: 12-3354
Impinger Vol. (initial): 200
Impinger Vol. (final): 811
Silica Gel Wt. (initial): 465
Silica Gel Wt. (final): 505

Compartment #: 11

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	930	6	102	2.6	158.040	57	58		47
2		6	119	↓		61	63		44
3		6	118			62	63		45
4		7	124			64	64		48
5		6	123			63	63		50
6		6	124			64	62		52
7		6	131			64	61		53
8	1030	6	134		211.5	64	61		52

Compartment #: 10

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1035	6	136	2.6	211.5	65	61		50
2		6	135	↓		64	59		51
3		6	133			62	59		52
4		6	132			63	58		53
5		6	130			63	58		54
6		6	128			63	58		47
7		6	126			63	58		46
8	1135	6	125		264.7	63	58		48

Compartment #: 9

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1140	6	123	2.6	264.7	65	60		52
2		7	126	↓		64	58		48
3		7	129			63	56		45
4		7	128			62	55		45
5		7	127			63	54		41
6		7	123			63	54		42
7		7	114			63	55		41
8	1240	7	119		318.5	63	62		43

REFERENCE METHOD 5D

Facility MACSTEEL
Location
Operator JS
Date 4-19-07
Run No. 3 cont
Sample Box No.
Meter Box No.
Meter Δ H_a
C Factor

Inlet SCFM:

Ambient Temp
Barometric Pressure
Nozzle Diameter
Leak Rate (cfm)
Static Pressure
Filter No.
Impinger Vol. (initial)
Impinger Vol. (final)
Silica Gel Wt. (initial)
Silica Gel Wt. (final)

Compartment #: 8

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1245	7	116	2.6	318.5	65	60		47
2		7	120	↓		65	56		42
3		7	118	↓		63	58		42
4		7	121			63	58		43
5		7	118			64	58		45
6		7	118			63	57		45
7		7	119			63	57		46
8	1345	7	119		372.971	63	57		46

Compartment #:

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1									
2									
3									
4									
5									
6									
7									
8									

Compartment #:

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1									
2									
3									
4									
5									
6									
7									
8									

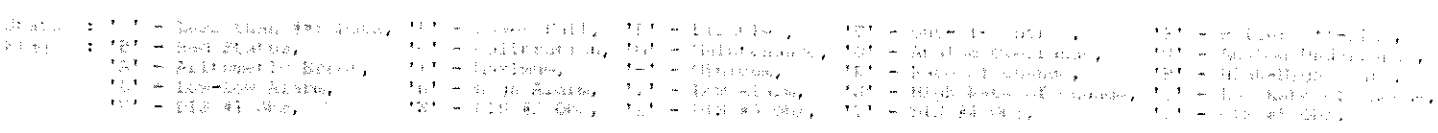
Current Date : 04/17/07
Current Time : 13:33

Daily Parameter Report - Minute Averages with Flags
MacSteel

Logger Name : MACSTEEL
Logger Id : 01
Parameter : 2FLOWRAT
Units : SCFM

Stack :
Boiler/Unit :
Interval : 001M

Date	Time	Average	Data Flags <PDTFBCMOUA+-RHLhlJjVWXYZf	Status Flags I?*>=m^vEd9za Q
04/17/07	08:00	798149		
04/17/07	08:01	797575		
04/17/07	08:02	803954		
04/17/07	08:03	817457		
04/17/07	08:04	830821		
04/17/07	08:05	819022		
04/17/07	08:06	806203		
04/17/07	08:07	793279		
04/17/07	08:08	795963		
04/17/07	08:09	800046		
04/17/07	08:10	787990		
04/17/07	08:11	789322		
04/17/07	08:12	797381		
04/17/07	08:13	791684		
04/17/07	08:14	783649		
04/17/07	08:15	779451		
04/17/07	08:16	782628		
04/17/07	08:17	783111		
04/17/07	08:18	780277		
04/17/07	08:19	779654		
04/17/07	08:20	784055		
04/17/07	08:21	779923		
04/17/07	08:22	778257		
04/17/07	08:23	772088		
04/17/07	08:24	776477		
04/17/07	08:25	771804		
04/17/07	08:26	769072		
04/17/07	08:27	782628		
04/17/07	08:28	781301		
04/17/07	08:29	773053		
04/17/07	08:30	774087		
	Max	830821		
	Min	769072		
	Mean	789044		
	Records	31		



Current Date : 04/17/07
Current Time : 13:34

Daily Parameter Report - Minute Averages with Flags
MacSteel

Logger Name : MACSTEEL
Logger Id : 01
Parameter : 2FLOWRAT
Units : SCFM

Stack :
Boiler/Unit :
Interval : 001M

Date	Time	Average	Data Flags <PDTFBCMOUA+-RHLhlJjVWXYZf	Status Flags I?*>=m^vEd9za Q
04/17/07	13:00	781455		
04/17/07	13:01	786730		
04/17/07	13:02	785308		
04/17/07	13:03	782999		
04/17/07	13:04	781851		
04/17/07	13:05	774177		
04/17/07	13:06	772893		
04/17/07	13:07	770444		
04/17/07	13:08	772938		
04/17/07	13:09	761980		
04/17/07	13:10	767120		
04/17/07	13:11	771487		
04/17/07	13:12	756967		
04/17/07	13:13	763296		
04/17/07	13:14	760308		
04/17/07	13:15	756567		
04/17/07	13:16	757692		
04/17/07	13:17	757225		
04/17/07	13:18	758993		
04/17/07	13:19	754593		
04/17/07	13:20	752144		
04/17/07	13:21	750787		
04/17/07	13:22	747690		
04/17/07	13:23	744898		
04/17/07	13:24	753279		
04/17/07	13:25	747438		
04/17/07	13:26	744022		
04/17/07	13:27	744045		
04/17/07	13:28	743374		
04/17/07	13:29	745719		
04/17/07	13:30	754450		
	Max	786730		
	Min	743374		
	Mean	761383		
	Records	31		

Status : '<' - Less than ## Data, 'P' - Power Fail, 'D' - Disabled, 'T' - Out-of-Control, 'F' - Boiler Off-Line,
Flags : 'B' - Bad Status, 'C' - Calibration, 'M' - Maintenance, 'O' - Analog Overrange, 'U' - Analog Underrange,
'A' - Arithmetic Error, '+' - Maximum, '-' - Minimum, 'R' - Rate Change, 'H' - High-High Alarm,
'L' - Low-Low Alarm, 'h' - High Alarm, 'l' - Low Alarm, 'J' - High Rate of Change, 'j' - Low Rate of Change,
'V' - DIS #1 Obs, 'W' - DIS #2 Obs, 'X' - DIS #3 Obs, 'Y' - DIS Obs, 'Z' - DIS #5 Obs.

