

COMPLIANCE TEST NO_x & SO₂

Unit 34 SRU Tail Gas Incinerator (EPN: 3411)

ConocoPhillips

Borger Petroleum Refinery

Borger, Hutchinson County, Texas

March 4, 2011

**COMPLIANCE TEST NO_x & SO₂
Reference Methods 1, 2, 3A, 4, 6C, & 7E**

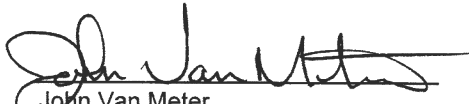
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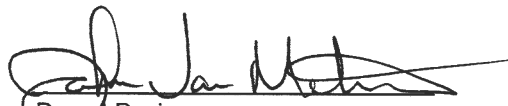
Test Date:
March 4, 2011

Report Date: April 18, 2011
CETCON Job Number: CJ-6483B

" We certify that we have personally examined and we are familiar with the information submitted herein, and based on our inquiries of those individuals immediately responsible for obtaining the information, we believe the submitted information is true, accurate, and complete."


John Van Meter
Sr. Project Coordinator


Alan Eason
Environmental Specialist


Report Review

CETCON

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EXECUTIVE SUMMARY

A Compliance Test was performed in conjunction with a Relative Accuracy Test Audit (RATA) for ConocoPhillips on Unit No. 34 Sulfur Recovery Unit (SRU) Tail Gas Incinerator (TGI) stack (EPN: 34I1) located in Borger, Texas on Friday, March 4, 2011. Compliance testing was conducted for Oxides of Nitrogen (NO_x) and Sulfur Dioxide (SO₂). The SRU was operating at approximately 85 Long Tons Per Day (LT/D) of sulfur production during the test. This production rate is equivalent to 71% of the maximum production rate of 120 LT/D. A series of nine (9), 21-minute test runs were conducted labeled R1 through R9. Each set of three tests were averaged together to produce a 63 minute average. Three stack flow measurements were made to establish a stack volumetric flow rate necessary for reporting emissions in units of pounds per hour (lb/hr). Results are summarized on the following page.

Testing was conducted in accordance with procedures set forth in the Code of Federal Regulations, Title 40 (CFR40), Part 60, Appendix A, Reference Methods (RM's) 1, 2, 3A, 4, 6C, and 7E.

The average emissions were presented in the following table.

Pollutant	ppmvd	ppmvd @ 0% O ₂	lb/mmBtu	lb/hr	ton/yr
NO _x	19.71	NA	0.029	1.25	5.49
SO ₂	8.76	12.45	NA	0.78	3.42

A more complete breakdown of all test data can be found on the following pages of this test report.

CETCON, Inc.

Summary Of Results

Unit Designation: Borger Petroleum Refinery
Unit 34 SRU Tail Gas Incinerator (EPN: 3411)

PARAMETERS:

Test Number:	C1	C2	C3
Date:	3/4/2011	3/4/2011	3/4/2011
Start Time:	952	1117	1302
End Time:	1052	1217	1402
Test Duration, min.	60	60	60

OPERATING DATA:

Sulfur Production Rate, LT/D	84.9	84.9	84.9	Average: 84.9
Maximum Permitted Production Rate, LT/D	120.0	120.0	120.0	120.0
Unit Load, % of Maximum	70.7	70.7	70.7	70.7

FLUE GAS:

Stack Temperature, °F	1185	1181	1175	1180.39
O ₂ , % dry	6.03	6.38	6.52	6.31
CO ₂ , % dry	6.86	7.00	7.08	6.98
% Moisture	13.97	14.14	14.34	14.15
Fuel Factor, F _d , scf/mmbtu	8457	8457	8457	8457
Stack Flow, ACFM	36128	36825	34811	35922
Stack Flow, DSCFM	8922	9099	8609	8877

EMISSION DATA:

SO ₂ , ppmvd	15.74	7.11	3.43	8.76
SO ₂ , ppmvd @ 0% O ₂	22.13	10.23	4.98	12.45
SO ₂ , lb/hr	1.40	0.65	0.29	0.78
SO ₂ , ton/yr	6.14	2.83	1.29	3.42
NO _x , ppmvd	19.98	19.70	19.44	19.71
NO _x , lb/mmbtu	0.028	0.029	0.029	0.029
NO _x , lb/hr	1.28	1.28	1.20	1.25
NO _x , ton/yr	5.59	5.62	5.25	5.49

Permit:

250.00

SAMPLING METHODS

Pollutants are measured according to EPA Reference Methods (RM's) and Performance Specifications (PS's) described in the Code of Federal Regulations (CFR), Title 40, Chapter 1, Part 60, Appendix A. The following methods were used:

- | | |
|-------|--|
| RM-1 | Sample and velocity traverses for stationary sources. Determination of measurement site and sample point location. |
| RM-2 | Determination of stack gas velocity and volumetric flow rate. A calibrated Type S pitot tube is used in conjunction with an inclined manometer to determine average gas velocity and for quantifying gas flow. |
| RM-3A | Determination of Oxygen (O ₂) and Carbon Dioxide (CO ₂) concentrations in emissions from stationary sources (Instrumental Analyzer Procedure). Servomex 1400B4 series analyzers are used to continuously measure the concentrations of O ₂ and CO ₂ . O ₂ and CO ₂ concentrations are determined by paramagnetic and non-dispersive infrared detectors, respectively. The instruments are calibrated either with gases prepared according to EPA Protocol One or with gases that have been certified using an Orsat analyzer (RM-3). |
| RM-4 | Determination of moisture content in stack gases. A gas sample is extracted from the source through an impinger sampling train which condenses the moisture. The volume of the gas sample leaving the impinger train is determined using a calibrated dry gas meter. The impingers are weighed before and after the test run to determine moisture content. |
| RM-6C | Determination of Sulfur Dioxide (SO ₂) emissions from stationary sources (Instrumental Analyzer Procedure). A Bovar (Western Research) Model 721AT2 or 721M ultraviolet photometric analyzer is used to continuously measure the concentration of SO ₂ . The instrument is calibrated with gases prepared according to EPA Protocol One. |
| RM-7E | Determination of Nitrogen Oxides (NO _x) emissions from stationary sources (Instrumental Analyzer Procedure). A Thermo Environmental Instruments Company Model 10S, 42H or 42C chemiluminescent analyzer is used to continuously measure the concentration of NO _x . The instrument is calibrated with gases prepared according to EPA Protocol One. |

DESCRIPTION OF TEST

Personnel from CETCON, Inc. (Combustion & Environmental Testing Consultants) arrived at ConocoPhillips' Borger Refinery located in Borger, Texas at approximately 7:30 AM on Friday, March 4, 2011. A low energy hot work permit was obtained from the control room and the trailer was then parked on the North side of Unit 34 Sulfur Recovery Unit (SRU). Power was supplied to the trailer and test equipment using a switch rack equipped with a hydrocarbon sensor and automatic power cutoff provided by ConocoPhillips electricians. The purpose of CETCON's visit was to perform a Compliance Test on the SRU Stack. The testing equipment necessary to measure concentrations and mass emission rates of SO₂ and NO_x had been set up the previous day. Calibration error, sampling system bias and system response time tests were conducted on the Reference Method (RM) test equipment. A moisture train was assembled, lifted to the stack platform and successfully leak tested. The pitot tube used for stack gas velocity measurement was also successfully leak tested at this time.

The probes were inserted into the stack and the analyzers were allowed to achieve stable responses. CETCON's clocks were synchronized with the plant's Data Acquisition and Handling System (DAHS). The first test run (designated R1) began at 9:47 AM. Test run R1 consisted of continuously measuring and recording the concentrations of SO₂ and O₂ for a duration of seven (7) minutes at each of three (3) sample traverse points, resulting in a total run length of twenty-one (21) minutes. A sampling system bias test was conducted at the conclusion of every 3rd test run to correct for calibration drift. Eight (8) additional test runs (designated R2 through R9) were conducted concluding at 2:05 PM. All test runs were identical in procedure and duration. A velocity traverse and moisture test was conducted to correspond with each set of three (3) RATA test runs. These data were used to calculate the stack gas volumetric flow rate and mass emission rate of SO₂. The data were examined and determined to be acceptable. The test equipment was removed from the stack platform and secured in the trailer. CETCON left the location at 4:30 PM.

The following people were present for the testing conducted March 4, 2011:

<u>Name</u>	<u>Affiliation</u>
John Van Meter	CETCON, Inc.
Alan Eason	CETCON, Inc.
Sandy Keys	ConocoPhillips

APPENDIX A

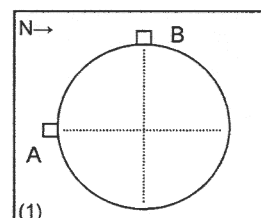
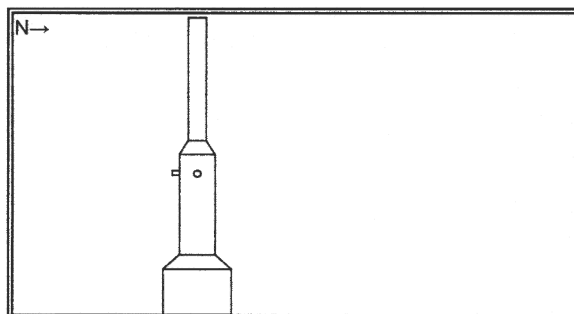
**Unit Diagram
And
Sample Point Location**

Job No:	CJ-6483
Customer:	ConocoPhillips
Unit:	Unit 34 SRU
Date:	March 4, 2011
Time:	9:00 AM

Rectangular Duct? (Y/N): _____ N
 Duct Width, in.: _____
 Duct Depth, in.: _____
 Equivalent Diameter, in.: _____
 Isokinetic Test? (Y/N): _____ N

NIST	5218	The
NIST Temp., °F	66	
Pitot Temp., °F	65	
Pitot Tube No:	6	
Pitot C_p =	0.787	
P_B =	26.99	Hg
P_S =	-0.75	H ₂ O
$A_S^{(2)}$ =	5073.78	in. ²
	35.23	ft. ²

Cross Section



Stack Height	<u>213</u>	ft.
Sampling Port Hgt	81	ft.

Point Number	Percent Diameter	Distance From Port Opening (decimal in.) ⁽⁴⁾	Distance From Port Opening (fractional in.) ⁽⁴⁾	Cyclonic Flow Calculation ⁽³⁾														
				Port A			Port B			Port C			Port D			Port E		
				ΔP	T _s	α	ΔP	T _s	α	ΔP	T _s	α	ΔP	T _s	α	ΔP	T _s	α

Reference Method 1 Velocity Traverse Points

[illegible]

Performance Specification 2 Pollutant Traverse Points

1	16.7	31.86	31	14 / 16
2	50.0	58.63	58	10 / 16
3	83.3	85.39	85	6 / 16

RATA Test ? (Y/N)	Y
Metric Points ? (Y/N)	N

Average Absolute Value of Cyclonic Flow Null Angle $\alpha = 16.9^\circ$ α Must Be $\leq 20^\circ$ For Acceptable Flow Conditions
 Average Stack Temperature, $T_s = 1181^\circ\text{F}$ Average $\Delta P_s = 0.016$ in. H_2O Average $\sqrt{\Delta P_s} = 0.124$ in. $\text{H}_2\text{O}^{1/2}$

Notes: (1) Clockwise from ladder or plant north (stacks w/o ladders) - sample port designation in sequence A, B, C, & D for circular ducts.
Left to right for rectangular ducts with sample port designation in sequence A, B, C, D, & E.
Higher traverse numbers for both rectangular and circular duct toward outside wall.

$$(2) A_s = \pi D^2 \div 4$$

(3) Cyclonic flow indication measured positive in clockwise rotation from null position.

(4) Points nearest stack walls are adjusted to a minimum of 0.5 in. (≤ 24 in.) or 1.0 in. ($D > 24$ in.).

QA/QC Check:

Completeness ✓

Legibility

Accuracy

Specifications

Reasonableness

Checked by:

Operator (Signature/Date)

Project Coordinator (Signature/Date)

4/18/2011

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4/18/2011

PRELIM.XLS

APPENDIX B

Plant Operational Data

ConocoPhillips
Borger Petroleum Refinery
Unit 34 SRU Tail Gas Incinerator (EPN: 3411)
CJ-6483
March 4, 2011

R1 Test Start Time:	9:47	Sulfur Pit Contents Tons:	148.79
R9 Test End Time:	14:04	Sulfur Pit Contents, Tons:	165.76
Duration, hh:mm:	4:17	Net Sulfur Production, Tons:	16.97
Duration, days	0.18	Net Sulfur Production, Long Tons:	15.15
		Sulfur Production Rate, LT/D	84.90
		Maximum Sulfur Production Rate, LT/D	120.00
		Unit Load, % of Maximum	70.7

Unit 34 CEMS RATA Data

START 3/4/2011 09:47:00 AM
END 3/4/2011 10:07:00 AM
INTERVAL 1M

TAGS	Name	#NAME?	34TI078.PV DEGF	34AI015.PV PPM	34AI016.PV %	34FX002B.PV MSCFH	34LB029.PV TON	34TC054.PV DEGF	34FI054.PV MSCF/D
34TI078.PV	Incinerator Stack								
			INCINERATOR STACK TEMPERATURE	INCINERATOR SO2	INCINERATOR O2	SRF TOT ACID GAS FLO	TONS IN SULPHUR PIT	INCINERATOR FIREBOX TEMPERATURE	FUEL GAS TO INCINERATOR Corrected SO2
34AI015.PV	Incinerator, SO2	3/4/2011 9:47	1127.18	16.41	6.07	7.00	148.79	1252.09	265.50
34AI016.PV	Incinerator, O2	3/4/2011 9:48	1126.86	16.38	6.08	7.00	148.84	1251.34	265.69
34FX002B.PV	Totalized Acid Gas Flow	3/4/2011 9:49	1126.49	16.14	6.18	7.00	148.91	1250.92	266.90
34LB029.PV	Sulfur Pit	3/4/2011 9:50	1126.37	16.08	6.20	7.00	148.96	1252.60	266.36
34TC054.PV	Stack Temp.	3/4/2011 9:51	1126.28	15.97	6.20	7.00	149.04	1250.90	265.56
34FI054.PV	Fuel Gas Consumption	3/4/2011 9:52	1126.01	14.98	6.17	7.00	149.13	1252.93	266.53
		3/4/2011 9:53	1126.47	14.74	6.17	7.00	149.21	1255.69	264.94
		3/4/2011 9:54	1126.58	14.70	6.17	7.00	149.30	1254.68	264.40
		3/4/2011 9:55	1126.44	14.37	6.26	7.00	149.36	1255.88	264.26
		3/4/2011 9:56	1127.23	14.29	6.28	7.00	149.40	1258.86	263.49
		3/4/2011 9:57	1128.16	14.18	6.23	7.00	149.45	1261.99	262.19
		3/4/2011 9:58	1128.12	13.22	5.74	7.00	149.53	1257.27	264.02
		3/4/2011 9:59	1128.31	12.99	5.62	7.00	149.63	1256.84	264.58
		3/4/2011 10:00	1128.71	13.08	5.63	7.00	149.71	1259.24	262.73
		3/4/2011 10:01	1128.60	13.92	5.75	7.00	149.78	1260.45	261.76
		3/4/2011 10:02	1128.71	14.13	5.78	7.00	149.84	1262.29	261.17
		3/4/2011 10:03	1128.84	14.05	5.81	7.00	149.90	1261.18	261.08
		3/4/2011 10:04	1128.42	13.36	6.04	7.00	149.96	1259.26	261.09
		3/4/2011 10:05	1127.87	13.19	6.10	7.00	150.02	1257.44	261.19
		3/4/2011 10:06	1127.56	13.18	6.10	7.00	150.11	1257.68	261.78
		3/4/2011 10:07	1127.84	13.12	6.12	7.00	150.17	1258.49	260.97
Average			1127.48	14.40	6.03	7.00	149.48	1256.57	263.63
									22.95

Unit 34 CEMS
RATA Data

START	3/4/2011 10:09:00 AM
END	3/4/2011 10:29:00 AM
INTERVAL	1M

TAGS	Name	#NAME?	34TI078.PV DEGF	34AI015.PV PPM	34AI016.PV %	34FX002B.PV MSCFH	34LB029.PV TON	34TC054.PV DEGF	34FI054.PV MSCF/D	
			INCINERATOR STACK TEMPERATURE	INCINERATOR SO2	INCINERATOR O2	SRF TOT ACID GAS FLO	TONS IN SULPHUR PIT	INCINERATOR FIREBOX TEMPERATURE	FUEL GAS TO INCINERATOR	Corrected SO2
34AI015.PV	Incinerator, SO2	3/4/2011 10:09	1128.28	13.50	6.11	7.00	150.29	1259.38	260.41	21.42
34AI016.PV	Incinerator, O2	3/4/2011 10:10	1128.87	17.11	6.05	7.00	150.38	1262.59	259.77	27.25
34FX002B.PV	Totalized Acid Gas Flow	3/4/2011 10:11	1129.45	17.99	6.04	7.00	150.47	1263.88	259.52	28.68
34LB029.PV	Sulfur Pit	3/4/2011 10:12	1129.28	17.95	6.04	7.00	150.56	1265.36	258.84	28.59
34TC054.PV	Stack Temp.	3/4/2011 10:13	1128.66	17.53	6.09	7.00	150.64	1261.91	258.72	27.85
34FI054.PV	Fuel Gas Consumption	3/4/2011 10:14	1128.47	17.42	6.10	7.00	150.72	1260.57	259.83	27.67
		3/4/2011 10:15	1128.64	17.32	6.08	7.00	150.78	1261.87	258.95	27.52
		3/4/2011 10:16	1128.89	16.32	5.93	7.00	150.86	1263.66	258.39	26.19
		3/4/2011 10:17	1129.23	16.08	5.89	7.00	150.88	1265.51	258.07	25.86
		3/4/2011 10:18	1128.90	16.01	5.92	7.00	150.94	1263.36	258.16	25.70
		3/4/2011 10:19	1128.58	15.38	6.21	7.00	151.00	1262.27	258.35	24.25
		3/4/2011 10:20	1128.26	15.23	6.29	7.00	151.05	1260.44	258.64	23.90
		3/4/2011 10:21	1127.60	15.50	6.28	7.00	151.13	1257.62	259.71	24.35
		3/4/2011 10:22	1128.21	18.06	6.18	7.00	151.19	1260.65	258.89	28.54
		3/4/2011 10:23	1129.41	18.69	6.16	7.00	151.30	1263.06	257.65	29.56
		3/4/2011 10:24	1129.21	18.80	6.14	7.00	151.34	1260.13	257.53	29.77
		3/4/2011 10:25	1128.15	19.85	6.01	7.00	151.39	1254.29	259.43	31.70
		3/4/2011 10:26	1127.62	20.11	5.97	7.00	151.47	1252.47	260.24	32.17
		3/4/2011 10:27	1127.06	20.03	5.99	7.00	151.54	1249.62	260.62	32.00
		3/4/2011 10:28	1126.75	19.24	6.16	7.00	151.64	1251.28	260.37	30.44
		3/4/2011 10:29	1126.72	19.05	6.20	7.00	151.71	1253.19	259.10	30.06
										0.00
	Average		1128.39	17.48	6.09	7.00	151.01	1259.67	259.10	26.52

START	3/4/2011 10:31:00 AM
END	3/4/2011 10:51:00 AM
INTERVAL	1m

[illegible]

Unit 34 CEMS RATA Data

START 3/4/2011 11:17:00 AM
END 3/4/2011 11:37:00 AM
INTERVAL 1m

TAGS	Name	#NAME?	34TI078.PV DEGF	34AI015.PV PPM	34AI016.PV %	34FX002B.PV MSCFH	34LB029.PV TON	34TC054.PV DEGF INCINERATOR	34FI054.PV MSCF/D
			INCINERATOR STACK TEMPERATURE	INCINERATOR SO2	INCINERATOR O2	SRF TOT ACID GAS FLO	TONS IN SULPHUR PIT	FIREBOX TEMPERATUR E	FUEL GAS TO INCINERATOR
34FX002B.PV	Totalized Acid Gas Flow	Timestamp	34TI078.PV - Average	34AI015.PV - Average	34AI016.PV - Average	34FX002B.PV - Average	34LB029.PV - Average	34TC054.PV - Average	34FI054.PV - Average
34LB029.PV	Sulfur Pit	3/4/11 11:17	1124.27	14.34	6.18	7.00	154.97	1257.95	256.95
34TC054.PV	Stack Temp.	3/4/11 11:18	1123.65	14.33	6.28	7.00	155.07	1254.96	257.02
34FI054.PV	Fuel Gas Consumption	3/4/11 11:19	1123.16	14.30	6.29	7.00	155.09	1255.00	257.67
		3/4/11 11:20	1123.32	14.00	6.42	7.00	155.16	1257.89	256.91
		3/4/11 11:21	1124.00	13.92	6.45	7.00	155.24	1261.82	256.62
		3/4/11 11:22	1124.30	13.93	6.43	7.00	155.30	1261.74	256.55
		3/4/11 11:23	1123.96	13.99	6.24	7.00	155.37	1260.20	256.50
		3/4/11 11:24	1123.53	14.00	6.20	7.00	155.43	1257.95	256.54
		3/4/11 11:25	1123.22	14.00	6.20	7.00	155.50	1256.57	256.68
		3/4/11 11:26	1122.56	13.97	6.17	7.00	155.59	1253.16	257.41
		3/4/11 11:27	1122.50	13.96	6.16	7.00	155.65	1250.77	258.23
		3/4/11 11:28	1122.57	13.96	6.16	7.00	155.73	1250.29	258.52
		3/4/11 11:29	1122.20	13.90	6.19	7.00	155.80	1248.11	258.69
		3/4/11 11:30	1122.07	13.88	6.19	7.00	155.92	1247.52	258.86
		3/4/11 11:31	1122.21	13.87	6.21	7.00	155.95	1248.57	259.07
		3/4/11 11:32	1121.32	13.75	6.36	7.00	156.02	1243.70	259.69
		3/4/11 11:33	1120.56	13.72	6.40	7.00	156.06	1245.66	260.15
		3/4/11 11:34	1120.95	13.69	6.38	7.00	156.08	1250.00	258.37
		3/4/11 11:35	1120.84	13.45	6.24	7.00	156.18	1249.98	257.81
		3/4/11 11:36	1120.41	13.39	6.21	7.00	156.25	1250.90	257.70
		3/4/11 11:37	1120.33	13.39	6.21	7.00	156.31	1252.84	257.58
	Average		1122.47	13.89	6.26	7.00	155.65	1253.12	257.79
									21.8

Unit 34 CEMS RATA Data

START 3/4/2011 11:39:00 AM
END 3/4/2011 11:59:00 AM
INTERVAL 1m

TAGS	Name	#NAME?	34TI078.PV DEGF	34AI015.PV PPM	34AI016.PV %	34FX002B.PV MSCFH	34LB029.PV TON	34TC054.PV DEGF INCINERATOR	34FI054.PV MSCF/D
			INCINERATOR STACK TEMPERATURE 34TI078.PV - Average	INCINERATOR SO2 34AI015.PV - Average	INCINERATOR O2 34AI016.PV - Average	SRF TOT ACID GAS FLO 34FX002B.PV - Average	TONS IN SULPHUR PIT 34LB029.PV - Average	FIREBOX TEMPERATUR E 34TC054.PV - Average	FUEL GAS TO INCINERATOR 34FI054.PV - Average
34FX002B.PV	Totalized Acid Gas Flow	Timestamp	3/4/11 11:39	1119.84	13.39	6.26	7.00	1247.24	259.26
34LB029.PV	Sulfur Pit	3/4/11 11:39	1119.84	13.39	6.26	6.26	7.00	1249.80	258.51
34TC054.PV	Stack Temp.	3/4/11 11:40	1120.20	13.39	6.26	6.26	7.00	1249.80	258.51
34FI054.PV	Fuel Gas Consumption	3/4/11 11:41	1120.83	13.39	6.31	6.31	7.00	1252.58	257.68
		3/4/11 11:42	1121.84	13.39	6.32	6.32	7.00	1255.90	257.05
		3/4/11 11:43	1122.10	13.36	6.34	6.34	7.00	1256.00	256.88
		3/4/11 11:44	1121.84	13.06	6.57	6.57	7.00	1255.07	256.83
		3/4/11 11:45	1121.61	12.99	6.63	6.63	7.00	1254.68	256.91
		3/4/11 11:46	1120.85	12.76	6.64	6.64	7.00	1248.70	258.20
		3/4/11 11:47	1120.00	10.72	6.76	6.76	7.00	1246.69	258.75
		3/4/11 11:48	1119.69	10.22	6.78	6.78	7.00	1247.53	258.92
		3/4/11 11:49	1119.72	10.08	6.74	6.74	7.00	1251.43	258.02
		3/4/11 11:50	1119.97	8.85	6.35	6.35	7.00	1254.34	256.98
		3/4/11 11:51	1119.90	8.55	6.25	6.25	7.00	1252.82	257.10
		3/4/11 11:52	1120.19	8.52	6.29	6.29	7.00	1250.15	258.22
		3/4/11 11:53	1120.58	8.25	6.60	6.60	7.00	1251.99	257.77
		3/4/11 11:54	1120.95	8.18	6.68	6.68	7.00	1255.04	256.92
		3/4/11 11:55	1120.96	8.17	6.66	6.66	7.00	1255.76	256.50
		3/4/11 11:56	1120.72	8.05	6.47	6.47	7.00	1254.34	257.51
		3/4/11 11:57	1121.03	8.02	6.43	6.43	7.00	1258.96	256.34
		3/4/11 11:58	1121.59	7.99	6.40	6.40	7.00	1261.82	255.39
		3/4/11 11:59	1121.45	7.72	6.19	6.19	7.00	1260.04	255.46
	Average		1120.76	10.43	6.47	6.47	7.00	1253.38	257.39
									16.18

START	3/4/2011 12:01:00 PM
END	3/4/2011 12:21:00 PM
INTERVAL	1m

TAGS	Name	#NAME?	34TI078.PV DEGF	34AI015.PV PPM	34AI016.PV %	34FX002B.PV MSCFH	34LB029.PV TON	34TC054.PV DEGF INCINERATOR	34FI054.PV MSCF/D
34TI078.PV 34AI015.PV 34AI016.PV	Incinerator Stack Incinerator, SO2 Incinerator, O2		INCINERATOR STACK TEMPERATURE 34TI078.PV - Average	INCINERATOR SO2 34AI015.PV - Average	INCINERATOR O2 34AI016.PV - Average	SRF TOT ACID GAS FLO 34FX002B.PV - Average	TONS IN SULPHUR PIT 34LB029.PV - Average	FIREBOX TEMPERATUR E 34TC054.PV - Average	FUEL GAS TO INCINERATOR 34FI054.PV - Average
34FX002B.PV	Totalized Acid Gas Flow	Timestamp	1122.61 3/4/2011 12:01	7.68 3/4/2011 12:02	6.15 3/4/2011 12:03	7.00 3/4/2011 12:04	157.83 3/4/2011 12:05	1261.43 3/4/2011 12:06	254.30 3/4/2011 12:07
34LB029.PV	Sulfur Pit		1121.88 3/4/2011 12:02	7.95 3/4/2011 12:03	6.30 3/4/2011 12:04	7.00 3/4/2011 12:05	157.89 3/4/2011 12:06	1254.45 3/4/2011 12:07	256.35 3/4/2011 12:08
34TC054.PV	Stack Temp.		1121.68 3/4/2011 12:03	8.02 3/4/2011 12:04	6.34 3/4/2011 12:05	7.00 3/4/2011 12:06	158.00 3/4/2011 12:07	1256.96 3/4/2011 12:08	255.75 3/4/2011 12:09
34FI054.PV	Fuel Gas Consumption		1122.06 3/4/2011 12:04	7.99 3/4/2011 12:05	6.33 3/4/2011 12:06	7.00 3/4/2011 12:07	158.11 3/4/2011 12:08	1258.56 3/4/2011 12:09	255.28 3/4/2011 12:10
			1122.23 3/4/2011 12:05	7.69 3/4/2011 12:06	6.24 3/4/2011 12:07	7.00 3/4/2011 12:08	158.17 3/4/2011 12:09	1254.91 3/4/2011 12:10	256.24 3/4/2011 12:11
			1122.06 3/4/2011 12:06	7.61 3/4/2011 12:07	6.22 3/4/2011 12:08	7.00 3/4/2011 12:09	158.19 3/4/2011 12:10	1254.46 3/4/2011 12:11	256.49 3/4/2011 12:12
			1121.36 3/4/2011 12:07	7.60 3/4/2011 12:08	6.25 3/4/2011 12:09	7.00 3/4/2011 12:10	158.25 3/4/2011 12:11	1254.24 3/4/2011 12:12	256.49 3/4/2011 12:13
			1120.62 3/4/2011 12:08	7.48 3/4/2011 12:09	6.47 3/4/2011 12:10	7.00 3/4/2011 12:11	158.33 3/4/2011 12:12	1254.01 3/4/2011 12:13	256.40 3/4/2011 12:14
			1120.56 3/4/2011 12:09	7.45 3/4/2011 12:10	6.52 3/4/2011 12:11	7.00 3/4/2011 12:12	158.40 3/4/2011 12:13	1255.57 3/4/2011 12:14	255.65 3/4/2011 12:15
			1121.16 3/4/2011 12:10	7.43 3/4/2011 12:11	6.50 3/4/2011 12:12	7.00 3/4/2011 12:13	158.45 3/4/2011 12:14	1257.84 3/4/2011 12:15	255.43 3/4/2011 12:16
			1121.59 3/4/2011 12:11	7.25 3/4/2011 12:12	6.34 3/4/2011 12:13	7.00 3/4/2011 12:14	158.53 3/4/2011 12:15	1259.38 3/4/2011 12:16	255.39 3/4/2011 12:17
			1121.92 3/4/2011 12:12	7.21 3/4/2011 12:13	6.30 3/4/2011 12:14	7.00 3/4/2011 12:15	158.57 3/4/2011 12:16	1259.81 3/4/2011 12:17	255.34 3/4/2011 12:18
			1121.85 3/4/2011 12:13	7.22 3/4/2011 12:14	6.29 3/4/2011 12:15	7.00 3/4/2011 12:16	158.63 3/4/2011 12:17	1255.80 3/4/2011 12:18	255.45 3/4/2011 12:19
			1121.13 3/4/2011 12:14	7.31 3/4/2011 12:15	6.27 3/4/2011 12:16	7.00 3/4/2011 12:17	158.68 3/4/2011 12:18	1249.88 3/4/2011 12:19	256.79 3/4/2011 12:20
			1120.67 3/4/2011 12:15	7.33 3/4/2011 12:16	6.26 3/4/2011 12:17	7.00 3/4/2011 12:18	158.72 3/4/2011 12:19	1249.36 3/4/2011 12:20	257.14 3/4/2011 12:21
			1120.39 3/4/2011 12:16	7.32 3/4/2011 12:17	6.27 3/4/2011 12:18	7.00 3/4/2011 12:19	158.80 3/4/2011 12:20	1249.94 3/4/2011 12:21	257.17 3/4/2011 12:22
			1120.74 3/4/2011 12:17	7.23 3/4/2011 12:18	6.42 3/4/2011 12:19	7.00 3/4/2011 12:20	158.88 3/4/2011 12:21	1251.03 3/4/2011 12:22	257.08 3/4/2011 12:23
			1121.17 3/4/2011 12:18	7.21 3/4/2011 12:19	6.45 3/4/2011 12:20	7.00 3/4/2011 12:21	158.96 3/4/2011 12:22	1253.12 3/4/2011 12:23	256.03 3/4/2011 12:24</

Unit 34 CEMS
RATA Data

START	3/4/2011 01:00:00 PM
END	3/4/2011 01:20:00 PM
INTERVAL	1m

[illegible]

Unit 34 CEMS RATA Data

START 3/4/2011 01:22:00 PM
END 3/4/2011 01:42:00 PM
INTERVAL 1m

TAGS	Name	#NAME?	34TI078.PV DEGF	34AI015.PV PPM	34AI016.PV %	34FX002B.PV MSCFH	34LB029.PV TON	34TC054.PV DEGF INCINERATOR	34FI054.PV MSCF/D
	Incinerator Stack								
	Incinerator, SO2								
	Incinerator, O2								
34FX002B.PV	Totalized Acid Gas Flow								
34LB029.PV	Sulfur Pit	Timestamp	INCINERATOR STACK TEMPERATURE 34TI078.PV - Average	INCINERATOR SO2 34AI015.PV - Average	INCINERATOR O2 34AI016.PV - Average	SRF TOT ACID GAS FLO 34FX002B.PV - Average	TONS IN SULPHUR PIT 34LB029.PV - Average	FIREBOX TEMPERATUR E 34TC054.PV - Average	FUEL GAS TO INCINERATOR 34FI054.PV - Average
34TC054.PV	Stack Temp.	3/4/2011 13:22	1121.84	6.79	6.75	7.00	163.09	1257.90	254.58
34FI054.PV	Fuel Gas Consumption	3/4/2011 13:23	1122.89	6.67	6.77	7.00	163.12	1262.59	254.09
		3/4/2011 13:24	1124.13	6.64	6.78	7.00	163.20	1265.10	253.51
		3/4/2011 13:25	1124.56	6.63	6.75	7.00	163.29	1264.49	253.51
		3/4/2011 13:26	1124.31	6.57	6.49	7.00	163.40	1265.63	253.26
		3/4/2011 13:27	1124.75	6.55	6.43	7.00	163.44	1266.75	252.91
		3/4/2011 13:28	1124.41	6.54	6.45	7.00	163.45	1262.94	252.69
		3/4/2011 13:29	1123.56	6.39	6.64	7.00	163.50	1262.33	253.50
		3/4/2011 13:30	1123.88	6.35	6.69	7.00	163.56	1264.93	252.95
		3/4/2011 13:31	1124.16	6.36	6.69	7.00	163.63	1265.25	252.73
		3/4/2011 13:32	1124.02	6.42	6.69	7.00	163.77	1264.37	252.69
		3/4/2011 13:33	1123.87	6.43	6.69	7.00	163.84	1263.36	252.65
		3/4/2011 13:34	1123.06	6.44	6.68	7.00	163.82	1260.33	252.70
		3/4/2011 13:35	1122.22	6.47	6.59	7.00	163.92	1258.65	253.41
		3/4/2011 13:36	1121.41	6.47	6.57	7.00	163.98	1257.67	253.63
		3/4/2011 13:37	1120.71	6.47	6.60	7.00	164.06	1253.67	254.09
		3/4/2011 13:38	1120.96	6.44	6.86	7.00	164.10	1256.76	254.09
		3/4/2011 13:39	1121.40	6.43	6.92	7.00	164.17	1259.98	253.13
		3/4/2011 13:40	1121.50	6.43	6.88	7.00	164.22	1261.73	252.16
		3/4/2011 13:41	1120.72	6.37	6.47	7.00	164.28	1255.78	252.78
		3/4/2011 13:42	1119.81	6.35	6.38	7.00	164.37	1247.78	253.79
		Average	1122.77	6.48	6.65	7.00	163.72	1260.86	253.28
									9.94

Corrected SO2

START	3/4/2011 01:44:00 PM
END	3/4/2011 02:04:00 PM
INTERVAL	1m

[illegible]

APPENDIX C

Field Data

Date: March 4, 2011
 Plant: Borger Petroleum Refinery
 Unit: Unit 34 SRU
 Operator: JRV AME
 Job No.: CJ-6483

CETCON, Inc.
EPA REFERENCE METHOD 4
IMPINGER WEIGHTS

Balance Field Calibration Check	
Balance No.	BAL6
Field Weight Number	002
Calibration Weight, gm	700.1
Balance Response, gm	700.2
Difference, gm	0.1

Run #	C1	Box #	1	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm				812.1	732.1	637.5	889.0		
Initial Weight, gm				721.4	731.2	637.1	882.4		
Net Weight, gm				90.7	0.9	0.4	6.6		
Total Weight Gain, gm				98.6					

Run #	C2	Box #	2	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm				820.8	740.0	599.1	910.9		
Initial Weight, gm				730.3	737.2	598.6	904.9		
Net Weight, gm				90.5	2.8	0.5	6.0		
Total Weight Gain, gm				99.8					

Run #	C3	Box #	1	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm				846.1	734.3	637.9	894.8		
Initial Weight, gm				753.0	732.1	637.5	889.0		
Net Weight, gm				93.1	2.2	0.4	5.8		
Total Weight Gain, gm				101.5					

Run #		Box #		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm									
Initial Weight, gm									
Net Weight, gm									
Total Weight Gain, gm									

Run #		Box #		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm									
Initial Weight, gm									
Net Weight, gm									
Total Weight Gain, gm									

Run #		Box #		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm									
Initial Weight, gm									
Net Weight, gm									
Total Weight Gain, gm									

Run #		Box #		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm									
Initial Weight, gm									
Net Weight, gm									
Total Weight Gain, gm									

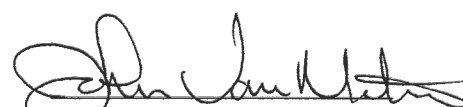
QA/QC Check:

Completeness ☒ Legibility ☒ Accuracy ☒ Specifications ☒ Reasonableness ☒

Checked by:

4/18/2011


 Operator (Signature/Date)
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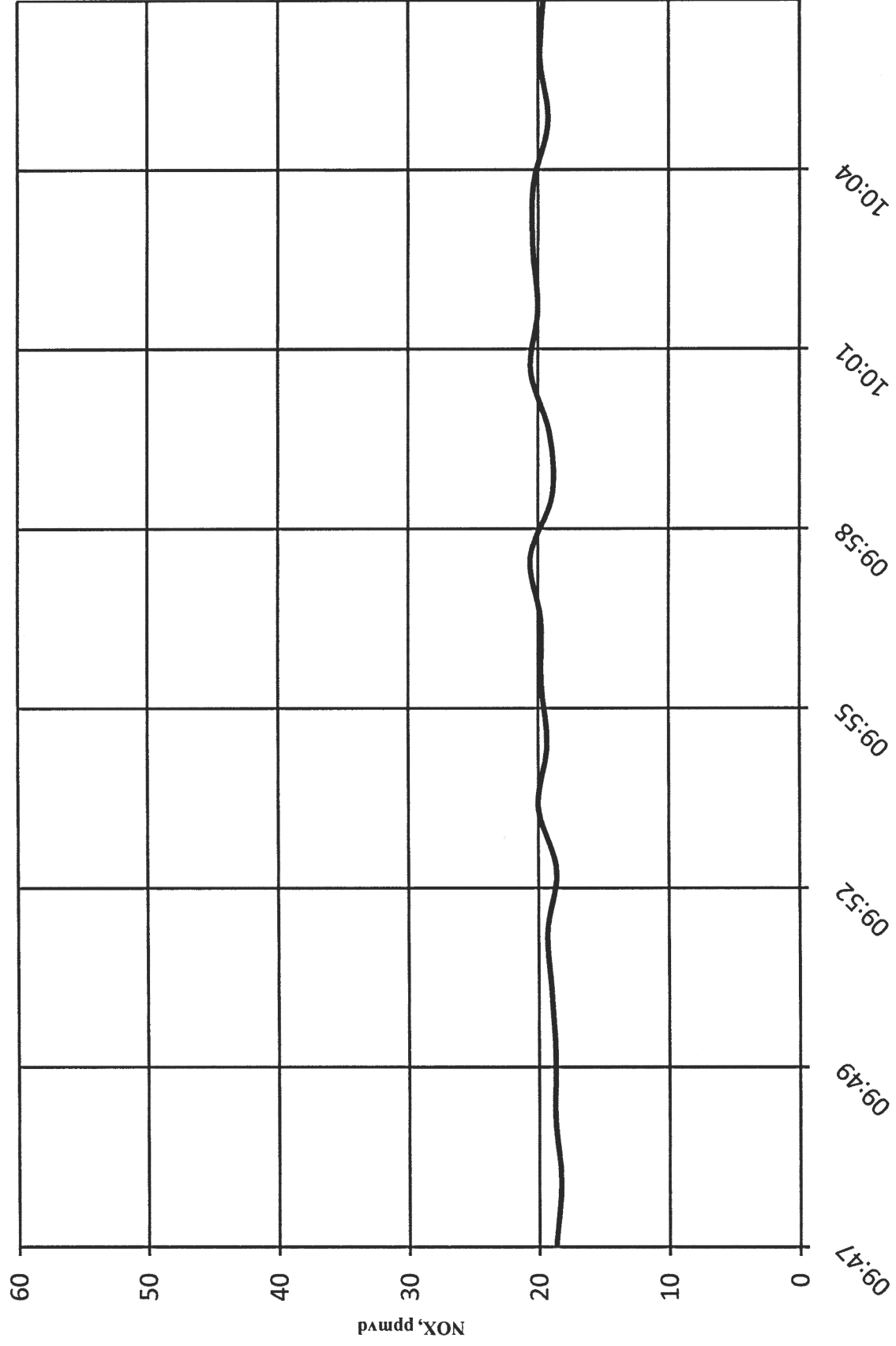

 Project Coordinator (Signature/Date)
 4/18/2011 IMPINGERS.XLS

CJ-6483 / Borger Complex / #34 SRU / R1

	ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
	Mean -->	19.476	539.299	6.016	6.795	15.577	53.459	-0.186	17.497
Time - 1 Min. Avgs		ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 09:47		18.690	560.350	6.460	6.700	18.070	53.710	-0.180	18.320
3/4/2011 09:48		18.327	593.898	6.199	6.658	17.955	53.710	-0.187	17.602
3/4/2011 09:49		18.741	592.254	6.124	6.705	17.173	53.710	-0.189	16.801
3/4/2011 09:50		18.729	601.041	6.058	6.778	16.657	53.694	-0.189	16.730
3/4/2011 09:51		18.993	558.513	6.139	6.763	16.324	49.121	-0.185	16.977
3/4/2011 09:52		19.313	571.224	6.197	6.696	15.885	53.710	-0.180	16.803
3/4/2011 09:53		18.622	559.586	5.983	6.793	15.406	53.710	-0.183	17.138
3/4/2011 09:54		20.003	501.953	6.027	6.786	15.213	53.710	-0.190	17.548
3/4/2011 09:55		19.336	599.626	6.205	6.658	14.778	53.710	-0.186	16.702
3/4/2011 09:56		19.761	512.273	5.778	6.956	14.747	53.710	-0.182	17.208
3/4/2011 09:57		19.790	481.070	5.744	6.991	14.837	53.710	-0.183	17.936
3/4/2011 09:58		20.603	413.688	5.713	6.992	15.090	53.710	-0.182	18.648
3/4/2011 09:59		18.930	647.021	6.352	6.549	14.438	53.710	-0.181	16.669
3/4/2011 10:00		19.129	479.865	5.678	7.009	14.560	53.075	-0.190	18.108
3/4/2011 10:01		20.568	458.823	5.833	6.883	15.140	53.694	-0.183	18.616
3/4/2011 10:02		20.025	519.791	5.849	6.917	16.024	53.710	-0.185	18.412
3/4/2011 10:03		20.419	441.456	5.570	7.078	15.301	53.710	-0.188	18.208
3/4/2011 10:04		20.353	553.468	6.203	6.660	15.081	53.710	-0.190	18.249
3/4/2011 10:05		19.243	565.366	5.998	6.756	14.486	53.710	-0.190	16.763
3/4/2011 10:06		19.849	577.166	6.298	6.596	14.543	53.710	-0.198	17.191
3/4/2011 10:07		19.591	536.849	5.942	6.788	15.413	53.710	-0.192	16.816

