Syed & Trey

NITROGEN OXIDES EMISSIONS TESTING of the CF INDUSTRIES, INC. SULFURIC ACID PLANT D Plant City, Florida

February 1, 2007

AIRS No. 0570005
E.U. ID No. 008
SES Reference No. 06S496

Conducted by:

SOUTHERN ENVIRONMENTAL SCIENCES, INC.
1204 North Wheeler Street
Plant City, Florida 33563
Phone (813) 752-5014, Fax (813) 752-2475

Project Participants

Mark S. Gierke
Malvin Hinsz

Southern Environmental Sciences, Inc.

NITROGEN OXIDES
EMISSIONS TESTING
of the
CF INDUSTRIES, INC.
SULFURIC ACID PLANT D
Plant City, Florida

February 1, 2007

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Southern Environmental Sciences, Inc.

1.0 INTRODUCTION

Southern Environmental Sciences, Inc. conducted nitrogen oxides emissions testing of the CF Industries, Inc. Sulfuric Acid Plant D on February 1, 2007. This plant is located on State Road 39 in Plant City, Florida. Testing was performed to determine if the plant was operating in compliance with requirements of the Florida Department of Environmental Protection (FDEP) and the Environmental Protection Commission of Hillsborough County (EPCHC).

2.0 SUMMARY OF RESULTS

The plant was found to be in compliance with all applicable emission limiting standards. Results of the emissions test are summarized in Table 1. Allowable nitrogen oxides emissions from this source are limited to a maximum of 0.12 pounds per ton of 100% sulfuric acid produced. The average measured nitrogen oxides emission rate was 0.083 pounds per ton of 100% sulfuric acid produced.

3.0 PROCESS DESCRIPTION

Sulfuric Acid Plant D is a 2750 TPD (approximately) sulfur-burning, double-conversion, double-absorption plant of Leonard-Monsanto design. Sulfur is burned with dried atmospheric oxygen to produce sulfur dioxide ($S0_2$). The sulfur dioxide is catalytically oxidized to sulfur trioxide ($S0_3$) over a vanadium pentoxide catalyst bed. The sulfur trioxide so produced is absorbed in 98% sulfuric acid. The acid flows from each absorbing tower are combined to provide product acid. By the use of an intermediate absorbing tower, the

TABLE 1. EMISSIONS TEST SUMMARY

Company: CF INDUSTRIES, INC.
Source: SULFURIC ACID PLANT D

	Run 1	Run 2	Run 3	
Date of Run	2/1/07	2/1/07	2/1/07	
Process Rate (TPH)	106.6	105.5	105.1	
Start Time (24-hr. clock)	0920	1125	1245	
End Time (24-hr. clock)	1020	1225	1345	
Barometric Pressure at Barom. (in. Hg.)	30.12	30.12	30.12	
Elev. Diff. Manom. to Barom. (ft.)	0	0	0	
Moisture in Stack Gas (% Vol.)	0.0	0.0	0.0	
Molecular Weight Dry Stack Gas	28.00	28.00	28.00	
Molecular Weight Wet Stack Gas	28.00	28.00	28.00	
Stack Gas Static Press. (in. H2O gauge)	-0.20	-0.22	-0.24	
Stack Gas Static Press. (in. Hg. abs.)	30.11	30.10	30.10	
Average Square Root Velocity Head	0.503	0.491	0.499	
Average Stack Gas Temperature (°F)	160.1	161.4	161.3	
Pitot Tube Coefficient	0.82	0.82	0.82	
Stack Gas Vel. Stack Cond. (ft./sec.)	30.23	29.54	30.04	
Effective Stack Area (sq. ft.)	67.20	67.20	67.20	
Stack Gas Flow Rate Std. Cond. (DSCFM)	104,432	101,808	103,572	
Stack Gas Flow Rate Stack Cond. (ACFM)	121,899	119,088	121,133	
NOx Emissions (PPM)	10.6	12.9	12.0	11.8
NOx Emissions (lb./hr.)	7.95	9.39	8.90	8.75
NOx Emissions (lbs/ton of 100% acid)	**0.075**	**0.089**	**0.085**	**0.083**
Allowable NOx Emissions (lbs./ton of 100% acid)				**0.12**

Note: Standard conditions 68° F, 29.92 in. Hg

Southern Environmental Sciences, Inc.

partial pressure of sulfur dioxide in the final converter is increased to drive the conversion reaction to a greater degree of completion, thus providing greater efficiency and cleaner atmospheric emissions.

The permitted process rate for this source is 2750 TPD based upon 100 percent H_2SO_4. Process rates during the test period were determined by plant personnel. Process operational data are included in the appendix.