FIGURE 7

By WEI 7/15/04

MD401
Revised 12/15/04

Current Date : 04/18/07
Current Time : 11:09

Daily Parameter Report - Minute Averages with Flags
MacSteel

Logger Name : MACSTEEL
Logger Id : 01
Parameter : 2FLOWRAT
Units : SCFM

Stack :
Boiler/Unit :
Interval : 001M

Date	Time	Average	Data Flags <PDTFBCMOUA+-RHLhlJjVWXYZf	Status Flags I?*>=m^vEd9za Q
04/18/07	08:30	759502		
04/18/07	08:31	757816		
04/18/07	08:32	758394		
04/18/07	08:33	758927		
04/18/07	08:34	757723		
04/18/07	08:35	769570		
04/18/07	08:36	750758		
04/18/07	08:37	751183		
04/18/07	08:38	768534		
04/18/07	08:39	770208		
04/18/07	08:40	766938		
04/18/07	08:41	766182		
04/18/07	08:42	768878		
04/18/07	08:43	767441		
04/18/07	08:44	768074		
04/18/07	08:45	764982		
04/18/07	08:46	773198		
04/18/07	08:47	765632		
04/18/07	08:48	766982		
04/18/07	08:49	774313		
04/18/07	08:50	768537		
04/18/07	08:51	768294		
04/18/07	08:52	768691		
04/18/07	08:53	770379		
04/18/07	08:54	777162		
04/18/07	08:55	770338		
04/18/07	08:56	764757		
04/18/07	08:57	748853		
04/18/07	08:58	738642		
04/18/07	08:59	748269		
04/18/07	09:00	752309		
	Max	777162		
	Min	738642		
	Mean	763273		
	Records	31		

Status : '<' - Less than ##* Data, 'P' - Power Fail, 'D' - Disabled, 'T' - Out-of-Control, 'F' - Boiler Off-Line,
Flags : 'B' - Bad Status, 'C' - Calibration, 'M' - Maintenance, 'O' - Analog Overrange, 'U' - Analog Underrange,
'A' - Arithmetic Error, '+' - Maximum, '-' - Minimum, 'R' - Rate of Change, 'H' - High-High Alarm,
'L' - Low-Low Alarm, 'h' - High Alarm, 'l' - Low Alarm, 'J' - High Rate of Change, 'j' - Low Rate of Change,
'V' - DIS #1 Obs, 'W' - DIS #2 Obs, 'X' - DIS #3 Obs, 'Y' - DIS #4 Obs, 'Z' - DIS #5 Obs.

Facility MACSTEEL
Location Ft. Smith, AR
Operator JS
Date 4-19-07
Run No. 1
Sample Box No.
Meter Box No.
Meter Δ H_a
C Factor
Pitot Coeff (C_p)

SN-01

Diameter (in.)
Downstream (in.)
Upstream (in.)

Ambient Temp 55
Barometric Pressure 30.0
Nozzle Diameter 0.24
Leak Rate (cfm) 0.01 @ 10"
Static Pressure 0.3
Filter No. R-3365
Impinger Vol. (initial) 200
Impinger Vol. (final) 205
Silica Gel Wt. (initial) 490
Silica Gel Wt. (final) 520

Initial Meter Reading: 373.190

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔP in. H_2O	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	~~840~~ 850	2	110	.30	1.0	378.6	58	56		57
2	900	2	105	.55	1.9	386.1	60	55		56
3	910	4	103	.80	2.7	394.8	63	53		45
4	920	3	99	.40	1.4	401.3	64	52		42
5	930	3	102	.35	1.2	407.5	63	52		41
6	940	3	99	.35	1.2	413.6	63	53		41
7	~~950~~ 1000	2	102	.25	0.9	418.9	57	53		47
8	1010	2	101	.25	0.9	424.3	61	54		40
9	1020	3	101	.35	1.2	430.5	61	54		41
10	1030	3	98	.45	1.5	437.3	62	55		40
11	1040	3	103	.55	1.9	445.0	62	53		37
12	1050	4	98	.60	2.0	450.8	63	54		37
13	~~1100~~ 1110	2	99	.25	0.9	458.2	58	53		42
14	1120	3	98	.35	1.2	464.3	59	54		35
15	1130	3	99	.45	1.5	471.0	59	53		34
16	1140	3	101	.45	1.5	478.4	60	54		33
17	1150	3	101	.60	2.0	486.3	60	55		32
18	1200	3	99	.40	1.4	493.0	62	56		32
19	1205 ~~1215~~	3	101	.45	1.5	499.8	58	55		35
20	1225	3	104	.55	1.9	507.5	59	55		32
21	1235	3	106	.50	1.7	515.0	60	55		31
22	1245	3	98	.55	1.9	522.6	60	54		33
23	1255	3	97	.60	2.0	530.7	60	55		33
24	1305	3	100	.65	2.2		61	55		35

Final Meter Reading: 539.115

Facility Macsteel
Location Fort Smith
Operator JS
Date 4-19-07
Run No. 2
Sample Box No.
Meter Box No.
Meter Δ H_a
C Factor
Pitot Coeff (C_p)

SN-01

Diameter (in.)
Downstream (in.)
Upstream (in.)

Ambient Temp 65
Barometric Pressure 30.0
Nozzle Diameter 0.24
Leak Rate (cfm) 0.0 @ 10"
Static Pressure 0.4
Filter No. R-
Impinger Vol. (initial) 206
Impinger Vol. (final) 205
Silica Gel Wt. (initial) 505
Silica Gel Wt. (final) 540

Initial Meter Reading: 540.029

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔP in. H_2O	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	1350/1400	2	102	.30	1.0	545.7	56	54		47
2	1410	2	100	.40	1.4	552.3	56	54		53
3	1420	3	103	.55	1.9	560.1	60	53		49
4	1430	3	96	.65	2.2	569.0	60	52		45
5	1440	3	95	.65	2.2	577.0	61	52		42
6	1450	3	94	.65	2.2	585.4	61	52		41
7	1455/1505	2	93	.35	1.2	591.5	58	53		40
8	1515	3	101	.45	1.5	598.6	58	53		43
9	1525	3	93	.55	1.9	606.4	59	53		44
10	1535	4	95	.65	2.2	614.9	59	53		45
11	1545	3	94	.60	2.0	622.2	59	53		46
12	1555	3	97	.60	2.0	630.7	59	53		46
13	1600/1610	3	96	.35	1.2	637.1	58	53		47
14	1620	3	95	.55	1.9	645.3	58	53		46
15	1630	3	95	.55	1.9	653.0	59	52		46
16	1640	3	94	.55	1.9	660.3	60	52		46
17	1650	3	96	.48	1.5	667.5	60	52		47
18	1700	3	94	.45	1.5	674.6	59	53		46
19	1702/1715	3	98	.35	1.2	680.8	58	53		43
20	1725	3	101	.55	1.9	688.6	59	54		45
21	1735	3	101	.60	2.0	696.5	60	54		46
22	1745	3	100	.65	2.2	704.9	60	54		47
23	1755	3	99	.60	2.0	713.0	60	54		49
24	1805	3	98	.60	2.0		61	54		50