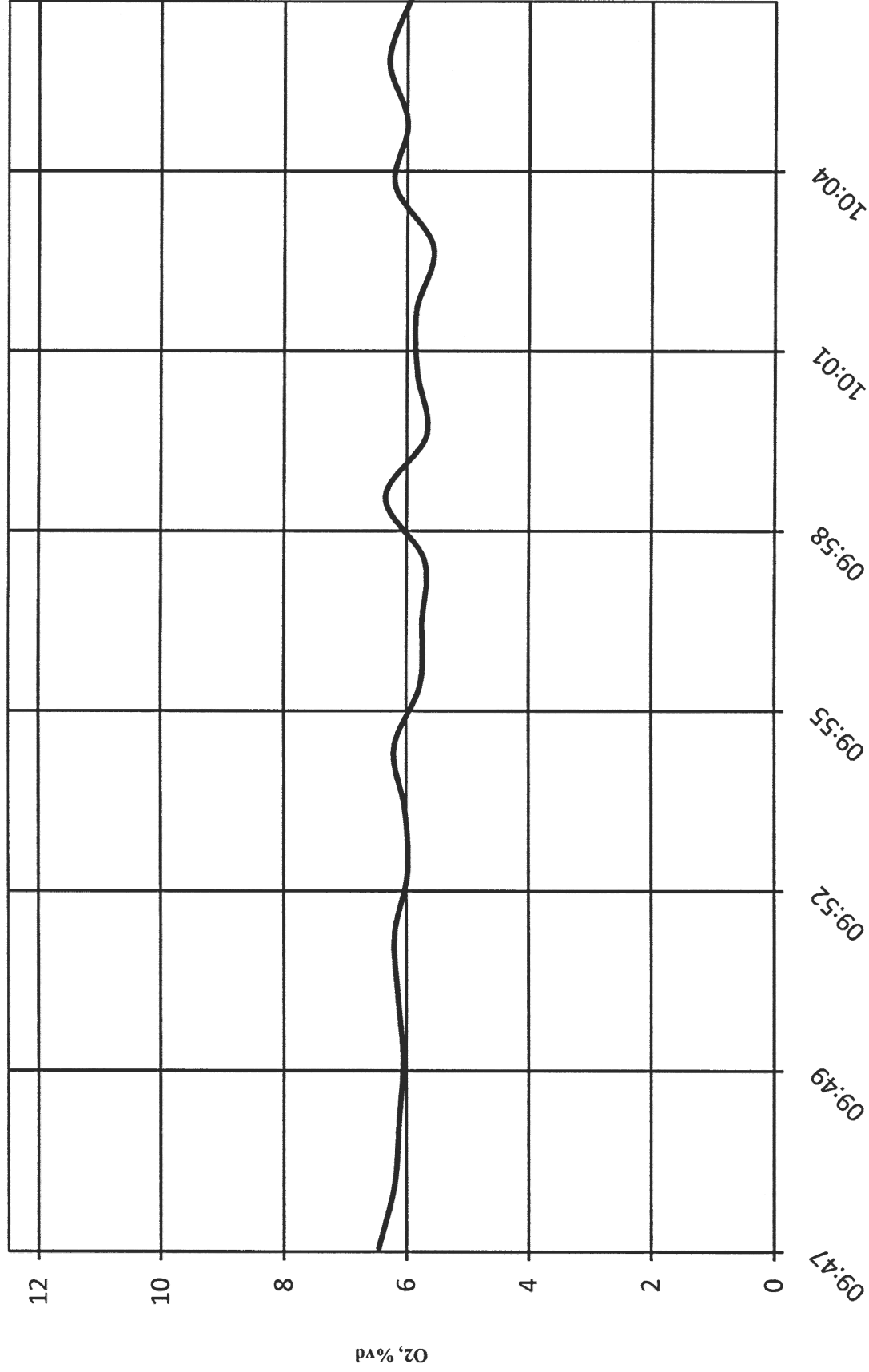
CJ-6483 / Borger Complex / #34 SRU / R1

Mean: 19.476



CJ-6483 / Borger Complex / #34 SRU / R1

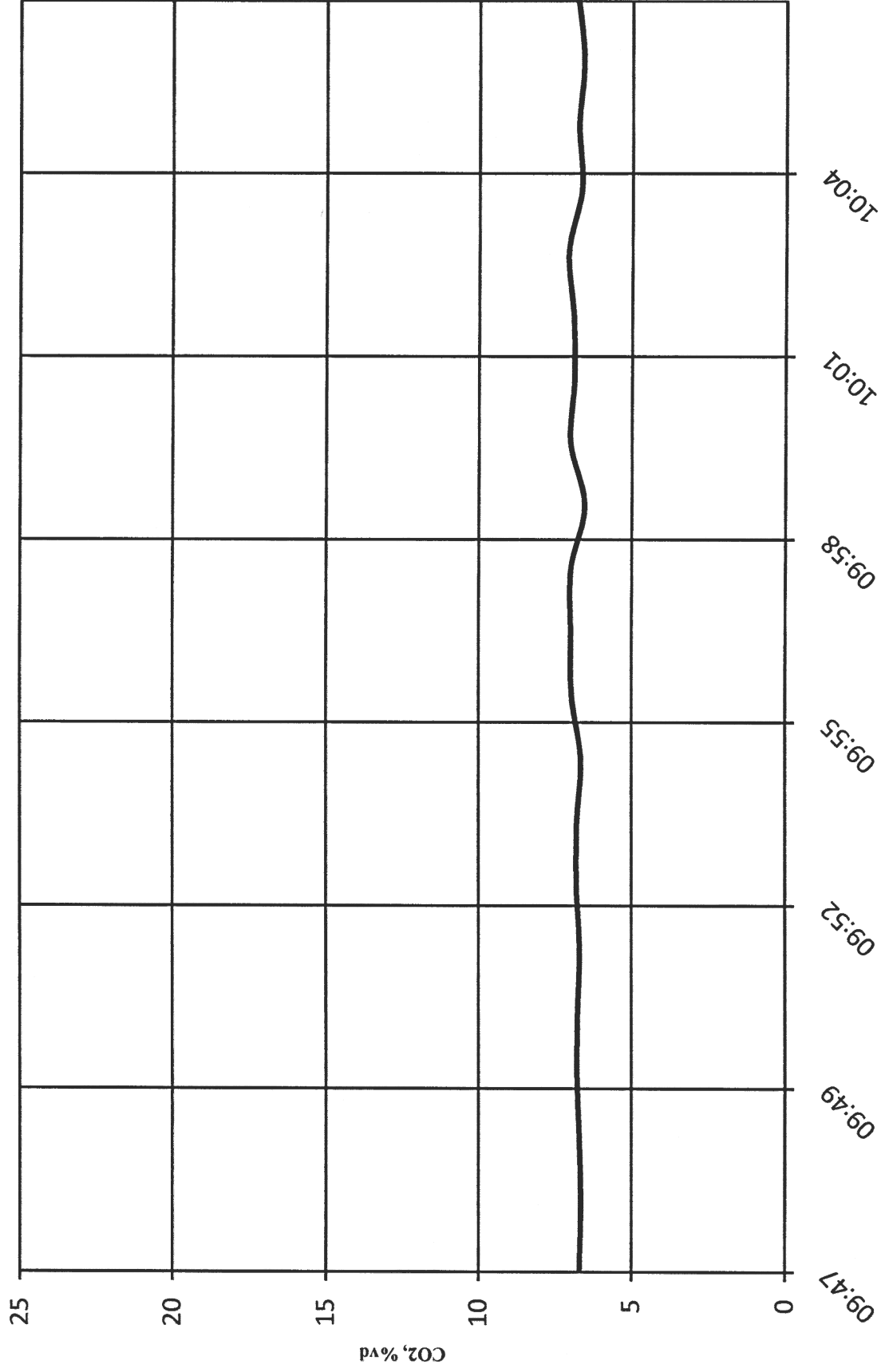
Mean: 6.016



Time - 1 Min. Intervals

CJ-6483 / Borger Complex / #34 SRU / R1

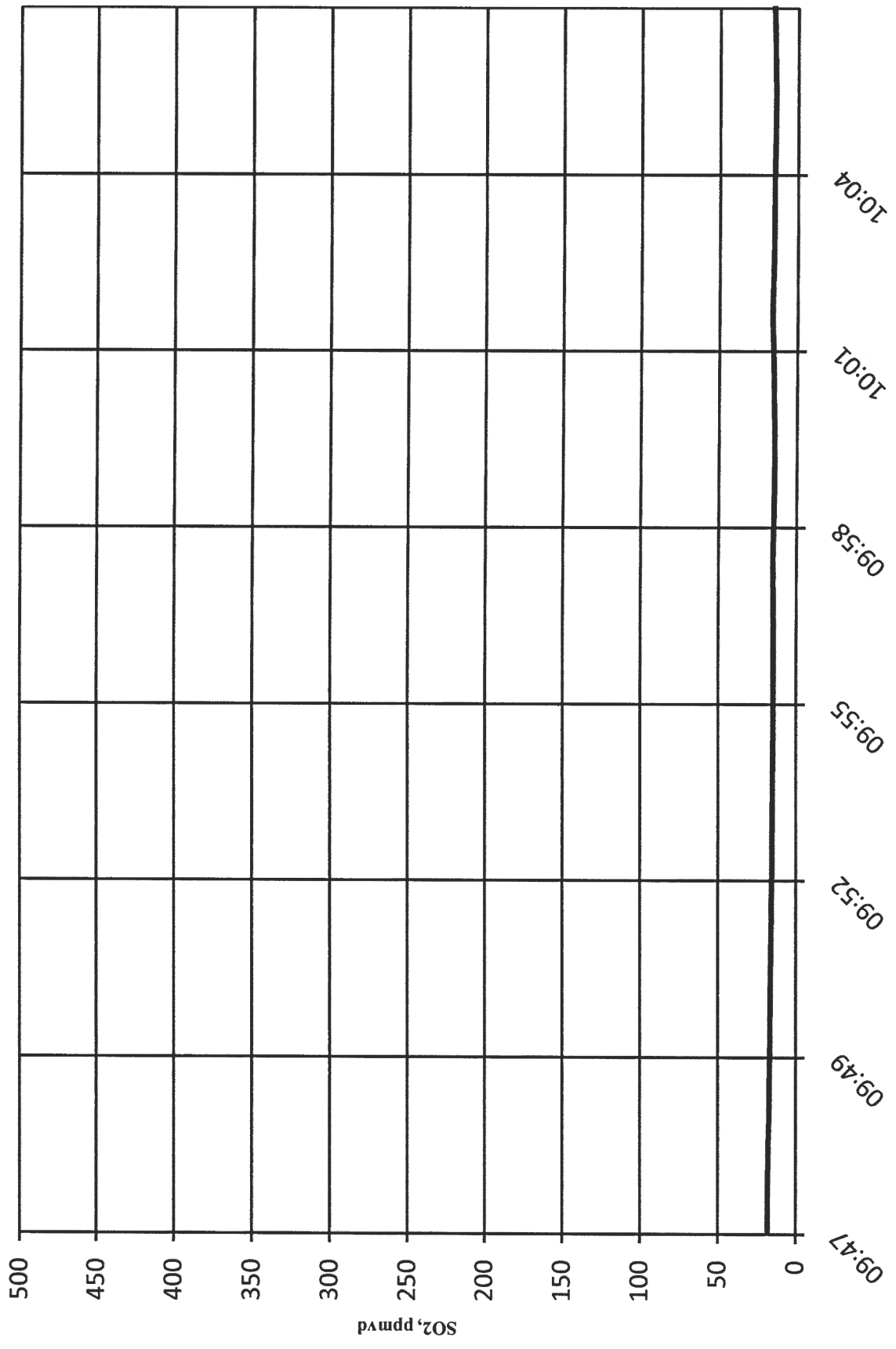
Mean: 6.795



Time - 1 Min. Intervals

CJ-6483 / Borger Complex / #34 SRU / R1

Mean: 15.577



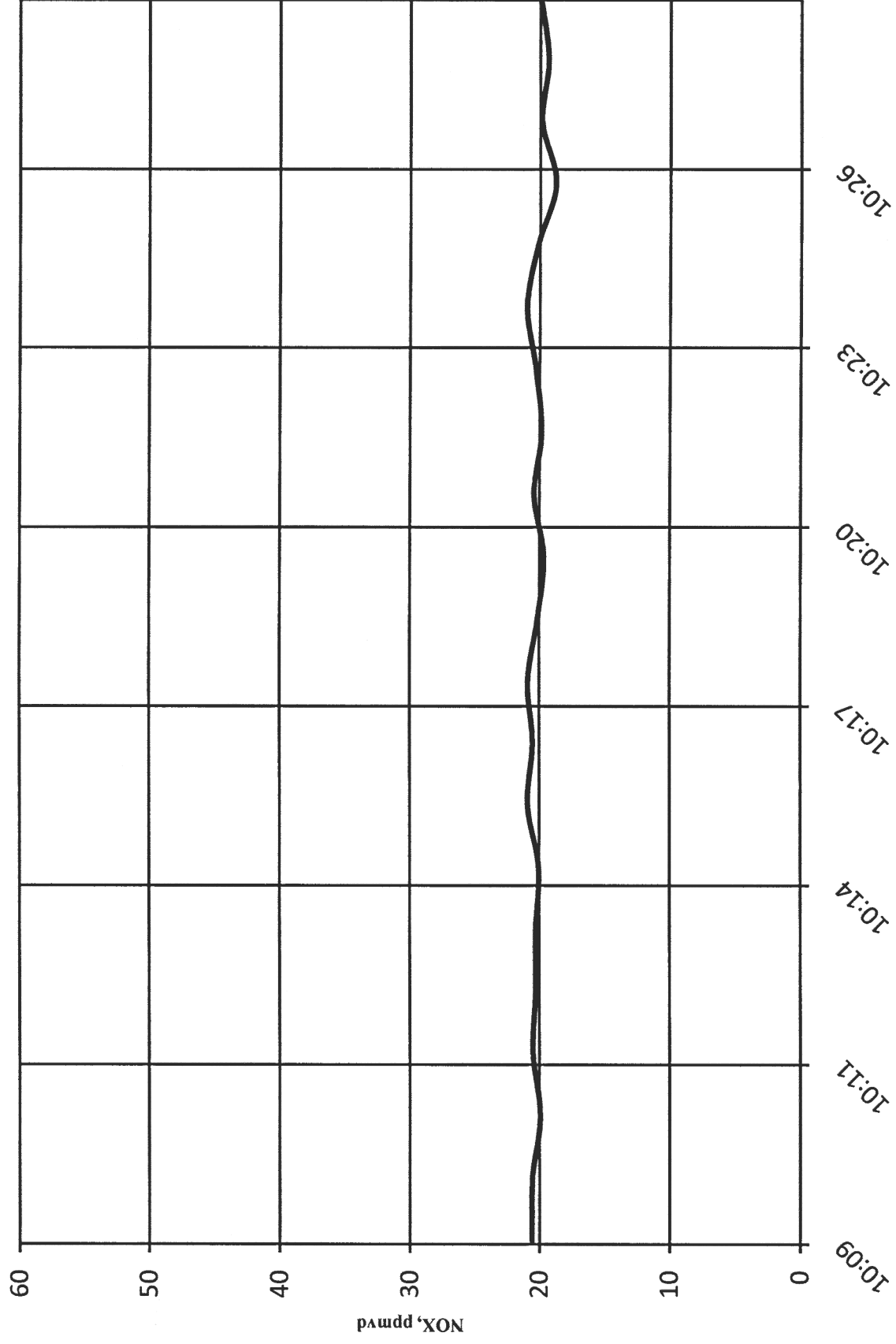
Time - 1 Min. Intervals

CJ-6483 / Borger Complex / #34 SRU / R2

	ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
	Mean -->	20.193	511.143	5.971	6.804	20.454	53.708	-0.186	17.374
Time - 1 Min. Avgs		ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 10:09		20.570	425.780	6.140	6.770	20.510	53.710	-0.190	18.910
3/4/2011 10:10		20.558	506.462	6.176	6.636	19.961	53.710	-0.187	17.042
3/4/2011 10:11		19.941	479.573	5.778	6.898	19.962	53.710	-0.187	17.600
3/4/2011 10:12		20.493	482.602	6.067	6.758	20.060	53.710	-0.184	18.184
3/4/2011 10:13		20.308	492.678	5.873	6.868	20.075	53.710	-0.183	17.628
3/4/2011 10:14		20.283	537.843	6.255	6.648	19.557	53.694	-0.189	17.669
3/4/2011 10:15		20.060	512.534	5.892	6.878	18.904	53.710	-0.187	16.946
3/4/2011 10:16		20.915	459.783	5.808	6.954	18.953	53.710	-0.185	17.388
3/4/2011 10:17		20.528	465.543	5.830	6.914	19.213	53.710	-0.182	17.142
3/4/2011 10:18		20.897	473.991	5.948	6.821	18.635	53.710	-0.181	17.773
3/4/2011 10:19		20.144	580.989	6.265	6.593	18.011	53.710	-0.193	17.153
3/4/2011 10:20		19.678	516.228	5.798	6.866	17.204	53.710	-0.188	16.294
3/4/2011 10:21		20.433	516.195	6.093	6.705	18.312	53.710	-0.185	17.797
3/4/2011 10:22		19.853	572.591	6.017	6.775	22.331	53.710	-0.186	17.098
3/4/2011 10:23		20.292	457.113	5.522	7.058	23.551	53.710	-0.183	17.248
3/4/2011 10:24		20.988	419.338	5.721	6.938	24.283	53.710	-0.184	17.522
3/4/2011 10:25		20.161	515.334	6.013	6.788	23.349	53.694	-0.191	17.287
3/4/2011 10:26		18.767	639.664	6.168	6.692	22.395	53.710	-0.184	16.551
3/4/2011 10:27		19.863	540.087	6.025	6.798	21.989	53.710	-0.194	17.846
3/4/2011 10:28		19.351	609.962	6.151	6.673	21.272	53.710	-0.184	16.928
3/4/2011 10:29		19.989	529.719	5.873	6.859	21.014	53.710	-0.184	16.865

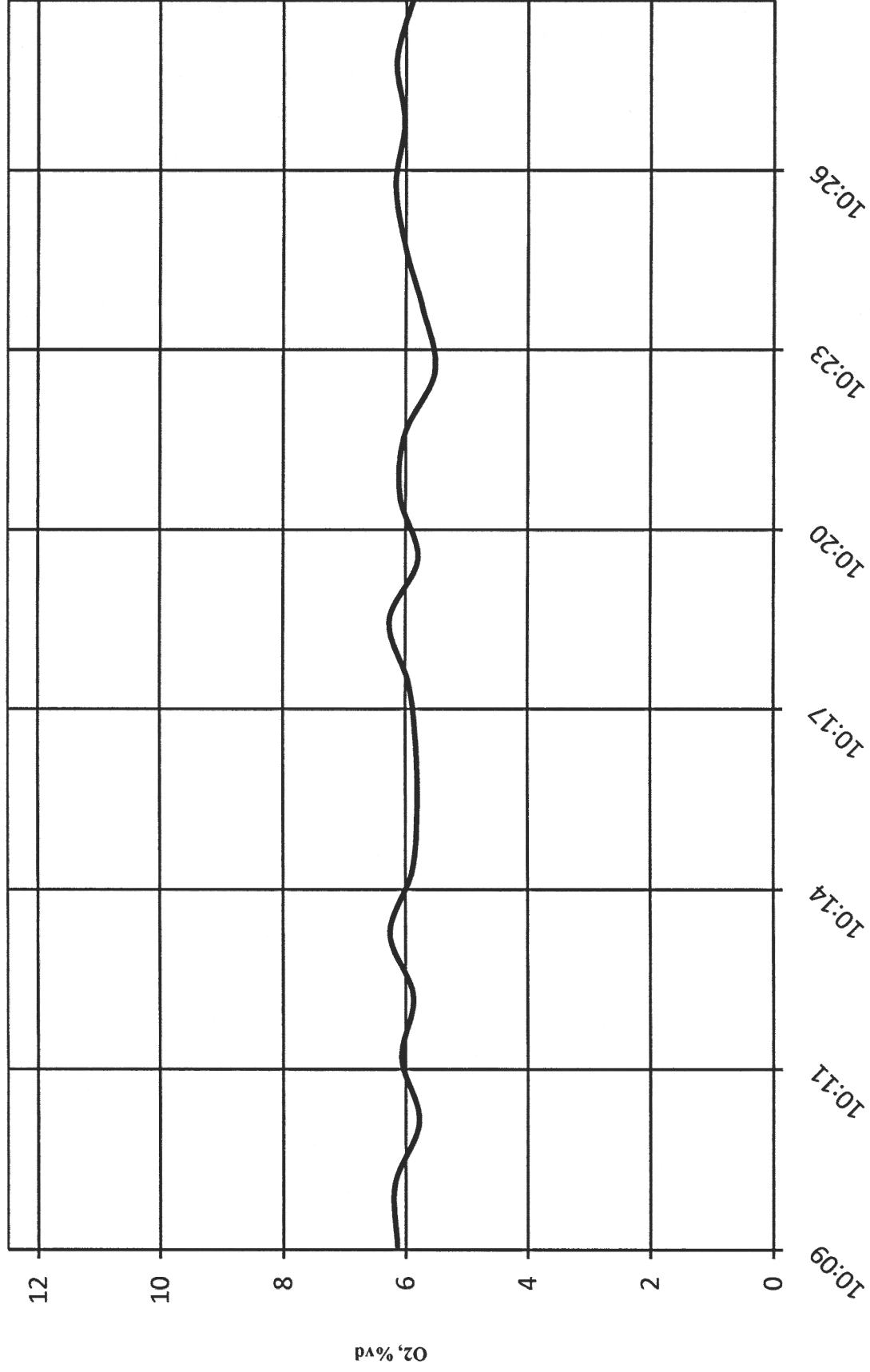
CJ-6483 / Borger Complex / #34 SRU / R2

Mean: 20.193



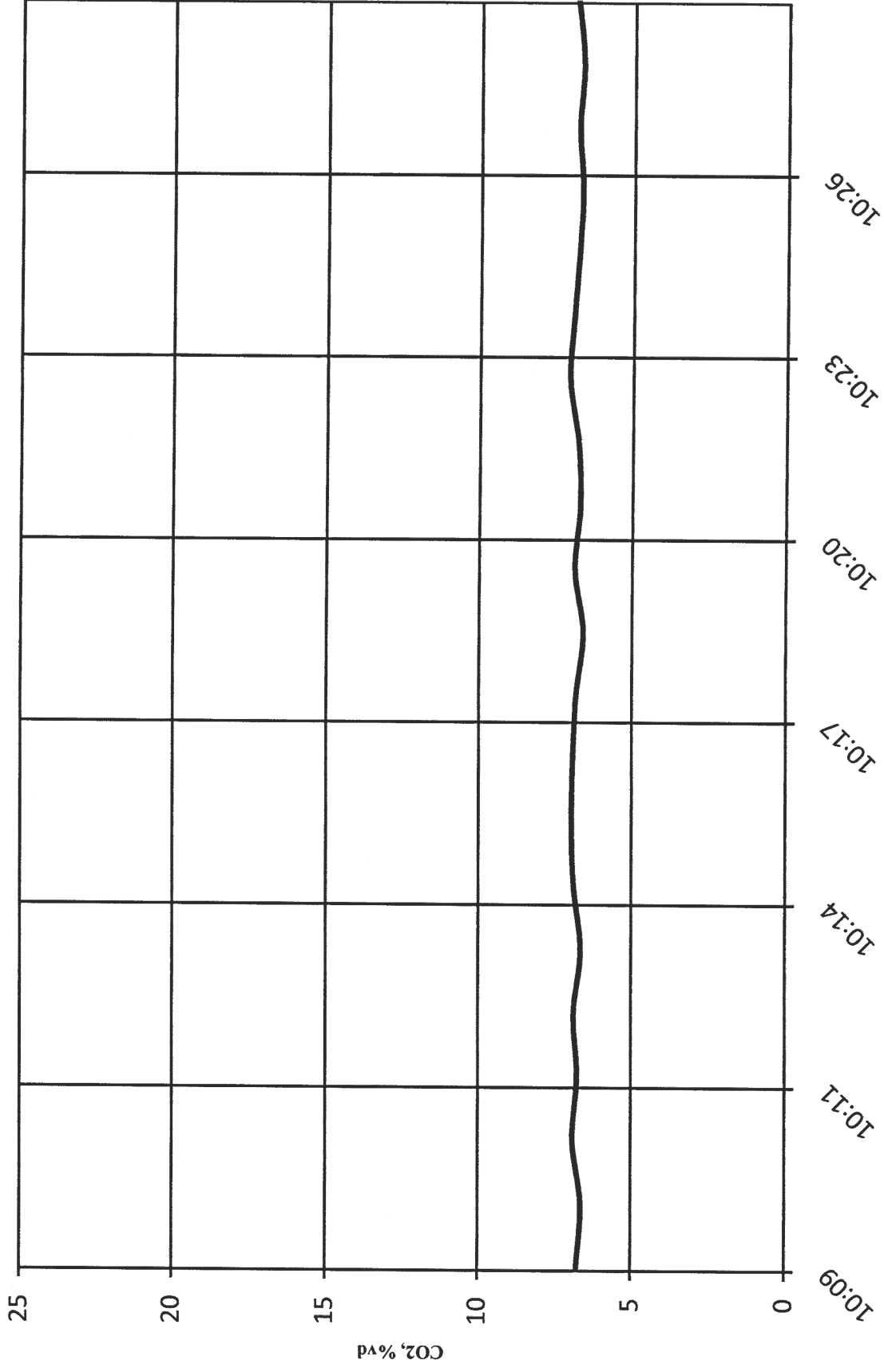
CJ-6483 / Borger Complex / #34 SRU / R2

Mean: 5.971



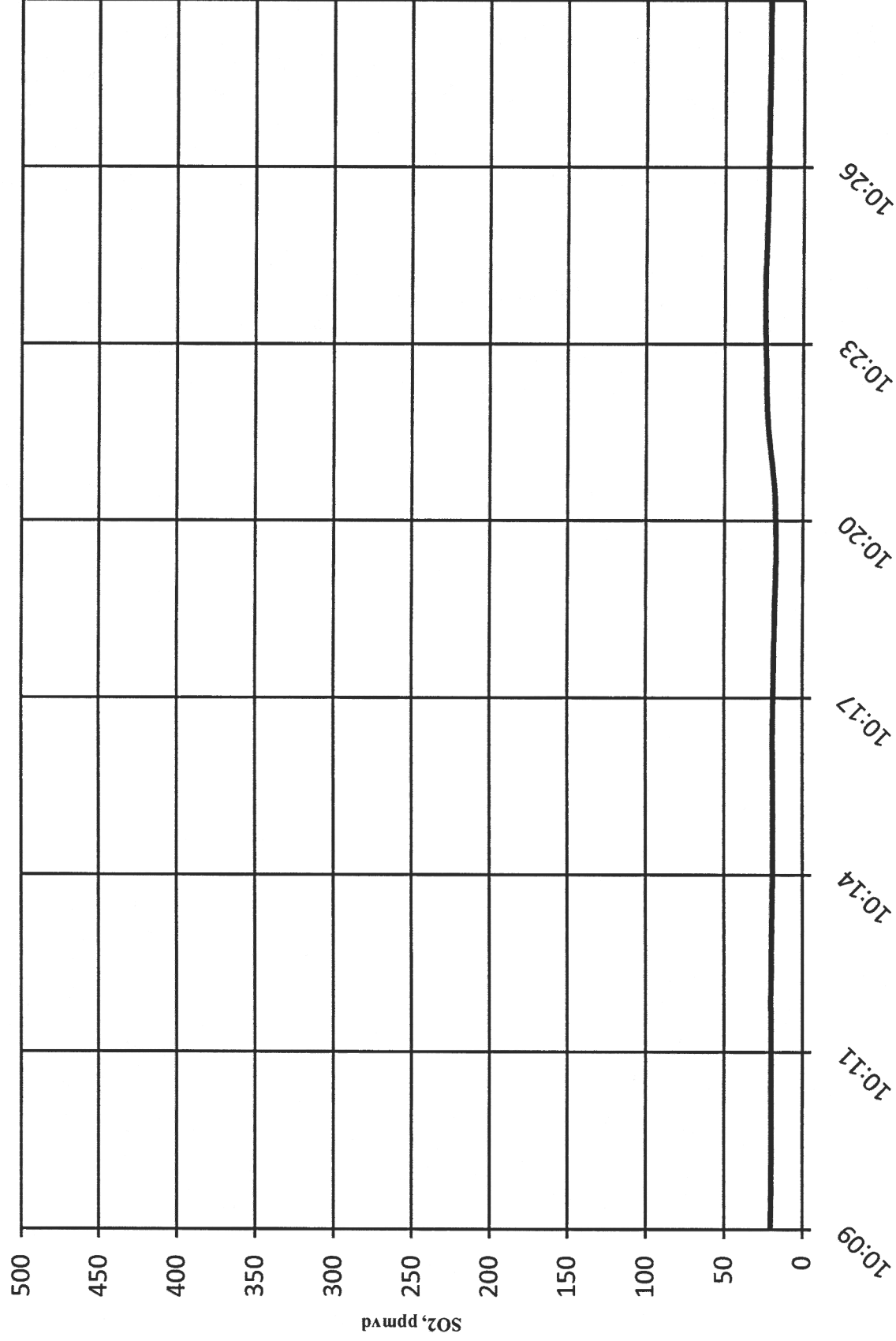
CJ-6483 / Borger Complex / #34 SRU / R2

Mean: 6.804



CJ-6483 / Borger Complex / #34 SRU / R2

Mean: 20.454



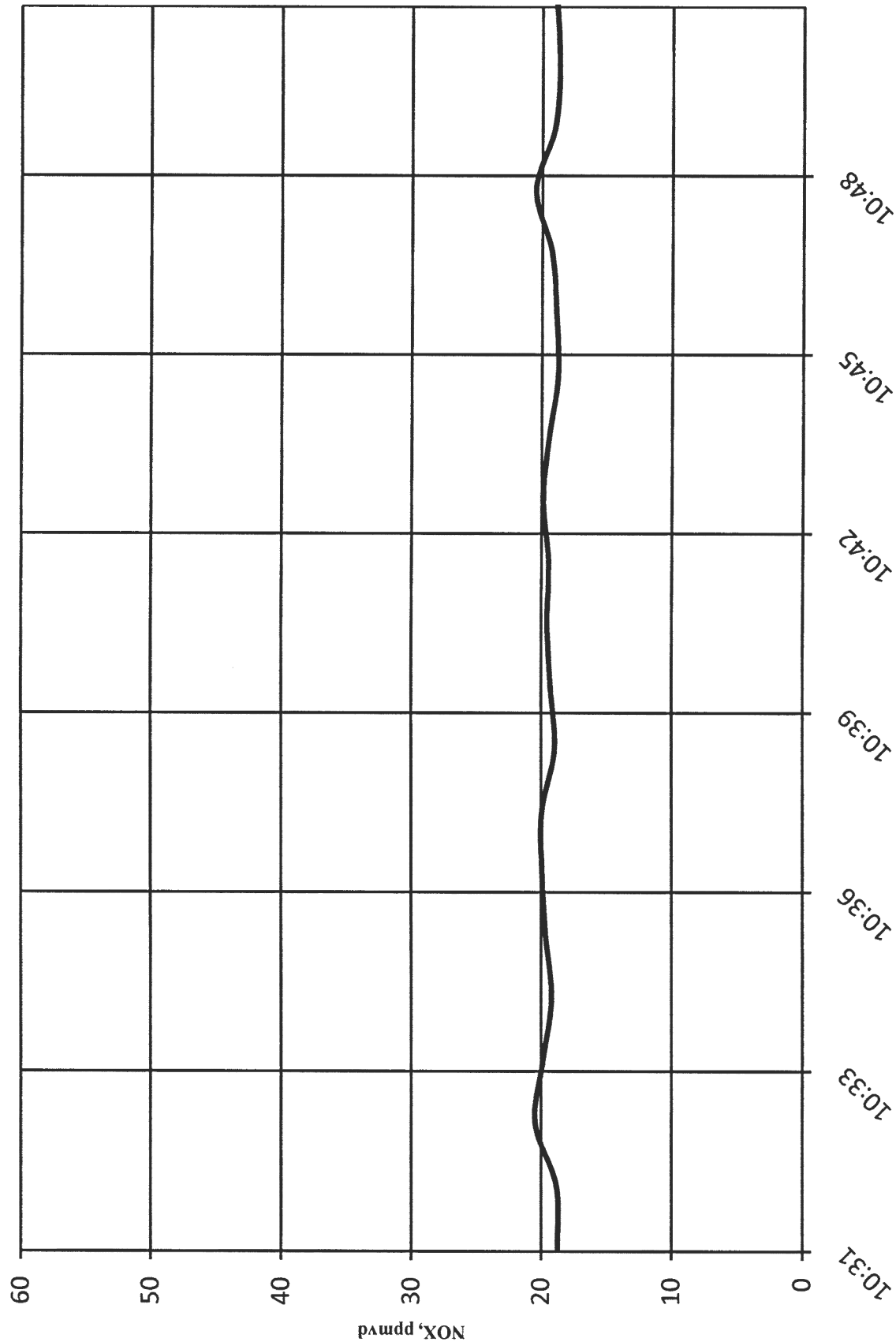
Time - 1 Min. Intervals

CJ-6483 / Borger Complex / #34 SRU / R3

	ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
	Mean -->	19.393	562.690	6.003	6.845	18.477	53.678	-0.194	16.473
Time - 1 Min. Avgs		ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 10:31		18.750	759.180	6.740	6.360	19.630	53.710	-0.180	14.670
3/4/2011 10:32		18.838	647.885	6.038	6.739	19.638	53.710	-0.183	14.613
3/4/2011 10:33		20.458	428.434	5.661	6.993	19.923	53.710	-0.193	17.450
3/4/2011 10:34		19.867	532.048	6.093	6.700	19.458	53.710	-0.191	17.613
3/4/2011 10:35		19.203	631.983	6.060	6.738	18.938	53.710	-0.183	15.544
3/4/2011 10:36		19.658	526.238	5.824	6.953	18.847	53.710	-0.187	16.627
3/4/2011 10:37		19.929	459.684	5.615	7.090	19.220	53.710	-0.184	17.382
3/4/2011 10:38		19.955	498.797	5.741	7.023	19.163	53.694	-0.187	17.931
3/4/2011 10:39		18.972	598.358	6.166	6.730	18.611	53.710	-0.186	17.110
3/4/2011 10:40		19.288	488.868	5.673	7.028	18.666	53.694	-0.197	17.016
3/4/2011 10:41		19.550	560.353	6.077	6.816	18.739	53.582	-0.206	16.528
3/4/2011 10:42		19.451	556.771	5.964	6.905	18.389	53.694	-0.193	16.643
3/4/2011 10:43		19.874	532.536	5.888	6.983	18.173	53.678	-0.202	16.496
3/4/2011 10:44		19.448	606.429	6.198	6.721	17.711	53.581	-0.212	15.678
3/4/2011 10:45		18.758	622.624	6.163	6.755	17.139	53.646	-0.210	16.258
3/4/2011 10:46		18.893	572.103	6.068	6.821	17.514	53.583	-0.197	16.136
3/4/2011 10:47		19.257	565.285	5.913	6.914	17.628	53.678	-0.207	16.183
3/4/2011 10:48		20.490	477.377	5.892	6.949	18.043	53.694	-0.207	17.568
3/4/2011 10:49		19.036	604.900	6.273	6.733	17.734	53.646	-0.202	16.601
3/4/2011 10:50		18.694	604.768	6.123	6.858	17.328	53.678	-0.196	15.130
3/4/2011 10:51		18.896	541.879	5.901	6.941	17.539	53.710	-0.188	16.780

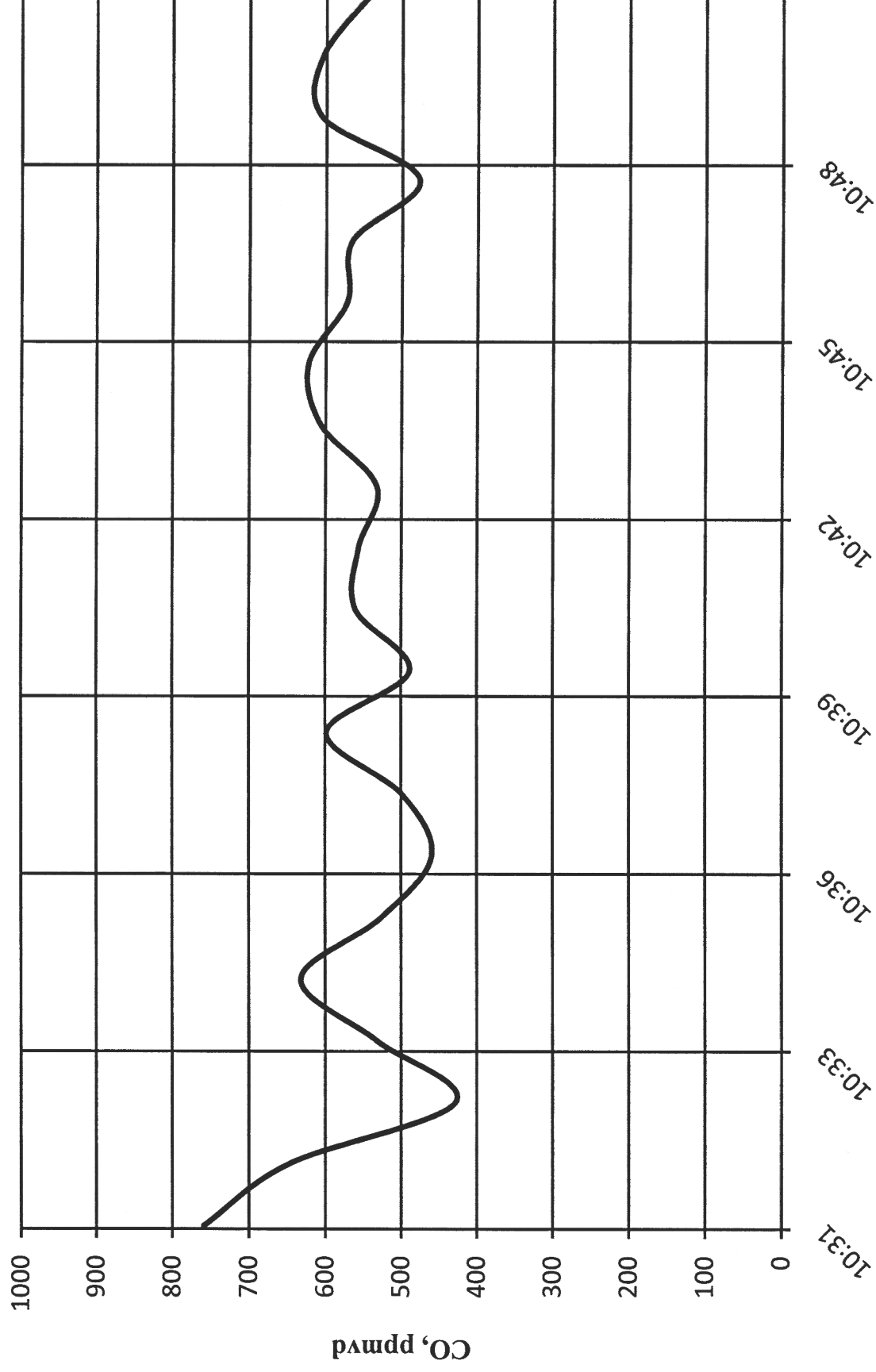
Mean: 19.393

CJ-6483 / Borger Complex / #34 SRU / R3



CJ-6483 / Borger Complex / #34 SRU / R3

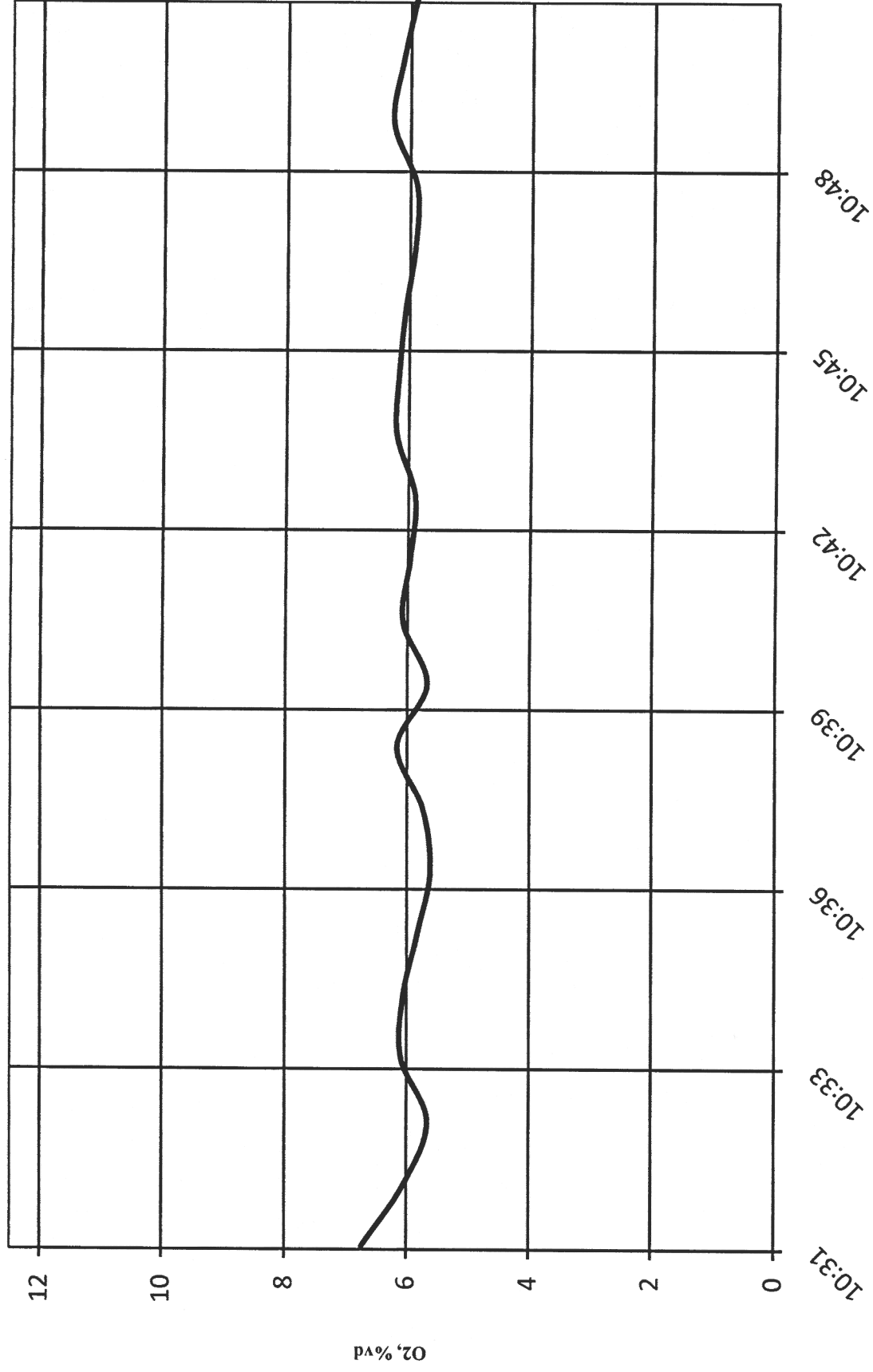
Mean: 562.690



Time - 1 Min. Intervals

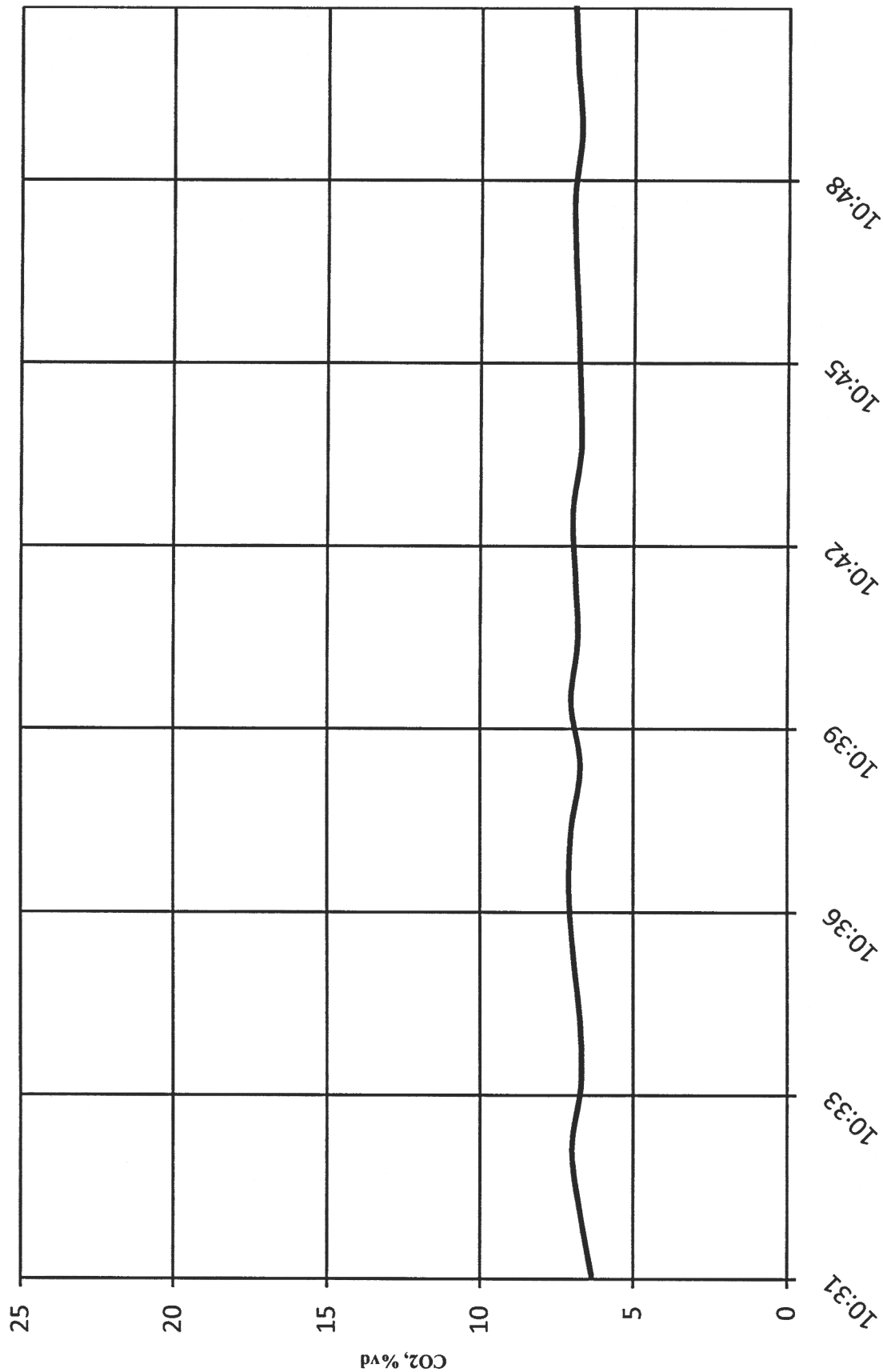
Mean: 6.003

CJ-6483 / Borger Complex / #34 SRU / R3



CJ-6483 / Borger Complex / #34 SRU / R3

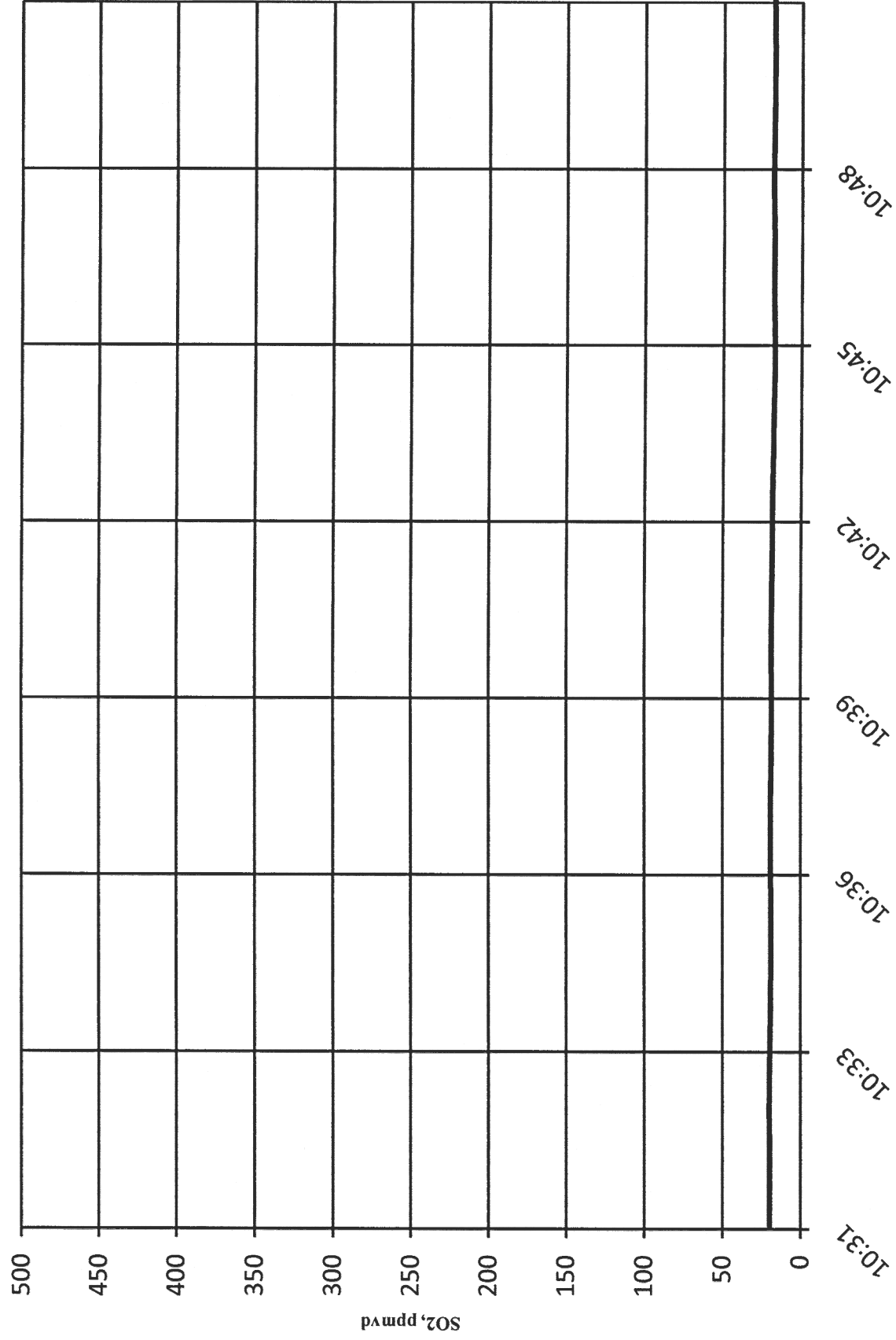
Mean: 6.845



Time - 1 Min. Intervals

CJ-6483 / Borger Complex / #34 SRU / R3

Mean: 18.477



Time - 1 Min. Intervals

Job No.: CJ-6483
Date: 3/4/2011
Customer: ConocoPhillips
Unit: Unit 34 SRU
Operator: JRV
File Name: C2

Field Data: Moisture/Velocity	
Run No.:	C2
Time of Run, T_R :	60 min.
Sample Box No.:	1
Meter Box No.:	CM#6
Stack Area, A_s :	5073.78 in ²

Barometer No.:	BAR6
Pitot Tube No.:	6
Pitot Tube, C_p :	0.787
Initial Pitot Leak:	X
Final Pitot Leak:	X
Assumed %M:	

Barometric Pressure, P _B :	26.83	C _P :	1.034
Ambient Temp., °F:	62	ΔH@:	1.776
Stack Pressure, P _S :	-0.79	in. H ₂ O =	26.77
Initial Leak @:	15.0	in. Hg =	0.000
Final Leak @:	6.5	in. Hg =	0.000
Balance No.:	BAL6		

C _q =	1.022	%Δ Must	Avg ΔP _s	Avg P _m	Avg T _s	Avg T _m	
%Δ =	1.1	Be ≤ 5.0	Avg (ΔP _s) ^{1/2}	Max Vacuum	6.5	31.042, ft ³ x C _F	32.097, ft ³
						Volume DGM	= V _m

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total
Final Wt, gm	820.8	740.0	599.1	910.9			3070.8
Initial Wt, gm	730.3	737.2	598.6	904.9			2971.0
Difference, gm	90.5	2.8	0.5	6.0			99.8

$= V_w$

$V_{M\text{ std}} = 17.64 \times V_M \times [(P_{B^*}(P_M / 13.6)) + T_M]$
 $Q_{M\text{ std}} = V_{M\text{ std}} \div T_R$
 $V_{W\text{ gas}} = 0.04715 \times V_w$
 $\%M = V_{W\text{ gas}} \times 100 \div (V_{M\text{ std}} + V_{W\text{ gas}})$

28.564	DSCF
0.476	DSCFM
4.706	SCF
14.144	%

	RM 3 or 3A Data		in. H ₂ O		dry fract
	%CO ₂	%O ₂	Avg. ΔP	M _D = (100 - %M) ÷ 100	
QA/QC Check:	6.938		0.031		
Completeness	6.298		0.174		29.362 lb/lbmol
Legibility			0.800		27.755 lb/lbmol
Accuracy			1181		1045.1 FPM
Specifications	86.764		1641		36825 ACFM
Reasonableness	37.729		73		9099 DSCFM
			533		10598 WSCFM

$$MW_D = (\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + (\%N_2 + \%CO) \times 0.28$$

$$MW = M_D \times MW_D + 18 (1 - M_D)$$

$$V_S = 5129.4 \times C_P \times (T_S \div (P_S \times MW))^{1/2} \times Avg(\Delta P_S)^{1/2}$$

$$Q_A = (V_S \times A_S) \div 144$$

$$Q_S = (0.1225 \times V_S \times M_D \times P_S \times A_S) \div T_S$$

$$Q_W = Q_S \div M_D$$

$$M_D = (100 - \%M) \div 100$$

Checked by:

Operator (Signature/Date)

Project Coordinator (Signature/Date)

4/18/2011 Page #1

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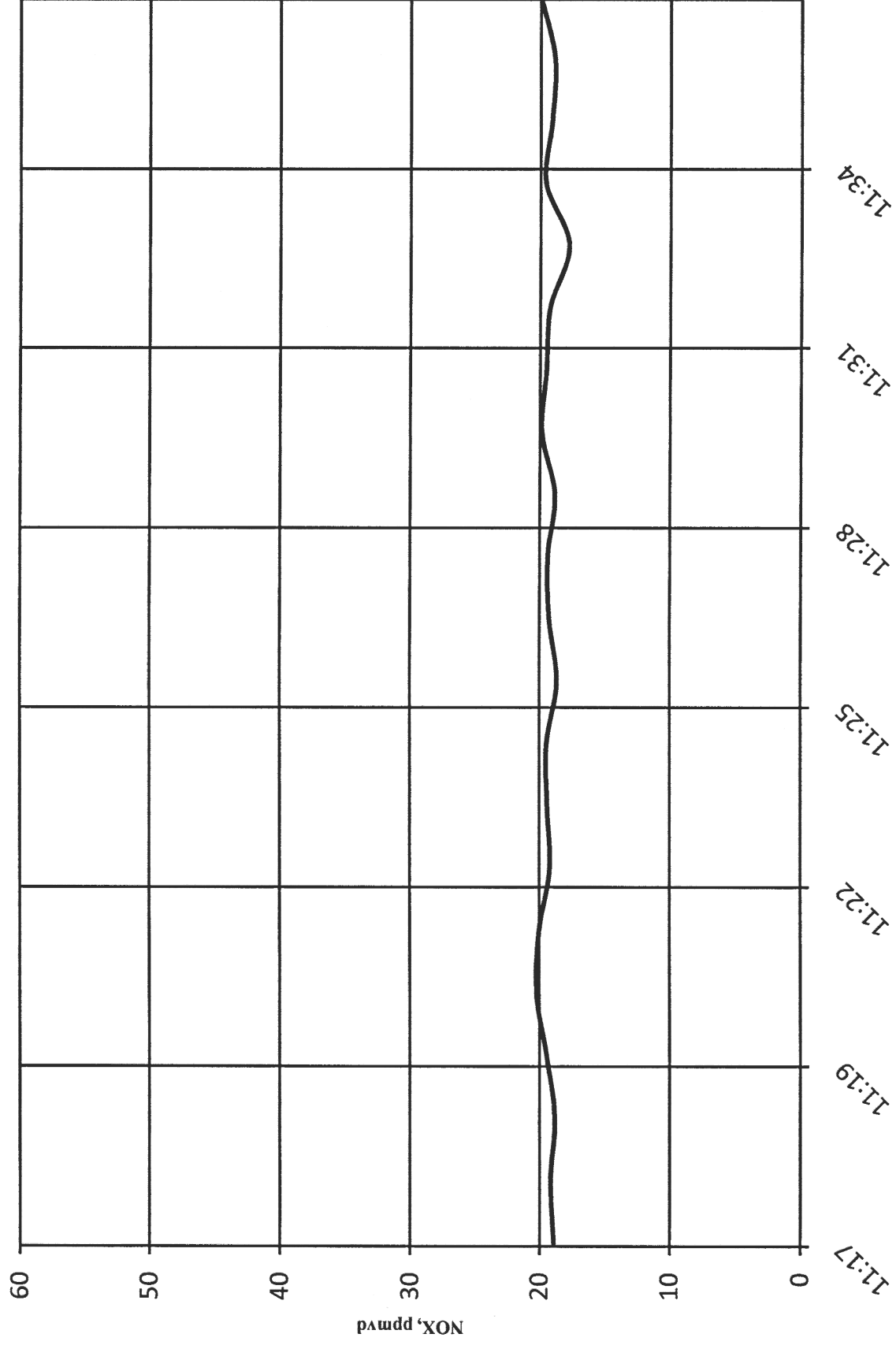
4/18/2011 FIELDAT.XLS

CJ-6483 / Borger Complex / #34 SRU / R4

ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
Mean -->	19.293	585.450	6.255	6.899	16.286	53.352	-0.195	16.327
Time - 1 Min. Avgs	ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 11:17	18.940	567.770	6.190	6.850	16.700	53.710	-0.190	17.820
3/4/2011 11:18	19.170	591.113	6.322	6.844	16.708	53.694	-0.194	16.326
3/4/2011 11:19	18.836	612.663	6.190	6.922	16.772	53.662	-0.197	15.883
3/4/2011 11:20	19.468	528.369	5.996	7.021	16.813	52.818	-0.197	16.663
3/4/2011 11:21	20.241	469.270	5.829	7.118	16.723	53.354	-0.208	17.128
3/4/2011 11:22	20.044	532.163	6.138	6.934	16.812	51.774	-0.202	17.101
3/4/2011 11:23	19.224	599.562	6.273	6.862	16.853	51.190	-0.209	15.981
3/4/2011 11:24	19.421	581.722	6.140	6.941	16.592	52.653	-0.195	16.348
3/4/2011 11:25	19.477	541.584	6.195	6.916	16.340	53.663	-0.193	16.897
3/4/2011 11:26	18.687	623.748	6.271	6.818	16.260	53.663	-0.198	15.763
3/4/2011 11:27	19.278	578.418	6.243	6.883	16.259	53.645	-0.193	16.099
3/4/2011 11:28	19.403	531.900	6.152	6.984	16.113	53.581	-0.196	16.310
3/4/2011 11:29	18.860	641.048	6.483	6.745	16.039	53.678	-0.189	15.900
3/4/2011 11:30	19.863	557.747	6.233	6.973	16.178	53.678	-0.193	16.228
3/4/2011 11:31	19.518	576.351	6.273	6.912	16.169	53.646	-0.193	16.426
3/4/2011 11:32	19.256	699.773	6.884	6.565	15.685	53.646	-0.195	15.444
3/4/2011 11:33	17.804	668.751	6.290	6.926	15.522	53.694	-0.198	15.183
3/4/2011 11:34	19.600	523.080	6.113	7.082	15.831	53.646	-0.193	17.501
3/4/2011 11:35	19.138	655.126	6.615	6.759	15.958	53.646	-0.193	16.107
3/4/2011 11:36	18.918	651.433	6.353	6.873	15.733	53.694	-0.191	15.243
3/4/2011 11:37	20.025	562.875	6.193	6.962	15.966	53.678	-0.193	16.522