4.0 SAMPLING PROCEDURES

4.1 Methods

All sampling was performed using methods currently acceptable to the FDEP. Nitrogen oxides sampling was conducted in accordance with EPA Method 7E - Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure), 40 CFR 60, Appendix A-4. Stack gas flow rates were determined in accordance with EPA Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube), 40 CFR 60 Appendix A-1. The effluent gas stream was considered to be dry and the water vapor volume and moisture content were assumed to be zero percent as described in section 6.4 of EPA Method 8.

4.2 Sampling Locations

Locations of the sample ports and stack dimensions are shown in Figure 1. Nitrogen

oxides sampling was performed from the same sampling ports as the those used for determination of stack gas flow rate. Twenty four sample points were chosen in accordance with EPA Method 1 - Sample and Velocity Traverses for Stationary Sources, 40 CFR 60, Appendix A.

4.3 Sampling Train

The sampling train consisted of a stainless steel probe, calibration valve, heated teflon sample line, condenser and a Teledyne Instruments, Model 200EH Chemiluminiscent NO/NO_X Analyzer as shown in Figure 2.

4.4 Sample Collection

The analyzer was calibrated immediately prior to the beginning of the test by introducing known gases into the instrument through the sampling system. Zero and a high-range calibration gas were introduced after each run to check for instrument drift.

5.0 ANALYTICAL PROCEDURE

5.1 Analysis

The average nitrogen oxides concentration was determined for each one-hour test run. Based on the stack flow rate determinations, the concentrations were then converted to pound per hour and pound per ton emissions rates.

FIGURES

Figure 1. Stack Dimensions and Sample Port Locations.

Figure 2. EPA Method 7E Sampling Train.

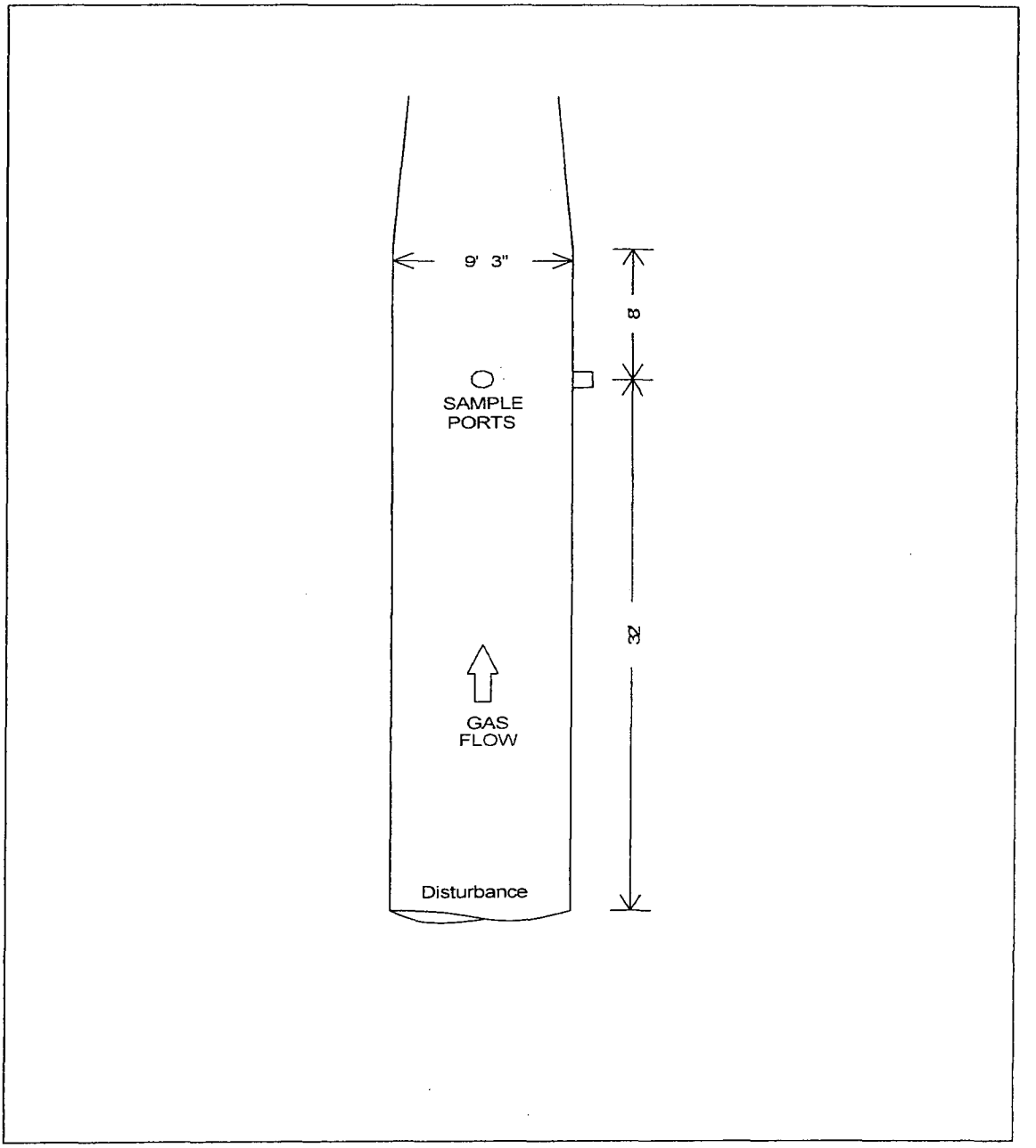

Figure 1. Stack Dimensions and Sample Port Locations, CF Industries, Inc., Sulfuric Acid Plant D, Plant City, Florida.