Final Meter Reading: 720.861

Facility MACSteel
Location Ft. Smith
Operator JS
Date 4-20-07
Run No. 3
Sample Box No.
Meter Box No.
Meter Δ H_a
C Factor
Pitot Coeff (C_p)

SN-01

Diameter (in.)
Downstream (in.)
Upstream (in.)

Ambient Temp 55
Barometric Pressure 30.0
Nozzle Diameter 0.24
Leak Rate (cfm)
Static Pressure 0.3
Filter No.
Impinger Vol. (initial) 200
Impinger Vol. (final) 205
Silica Gel Wt. (initial) 909
Silica Gel Wt. (final) 525

Initial Meter Reading: 721.029

Traverse Point No.	Sample Time (min.)	Sample Vacuum (in. Hg)	Stack Temp. (°F)	ΔP in. H_2O	ΔH in. H_2O	Gas Volume (ft^3)	DGM Temp. IN	DGM Temp. OUT	Filter Temp. (°F)	Last Impinger (°F)
1	~~825~~ 835	2	115	.30	1.0	726.4	59	57		57
2	845	2	112	.40	1.4	733.0	59	56		56
3	855	3	109	.60	2.0	740.8	62	57		54
4	905	3	109	.65	2.2	749.0	63	55		55
5	915	3	110	.65	2.2	757.1	64	55		54
6	925	3	106	.65	2.2	765.0	64	55		53
7	~~930~~ 940	3	105	.35	1.2	770.5	63	54		53
8	950	3	104	.40	1.4	777.6	63	54		54
9	1000	3	105	.50	1.7	784.7	61	54		54
10	1010	3	102	.60	2.0	792.8	62	54		53
11	1020	3	99	.65	2.2	801.0	62	54		53
12	1030	3	98	.65	2.2	809.2	62	53		51
13	~~1035~~ 1045	3	98	.30	1.0	815.9	59	53		48
14	1055	3	99	.45	1.5	822.0	59	52		45
15	1105	3	99	.45	1.5	828.8	59	52		41
16	1115	3	101	.50	1.7	836.2	59	53		40
17	1125	3	102	.60	2.0	843.6	59	53		40
18	1135	3	104	.60	2.0	851.9	60	54		42
19	~~1140~~ 1150	2	99	.30	1.0	857.8	57	53		43
20	1200	3	100	.45	1.5	864.6	57	53		44
21	1210	3	102	.55	1.9	872.4	58	53		45
22	1220	3	99	.55	1.9	880.3	58	53		46
23	1230	3	99	.60	2.0	888.3	58	53		47
24	1240	3	98	.60	2.0		58	53		47

Final Meter Reading: 896.116

Appendix C

Analysis Data

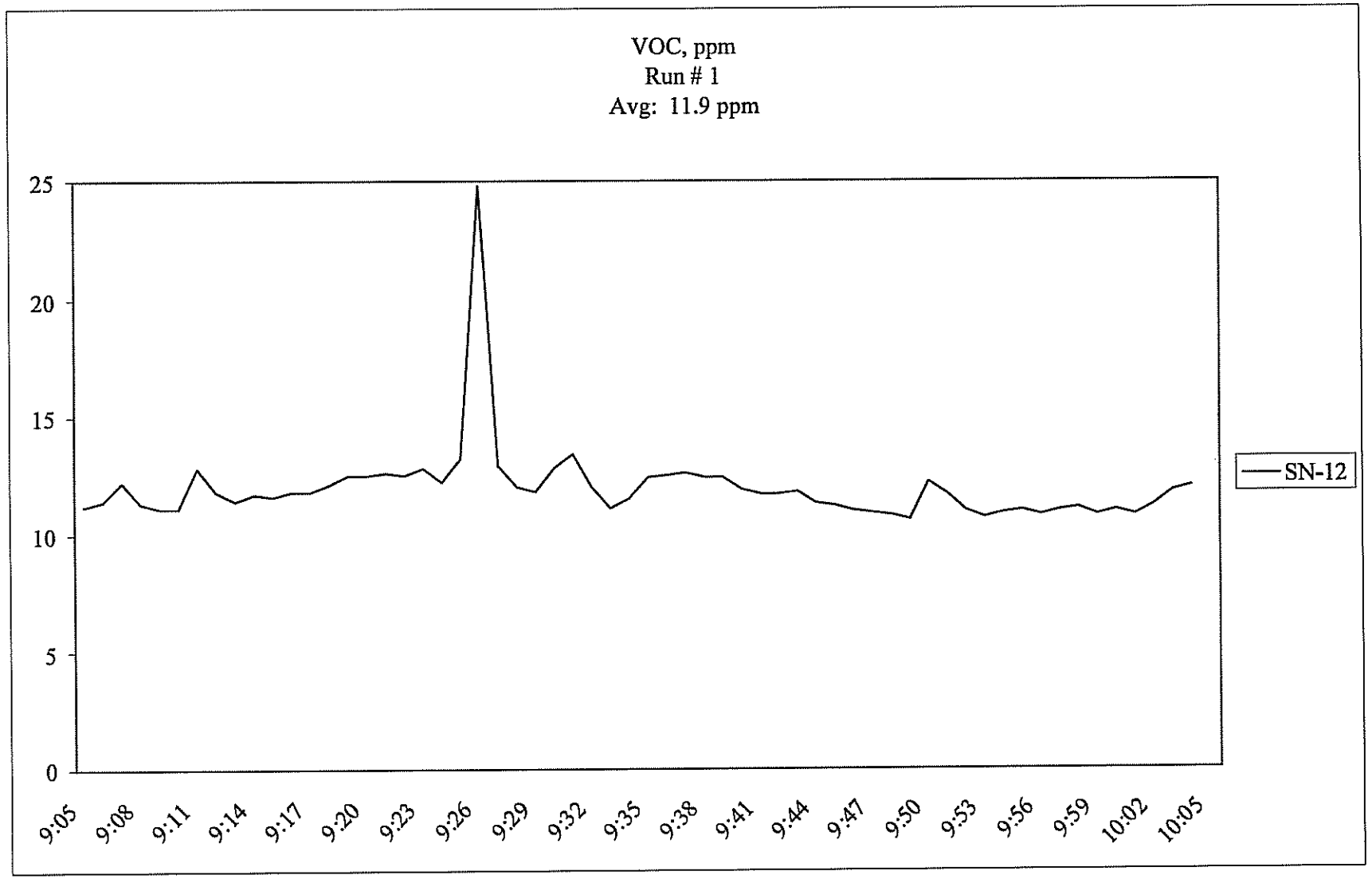
Volatile Organic Compound Results

Particulate Matter Gravimetric Analysis

MacSteel
Ft. Smith, AR

EAF Exhaust
(SN-12)