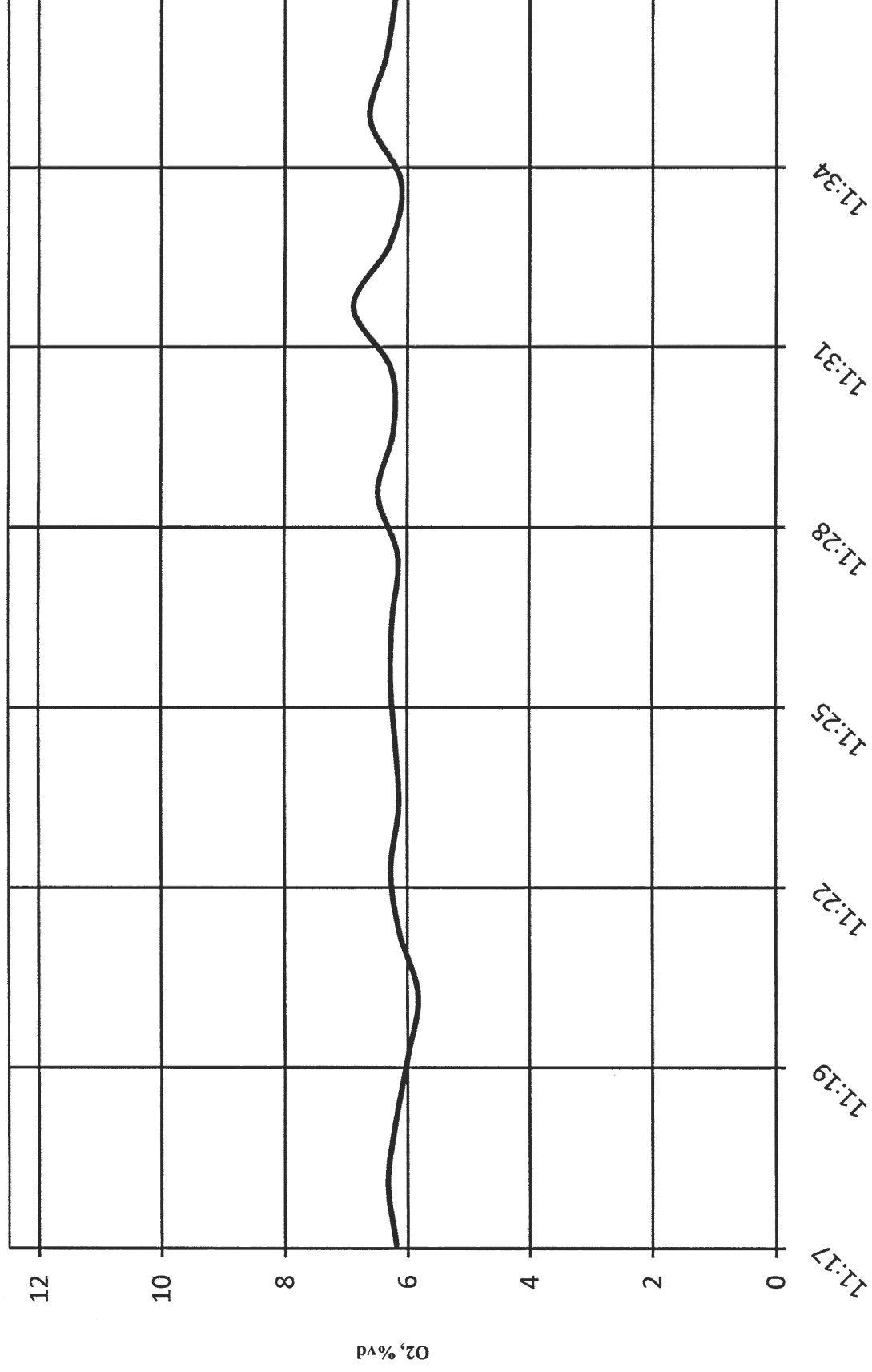
CJ-6483 / Borger Complex / #34 SRU / R4

Mean: 19.293



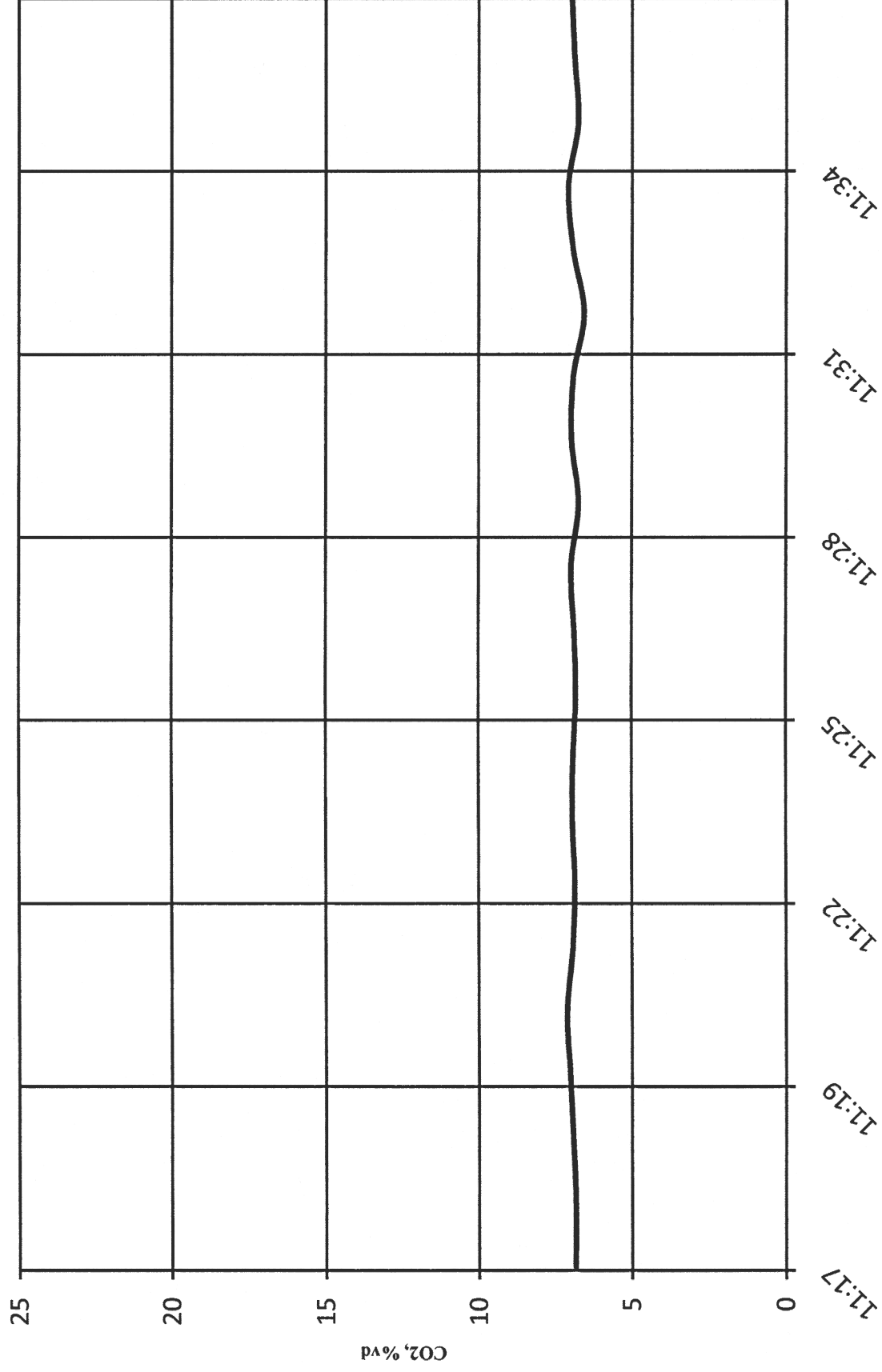
CJ-6483 / Borger Complex / #34 SRU / R4

Mean: 6.255



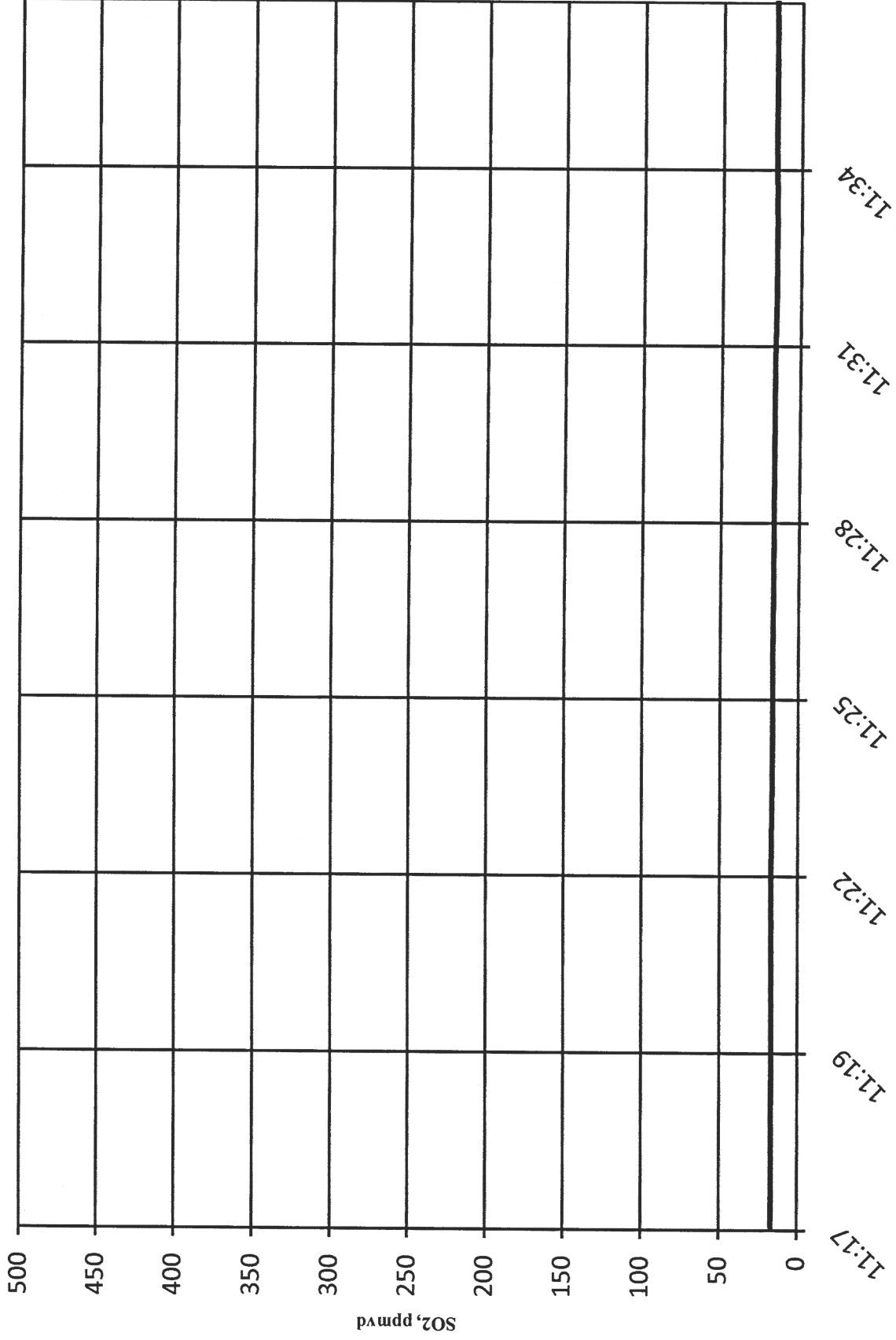
CJ-6483 / Borger Complex / #34 SRU / R4

Mean: 6.899



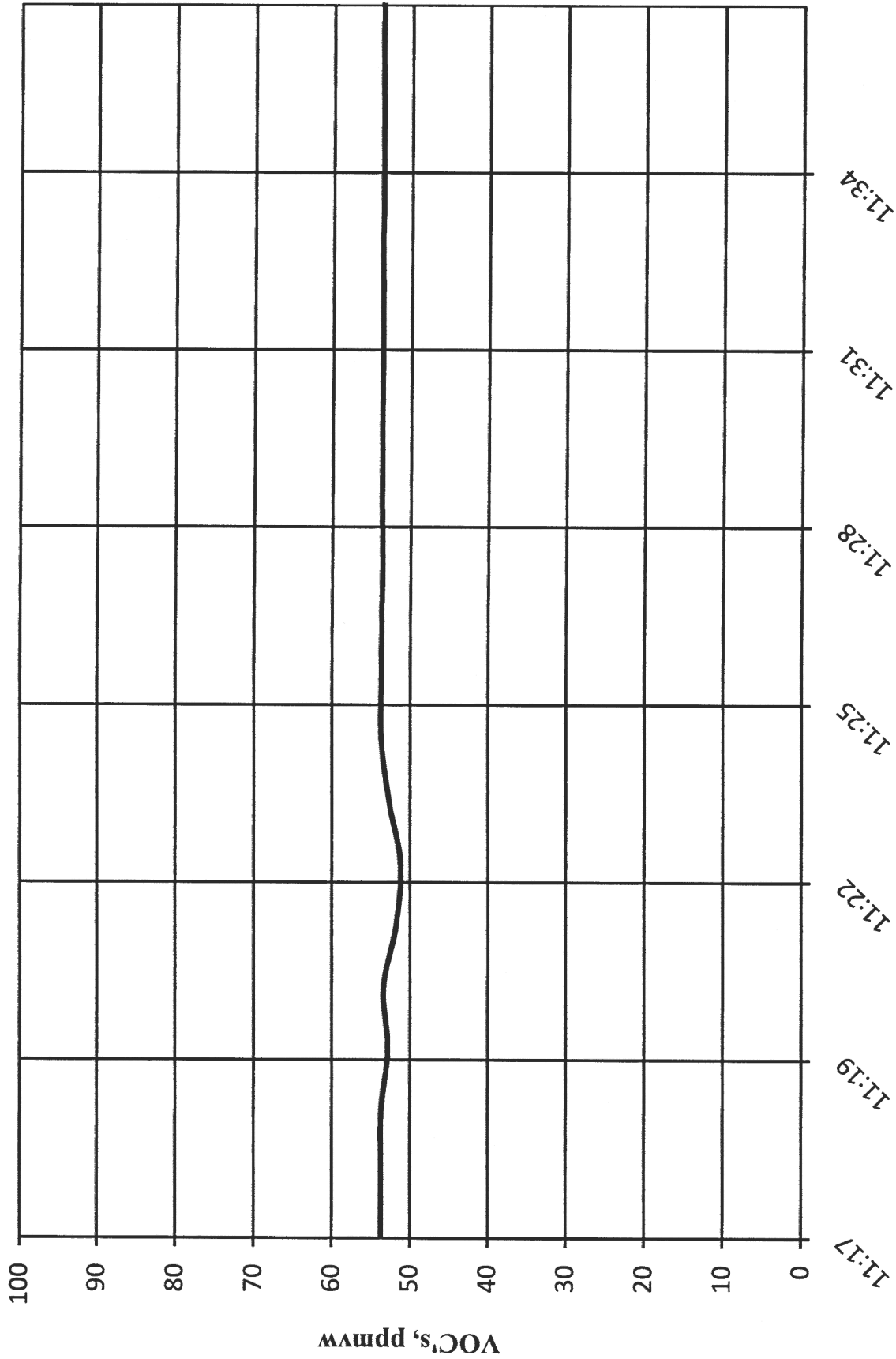
Mean: 16.286

CJ-6483 / Borger Complex / #34 SRU / R4



CJ-6483 / Borger Complex / #34 SRU / R4

Mean: 53.352

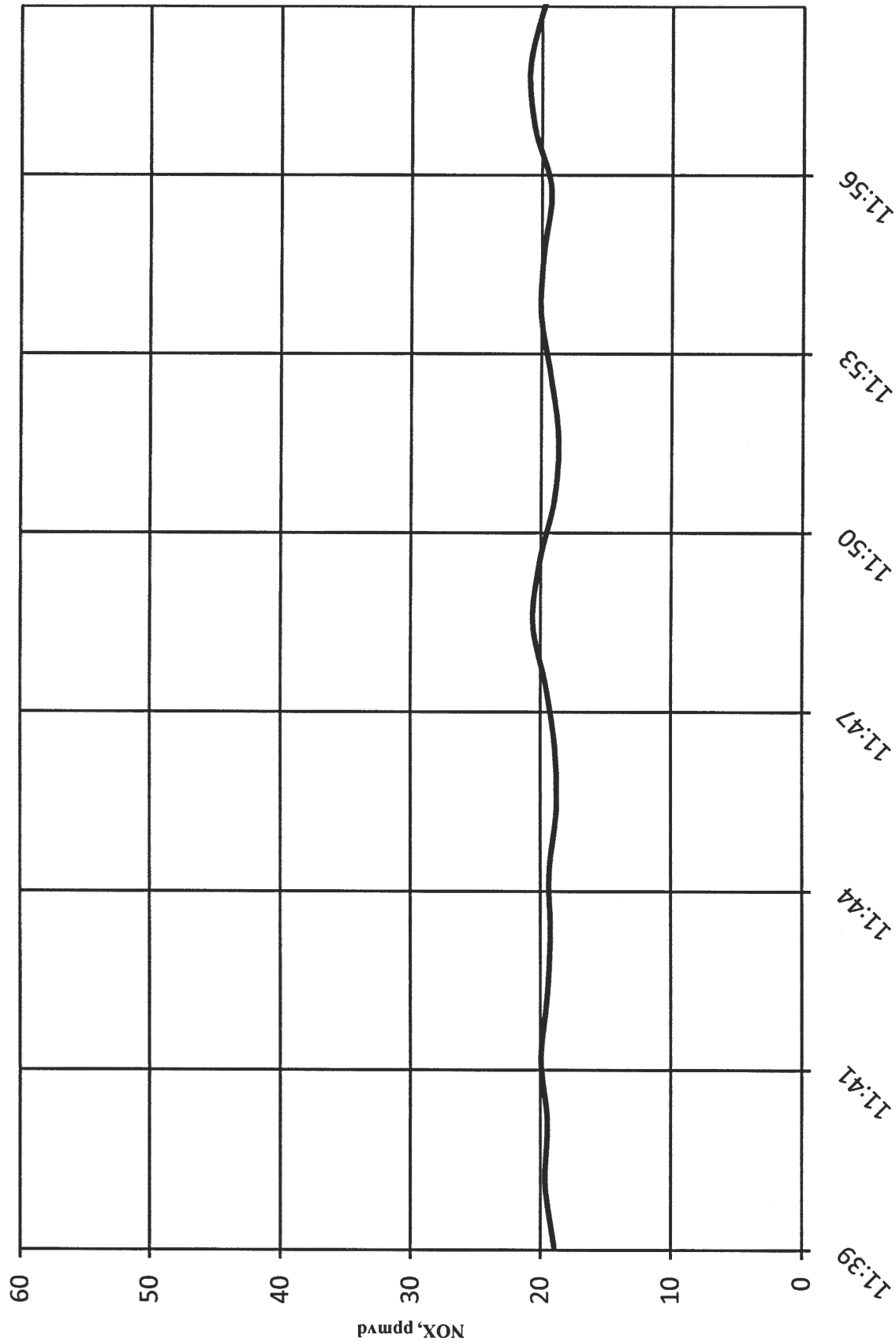


CJ-6483 / Borger Complex / #34 SRU / R5

ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
Mean -->	19.596	575.753	6.396	6.962	11.598	53.631	-0.193	16.561
Time - 1 Min. Avgs	ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 11:39	18.970	512.300	5.620	7.560	16.020	53.320	-0.210	15.670
3/4/2011 11:40	19.643	531.868	6.395	6.975	16.016	53.646	-0.207	16.703
3/4/2011 11:41	19.480	549.187	6.228	7.045	15.684	53.710	-0.185	16.385
3/4/2011 11:42	19.956	509.376	6.223	7.046	15.765	53.678	-0.192	17.073
3/4/2011 11:43	19.488	590.787	6.649	6.786	15.220	53.581	-0.188	16.095
3/4/2011 11:44	19.238	593.455	6.537	6.828	14.233	53.598	-0.207	16.218
3/4/2011 11:45	19.342	613.818	6.600	6.783	12.995	53.598	-0.198	16.358
3/4/2011 11:46	18.798	660.204	6.756	6.691	11.996	53.646	-0.201	16.159
3/4/2011 11:47	18.908	637.647	6.544	6.842	11.141	53.694	-0.194	15.830
3/4/2011 11:48	19.599	638.054	6.554	6.889	10.326	53.694	-0.194	15.528
3/4/2011 11:49	20.605	522.463	6.187	7.151	10.114	53.678	-0.190	16.823
3/4/2011 11:50	20.114	561.491	6.442	6.929	10.066	53.647	-0.191	17.591
3/4/2011 11:51	18.986	665.936	6.707	6.771	9.766	53.646	-0.197	16.081
3/4/2011 11:52	18.685	648.015	6.608	6.806	9.628	53.663	-0.193	15.604
3/4/2011 11:53	19.286	589.112	6.438	6.925	9.465	53.678	-0.185	16.774
3/4/2011 11:54	20.053	582.357	6.476	6.898	9.018	53.663	-0.187	16.832
3/4/2011 11:55	19.828	564.452	6.356	6.979	9.190	53.403	-0.193	16.677
3/4/2011 11:56	19.287	612.224	6.405	6.942	9.188	53.678	-0.187	16.143
3/4/2011 11:57	20.576	474.463	6.015	7.220	9.197	53.662	-0.189	18.115
3/4/2011 11:58	20.915	448.421	6.093	7.218	9.328	53.678	-0.193	18.225
3/4/2011 11:59	19.780	585.191	6.502	6.938	9.205	53.694	-0.193	16.908

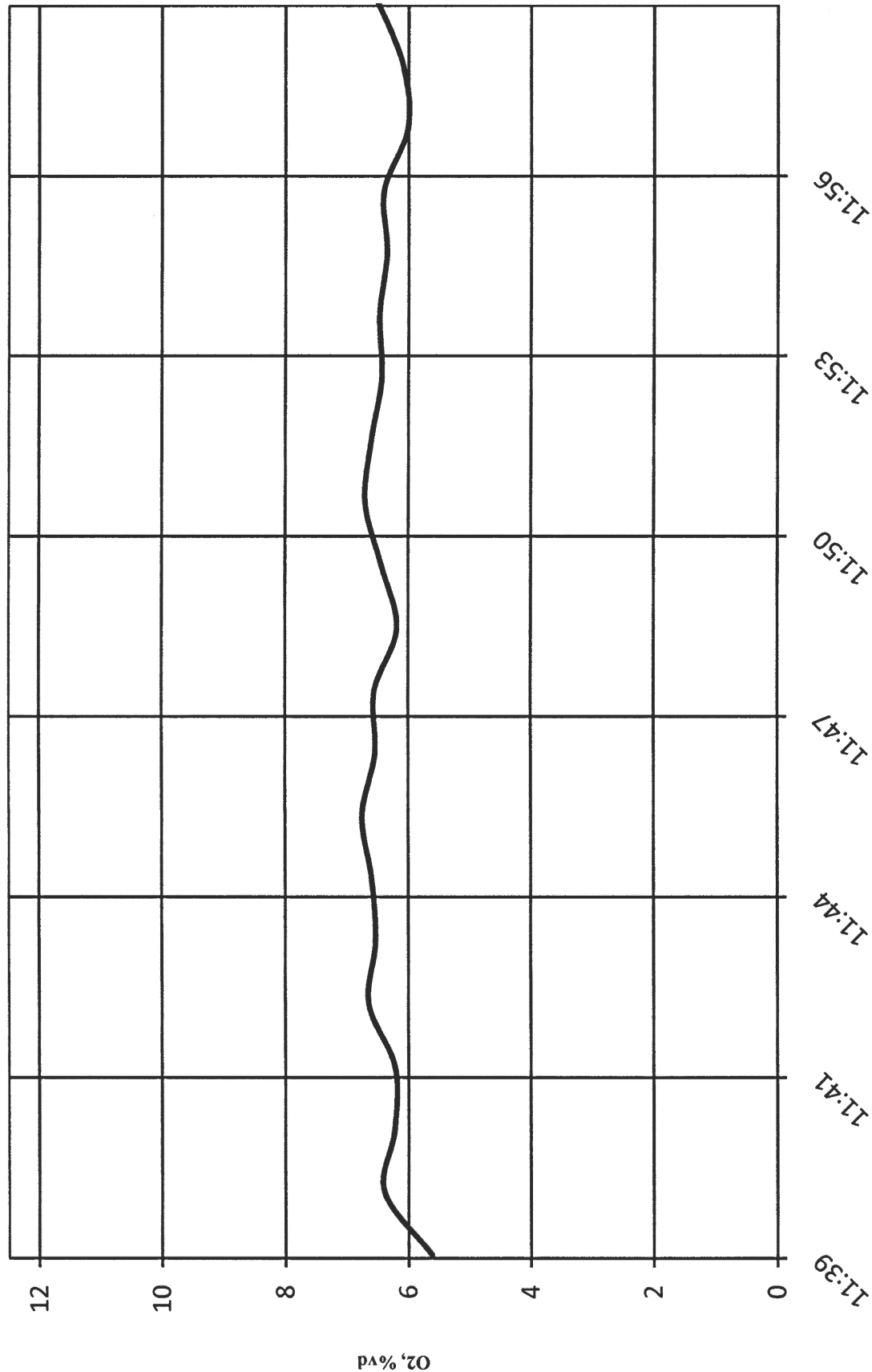
CJ-6483 / Borger Complex / #34 SRU / R5

Mean: 19.596



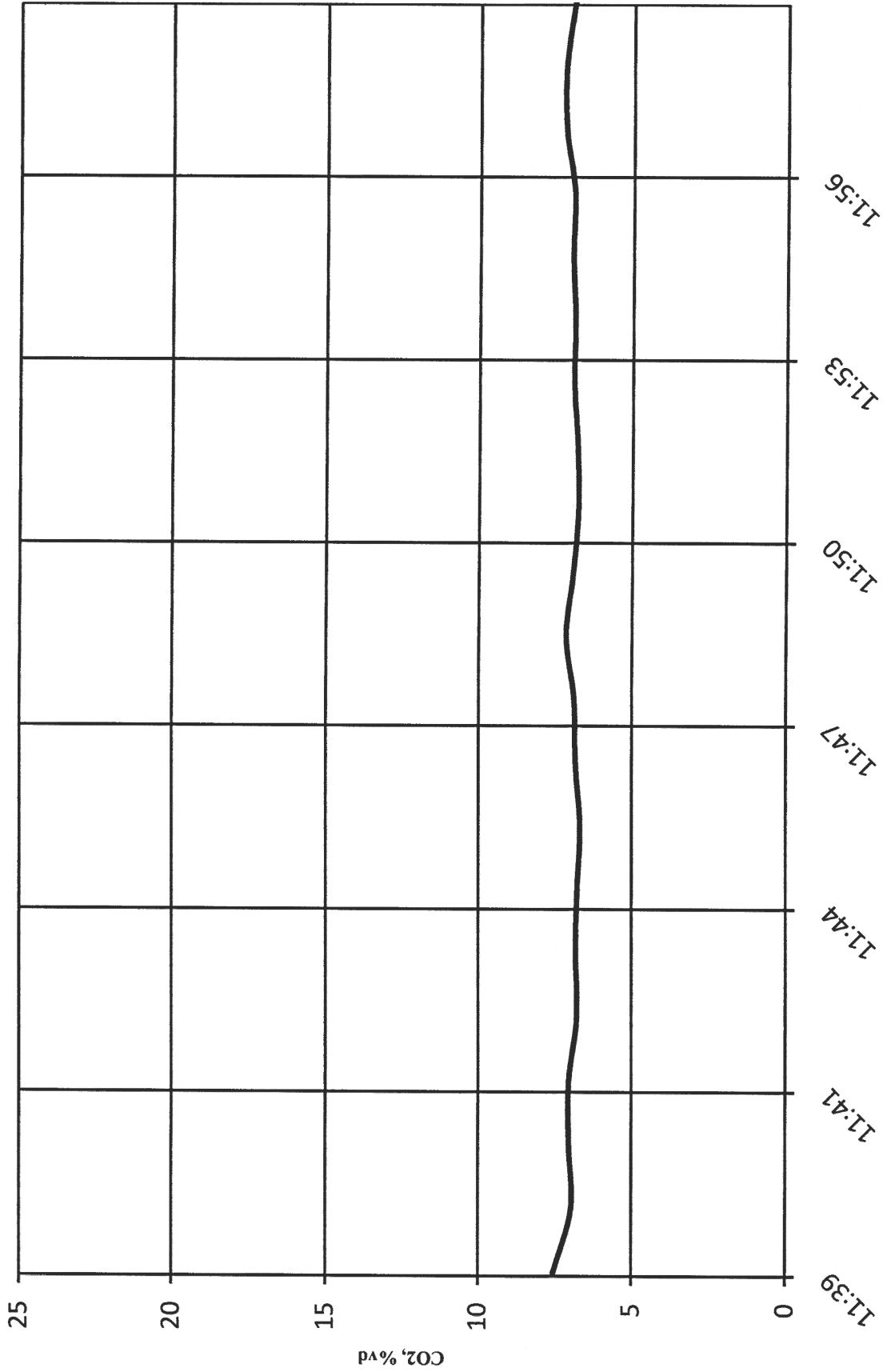
CJ-6483 / Borger Complex / #34 SRU / R5

Mean: 6.396



CJ-6483 / Borger Complex / #34 SRU / R5

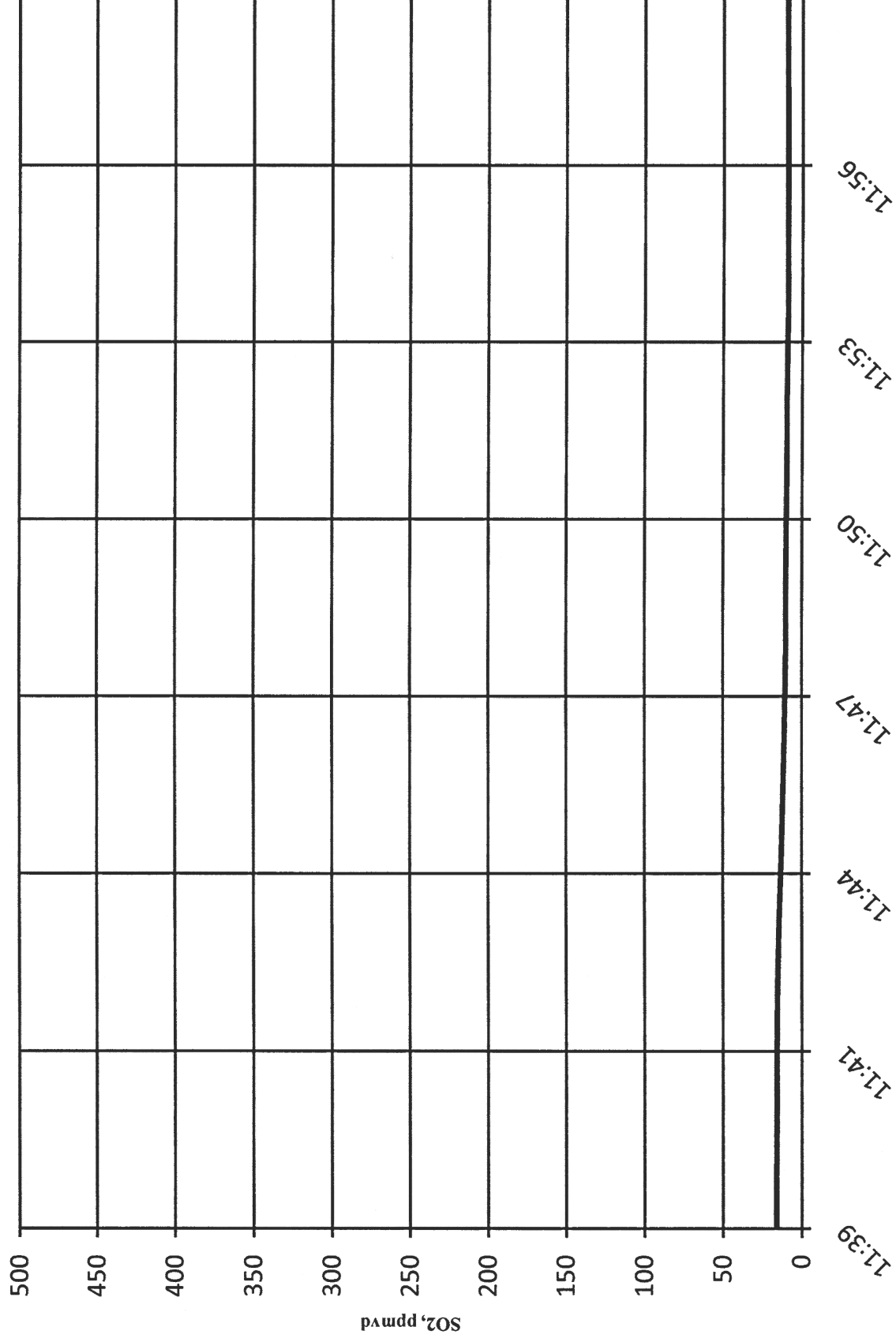
Mean: 6.962



Time - 1 Min. Intervals

Mean: 11.598

CJ-6483 / Borger Complex / #34 SRU / R5



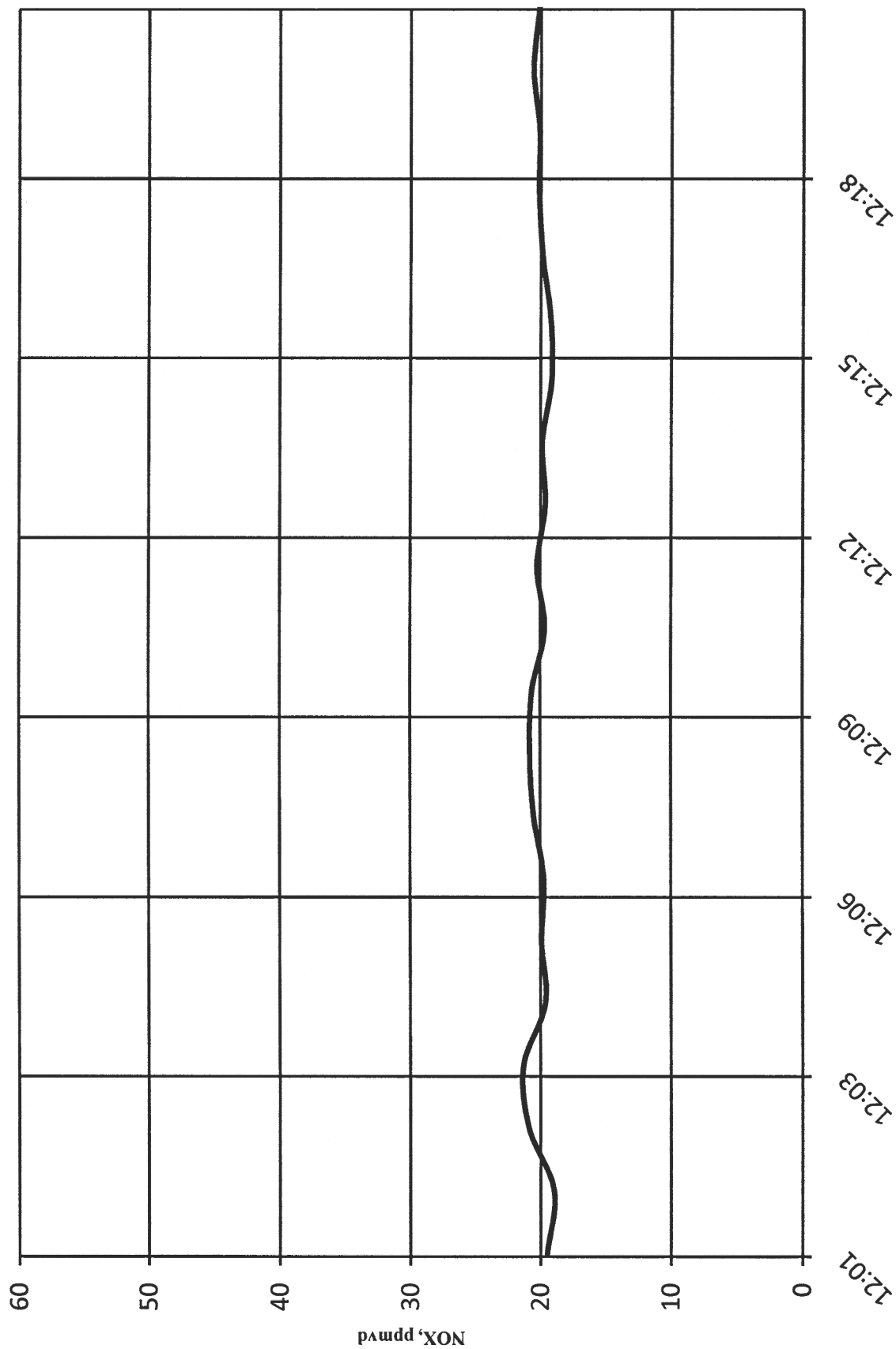
Time - 1 Min. Intervals

CJ-6483 / Borger Complex / #34 SRU / R6

	ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
	Mean -->	20.034	565.038	6.353	7.033	8.743	53.596	-0.196	16.937
Time - 1 Min. Avgs		ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 12:01		19.510	606.840	7.020	6.630	9.180	53.710	-0.230	17.460
3/4/2011 12:02		18.983	672.120	6.637	6.796	9.115	53.582	-0.200	15.788
3/4/2011 12:03		20.902	406.592	5.681	7.426	8.961	53.582	-0.192	17.790
3/4/2011 12:04		21.324	491.014	6.176	7.118	9.223	53.516	-0.198	17.818
3/4/2011 12:05		19.636	577.066	6.498	6.923	9.059	53.453	-0.198	17.469
3/4/2011 12:06		19.918	543.311	6.377	7.005	8.831	53.564	-0.194	17.313
3/4/2011 12:07		19.738	574.772	6.385	7.002	8.790	53.678	-0.190	17.032
3/4/2011 12:08		20.521	554.053	6.278	7.070	8.830	53.631	-0.205	17.201
3/4/2011 12:09		20.818	523.974	6.203	7.118	8.790	53.630	-0.195	16.861
3/4/2011 12:10		20.657	523.519	6.296	7.068	8.798	53.583	-0.195	16.828
3/4/2011 12:11		19.683	557.291	6.213	7.088	8.635	53.598	-0.192	16.384
3/4/2011 12:12		20.268	514.859	6.350	7.028	8.610	53.565	-0.188	17.805
3/4/2011 12:13		19.643	544.890	6.396	7.018	8.513	53.582	-0.190	17.834
3/4/2011 12:14		19.873	677.068	6.693	6.833	8.398	53.500	-0.204	15.163
3/4/2011 12:15		19.162	646.534	6.631	6.898	8.309	53.517	-0.202	15.467
3/4/2011 12:16		19.251	583.335	6.396	7.034	8.423	53.566	-0.198	17.183
3/4/2011 12:17		19.880	588.623	6.238	7.114	8.505	53.598	-0.188	15.819
3/4/2011 12:18		20.162	562.663	6.273	7.116	8.536	53.694	-0.194	17.079
3/4/2011 12:19		20.110	559.148	6.158	7.202	8.538	53.615	-0.192	17.464
3/4/2011 12:20		20.573	577.229	6.203	7.147	8.773	53.678	-0.188	16.978
3/4/2011 12:21		20.107	580.908	6.318	7.071	8.798	53.694	-0.192	16.962

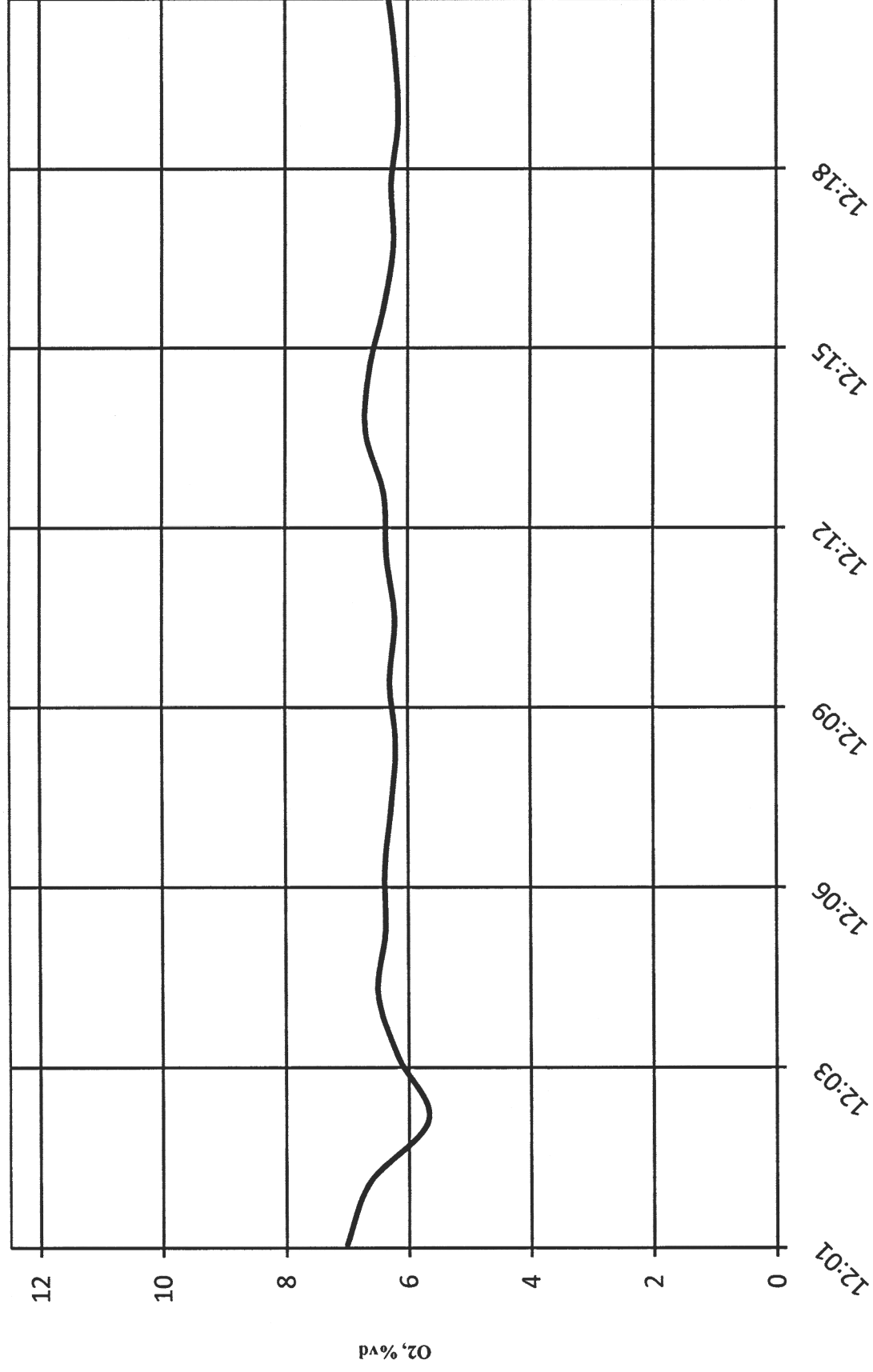
CJ-6483 / Borger Complex / #34 SRU / R6

Mean: 20.034



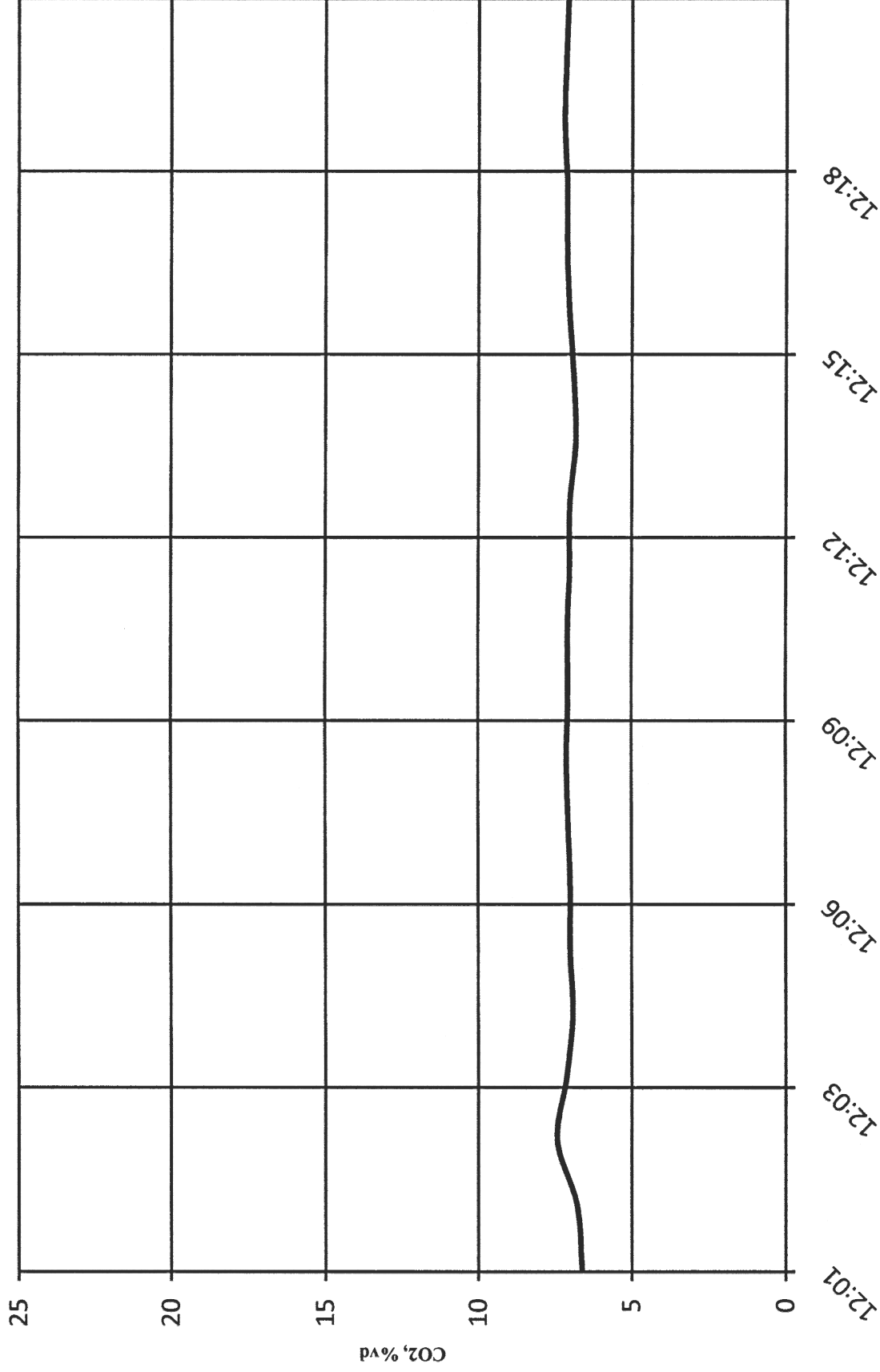
CJ-6483 / Borger Complex / #34 SRU / R6

Mean: 6.353



CJ-6483 / Borger Complex / #34 SRU / R6

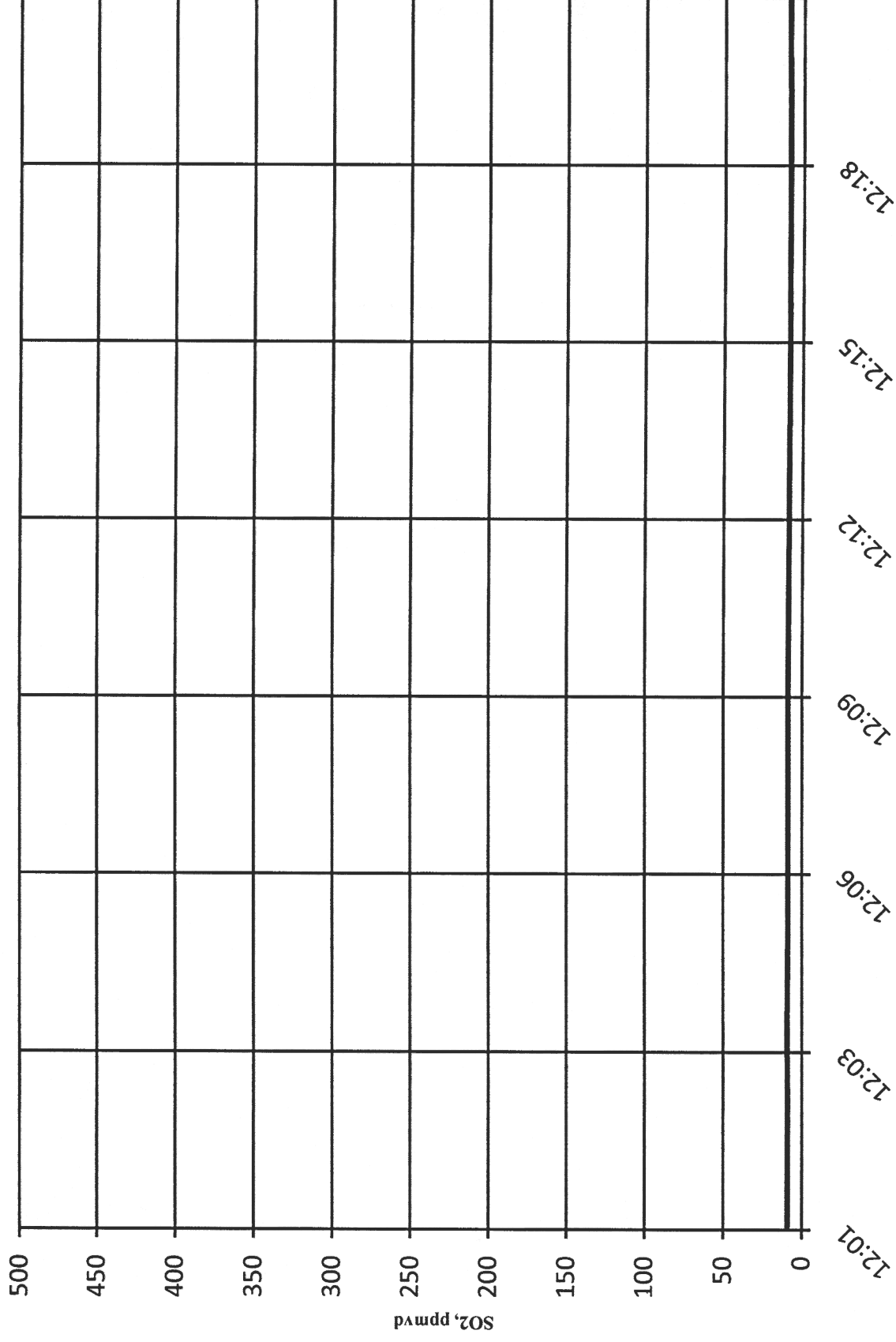
Mean: 7.033



Time - 1 Min. Intervals

Mean: 8.743

CJ-6483 / Borger Complex / #34 SRU / R6



$C_F: 1.034$

Date: 3/4/2011

Comer: ConocoPhillips

Unit: Unit 34 SRU

Operator: JRV

Name: C3

 $C_F: 1.034$

Run No.: C3

of Run, T_R : 60 min.