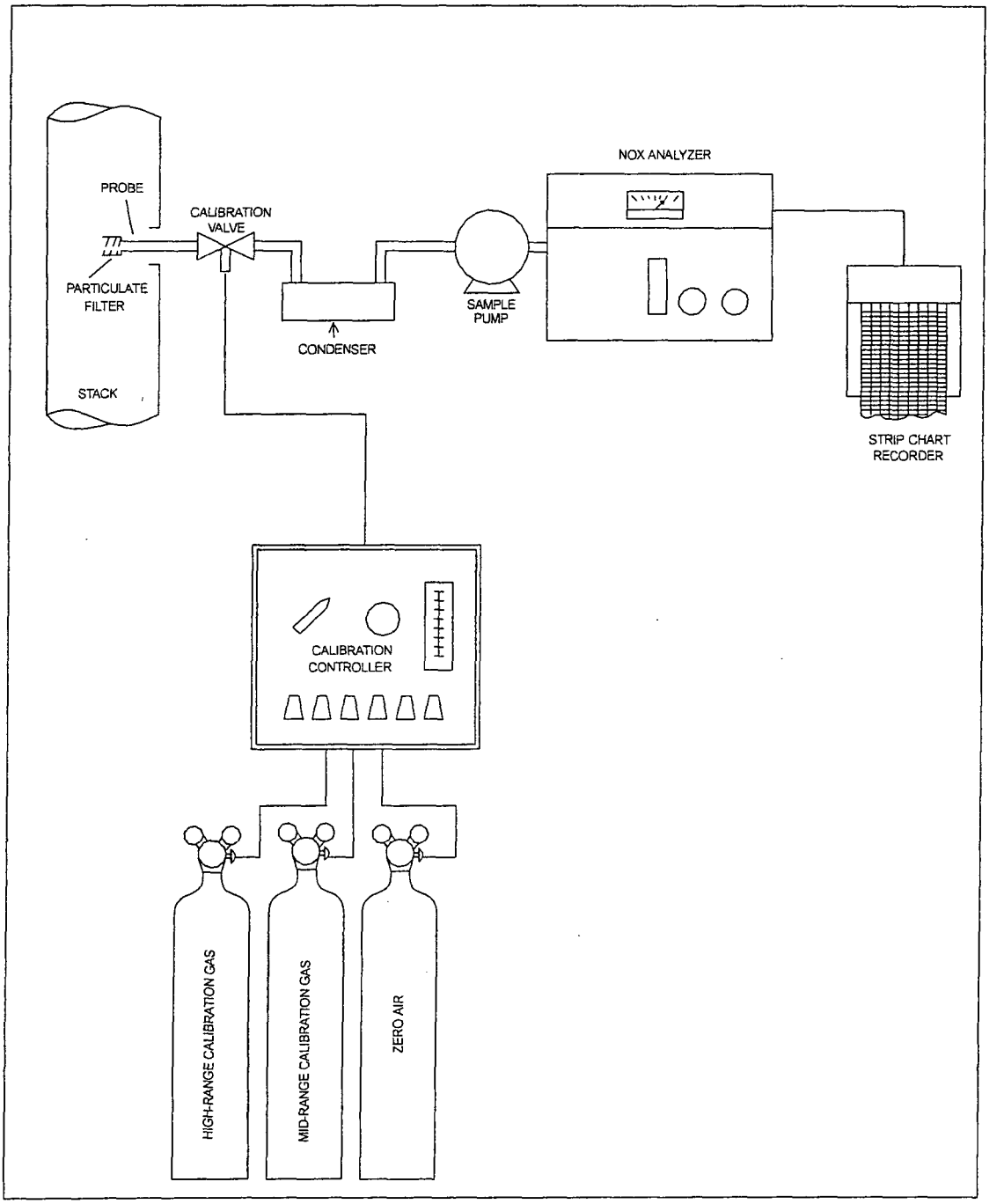

Figure 2. EPA Method 7E Sampling Train.