April 17, 2007

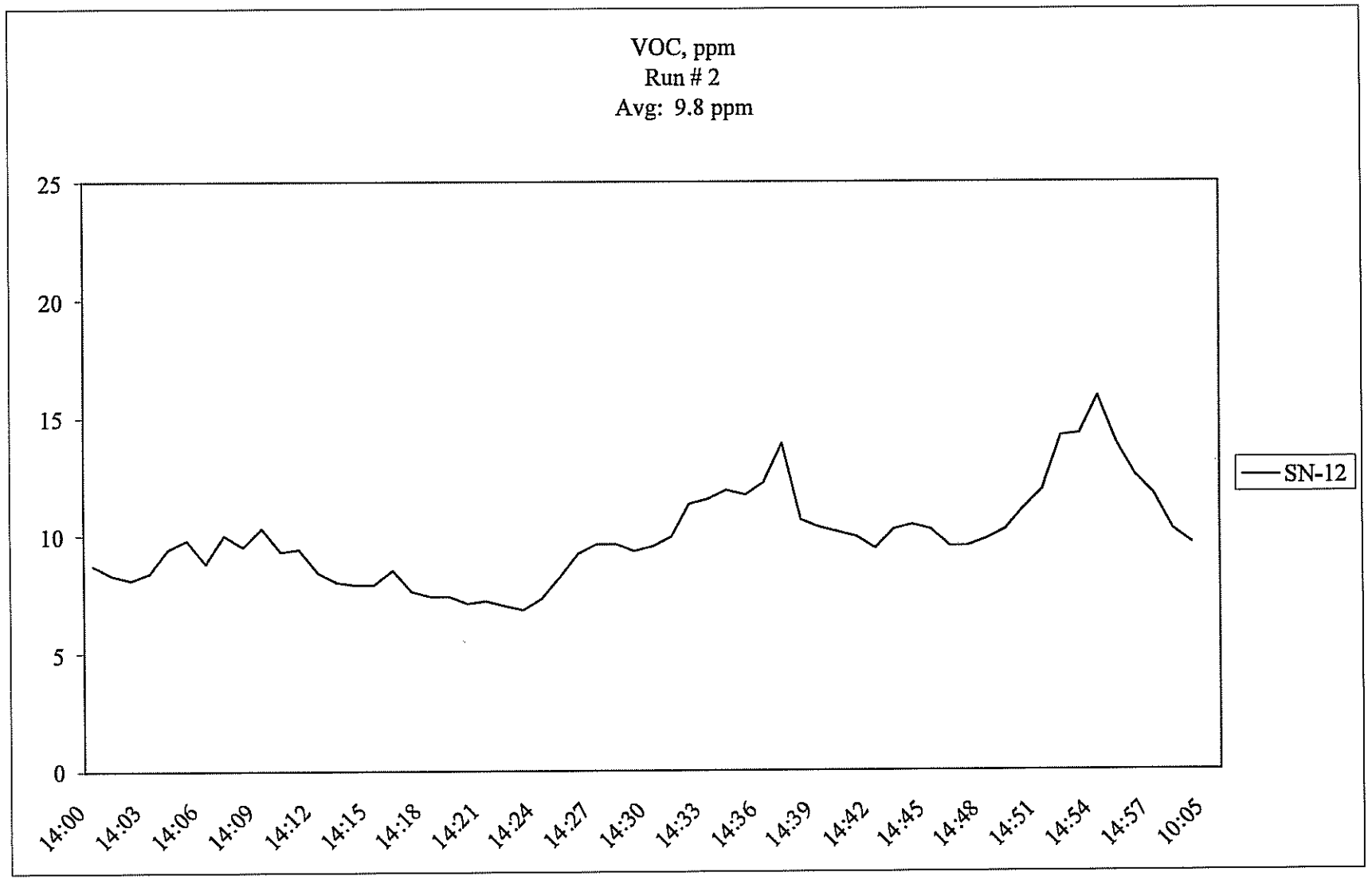


White Star Environmental

MacSteel
Ft. Smith, AR

EAF Exhaust
(SN-12)