Sample Box No.: 1

ter Box No.: CM#6

Back Area, A_S: 5073.78 in²

 $C_F: 1.034$

Ambient Temp., °F:

Stack Pressure, P_s :

Initial Leak @:

Final Leak @:

Balance No.:

Checked by:

Operator (Signature/Date)

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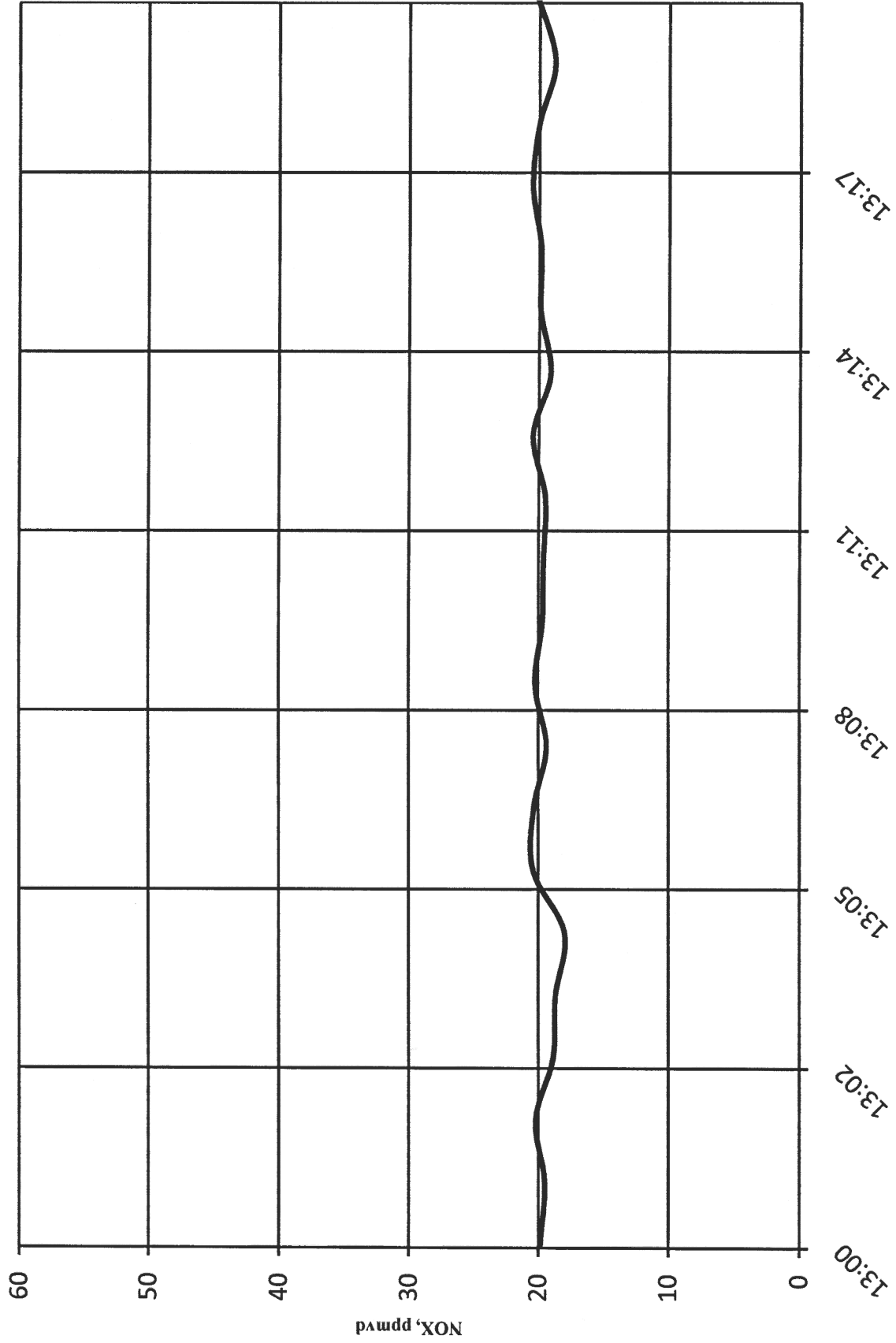
Project Coordinator (Signature/Date)
4/18/2011

CJ-6483 / Borger Complex / #34 SRU / R7

	ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
	Mean -->	19.666	571.985	6.468	7.049	7.682	22.845	-0.229	16.222
Time - 1 Min. Avgs		ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 13:00		19.860	672.660	7.080	6.630	8.010	52.730	-0.230	14.740
3/4/2011 13:01		19.516	573.553	6.229	7.128	7.999	36.538	-0.230	15.151
3/4/2011 13:02		20.199	547.638	6.573	6.988	8.016	3.858	-0.230	16.805
3/4/2011 13:03		18.868	694.938	6.772	6.877	7.918	10.203	-0.230	14.691
3/4/2011 13:04		18.678	734.343	7.038	6.715	7.787	-2.684	-0.229	14.277
3/4/2011 13:05		17.984	675.326	6.561	6.999	7.730	6.478	-0.230	14.345
3/4/2011 13:06		20.387	439.241	5.914	7.399	7.794	0.863	-0.230	17.548
3/4/2011 13:07		20.359	468.017	6.212	7.243	7.747	9.733	-0.230	17.486
3/4/2011 13:08		19.386	516.585	6.343	7.093	7.559	20.230	-0.230	17.126
3/4/2011 13:09		20.243	502.392	6.383	7.148	7.483	34.603	-0.230	17.408
3/4/2011 13:10		19.691	566.763	6.543	6.993	7.575	41.293	-0.230	16.729
3/4/2011 13:11		19.623	590.788	6.410	7.079	7.502	39.682	-0.230	16.338
3/4/2011 13:12		19.496	566.619	6.323	7.113	7.624	26.938	-0.230	16.233
3/4/2011 13:13		20.449	519.156	6.503	7.076	7.698	32.292	-0.230	17.570
3/4/2011 13:14		19.112	603.402	6.412	7.082	7.639	18.653	-0.230	15.842
3/4/2011 13:15		19.883	615.658	6.649	6.950	7.550	16.405	-0.230	15.814
3/4/2011 13:16		19.846	512.208	6.079	7.275	7.566	-2.848	-0.228	16.645
3/4/2011 13:17		20.494	477.263	6.319	7.141	7.542	15.593	-0.229	17.660
3/4/2011 13:18		20.018	561.768	6.645	6.943	7.460	30.614	-0.230	16.418
3/4/2011 13:19		18.793	620.654	6.441	7.057	7.519	38.639	-0.228	15.484
3/4/2011 13:20		20.101	552.718	6.406	7.118	7.623	49.952	-0.230	16.364

CJ-6483 / Borger Complex / #34 SRU / R7

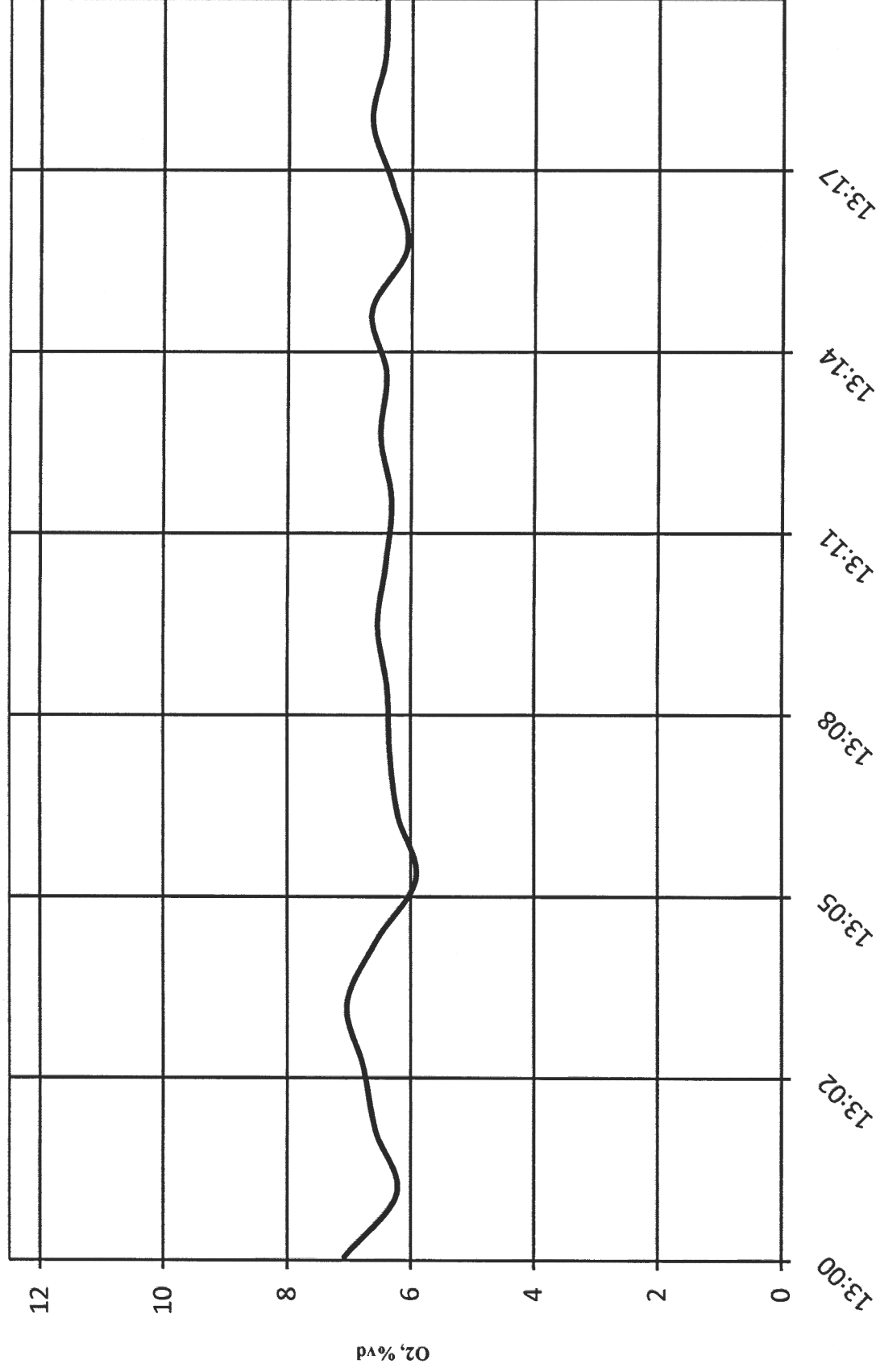
Mean: 19.666



Time - 1 Min. Intervals

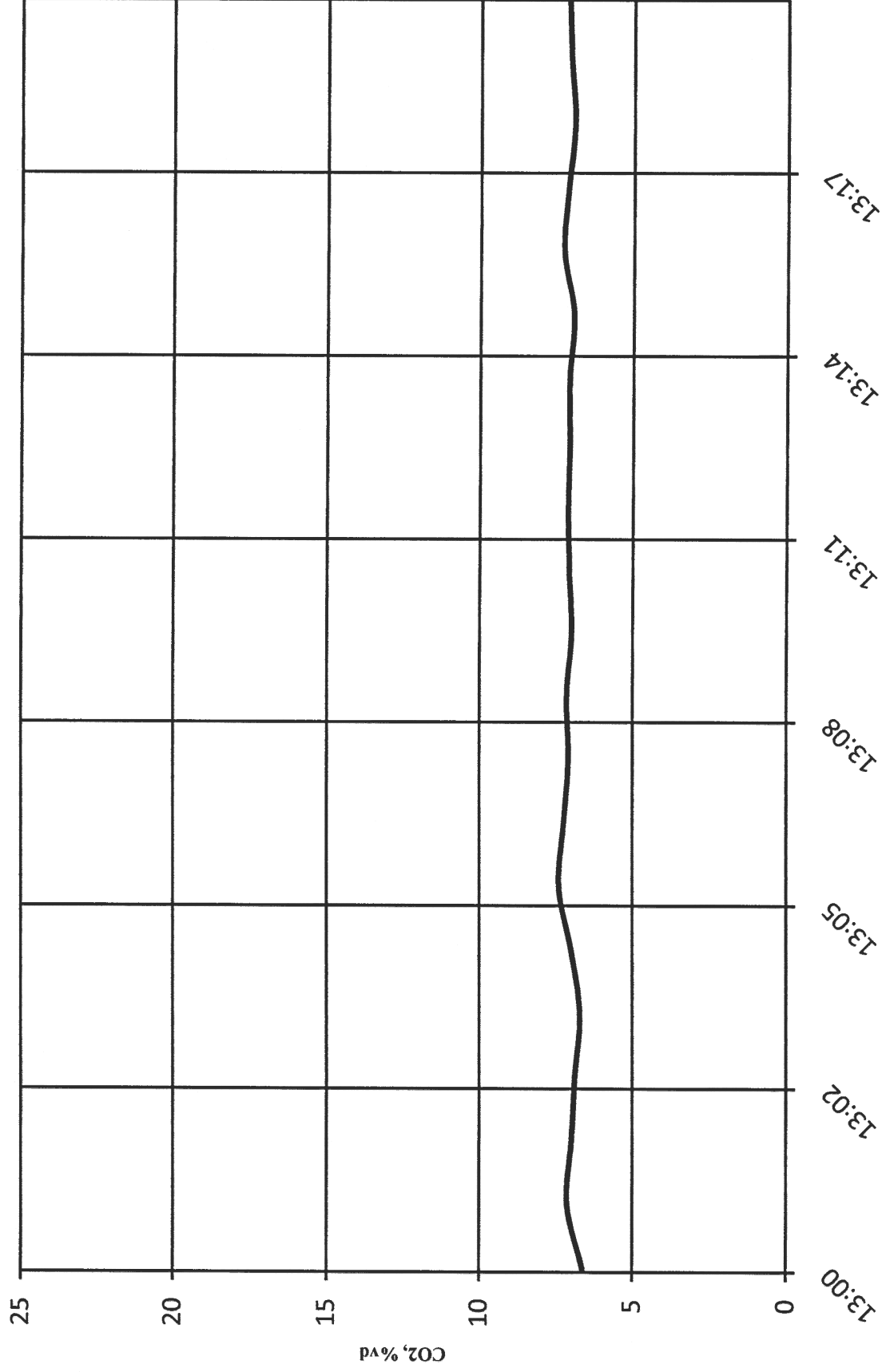
Mean: 6.468

CJ-6483 / Borger Complex / #34 SRU / R7



CJ-6483 / Borger Complex / #34 SRU / R7

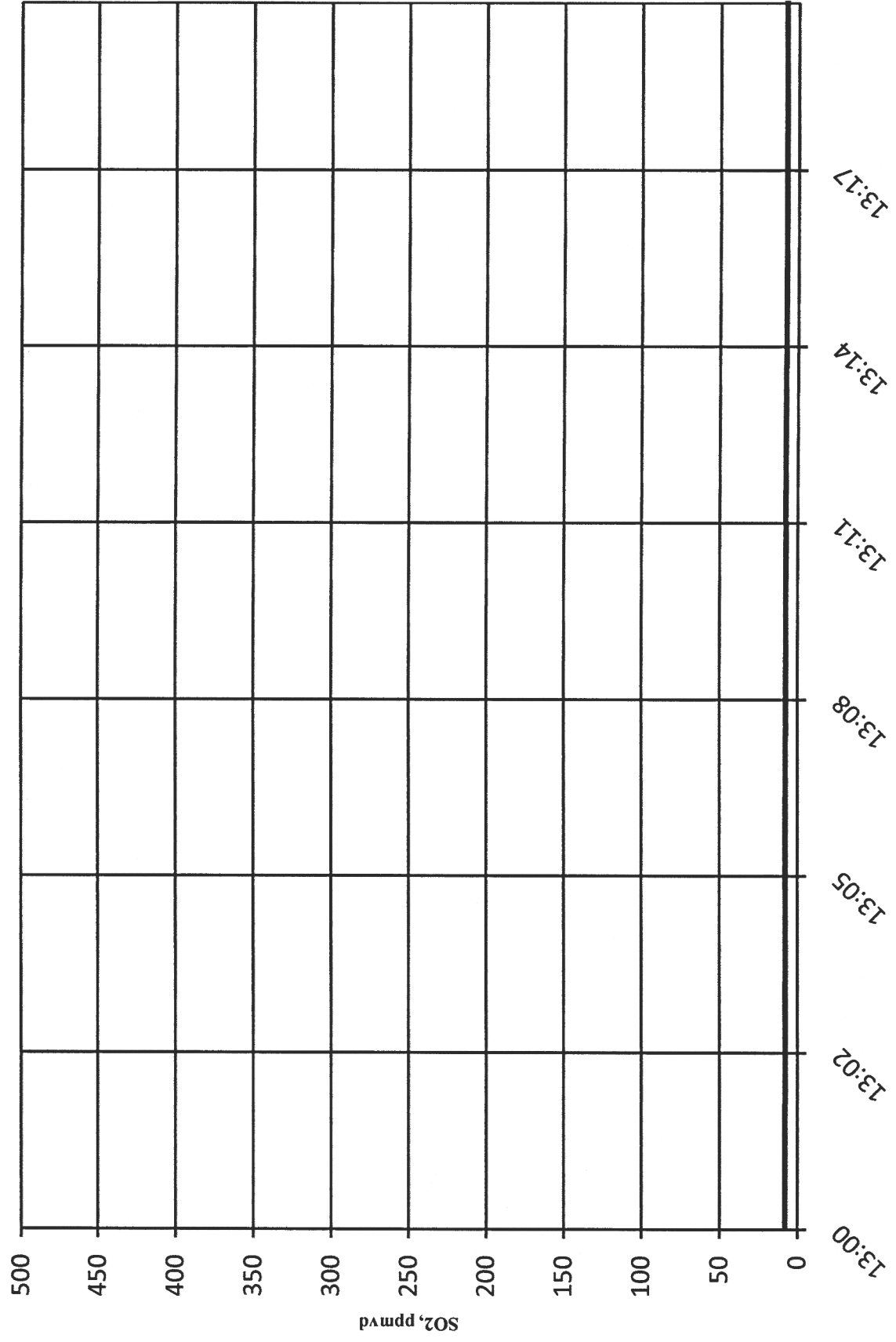
Mean: 7.049



Time - 1 Min. Intervals

CJ-6483 / Borger Complex / #34 SRU / R7

Mean: 7.682

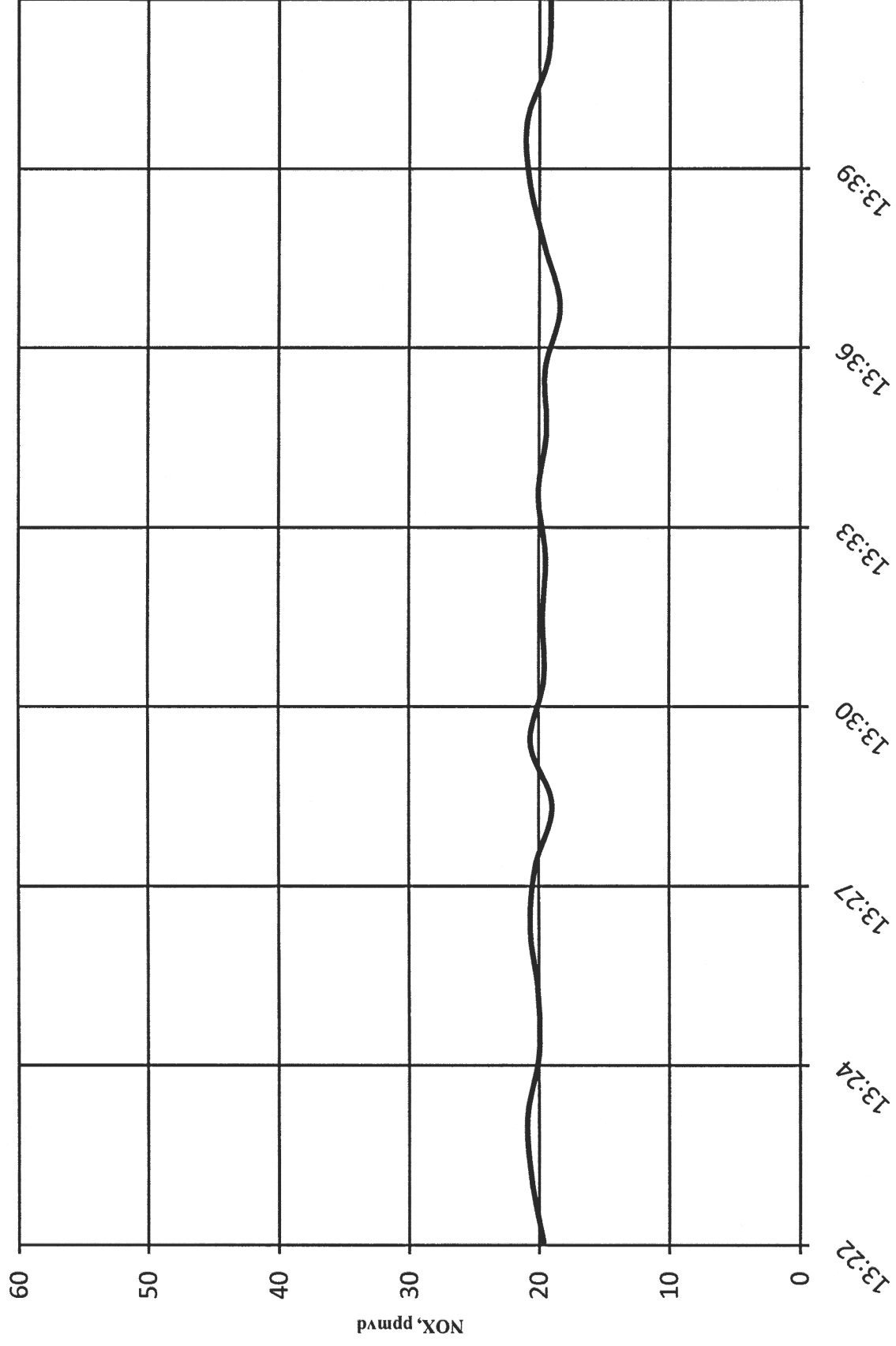


CJ-6483 / Borger Complex / #34 SRU / R8

ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
Mean -->	19.907	539.345	6.364	7.091	7.488	52.412	-0.230	16.518
Time - 1 Min. Avgs	ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 13:22	19.690	490.630	5.380	7.680	7.910	52.730	-0.230	15.340
3/4/2011 13:23	20.583	387.762	5.725	7.492	7.786	52.730	-0.230	17.568
3/4/2011 13:24	20.893	467.059	6.237	7.189	7.813	52.698	-0.230	17.339
3/4/2011 13:25	20.022	514.014	6.355	7.122	7.787	52.731	-0.230	16.519
3/4/2011 13:26	20.088	532.748	6.358	7.048	7.705	52.747	-0.232	16.510
3/4/2011 13:27	20.679	456.382	6.161	7.215	7.599	52.730	-0.230	17.842
3/4/2011 13:28	20.313	590.708	6.802	6.787	7.518	52.698	-0.230	16.585
3/4/2011 13:29	18.988	580.388	6.246	7.148	7.372	52.699	-0.229	15.228
3/4/2011 13:30	20.661	449.773	6.381	7.090	7.444	52.277	-0.230	17.721
3/4/2011 13:31	19.623	557.665	6.448	7.016	7.509	52.048	-0.230	16.118
3/4/2011 13:32	19.713	536.117	6.460	7.062	7.330	51.595	-0.230	17.471
3/4/2011 13:33	19.505	541.146	6.246	7.124	7.427	52.407	-0.229	16.128
3/4/2011 13:34	20.063	561.768	6.560	6.994	7.370	52.747	-0.230	16.436
3/4/2011 13:35	19.437	596.630	6.648	6.939	7.338	52.458	-0.232	16.045
3/4/2011 13:36	19.553	604.574	6.525	7.008	7.419	52.293	-0.232	16.370
3/4/2011 13:37	18.413	661.817	6.678	6.919	7.386	52.324	-0.230	15.701
3/4/2011 13:38	19.637	504.298	6.141	7.244	7.320	52.050	-0.229	16.943
3/4/2011 13:39	20.758	510.368	6.390	7.086	7.329	52.650	-0.230	16.764
3/4/2011 13:40	20.952	504.279	6.377	7.122	7.337	52.602	-0.233	17.015
3/4/2011 13:41	19.348	640.982	6.760	6.841	7.298	51.969	-0.230	16.251
3/4/2011 13:42	19.143	637.142	6.780	6.807	7.258	51.482	-0.230	14.995

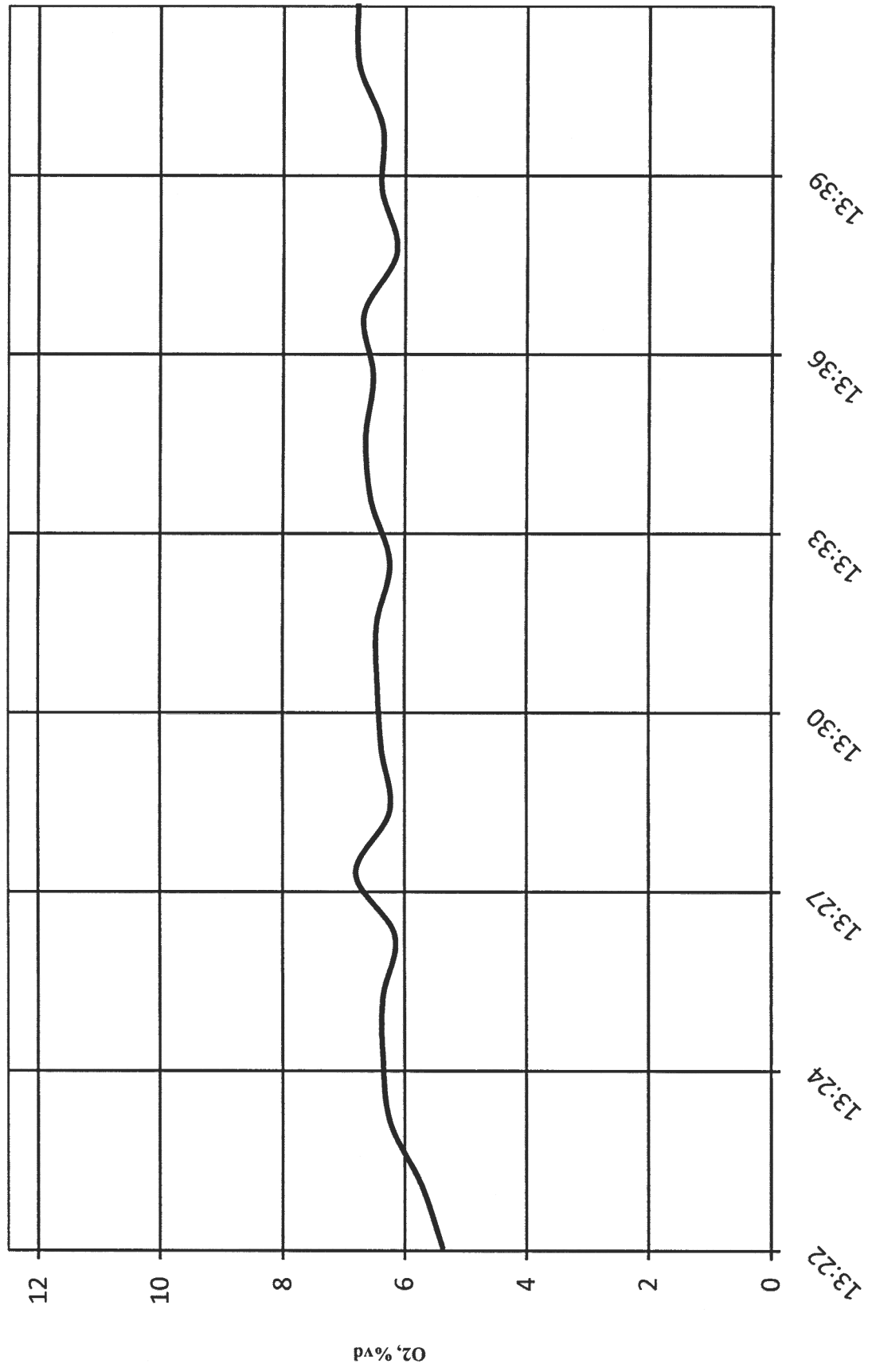
CJ-6483 / Borger Complex / #34 SRU / R8

Mean: 19.907



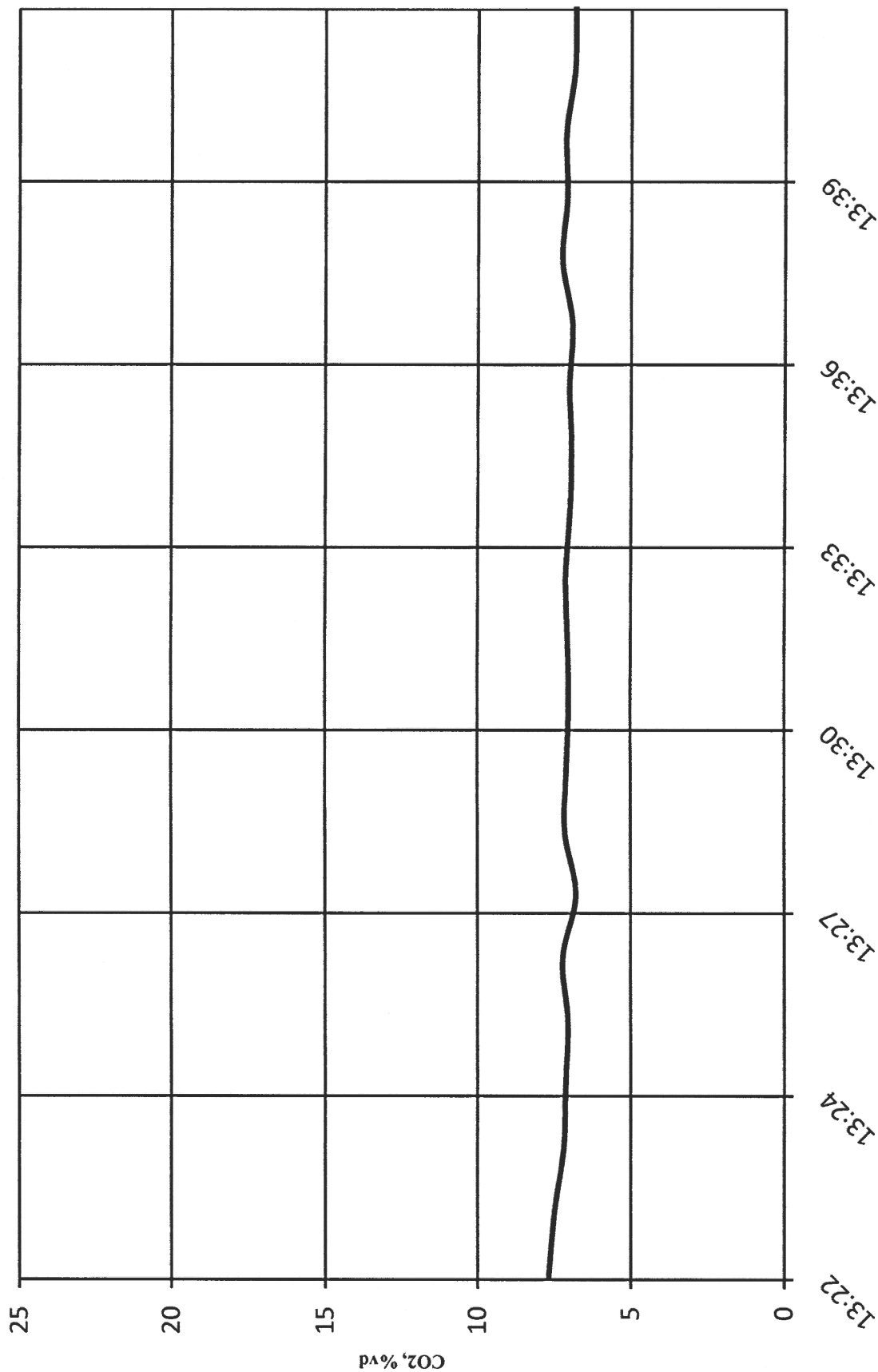
CJ-6483 / Borger Complex / #34 SRU / R8

Mean: 6.364



CJ-6483 / Borger Complex / #34 SRU / R8

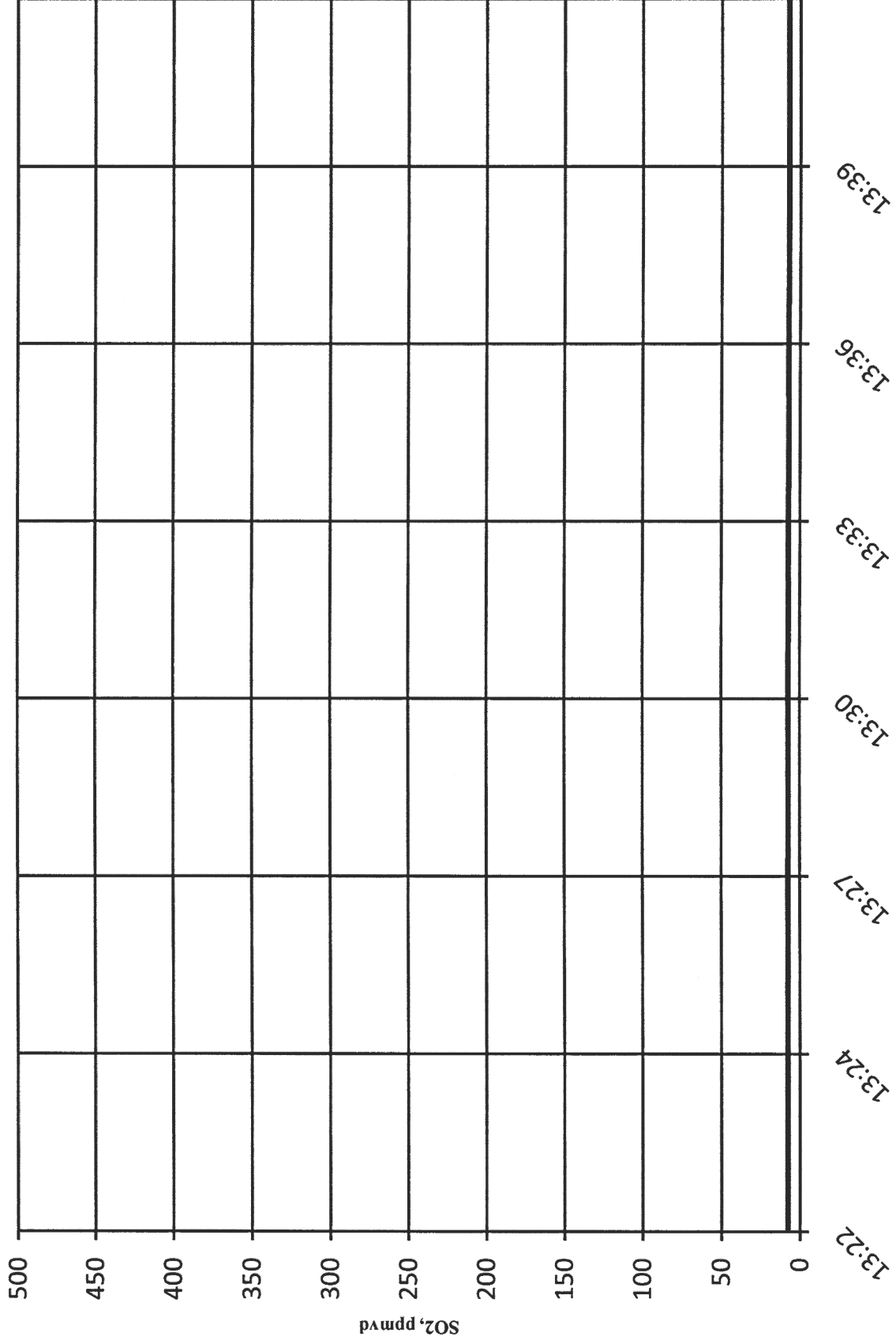
Mean: 7.091



Time - 1 Min. Intervals

CJ-6483 / Borger Complex / #34 SRU / R8

Mean: 7.488

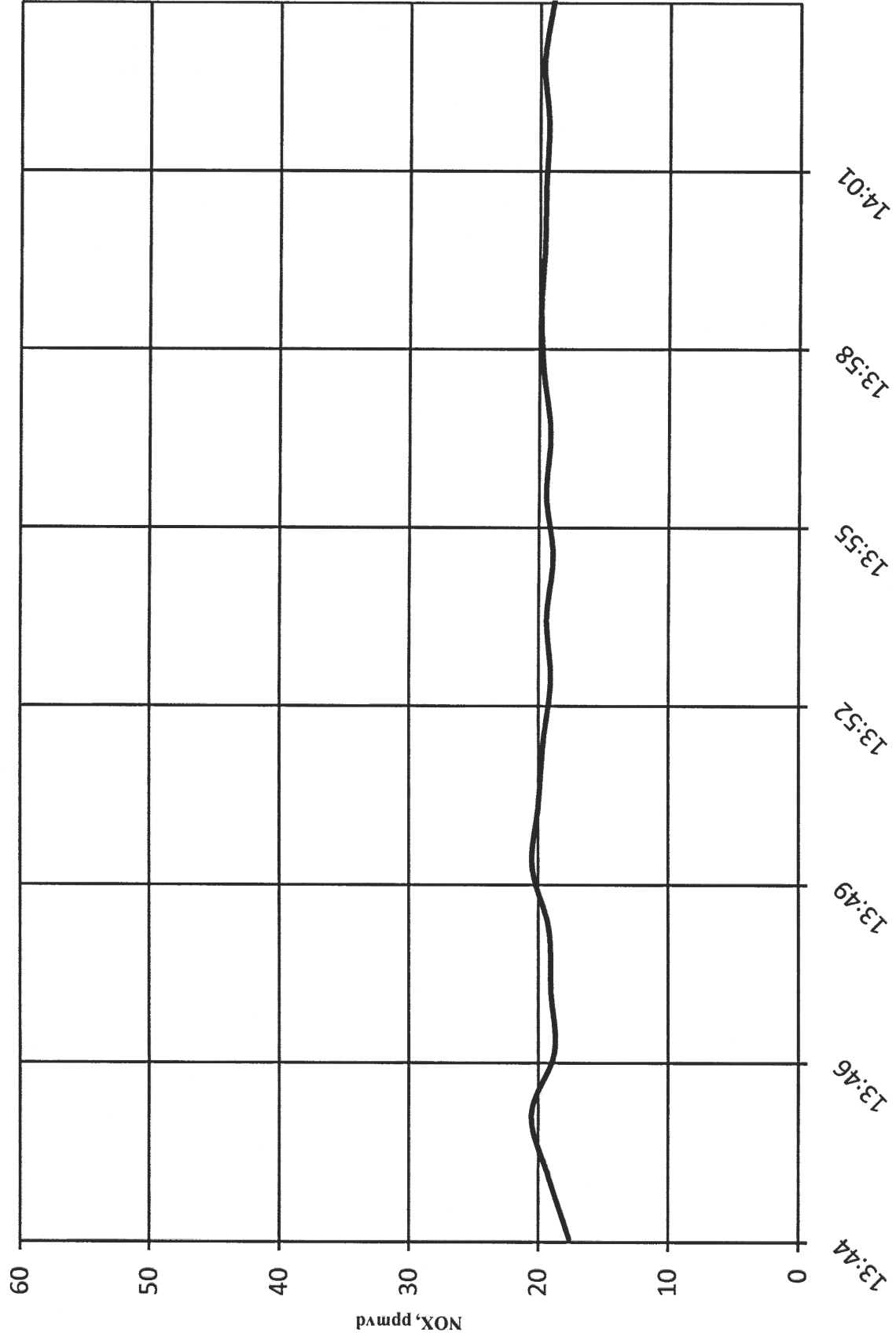


CJ-6483 / Borger Complex / #34 SRU / R9

	ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
	Mean -->	19.392	610.146	6.547	7.005	7.307	46.624	-0.229	15.787
Time - 1 Min. Avgs		ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 13:44		17.640	703.320	6.800	6.810	7.130	52.540	-0.220	14.240
3/4/2011 13:45		19.236	524.835	6.020	7.289	7.208	42.660	-0.229	15.700
3/4/2011 13:46		20.536	513.282	6.579	7.013	7.320	7.682	-0.230	17.503
3/4/2011 13:47		18.769	668.618	6.819	6.818	7.265	50.422	-0.229	14.592
3/4/2011 13:48		19.048	641.359	6.702	6.891	7.168	52.602	-0.230	15.910
3/4/2011 13:49		19.209	643.262	6.433	7.041	7.193	22.917	-0.229	15.455
3/4/2011 13:50		20.473	476.286	6.221	7.310	7.354	52.683	-0.229	17.020
3/4/2011 13:51		20.008	603.580	6.561	6.988	7.388	43.212	-0.229	16.088
3/4/2011 13:52		19.645	640.431	6.603	7.008	7.394	52.763	-0.229	16.000
3/4/2011 13:53		19.082	708.497	6.709	6.848	7.363	51.965	-0.230	14.548
3/4/2011 13:54		19.403	593.588	6.568	6.980	7.345	52.747	-0.229	15.691
3/4/2011 13:55		18.924	610.954	6.574	6.976	7.322	52.763	-0.229	16.147
3/4/2011 13:56		19.454	562.745	6.488	7.044	7.224	31.233	-0.229	16.204
3/4/2011 13:57		19.136	608.773	6.538	7.029	7.353	49.899	-0.229	16.204
3/4/2011 13:58		19.673	601.254	6.609	7.013	7.328	52.602	-0.230	15.959
3/4/2011 13:59		19.874	588.168	6.441	7.094	7.371	51.999	-0.230	15.753
3/4/2011 14:00		19.616	617.075	6.575	6.999	7.353	49.038	-0.230	15.538
3/4/2011 14:01		19.543	618.293	6.601	6.995	7.328	52.813	-0.230	15.823
3/4/2011 14:02		19.339	630.453	6.583	7.020	7.370	50.992	-0.230	15.724
3/4/2011 14:03		19.675	631.788	6.652	6.886	7.347	52.780	-0.229	15.888
3/4/2011 14:04		18.954	626.513	6.430	7.057	7.328	52.796	-0.229	15.558

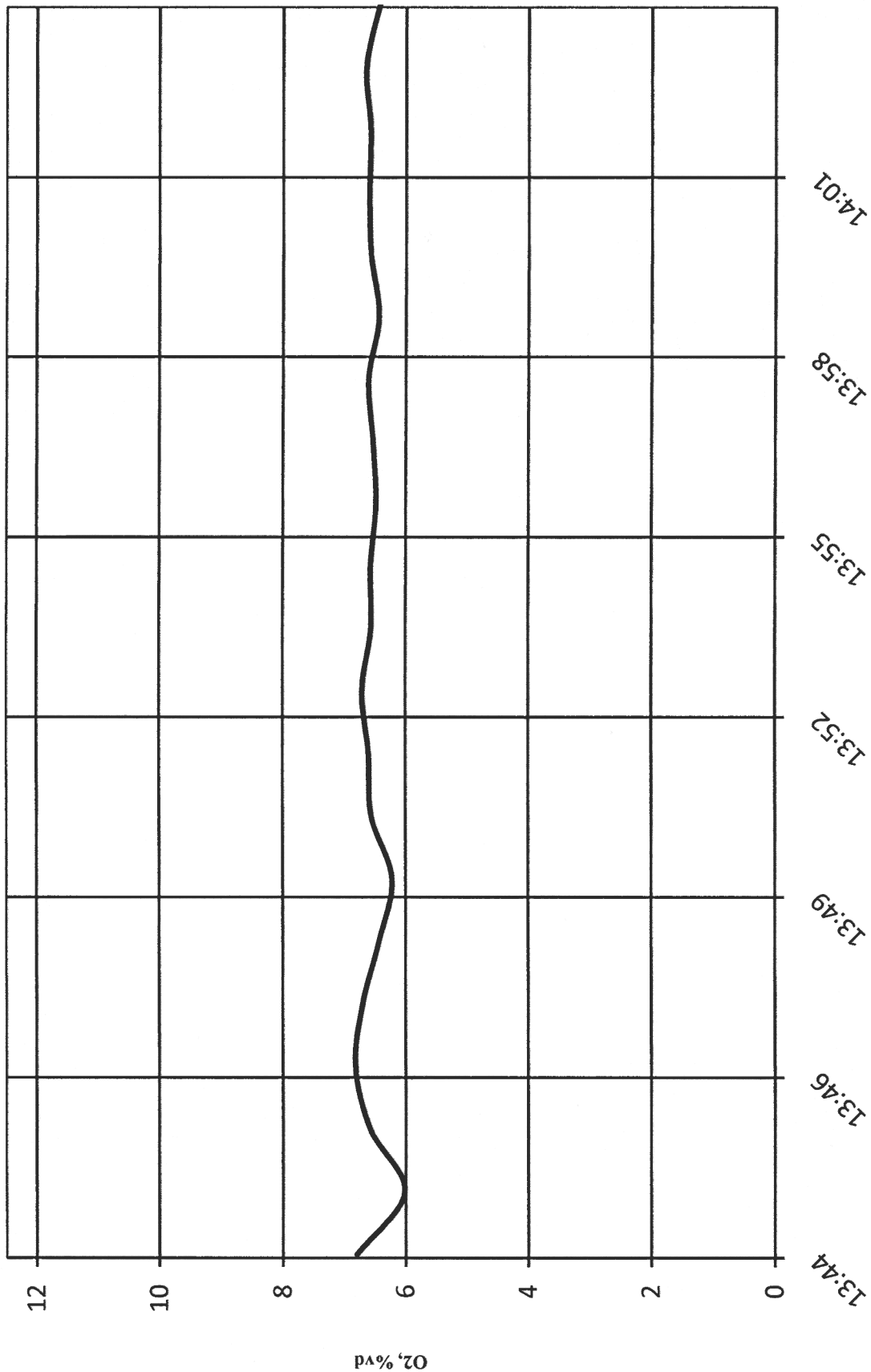
CJ-6483 / Borger Complex / #34 SRU / R9

Mean: 19.392



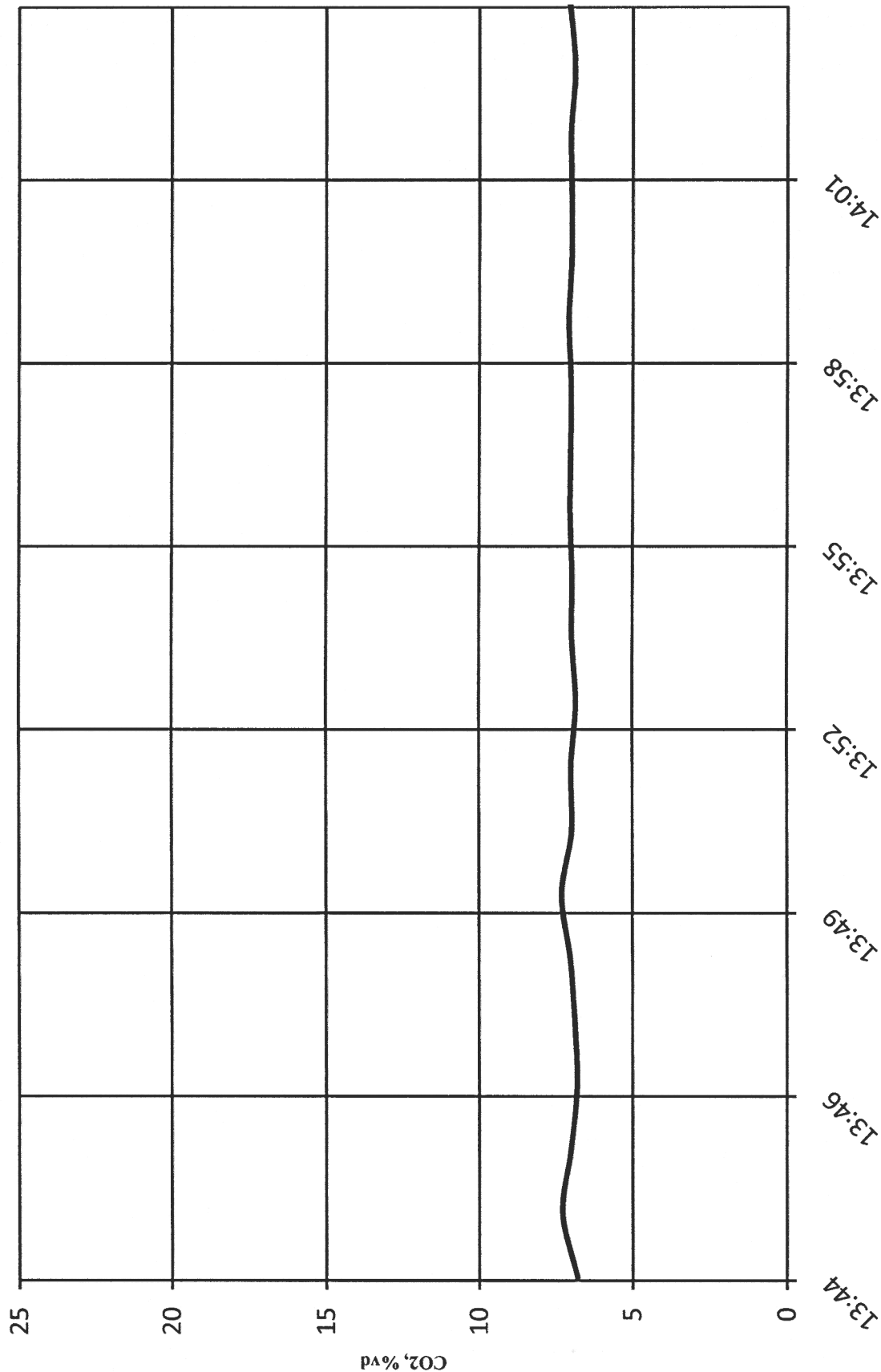
CJ-6483 / Borger Complex / #34 SRU / R9

Mean: 6.547



CJ-6483 / Borger Complex / #34 SRU / R9

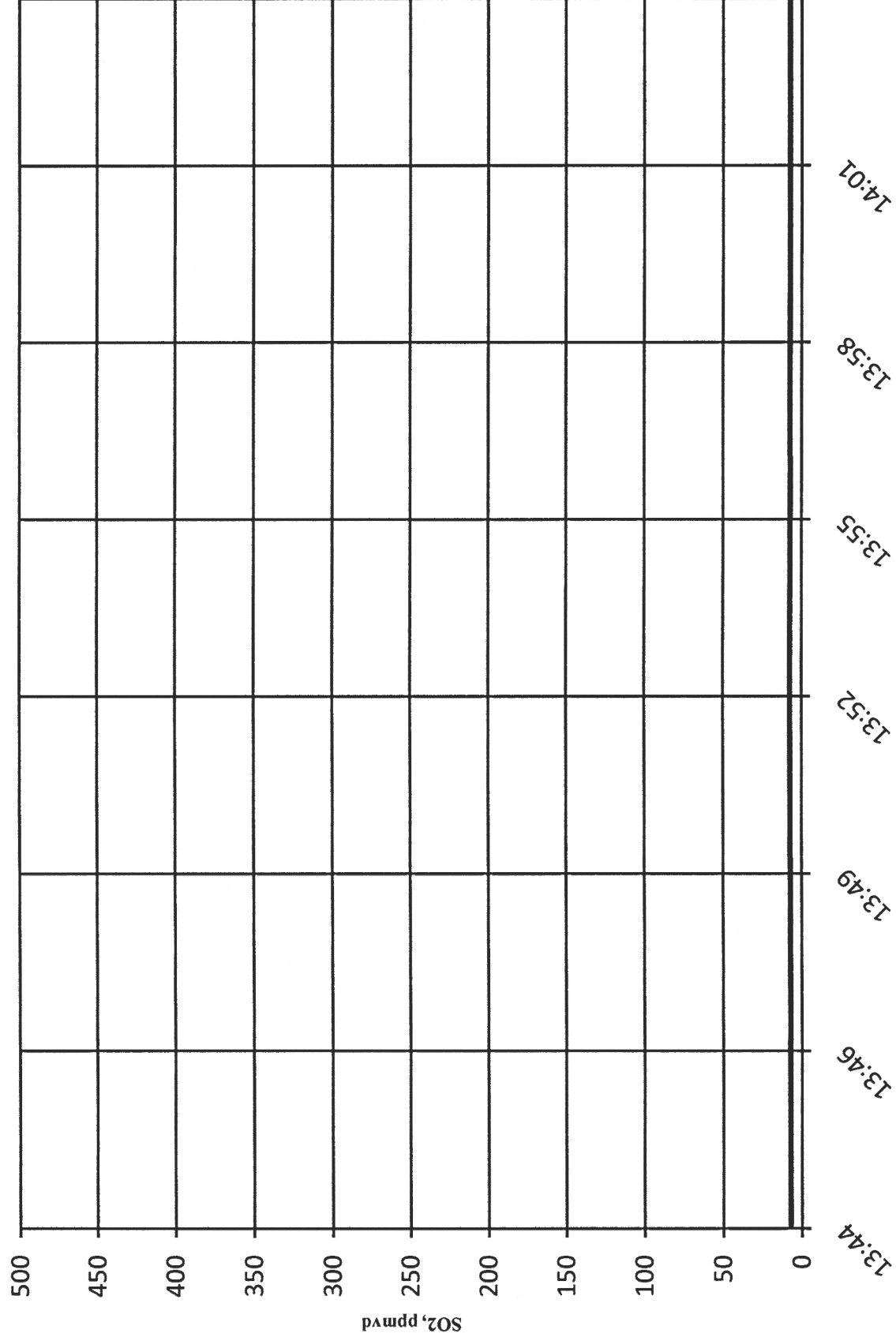
Mean: 7.005



Time - 1 Min. Intervals

Mean: 7.307

CJ-6483 / Borger Complex / #34 SRU / R9



APPENDIX D

Calibration Data

CETCON, Inc.