APPENDIX

Project Participants

Certification

Process Operational Data

Field Data Sheets

Analyzer Strip Charts

Calibration Data

Calculations and Symbols

PROJECT PARTICIPANTS AND CERTIFICATION
CF INDUSTRIES, INC.
SULFURIC ACID PLANT D
Plant City, Florida

February 1, 2007

Project Participants:

Mark S. Gierke Malvin Hinsz	Conducted the field testing.
Frank Dlugos (CF Industries)	Provided process rates.
Mark S. Gierke	Computed test results.
Dale A. Wingler	Prepared the final test report.

Certification:

I certify that to my knowledge all data submitted in this report is true and correct.

Mark S. Gierke

Southern Environmental Sciences, Inc.

Byron Nelson

From: mark gierke [mgierke@sesfla.com]
Sent: Friday, February 02, 2007 3:41 PM
To: bnelson@sesfla.com
Subject: FW: D SAP TIMES

-----Original Message-----
From: Dlugos, Frank [mailto:fdlugos@cfifl.com]
Sent: Friday, February 02, 2007 2:34 PM
To: mark gierke
Subject: RE: D SAP TIMES

Mark,

Here are the production tons per day for the runs that you had yesterday.

Run No.	1	2	3
Avg rate (TPD)	2559	2531	2522

Frank

-----Original Message-----
From: mark gierke [mailto:mgierke@sesfla.com]
Sent: Friday, February 02, 2007 10:40 AM
To: Dlugos, Frank
Subject: D SAP TIMES

Hey Frank,

Here are the run times.

RUN NO 1 - 9:20-10:20
RUN NO 2 - 11:25-12:25
RUN NO 3 - 12:45-13:45

Anything else let me know.

Mark

yron Nelson

rom: Dlugos, Frank [fdlugos@cfifl.com]
ent: Friday, February 02, 2007 10:21 AM
o: bnelson@sesfla.com
c: kroberts@sesfla.com
ubject: D SAP NOx

on,

initial tons per day estimate for D SAP is 2533. I will provide you with the final number when you provide me with your testing es.

ase let me know your NOx results when you calculate them.

nks,
nk Dlugos
ironmental Supervisor
Industries, Inc.
nt City Phosphate Complex
3) 364-5654
gos@cfifl.com
813 783-8068

/2007

SOUTHERN ENVIRONMENTAL SCIENCES, INC.

1204 N. Wheeler St., Plant City, Florida 33566 (813) 752-5014

VELOCITY TRAVERSE

Company:	CF Industries			Stack Diameter:	111"
Unit Tested:	D SAP			BP, (in. Hg):	30.12
Date:	2/1/07			Time:	0925
Run #:	1	Cp:	.82	Operator:	MG/MH

Point No.	Dist. from Duct Wall (Inches)	Velocity Head ("H2O)	Static Pressure ("H2O)	Stack Temp. (°F)	
1		.32		160	
2		.31		161	
3		.33		161	
4		.32	-.20	162	
5		.30		161	
6		.27		161	
7		.20		161	
8		.21		161	
9		.23		160	
10		.21		159	
11		.20		159	
12		.18		158	
1		.24		157	
2		.23		158	
3		.21		159	
4		.18		160	
5		.18		160	
6		.19		161	
7		.26		161	
8		.29		161	
9		.32		161	
10		.33		161	
11		.33		160	
12		.30		160	

SOUTHERN ENVIRONMENTAL SCIENCES, INC.

1204 N. Wheeler St., Plant City, Florida 33566 (813) 752-5014

VELOCITY TRAVERSE

Company:	CF Industries			Stack Diameter:	111"
Unit Tested:	D SAP			BP, (in. Hg):	30.12
Date:	2/1/07			Time:	1130
Run #:	2	Cp:	.82	Operator:	mc/mH

Point No.	Dist. from Duct Wall (Inches)	Velocity Head ("H2O)	Static Pressure ("H2O)	Stack Temp. (°F)	
1		.21		154	
2		.22	-.22	154	
3		.22		158	
4		.20		159	
5		.16		160	
6		.21		162	
7		.26		163	
8		.30		163	
9		.30		162	
10		.32		162	
11		.31		163	
12		.29		162	
1		.29		161	
2		.30		162	
3		.30		163	
4		.31		163	
5		.30		163	
6		.28		163	
7		.22		163	
8		.21		163	
9		.20		163	
10		.22		163	
11		.22		163	
12		.22		162	