April 17, 2007

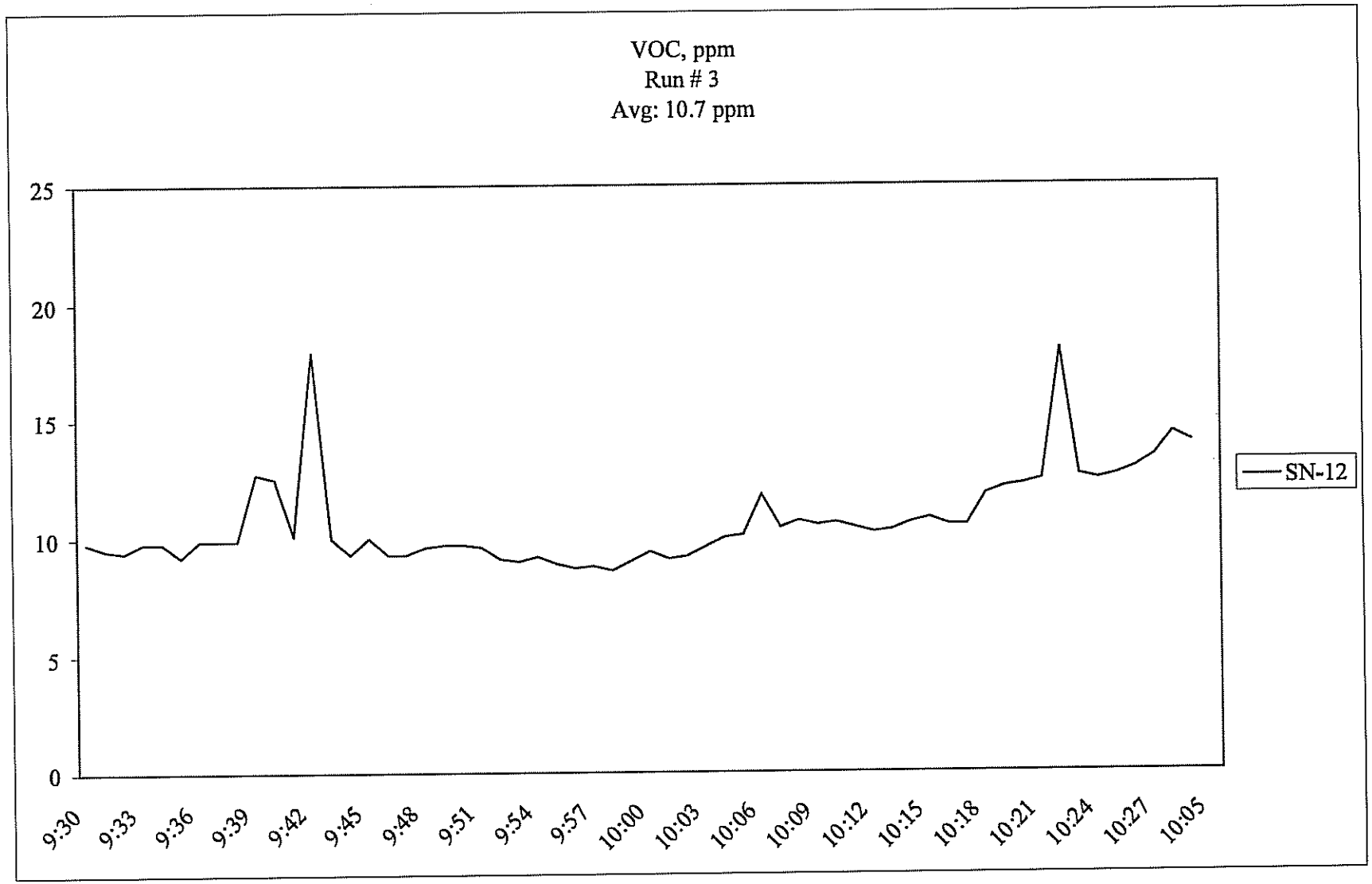


White Star Environmental

MacSteel
Ft. Smith, AR

EAF Exhaust
(SN-12)

April 17, 2007

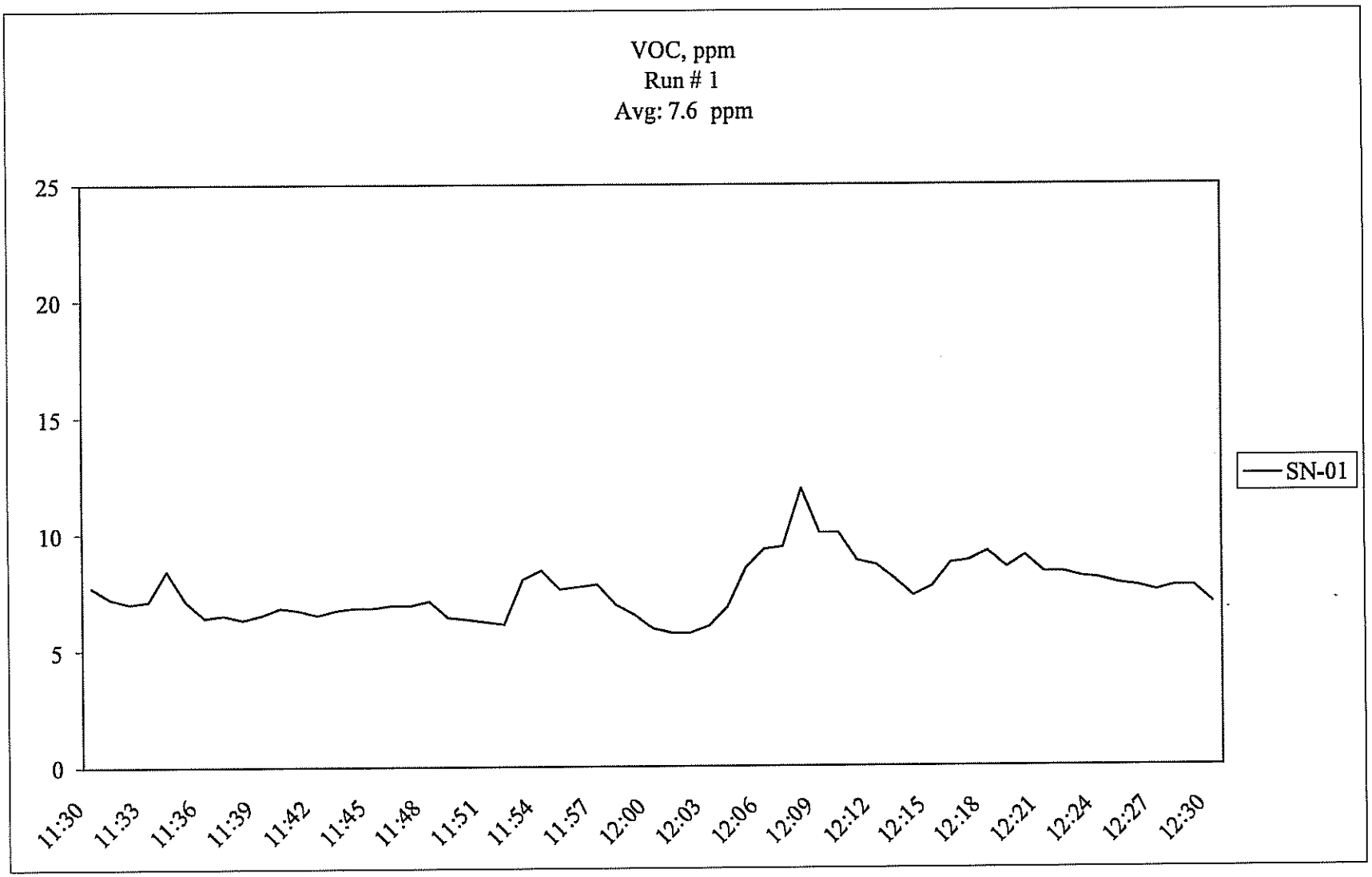


White Star Environmental

MacSteel
Ft. Smith, AR

EAF Exhaust
(SN-01)