Date: March 4, 2011
Plant: Borger Complex
Unit: #34 SRU

Operator: JRV
Job No.: CJ-6483
A/D Converter SN: 139

Analyzer Calibration Table

Software ID:	0	1	2	3	4	5	6	7
Parameter	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO

High Span Gas Value	51.400	450.000	11.600	22.400	284.000			
Analyzer Value	51.330	445.310	11.600	22.490	282.230			
Cylinder No.	ALM-019065	ALM-023394	CC236946	CC52718	ALM-019500			
Captured Time	8:34:52	8:42:15	8:49:05	8:47:47	8:40:01			

Mid Span Gas Value	27.200	277.000	4.960	11.600	124.600			
Analyzer Value	27.300	284.180	4.930	11.940	124.020			
Cylinder No.	1L2342	ALM-019500	CC52718	CC236946	ALM-055658			
Captured Time	8:36:29	8:44:12	8:47:44	8:49:05	8:46:21			

Low Span Gas Value								
Analyzer Value								
Cylinder No.								
Captured Time								

Zero Gas Value	0.000	0.000	0.000	0.000	0.000			
Analyzer Value	0.000	0.000	0.070	0.070	0.980			
Cylinder No.	SSG-1123	SSG-1123	SSG-1123	SSG-1123	SSG-1123			
Captured Time	8:32:55	8:32:56	8:32:59	8:33:00	8:33:08			

QA/QC Check:

Completeness ☒

Legibility ☒

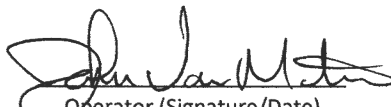
Accuracy ☒

Specifications ☒

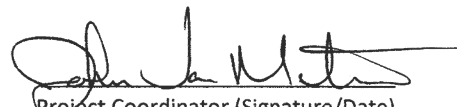
Reasonableness ☒

Checked by:

4/15/2011


Operator (Signature/Date)

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Project Coordinator (Signature/Date)

Analyzer Calibration Table.xls

CJ-6483 / Borger Complex / Calibration Data

ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
Time	ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 8:32:03	0.070	72.660	0.070	0.070	11.620	53.710	-0.210	0.270
3/4/2011 8:32:08	0.210	60.160	0.070	0.070	4.880	53.520	-0.180	0.410
3/4/2011 8:32:13	0.330	39.450	0.070	0.080	3.130	53.710	-0.180	0.320
3/4/2011 8:32:18	0.470	20.510	0.070	0.080	2.250	53.710	-0.180	0.180
3/4/2011 8:32:23	0.380	8.590	0.080	0.070	1.860	53.710	-0.180	0.080
3/4/2011 8:32:28	0.230	3.520	0.070	0.070	1.460	53.710	-0.180	-0.060
3/4/2011 8:32:33	0.140	1.170	0.070	0.070	1.460	53.710	-0.180	-0.060
3/4/2011 8:32:38	0.000	0.780	0.070	0.070	1.460	53.710	-0.210	-0.060
3/4/2011 8:32:43	0.000	0.780	0.070	0.070	1.660	53.710	-0.190	-0.060
3/4/2011 8:32:48	0.000	0.590	0.070	0.070	1.560	53.710	-0.180	-0.060
3/4/2011 8:32:53	0.000	0.590	0.070	0.070	1.460	53.710	-0.180	-0.060
3/4/2011 8:32:58	0.000	0.780	0.070	0.070	1.460	53.710	-0.180	-0.060
3/4/2011 8:33:03	-0.020	0.980	0.070	0.080	1.460	53.710	-0.180	-0.060
3/4/2011 8:33:08	-0.040	0.780	0.070	0.070	1.370	53.710	-0.180	-0.060
3/4/2011 8:33:13	-0.040	0.590	0.070	0.070	1.270	53.710	-0.180	-0.060
3/4/2011 8:33:18	-0.010	0.590	0.060	0.070	1.460	53.710	-0.180	-0.060
3/4/2011 8:33:23	0.000	0.780	0.100	0.070	1.460	53.710	-0.190	-0.060
3/4/2011 8:33:28	0.000	3.130	0.100	0.090	4.790	53.710	-0.180	-0.060
3/4/2011 8:33:33	0.000	3.520	0.070	0.080	5.470	53.710	-0.180	-0.060
3/4/2011 8:33:38	0.000	3.710	0.050	0.070	3.130	53.710	-0.190	-0.060
3/4/2011 8:33:43	4.460	3.520	0.050	0.070	2.050	53.710	-0.180	-0.060
3/4/2011 8:33:48	11.130	3.710	0.050	0.070	1.460	53.710	-0.180	-0.060
3/4/2011 8:33:53	15.600	2.930	0.050	0.070	1.460	53.710	-0.190	10.280
3/4/2011 8:33:58	22.310	1.950	0.050	0.070	1.460	53.710	-0.180	25.780
3/4/2011 8:34:03	28.210	0.780	0.050	0.070	1.370	53.710	-0.190	36.140
3/4/2011 8:34:08	37.040	0.390	0.050	0.070	1.270	53.710	-0.190	51.680
3/4/2011 8:34:13	42.960	0.390	0.050	0.070	1.170	53.710	-0.190	51.750
3/4/2011 8:34:18	51.800	0.200	0.050	0.070	1.460	53.710	-0.200	51.860
3/4/2011 8:34:23	51.860	0.590	0.050	0.070	1.460	53.710	-0.190	51.940
3/4/2011 8:34:28	51.960	0.390	0.050	0.080	1.370	53.710	-0.210	52.030
3/4/2011 8:34:33	52.010	0.590	0.050	0.070	1.460	53.710	-0.210	52.030
3/4/2011 8:34:38	52.140	0.390	0.050	0.070	1.270	53.710	-0.190	52.040
3/4/2011 8:34:43	51.590	0.390	0.050	0.070	0.980	53.710	-0.200	51.420
3/4/2011 8:34:48	51.340	0.390	0.050	0.060	1.070	53.710	-0.190	51.260
3/4/2011 8:34:53	51.350	0.390	0.050	0.050	0.980	53.710	-0.220	51.270
3/4/2011 8:34:58	51.340	0.780	0.040	0.060	1.270	53.710	-0.180	51.260
3/4/2011 8:35:03	51.390	0.390	0.070	0.050	1.170	53.710	-0.180	51.270
3/4/2011 8:35:08	51.420	0.780	0.100	0.060	2.340	53.710	-0.190	51.270
3/4/2011 8:35:13	51.450	1.950	0.050	0.050	2.440	53.710	-0.180	51.230
3/4/2011 8:35:18	51.450	1.950	0.050	0.050	1.560	53.710	-0.180	51.180
3/4/2011 8:35:23	48.060	1.560	0.040	0.050	1.460	53.710	-0.200	51.160
3/4/2011 8:35:28	42.950	1.950	0.050	0.050	1.370	53.710	-0.180	51.150
3/4/2011 8:35:33	39.520	1.560	0.040	0.050	1.370	53.710	-0.190	46.340
3/4/2011 8:35:38	34.410	0.200	0.050	0.050	0.980	53.710	-0.220	39.200
3/4/2011 8:35:43	33.000	0.780	0.040	0.050	1.070	53.710	-0.190	34.370
3/4/2011 8:35:48	30.900	0.390	0.040	0.050	1.170	53.710	-0.180	27.200
3/4/2011 8:35:53	29.530	0.590	0.040	0.050	1.070	53.710	-0.190	27.230
3/4/2011 8:35:58	27.420	0.590	0.040	0.050	1.070	53.710	-0.190	27.250
3/4/2011 8:36:03	27.380	0.200	0.030	0.050	0.980	53.710	-0.200	27.260
3/4/2011 8:36:08	27.380	0.780	0.040	0.050	0.980	53.710	-0.200	27.270
3/4/2011 8:36:13	27.340	0.780	0.040	0.050	0.980	53.710	-0.180	27.250
3/4/2011 8:36:18	27.350	0.590	0.040	0.050	1.370	53.710	-0.180	27.220
3/4/2011 8:36:23	27.330	0.390	0.040	0.050	1.460	53.710	-0.210	27.200
3/4/2011 8:36:28	27.300	0.390	0.020	0.050	1.170	53.710	-0.200	27.200

3/4/2011 8:36:33	27.300	0.390	0.020	0.050	1.460	53.710	-0.210	27.200
3/4/2011 8:36:38	27.300	0.780	0.040	0.050	0.980	53.710	-0.200	27.200
3/4/2011 8:36:43	27.300	0.590	0.050	0.050	1.070	53.710	-0.180	27.210
3/4/2011 8:36:48	27.300	1.760	1.800	0.050	1.370	53.710	-0.190	27.190
3/4/2011 8:36:53	27.300	29.880	2.660	0.210	5.760	53.710	-0.190	26.880
3/4/2011 8:36:58	27.300	103.710	0.220	0.070	5.370	53.710	-0.190	26.430
3/4/2011 8:37:03	24.930	190.630	0.050	0.050	2.730	53.710	-0.180	26.100
3/4/2011 8:37:08	21.340	274.610	0.030	0.050	1.950	53.710	-0.180	25.590
3/4/2011 8:37:13	18.930	349.410	0.020	0.050	1.460	53.710	-0.200	20.590
3/4/2011 8:37:18	15.340	406.450	0.020	0.040	1.370	53.710	-0.190	13.080
3/4/2011 8:37:23	12.410	442.380	0.020	0.040	0.980	53.710	-0.200	8.070
3/4/2011 8:37:28	8.060	460.740	0.020	0.050	1.270	53.710	-0.180	0.600
3/4/2011 8:37:33	5.120	470.120	0.030	0.050	1.370	53.710	-0.180	0.500
3/4/2011 8:37:38	0.710	473.630	0.020	0.050	1.070	53.710	-0.180	0.350
3/4/2011 8:37:43	0.600	474.610	0.020	0.050	1.370	53.710	-0.180	0.260
3/4/2011 8:37:48	0.410	474.800	0.020	0.050	1.460	53.710	-0.190	0.120
3/4/2011 8:37:53	0.320	474.610	0.020	0.050	1.460	53.710	-0.190	0.080
3/4/2011 8:37:58	0.180	476.370	0.020	0.050	1.460	53.710	-0.210	0.060
3/4/2011 8:38:03	0.150	470.700	0.020	0.050	1.370	53.710	-0.190	0.020
3/4/2011 8:38:08	0.120	453.320	0.020	0.050	1.070	53.710	-0.210	0.000
3/4/2011 8:38:13	0.090	451.760	0.020	0.050	0.980	53.710	-0.200	0.000
3/4/2011 8:38:18	0.060	451.560	0.020	0.050	1.170	53.710	-0.190	0.000
3/4/2011 8:38:23	0.080	451.950	0.020	0.050	1.370	53.710	-0.190	-0.020
3/4/2011 8:38:28	0.060	451.950	0.010	0.050	1.460	53.710	-0.200	-0.060
3/4/2011 8:38:33	0.040	435.160	0.000	0.050	1.370	53.710	-0.200	-0.060
3/4/2011 8:38:38	0.000	433.400	0.010	0.050	1.370	53.710	-0.200	-0.060
3/4/2011 8:38:43	0.000	448.240	0.100	0.050	2.150	53.710	-0.190	-0.060
3/4/2011 8:38:48	0.000	419.340	0.050	0.070	68.360	53.710	-0.190	-0.060
3/4/2011 8:38:53	0.000	378.710	0.030	0.050	192.480	53.710	-0.190	-0.060
3/4/2011 8:38:58	0.000	350.980	0.020	0.050	250.100	53.710	-0.190	-0.060
3/4/2011 8:39:03	0.330	325.590	0.020	0.050	269.730	53.710	-0.180	-0.040
3/4/2011 8:39:08	0.800	306.050	0.020	0.050	276.370	53.710	-0.180	-0.010
3/4/2011 8:39:13	1.040	295.700	0.020	0.050	278.520	53.710	-0.180	0.150
3/4/2011 8:39:18	1.490	291.020	0.020	0.050	279.200	53.710	-0.180	0.350
3/4/2011 8:39:23	1.360	288.280	0.020	0.050	279.980	53.710	-0.180	0.470
3/4/2011 8:39:28	1.140	288.090	0.020	0.050	280.370	53.710	-0.180	0.640
3/4/2011 8:39:33	1.000	287.890	0.020	0.050	280.760	53.710	-0.180	0.660
3/4/2011 8:39:38	0.770	287.890	0.020	0.050	281.250	53.710	-0.200	0.640
3/4/2011 8:39:43	0.800	288.090	0.020	0.050	281.540	53.710	-0.190	0.640
3/4/2011 8:39:48	0.790	288.090	0.020	0.050	281.540	53.710	-0.190	0.640
3/4/2011 8:39:53	0.790	288.090	0.020	0.050	281.840	53.710	-0.220	0.660
3/4/2011 8:39:58	0.810	287.300	0.020	0.050	282.030	53.710	-0.190	0.640
3/4/2011 8:40:03	0.760	288.480	0.020	0.050	281.740	53.710	-0.200	0.640
3/4/2011 8:40:08	0.730	288.090	0.020	0.050	281.930	53.710	-0.210	0.640
3/4/2011 8:40:13	0.750	286.910	0.020	0.050	281.930	53.710	-0.210	0.640
3/4/2011 8:40:18	0.730	284.180	0.030	0.050	281.450	53.710	-0.180	0.640
3/4/2011 8:40:23	0.750	287.700	0.150	0.060	270.700	53.710	-0.190	0.640
3/4/2011 8:40:28	0.740	307.030	0.060	0.050	164.160	53.710	-0.180	0.640
3/4/2011 8:40:33	0.730	333.400	0.020	0.050	70.900	53.710	-0.180	0.830
3/4/2011 8:40:38	0.690	360.160	0.020	0.050	31.450	53.710	-0.180	1.090
3/4/2011 8:40:43	0.640	387.890	0.020	0.050	14.940	53.710	-0.180	1.240
3/4/2011 8:40:48	0.550	411.520	0.020	0.050	8.300	53.710	-0.210	1.520
3/4/2011 8:40:53	0.470	429.490	0.020	0.050	5.180	53.710	-0.200	1.200
3/4/2011 8:40:58	0.350	441.600	0.020	0.050	3.710	53.710	-0.190	0.710
3/4/2011 8:41:03	0.280	446.680	0.020	0.050	2.930	53.710	-0.180	0.400
3/4/2011 8:41:08	0.160	449.410	0.020	0.050	2.440	53.710	-0.180	0.000
3/4/2011 8:41:13	0.110	451.170	0.010	0.050	2.250	53.710	-0.190	-0.040
3/4/2011 8:41:18	0.000	452.730	0.020	0.050	2.150	53.710	-0.190	-0.060
3/4/2011 8:41:23	0.000	452.340	0.020	0.050	1.860	53.710	-0.190	-0.060
3/4/2011 8:41:28	0.000	451.170	0.020	0.050	1.860	53.710	-0.180	-0.060

3/4/2011 8:41:33	0.000	452.150	0.020	0.050	1.760	53.710	-0.180	-0.060
3/4/2011 8:41:38	0.000	452.730	0.020	0.050	1.660	53.710	-0.180	-0.060
3/4/2011 8:41:43	0.000	451.370	0.020	0.050	1.560	53.710	-0.180	-0.060
3/4/2011 8:41:48	-0.020	448.630	0.020	0.050	1.760	53.710	-0.180	-0.060
3/4/2011 8:41:53	0.000	446.090	0.020	0.050	1.460	53.710	-0.180	-0.060
3/4/2011 8:41:58	0.000	445.510	0.020	0.050	1.460	53.710	-0.190	-0.060
3/4/2011 8:42:03	0.010	443.950	0.020	0.050	1.460	53.710	-0.190	-0.060
3/4/2011 8:42:08	0.000	444.340	0.020	0.050	1.460	53.710	-0.180	-0.060
3/4/2011 8:42:13	0.000	445.310	0.020	0.050	1.460	53.710	-0.180	-0.060
3/4/2011 8:42:18	0.000	445.510	0.010	0.050	1.460	53.710	-0.190	-0.060
3/4/2011 8:42:23	0.000	446.480	0.010	0.050	1.460	53.710	-0.190	-0.060
3/4/2011 8:42:28	0.000	443.950	0.000	0.050	1.270	53.710	-0.180	-0.060
3/4/2011 8:42:33	0.000	436.330	0.030	0.050	2.150	53.710	-0.180	-0.060
3/4/2011 8:42:38	-0.050	434.770	0.030	0.060	50.390	53.710	-0.180	-0.060
3/4/2011 8:42:43	0.000	408.400	0.020	0.050	184.080	53.710	-0.200	-0.060
3/4/2011 8:42:48	0.000	382.420	0.020	0.050	249.800	53.710	-0.180	-0.060
3/4/2011 8:42:53	0.000	355.270	0.020	0.050	270.900	53.710	-0.180	0.140
3/4/2011 8:42:58	0.000	328.910	0.020	0.050	277.440	52.930	-0.180	0.290
3/4/2011 8:43:03	0.140	308.200	0.010	0.050	279.690	53.710	-0.200	0.480
3/4/2011 8:43:08	0.350	295.700	0.010	0.050	280.570	53.710	-0.210	0.610
3/4/2011 8:43:13	0.480	288.870	0.020	0.050	281.050	53.710	-0.200	0.640
3/4/2011 8:43:18	0.640	285.550	0.010	0.050	281.250	53.710	-0.180	0.640
3/4/2011 8:43:23	0.680	284.180	0.010	0.050	281.740	53.710	-0.190	0.640
3/4/2011 8:43:28	0.730	284.380	0.010	0.050	282.130	47.070	-0.200	0.640
3/4/2011 8:43:33	0.700	284.570	0.000	0.050	282.320	53.710	-0.190	0.640
3/4/2011 8:43:38	0.710	284.180	0.010	0.050	282.520	53.710	-0.200	0.660
3/4/2011 8:43:43	0.710	284.180	0.010	0.050	282.710	53.710	-0.180	0.660
3/4/2011 8:43:48	0.700	284.380	0.010	0.050	282.710	53.320	-0.180	0.640
3/4/2011 8:43:53	0.730	284.770	0.010	0.050	282.710	53.710	-0.180	0.640
3/4/2011 8:43:58	0.710	284.380	0.010	0.050	282.710	53.710	-0.180	0.640
3/4/2011 8:44:03	0.730	283.790	0.000	0.050	282.810	53.710	-0.190	0.660
3/4/2011 8:44:08	0.750	284.770	0.010	0.050	282.710	53.710	-0.180	0.660
3/4/2011 8:44:13	0.750	284.380	0.010	0.050	282.710	53.710	-0.180	0.670
3/4/2011 8:44:18	0.740	284.180	0.000	0.050	282.710	53.710	-0.180	0.640
3/4/2011 8:44:23	0.750	284.180	0.010	0.050	282.810	53.710	-0.180	0.640
3/4/2011 8:44:28	0.740	284.180	0.000	0.050	283.010	53.710	-0.180	0.640
3/4/2011 8:44:33	0.750	281.450	0.000	0.050	282.420	53.710	-0.180	0.640
3/4/2011 8:44:38	0.740	278.130	0.010	0.050	282.030	53.710	-0.180	0.640
3/4/2011 8:44:43	0.750	288.480	0.080	0.060	279.880	53.710	-0.180	0.640
3/4/2011 8:44:48	0.750	277.340	0.040	0.060	226.560	53.710	-0.180	0.640
3/4/2011 8:44:53	0.740	246.480	0.020	0.050	160.250	53.710	-0.200	0.640
3/4/2011 8:44:58	0.760	220.510	0.020	0.050	134.960	53.710	-0.180	0.640
3/4/2011 8:45:03	0.820	193.550	0.020	0.050	127.640	53.710	-0.180	0.660
3/4/2011 8:45:08	0.840	168.950	0.020	0.050	125.200	53.710	-0.180	0.640
3/4/2011 8:45:13	0.910	150.200	0.010	0.050	124.510	53.710	-0.180	0.680
3/4/2011 8:45:18	0.970	138.480	0.020	0.050	124.220	53.710	-0.180	0.740
3/4/2011 8:45:23	0.960	133.790	0.020	0.050	124.020	53.710	-0.180	0.770
3/4/2011 8:45:28	0.950	132.230	0.020	0.050	124.220	53.710	-0.180	0.820
3/4/2011 8:45:33	0.910	131.050	0.010	0.050	124.020	53.710	-0.180	0.830
3/4/2011 8:45:38	0.900	130.860	0.010	0.050	123.930	53.710	-0.190	0.840
3/4/2011 8:45:43	0.880	130.860	0.010	0.050	124.020	53.710	-0.190	0.830
3/4/2011 8:45:48	0.880	130.860	0.010	0.050	124.020	53.710	-0.180	0.870
3/4/2011 8:45:53	0.910	131.450	0.010	0.050	123.730	53.710	-0.180	0.880
3/4/2011 8:45:58	0.890	131.050	0.010	0.050	123.540	53.710	-0.180	0.860
3/4/2011 8:46:03	0.900	130.860	0.010	0.050	123.540	53.710	-0.190	0.840
3/4/2011 8:46:08	0.880	130.860	0.010	0.050	123.540	53.710	-0.190	0.830
3/4/2011 8:46:13	0.890	130.860	0.010	0.050	123.630	53.710	-0.180	0.820
3/4/2011 8:46:18	0.880	130.860	0.010	0.050	124.020	53.710	-0.190	0.840
3/4/2011 8:46:23	0.880	130.860	0.020	0.050	123.730	53.710	-0.180	0.840
3/4/2011 8:46:28	0.890	130.660	0.000	0.050	123.630	53.710	-0.190	0.870

3/4/2011 8:46:33	0.900	128.130	0.000	0.050	123.540	53.710	-0.200	0.840
3/4/2011 8:46:38	0.880	130.080	0.000	0.050	123.240	53.710	-0.200	0.860
3/4/2011 8:46:43	0.880	134.380	0.020	0.050	123.340	53.710	-0.180	0.840
3/4/2011 8:46:48	0.900	135.550	2.180	1.150	122.460	53.710	-0.190	0.870
3/4/2011 8:46:53	0.880	120.120	4.410	17.750	80.570	53.710	-0.180	0.790
3/4/2011 8:46:58	0.880	96.480	4.850	21.940	30.470	53.710	-0.180	0.750
3/4/2011 8:47:03	0.740	71.680	4.920	22.300	11.620	53.710	-0.180	0.660
3/4/2011 8:47:08	0.640	52.150	4.940	22.360	5.660	53.710	-0.190	0.590
3/4/2011 8:47:13	0.540	36.330	4.940	22.410	3.610	53.710	-0.180	0.380
3/4/2011 8:47:18	0.470	24.220	4.940	22.410	3.030	53.710	-0.190	0.220
3/4/2011 8:47:23	0.340	15.430	4.940	22.430	2.540	53.710	-0.190	0.060
3/4/2011 8:47:28	0.230	9.180	4.940	22.440	2.440	53.710	-0.180	-0.060
3/4/2011 8:47:33	0.090	5.270	4.950	22.460	2.150	53.710	-0.180	-0.060
3/4/2011 8:47:38	-0.010	2.340	4.940	22.470	1.950	53.710	-0.190	-0.060
3/4/2011 8:47:43	-0.010	0.390	4.930	22.470	1.950	53.710	-0.190	-0.060
3/4/2011 8:47:48	0.000	0.000	4.940	22.480	1.860	53.710	-0.180	-0.060
3/4/2011 8:47:53	-0.010	-0.980	4.930	22.480	2.050	53.710	-0.180	-0.060
3/4/2011 8:47:58	-0.010	-0.780	4.900	22.290	1.950	53.710	-0.190	-0.060
3/4/2011 8:48:03	0.000	0.200	4.880	22.180	1.950	53.710	-0.180	-0.060
3/4/2011 8:48:08	0.000	2.730	4.910	22.100	2.340	53.520	-0.180	-0.060
3/4/2011 8:48:13	-0.010	4.690	6.580	21.910	3.710	53.710	-0.180	-0.060
3/4/2011 8:48:18	0.000	6.450	10.810	14.960	7.130	53.710	-0.190	-0.060
3/4/2011 8:48:23	0.010	6.840	11.450	12.160	4.490	53.710	-0.190	-0.060
3/4/2011 8:48:28	0.000	5.660	11.560	12.000	3.030	53.710	-0.190	-0.060
3/4/2011 8:48:33	0.050	5.080	11.580	11.960	2.340	53.710	-0.180	-0.060
3/4/2011 8:48:38	0.060	3.320	11.590	11.960	1.660	53.710	-0.180	-0.060
3/4/2011 8:48:43	0.060	2.340	11.600	11.940	1.460	53.710	-0.180	-0.060
3/4/2011 8:48:48	0.020	0.980	11.590	11.930	1.460	53.520	-0.210	-0.090
3/4/2011 8:48:53	0.020	0.780	11.600	11.940	1.460	53.710	-0.180	-0.060
3/4/2011 8:48:58	0.000	0.980	11.600	11.940	1.560	53.710	-0.190	-0.060
3/4/2011 8:49:03	0.000	0.590	11.600	11.940	1.460	53.710	-0.180	-0.060

CJ-6483 / Borger Complex / Response Time

ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
Time	ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
100%	26.840	281.740	4.910	22.070	118.650	0.000	0.000	0.000
95%	25.498	267.653	4.665	20.967	112.718	0.000	0.000	0.000
5%	1.342	14.087	0.246	1.104	5.933	0.000	0.000	0.000
Upscale	1:25	1:15	0:45	0:55	2:45			
Downscale	1:25	1:20	0:45	0:45	2:50			
3/3/2011 14:41:01	-0.120	0.680	0.060	0.070	2.640	53.710	-0.180	-0.060
3/3/2011 14:41:06	-0.120	0.980	0.060	0.060	2.640	53.710	-0.200	-0.060
3/3/2011 14:41:11	-0.120	0.780	0.050	0.070	2.540	53.710	-0.190	-0.060
3/3/2011 14:41:16	-0.120	0.780	0.050	0.050	2.730	53.710	-0.210	-0.070
3/3/2011 14:41:21	-0.120	0.880	0.050	0.050	2.830	53.710	-0.230	-0.060
3/3/2011 14:41:26	-0.120	0.980	0.050	0.060	2.930	53.710	-0.220	-0.060
3/3/2011 14:41:31	-0.120	0.980	0.050	0.050	2.930	53.710	-0.200	-0.060
3/3/2011 14:41:36	-0.110	0.980	0.050	0.050	2.930	53.710	-0.220	-0.060
3/3/2011 14:41:41	-0.120	0.880	0.050	0.050	2.930	53.710	-0.220	-0.060
3/3/2011 14:41:46	-0.120	0.980	0.050	0.050	2.930	53.710	-0.200	-0.060
3/3/2011 14:41:51	-0.120	0.780	0.050	0.050	2.930	53.710	-0.200	-0.060
3/3/2011 14:41:56	-0.120	0.880	0.050	0.050	2.930	53.320	-0.190	-0.060
3/3/2011 14:42:01	-0.120	0.780	0.050	0.050	2.930	53.710	-0.180	-0.060
3/3/2011 14:42:06	-0.120	0.880	0.050	0.050	2.830	53.520	-0.190	-0.060
3/3/2011 14:42:11	-0.120	0.780	0.050	0.050	2.930	53.710	-0.190	-0.060
3/3/2011 14:42:16	-0.120	0.880	0.050	0.050	2.930	53.710	-0.200	-0.060
3/3/2011 14:42:21	-0.120	0.980	0.050	0.050	2.640	53.710	-0.190	-0.070
3/3/2011 14:42:26	-0.120	0.880	0.050	0.050	2.730	53.710	-0.180	-0.060
3/3/2011 14:42:31	-0.130	0.780	0.040	0.060	2.730	53.710	-0.200	-0.060
3/3/2011 14:42:36	-0.120	0.980	0.050	0.050	2.930	53.710	-0.210	-0.060
3/3/2011 14:42:41	-0.120	0.780	0.050	0.060	2.930	53.710	-0.200	-0.070
3/3/2011 14:42:46	-0.130	0.880	0.050	0.050	2.930	53.710	-0.190	-0.130
3/3/2011 14:42:51	-0.120	0.880	0.040	0.050	2.930	53.710	-0.180	-0.120
3/3/2011 14:42:56	-0.120	0.780	0.050	0.050	2.830	53.710	-0.180	-0.130
3/3/2011 14:43:01	-0.120	0.880	0.050	0.070	2.830	53.710	-0.180	-0.120
3/3/2011 14:43:06	-0.120	0.880	0.050	0.070	2.930	53.710	-0.180	-0.120
3/3/2011 14:43:11	-0.130	0.680	0.050	0.070	2.730	53.710	-0.180	-0.120
3/3/2011 14:43:16	-0.120	0.880	0.030	0.060	2.930	53.710	-0.180	-0.060
3/3/2011 14:43:21	-0.120	0.980	0.050	0.060	2.930	53.710	-0.180	-0.060
3/3/2011 14:43:26	-0.120	0.980	0.050	0.050	2.930	53.710	-0.190	-0.060
3/3/2011 14:43:31	-0.120	0.880	0.060	0.050	2.930	53.710	-0.190	-0.060
3/3/2011 14:43:36	-0.120	0.780	1.090	0.060	2.930	53.710	-0.200	-0.060
3/3/2011 14:43:41	-0.130	3.520	1.740	0.130	2.930	53.710	-0.200	-0.060
3/3/2011 14:43:46	-0.120	15.530	0.690	0.140	4.200	53.710	-0.180	-0.130
3/3/2011 14:43:51	-0.120	35.640	0.210	0.080	11.230	53.710	-0.180	-0.130
3/3/2011 14:43:56	-0.120	57.910	0.070	0.070	25.000	53.710	-0.180	-0.020
3/3/2011 14:44:01	-0.120	79.880	0.050	0.070	42.190	53.710	-0.180	-0.040
3/3/2011 14:44:06	0.230	99.020	0.050	0.070	58.200	53.710	-0.180	0.060
3/3/2011 14:44:11	0.230	113.480	0.050	0.050	70.900	53.710	-0.180	0.060
3/3/2011 14:44:16	0.590	122.560	0.070	0.060	80.080	53.710	-0.180	0.420
3/3/2011 14:44:21	0.590	126.660	0.160	0.060	87.110	53.520	-0.180	0.410
3/3/2011 14:44:26	0.710	128.520	0.230	0.060	92.190	53.710	-0.190	0.760
3/3/2011 14:44:31	0.740	129.000	0.250	0.050	95.700	53.710	-0.190	0.760
3/3/2011 14:44:36	0.760	129.200	0.250	0.060	98.340	53.710	-0.180	0.770

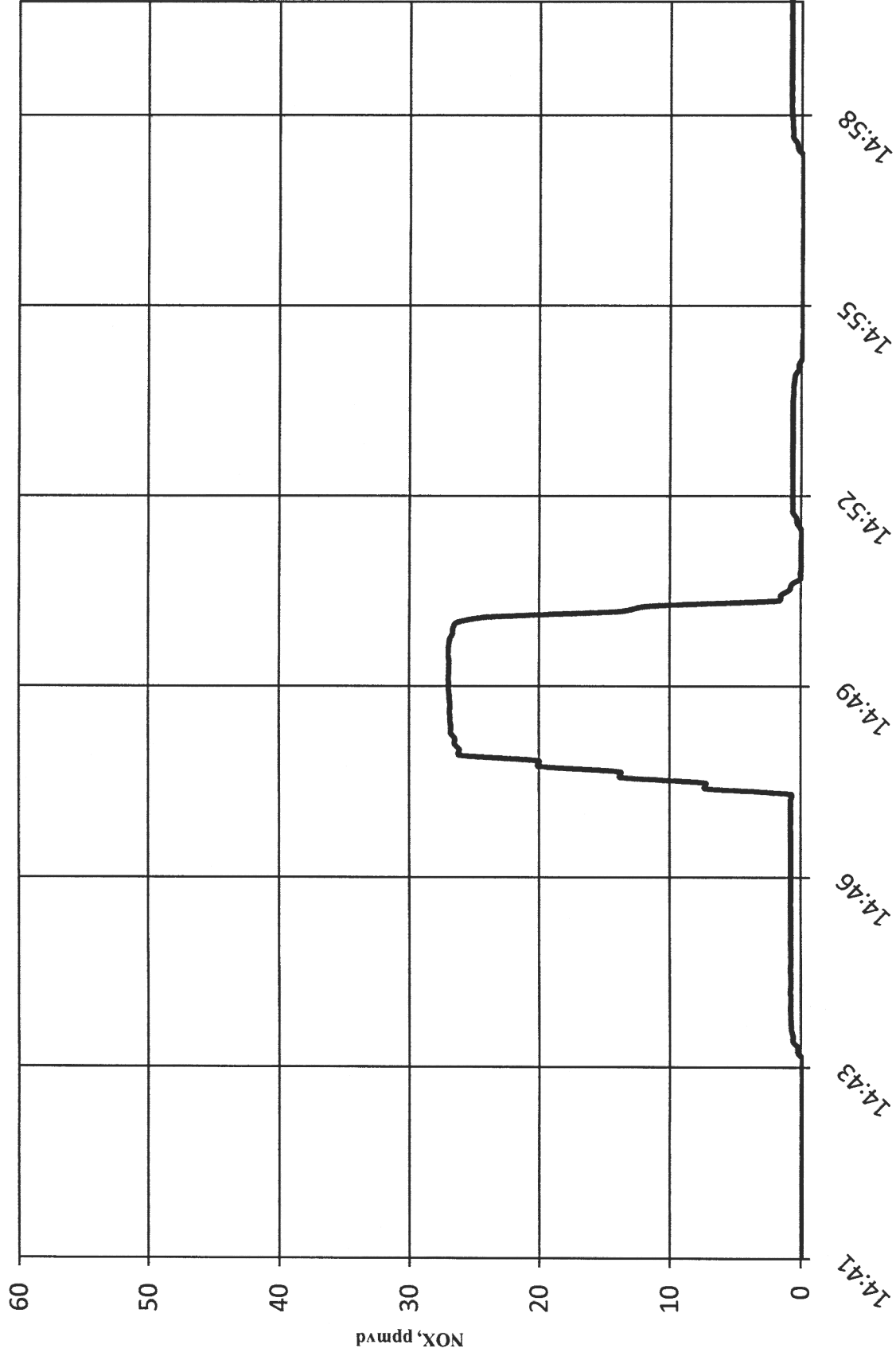
3/3/2011 14:44:41	0.760	128.610	0.240	0.060	100.390	53.710	-0.180	0.770
3/3/2011 14:44:46	0.790	128.420	0.240	0.070	101.950	53.710	-0.180	0.800
3/3/2011 14:44:51	0.770	128.420	0.240	0.060	103.420	53.710	-0.180	0.790
3/3/2011 14:44:56	0.760	128.420	0.230	0.050	104.590	53.710	-0.180	0.770
3/3/2011 14:45:01	0.810	128.320	0.220	0.050	105.370	53.710	-0.180	0.760
3/3/2011 14:45:06	0.770	128.320	0.220	0.050	106.350	53.520	-0.200	0.790
3/3/2011 14:45:11	0.760	128.420	0.210	0.050	107.420	53.520	-0.180	0.770
3/3/2011 14:45:16	0.760	128.810	0.210	0.050	108.010	53.520	-0.180	0.790
3/3/2011 14:45:21	0.810	128.810	0.200	0.060	108.690	53.520	-0.200	0.800
3/3/2011 14:45:26	0.790	128.810	0.200	0.050	109.180	53.710	-0.200	0.770
3/3/2011 14:45:31	0.760	128.910	0.210	0.050	110.250	53.710	-0.200	0.760
3/3/2011 14:45:36	0.760	128.420	0.210	0.050	110.940	53.710	-0.190	0.760
3/3/2011 14:45:41	0.770	128.810	0.200	0.050	111.330	53.710	-0.180	0.770
3/3/2011 14:45:46	0.790	128.910	0.200	0.060	111.910	53.710	-0.180	0.770
3/3/2011 14:45:51	0.770	128.910	0.190	0.060	112.400	53.710	-0.180	0.770
3/3/2011 14:45:56	0.770	128.910	0.180	0.060	112.700	53.710	-0.180	0.770
3/3/2011 14:46:01	0.770	128.810	0.170	0.060	112.790	53.710	-0.180	0.760
3/3/2011 14:46:06	0.760	129.300	0.170	0.060	113.180	53.710	-0.180	0.760
3/3/2011 14:46:11	0.760	129.000	0.170	0.050	113.570	53.710	-0.180	0.760
3/3/2011 14:46:16	0.760	128.810	0.170	0.050	114.060	53.710	-0.190	0.760
3/3/2011 14:46:21	0.790	129.100	0.170	0.050	114.360	53.710	-0.180	0.760
3/3/2011 14:46:26	0.760	129.000	0.170	0.050	114.650	53.710	-0.180	0.760
3/3/2011 14:46:31	0.760	129.300	0.170	0.050	114.750	53.710	-0.180	0.760
3/3/2011 14:46:36	0.760	128.910	0.170	0.050	115.140	53.520	-0.180	0.760
3/3/2011 14:46:41	0.760	128.910	0.160	0.050	115.140	52.150	-0.180	0.760
3/3/2011 14:46:46	0.760	128.910	0.150	0.060	115.530	53.320	-0.180	0.790
3/3/2011 14:46:51	0.770	129.390	0.150	0.050	115.530	51.950	-0.190	0.760
3/3/2011 14:46:56	0.760	129.200	0.150	0.050	115.720	52.730	-0.190	0.830
3/3/2011 14:47:01	0.770	129.000	0.140	0.050	115.720	53.130	-0.180	0.830
3/3/2011 14:47:06	0.770	129.100	0.130	0.050	115.820	53.710	-0.180	0.840
3/3/2011 14:47:11	0.760	129.200	0.130	0.050	116.210	53.520	-0.180	0.860
3/3/2011 14:47:16	0.760	129.390	0.130	0.050	116.410	53.710	-0.190	0.860
3/3/2011 14:47:21	0.760	129.390	0.140	0.050	116.700	53.710	-0.190	0.830
3/3/2011 14:47:26	0.770	129.390	0.120	0.050	116.700	52.150	-0.200	0.770
3/3/2011 14:47:31	0.790	129.100	0.130	0.050	116.700	52.150	-0.180	0.790
3/3/2011 14:47:36	0.760	129.300	0.130	0.050	116.020	53.320	-0.180	0.830
3/3/2011 14:47:41	0.770	128.910	0.340	0.050	115.720	53.710	-0.180	0.830
3/3/2011 14:47:46	0.770	125.390	0.470	0.090	112.890	53.710	-0.190	0.820
3/3/2011 14:47:51	0.770	111.620	0.190	0.080	95.800	53.710	-0.200	0.840
3/3/2011 14:47:56	0.770	90.530	0.060	0.070	71.000	53.710	-0.180	0.880
3/3/2011 14:48:01	0.770	68.950	0.040	0.070	50.780	52.340	-0.190	0.900
3/3/2011 14:48:06	7.290	47.750	0.040	0.060	36.820	52.150	-0.190	1.000
3/3/2011 14:48:11	7.270	29.590	0.050	0.060	28.320	53.520	-0.180	3.490
3/3/2011 14:48:16	13.770	16.110	0.040	0.060	22.850	53.710	-0.190	13.460
3/3/2011 14:48:21	13.770	8.400	0.020	0.050	19.140	53.710	-0.180	15.970
3/3/2011 14:48:26	20.040	4.200	0.020	0.050	16.600	53.710	-0.190	25.960
3/3/2011 14:48:31	20.040	2.340	0.020	0.050	14.750	53.710	-0.180	26.030
3/3/2011 14:48:36	26.130	1.660	0.020	0.050	13.280	53.710	-0.180	26.310
3/3/2011 14:48:41	26.130	1.270	0.020	0.050	11.620	53.710	-0.180	26.390
3/3/2011 14:48:46	26.500	0.980	0.020	0.050	10.840	53.710	-0.200	26.720
3/3/2011 14:48:51	26.500	0.980	0.020	0.050	9.960	53.710	-0.180	26.730
3/3/2011 14:48:56	26.810	1.070	0.020	0.050	9.280	53.710	-0.180	26.780
3/3/2011 14:49:01	26.790	1.270	0.020	0.050	8.790	53.710	-0.190	26.790
3/3/2011 14:49:06	26.850	1.170	0.020	0.050	8.590	53.710	-0.210	26.860
3/3/2011 14:49:11	26.870	1.270	0.020	0.050	8.200	53.710	-0.200	26.870
3/3/2011 14:49:16	26.890	1.170	0.020	0.050	7.810	53.710	-0.210	26.850
3/3/2011 14:49:21	26.850	1.170	0.020	0.050	7.420	53.710	-0.200	26.850
3/3/2011 14:49:26	26.910	1.070	0.020	0.050	7.230	53.520	-0.190	26.890
3/3/2011 14:49:31	26.930	0.780	0.020	0.050	6.740	52.540	-0.180	26.890
3/3/2011 14:49:36	26.980	1.270	0.020	0.050	6.350	51.950	-0.180	26.890

3/3/2011 14:49:41	26.960	1.170	0.020	0.050	6.150	53.520	-0.190	26.890
3/3/2011 14:49:46	27.000	1.070	0.020	0.050	6.150	53.710	-0.180	26.890
3/3/2011 14:49:51	26.950	0.880	0.020	0.050	6.250	53.520	-0.180	26.920
3/3/2011 14:49:56	26.950	1.270	0.020	0.050	5.960	53.710	-0.190	26.950
3/3/2011 14:50:01	26.940	1.070	0.020	0.050	5.960	53.710	-0.190	26.960
3/3/2011 14:50:06	27.000	0.590	0.090	0.050	5.570	53.710	-0.190	27.010
3/3/2011 14:50:11	27.000	0.980	1.680	1.330	5.370	53.710	-0.190	27.000
3/3/2011 14:50:16	26.960	1.170	3.760	11.400	5.370	53.710	-0.180	26.950
3/3/2011 14:50:21	26.890	1.460	4.630	19.410	5.080	53.130	-0.210	26.920
3/3/2011 14:50:26	26.670	1.070	4.830	21.410	5.270	53.520	-0.190	26.940
3/3/2011 14:50:31	26.640	1.170	4.870	21.860	5.080	53.710	-0.210	24.590
3/3/2011 14:50:36	26.330	0.980	4.880	21.990	5.270	53.710	-0.180	15.070
3/3/2011 14:50:41	23.850	0.490	4.890	22.050	4.880	53.710	-0.190	12.690
3/3/2011 14:50:46	14.000	0.880	4.890	22.080	4.880	52.730	-0.180	3.220
3/3/2011 14:50:51	11.540	0.000	4.880	22.120	4.590	44.340	-0.180	2.920
3/3/2011 14:50:56	1.700	0.100	4.880	22.120	4.390	52.540	-0.180	1.610
3/3/2011 14:51:01	1.540	0.390	4.880	22.100	4.490	53.130	-0.180	1.300
3/3/2011 14:51:06	0.880	0.000	4.870	22.090	4.390	53.710	-0.180	0.060
3/3/2011 14:51:11	0.710	0.390	4.880	22.120	4.390	53.710	-0.180	0.050
3/3/2011 14:51:16	0.060	0.100	4.880	22.180	4.790	53.710	-0.190	0.000
3/3/2011 14:51:21	0.050	0.200	4.900	22.210	4.390	53.710	-0.210	0.000
3/3/2011 14:51:26	-0.010	0.000	4.910	22.220	4.100	53.710	-0.180	-0.010
3/3/2011 14:51:31	-0.010	0.100	5.740	21.760	4.390	53.710	-0.200	0.000
3/3/2011 14:51:36	-0.010	2.250	4.960	15.200	7.910	53.710	-0.180	0.000
3/3/2011 14:51:41	-0.020	21.390	1.510	5.000	44.530	53.710	-0.190	-0.010
3/3/2011 14:51:46	0.000	62.400	0.340	1.530	114.260	53.710	-0.180	0.000
3/3/2011 14:51:51	-0.020	110.740	0.100	0.680	175.490	53.710	-0.180	0.060
3/3/2011 14:51:56	-0.070	156.540	0.050	0.430	214.940	53.710	-0.180	0.300
3/3/2011 14:52:01	0.010	194.630	0.020	0.320	237.300	53.710	-0.180	0.360
3/3/2011 14:52:06	0.290	224.800	0.020	0.270	249.900	53.130	-0.180	0.640
3/3/2011 14:52:11	0.350	247.270	0.020	0.230	256.640	52.540	-0.180	0.640
3/3/2011 14:52:16	0.620	262.990	0.020	0.210	260.840	47.070	-0.180	0.640
3/3/2011 14:52:21	0.630	273.730	0.020	0.190	263.180	53.520	-0.180	0.640
3/3/2011 14:52:26	0.640	279.000	0.020	0.170	264.840	53.710	-0.180	0.640
3/3/2011 14:52:31	0.640	280.370	0.020	0.170	266.020	53.710	-0.180	0.640
3/3/2011 14:52:36	0.640	281.350	0.010	0.160	266.700	53.710	-0.180	0.640
3/3/2011 14:52:41	0.640	281.050	0.020	0.150	267.480	53.520	-0.190	0.640
3/3/2011 14:52:46	0.640	281.540	0.010	0.150	268.360	53.710	-0.180	0.640
3/3/2011 14:52:51	0.640	282.320	0.010	0.140	268.950	53.520	-0.180	0.640
3/3/2011 14:52:56	0.640	281.350	0.000	0.130	269.240	53.710	-0.180	0.640
3/3/2011 14:53:01	0.640	282.320	0.010	0.120	269.820	53.130	-0.190	0.640
3/3/2011 14:53:06	0.640	283.010	0.000	0.120	270.310	52.730	-0.190	0.640
3/3/2011 14:53:11	0.640	282.520	0.000	0.120	270.900	53.520	-0.180	0.640
3/3/2011 14:53:16	0.640	282.230	0.000	0.120	271.000	53.710	-0.180	0.640
3/3/2011 14:53:21	0.640	281.250	0.010	0.120	271.290	53.710	-0.180	0.640
3/3/2011 14:53:26	0.640	282.320	0.000	0.110	271.880	53.710	-0.180	0.640
3/3/2011 14:53:31	0.640	281.930	0.000	0.110	272.460	53.710	-0.190	0.640
3/3/2011 14:53:36	0.640	282.710	0.010	0.100	272.750	53.710	-0.200	0.660
3/3/2011 14:53:41	0.640	282.230	0.010	0.100	272.460	53.710	-0.190	0.660
3/3/2011 14:53:46	0.640	280.860	0.010	0.110	271.290	53.710	-0.180	0.640
3/3/2011 14:53:51	0.640	271.000	0.030	0.140	239.550	53.710	-0.180	0.640
3/3/2011 14:53:56	0.640	237.300	0.050	0.210	162.300	53.710	-0.180	0.640
3/3/2011 14:54:01	0.630	192.290	0.050	0.270	98.140	53.710	-0.180	0.640
3/3/2011 14:54:06	0.590	145.800	0.050	0.270	62.010	53.710	-0.180	0.640
3/3/2011 14:54:11	0.590	99.220	0.040	0.240	42.480	53.520	-0.180	0.570
3/3/2011 14:54:16	0.530	60.060	0.030	0.210	31.640	51.370	-0.180	0.290
3/3/2011 14:54:21	0.470	33.110	0.020	0.180	25.000	53.520	-0.180	0.230
3/3/2011 14:54:26	0.220	17.290	0.020	0.150	20.800	53.710	-0.180	-0.020
3/3/2011 14:54:31	0.180	9.570	0.020	0.150	17.680	53.710	-0.180	-0.010
3/3/2011 14:54:36	-0.060	5.960	0.020	0.130	15.330	53.520	-0.180	-0.060

3/3/2011 14:54:41	-0.060	4.200	0.020	0.120	13.770	53.710	-0.180	-0.060
3/3/2011 14:54:46	-0.060	3.520	0.020	0.120	12.600	53.710	-0.180	-0.060
3/3/2011 14:54:51	-0.070	2.640	0.020	0.120	11.520	53.710	-0.180	-0.060
3/3/2011 14:54:56	-0.120	2.440	0.020	0.120	10.840	53.710	-0.190	-0.060
3/3/2011 14:55:01	-0.130	2.440	0.010	0.100	10.060	53.710	-0.180	-0.060
3/3/2011 14:55:06	-0.120	1.660	0.020	0.090	9.380	53.710	-0.180	-0.060
3/3/2011 14:55:11	-0.120	1.560	0.010	0.090	9.080	53.710	-0.190	-0.060
3/3/2011 14:55:16	-0.110	1.660	0.010	0.100	8.590	53.710	-0.190	-0.060
3/3/2011 14:55:21	-0.120	1.860	0.020	0.090	8.200	53.710	-0.180	-0.060
3/3/2011 14:55:26	-0.120	1.270	0.020	0.080	7.810	53.710	-0.180	-0.060
3/3/2011 14:55:31	-0.130	1.070	0.000	0.080	7.320	53.710	-0.190	-0.060
3/3/2011 14:55:36	-0.120	1.370	0.000	0.070	7.130	53.520	-0.180	-0.060
3/3/2011 14:55:41	-0.120	1.270	0.000	0.070	6.840	53.710	-0.180	-0.060
3/3/2011 14:55:46	-0.120	1.460	0.000	0.070	6.540	53.710	-0.180	-0.060
3/3/2011 14:55:51	-0.120	1.070	0.000	0.080	6.640	53.710	-0.200	-0.060
3/3/2011 14:55:56	-0.120	1.270	0.000	0.070	6.350	53.710	-0.180	-0.060
3/3/2011 14:56:01	-0.120	1.270	0.000	0.070	6.150	53.710	-0.180	-0.060
3/3/2011 14:56:06	-0.120	1.270	0.000	0.070	6.350	53.710	-0.180	-0.060
3/3/2011 14:56:11	-0.120	1.270	0.000	0.070	6.050	53.710	-0.180	-0.060
3/3/2011 14:56:16	-0.120	1.270	0.000	0.070	5.370	53.710	-0.180	-0.060
3/3/2011 14:56:21	-0.120	1.170	0.000	0.080	5.370	53.710	-0.180	-0.060
3/3/2011 14:56:26	-0.120	1.270	0.000	0.070	5.570	53.710	-0.190	-0.060
3/3/2011 14:56:31	-0.120	1.270	0.000	0.070	5.660	53.710	-0.180	-0.060
3/3/2011 14:56:36	-0.130	1.460	0.000	0.070	5.370	53.710	-0.180	-0.060
3/3/2011 14:56:41	-0.130	1.270	0.000	0.070	5.370	53.710	-0.180	-0.070
3/3/2011 14:56:46	-0.120	1.070	0.000	0.070	5.370	53.710	-0.180	-0.060
3/3/2011 14:56:51	-0.120	1.170	0.000	0.070	4.980	53.520	-0.180	-0.060
3/3/2011 14:56:56	-0.130	0.980	0.000	0.070	5.370	53.710	-0.180	-0.060
3/3/2011 14:57:01	-0.120	0.780	0.010	0.070	5.370	53.710	-0.180	-0.060
3/3/2011 14:57:06	-0.120	1.170	0.000	0.070	5.370	53.710	-0.190	-0.060
3/3/2011 14:57:11	-0.120	0.980	0.100	0.070	5.370	53.710	-0.190	-0.060
3/3/2011 14:57:16	-0.120	3.220	0.290	0.140	6.350	53.710	-0.180	-0.060
3/3/2011 14:57:21	-0.130	14.550	0.140	0.130	17.680	53.710	-0.200	-0.060
3/3/2011 14:57:26	-0.120	34.180	0.050	0.080	41.990	53.710	-0.210	-0.060
3/3/2011 14:57:31	-0.130	55.960	0.020	0.070	66.210	53.710	-0.200	-0.010
3/3/2011 14:57:36	-0.120	77.730	0.020	0.070	84.080	53.710	-0.180	0.180
3/3/2011 14:57:41	-0.040	97.460	0.010	0.070	95.410	53.710	-0.200	0.230
3/3/2011 14:57:46	0.290	112.400	0.020	0.070	102.250	53.710	-0.200	0.470
3/3/2011 14:57:51	0.360	121.290	0.020	0.070	106.450	53.710	-0.210	0.500
3/3/2011 14:57:56	0.660	125.980	0.020	0.060	108.980	53.710	-0.210	0.640
3/3/2011 14:58:01	0.670	128.130	0.020	0.070	111.040	53.710	-0.180	0.680
3/3/2011 14:58:06	0.710	128.710	0.020	0.070	112.400	53.710	-0.190	0.840
3/3/2011 14:58:11	0.710	129.100	0.020	0.060	113.670	53.710	-0.180	0.830
3/3/2011 14:58:16	0.760	129.300	0.020	0.060	114.650	53.710	-0.180	0.820
3/3/2011 14:58:21	0.770	129.690	0.010	0.060	115.140	53.710	-0.180	0.840
3/3/2011 14:58:26	0.790	129.390	0.000	0.060	115.920	53.710	-0.180	0.830
3/3/2011 14:58:31	0.760	129.790	0.010	0.060	116.410	53.710	-0.180	0.840
3/3/2011 14:58:36	0.790	129.590	0.020	0.070	116.700	53.520	-0.190	0.830
3/3/2011 14:58:41	0.770	129.390	0.020	0.060	117.090	53.710	-0.180	0.820
3/3/2011 14:58:46	0.790	129.880	0.010	0.060	117.380	53.710	-0.180	0.840
3/3/2011 14:58:51	0.760	129.490	0.010	0.050	117.680	53.710	-0.180	0.830
3/3/2011 14:58:56	0.760	129.490	0.020	0.050	118.160	53.710	-0.180	0.820
3/3/2011 14:59:01	0.760	129.490	0.000	0.050	118.160	53.710	-0.190	0.820
3/3/2011 14:59:06	0.760	129.880	0.010	0.050	118.160	53.710	-0.180	0.820
3/3/2011 14:59:11	0.770	129.880	0.020	0.060	118.360	53.710	-0.190	0.830
3/3/2011 14:59:16	0.770	129.880	0.000	0.060	118.950	53.710	-0.180	0.820
3/3/2011 14:59:21	0.770	129.790	0.010	0.060	118.750	53.710	-0.190	0.840
3/3/2011 14:59:26	0.770	129.790	0.000	0.050	119.040	53.520	-0.180	0.820
3/3/2011 14:59:31	0.770	130.270	0.010	0.050	119.140	53.710	-0.180	0.830
3/3/2011 14:59:36	0.760	129.490	0.010	0.050	119.240	53.710	-0.200	0.840