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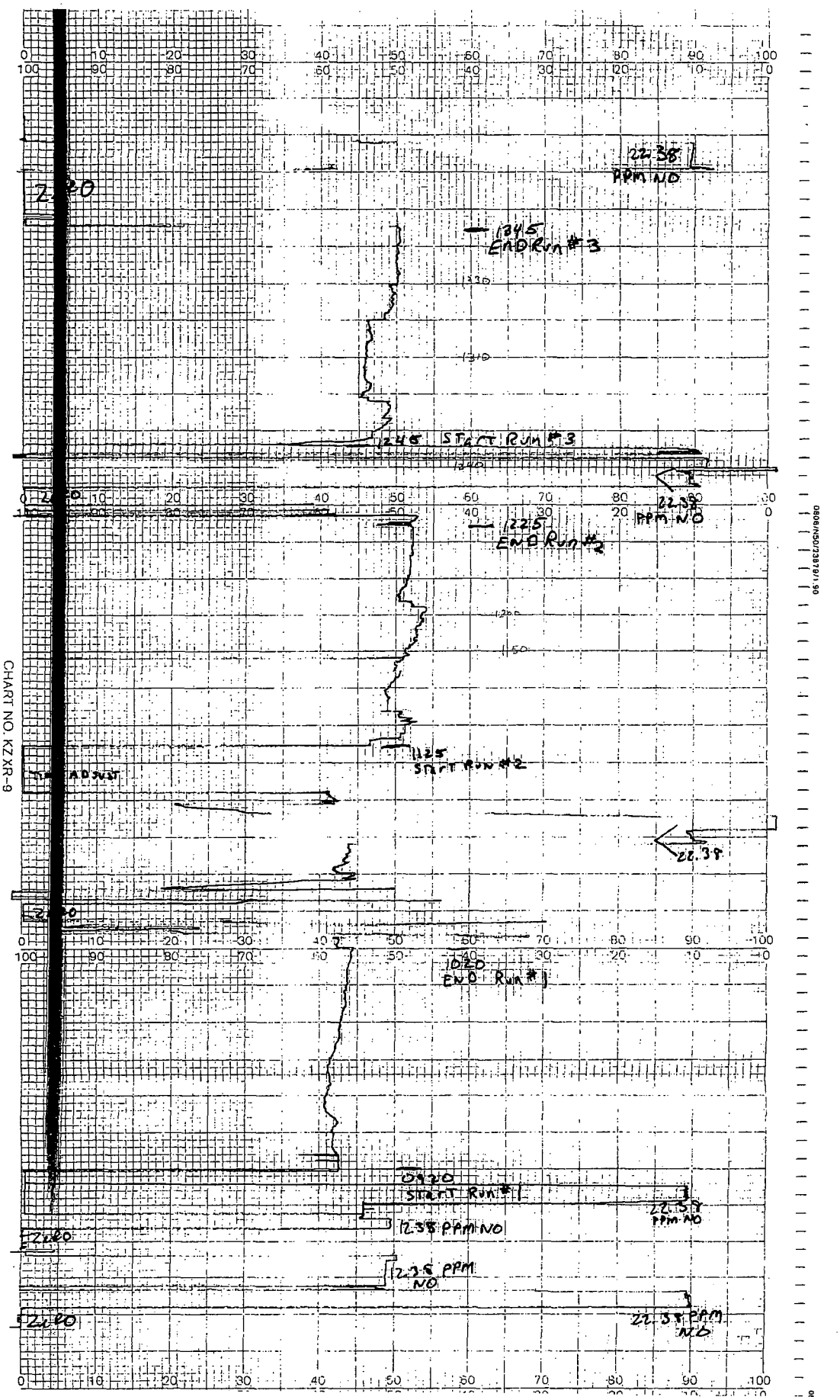
VELOCITY TRAVERSE

Company:	CF Industries			Stack Diameter:	111"
Unit Tested:	D SAP			BP, (in. Hg):	30.12
Date:	2/1/07			Time:	1300
Run #:	3	Cp:	.82	Operator:	MG/MH

Point No.	Dist. from Duct Wall (Inches)	Velocity Head ("H2O)	Static Pressure ("H2O)	Stack Temp. (°F)	
1		.31		154	
2		.32	-.24	158	
3		.31		159	
4		.31		159	
5		.32		161	
6		.28		161	
7		.22		162	
8		.19		162	
9		.21		163	
10		.23		163	
11		.22		163	
12		.20		160	
1		.23		159	
2		.24		161	
3		.20		162	
4		.18		162	
5		.18		162	
6		.18		163	
7		.25		163	
8		.30		163	
9		.30		163	
10		.31		163	
11		.29		163	
12		.26		162	

CF INDUSTRIES
SAP "D"
NITROGEN OXIDES
0 - 25 PPM
6 CM/HR
2/01/2007



SOUTHERN ENVIRONMENTAL SCIENCES, INC.