April 19, 2007

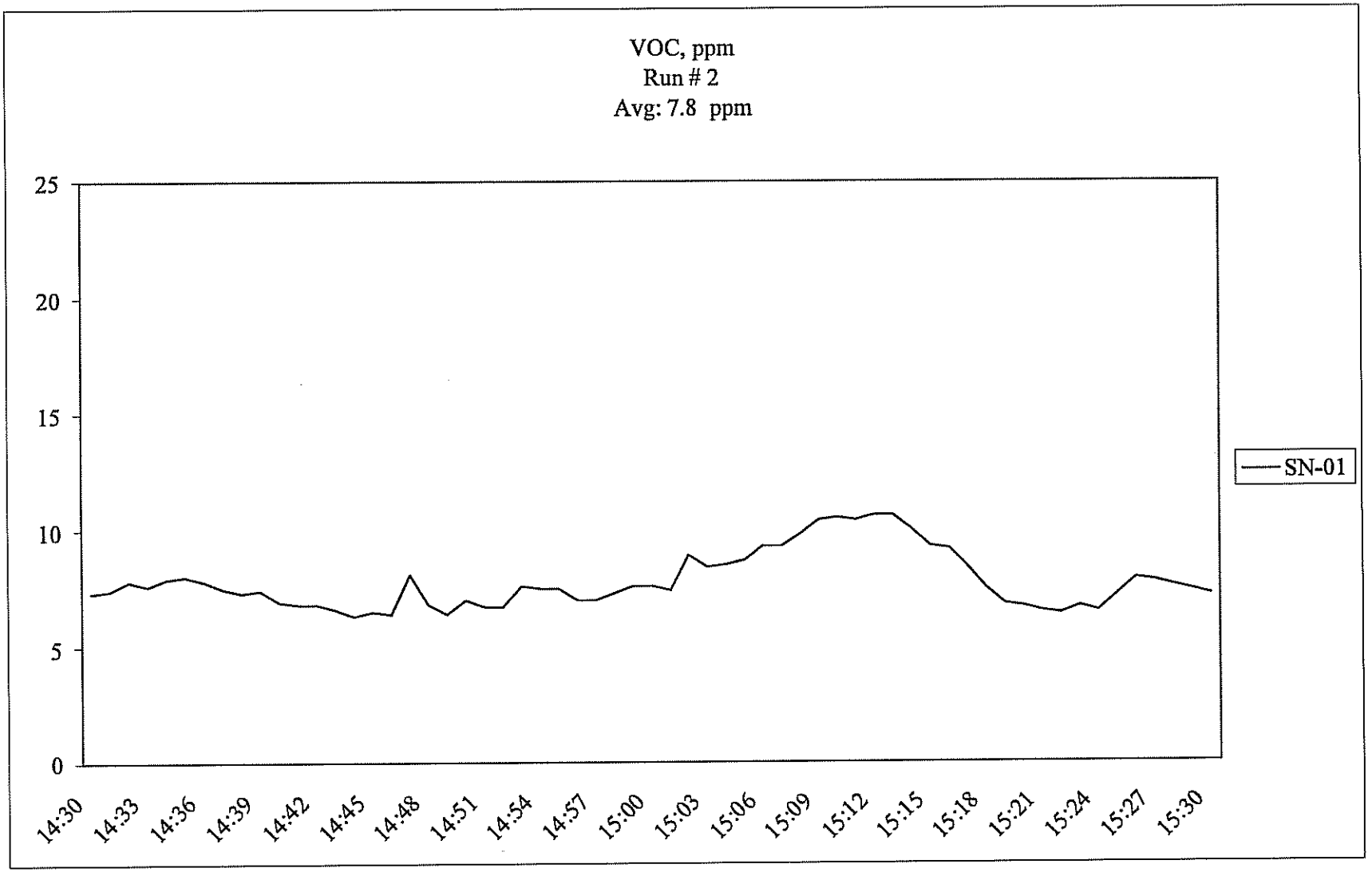


White Star Environmental

MacSteel
Ft. Smith, AR

EAF Exhaust
(SN-01)