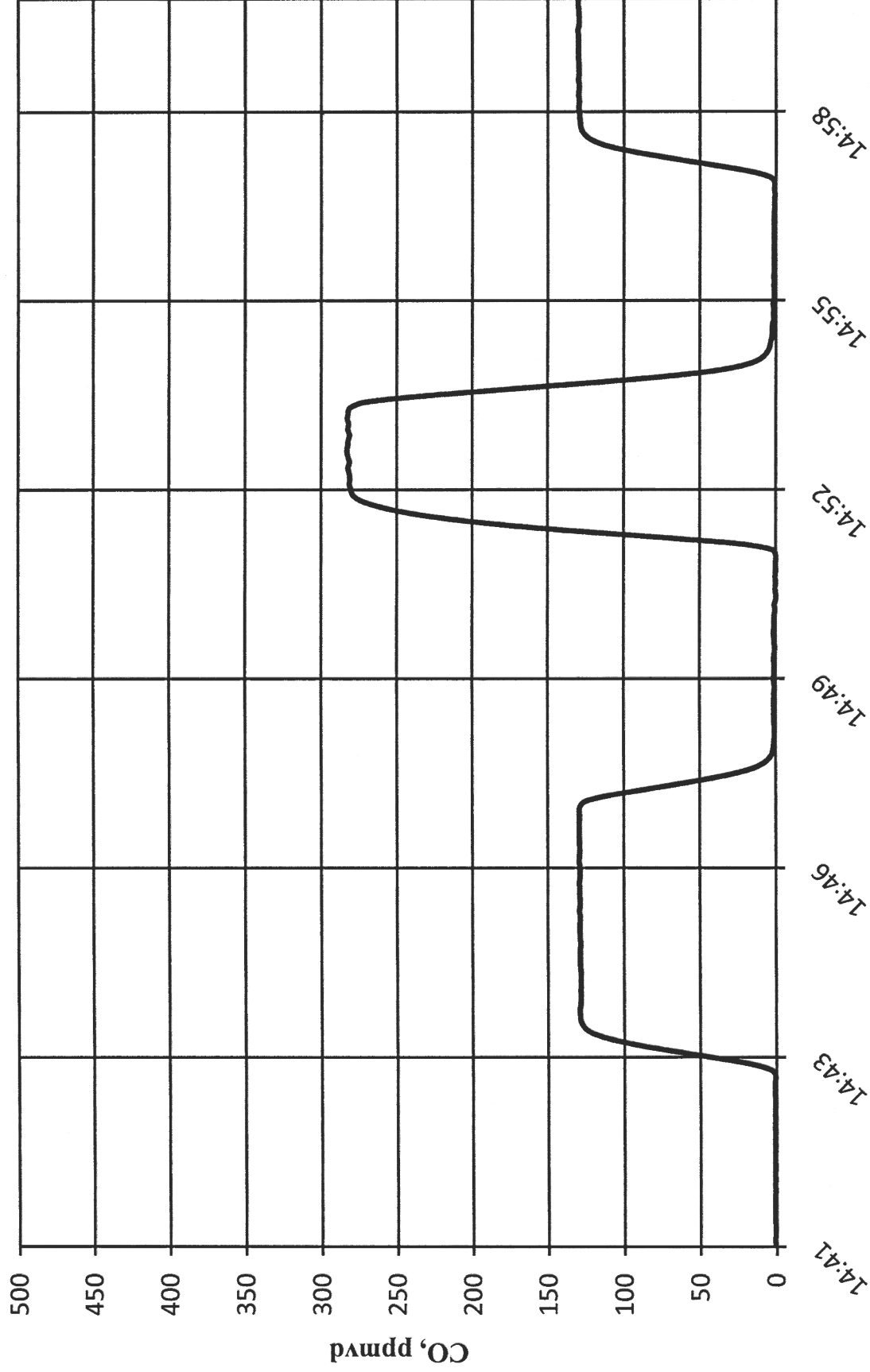
3/3/2011 14:59:41	0.760	129.390	0.010	0.050	119.140	53.710	-0.180	0.830
3/3/2011 14:59:46	0.790	129.490	0.010	0.050	119.140	53.710	-0.180	0.840
3/3/2011 14:59:51	0.760	129.880	0.000	0.050	119.530	53.710	-0.200	0.830
3/3/2011 14:59:56	0.770	129.980	0.000	0.050	119.630	53.710	-0.180	0.820
3/3/2011 15:00:01	0.760	129.880	0.010	0.050	119.630	53.710	-0.180	0.830

CJ-6483 / Borger Complex / Response Time



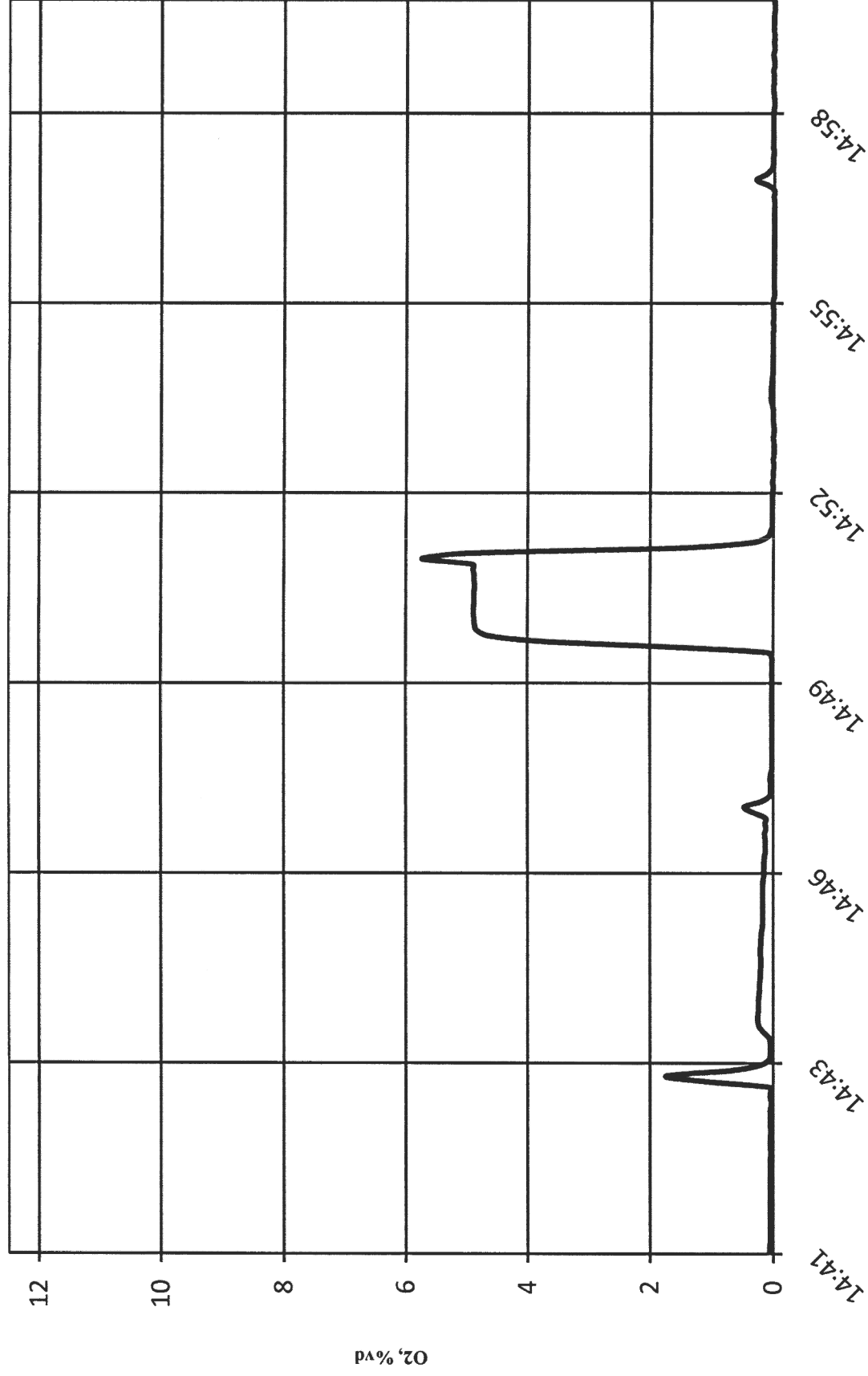
Time - 5 Sec Intervals

CJ-6483 / Borger Complex / Response Time



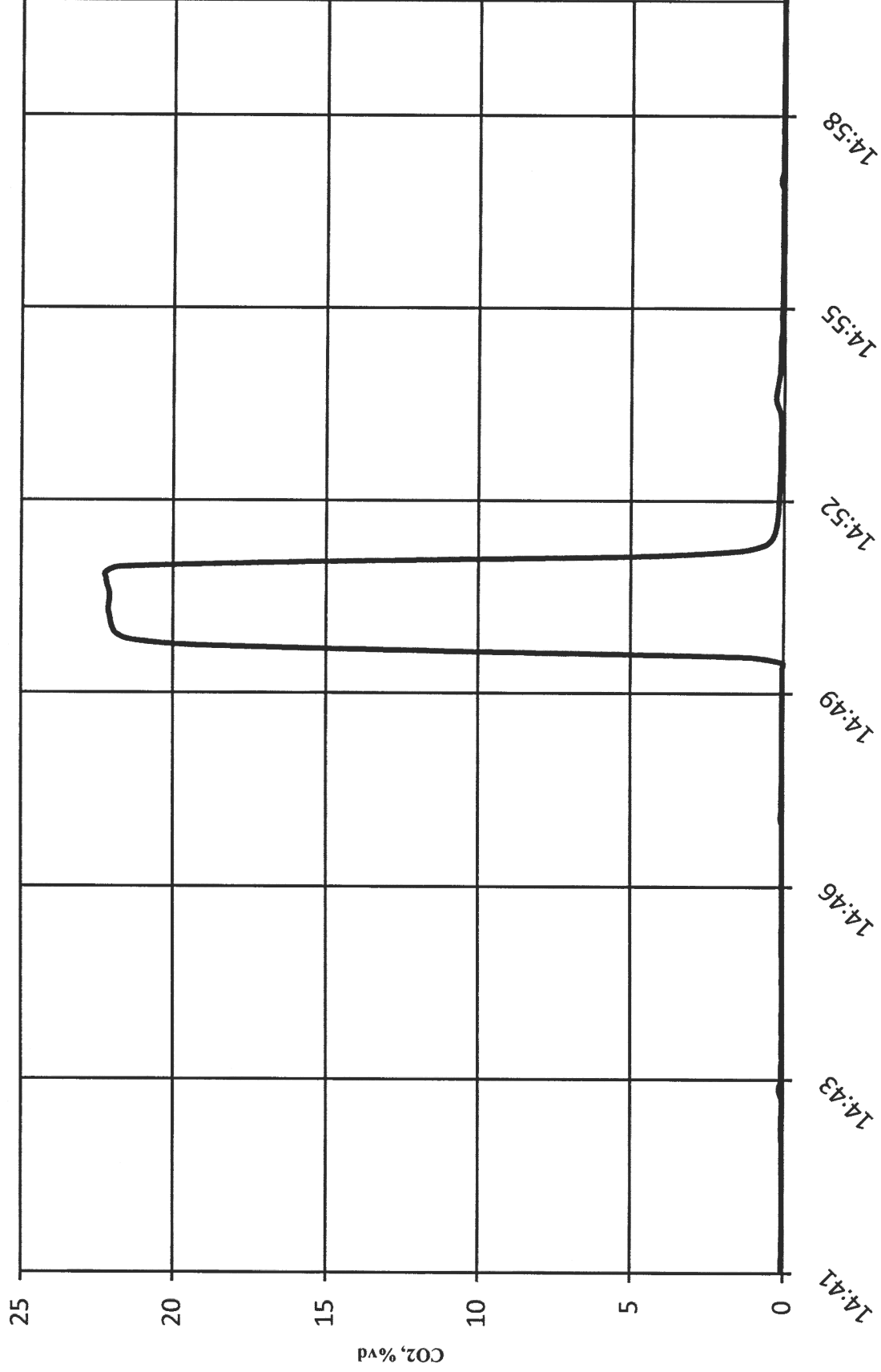
Time - 5 Sec. Intervals

CJ-6483 / Borger Complex / Response Time

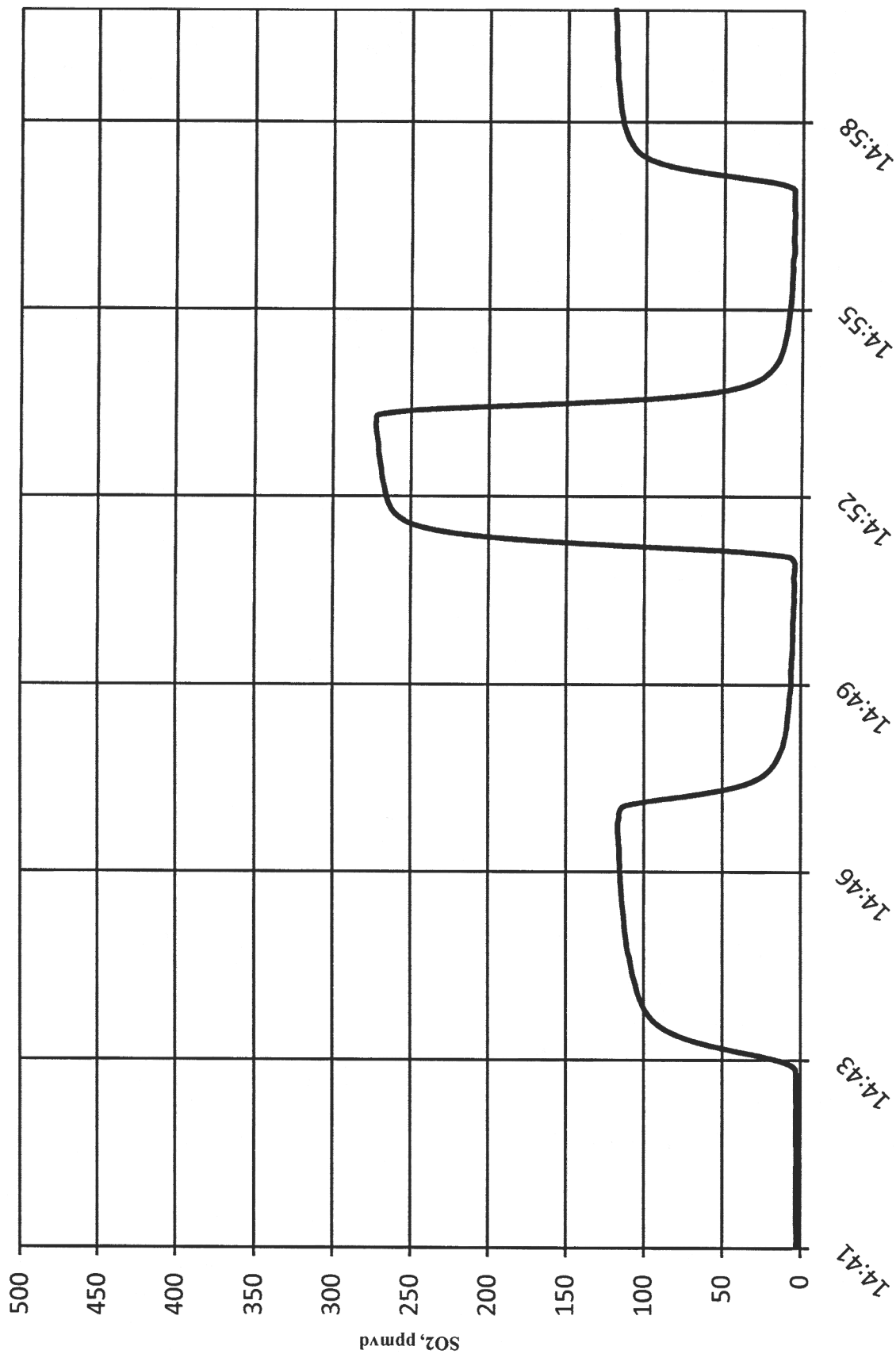


Time - 5 Sec. Intervals

CJ-6483 / Borger Complex / Response Time



CJ-6483 / Borger Complex / Response Time



Time - 5 Sec. Intervals

CETCON, Inc.

Date: March 4, 2011
 Plant: Borger Complex
 Unit: #34 SRU

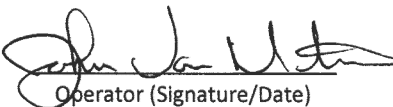
Operator: JRV
 Job No.: CJ-6483
 A/D Converter SN: 174

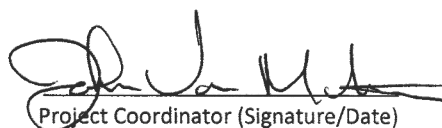
Analyzer Calibration Table

Software ID:	0	1	2	3	4	5	6	7
Parameter	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
Bias & Drift Data								
Zero Time	8:57:26	8:57:28	8:57:30	8:57:30	8:57:32			
Initial Bias	0.000	0.000	0.150	0.050	1.460			
	26.780	283.200	4.960	22.220	117.680			
Span Time	9:00:14	9:11:39	9:01:37	9:01:48	9:07:45			
Zero Time	10:56:07	11:02:25	10:56:08	10:56:09	11:06:07			
Post Run 1 Bias	0.940	0.000	0.020	0.020	6.350			
	26.480	278.320	4.930	22.220	116.700			
Span Time	11:02:18	11:00:36	11:03:52	11:04:04	10:56:55			
Zero Time	12:31:07	12:35:47	12:31:05	12:31:04	12:39:47			
Post Run 2 Bias	0.880	0.000	0.050	0.000	5.370			
	27.070	278.320	4.930	22.240	118.160			
Span Time	12:35:45	12:33:27	12:38:29	12:38:31	12:31:03			
Zero Time	14:10:43		14:10:42	14:10:44	14:18:59			
Post Run 3 Bias	0.940		0.000	0.070	3.420			
	27.190		4.910	22.170	116.700			
Span Time	14:13:29		14:15:19	14:15:19	14:10:49			

Checked by:

4/15/2011


 Operator (Signature/Date)
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 Project Coordinator (Signature/Date)
 Analyzer Calibration Table.xls
 4/15/2011

CJ-6483 / Borger Complex / Post Run 1 Data

ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
3/4/2011 10:56:03	0.950	130.080	0.020	0.030	114.650	53.710	-0.180	0.820
3/4/2011 10:56:08	0.950	130.270	0.020	0.030	115.040	53.710	-0.200	0.840
3/4/2011 10:56:13	0.940	130.470	0.020	0.030	115.630	53.710	-0.180	0.830
3/4/2011 10:56:18	0.940	130.660	0.020	0.030	115.720	53.710	-0.180	0.870
3/4/2011 10:56:23	0.980	129.880	0.020	0.020	115.820	53.710	-0.190	0.840
3/4/2011 10:56:28	0.950	129.690	0.020	0.030	116.210	53.710	-0.210	0.820
3/4/2011 10:56:33	0.940	129.880	0.010	0.030	116.410	53.320	-0.210	0.820
3/4/2011 10:56:38	0.950	130.080	0.010	0.030	116.700	53.710	-0.190	0.820
3/4/2011 10:56:43	0.940	129.880	0.020	0.020	116.700	53.710	-0.220	0.830
3/4/2011 10:56:48	0.940	129.880	0.010	0.020	116.700	53.710	-0.230	0.840
3/4/2011 10:56:53	0.940	129.880	0.010	0.020	117.090	53.710	-0.220	0.830
3/4/2011 10:56:58	0.940	129.880	0.010	0.040	117.680	53.710	-0.200	0.820
3/4/2011 10:57:03	0.940	129.880	0.030	0.020	118.460	53.710	-0.210	0.820
3/4/2011 10:57:08	0.960	129.880	0.160	0.030	119.820	53.710	-0.200	0.820
3/4/2011 10:57:13	0.940	129.880	0.280	0.030	120.610	53.710	-0.180	0.840
3/4/2011 10:57:18	0.960	129.300	0.340	0.020	120.510	53.710	-0.190	0.830
3/4/2011 10:57:23	0.950	128.320	0.380	0.030	120.120	53.710	-0.200	0.820
3/4/2011 10:57:28	0.940	128.320	0.390	0.020	118.850	53.710	-0.180	0.830
3/4/2011 10:57:33	0.980	128.520	0.370	0.020	117.680	53.710	-0.190	0.840
3/4/2011 10:57:38	0.890	128.320	0.720	0.020	116.890	53.710	-0.190	0.830
3/4/2011 10:57:43	0.890	125.000	0.940	0.050	115.630	53.710	-0.180	0.860
3/4/2011 10:57:48	0.880	110.740	0.540	0.050	108.980	53.710	-0.180	0.830
3/4/2011 10:57:53	0.880	89.650	0.350	0.030	93.070	53.710	-0.190	0.840
3/4/2011 10:57:58	2.750	67.770	0.310	0.020	74.220	53.710	-0.200	0.830
3/4/2011 10:58:03	2.750	45.900	0.290	0.020	58.590	53.710	-0.210	0.830
3/4/2011 10:58:08	4.630	28.130	0.300	0.020	46.880	53.710	-0.190	12.890
3/4/2011 10:58:13	4.630	14.650	0.360	0.020	38.570	53.710	-0.180	12.910
3/4/2011 10:58:18	15.120	6.840	0.280	0.020	32.710	53.710	-0.190	24.910
3/4/2011 10:58:23	15.130	2.930	0.470	0.020	28.420	53.710	-0.180	24.900
3/4/2011 10:58:28	25.610	4.100	1.140	0.030	25.200	53.710	-0.180	25.640
3/4/2011 10:58:33	25.620	21.880	0.770	0.040	26.170	53.710	-0.200	25.630
3/4/2011 10:58:38	26.100	63.280	0.500	0.030	49.610	53.710	-0.190	26.370
3/4/2011 10:58:43	26.110	112.300	0.360	0.020	96.970	53.710	-0.180	26.360
3/4/2011 10:58:48	26.550	160.550	0.340	0.020	145.120	53.710	-0.200	17.660
3/4/2011 10:58:53	26.550	203.710	0.340	0.020	180.660	53.710	-0.190	17.660
3/4/2011 10:58:58	14.940	236.330	0.340	0.020	203.710	53.710	-0.190	8.870
3/4/2011 10:59:03	14.940	258.590	0.340	0.020	218.650	53.710	-0.210	8.870
3/4/2011 10:59:08	3.340	269.140	0.360	0.010	228.710	53.710	-0.190	4.850
3/4/2011 10:59:13	3.350	274.020	0.370	0.020	235.940	53.710	-0.190	4.860
3/4/2011 10:59:18	2.110	276.370	0.360	0.020	240.720	53.710	-0.180	0.760
3/4/2011 10:59:23	2.110	277.340	0.360	0.010	244.630	53.710	-0.200	0.760
3/4/2011 10:59:28	0.880	278.320	0.360	0.020	247.660	53.520	-0.180	0.700
3/4/2011 10:59:33	0.880	278.130	0.370	0.020	250.000	53.710	-0.190	0.700
3/4/2011 10:59:38	0.840	276.760	0.370	0.020	251.950	53.710	-0.190	0.730
3/4/2011 10:59:43	0.830	277.730	0.370	0.020	253.910	53.710	-0.180	0.700
3/4/2011 10:59:48	0.770	278.130	0.370	0.020	255.470	53.710	-0.190	0.730
3/4/2011 10:59:53	0.760	277.150	0.370	0.020	256.930	53.710	-0.210	0.710
3/4/2011 10:59:58	0.770	277.540	0.370	0.010	257.910	53.710	-0.210	0.640
3/4/2011 11:00:03	0.760	278.130	0.370	0.020	258.790	53.710	-0.190	0.640
3/4/2011 11:00:08	0.760	277.340	0.370	0.010	259.470	53.710	-0.190	0.640
3/4/2011 11:00:13	0.760	276.760	0.370	0.020	260.250	53.710	-0.200	0.640
3/4/2011 11:00:18	0.760	277.730	0.370	0.020	260.940	53.710	-0.180	0.640
3/4/2011 11:00:23	0.790	278.130	0.370	0.010	261.520	53.710	-0.200	0.640
3/4/2011 11:00:28	0.700	276.760	0.370	0.020	262.110	53.710	-0.190	0.640
3/4/2011 11:00:33	0.700	278.130	0.370	0.020	262.700	53.710	-0.180	0.640
3/4/2011 11:00:38	0.710	277.540	0.370	0.020	263.180	53.710	-0.190	0.660

3/4/2011 11:00:43	0.710	276.950	0.380	0.020	263.770	53.710	-0.200	0.640
3/4/2011 11:00:48	0.730	277.340	0.480	0.010	264.160	53.710	-0.200	0.640
3/4/2011 11:00:53	0.730	272.460	0.620	0.020	263.090	53.710	-0.210	0.640
3/4/2011 11:00:58	0.710	248.630	0.490	0.020	245.310	53.710	-0.180	0.640
3/4/2011 11:01:03	0.700	207.420	0.420	0.020	200.290	53.710	-0.180	0.640
3/4/2011 11:01:08	0.700	160.160	0.390	0.010	150.290	53.710	-0.180	3.860
3/4/2011 11:01:13	0.690	113.090	0.390	0.010	110.840	53.710	-0.190	3.830
3/4/2011 11:01:18	11.130	69.730	0.410	0.000	84.380	53.710	-0.190	7.080
3/4/2011 11:01:23	11.130	37.890	0.420	0.010	66.800	53.710	-0.200	7.090
3/4/2011 11:01:28	21.470	17.770	0.410	0.000	55.180	53.710	-0.180	16.580
3/4/2011 11:01:33	21.460	7.810	0.410	0.000	46.780	53.320	-0.230	16.550
3/4/2011 11:01:38	23.850	3.320	0.410	0.000	40.630	53.710	-0.230	26.100
3/4/2011 11:01:43	23.850	2.150	0.410	0.000	36.130	53.710	-0.210	26.130
3/4/2011 11:01:48	26.190	1.560	0.420	0.000	32.130	53.710	-0.190	26.230
3/4/2011 11:01:53	26.190	0.390	0.410	0.010	28.710	53.710	-0.200	26.240
3/4/2011 11:01:58	26.310	0.590	0.350	0.010	26.070	53.710	-0.190	26.310
3/4/2011 11:02:03	26.320	0.390	0.200	0.020	23.730	53.710	-0.190	26.300
3/4/2011 11:02:08	26.430	0.590	0.120	0.010	21.780	53.710	-0.180	26.370
3/4/2011 11:02:13	26.440	0.390	0.120	0.010	20.210	53.710	-0.200	26.370
3/4/2011 11:02:18	26.530	0.590	0.150	0.000	18.850	53.710	-0.210	26.430
3/4/2011 11:02:23	26.520	0.590	0.170	0.010	17.580	53.710	-0.190	26.410
3/4/2011 11:02:28	26.550	0.200	0.190	0.010	16.600	53.710	-0.210	26.600
3/4/2011 11:02:33	26.570	0.000	0.200	0.010	15.920	53.710	-0.180	26.590
3/4/2011 11:02:38	26.680	0.390	0.200	0.010	14.940	53.710	-0.190	26.770
3/4/2011 11:02:43	26.680	0.390	0.210	0.000	14.450	53.710	-0.180	26.780
3/4/2011 11:02:48	26.840	0.780	0.220	0.000	13.670	53.710	-0.180	26.720
3/4/2011 11:02:53	26.810	0.390	0.210	0.000	13.180	53.710	-0.190	26.710
3/4/2011 11:02:58	26.790	0.390	0.210	0.010	12.700	53.710	-0.190	26.700
3/4/2011 11:03:03	26.790	0.390	0.290	0.000	12.010	53.710	-0.200	26.720
3/4/2011 11:03:08	26.820	0.980	0.290	0.000	11.520	53.710	-0.190	26.720
3/4/2011 11:03:13	26.810	0.590	0.470	0.010	11.230	53.710	-0.200	26.720
3/4/2011 11:03:18	26.800	0.980	2.460	2.940	10.640	53.710	-0.190	26.660
3/4/2011 11:03:23	26.790	2.340	4.200	13.920	10.250	53.710	-0.200	26.660
3/4/2011 11:03:28	26.820	2.340	4.780	19.910	10.160	53.710	-0.190	26.600
3/4/2011 11:03:33	26.840	2.540	4.910	21.450	10.640	53.710	-0.190	26.600
3/4/2011 11:03:38	20.030	2.540	4.930	21.870	10.640	53.710	-0.200	26.480
3/4/2011 11:03:43	20.030	2.150	4.930	22.010	10.250	53.710	-0.190	26.470
3/4/2011 11:03:48	13.160	1.760	4.930	22.090	9.960	53.710	-0.180	13.520
3/4/2011 11:03:53	13.150	0.780	4.930	22.140	9.280	53.710	-0.190	13.540
3/4/2011 11:03:58	6.860	0.200	4.930	22.170	9.280	53.710	-0.190	0.530
3/4/2011 11:04:03	6.840	0.390	4.930	22.200	9.180	53.710	-0.190	0.530
3/4/2011 11:04:08	0.530	-0.980	4.930	22.220	8.690	53.710	-0.200	0.290
3/4/2011 11:04:13	0.530	-0.980	4.920	22.230	8.300	47.460	-0.180	0.280
3/4/2011 11:04:18	0.290	-0.980	4.920	22.250	7.810	53.710	-0.180	0.050
3/4/2011 11:04:23	0.290	-0.780	4.920	22.260	8.010	53.710	-0.200	0.060
3/4/2011 11:04:28	0.120	-0.980	4.920	22.270	7.520	53.710	-0.190	-0.010
3/4/2011 11:04:33	0.120	-0.980	4.910	22.280	7.320	53.710	-0.180	-0.010
3/4/2011 11:04:38	0.120	-0.780	4.930	22.280	7.230	53.710	-0.210	-0.010
3/4/2011 11:04:43	0.120	-0.980	4.940	22.280	6.840	53.710	-0.200	0.000
3/4/2011 11:04:48	0.060	-0.590	4.960	22.260	6.840	53.710	-0.200	-0.010
3/4/2011 11:04:53	0.050	-0.980	4.960	22.240	6.540	53.710	-0.220	0.000
3/4/2011 11:04:58	0.050	-0.780	4.980	22.220	6.350	53.710	-0.210	-0.070
3/4/2011 11:05:03	0.060	-0.590	4.960	22.150	6.150	53.710	-0.220	-0.060
3/4/2011 11:05:08	0.050	-0.200	4.870	21.790	5.860	53.710	-0.230	-0.060
3/4/2011 11:05:13	0.060	0.390	4.800	21.270	6.050	53.710	-0.220	-0.060
3/4/2011 11:05:18	0.060	1.760	4.660	21.040	6.350	53.710	-0.210	-0.060
3/4/2011 11:05:23	0.040	2.540	3.270	19.060	6.350	53.710	-0.230	-0.050
3/4/2011 11:05:28	0.050	3.320	1.470	10.520	7.130	53.710	-0.210	0.060
3/4/2011 11:05:33	0.060	3.710	0.660	4.180	7.320	53.710	-0.200	0.070
3/4/2011 11:05:38	0.180	3.710	0.440	2.100	7.620	53.710	-0.220	0.120

3/4/2011 11:05:43	0.180	3.320	0.440	1.320	7.320	53.710	-0.210	0.120
3/4/2011 11:05:48	0.290	2.730	0.450	0.950	7.320	53.710	-0.220	0.120
3/4/2011 11:05:53	0.290	2.340	0.530	0.910	7.230	53.710	-0.200	0.110
3/4/2011 11:05:58	0.230	1.950	0.500	1.020	6.740	53.710	-0.190	0.060
3/4/2011 11:06:03	0.230	1.760	0.470	0.700	6.250	53.710	-0.210	0.060

CJ-6483 / Borger Complex / Post Run 2 Data

ID -->	NO_x	CO	O₂	CO₂	SO₂	VOC's	MHC	NO
3/4/2011 12:31:03	0.880	129.690	0.040	0.000	118.160	53.710	-0.200	0.820
3/4/2011 12:31:08	0.880	128.910	0.050	0.000	118.360	53.710	-0.180	0.820
3/4/2011 12:31:13	0.880	128.710	0.050	0.000	118.160	53.520	-0.190	0.820
3/4/2011 12:31:18	0.880	130.270	0.050	0.000	118.260	53.710	-0.190	0.830
3/4/2011 12:31:23	0.880	129.300	0.050	-0.010	118.650	53.710	-0.200	0.820
3/4/2011 12:31:28	0.880	128.910	0.050	0.000	118.750	53.710	-0.190	0.860
3/4/2011 12:31:33	0.890	128.710	0.060	0.000	118.850	53.710	-0.230	0.830
3/4/2011 12:31:38	0.880	128.910	0.120	0.000	119.040	53.710	-0.180	0.830
3/4/2011 12:31:43	0.890	128.910	0.170	-0.010	119.340	53.520	-0.190	0.820
3/4/2011 12:31:48	0.880	128.520	0.230	0.000	119.630	53.130	-0.210	0.820
3/4/2011 12:31:53	0.880	129.490	0.460	0.000	119.340	53.710	-0.200	0.830
3/4/2011 12:31:58	0.880	139.450	0.400	0.020	123.050	53.710	-0.180	0.820
3/4/2011 12:32:03	0.880	161.130	0.290	0.000	141.990	53.520	-0.200	0.830
3/4/2011 12:32:08	0.880	186.520	0.270	0.000	171.090	53.520	-0.200	0.840
3/4/2011 12:32:13	0.880	211.330	0.260	0.000	196.390	53.710	-0.190	0.840
3/4/2011 12:32:18	0.880	234.380	0.260	0.000	215.140	53.520	-0.190	0.840
3/4/2011 12:32:23	0.830	251.950	0.250	0.000	227.930	53.520	-0.190	0.740
3/4/2011 12:32:28	0.840	265.040	0.240	0.000	236.820	53.710	-0.180	0.700
3/4/2011 12:32:33	0.760	271.480	0.240	-0.010	242.680	53.710	-0.180	0.660
3/4/2011 12:32:38	0.760	275.390	0.240	0.000	246.970	52.930	-0.180	0.640
3/4/2011 12:32:43	0.700	277.340	0.240	0.000	250.200	53.520	-0.180	0.640
3/4/2011 12:32:48	0.710	276.370	0.240	0.000	252.930	53.520	-0.190	0.640
3/4/2011 12:32:53	0.700	276.760	0.230	-0.010	254.690	53.710	-0.180	0.640
3/4/2011 12:32:58	0.710	276.370	0.220	0.000	256.540	53.710	-0.200	0.640
3/4/2011 12:33:03	0.700	276.370	0.220	0.000	257.710	53.710	-0.190	0.640
3/4/2011 12:33:08	0.710	276.760	0.210	0.000	258.890	53.520	-0.200	0.640
3/4/2011 12:33:13	0.730	276.760	0.220	-0.010	259.860	53.520	-0.180	0.640
3/4/2011 12:33:18	0.730	276.560	0.210	-0.010	260.940	53.520	-0.180	0.640
3/4/2011 12:33:23	0.700	276.760	0.210	-0.010	261.330	53.710	-0.190	0.640
3/4/2011 12:33:28	0.700	277.930	0.210	-0.010	262.110	53.520	-0.210	0.640
3/4/2011 12:33:33	0.700	278.320	0.220	-0.020	262.790	53.520	-0.190	0.640
3/4/2011 12:33:38	0.710	278.520	0.220	0.000	263.180	53.710	-0.180	0.660
3/4/2011 12:33:43	0.730	277.150	0.220	-0.010	263.380	53.520	-0.200	0.640
3/4/2011 12:33:48	0.730	276.370	0.200	0.000	263.770	53.520	-0.190	0.640
3/4/2011 12:33:53	0.730	276.560	0.200	-0.020	264.160	53.320	-0.200	0.640
3/4/2011 12:33:58	0.710	278.130	0.200	0.000	265.040	53.710	-0.180	0.640
3/4/2011 12:34:03	0.680	277.150	0.250	0.000	265.330	52.930	-0.210	0.630
3/4/2011 12:34:08	0.690	277.150	0.270	-0.010	264.750	52.730	-0.230	0.640
3/4/2011 12:34:13	0.680	277.930	0.330	0.000	263.670	52.930	-0.220	0.630
3/4/2011 12:34:18	0.690	275.590	1.490	0.010	262.400	53.130	-0.230	0.640
3/4/2011 12:34:23	0.670	257.030	0.890	0.040	250.000	52.930	-0.220	0.630
3/4/2011 12:34:28	0.700	219.340	0.260	0.000	209.380	52.730	-0.230	0.640
3/4/2011 12:34:33	0.820	174.220	0.080	0.000	160.250	53.320	-0.210	0.640
3/4/2011 12:34:38	0.810	126.170	0.030	-0.010	119.820	52.730	-0.230	2.800
3/4/2011 12:34:43	0.930	81.250	0.020	0.000	92.770	52.730	-0.230	11.470
3/4/2011 12:34:48	0.950	45.900	0.020	0.020	73.630	53.320	-0.210	13.700
3/4/2011 12:34:53	12.930	22.270	0.010	0.010	60.350	53.320	-0.190	22.440
3/4/2011 12:34:58	12.930	9.770	0.020	0.020	51.370	52.930	-0.210	22.880
3/4/2011 12:35:03	24.810	4.100	0.010	0.010	44.820	53.130	-0.210	24.600
3/4/2011 12:35:08	24.800	1.370	0.000	0.010	39.360	52.730	-0.220	25.030
3/4/2011 12:35:13	25.820	1.170	0.010	0.020	35.450	53.130	-0.220	26.750
3/4/2011 12:35:18	25.840	0.000	0.010	0.020	32.130	53.520	-0.220	26.790
3/4/2011 12:35:23	26.850	0.000	0.010	0.010	29.300	53.320	-0.200	26.890
3/4/2011 12:35:28	26.850	-0.200	0.010	0.000	26.760	52.930	-0.230	26.890
3/4/2011 12:35:33	26.920	0.200	0.010	0.010	24.710	53.130	-0.210	26.920
3/4/2011 12:35:38	26.920	-0.200	0.000	0.000	23.050	52.730	-0.230	26.910

3/4/2011 12:35:43	27.070	0.390	0.010	0.020	21.580	53.710	-0.180	26.950
3/4/2011 12:35:48	27.050	0.200	0.000	0.010	20.120	53.520	-0.200	26.960
3/4/2011 12:35:53	27.070	0.000	0.000	0.020	19.140	53.520	-0.180	27.010
3/4/2011 12:35:58	27.070	0.000	0.000	0.010	18.160	53.520	-0.210	27.010
3/4/2011 12:36:03	27.060	0.200	0.010	0.020	17.190	53.710	-0.180	27.010
3/4/2011 12:36:08	27.060	0.000	0.000	0.000	16.700	53.130	-0.210	27.010
3/4/2011 12:36:13	27.110	0.390	0.000	0.010	16.020	53.710	-0.190	27.010
3/4/2011 12:36:18	27.080	0.000	0.030	0.010	15.530	53.520	-0.210	27.010
3/4/2011 12:36:23	27.070	0.780	0.100	0.020	15.140	53.320	-0.190	27.010
3/4/2011 12:36:28	27.110	0.000	0.170	0.020	14.550	53.320	-0.210	27.010
3/4/2011 12:36:33	27.080	0.200	0.300	0.020	14.550	53.520	-0.220	27.010
3/4/2011 12:36:38	27.110	0.200	1.880	1.790	13.870	53.710	-0.200	27.000
3/4/2011 12:36:43	27.120	1.950	3.870	11.560	13.280	53.520	-0.190	26.950
3/4/2011 12:36:48	26.920	1.760	4.740	18.890	12.890	53.520	-0.190	26.930
3/4/2011 12:36:53	26.190	1.950	4.980	20.960	12.700	53.710	-0.200	26.840
3/4/2011 12:36:58	26.040	1.370	5.040	21.530	12.400	53.520	-0.190	24.420
3/4/2011 12:37:03	25.370	0.980	5.050	21.700	12.300	53.520	-0.210	14.810
3/4/2011 12:37:08	23.000	0.390	5.050	21.800	11.910	53.710	-0.200	12.410
3/4/2011 12:37:13	13.540	0.590	5.060	21.830	11.620	53.520	-0.200	2.770
3/4/2011 12:37:18	11.160	0.390	5.060	21.870	11.230	53.710	-0.190	2.480
3/4/2011 12:37:23	1.610	-0.590	5.070	21.890	10.740	53.320	-0.200	1.430
3/4/2011 12:37:28	1.450	-0.980	5.070	21.910	10.450	53.130	-0.200	1.140
3/4/2011 12:37:33	0.870	-0.980	5.060	21.920	10.160	52.730	-0.210	0.020
3/4/2011 12:37:38	0.740	-0.980	5.060	21.930	10.060	52.730	-0.220	0.020
3/4/2011 12:37:43	0.160	-0.980	5.060	21.940	9.860	53.130	-0.220	0.020
3/4/2011 12:37:48	0.160	-0.590	5.070	21.960	9.280	53.320	-0.200	0.040
3/4/2011 12:37:53	0.120	-0.980	5.070	21.970	9.080	53.320	-0.200	-0.040
3/4/2011 12:37:58	0.090	-0.780	5.050	21.990	9.080	53.320	-0.200	-0.040
3/4/2011 12:38:03	0.050	-0.780	5.050	22.020	8.690	53.320	-0.210	-0.040
3/4/2011 12:38:08	0.050	-0.980	5.050	22.020	8.400	53.130	-0.230	-0.040
3/4/2011 12:38:13	0.060	-0.980	5.050	22.020	8.110	53.320	-0.220	-0.040
3/4/2011 12:38:18	0.060	-0.590	5.040	22.040	7.910	53.710	-0.190	-0.010
3/4/2011 12:38:23	0.060	-0.590	4.980	22.100	7.710	53.710	-0.210	-0.060
3/4/2011 12:38:28	0.060	-0.980	4.930	22.220	7.320	53.320	-0.200	-0.060
3/4/2011 12:38:33	0.060	-0.980	4.910	22.300	7.230	53.710	-0.200	-0.060
3/4/2011 12:38:38	0.050	-0.200	4.910	22.310	6.840	53.520	-0.210	-0.060
3/4/2011 12:38:43	0.000	-0.780	4.900	22.300	6.840	53.710	-0.200	-0.070
3/4/2011 12:38:48	-0.020	-0.780	4.890	22.300	6.540	53.130	-0.200	-0.070
3/4/2011 12:38:53	-0.020	-0.980	4.900	22.320	6.350	53.130	-0.210	-0.070
3/4/2011 12:38:58	-0.020	-0.980	4.900	22.330	6.450	52.730	-0.220	-0.090
3/4/2011 12:39:03	-0.040	-0.780	4.900	22.330	6.050	52.930	-0.210	-0.070
3/4/2011 12:39:08	0.000	-0.980	4.910	22.330	5.860	53.130	-0.230	-0.070
3/4/2011 12:39:13	-0.040	-0.980	4.900	22.360	5.660	53.320	-0.220	-0.080
3/4/2011 12:39:18	0.000	-0.980	3.970	21.700	5.370	53.520	-0.190	-0.060
3/4/2011 12:39:23	-0.040	-0.980	1.420	11.780	5.470	53.320	-0.200	-0.070
3/4/2011 12:39:28	-0.010	-0.980	0.450	3.580	5.660	53.520	-0.210	-0.060
3/4/2011 12:39:33	-0.020	-0.200	0.210	1.780	5.570	53.320	-0.220	-0.070
3/4/2011 12:39:38	-0.010	0.200	0.140	1.190	5.370	53.320	-0.230	-0.060
3/4/2011 12:39:43	-0.010	0.980	0.100	0.880	5.370	53.320	-0.200	-0.060
3/4/2011 12:39:48	-0.020	1.950	0.070	0.660	5.370	53.710	-0.200	-0.060
3/4/2011 12:39:53	-0.010	1.760	0.050	0.510	5.370	53.710	-0.180	-0.060
3/4/2011 12:39:58	-0.010	1.950	0.040	0.420	5.270	53.520	-0.200	-0.060
3/4/2011 12:40:03	0.000	1.950	0.040	0.360	5.180	53.520	-0.180	-0.090

CJ-6483 / Borger Complex / Post Run 3 Data

ID -->	NO _x	CO	O ₂	CO ₂	SO ₂	VOC's	MHC	NO
Time	ppmvd	ppmvd	%vd	%vd	ppmvd	ppmvw	ppmvw	ppmvd
3/4/2011 14:10:03	0.930	128.520	-0.010	0.070	114.940	52.730	-0.230	0.880
3/4/2011 14:10:08	0.940	128.520	0.000	0.070	115.230	52.730	-0.230	0.870
3/4/2011 14:10:13	0.930	128.320	0.000	0.070	115.330	52.730	-0.230	0.870
3/4/2011 14:10:18	0.900	127.930	0.000	0.070	115.720	52.730	-0.230	0.810
3/4/2011 14:10:23	0.930	128.910	-0.010	0.070	115.720	52.930	-0.230	0.800
3/4/2011 14:10:28	0.930	128.130	-0.010	0.070	116.020	52.730	-0.230	0.820
3/4/2011 14:10:33	0.940	129.100	-0.010	0.070	116.210	52.730	-0.230	0.820
3/4/2011 14:10:38	0.930	128.320	0.000	0.070	116.210	52.730	-0.230	0.820
3/4/2011 14:10:43	0.940	128.130	-0.020	0.070	116.310	52.730	-0.230	0.820
3/4/2011 14:10:48	0.940	128.320	-0.010	0.070	116.700	52.930	-0.230	0.810
3/4/2011 14:10:53	0.910	128.910	-0.010	0.070	116.210	52.730	-0.230	0.820
3/4/2011 14:10:58	0.940	128.910	-0.010	0.070	116.310	52.730	-0.230	0.810
3/4/2011 14:11:03	0.940	129.100	-0.010	0.070	116.700	52.730	-0.230	0.810
3/4/2011 14:11:08	0.940	129.100	-0.010	0.070	116.700	42.970	-0.230	0.810
3/4/2011 14:11:13	0.940	128.320	-0.010	0.070	116.890	52.730	-0.230	0.810
3/4/2011 14:11:18	0.940	127.930	-0.010	0.070	116.800	52.730	-0.230	0.810
3/4/2011 14:11:23	0.930	127.930	0.020	0.070	116.700	52.730	-0.230	0.820
3/4/2011 14:11:28	0.910	127.930	0.020	0.070	116.210	52.730	-0.230	0.820
3/4/2011 14:11:33	0.940	127.930	0.000	0.070	115.720	52.730	-0.230	0.840
3/4/2011 14:11:38	0.930	128.710	0.100	0.080	115.920	52.540	-0.230	0.810
3/4/2011 14:11:43	0.940	134.380	0.120	0.140	118.850	52.540	-0.230	0.820
3/4/2011 14:11:48	0.940	153.320	0.120	0.110	132.910	52.930	-0.230	0.820
3/4/2011 14:11:53	0.930	178.320	0.160	0.070	159.280	52.930	-0.230	0.820
3/4/2011 14:11:58	0.910	201.370	0.190	0.080	185.350	52.730	-0.230	0.820
3/4/2011 14:12:03	0.910	206.050	0.210	0.080	195.410	52.730	-0.230	0.810
3/4/2011 14:12:08	0.820	186.520	0.210	0.070	175.590	52.730	-0.230	0.810
3/4/2011 14:12:13	0.810	154.300	0.180	0.070	141.410	52.730	-0.230	2.290
3/4/2011 14:12:18	0.760	114.840	0.110	0.070	110.450	53.130	-0.210	8.190
3/4/2011 14:12:23	3.090	74.610	0.070	0.070	87.210	52.930	-0.220	9.680
3/4/2011 14:12:28	12.410	41.020	0.060	0.070	70.120	52.730	-0.230	15.640
3/4/2011 14:12:33	14.770	19.340	0.050	0.070	58.110	52.540	-0.230	16.770
3/4/2011 14:12:38	24.070	7.620	0.050	0.070	49.320	52.540	-0.250	21.270
3/4/2011 14:12:43	24.360	3.130	0.070	0.070	42.870	52.930	-0.220	22.430
3/4/2011 14:12:48	25.590	1.370	0.100	0.060	37.600	52.930	-0.230	26.990
3/4/2011 14:12:53	25.860	0.590	0.100	0.070	33.200	52.730	-0.230	26.980
3/4/2011 14:12:58	27.130	0.000	0.120	0.070	29.790	52.730	-0.230	27.040
3/4/2011 14:13:03	27.150	0.000	0.120	0.070	26.950	52.930	-0.220	27.060
3/4/2011 14:13:08	27.150	-0.200	0.110	0.070	25.000	52.930	-0.210	27.070
3/4/2011 14:13:13	27.180	0.200	0.110	0.070	23.050	52.930	-0.210	27.090
3/4/2011 14:13:18	27.220	0.200	0.100	0.060	21.090	53.130	-0.200	27.140
3/4/2011 14:13:23	27.190	-0.200	0.110	0.070	19.340	52.730	-0.230	27.130
3/4/2011 14:13:28	27.190	0.000	0.120	0.070	18.260	52.730	-0.230	27.180
3/4/2011 14:13:33	27.200	0.000	0.140	0.070	17.090	52.730	-0.230	27.150
3/4/2011 14:13:38	27.260	0.000	0.140	0.070	16.110	52.730	-0.230	27.160
3/4/2011 14:13:43	27.250	0.000	0.120	0.060	15.140	52.730	-0.230	27.150
3/4/2011 14:13:48	27.280	0.000	0.120	0.070	14.260	52.730	-0.230	27.180
3/4/2011 14:13:53	27.270	0.000	0.120	0.060	13.380	52.730	-0.230	27.160
3/4/2011 14:13:58	27.260	0.000	0.120	0.060	12.990	52.730	-0.230	27.190
3/4/2011 14:14:03	27.260	0.000	0.130	0.060	12.500	52.540	-0.230	27.180
3/4/2011 14:14:08	27.250	0.000	0.120	0.050	11.720	52.730	-0.230	27.150
3/4/2011 14:14:13	27.260	-0.200	0.100	0.060	10.940	52.730	-0.230	27.140
3/4/2011 14:14:18	27.320	0.000	0.820	0.190	10.640	52.730	-0.220	27.150
3/4/2011 14:14:23	27.290	0.980	3.060	5.720	10.250	52.730	-0.230	27.180
3/4/2011 14:14:28	27.260	1.950	4.400	16.540	10.060	52.730	-0.230	27.250

3/4/2011 14:14:33	27.270	1.950	4.820	20.640	10.250	52.730	-0.230	26.270
3/4/2011 14:14:38	27.260	1.950	4.910	21.630	10.060	52.540	-0.230	22.440
3/4/2011 14:14:43	24.950	1.950	4.930	21.870	9.770	52.730	-0.230	21.480
3/4/2011 14:14:48	15.730	1.170	4.930	21.980	9.570	52.730	-0.230	17.640
3/4/2011 14:14:53	13.410	0.780	4.930	22.020	9.280	52.930	-0.230	15.890
3/4/2011 14:14:58	4.110	0.000	4.930	22.060	9.180	52.730	-0.230	8.910
3/4/2011 14:15:03	3.730	0.000	4.930	22.080	8.590	52.930	-0.230	7.150
3/4/2011 14:15:08	2.210	-0.780	4.930	22.120	8.010	52.730	-0.230	0.120
3/4/2011 14:15:13	1.820	-0.980	4.930	22.140	7.710	52.930	-0.230	0.120
3/4/2011 14:15:18	0.270	-0.980	4.920	22.150	7.320	52.730	-0.230	0.060
3/4/2011 14:15:23	0.270	-0.980	4.930	22.170	7.130	52.730	-0.230	0.060
3/4/2011 14:15:28	0.190	-0.980	4.920	22.180	6.840	52.730	-0.230	0.000
3/4/2011 14:15:33	0.160	-0.980	4.930	22.190	6.840	52.730	-0.230	-0.010
3/4/2011 14:15:38	0.080	-0.980	4.920	22.220	6.840	52.730	-0.230	-0.060
3/4/2011 14:15:43	0.120	-0.980	4.920	22.220	6.740	52.730	-0.230	-0.060
3/4/2011 14:15:48	0.080	-0.980	4.910	22.220	6.640	52.730	-0.230	-0.060
3/4/2011 14:15:53	0.060	-0.980	4.910	22.220	6.350	52.730	-0.230	-0.060
3/4/2011 14:15:58	0.000	-0.980	4.910	22.230	5.860	52.730	-0.230	-0.060
3/4/2011 14:16:03	0.020	-0.980	4.930	22.220	5.860	52.730	-0.230	-0.050
3/4/2011 14:16:08	0.020	-0.980	4.930	22.220	5.570	52.930	-0.230	-0.050
3/4/2011 14:16:13	0.020	-0.980	4.930	22.220	5.470	52.730	-0.230	-0.060
3/4/2011 14:16:18	0.000	-0.980	4.930	22.220	5.470	52.730	-0.230	-0.060
3/4/2011 14:16:23	0.010	-0.980	4.890	22.130	5.370	52.730	-0.230	-0.070
3/4/2011 14:16:28	0.020	-0.390	4.810	21.700	5.080	52.730	-0.230	-0.120
3/4/2011 14:16:33	0.010	0.590	4.740	21.270	5.370	52.730	-0.230	-0.120
3/4/2011 14:16:38	0.000	1.760	4.740	21.170	5.370	52.730	-0.230	-0.110
3/4/2011 14:16:43	0.040	3.130	4.340	20.690	5.470	52.730	-0.230	-0.120
3/4/2011 14:16:48	0.020	3.910	2.330	15.550	6.150	52.930	-0.230	-0.110
3/4/2011 14:16:53	0.010	4.100	0.740	6.550	6.840	52.730	-0.230	-0.090
3/4/2011 14:16:58	0.020	3.910	0.230	2.280	7.230	52.730	-0.230	0.000
3/4/2011 14:17:03	0.050	3.320	0.110	1.070	6.930	52.730	-0.230	0.010
3/4/2011 14:17:08	0.080	2.340	0.070	0.750	6.640	52.730	-0.230	0.060
3/4/2011 14:17:13	0.120	1.760	0.060	0.580	6.450	52.730	-0.230	0.050
3/4/2011 14:17:18	0.140	0.980	0.050	0.480	6.350	52.730	-0.230	0.000
3/4/2011 14:17:23	0.150	0.980	0.070	0.420	5.860	52.730	-0.230	-0.020
3/4/2011 14:17:28	0.090	0.390	0.060	0.380	5.660	52.730	-0.230	-0.110
3/4/2011 14:17:33	0.080	0.000	0.060	0.350	5.370	52.730	-0.230	-0.120
3/4/2011 14:17:38	0.010	0.000	0.060	0.330	5.370	52.730	-0.230	-0.120
3/4/2011 14:17:43	0.010	0.200	0.050	0.310	5.370	52.730	-0.230	-0.110
3/4/2011 14:17:48	0.010	0.000	0.050	0.270	5.080	52.730	-0.230	-0.120
3/4/2011 14:17:53	0.010	0.000	0.050	0.270	4.980	52.540	-0.230	-0.120
3/4/2011 14:17:58	-0.050	0.000	0.050	0.260	4.490	52.540	-0.230	-0.090
3/4/2011 14:18:03	-0.060	0.000	0.050	0.240	4.690	52.730	-0.230	-0.120
3/4/2011 14:18:08	-0.050	0.000	0.050	0.230	4.390	52.730	-0.230	-0.120
3/4/2011 14:18:13	-0.050	0.000	0.050	0.220	4.300	52.730	-0.230	-0.120
3/4/2011 14:18:18	-0.060	-0.200	0.050	0.210	4.390	52.930	-0.230	-0.110
3/4/2011 14:18:23	-0.050	0.000	0.040	0.200	4.390	52.730	-0.230	-0.120
3/4/2011 14:18:28	-0.040	0.000	0.050	0.200	4.390	52.730	-0.230	-0.110
3/4/2011 14:18:33	-0.050	0.000	0.050	0.200	4.000	52.730	-0.230	-0.070
3/4/2011 14:18:38	-0.050	0.000	0.050	0.190	3.910	52.730	-0.230	-0.120
3/4/2011 14:18:43	-0.060	0.000	0.050	0.180	3.420	52.930	-0.230	-0.120
3/4/2011 14:18:48	-0.060	0.000	0.040	0.180	3.710	52.730	-0.230	-0.110
3/4/2011 14:18:53	-0.060	0.000	0.040	0.170	3.610	52.730	-0.230	-0.090
3/4/2011 14:18:58	-0.040	0.000	0.030	0.170	3.610	52.540	-0.250	-0.120
3/4/2011 14:19:03	-0.050	0.000	0.040	0.170	3.420	52.730	-0.230	-0.110

Date: March 4, 2011
 Plant: Borger Petroleum Refinery
 Unit: Unit 34 SRU
 Operator: JRV
 Job No.: CJ-6483

CETCON, Inc.