1204 North Wheeler St. Plant City, Florida 33566 (813) 752-5014

NITROGEN OXIDES ANALYZER CALIBRATION DATA

EPA METHOD 7E

COMPANY	CF INDUSTRIES
SOURCE	SULURIC ACID "D"
OPERATOR	M. GIERKE
DATE	02/01/2007
RUN #'S	1 THROUGH 3
INSTRU. SPAN RANGE	25 PPM

	Cylinder value (PPM)	Analyzer calibration responses (PPM)	Absolute difference (PPM)	Difference (% of Span)
Zero	0	0	0	0.0
Mid-range	12.35	12.450	0.1	0.4
High-range	22.38	22.45	0.07	0.3

SYSTEM CALIBRATION BIAS AND DRIFT DATA

			Initial Values		Final Values		
		Analyzer calibration response (PPM)	System calibration response (PPM)	System calibration bias (% of span)	System calibration response (PPM)	System calibration bias (% of span)	Drift (% of span)
Run 1	Zero	0	0	0.0	0	0.0	0.0
	Upscale	22.450	22.4	-0.2	22.5	0.2	0.4
Run 2	Zero	0	0	0.0	0	0.0	0.0
	Upscale	22.450	22.5	0.2	22.4	-0.2	-0.4
Run 3	Zero	0	0	0.0	0	0.0	0.0
	Upscale	22.450	22.4	-0.2	22.45	0.0	0.2

$$\text{System Calibration Bias} = \frac{\text{System Cal. Response - Analyzer Cal.}}{\text{Span}} \times 100$$

SOUTHERN ENVIRONMENTAL SCIENCES, INC.
PITOT TUBE CALIBRATION

Pitot Tube ID: 10A
Date: 11/22/06
Calibrated By: MH
Cp of Standard Pitot: 0.99

"A" SIDE CALIBRATION				
Run No.	Delta P std (in. H2O)	Delta P(s) (in. H2O)	Cp(s)	Deviation Cp(s) - $\overline{Cp}$(A)
1	0.52	0.75	0.82	0.00
2	0.52	0.75	0.82	0.00
3	0.52	0.75	0.82	0.00
Average →		Cp (SIDE A)	0.82	0.00

"B" SIDE CALIBRATION				
Run No.	Delta P std (in. H2O)	Delta P(s) (in. H2O)	Cp(s)	Deviation Cp(s) - Cp(B)
1	0.52	0.75	0.82	0.00
2	0.52	0.75	0.82	0.00
3	0.52	0.76	0.82	0.00
Average →		Cp (SIDE B)	0.82	0.00

$$Cp(s) = Cp(std) \times (\Delta Pstd/\Delta Ps)^{1/2}$$

$$\text{Average Deviation} = \text{Sum}\left|\frac{Cp(s)-\overline{Cp}(A \text{ or } B)}{3}\right| \quad \text{Must be} \leq 0.01$$

$$\left|\overline{Cp}\,(SIDEA) - \overline{Cp}\,(SIDE\ B)\right| \quad \text{Must be} \leq 0.01$$

THERMOMETER CALIBRATIONS

Calibrated By/Date: Dale A, Wingler 3/17/06

TEMPERATURES ARE DEGREES RANKIN

ID No.	Type	Range	ICE BATH			TEPID WATER			BOILING WATER			HOT OIL		
			STD Therm	Temp	Deg or Diff	STD Therm	Temp	Deg or Diff	STD Therm	Temp	Deg or Diff	STD Therm	Temp	Deg or Diff
T1	PT	2000° F	500	505	1.00%	538	536	0.37%	622	623	0.16%	828	830	0.24%
T2	PT	2000° F	500	504	0.80%	538	536	0.37%	627	628	0.16%	816	818	0.25%
T3	PT	2000° F	500	501	0.20 %	538	535	0.56%	630	633	0.48%	818	822	0.50%
T4	PT	2000° F	500	502	0.40 %	538	536	0.37%	634	636	0.32%	820	824	0.49%
T5	PT	2000° F	500	503	0.60%	538	535	0.56%	640	639	0.16%	820	818	0.24%
T6	PT	2000° F	500	504	0.80%	538	535	0.56%	644	644	0.00%	824	820	0.49%
T7	PT	2000° F	500	503	0.60%	538	535	0.56%	646	645	.015%	824	820	0.49%
T8	PT	2000° F	500	501	0.20%	538	536	0.37%	648	648	0.00%	816	820	0.49%
T9	PT	2000° F	500	502	0.40%	538	535	0.56%	650	651	0.15%	818	821	0.37%
SS110	BM	220° F	498	500	2°	538	535	3°	672	674	2°	-	-	-
SS300	PT	2000 °F	498	498	0.00%	538	535	0.56%	672	674	0.30%	830	832	0.24%
SS301	PT	2000° F	498	499	0.20%	538	535	0.56%	672	672	0.00%	830	834	0.48%
SS306	PT	2000° F	498	500	0.40%	538	535	0.56%	672	674	0.30%	830	830	0.00%
2.5'PA	PT	2000° F	494	494	0.00%	524	523	0.19%	650	649	0.15%	754	754	0.00%
2.5'PB	PT	2000° F	498	500	0.40%	538	538	0.00%	661	662	0.15%	828	832	0.48%
3'P	PT	2000° F	498	497	0.20%	538	537	0.19%	662	664	0.30%	828	830	0.24%
3'INC	PT	2000° F	497	497	0.00%	538	538	0.00%	660	659	0.15%	835	836	0.12%
5'PA	PT	2000° F	497	496	0.20%	538	539	.019%	662	660	0.30%	832	831	0.12%
5'PB	PT	2000° F	497	497	0.00%	538	540	0.37%	662	662	0.00%	832	834	0.24%
5'PC	PT	2000° F	497	497	0.00%	538	539	0.19%	664	664	0.00%	832	834	.024%
5'PD	PT	2000° F	497	498	0.20%	538	539	0.19%	664	664	0.00%	830	831	0.12%
5'PE	PT	2000° F	497	499	0.40%	538	538	0.00%	666	664	0.00%	830	832	0.24%
5'VP	PT	2000° F	497	495	0.40%	538	538	0.00%	662	664	0.30%	832	831	0.12%
5'INC	PT	2000° F	497	497	0.00%	538	537	0.19%	660	662	0.30%	836	835	0.12%
8'PA	PT	2000° F	496	498	0.40%	538	538	0.00%	668	668	0.00%	834	833	0.12%
8'PB	PT	2000° F	496	498	0.40%	538	539	0.19%	669	670	0.15%	834	834	0.00%
8'PC	PT	2000° F	496	497	0.20%	538	539	0.19%	670	671	0.15%	834	833	0.12%
8'PD	PT	2000° F	496	496	0.00%	538	539	0.19%	670	672	0.30%	834	832	0.24%
10'PA	PT	2000° F	498	501	0.60%	538	540	0.37%	656	658	.30%	840	842	0.24%
10'PB	PT	2000° F	498	500	0.40%	538	540	0.37%	656	657	0.15%	840	838	0.24%