April 19, 2007

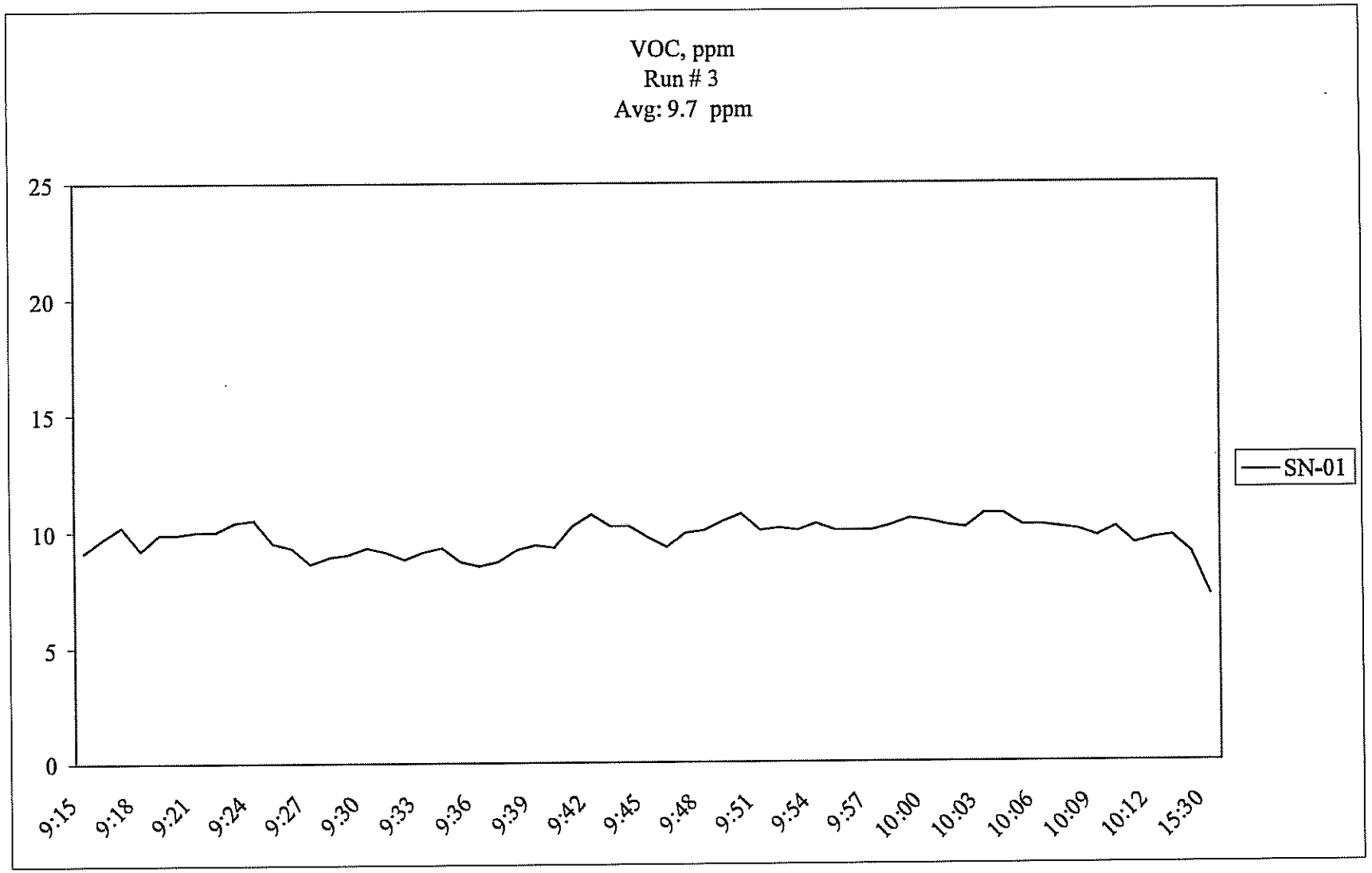


White Star Environmental

MacSteel
Ft. Smith, AR

EAF Exhaust
(SN-01)

April 20, 2007



White Star Environmental

Gravimetric Analysis Report

MacSteel Corp.
EAF #1 (SN-01)

Acetone Blank Sample			
	Volume, ml	100	Date/Time
	1st weight	54.7969	4/29; 10:00
	2nd weight	54.797	4/30; 16:00
	Average	54.79695	
	Tare Wt.	54.7964	
	Blank Wt.	0.0005	

Filter Samples			
Item	Run 1	Run 2	Run 3
Filter No.	R-3365	R-3366	R-3367
1st weight	0.3753	0.3772	0.3809
2nd weight	0.3752	0.3772	0.381
Average	0.37525	0.3772	0.38095
Tare Wt.	0.3723	0.3746	0.3781
Wt. of PM	0.00295	0.0026	0.00285

Acetone Wash Samples			
Item	Run 1	Run 2	Run 3
Volume, ml	120	140	110
1st weight	54.5092	54.391	55.0758
2nd weight	54.509	54.3912	55.0758
Average	54.5091	54.3911	55.0758
Tare Wt.	54.5061	54.3892	55.0735
Blank Wt.	0.0007	0.0008	0.0006
Wt. of PM	0.0023	0.0011	0.0017

Particulate Matter, mg			
Filter Wt.	2.9	2.6	2.9
Acetone Wt.	2.3	1.1	1.7
Total Wt.	5.3	3.7	4.5

Analyst: wjs

Hygrometer: 32 %

White Star Environmental

Gravimetric Analysis Report

MacSteel Corp.
EAF #2 (SN-12)

Acetone Blank Sample		
Volume, ml	100	Date/Time
1st weight	54.7969	4/29; 10:00
2nd weight	54.797	4/30; 16:00
Average	54.79695	
Tare Wt.	54.7964	
Blank Wt.	0.0005	

Filter Samples			
Item	Run 1	Run 2	Run 3
Filter No.	3268	R-3363	R-3364
1st weight	0.2588	0.3778	0.3817
2nd weight	0.259	0.3777	0.3815
Average	0.2589	0.37775	0.3816
Tare Wt.	0.2569	0.3732	0.3794
Wt. of PM	0.002	0.00455	0.0022

Acetone Wash Samples			
Item	Run 1	Run 2	Run 3
Volume, ml	85	90	90
1st weight	54.9158	55.3936	54.4369
2nd weight	54.9158	55.3934	54.437
Average	54.9158	55.3935	54.4370
Tare Wt.	54.9131	55.3903	54.4349
Blank Wt.	0.0005	0.0005	0.0005
Wt. of PM	0.0022	0.0027	0.0016

Particulate Matter, mg			
Filter Wt.	2.0	4.6	2.2
Acetone Wt.	2.2	2.7	1.6
Total Wt.	4.2	7.3	3.8

Analyst: wjs

Hygrometer: 32 %

White Star Environmental

Appendix D

Calibration

Calibration Standard Cert. of Analysis
Instrument Calibration Records
Isokinetic Equipment Calibration

Linde Gas

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 MEMPHIS INTERBRANCH
3390 WINBROOK
MEMPHIS TN 38116
USA
901-396-7020

Material:	5982		**Blend Tolerance:**	5 % Relative
EPA CH4/N2 0.5 - 130 ppm		A31	**Blend Type:**	EPA Protocol
Production #:	100111715		**Cyl. Pressure:**	2000 psig
Lot #:	02499A6070SG		**Balance Gas:**	Nitrogen
Cylinder #:	CC13630		**CGA:**	350
Expiration Date:	1/12/2009		**Analytical Accuracy:**	1.00 % Relative
Shelf Life:	36 months		**Confidence:**	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
74-82-8	Methane	85	86.2 +/- 0.9 ppm	01/12/2006
7727-37-9	Nitrogen		Balance	01/12/2006

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
74-82-8	Methane	CC24916 , GMIS	50.23 ppm	07/14/2007
74-82-8	Methane	CC7340 , GMIS	101.4 ppm	06/22/2006

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba FIA-510	56847471	Flame Ionization	01/10/2006

All analyses are performed under controlled environmental conditions.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

Analysis Certificate

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 MEMPHIS INTERBRANCH
3390 WINBROOK
MEMPHIS TN 38116
USA
901-396-7020

Material:	5982		Blend Tolerance:	5 % Relative
EPA CH4/N2 0.5 - 130 ppm		A31	Blend Type:	EPA Protocol
Production #:	100111715		Cyl. Pressure:	2000 psig
Lot #:	02499A6070SG		Balance Gas:	Nitrogen
Cylinder #:	CC13630		CGA:	350
Expiration Date:	1/12/2009		Analytical Accuracy:	1.00 % Relative
Shelf Life:	36 months		Confidence:	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
74-82-8	Methane	50	50.1 +/- 0.5 ppm	01/12/2006
7727-37-9	Nitrogen		Balance	01/12/2006

CAS #	Reference Standard	Cylinder/Standard #/	Concentration	Expire Date
74-82-8	Methane	CC24916 , GMIS	50.23 ppm	07/14/2007
74-82-8	Methane	CC7340 , GMIS	101.4 ppm	06/22/2006