NO_x ANALYZER CALIBRATION DATA

NO _x		Serial Number:		69544-363	
Analyzer:		Range:	60.0	=	10.00
Make:	TECO	Span:	51.4	=	8.57
Model:	42C	Units:	ppm	=	VDC
		Zero Gas:		0.0	
		Mid Range Gas:		8.57	
		High Range Gas:		VDC	

Calibration Error Test		Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span
Analyzer Response		0.0	0.0	27.3	0.2	51.3	-0.1
System Bias Test		Zero	Bias, % Span	Mid	Bias, % Span		
System Response		0.0	0.0	26.8	-1.0		

Bias Gas Used (Mid/High)?		Mid	=	27.2	ppm
		Calibration Error Response =			
		27.3			

Sample Run #	C ₀ ppm	C _{0F} ppm	Zero Drift % Span	Zero Bias % Span	C _{0M} ppm	C _{0H} ppm	Cal Drift % Span	Cal Bias % Span	C _{Ave} ppm	Corrected Conc., ppm
R1	0.0	0.9	1.8	1.8	26.8	26.5	-0.6	-1.6	19.476	19.762
R2	0.0	0.9	1.8	1.8	26.8	26.5	-0.6	-1.6	20.193	20.507
R3	0.0	0.9	1.8	1.8	26.8	26.5	-0.6	-1.6	19.393	19.675
R4	0.9	0.9	-0.1	1.7	26.5	27.1	1.1	-0.4	19.293	19.332
R5	0.9	0.9	-0.1	1.7	26.5	27.1	1.1	-0.4	19.596	19.650
R6	0.9	0.9	-0.1	1.7	26.5	27.1	1.1	-0.4	20.034	20.111
R7	0.9	0.9	0.1	1.8	27.1	27.2	0.2	-0.2	19.666	19.457
R8	0.9	0.9	0.0	1.8	27.1	27.2	0.2	-0.2	19.907	19.698
R9	0.9	0.9	0.0	1.8	27.1	27.2	0.2	-0.2	19.392	19.164

Drift ≤ 3% Span, Bias ≤ 5% Span

C_{0i}: Initial Zero Gas Response, ppm
 C_{0F}: Final Zero Gas Response, ppm
 C₀: Average Zero Gas Response, ppm

C_{mi}: Initial Span Gas Response, ppm
 C_{mf}: Final Span Gas Response, ppm
 C_m: Average Span Gas Response, ppm

C_{ma}: Span Gas Value, ppm
 C_{Ave}: Average From Test, ppm

Drift Corrected Concentration, ppm =

$$(C_{Ave} - C_0) \cdot C_{ma} \div (C_m - C_0)$$

Method 7E Equation: 7E-5

QA/QC Check:

Completeness: ☒ Legibility: ☒

Accuracy: ☒ Specifications: ☒

Reasonableness: ☒

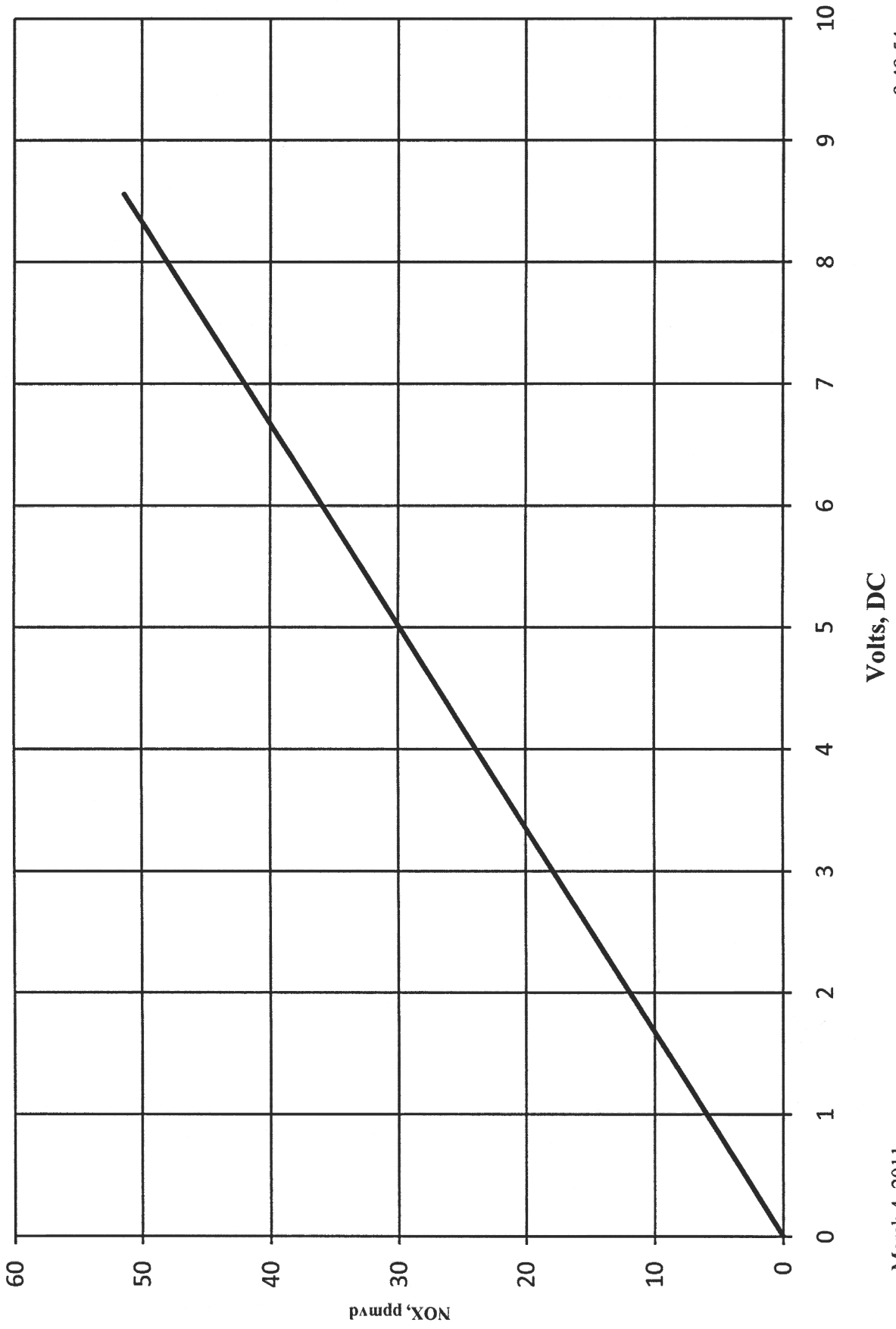
Checked by:

4/15/2011

Operator (Signature/Date)
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Reasonableness: ☒
 Operator (Signature/Date)
 4/18/2011 CALNOXRATA.XLS

NOX Calibration Curve



March 4, 2011

8:49:54

**AIR LIQUIDE**Air Liquide America
Specialty Gases LLC**RATA CLASS***Dual-Analyzed Calibration Standard*

1290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950

Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol GasAssay LaboratoryAIR LIQUIDE AMERICA SPECIALTY GASES LLC
1290 COMBERMERE STREET
TROY, MI 48083

P.O. No.: ALAS-56936

Project No.: 05-88628-001

CustomerAIR LIQUIDE (CETCON)
CETCON
1319 NORTH PEORIA
TULSA OK 74106**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: 1L2342 Certification Date: 15Jun2010 Exp. Date: 14Jun2012
Cylinder Pressure***: 1996 PSIGCOMPONENTCERTIFIED CONCENTRATION (Moles)ANALYTICALACCURACY**TRACEABILITY

NITRIC OXIDE

27.1 PPM

+/- 1%

Direct NIST and VSL

NITROGEN - OXYGEN FREE

BALANCE

TOTAL OXIDES OF NITROGEN

27.2 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 1684 1	15Oct2012	KAL004455	95.84 PPM	NITRIC OXIDE

INSTRUMENTATIONINSTRUMENT/MODEL/SERIAL#DATE LAST CALIBRATEDANALYTICAL PRINCIPLE

FTIR/0928621

11Jun2010

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:	08Jun2010	Response Unit:	PPM
Z1 =	-0.08431	R1 =	95.25120
T1 =	26.84617		
R2 =	95.33529	Z2 =	0.01623
T2 =	26.85510		
Z3 =	0.05157	T3 =	26.92288
R3 =	95.45002		
Avg. Concentration:	27.02	PPM	

Date:	15Jun2010	Response Unit:	PPM
Z1 =	-0.13978	R1 =	95.28818
T1 =	26.98400		
R2 =	95.45477	Z2 =	-0.07544
T2 =	27.00150		
Z3 =	-0.02362	T3 =	27.22818
R3 =	95.70702		
Avg. Concentration:	27.23	PPM	

Concentration = A + Bx + Cx ² + Dx ³ + Ex ⁴	
r = 9.99997E-1	
Constants:	A = 0.00000E+0
B = 9.17564E-1	C = 1.32000E-4
D = 0.00000E+0	E = 0.00000E+0

Special Notes:

CET0004 RANGE: 26.7-27.2 PPM NO

LOT# 0588628001

APPROVED BY:

Rob McCrandall

**AIR LIQUIDE**Air Liquide America
Specialty Gases LLC**Scott****RATA CLASS***Dual-Analyzed Calibration Standard*

1290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950

Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol GasAssay LaboratoryAIR LIQUIDE AMERICA SPECIALTY GASES LLC
1290 COMBERMERE STREET
TROY, MI 48083

P.O. No.: 11119

Project No.: 05-80532-002

CustomerAIR LIQUIDE
CETCON
1319 NORTH PEORIA
TULSA OK 74106**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: ALM019065 Certification Date: 06Oct2009 Exp. Date: 06Oct2011
Cylinder Pressure***: 1844 PSIGCOMPONENTCERTIFIED CONCENTRATION (Moles)ANALYTICALACCURACY**TRACEABILITY

NITRIC OXIDE

51.4 PPM

+/- 1%

Direct NIST and VSL

NITROGEN - OXYGEN FREE

BALANCE

TOTAL OXIDES OF NITROGEN

51.4 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

<u>TYPE/SRM NO.</u>	<u>EXPIRATION DATE</u>	<u>CYLINDER NUMBER</u>	<u>CONCENTRATION</u>	<u>COMPONENT</u>
NTRM 1684	05Jul2010	AAL069401	94.62 PPM	NITRIC OXIDE

INSTRUMENTATIONINSTRUMENT/MODEL/SERIAL#DATE LAST CALIBRATEDANALYTICAL PRINCIPLE

FTIR/0928621

18Sep2009

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: 28Sep2009	Response Unit: PPM
Z1 = -0.28439	R1 = 93.65037 T1 = 51.10451
R2 = 93.76423	Z2 = -0.08761 T2 = 51.25401
Z3 = 0.10245	T3 = 51.06263 R3 = 94.45434
Avg. Concentration:	51.14 PPM

Date: 06Oct2009	Response Unit: PPM
Z1 = -0.06236	R1 = 93.98155 T1 = 51.22952
R2 = 94.16087	Z2 = -0.05330 T2 = 51.28792
Z3 = 0.01825	T3 = 51.34877 R3 = 94.28141
Avg. Concentration:	51.56 PPM

Concentration = A + Bx + Cx ² + Dx ³ + Ex ⁴	
r = 9.99973E-1	
Constants:	A = 0.00000E+0
B = 9.91808E-1	C = 2.21000E-4
D = 0.00000E+0	E = 0.00000E+0

APPROVED BY: _____

Rob McCrandall

Date: March 4, 2011
 Plant: Borger Petroleum Refinery
 Unit: Unit 34 SRU
 Operator: JRV
 Job No.: CJ-6483

CETCON, Inc.

O₂ ANALYZER CALIBRATION DATA

Analyzer:		Serial Number:		X1440D174B		Value, %		% of Span		Cylinder #	
Make:		Range:		12.50 =		5.00		0.0		SSG-1123	
Model:		Span:		11.60 =		4.64		42.8		CC-52718	
		Units:		%		VDC		100.0		CC-236946	

Calibration Error Test		Zero	Error, % Span	Mid	Error, % Span	High	Error	
Analyzer Response		0.07	0.6	4.93	-0.3	11.60	≤ 2% Span	
System Bias Test		Zero	Bias, % Span	Mid	Bias, % Span		95% Response Time	
System Response		0.15	0.7	4.96	0.3		Minutes:Seconds	

Bias Gas Used (Mid/High)?		Mid	=	4.96	%	Calibration Error Response =		4.93	%
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Sample Run #	C ₀ %	C _{ref} %	Zero Drift % Span	Zero Bias % Span	C _{mid} %	C _{ref} %	Cal Drift % Span	Cal Bias % Span	C _{AVE} %	Corrected Conc., %
R1	0.15	0.02	-1.1	-0.4	4.96	4.93	-0.3	0.0	6.016	6.053
R2	0.15	0.02	-1.1	-0.4	4.96	4.93	-0.3	0.0	5.971	6.007
R3	0.15	0.02	-1.1	-0.4	4.96	4.93	-0.3	0.0	6.003	6.040
R4	0.02	0.02	0.0	-0.4	4.93	4.93	0.0	0.0	6.255	6.298
R5	0.02	0.02	0.0	-0.4	4.93	4.93	0.0	0.0	6.396	6.441
R6	0.02	0.02	0.0	-0.4	4.93	4.93	0.0	0.0	6.353	6.397
R7	0.02	0.00	-0.2	-0.6	4.93	4.91	-0.2	-0.2	6.468	6.524
R8	0.02	0.00	-0.2	-0.6	4.93	4.91	-0.2	-0.2	6.364	6.419
R9	0.02	0.00	-0.2	-0.6	4.93	4.91	-0.2	-0.2	6.547	6.604

Drift ≤ 3% Span, Bias ≤ 5% Span

C_{0i}: Initial Zero Gas Response, %
 C_{0f}: Final Zero Gas Response, %
 C₀: Average Zero Gas Response, %

C_{mi}: Initial Span Gas Response, %
 C_{mf}: Final Span Gas Response, %
 C_m: Average Span Gas Response, %

C_{ma}: Span Gas Value, %
 C_{Ave}: Average From Test, %

Drift Corrected Concentration, % =

$$(C_{AVE} - C_0) \cdot C_{ma} \div (C_m - C_0)$$

Method 7E Equation: 7E-5

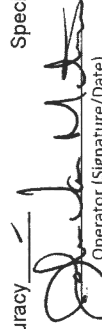
QA/QC Check:

Completeness ☒ Legibility ☒

Accuracy ☒ Specifications ☒

Reasonableness ☒

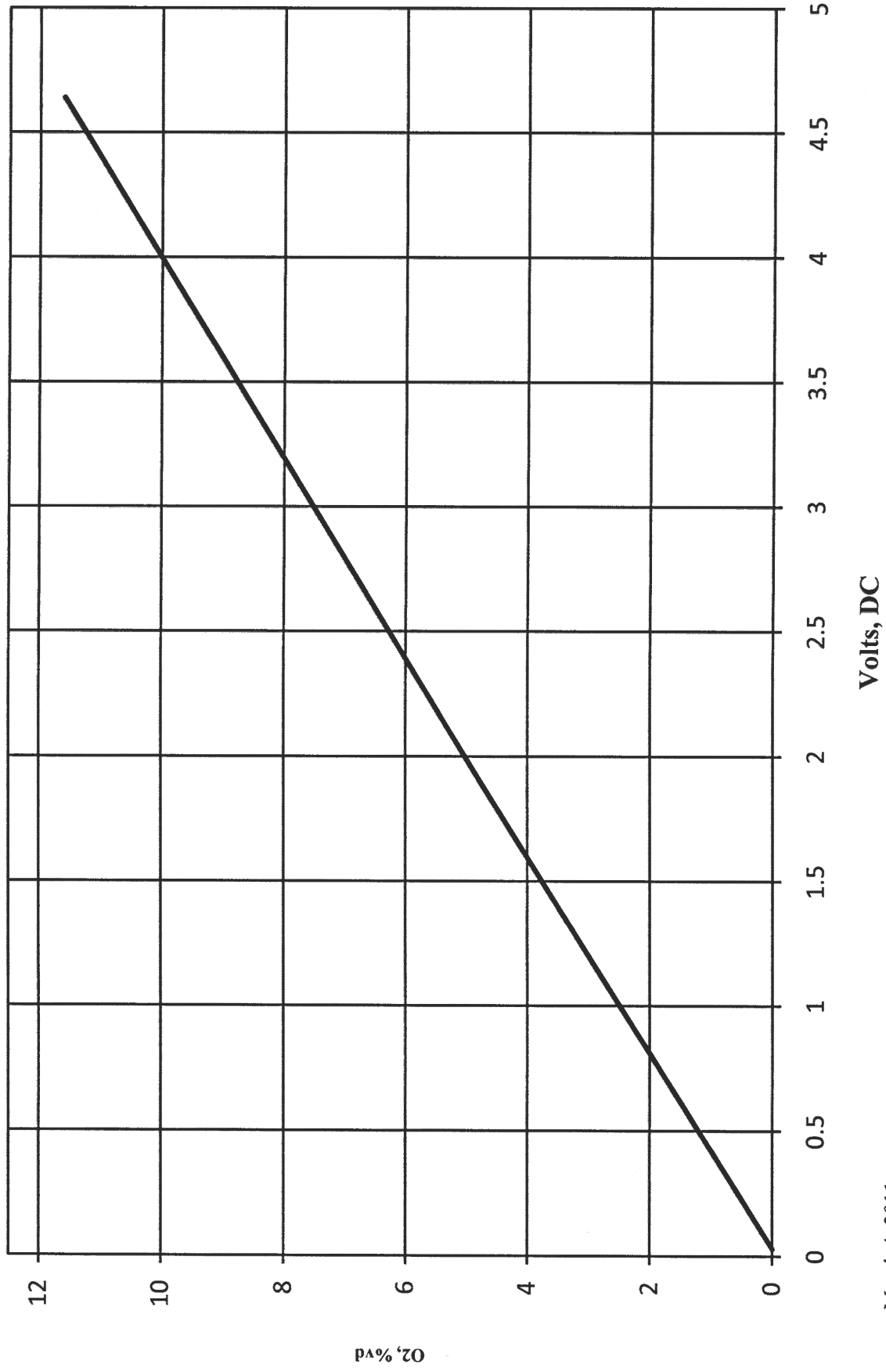
Checked by:


 Operator (Signature/Date)
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 Project Coordinator (Signature/Date)
 4/18/2011
 CALINOXDATA.XLS

4/15/2011

O2 Calibration Curve



March 4, 2011

8:49:54

**AIR LIQUIDE**Air Liquide America
Specialty Gases LLC**Scott****RATA CLASS***Dual-Analyzed Calibration Standard*

11426 FAIRMONT PKWY, LA PORTE, TX 77571

Phone: 800-248-1427

Fax: 281-474-8419

CERTIFICATE OF ACCURACY: Interference Free Multi-Component EPA Protocol GasAssay LaboratoryAIR LIQUIDE AMERICA SPECIALTY GASES LLC
11426 FAIRMONT PKWY
LA PORTE, TX 77571

P.O. No.: 11667

Document #: 40341921-001

Customer

CETCON

CRAIG FOX
4953 S 45TH WEST AVE
TULSA OK 74107
US**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: **CC52718**
Cylinder Pressure***: 1900 PSIG

Certification Date: 18Jan2011

Exp. Date: 18Jan2014
Batch No: LAP0032573

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
CARBON DIOXIDE	22.4 %	+/- 1%	Direct NIST and VSL
OXYGEN	4.96 %	+/- 1%	
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 2300	02Jan2012	K002682	23.01 %	CARBON DIOXIDE
NTRM 2350	01May2013	K026427	23.50 %	OXYGEN

INSTRUMENTATIONINSTRUMENT/MODEL/SERIAL#FTIR/MG-09-149
SERVOMEX/MODEL 244A/701/716DATE LAST CALIBRATED01Jan2011
20Jan2011ANALYTICAL PRINCIPLEFTIR
PARAMAGNETIC**ANALYZER READINGS**

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

CARBON DIOXIDEDate: 17Jan2011 Response Unit: %
Z1=0.00038 R1=23.13889 T1=22.54035
R2=23.15347 Z2=0.00441 T2=22.58218
Z3=0.00525 T3=22.56592 R3=23.17870
Avg. Concentration: 22.41 %Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 9.99992E-1
Constants: A = -5.33237E+1
B = 1.45669E+0 C = 0.00000E+0
D = 0.00000E+0 E = 0.00000E+0**OXYGEN**Date: 26Jan2011 Response Unit: VOLTS
Z1=0.00000 R1=0.94300 T1=0.19920
R2=0.94330 Z2=0.00000 T2=0.19950
Z3=0.00000 T3=0.19950 R3=0.94350
Avg. Concentration: 4.955 %Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.9999971
Constants: A = -0.1046095
B = 24.96589325 C =
D = E =**Special Notes:**

Written certs and tags for Cetcon, include part number CET0080 as item number, include Cetcon PO number on C of A.

APPROVED BY: David Kelly

DAVID KELLY

Vepint

03/07/11 Page 1 of 1

**AIR LIQUIDE**Air Liquide America
Specialty Gases LLC**Scott****RATA CLASS***Dual-Analyzed Calibration Standard*

1290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950

Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol GasAssay LaboratoryAIR LIQUIDE AMERICA SPECIALTY GASES LLC
1290 COMBERMERE STREET
TROY, MI 48083P.O. No.: ALAS-59094 PO#11557
Project No.: 05-91896-002Customer

CETCON

4953 S. 45TH W. AVENUE
TULSA OK 74107**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: **CC236946**Certification Date: **04Oct2010**Exp. Date: **03Oct2013**Cylinder Pressure***: **2000 PSIG**

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
CARBON DIOXIDE	11.6 %	+/- 1%	Direct NIST and VSL
OXYGEN	11.6 %	+/- 1%	Direct NIST and VSL
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 2300	01Nov2010	1D002807	23.04 %	CARBON DIOXIDE
NTRM 2350	01Dec2011	K016398	23.20 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
PIR/2000/609015	24Sep2010	NDIR
CAI/110P/V03018	13Sep2010	PARAMAGNETIC

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis**CARBON DIOXIDE**

Date: 05Oct2010 Response Unit: MV

Z1=0.00000 R1=100.0000 T1=67.00000

R2=100.0000 Z2=0.00000 T2=67.00000

Z3=0.00000 T3=67.00000 R3=100.0000

Avg. Concentration: 11.59 %

OXYGEN

Date: 05Oct2010 Response Unit: %

Z1=0.00000 R1=23.20000 T1=11.60000

R2=23.19000 Z2=0.00000 T2=11.61000

Z3=0.00000 T3=11.61000 R3=23.19000

Avg. Concentration: 11.61 %

Second Triad Analysis**Calibration Curve**Concentration = A + Bx + Cx² + Dx³ + Ex⁴
r = 0.999994Constants: A = -0.00399129
B = 0.13400661 C = -0.0001875
D = 1.14923E-05 E = 0Concentration = A + Bx + Cx² + Dx³ + Ex⁴
r = 0.999999Constants: A = 0.004953498
B = 0.99985602 C = 0
D = 0 E = 0**Special Notes:**CET0081 RANGE: 11-12% CO₂, 11-12% O₂ PO# 10974

LOT# 0591896002

APPROVED BY:

JEFF CROTEAU

Date:	<u>March 4, 2011</u>
Plant:	<u>Borger Petroleum</u>
Unit:	<u>Unit 34 SRU</u>
Operator:	<u>JRV</u>
Job No.:	<u>CJ-6483</u>

SO₂ ANALYZER CALIBRATION DATA

[illegible]

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error
Analyzer Response	1.0	0.3	124.0	-0.3	282.2	-0.6	$\leq 2\%$ Span
System Bias Test	Zero	Bias, % Span	Mid	Bias, % Span	High	Bias	
System Response	1.5	0.2	117.7	-2.2	$\leq 5\%$ Span	95% Response Time	
					Minutes:Seconds	Upstream	Downstream
					2:45	2:50	

Bias Gas Used (Mid/High)?	Mid	=	125.0	ppm
			124.0	ppm
			Calibration Error Response =	

[illegible]

Drift $\leq 3\%$ Span, Bias $\leq 5\%$ Span

C_{α} :	Initial Zero Gas Response, ppm
C_{α} :	Final Zero Gas Response, ppm
C_0 :	Average Zero Gas Response, ppm

C_{mi} :	Initial Span Gas Response, ppm
C_{mf} :	Final Span Gas Response, ppm
C_m :	Average Span Gas Response, ppm

Drift Corrected Concentration, ppm =

$$(C_{\text{Ave}} - C_0) \cdot C_{\text{ma}} \div (C_{\text{m}} - C_0)$$

Method 7E Equation: 7E-5

QA/QC Check:

Completeness ✓

Legibility ✓

Accuracy 100% ✓ Specifications ✓

Reasonableness ✓

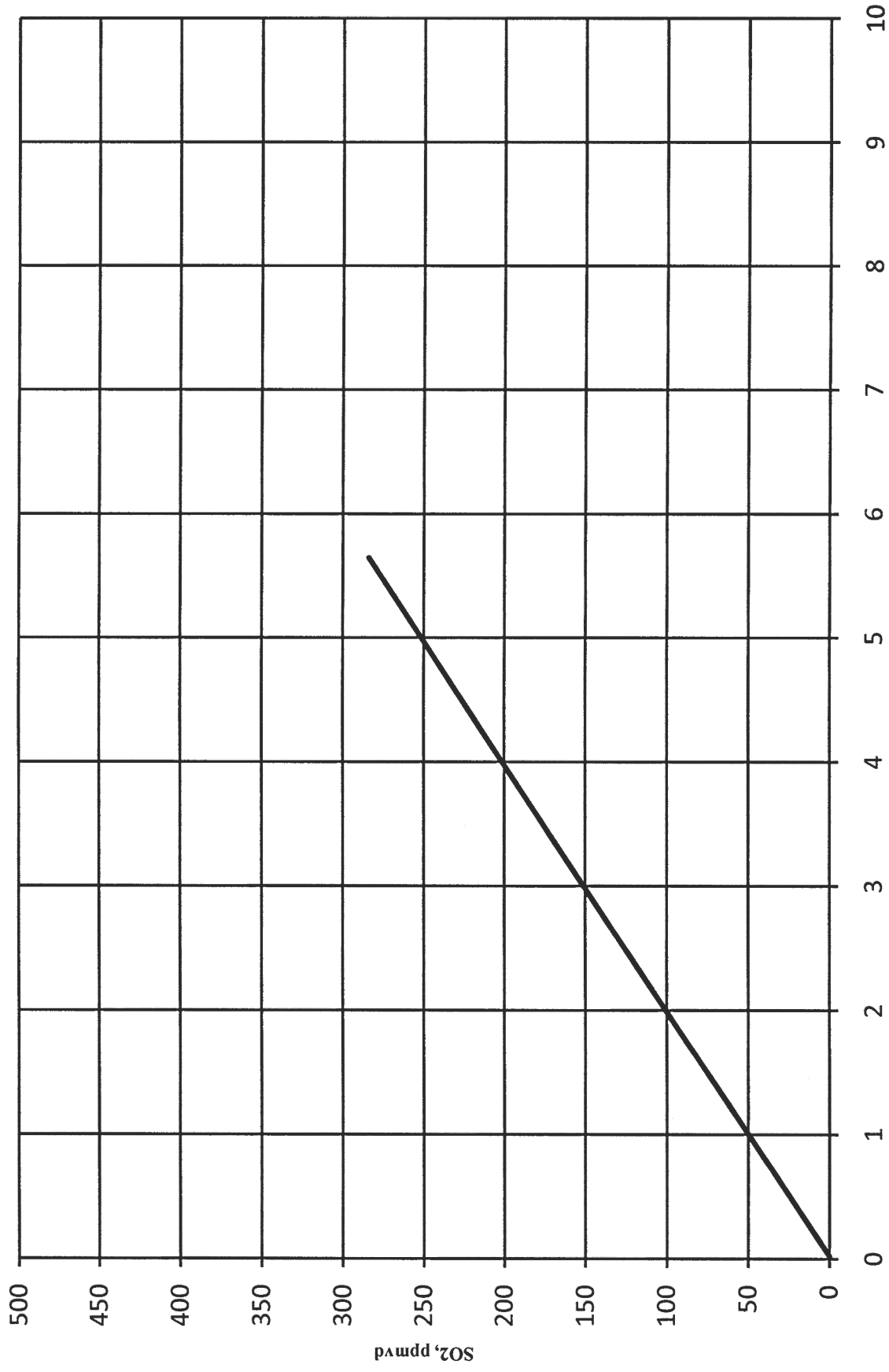

Operator (Signature/Date)

4/15/2011

Project Coordinator (Signature/Date)
4/18/2018 CALNOXRATA.XLS

4/19/26)(CALNOXRATA.XLS

SO2 Calibration Curve



Volts, DC

March 4, 2011

8:49:54



Scott Specialty Gases

www.scottgas.com

RATA CLASS

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950

Fax: 248-589-2134

TM

CERTIFICATE OF ACCURACY: Interference Free Multi-Component EPA Protocol Gas

Assay Laboratory

AIR LIQUIDE AMERICA SPECIALTY GASES LLC
1290 COMBERMERE STREET
TROY, MI 48083

P.O. No.: 4512130809

Customer

WRB REFINING, LLC
05-79490-003
BORGER REFINING WAREHOUSE
ATTN RECEIVING
SPUR 119 NORTH
BORGER TX 79007

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: ALM055658 Certification Date: Sep2009 Exp. Date: 4Sep2011
Cylinder Pressure***: 1967 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
CARBON MONOXIDE	123.8 PPM	+/- 1%	Direct NIST and VSL
SULFUR DIOXIDE *	124.6 PPM	+/- 1%	Direct NIST and VSL
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	02Oct2011	KAL003802	240.8PPM	CARBON MONOXIDE
NTRM 0260 26	02Oct2012	ALM031098	254.4PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
FTIR//0928621	14Aug2009	FTIR
FTIR//0928621	31Aug2009	FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

CARBON MONOXIDE

Date: 28Aug2009
Z1=0.016851=239.37081
R2=239.6429=0.17663
Z3=0.382073=123.56773
Avg. Concentration: PPM

Date: 04Sep2009
Z1=-0.01999=240.0500
R2=240.0733=0.13992
Z3=0.360903=123.6136
Avg. Concentration: PPM

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99992E-1
Constants: A=0.00000E+0
B=5.02755E-1=2.00000E-4
D=0.00000E+0=0.00000E+0

SULFUR DIOXIDE *

Date: 28Aug2009
Z1=0.022351=253.12961
R2=253.3384=0.05315
Z3=0.256173=124.21193
Avg. Concentration: PPM

Date: 04Sep2009
Z1=0.020171=255.6669
R2=255.7021=0.04445
Z3=0.062223=125.1258
Avg. Concentration: PPM

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99972E-1
Constants: A=0.00000E+0
B=1.00476E+0=8.00000E-6
D=0.00000E+0=0.00000E+0

APPROVED BY:

Rob McCrandall

Page 1 of 1



Scott Specialty Gases

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RATA CLASS

Dual-Analyzed Calibration Standard

1290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950

Fax: 248-589-2134

TM

CERTIFICATE OF ACCURACY: Interference Free Multi-Component EPA Protocol Gas

Assay Laboratory

P.O. No.: 4512130809

Customer

WRB REFINING, LLC

AIR LIQUIDE AMERICA SPECIALTY GASES LLC Project No.: 05-79490-001

BORGER REFINING WAREHOUSE

ATTN RECEIVING

SPUR 119 NORTH

BORGER TX 79007

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: ALM019500

Certification Date: Sep2009

Exp. Date: 4Sep2011

Cylinder Pressure***: 1926 PSIG

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
CARBON MONOXIDE	277 PPM	+/- 1%	Direct NIST and VSL
SULFUR DIOXIDE *	284 PPM	+/- 1%	Direct NIST and VSL
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 1680	01Nov2012	ALM059546	498.0PPM	CARBON MONOXIDE
NTRM 1661	15Jun2012	KAL004385	501.3PPM	SULFUR DIOXIDE

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#
FTIR//0928621
FTIR//0928621

DATE LAST CALIBRATED
14Aug2009
31Aug2009

ANALYTICAL PRINCIPLE
FTIR
FTIR

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis

Second Triad Analysis

Calibration Curve

CARBON MONOXIDE

Date: 28Aug2009 onse Unit: PPM
Z1=0.000061=492.85721=274.1201
R2=493.1395=0.03233T2=274.4274
Z3=0.650333=274.59663=493.3190
Avg. Concentration: PPM

Date: 04Sep2009 onse Unit: PPM
Z1=-0.06067=491.3368=273.6979
R2=491.4615=0.249432=273.8023
Z3=0.564553=274.3457=491.6598
Avg. Concentration: PPM

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99979E-1
Constants: A=0.00000E+0
B=4.96322E-1=1.36000E-4
D=0.00000E+0=0.00000E+0

SULFUR DIOXIDE *

Date: 28Aug2009 onse Unit: PPM
Z1=-0.51978=502.62371=285.4081
R2=503.1306=-0.282472=285.7543
Z3=0.239393=285.90973=503.6815
Avg. Concentration: PPM

Date: 04Sep2009 onse Unit: PPM
Z1=0.291731=502.8892=285.3400
R2=503.4823=0.332632=285.7263
Z3=0.443643=285.8909=504.5455
Avg. Concentration: PPM

Concentration=A+Bx+Cx2+Dx3+Ex4
r=9.99995E-1
Constants: A=0.00000E+0
B=9.91438E-1=3.00000E-6
D=0.00000E+0=0.00000E+0

APPROVED BY:

Rob McCrandall

Page 1 of 1

Date: March 4, 2011
 Plant: Borger Petroleum Refinery
 Unit: Unit 34 SRU
 Operator: JRV
 Job No.: CJ-6483

CETCON, Inc.

CO₂ ANALYZER CALIBRATION DATA

CO₂		Serial Number: X1440D174A	
Analyzer:	Range:	25.00	= 10.00
Make:	Span:	22.40	= 8.96
Model:	Units:	%	= VDC
		Zero Gas:	0.00
		Mid Range Gas:	11.60
		High Range Gas:	22.40

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span
Analyzer Response	0.07	0.3	11.94	1.5	22.49	0.4
System Bias Test	Zero	Bias, % Span	High	Bias, % Span	95% Response Time	
System Response	0.05	-0.1	22.22	-1.2	Minutes:Seconds	

Bias Gas Used (Mid/High)?	High	=	22.40	%	Calibration Error Response =	22.49	%
---------------------------	------	---	-------	---	------------------------------	-------	---

Sample Run #	C _{ref} %	C _{ref} %	Zero Bias % Span	C _{mi} %	C _{mf} %	Cal Drift % Span	Cal Bias % Span	C _{Ave} %	Corrected Conc., %
R1	0.05	0.02	-0.2	22.22	22.00	-1.0	-2.2	6.795	6.860
R2	0.05	0.02	-0.2	22.22	22.22	0.0	-1.2	6.804	6.835
R3	0.05	0.02	-0.2	22.22	22.22	0.0	-1.2	6.845	6.876
R4	0.02	0.02	-0.2	22.22	22.24	0.1	-1.1	6.899	6.938
R5	0.02	0.02	-0.2	22.22	22.24	0.1	-1.1	6.962	7.001
R6	0.02	0.02	-0.2	22.22	22.24	0.1	-1.1	7.033	7.073
R7	0.02	0.07	0.0	22.24	22.17	-0.3	-1.4	7.049	7.080
R8	0.02	0.07	0.0	22.24	22.17	-0.3	-1.4	7.091	7.122
R9	0.02	0.07	0.0	22.24	22.17	-0.3	-1.4	7.005	7.035

Drift ≤ 3% Span, Bias ≤ 5% Span

C₀: Initial Zero Gas Response, %
 C_{ref}: Final Zero Gas Response, %
 C₀: Average Zero Gas Response, %

C_{mi}: Initial Span Gas Response, %
 C_{mf}: Final Span Gas Response, %
 C_m: Average Span Gas Response, %

C_{ma}: Span Gas Value, %
 C_{Ave}: Average From Test, %

Drift Corrected Concentration, % =

$$(C_{Ave} - C_0) \cdot C_{ma} \div (C_m - C_0)$$

Method 7E Equation: 7E-5

QA/QC Check:

Completeness _____ Legibility _____

Accuracy _____ Specifications _____

Reasonableness _____

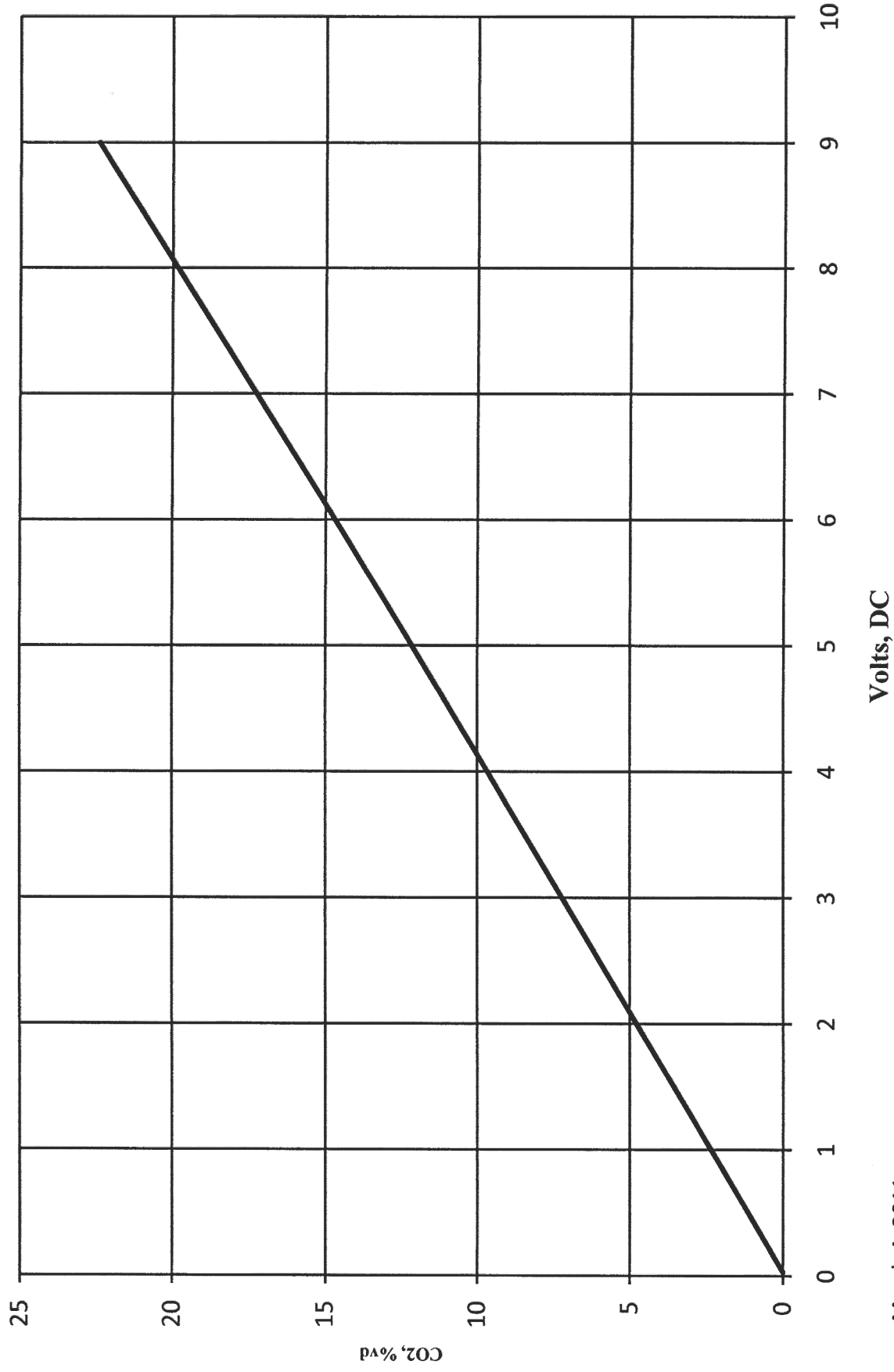
Checked by:

Operator (Signature/Date)
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Project Coordinator (Signature/Date)
 4/18/2011 CALNOXRATA.XLS

4/15/2011

CO2 Calibration Curve



March 4, 2011

8:49:54

**AIR LIQUIDE**Air Liquide America
Specialty Gases LLC**Scott****RATA CLASS***Dual-Analyzed Calibration Standard*

1290 COMBERMERE STREET, TROY, MI 48083

Phone: 248-589-2950

Fax: 248-589-2134

CERTIFICATE OF ACCURACY: EPA Protocol GasAssay LaboratoryAIR LIQUIDE AMERICA SPECIALTY GASES LLC
1290 COMBERMERE STREET
TROY, MI 48083P.O. No.: ALAS-59094 PO#11557
Project No.: 05-91896-002Customer
CETCON4953 S. 45TH W. AVENUE
TULSA OK 74107**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: **CC236946**Certification Date: **04Oct2010**Exp. Date: **03Oct2013**Cylinder Pressure***: **2000 PSIG**

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ACCURACY**	TRACEABILITY
CARBON DIOXIDE	11.6 %	+/- 1%	Direct NIST and VSL
OXYGEN	11.6 %	+/- 1%	Direct NIST and VSL
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 2300	01Nov2010	1D002807	23.04 %	CARBON DIOXIDE
NTRM 2350	01Dec2011	K016398	23.20 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
PIR/2000/609015	24Sep2010	NDIR
CAI/110P/V03018	13Sep2010	PARAMAGNETIC

ANALYZER READINGS

(Z=Zero Gas R=Reference Gas T=Test Gas r=Correlation Coefficient)

First Triad Analysis**Second Triad Analysis****Calibration Curve****CARBON DIOXIDE**Date: 05Oct2010 Response Unit: MV
Z1=0.00000 R1=100.0000 T1=67.00000
R2=100.0000 Z2=0.00000 T2=67.00000
Z3=0.00000 T3=67.00000 R3=100.0000
Avg. Concentration: 11.59 %Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.999994
Constants: A = -0.00399129
B = 0.13400661 C = -0.0001875
D = 1.14923E-05 E = 0**OXYGEN**Date: 05Oct2010 Response Unit: %
Z1=0.00000 R1=23.20000 T1=11.60000
R2=23.19000 Z2=0.00000 T2=11.61000
Z3=0.00000 T3=11.61000 R3=23.19000
Avg. Concentration: 11.61 %Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.999999
Constants: A = 0.004953498
B = 0.99985602 C = 0
D = 0 E = 0**Special Notes:**CET0081 RANGE: 11-12% CO2, 11-12% O2 PO# 10974
LOT# 0591896002**APPROVED BY:**

JEFF CROTEAU

**AIR LIQUIDE**Air Liquide America
Specialty Gases LLC**Scott****RATA CLASS***Dual-Analyzed Calibration Standard*

11426 FAIRMONT PKWY, LA PORTE, TX 77571

Phone: 800-248-1427

Fax: 281-474-8419

CERTIFICATE OF ACCURACY: Interference Free Multi-Component EPA Protocol Gas**Assay Laboratory**AIR LIQUIDE AMERICA SPECIALTY GASES LLC
11426 FAIRMONT PKWY
LA PORTE, TX 77571

P.O. No.: 11667

Document #: 40341921-001

Customer

CETCON

CRAIG FOX
4953 S 45TH WEST AVE
TULSA OK 74107
US**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: **CC52718**
Cylinder Pressure***: 1900 PSIG

Certification Date: 18Jan2011

Exp. Date: 18Jan2014
Batch No: LAP0032573**COMPONENT**CARBON DIOXIDE
OXYGEN
NITROGEN**CERTIFIED CONCENTRATION (Moles)**22.4 %
4.96 %
BALANCE**ACCURACY****+/- 1%
+/- 1%**TRACEABILITY**

Direct NIST and VSL

*** 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.**NTRM 2300
NTRM 2350**EXPIRATION DATE**02Jan2012
01May2013**CYLINDER NUMBER**K002682
K026427**CONCENTRATION**23.01 %
23.50 %**COMPONENT**CARBON DIOXIDE
OXYGEN**INSTRUMENTATION****INSTRUMENT/MODEL/SERIAL#**FTIR//MG-09-149
SERVOMEX/MODEL 244A/701/716**DATE LAST CALIBRATED**01Jan2011
20Jan2011**ANALYTICAL PRINCIPLE**FTIR
PARAMAGNETIC**ANALYZER READINGS**

(Z = Zero Gas R = Reference Gas T = Test Gas r = Correlation Coefficient)

First Triad Analysis**Second Triad Analysis****Calibration Curve****CARBON DIOXIDE**Date: 17Jan2011 Response Unit: %
Z1=0.00038 R1=23.13889 T1=22.54035
R2=23.15347 Z2=0.00441 T2=22.56218
Z3=0.00525 T3=22.56592 R3=23.17870
Avg. Concentration: 22.41 %Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 9.99992E-1
Constants: A = -5.33237E + 1
B = 1.45669E + 0 C = 0.00000E + 0
D = 0.00000E + 0 E = 0.00000E + 0**OXYGEN**Date: 26Jan2011 Response Unit: VOLTS
Z1=0.00000 R1=0.94300 T1=0.19920
R2=0.94330 Z2=0.00000 T2=0.19950
Z3=0.00000 T3=0.19950 R3=0.94350
Avg. Concentration: 4.955 %Concentration = A + Bx + Cx2 + Dx3 + Ex4
r = 0.9999971
Constants: A = -0.1046095
B = 24.96589325 C =
D = E =**Special Notes:**

Written certs and tags for Cetcon, include part number CET0080 as item number, include Cetcon PO number on C of A.

APPROVED BY:

DAVID KELLY
veprint 03/07/11

Page 1 of 1

Superior Specialty Gas Services, Inc.

1102 West 36th St. North
Tulsa, Ok 74127
(918) 592-0081
Fax: (918) 592-0095

CERTIFICATE OF CONFORMANCE

September 14, 2010

Cetcon
4953 S. 45th W. Ave.
Tulsa, OK 74170

Purchase Order: 11558

Product: Nitrogen, Ultra High Purity Grade

Cylinder SN#: SSG-1123, SG9126935

REPORTED IN MOLE %

<u>Minimum Purity</u>	<u>Component</u>	<u>Analysis</u>
99.999%	Nitrogen	
	Oxygen	<2.0 ppm
	Moisture	<2.0 ppm
	THC	<0.5 ppm


Analyst: William Rogers

CETCON, Inc.