Quality Control Limits: Impinger Thermometers± 2°F, Bimetalic Thermometers(Bm)± 5°F,Pyrometers/Thermocouples(PT)± 1.5%

Airgas

Certificate of Analysis: EPA Protocol Gas Mixture

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

Cylinder Number:	CC215989	Reference Number:	82-124042865-1
Cylinder Pressure:	1999.6 PSIG	Expiration Date:	8/19/2007
Certification Date:	8/19/2005	Laboratory:	ASG - Riverton - NJ

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
NITRIC OXIDE	12.35 PPM	+/- 1%	Chemiluminescence	G1
NITROGEN	Balance			
Total oxides of nitrogen	12.45 PPM			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences.

Notes:NOx - 1st analysis = 12.43ppm - 8/12/05
NOx - 2nd analysis = 12.46ppm – 8/19/05
Analytical accuracy = +/-2% relative
Analytical principle = Chemiluminescence
Standard 6= NTRM XC019162B 20.18ppm NOX

Do not use cylinder below 150 psig. Approval Signature

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 82629	NITROGEN	NITRIC OXIDE	XC019242B	20.13 PPM

Analytical Results

1st Component NITRIC OXIDE

1st Analysis Date:	08/12/2005		
R 7.835	S 4.801	Z -0.004	Conc 12.32 PPM
S 4.818	Z 0.003	R 7.870	Conc 12.31 PPM
Z 0.004	R 7.842	S 4.819	Conc 12.36 PPM
			AVG: 12.33 PPM
2nd Analysis Date:	08/19/2005		
R 7.760	S 4.776	Z -0.003	Conc 12.37 PPM
S 4.762	Z 0.004	R 7.749	Conc 12.37 PPM
Z 0.005	R 7.735	S 4.769	Conc 12.39 PPM
			AVG: 12.37 PPM

Airgas

Airgas Specialty Gases
600 Union Landing Road
Riverton, NJ 08077
(856) 829-7878
Fax (856) 829-0571
www.airgas.com

Certificate of Analysis: EPA Protocol Gas Mixture

Cylinder Number:	CC216072	Reference Number:	82-124042863-1
Cylinder Pressure:	1999.6 PSIG	Expiration Date:	8/22/2007
Certification Date:	8/22/2005	Laboratory:	ASG - Riverton - NJ

Certified Concentrations

Component	Concentration	Accuracy	Analytical Principle	Procedure
NITRIC OXIDE	22.38 PPM	+/- 1%	Chemiluminescence	G1
NITROGEN	Balance			
Total oxides of nitrogen	22.55 PPM			

Certification performed in accordance with "EPA Traceability Protocol (Sept. 1997)" using the assay procedures listed. Analytical Methodology does not require correction for analytical interferences.