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba FIA-510	56847471	Flame Ionization	01/10/2006

All analyses are performed under controlled environmental conditions.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

Linde Gas

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 MEMPHIS INTERBRANCH
3390 WINBROOK
MEMPHIS TN 38116
USA
901-396-7020

Material:	5982 EPA CH4/N2 0.5 - 130 ppm A31	**Blend Tolerance:**	5 % Relative
Production #:	100111716	**Blend Type:**	EPA Protocol
Lot #:	02499A6070SE	**Cyl. Pressure:**	2000 psig
Cylinder #:	CC185422	**Balance Gas:**	Nitrogen
Expiration Date:	1/12/2009	**CGA:**	350
Shelf Life:	36 months	**Analytical Accuracy:**	1.00 % Relative
		Confidence:	95 %

CAS #	Certified Component	Requested Concentration	Concentration and Uncertainty	Date of Certification
74-82-8	Methane	30	31.9 +/- 0.3 ppm	01/12/2006
7727-37-9	Nitrogen		Balance	01/12/2006

CAS #	Reference Standard	Cylinder/Standard #	Concentration	Expire Date
74-82-8	Methane	CC24916 , GMIS	50.23 ppm	07/14/2007
74-82-8	Methane	CC156744 , GMIS	10.03 ppm	04/21/2006

Instrument	Serial #	Analytical Principle	Calibration Date
Horiba FIA-510	56847471	Flame Ionization	01/10/2006

All analyses are performed under controlled environmental conditions.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

Analysis Certificate

Facility: Masterr Location: Fort Smith, AR
Source ID: SN-12 Test Date: 4-17-07

Analyzer Calibration Error

Component	Cylinder No.	Actual Conc.	Analyzer Response	Difference
CO - High				
CO - Mid				
CO - Low				
CO - Zero	-	0.0		0.0
NOx - High				
NOx - Mid				
NOx - Zero	-	0.0		0.0
O_2 - High		20.9		
O_2 - Mid				
O_2 - Zero	-	0.0		0.0
SO_2 - High				
SO_2 - Mid				
SO_2 - Zero	-	0.0		0.0
VOC - High		86	86.3	
VOC - Mid		50.1	49.7	
VOC - Low		31.9	31.6	
VOC - Zero	-	0.0	0.0	0.0

System Calibration Bias

Calibration Gas	Analyzer Response	System Response	Difference
CO - Zero Gas			
CO - Upscale Gas			
NOx - Zero Gas			
NOx - Upscale Gas			
O_2 - Zero Gas			
O_2 - Upscale Gas			
SO_2 - Zero Gas			
SO_2 - Upscale Gas			
VOC - Zero Gas	0.0	0.1	
VOC - Upscale Gas	31.6	31.4	

System Calibration Drift

Source: SN-12

Date: 4-17-07 → 4-18-07

Run # 1 — Time: 905-1005

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC	0.1	31.4	-0.4	32.3

Run # 2 — Time: 1400 - 1500

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC	0.5	32.6	0.2	31.8

Run # 3 — Time: 930 - 1030

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC	0.4	32.0	1.1	33.2

Run # — Time:

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # — Time:

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # — Time:

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # — Time: CH_4 1010 - 1020

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO	THC =	11.9	ppm →	12.0
~~NOx~~	CH_4 =	12.2	ppm	
O_2				
SO_2				
VOC				

Run # — Time: CH_4 1510 - 1520

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx	THC =	9.8		
O_2	CH_4 =	9.4		
SO_2				
VOC				

Run # — Time: CH_4 = 1040 - 1050

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx	THC =	10.7		
O_2	CH_4 =	10.6		
SO_2				
VOC				

Run # — Time:

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # — Time:

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # — Time:

Type	Pre-test Value		Post-test Value	
	Zero	Span	Zero	Span
CO				
NOx				
O_2				
SO_2				
VOC				

System Calibration Drift

Source: SN-01

Date: 4-19-07 → 4-20-07

Run # 1 Time: 1130-1230

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC	0.4	31.9	0.0	31.4

Run # 2 Time: 1430-1530

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC	0.5	32.1	0.1	31.7

Run # 3 Time: 915-1015

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC	0.3	31.9	0.6	30.3

Run # Time:

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # Time:

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # Time:

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # Time: CH_4 - 1240-1250

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx	THC = 7.6			
O_2	CH_4 = 7.4			
SO_2				
VOC				

Run # Time: CH_4 = 1540-1550

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx	THC = 7.8			
O_2	CH_4 = 7.2			
SO_2				
VOC				

Run # Time: CH_4 = 1020-1030

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx	THC = 9.7			
O_2	CH_4 = 9.6			
SO_2				
VOC				

Run # Time:

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # Time:

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC				

Run # Time:

Type	Pre-test Value Zero	Pre-test Value Span	Post-test Value Zero	Post-test Value Span
CO				
NOx				
O_2				
SO_2				
VOC				

Dry Gas Meter Calibration Form

Certification Date: 3/31/2007 **Pb (in.Hg): 30** **Meter Box I.D: Nutech**

Orifice Manometer Setting, dH, in.H_20	Wet Test Meter Volume V_w, ft^3	Dry Gas Meter Volume V_m, ft^3	Temperatures				Time Theta, min.
			Wet Test Meter t_w, F	DGM Inlet t_i, F	DGM Outlet t_o, F	DGM Average t_m, F	
0.5	10.00	10.183	70.0	75.7	71.0	73.3	24.85
1.0	10.00	10.072	70.0	75.7	71.0	73.3	17.70
2.0	10.00	10.011	70.0	75.7	71.0	73.3	13.50
3.0	10.00	9.886	70.0	75.7	71.0	73.3	10.50
3.5	11.00	11.054	70.0	75.7	71.0	73.3	10.70

Orifice Manometer Setting, dH, in.H_20	Calibration Factor, Y	Orifice Pressure Differential, dH@
0.5	0.987	1.726
1.0	0.997	1.751
2.0	1.000	2.037
3.0	1.010	1.849
3.5	0.993	1.851
Average:	**0.997**	**1.843**
Standard Deviation	**0.009**	**0.123**
Acceptable Value?	**YES!**	**YES!**

*Tolerances for individual Y values+/- 0.02 from average.
**Tolerances for individual dH@ values +/- 0.20 from average.

$$Y = \frac{V_w P_b (t_m + 460)}{V_m \left[P_b + \frac{dH}{13.6} \right] (t_w + 460)}$$

$$dH_@ = \frac{0.0317 dH}{P_b (t_o + 460)} \left[\frac{(t_w + 460) Theta}{V_w} \right]^2$$