Notes:NOx - 1st analysis = 22.51 ppm – 08/15/2005
NOx - 2nd analysis = 22.58 ppm – 08/22/2005
Analytical accuracy = +/-1% relative
Analytical principle = Chemiluminescence
Standard = NTRM, XC019242B = 20.18 NOx/N2

Do not use cylinder below 150 psig. Approval Signature

Reference Standard Information

Type	Balance Gas	Component	Cyl.Number	Concentration
NTRM 82629	NITROGEN	NITRIC OXIDE	XC019242B	20.13 PPM

Analytical Results

1st Component NITRIC OXIDE

1st Analysis Date:	08/15/2005		
R 7.918	S 8.819	Z -0.003	Conc 22.41 PPM
S 8.824	Z 0.006	R 7.913	Conc 22.44 PPM
Z 0.006	R 7.923	S 8.812	Conc 22.38 PPM
			AVG: 22.41 PPM
2nd Analysis Date:	08/22/2005		
R 7.889	S 8.759	Z -0.003	Conc 22.34 PPM
S 8.774	Z 0.008	R 7.885	Conc 22.39 PPM
Z 0.009	R 7.893	S 8.775	Conc 22.37 PPM
			AVG: 22.36 PPM

#5000

SOUTHERN ENVIRONMENTAL SCIENCES, INC.

1204 North Wheeler St. Plant City, Florida 33563 (813) 752-5014

NOX EMISSIONS TEST CALCULATIONS

COMPANY: CF NDUSTRIES
SOURCE: SULFURIC ACID "D'
TEST DATE: 02/01/2007
DATA ANALYST: M. GIERKE

RUN NO.	AVERAGE CONC. (PPM)	STACK PRESS (in. Hg)	STACK FLOWRATE (dscfm)	EMISSIONS (mg/m3)	EMISSIONS (lbs/ft3)	EMISSIONS (lbs/hr)
1	10.6	30.11	104,432	20.32	1.27E-06	7.95
2	12.9	30.10	101,808	24.62	1.54E-06	9.39
3	12.0	30.10	103,572	22.95	1.43E-06	8.90
AVERAGE	11.8	30.10	103,271	22.63	1.41E-06	8.75

FORMULAS: mg/m3 = ppm x .041573 x molecular wt.

$$\text{lb/ft3} = \frac{\text{mg/m3}}{35.31\ \text{ft3/m3} \times 1000\ \text{mg/g} \times 453.59\ \text{g/lb}}$$

lb/hr = lb/ft3 x flowrate x 60 min/hr

where:

Pstd = 29.92 "Hg
Tstd = 528 deg R
Molecular Wt. of NOx = 46

SOUTHERN ENVIRONMENTAL SCIENCES, INC.

1204 North Wheeler Street □ Plant City, Florida 33563-2354 □ (813) 752-5014

NOMENCLATURE USED IN STACK SAMPLING CALCULATIONS

A_n	=	Cross-sectional area of nozzle, ft^2
A_s	=	Cross-sectional area of stack, ft^2
B_{ws}	=	Water vapor in gas stream, proportion by volume
C_p	=	Pitot Coefficient
C_s	=	Pollutant concentration, gr/dscf or mg/dscf
F_d	=	Ratio of gas generated to heat input value of fuel, DSCF/mmBTU
$\triangle H$	=	Average pressure differential across orifice, in. H_2O
%I	=	Isokinetic Variation, %
M_d	=	Molecular weight of dry gas
M_n	=	Total amount of pollutant collected, mg
M_s	=	Molecular weight of stack gas
N	=	Normality of barium perchlorate titrant
$\sqrt{\triangle P}_{avg}$	=	Average of the square roots of the velocity heads
P_{bar}	=	Barometric pressure at the sampling site, in. Hg
P_g	=	Stack gas static pressure
P_m	=	Absolute pressure at the dry gas meter, in. Hg
P_s	=	Absolute stack pressure, in. Hg
P_{std}	=	Standard absolute pressure, 29.92 in. Hg
θ	=	Total sampling time, minutes
Q	=	Stack gas flowrate, ACFM
Q_{std}	=	Stack gas flowrate, DSCFM
T_m	=	Absolute average meter temperature, °R
T_s	=	Absolute average stack gas temperature, °R
T_{std}	=	Standard absolute temperature, °R
V_a	=	Volume of sample aliquot titrated, ml
V_{lc}	=	Liquid collected in impingers and silica gel, ml
V_m	=	Sample volume at meter conditions, DCF
$V_{m(std)}$	=	Sample volume at standard conditions, DSCF
V_s	=	Stack gas velocity, ft/sec
V_{soln}	=	Total volume of solution, ml
V_t	=	Volume of barium perchlorate titrant used for sample, ml
V_{tb}	=	Volume of barium perchlorate titrant used for blank, ml
$V_{w(std)}$	=	Volume of water vapor in sample corrected to standard conditions, SCF
Y	=	Dry gas meter calibration factor
13.6	=	Specific gravity of mercury