DRY GAS METER CALIBRATION
METERING SYSTEM CALIBRATION - CFR40, Part 60, Appendix A, Reference Method 5
CRITICAL ORIFICE METHOD

Control Module: CM#6
 DGM Serial Number: 27381
 Calibration Date: 12/16/2010
 Calibrator: AME
 Vac. Leak Check, in. Hg: -25
 Press. Leak Check, in. H₂O: 4.7
 C_F: 1.034
 ΔH@: 1.776

Previous Calibration Values:

C_F: 1.046
 ΔH@: 1.785

Deviation From Pre-Test Cal:

→ -1.19 %
 → -0.51 %

Orifice Serial Number	1400S-12	1400S-16	1400S-18	1400S-24	1400S-29	1403-2
Orifice Coefficient, K'	0.3170	0.4328	0.4960	0.6564	0.7987	
Run Time, R (min)	12.625	9.249	8.058	6.148	6.044	
Barometric Pressure, P _B (in. Hg)	29.22	29.22	29.22	29.21	29.21	
Ambient Temp, T _A (°F)	52	54	54	54	54	
Pump Vacuum (in. Hg)	21.5	19.7	19.1	17.0	15.0	
Orifice Pressure Drop, ΔH (in. H ₂ O)						
Start	0.51	0.97	1.30	2.25	3.40	
Finish	0.51	0.97	1.30	2.25	3.40	
Average	0.51	0.97	1.30	2.25	3.40	
Inlet Temp DGM, T _i (°F) :						
Start	58	57	57	58	60	
Finish	57	57	58	58	61	
Average	58	57	58	58	61	
Outlet Temp DGM, T _o (°F) :						
Start	55	56	56	56	57	
Finish	55	56	56	57	57	
Average	55	56	56	57	57	
Average Temp DGM, T _m (°F) :	56	57	57	57	59	
DGM Volume, V _m (ft ³):						
Finish	255.500	261.300	267.300	273.400	283.000	
Start	250.500	256.300	262.300	268.400	277.000	
Difference	5.000	5.000	5.000	5.000	6.000	
V _{crstd} , ft ³ (1)	5.168	5.159	5.151	5.199	6.220	
Flow Rate, Q, scfm	0.409	0.558	0.639	0.846	1.029	
V _{mstd} , ft ³ (2)	4.999	5.002	5.004	5.009	6.011	
C _F (3)	1.034	1.031	1.029	1.038	1.035	
C _F Dev (4)	0.000	-0.002	-0.004	0.004	0.001	
ΔH@ (5)	1.714	1.759	1.797	1.783	1.825	
ΔH@ Dev (6)	-0.062	-0.017	0.021	0.008	0.050	

NOTE:

1. $V_{crstd} = K' \times R \times P_B \div ((T_A + 460)^{0.5})$
2. $V_{mstd} = 17.64 \times V_m \times (P_B + \Delta H / 13.6) \div (T_m + 460)$
3. $C_F = V_{crstd} \div V_{mstd}$
4. $C_F \text{ Dev} = C_F(i) - C_F(\text{average})$; (Allowable Deviation = ± 0.02)
5. $\Delta H@ = 0.0319 \times \Delta H \times (T_m + 460) \times R^2 \div (P_B \times C_F^2 \times V_m^2)$
6. $\Delta H \text{ Dev} = \Delta H(i) - \Delta H@(\text{average})$; (Allowable Deviation = ± 0.20)

Completeness ☒ Legibility ☒ Accuracy ☒ Specifications ☒

Checked by:

12/16/2010

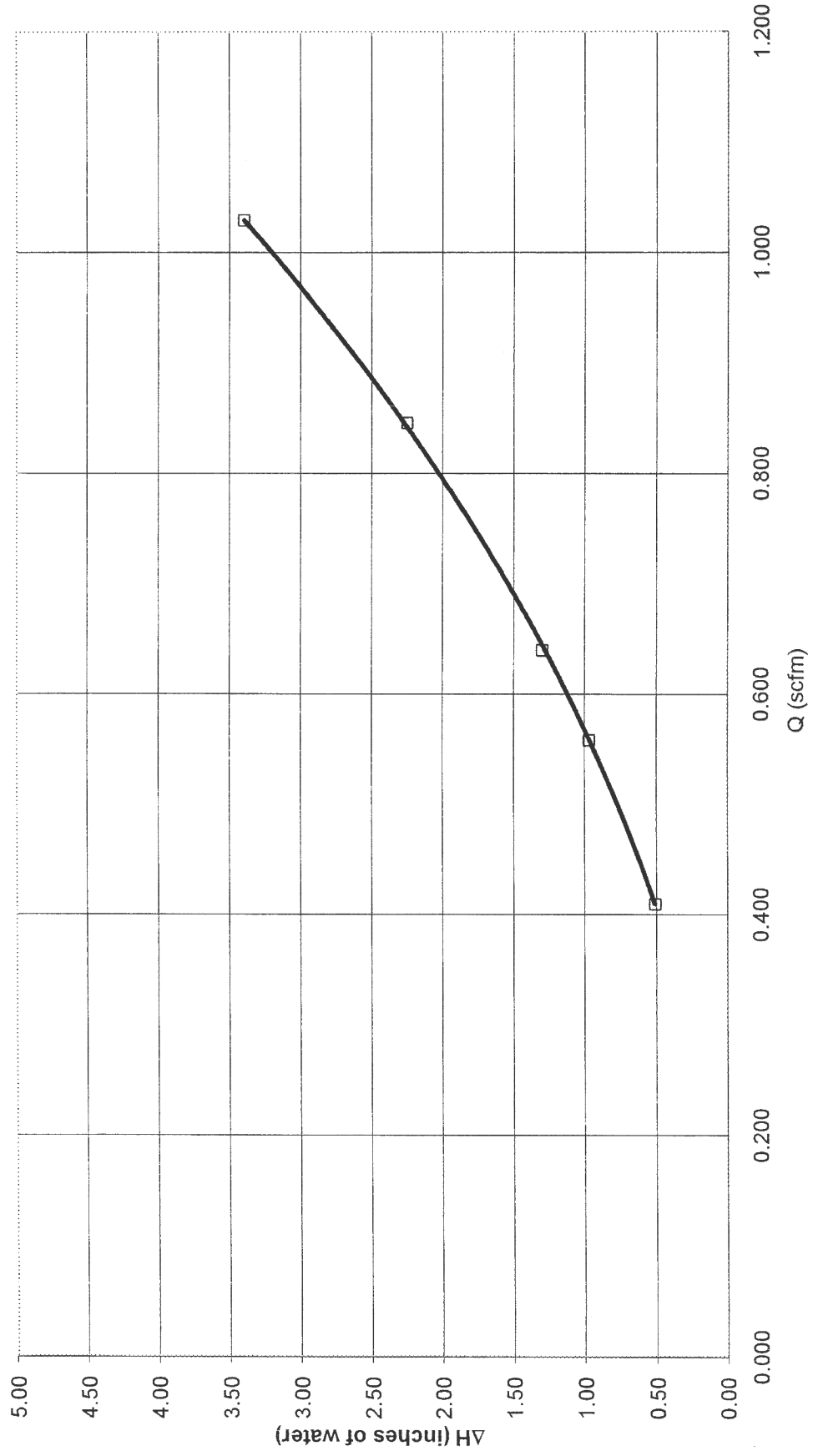
12/16/2010
 Operator (Signature/Date)

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Reasonableness ☒

12/28/2010
 Project Coordinator (Signature/Date)
 CM6CAL

CETCON, INC.
CM#6 ORIFICE CURVE - December 16, 2010



CETCON, Inc.

INSTRUMENT CALIBRATION DATA

Digital Temperature Indicator (DTI) No: CM #6

Thermo Andersen MST

SN: 90806

Calibration Date: December 17, 2010

Calibrator: AME

MEDIA	TIME	Mercury Thermometer (°F)	Temperature Indicator (°F)	Difference (°F)	
ICE BATH	10:47	34	35	1	(1)
(NIST: L58319) AMBIENT AIR	10:49	41	41	0	(1)
BOILING WATER	10:54	210	212	2	(1)
OVEN	11:01	214	213	-1	(2)
OVEN	11:12	248	250	2	(2)
OVEN	11:19	300	300	0	(2)(3)
OVEN	11:25	350	350	0	(2)(3)

Average 0.6

Required Accuracy ⁽¹⁾: $-2.0 \leq \text{Difference (°F)} \leq 2.0$

Required Accuracy ⁽²⁾: $-5.4 \leq \text{Difference (°F)} \leq 5.4$

NIST 2M2923 ⁽³⁾

Adjustment Required?

YES	NO
	X

Completeness ☒

Legibility ☒

Accuracy ☒

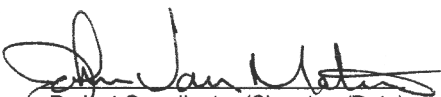
Specifications ☒

Reasonableness ☒

Checked by:

12/17/2010

 12/17/2010
Operator (Signature/Date)
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Project Coordinator (Signature/Date)
12/28/2010 CM6TEMP

CETCON, Inc.

INSTRUMENT CALIBRATION DATA

Digital Temperature Indicator (DTI) No: CM #6

Thermo Anderson MST

SN: 90806

Calibration Date: December 16, 2010

Calibrator: AME

Temperature Simulator: Transmation

Model No.: 1062

Serial No.: B11605JK

Thermocouple Type: K

Temp. Simulator (°F)	TIME	Temp. Indicator (°F)	Difference (°F)	Error, %
0	14:04	1	1	1.0
NIST L58319 56	14:02	58	2	3.6
100	14:05	101	1	1.0
200	14:05	200	0	0.0
300	14:06	301	1	0.3
400	14:06	401	1	0.3
500	14:06	501	1	0.2
600	14:07	601	1	0.2
700	14:07	701	1	0.1
800	14:07	801	1	0.1
900	14:08	901	1	0.1
1000	14:08	1001	1	0.1
1100	14:09	1101	1	0.1
1200	14:09	1202	2	0.2
1300	14:10	1302	2	0.2
1400	14:10	1402	2	0.1
1500	14:10	1502	2	0.1
1600	14:11	1601	1	0.1
1700	14:11	1701	1	0.1
1800	14:11	1802	2	0.1
1900	14:12	1902	2	0.1
2000	14:12	2002	2	0.1
2100	14:12	2102	2	0.1

Average:

1.3

0.4

Required Accuracy:

-1.5 ≤ Error, % ≤ 1.5

Adjustment Required?

YES	NO
	X

Completeness ☒

Legibility ☒

Accuracy ☒

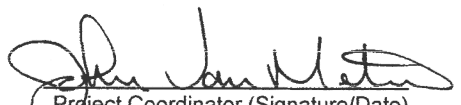
Specifications ☒

Reasonableness ☒

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12/16/2010

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12/28/2010 CM6SIM

CETCON, Inc.
Pitot Tube Calibration

Pitot Tube No:	6	CETCON VI	C_{Pstd} :	0.990 (18" probe)
Length, ft.:	10		C_{PA} :	0.788
P_B (in. Hg):	29.45		C_{PB} :	0.786
$P_A + P_B$, in.:	0.958	(6) (7)	Cal. Date:	12/27/2010
D_t , in.:	0.375		Due Date:	6/27/2011
Room Temp °F	62	(Using NIST Thermometer SN=L58319)	Calibrator:	DCD/AME
Pitot Temp. °F	61	(8) with Calibrated CM or Transmation)		

	Run No.	Target ΔP_{std} (in. w.c.)	Target Velocity (fpm)	Std Pitot ΔP_{std} (in. w.c.)	S-Type ΔP_s (in. w.c.)	C_P (1)	Deviation From Mean (2)
High Side (A)	1	0.15	1550	0.150	0.230	0.799	0.011
	2	0.25	2000	0.250	0.410	0.773	-0.015
	3	0.50	2830	0.500	0.760	0.803	0.015
	4	0.75	3475	0.750	1.200	0.783	-0.006
	5	1.00	4000	1.000	1.600	0.783	-0.006
	Avg.					0.788	0.000
Low Side (B)	1	0.15	1550	0.150	0.230	0.799	0.013
	2	0.25	2000	0.250	0.420	0.764	-0.023
	3	0.50	2830	0.500	0.760	0.803	0.017
	4	0.75	3475	0.750	1.200	0.783	-0.004
	5	1.00	4000	1.000	1.600	0.783	-0.004
	Avg.					0.786	0.000
SUMMARY							
C_{PA}	C_{PB}	C_P avg. (3)	$ C_P \text{ avg. (A)} - C_P \text{ avg. (B)} $ (4)		DEV avg. (A)	DEV avg. (B)	
0.788	0.786	0.787	0.002		0.001	0.001	

- $C_P = C_{Pstd} \times (\Delta P_{std} \div \Delta P_s)^{1/2}$
- Deviation = C_P (i) - C_P avg. (A or B) Note: Used when calibrating at a single velocity.
- $C_P \text{ avg.} = [C_{PA} + C_{PB}] / 2$
- $|C_{PA} - C_{PB}|$ (Must Be ≤ 0.01)
- $|DEV \text{ avg (A)}|$ or $|DEV \text{ avg (B)}|$ (Must Be ≤ 0.01)
- $P_A + P_B \text{ minimum} = 2 \times (D_t \times 1.05) =$ 0.788
- $P_A + P_B \text{ maximum} = 2 \times (D_t \times 1.50) =$ 1.125
- Pitot thermocouple and reference must agree within 2 °F

Geometric Calibration Data	
$\alpha_1 =$ 1.0 °	$\beta_1 =$ 2.0 °
$\alpha_2 =$ 2.0 °	$\beta_2 =$ -1.0 °
$\leq 10^\circ$	$\leq 5^\circ$
$Y =$ 1.0 °	$T =$ 1.0 °
$A = P_A + P_B =$	0.958 in.
$Z = A \sin Y =$	0.017 in.
$\leq 0.125 \text{ in.}$	$\leq 0.031 \text{ in.}$
Wind Tunnel Calibration Required?	No
Thermocouple Replacement Required?	No

α_1, α_2 = angle of pitot openings perpendicular to axis	Y = angle from tip of high side opening to tip of low side opening
β_1, β_2 = angle of pitot openings parallel to axis	T = angle from side of high side opening to side of low side opening

QA/QC Check
 Completeness ☒ Legibility ☒ Accuracy ☒ Specifications ☒ Reasonableness ☒

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 Project Coordinator (Signature/Date)
 12/28/2010
 PITOT6

CETCON, Inc.

CETCON ELECTRONIC BALANCE INSTRUMENT CALIBRATION VERIFICATION

Model: N1B110
Serial Number: D125005259
Calibrator: AME
Calibration Verification Date: December 17, 2010

NIST Class S Stainless Steel Weight (g)	Time	Electronic Balance Display (g)	Magnitude of the Difference (g)	Comments
100.0	14:57	100.0	0.0	
200.0	14:58	200.0	0.0	
300.0	14:58	300.0	0.0	
500.0	14:59	500.0	0.0	
800.0	14:59	800.0	0.0	
1000.0	15:00	1000.0	0.0	
2000.0	15:00	2000.0	0.0	

Average Difference 0.0
Must be $\leq 0.5g$

Calibration Adjustment
Required?

YES	NO
	x

S.S. Weight, g	Serial Number
100.0	52387
200.0	70041
500.0	70667
1000.0	04280403
2000.0	04280402

Trailer Reference Weight, No. 002 = 700.1 g

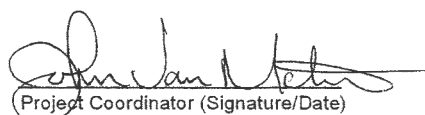
QA/QC Check:

Completeness ☒ Legibility ☒ Accuracy ☒ Specifications ☒ Reasonableness ☒

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12/29/2010 Trailer 6 SCALE

CETCON, Inc.

Barometer Calibration

Date: December 17, 2010
Barometer ID: BAR VI
Calibrator: AME

Sea Level Corrected
Barometric Pressure, in. Hg @ National Weather Service, Tulsa, Oklahoma 30.19
Station Pressure, in. Hg @ National Weather Service, Tulsa, Oklahoma 29.51
@ Elevation, ft: 680
@ Temperature, °F: 48

National Weather Service Barometer converted to Station
Pressure at elevation of CETCON's Tulsa, Oklahoma Office: 29.46

CETCON Barometer Reading: 29.40

@ Elevation, ft: 730
@ Temperature, °F: 48

Variation: 0.06 *Must Be ≤ 0.10*

Barometer Adjustment Required ? YES _____ NO x
Altimeter Calibration Performed ? YES _____ NO x

Completeness ✓ Legibility ✓ Accuracy ✓ Specifications ✓ Reasonableness ✓

Checked by:

12/17/2010

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12/28/2010 BAROCAL.XLS

CETCON, Inc.

EPA Reference Method 20 NO_x Analyzer Interference Response Test

CETCON VI

Required Test Gas Concentrations

CO	500 ± 50 ppm	SO ₂	200 ± 20 ppm	CO ₂	10.0 ± 1.0 %	O ₂	20.9 ± 1.0 %
----	--------------	-----------------	--------------	-----------------	--------------	----------------	--------------

Date of Test: August 2, 2005
Analyzer Model: TECO 42C
Analyzer Type: Chemiluminescent
Serial Number: 69544-363
Span Value, ppm: 250

Test Gas	Concentration	Cylinder Number	Analyzer Response, ppm	Interference, % of Span ⁽¹⁾
CO	457.00	CC148526	0.0	0.0
SO ₂	222.00	CC67679	0.4	0.2
CO ₂	11.40%	CC150403	0.3	0.1
O ₂	20.90%	ambinet	0.2	0.1

Sum of Interference Responses:

0.4 ⁽²⁾

Notes: (1) Interference, % of Span = Analyzer Response, ppm x 100 ÷ Span Value, ppm

(2) Sum of Interference Responses must be ≤ 2.0 %

QA/QC Check:

Completeness ☒

Legibility ☒

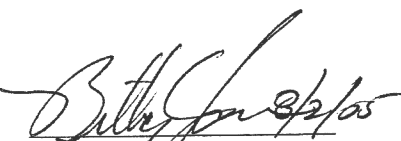
Accuracy ☒

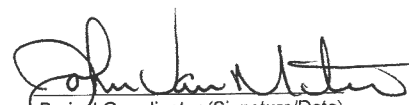
Specifications ☒

Reasonableness ☒

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CETCON, Inc.

EPA Reference Method 20 CO Analyzer Interference Response Test

CETCON VI

Test Gas Concentrations

NO _x	200 ± 20 ppm	SO ₂	200 ± 20 ppm	CO ₂	10.0 ± 1.0 %	O ₂	20.9 ± 1.0 %
-----------------	--------------	-----------------	--------------	-----------------	--------------	----------------	--------------

Date of Test: August 2, 2005
Analyzer Model: TECO 48C
Analyzer Type: Infrared
Serial Number: 69340-363
Span Value, ppm: 500

Test Gas	Concentration	Cylinder Number	Analyzer Response, ppm	Interference, % of Span ⁽¹⁾
NO _x	207.00	CC62748	0.1	0.0
SO ₂	222.00	CC67679	0.1	0.0
CO ₂	11.40%	CC150403	0.6	0.1
O ₂	20.90%	ambinet	0.3	0.1

Sum of Interference Responses:

0.2 ⁽²⁾

Notes: (1) Interference, % of Span = Analyzer Response, ppm x 100 ÷ Span Value, ppm

(2) Sum of Interference Responses must be ≤ 2.0 %

QA/QC Check:

Completeness ✓

Legibility ✓

Accuracy ✓

Specifications ✓

Reasonableness ✓

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Project Coordinator (Signature/Date)
8/2/2005
COINT20

CETCON, Inc.

EPA Reference Method 20 O₂ Analyzer Interference Response Test

CETCON VI

Required Test Gas Concentrations

CO	500 ± 50 ppm	SO ₂	200 ± 20 ppm	CO ₂	10.0 ± 1.0 %	NO _x	200 ± 20 ppm
----	--------------	-----------------	--------------	-----------------	--------------	-----------------	--------------

Date of Test: August 2, 2005
Analyzer Model: X1440
Analyzer Type: Paramagnetic
Serial Number: X1440D1/74B
Span Value, %: 25

Test Gas	Concentration	Cylinder Number	Analyzer Response, %	Interference, % of Span ⁽¹⁾
CO	457.00	CC148526	0.00	0.0
SO ₂	222.00	CC67679	0.00	0.0
CO ₂	9.40%	See Note #3	0.00	0.0
NO _x	207.00	CC62748	0.00	0.0

Sum of Interference Responses:

0.0 ⁽²⁾

- Notes: (1) Interference, % of Span = Analyzer Response, % x 100 ÷ Span Value, %
- (2) Sum of Interference Responses must be ≤ 2.0 %
- (3) Diluted 40% CO₂ with Nitrogen to 9.4% CO₂

QA/QC Check:

Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

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8/2/2005 O2INT20

CETCON, Inc.

EPA Reference Method 20 SO₂ Analyzer Interference Response Test

CETCON VI

Test Gas Concentrations

CO	500 ± 50 ppm	NO _x	200 ± 20 ppm	CO ₂	10.0 ± 1.0 %	O ₂	20.9 ± 1.0 %
----	--------------	-----------------	--------------	-----------------	--------------	----------------	--------------

Date of Test: August 2, 2005
Analyzer Model: 721AT2
Analyzer Type: Photometric
Serial Number: 721AT2-7692-1
Span Value, ppm: 250

Test Gas	Concentration	Cylinder Number	Analyzer Response, ppm	Interference, % of Span ⁽¹⁾
CO	457.00	CC148526	0.0	0.0
NO _x	207.00	CC62748	0.0	0.0
CO ₂	11.40%	CC150403	0.0	0.0
O ₂	20.90%	Ambient	1.0	0.4

Sum of Interference Responses:

0.4 ⁽²⁾

Notes: (1) Interference, % of Span = Analyzer Response, ppm x 100 ÷ Span Value, ppm

(2) Sum of Interference Responses must be ≤ 2.0 %

QA/QC Check:

Completeness ✓

Legibility ✓

Accuracy ✓

Specifications ✓

Reasonableness ✓

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8/2/2005 SO2INT20

CETCON, Inc.

EPA Reference Method 20 CO₂ Analyzer Interference Response Test

CETCON VI

Required Test Gas Concentrations

CO	500 ± 50 ppm	SO ₂	200 ± 20 ppm	NO _x	200 ± 20 ppm	O ₂	20.9 ± 1.0 %
----	--------------	-----------------	--------------	-----------------	--------------	----------------	--------------

Date of Test: August 2, 2005
Analyzer Model: X1440
Analyzer Type: Infrared
Serial Number: X1440D1/74A
Span Value, %: 25

Test Gas	Concentration	Cylinder Number	Analyzer Response, %	Interference, % of Span ⁽¹⁾
CO	457.00	CC148526	0.00	0.0
SO ₂	222.00	CC67679	0.00	0.0
NO _x	207.00	CC62748	0.00	0.0
O ₂	20.90%	ambient	0.00	0.0

Sum of Interference Responses:

0.0 ⁽²⁾

Notes: (1) Interference, % of Span = Analyzer Response, % x 100 ÷ Span Value, %

(2) Sum of Interference Responses must be ≤ 2.0 %

QA/QC Check:

Completeness ✓

Legibility ✓

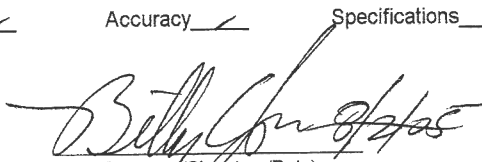
Accuracy ✓

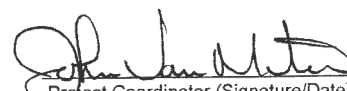
Specifications ✓

Reasonableness ✓

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8/2/2005 CO2INT20

APPENDIX E

Lab Analysis

CETCON, Inc.

Job No.: CJ-6483
 Date: 3/4/2011
 Customer: ConocoPhillips
 Unit: Unit 34 SRU

FUEL FACTOR CALCULATION BASED ON FUEL ANALYSIS

COMPONENT	MW	MOLE%	MOLES C	MOLES H	MOLES O	MOLES N	MOLES S
METHANE	16.043	54.640	54.640	218.560			
ETHANE	30.070	9.470	18.940	56.820			
ETHYLENE	28.054	2.430	4.860	9.720			
PROPANE	44.097	1.580	4.740	12.640			
PROPYLENE	42.081	0.000					
ISO-BUTANE	58.124	0.000					
N-BUTANE	58.124	0.000					
1-BUTENE	56.108	0.000					
ISO-BUTENE	56.108	0.000					
TRANS-2-BUTENE	56.108	0.020	0.080	0.160			
CIS-2-BUTENE	56.108	0.000					
2,2-DIMETHYL PROPANE	72.151	0.240	1.200	2.880			
ISO-PENTANE	72.151	0.000					
N-PENTANE	72.151	0.000					
PENTENES	70.135	0.030	0.150	0.300			
HEXANE	86.178	0.740	4.440	10.360			
OXYGEN	31.999	0.090			0.180		
NITROGEN	28.013	3.520				7.040	
HYDROGEN	2.016	27.040		54.080			
HELIUM	4.003	0.000					
CARBON MONOXIDE	28.010	0.000					
CARBON DIOXIDE	44.010	0.200	0.200		0.400		
BENZENE	78.114	0.000					
TOLUENE	92.141						
ETHYLBENZENE	106.168						
XYLENE	106.168						
HYDROGEN SULFIDE	34.076	0.000					

TOTAL	100.000	89.250	365.520	0.580	7.040	
WEIGHT (LBS)		1072.0	368.4	9.3	98.6	
WEIGHT%		69.24	23.79	0.60	6.37	0.00

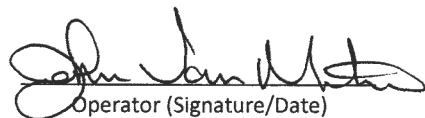
LHV (BTU/SCF): $840.1 = \text{SUM} [(\text{MOLE}\%_i \bullet \text{LHV}_i) + 100]$
 HHV (BTU/SCF): $932.0 = \text{SUM} [(\text{MOLE}\%_i \bullet \text{HHV}_i) + 100]$
 DENSITY (LB/SCF): $0.0408 = \text{SUM} [(\text{MOLE}\%_i \bullet \text{DENSITY}_i) + 100]$
 SPECIFIC GRAVITY: $0.5346 = \text{DENSITY (LB/SCF)} \div \text{DENSITY}_{\text{AIR}} (0.0763 \text{ LB/SCF})$
 GCV (BTU/LB): $22841 = \text{HHV} \div \text{DENSITY}$
 MW (LB/LBMOLE): $15.483 = \text{SUM} [(\text{MOLE}\%_i \bullet \text{MW}_i) + 100]$
 $F_d (\text{DSCF/MMBTU}): 8457 = 10^6 \bullet [(3.64 \bullet \%H) + (1.53 \bullet \%C) + (0.14 \bullet \%N) + (0.57 \bullet \%S) - (0.46 \bullet \%O)] \div \text{GCV}$
 $F_w (\text{WSCF/MMBTU}): 10467 = 10^6 \bullet [(5.57 \bullet \%H) + (1.53 \bullet \%C) + (0.14 \bullet \%N) + (0.57 \bullet \%S) - (0.46 \bullet \%O)] \div \text{GCV}$
 $F_c (\text{SCF/MMBTU}): 973 = 10^6 \bullet (0.321 \bullet \%C) \div \text{GCV}$
 Expected F_o : $1.816 = 0.209 \bullet F_d + F_c$

QA/QC Check:

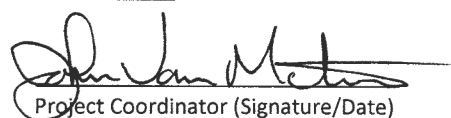
Completeness ☒ Legibility ☒ Accuracy ☒ Specifications ☒ Reasonableness ☒

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4/20/2011


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4/20/2011 F_FACTOR.XLS

Unit 34 and Unit 43

Sample Name	Sampled	Test Name	Determinate	Value	UOM
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Carbon Content	0.6908	Kg C/Kg Fu
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Average Molecular Wt	15.5	g/mol
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Ideal Density	2.54	lb/gal
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Specific Gravity (Gas)	0.535	
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Gross Heat of Combustion	937	Btu/SCF
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Net Heat of Combustion	848	Btu/SCF
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	H2 (Hydrogen)	27.04	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Carbon Monoxide	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	He (Helium)	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	N2 (Nitrogen)	3.52	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	O2 (Oxygen)	0.09	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Carbon Dioxide	0.2	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Hydrogen Sulfide	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Methane	54.64	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Ethane	9.47	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Ethene	2.43	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Propane	1.58	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Propene	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	i-Butane	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	n-Butane	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	1-Butene	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	i-Butene	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	trans-2-Butene	0.02	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	cis-2-Butene	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Propane, 2,2-Dimethyl	0.24	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	i-Pentane	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	n-Pentane	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Pentenenes	0.03	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Benzene	0	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	C6 & Heavier	0.74	Mol %
662701 FUEL GAS FROM MIX TANK	YTD	D-2163 Mod GC•NGL Gas Mol %	Total % Recovered	100	Mol %

APPENDIX F

Equations

NOMENCLATURE

General Equations

A_s	Stack cross sectional area, sq. in.
BAF	Bias adjustment factor (Part 75)
CF	Cubic feet
C_{adj}	Emission concentration (ppmvd) corrected to 15% O ₂ on a dry basis
C_d	Emission concentration (ppmvd), dry basis
C_{dCorr}	Emission concentration corrected to 15% O ₂ on a dry basis
CE	Calibration Error check percentage (Part 75)
C_F	Wet gas meter orifice correction factor
CFM	Cubic feet per minute
C_P	Pitot tube coefficient
C_{PM}	Particulate matter concentrations, lb/dscf
D	Stack diameter, in.
D_e	Equivalent stack diameters for rectangular ducts, in.
DGM	Dry gas meter
D_N	Nozzle diameter, in.
E	Emission ratio, lb/mmmbtu
%EA	Percent of excess air
F_d	Fuel factor or F-factor, ratio of flue gas volume to fuel heat input, dscf/mmmbtu
F_c	Fuel factor, ratio of CO ₂ volume to fuel heat input, dscf/mmmbtu
F_o	Fuel factor, based on ratio of CO ₂ volume to O ₂ volume, dry basis
Hg	Mercury
%I	Percent isokinetic
K_P	Pitot tube constant, $85.49(\text{ft/s})[(\text{lb/lb-mole})(\text{in. Hg}) / (^\circ\text{R})(\text{in. H}_2\text{O})]^{1/2}$
L	Length, in.
L	Volume of fuel loaded, liters during Subpart XX testing.
LE	Linearity Error check percentage (Part 75)
M_D	Volume fraction of dry gas
MW_D	Dry molecular weight of stack gas, g/g-mole (lb/lb-mole)
MT	Total Particulate, mg
MW	Wet molecular weight of flue gas, g/g-mole (lb/lb-mole)
%M	Percent moisture by volume in stack gas
%O ₂	Percent oxygen by volume in stack gas, dry basis
%CO ₂	Percent carbon dioxide by volume in stack gas, dry basis
%N ₂	Percent nitrogen by volume in stack gas, dry basis (100 - %O ₂ - %CO ₂)
%CO	Percent carbon monoxide by volume in stack gas, dry basis (ppmvd/10000)
NMHC	Non-Methane Hydrocarbons
P_B	Barometric pressure, in. Hg
P_{bar}	Barometric pressure at sampling site, mm Hg (in. Hg).
PM	Particulate matter emission, lb/hr
P_M	Pressure drop across orifice, in. water

NOMENCLATURE, continued

General Equations

P_S	Stack static pressure, in. water or in. Hg
ΔP	Stack gas velocity head, in. water
ppmvd	Parts per million by volume, dry basis
Q_A	Actual stack flow, acfm
Q_S	Dry stack flow, dscfm
Q_{Fuel}	Heat input based on fuel higher heating value (HHV), mmbtu/hr
RV	Reference value or protocol gas value (Part 75)
scfm	Standard cubic feet per minute
THC	Total Hydrocarbons
T_M	Mean gas meter temperature, °F or °R
T_R	Test run time, min.
T_S	Average stack temperature, °F or °R
V_M	Volume of dry gas at meter conditions, scf
V_{Mstd}	Dry gas meter volume at standard conditions, dscf
V_S	Stack flow velocity, fpm
V_W	Total water collected, gm
V_{Wgas}	Volume of moisture in flue gas, scf
V_{sei}	Volume of voc/air exhaust from vapor recovery unit, cubic meter
VOC	Volatile organic compounds (THC) concentration (Subpart XX)
W	Width, in.
X_{CO_2}	CO ₂ correction factor for 15% O ₂ (Method 19)

EQUATIONS

1. Stack cross sectional area, sq. in.

$$A_s = \frac{\pi}{4} \cdot D^2$$

$$D_e = \frac{2 L W}{(L + W)}, \text{ equivalent stack diameters for rectangular ducts.}$$

2. Dry gas volume samples at standard conditions (29.92" Hg, 528°R)

$$V_{Mstd} = 17.65 \cdot V_M \cdot [(P_B + (P_M / 13.6)) / T_M]$$

3. Water vapor volume collected at standard conditions, scf

$$V_{Wgas} = 0.0472 \cdot V_W$$

4. Percent moisture content

$$\%M = V_{Wgas} / (V_{Mstd} + V_{Wgas}) \cdot 100$$

5. Dry gas mole fraction

$$M_D = (100 - \%M) / 100$$

6. Mean molecular weight of dry stack gas

$$MW_D = (\%CO_2 \cdot 0.44) + (\%O_2 \cdot 0.32) + (\%N_2 \cdot 0.28)$$

7. Molecular weight of stack gas

$$MW = M_D \cdot MW_D + 18 \cdot (1 - M_D)$$

8. Stack velocity, fpm

$$V_s = K_p \cdot 60 \cdot C_p \cdot \sqrt{(T_s / (P_s \cdot MW))} \cdot \text{Average } \sqrt{\Delta P_s}; \quad K_p = 85.397 \quad (\text{pitot tube constant})$$

9. Volumetric flow at stack conditions, ACFM

$$Q_A = (V_s \cdot A_s) / 144$$

10. Volumetric flow at standard conditions, DSCFM

$$Q_s = 0.123 \cdot V_s \cdot M_D \cdot P_s \cdot A_s / T_s$$

11. Percentage of excess air

$$\%EA = 100 \cdot (\%O_2 - 0.5 \cdot \%CO) / (0.265 \cdot \%N_2 - \%O_2 + 0.5 \cdot \%CO)$$

12. Stack pressure, "Hg

$$P_s = P_B + P_s (\text{inches of water}) / 13.6$$

13. Particulate matter concentrations, lb/dscf

$$C_{PM}(\text{lb} / \text{dscf}) = 2.2046 \times 10^{-6} \cdot MT(\text{mg}) / V_{Mstd}(\text{dscf})$$
14. Particulate matter emission, lb/hr

$$PM(\text{lb} / \text{hr}) = C_{PM}(\text{lb} / \text{dscf}) \cdot Q_S(\text{dscfm}) \cdot 60(\text{min} / \text{hr})$$
15. Emission ratio, lb/mmbtu (Heat Input Method)

$$E(\text{lb} / \text{mmbtu}) = \frac{\text{Emission Rate, (lb / hr)}}{Q_{Fuel}, (\text{mmbtu} / \text{hr})}$$
16. Fuel factors or F-factors (CFR Method 19)

$$F_d = 8710 (\text{Natural Gas}); F_d = 9780 (\text{Bituminous Coal}); F_d = 9190 (\text{Fuel Oil})$$

$$F_d = \frac{[3.64 \cdot (\%H) + 1.53 \cdot (\%C) + 0.57 \cdot (\%S) + 0.14 \cdot (\%N) - 0.46 \cdot (\%O)] \cdot (10^6)}{GCV}$$

$$F_c = 1040 (\text{Natural Gas}); F_c = 1800 (\text{Bituminous Coal}); F_c = 1420 (\text{Fuel Oil})$$

$$F_c = \frac{0.321 \cdot \%C \cdot 10^6}{GCV}$$
17. Emission ratio, lb/mmbtu (F-factor method)

$$E(\text{lb} / \text{mmbtu}) = C_d(\text{lb} / \text{dscf}) \cdot F_d \cdot [20.9 / (20.9 - \%O_2)]$$

$$E(\text{lb} / \text{mmbtu}) = C_d(\text{lb} / \text{dscf}) \cdot F_c \cdot 100 / \%CO_2$$
18. Nitrogen oxide emissions, lb/hr

$$NO_x(\text{lb} / \text{hr}) = 7.164 \times 10^{-6} \cdot Q_S(\text{dscfm}) \cdot NO_x(\text{ppmvd})$$
19. Nitrogen oxide emissions (F-factor method)

$$NO_x(\text{lb} / \text{hr}) = E_{NO_x}(\text{lb} / \text{mmbtu}) \cdot Q_{Fuel}(\text{mmbtu} / \text{hr})$$
20. Carbon monoxide emissions, lb/hr

$$CO(\text{lb} / \text{hr}) = 4.362 \times 10^{-6} \cdot Q_S(\text{dscfm}) \cdot CO(\text{ppmvd})$$
21. Carbon monoxide emissions (F-factor method)

$$CO(\text{lb} / \text{hr}) = E_{CO}(\text{lb} / \text{mmbtu}) \cdot Q_{Fuel}(\text{mmbtu} / \text{hr})$$
22. Sulfur dioxide emissions, lb/hr

$$SO_2(\text{lb} / \text{hr}) = 9.976 \times 10^{-6} \cdot Q_S(\text{dscfm}) \cdot SO_2(\text{ppmvd})$$
23. Sulfur dioxide emissions (F-factor method)

$$SO_2(\text{lb} / \text{hr}) = E_{SO_2}(\text{lb} / \text{mmbtu}) \cdot Q_{Fuel}(\text{mmbtu} / \text{hr})$$

24. THC or NMHC emissions, lb/hr
 $THC \text{ or NMHC (lb/hr)} = 6.87 \times 10^{-6} \cdot Q_s(\text{dscfm}) \cdot THC \text{ or NMHC (ppmvd)}$
(reported as propane)
 $THC \text{ or NMHC (lb/hr)} = 1.87 \times 10^{-6} \cdot Q_s(\text{dscfm}) \cdot THC \text{ or NMHC (ppmvd)}$
(reported as carbon)
25. THC or NMHC emissions (F-factor method)
 $THC \text{ or NMHC (lb/hr)} = E_{THC \text{ or NMHC}}(\text{lb / mmbtu}) \cdot Q_{Fuel}(\text{mmbtu / hr})$
26. Carbon dioxide (CO₂) emissions, lb/hr (Part 75)
 $CO_2(\text{lb / hr}) = 1.90 \times 10^{-5} \cdot \%CO_2 \cdot Q_s(\text{dscfm})$
27. Dry Emission Concentration Oxygen Correction factor

$$C_{d \text{ Corr}} = C_d \frac{(20.9 - \%O_{2, \text{desired correction}})}{(20.9 - \%O_{2, \text{measured}})}$$
28. Percent isokinetics
 $\%I = (1039 \cdot V_{Mstd} \cdot T_S) / (M_D \cdot P_S \cdot V_S \cdot T_R \cdot D_N^2)$
29. Engine emission ratio, grams/hp-hr (TCEQ)

$$E(\text{grams/hp - hr}) = \frac{\text{Emission Rate (lb / hr)} \cdot 454(\text{grams / lb})}{\text{Engine HP}}$$
30. Bias Adjustment Factor, BAF (Part 75)

$$BAF = 1 + \frac{|\bar{d}|}{|CEMS|}$$
31. Bias Adjustment (Part 75)
 $CEM_{ADJ} = CEM_i \cdot BAF$
32. Linearity Error (Part 75)

$$\%LE = \frac{|RV - CEM_i|}{RV} \cdot 100$$
33. Calibration Error (Part 75)

$$\%CE = \frac{|RV - CEM_i|}{SPAN_{CEM}} \cdot 100$$

34. Emission concentration correction to 15% O₂ (CFR Method 19)

$$C_{adj} = C_d \cdot \frac{5.9}{(20.9 - \%O_2)}$$

$$C_{adj} = C_d \cdot \frac{\chi_{CO_2}}{\%CO_2} \quad \chi_{CO_2} = \frac{5.9}{F_o}$$

35. Fuel factor for CO₂ diluent measurements, F_o

$$F_o = 0.209 \cdot \frac{F_d}{F_c}$$

36. Ratio CO₂ volume per GCV gas volume, F_c

$$F_c = 1040 \text{ (Natural Gas)}; F_c = 1800 \text{ (Bituminous Coal)}$$

$$F_c = \frac{321 \times 10^3 \cdot \%C}{GCV} \text{ (optional CO}_2 \text{ flue gas ratio)}$$

37. VOC emission concentration reported as propane, mg VOC/liter fuel (Subpart XX)

$$E \text{ (mg/liter)} = \frac{1.83 \times 10^6 \cdot V_{sei} \text{ (scm)} \cdot VOC_{out} \text{ (ppm)}}{L_{fuel \text{ loaded}} \text{ (liters)} \cdot (10^{-6})}$$

$$K = VOC_{propane \text{ gas density}} = 1.83 \times 10^6, \text{ mg/cm}$$

IDEAL GAS LAW EQUATIONS

Ideal Gas Law: $P \cdot V = n \cdot R \cdot T$

$R = 21.845 \text{ (ft}^3 \cdot \text{in. Hg) / (}^\circ\text{R} \cdot \text{lbmole)}$
 $T, ^\circ\text{R} = T, ^\circ\text{F} + 459.72$
 $T_{\text{std}} = 68 \text{ }^\circ\text{F}$
 $T_{\text{std}} = 527.72 \text{ }^\circ\text{R}$
 $P_{\text{std}} = 29.921 \text{ in. Hg}$

Molar Volume Of Ideal Gas @ T_{std} & P_{std} = $V_{\text{std}} \div n = R \cdot T_{\text{std}} \div P_{\text{std}}$

$V_{\text{std}} \div n = 385.3 \text{ ft}^3 \div \text{lbmole}$

Concentration Conversion Factors For Ideal Gas:

$f_i =$ Fraction Of Ideal Gas (i) In Sample

$\text{ppmvd}_i = f_i \cdot 1000000$

$\% \text{vd}_i = f_i \cdot 100$

$\text{lb}_i \div \text{ft}^3 = \text{MW}_i, (\text{lb} \div \text{lbmole}) \cdot f_i \div 385.3, (\text{ft}^3 \div \text{lbmole})$

$\text{lb}_i \div \text{ft}^3 = \text{MW}_i, (\text{lb} \div \text{lbmole}) \cdot \text{ppmvd}_i \div [385.3, (\text{ft}^3 \div \text{lbmole}) \cdot 1000000000]$

$\text{lb}_i \div \text{ft}^3 = \text{MW}_i, (\text{lb} \div \text{lbmole}) \cdot \text{ppmvd}_i \div [385.3, (\text{ft}^3 \div \text{lbmole}) \cdot 1000000]$

$\text{lb}_i \div \text{ft}^3 = \text{MW}_i, (\text{lb} \div \text{lbmole}) \cdot \% \text{vd}_i \div [385.3, (\text{ft}^3 \div \text{lbmole}) \cdot 100]$

Ideal Gas Name	Formula	MW	lb/dscf / %dv
Nitric Oxide	NO	30.0061	$0.7788 \cdot 10^{-7}$
Nitrogen Dioxide	NO ₂	46.0055	$1.1940 \cdot 10^{-7}$
Nitrogen Oxides	NO _x	46.0055	$1.1940 \cdot 10^{-7}$
Sulfur Dioxide	SO ₂	64.0628	$1.6627 \cdot 10^{-7}$
Sulfur Trioxide	SO ₃	80.0622	$2.0779 \cdot 10^{-7}$
Sulfuric Acid	H ₂ SO ₄	98.0774	$2.5455 \cdot 10^{-7}$
Carbon Monoxide	CO	28.0106	$0.7270 \cdot 10^{-7}$
Carbon	C	12.0112	$0.3117 \cdot 10^{-7}$
Methane	CH ₄	16.0428	$0.4164 \cdot 10^{-7}$
Ethane	C ₂ H ₆	30.0698	$0.7804 \cdot 10^{-7}$
Propane	C ₃ H ₈	44.0968	$1.1445 \cdot 10^{-7}$
Butane	C ₄ H ₁₀	58.1238	$1.5085 \cdot 10^{-7}$
Pentane	C ₅ H ₁₂	72.1508	$1.8726 \cdot 10^{-7}$
Hexane	C ₆ H ₁₄	86.1778	$2.2366 \cdot 10^{-7}$
Heptane	C ₇ H ₁₆	100.2048	$2.6007 \cdot 10^{-7}$
Octane	C ₈ H ₁₈	114.2318	$2.9647 \cdot 10^{-7}$
1,3-Butadiene	C ₄ H ₆	54.0914	$1.4039 \cdot 10^{-7}$
Formaldehyde	H ₂ CO	30.0264	$0.7793 \cdot 10^{-7}$
Hydrogen Sulfide	H ₂ S	34.0798	$0.8845 \cdot 10^{-7}$
Carbonyl Sulfide	COS	60.0746	$1.5592 \cdot 10^{-7}$
Carbon Disulfide	CS ₂	76.1392	$1.9761 \cdot 10^{-7}$
Methyl Mercaptan	CH ₃ SH	48.1068	$1.2486 \cdot 10^{-7}$
Dimethyl Sulfide	C ₂ H ₆ S	62.1338	$1.6126 \cdot 10^{-7}$
Dimethyl Disulfide	C ₂ H ₆ S ₂	94.1978	$2.4448 \cdot 10^{-7}$
Hydrogen Chloride	HCl	36.4609	$0.9463 \cdot 10^{-7}$
Hydrogen Fluoride	HF	20.0063	$0.5192 \cdot 10^{-7}$
Ammonia	NH ₃	17.0304	$0.4420 \cdot 10^{-7}$
Methanol	CH ₃ OH	32.0422	$0.8316 \cdot 10^{-7}$
Ideal Gas Name	Formula	MW	lb/dscf / %dv
Oxygen	O ₂	31.9988	$0.8305 \cdot 10^{-3}$
Carbon Dioxide	CO ₂	44.0100	$1.1422 \cdot 10^{-3}$
Nitrogen	N ₂	28.0134	$0.7271 \cdot 10^{-3}$
Hydrogen Sulfide	H ₂ S	34.0798	$0.8845 \cdot 10^{-3}$

Calculation Of Mass Emission Rate

$E_i =$ Mass Emission Rate Of Ideal Gas (i), lb/hr

$E_i = \text{lb}_i \div \text{dscf} \cdot \text{Stack Flow (dscf/min)} \cdot 60 \text{ (min/hr)}$

METHOD 19

Oxygen Based "F" Factor

Method 19 F-Factor or fuel factor method is the ratio of the products of combustion to the higher heating value (HHV) of the fuel supply. Concentrations of SO₂, NO_x, CO and NMHC (Non-Methane Hydrocarbons) are measured using Reference Methods (RM's) 6C, 7E, 10 and 25A. Concentrations of O₂ are measured using RM 3 or 3A.

F-Factors are used to determine the ratio of pollutant emissions to heat input (lb/mmmbtu). The following calculations demonstrate the use of F-factors to document emissions.

Nomenclature:

E - emission ratio, lb/mmmbtu

C_d - pollutant concentration, ppmvd (dry basis)

F_d - F-factor (fuel factor), dry basis

F_d = 8710 dscf/mmmbtu for natural gas.

%O_{2d} = %O₂ in exhaust gases, dry basis

K₁ = 1.194 (10⁻⁷) conversion from NO_x ppm to NO_x lb/dscf

K₂ = 0.727 (10⁻⁷) conversion from CO ppm to CO lb/dscf

K₃ = 1.664 (10⁻⁷) conversion from SO₂ ppm to SO₂ lb/dscf

K₄ = 1.143 (10⁻⁷) conversion from NMHC ppm to NMHC lb/dscf (reported as propane)

K₅ = 0.312 (10⁻⁷) conversion from NMHC ppm to NMHC lb/dscf (reported as carbon)

Equations:

$$Q_{FUEL} (mmmbtu/hr) = HHV \frac{btu}{scf} \cdot Fuel\ flow \frac{scf}{hr} \cdot \frac{mmmbtu}{10^6\ btu}$$

$$Exhaust\ Flow, dscfm = Q_{FUEL} (mmmbtu/hr) \cdot F_d \frac{dscf}{mmmbtu} \cdot \frac{hr}{60\ min} \cdot \frac{20.9}{(20.9 - \%O_{2d})}$$

$$E_{NO_x} (lb/mmmbtu), NO_x = K_1 \cdot C_d \cdot F_d [20.9/(20.9 - \%O_{2d})]$$

$$E_{CO} (lb/mmmbtu), CO = K_2 \cdot C_d \cdot F_d [20.9/(20.9 - \%O_{2d})]$$

$$E_{SO_2} (lb/mmmbtu), SO_2 = K_3 \cdot C_d \cdot F_d [20.9/(20.9 - \%O_{2d})]$$

$$E_{NMHC} (lb/mmmbtu), NMHC = K_{4\ or\ 5} \cdot C_d \cdot F_d [20.9/(20.9 - \%O_{2d})]$$

$$NO_x\ lb/hr = E_{NO_x} \cdot Q_{FUEL} (MMBtu/hr)$$

$$CO\ lb/hr = E_{CO} \cdot Q_{FUEL} (MMBtu/hr)$$

$$SO_2\ lb/hr = E_{SO_2} \cdot Q_{FUEL} (MMBtu/hr)$$

$$NMHC\ lb/hr = E_{NMHC} \cdot Q_{FUEL} (MMBtu/hr) \text{ (reported as propane or carbon)}$$

APPENDIX G

Original Test Proposal

EMISSIONS TESTING PROCEDURE

DEMONSTRATION OF COMPLIANCE CONOCOPHILLIPS COMPANY

Borger Refinery - Borger, Texas

Unit No. 34 Sulfur Recovery Unit (SRU)

Tail Gas Incinerator (TGI) Stack (EPN: 34I1)

TCEQ Flexible Permit No. 9868A and PSD-TX-102M7

Demonstration of compliance will be performed to document mass emission rates of Sulfur Dioxide (SO₂), Nitrogen Oxides (NO_x) and Carbon Monoxide (CO). Testing will be performed in accordance with procedures set forth in the Code of Federal Regulations, Title 40, Part 60, Appendix A, Reference Methods (RMs) 1, 2, 3A, 4, 6C, 7E and 10.

Project Specifics

The SO₂, NO_x and CO compliance demonstration will be performed concurrent with the RATA test. Demonstration of compliance will be conducted by performing a series of nine (9) 21-minute test runs to determine SO₂, NO_x and CO concentrations using RM 6C, 7E and 10, respectively. Each set of three 21-minute test runs will be averaged to provide the equivalent of one (1) 63-minute compliance run. Nine 21-minute test runs will provide the equivalent of three (3) 63-minute test runs. A velocity traverse, oxygen concentration and moisture determination will be performed using RM's 1, 2, 3A and 4 to determine volumetric stack flow. One flue gas velocity measurement (RM 2) and one RM 4 (flue gas moisture) will be performed relative to each set of three RATA runs. The volumetric stack flow rate and the pollutant concentrations obtained during each compliance test run will be averaged to determine mass emission rates.

Testing will be performed while the unit is operating at least 90% of permit or process capacity to meet the requirements of unit operation during the compliance test being performed in conjunction with the RATA.

Operating parameters will be recorded to verify that the unit is running at the required load(s) during the sampling period. Operating parameters will be documented by facility personnel coinciding with each test run and will be forwarded to CETCON, Inc. for inclusion into the test report.

Attached are detailed descriptions of each analytical method proposed along with the schematic of the sample trains.

SAMPLE METHODS SUMMARY

Pollutants are measured according to EPA Reference Methods (RM's) described in the Code of Federal Regulations (CFR), Title 40, Part 60, Appendix A. The following methods will be used:

- RM-1 Sample and velocity traverses for stationary sources. Determination of measurement site and sample point location.
- RM-2 Determination of stack gas velocity and volumetric flow rate. A calibrated Type S pitot tube is used in conjunction with an inclined manometer to determine average gas velocity and for quantifying gas flow.
- RM-3A Determination of Oxygen (O₂) and Carbon Dioxide (CO₂) concentrations in emissions from stationary sources (Instrumental Analyzer Procedure). Servomex 1400B4 series analyzers are used to continuously measure the concentrations of O₂ and CO₂. O₂ and CO₂ concentrations are determined by paramagnetic and non-dispersive infrared detectors, respectively. The instruments are calibrated with gases prepared according to EPA Protocol One.
- RM-4 Determination of moisture content in stack gases. A gas sample is extracted from the source through an impinger sampling train which condenses the moisture. The volume of the gas sample leaving the impinger train is determined using a calibrated dry gas meter. The impingers are weighed before and after the test run to determine moisture content.
- RM-6C Determination of Sulfur Dioxide (SO₂) emissions from stationary sources (Instrumental Analyzer Procedure). A Bovar (Western Research) Model 721AT2 or 721M ultraviolet photometric analyzer is used to continuously measure the concentration of SO₂. The instrument is calibrated with gases prepared according to EPA Protocol One.
- RM-7E Determination of Nitrogen Oxides (NO_x) emissions from stationary sources (Instrumental Analyzer Procedure). A Thermo Environmental Instruments Company Model 10S, 42H or 42C chemiluminescent analyzer is used to continuously measure the concentration of NO_x. The instrument is calibrated with gases prepared according to EPA Protocol One.
- RM-10 Determination of Carbon Monoxide (CO) emissions from stationary sources (Instrumental Analyzer Procedure). A Thermo Environmental Instruments Company Model 48 or 48C gas filter correlation infrared analyzer is used to continuously measure the concentration of CO. The instrument is calibrated with gases prepared according to EPA Protocol One.

EMISSIONS TESTING PROCEDURE – METHODS 1, 2, 3A, & 4

Oxygen (O₂), Carbon Dioxide (CO₂) and Moisture (H₂O) concentrations as well as stack gas velocity and volumetric flow rate are determined according to procedures set forth in the Code of Federal Regulations, Title 40 (CFR40), Part 60, Appendix A, Reference Methods 1, 2, 3A and 4.

Sampling Procedure

Reference Methods 1 and 2 are used to measure the stack gas velocity and volumetric flow rate. Method 1 is used to select the sampling site and number of traverse points. Method 2 is used to perform the actual velocity measurement. A calibrated S-Type pitot tube connected to an inclined manometer and equipped with a thermocouple for temperature measurement is used to measure the stack gas velocity. The pitot tube pressure drop and stack gas temperature at each traverse point are recorded. The barometric pressure and stack pressure are also measured and recorded. A cyclonic flow test is conducted to validate the acceptability of the sampling location. The pitot tube is held perpendicular to the flow and rotated until a pressure drop of zero is obtained. The amount of rotation required to obtain a zero reading is called the null angle. The average null angle of all traverse points must be less than 20° for the location to be acceptable.

Reference Method 3A is used to determine O₂ and CO₂ concentrations and stack gas dry molecular weight. Flue gas is extracted continuously from the stack through a heated probe, filter and sample line, all of which are heated sufficiently to prevent condensation. A thermo-electrically cooled sample conditioner equipped with a sample pump is used to dry and cool the sample. Condensed water is continuously removed from the system by a peristaltic pump. The conditioned sample is conveyed to the testing trailer at grade through 3/8 inch O.D. Teflon tubing. The flow panel in the trailer distributes a portion of the sample to the O₂ and CO₂ analyzers and the remainder is vented to the outside. The O₂ and CO₂ concentrations measured by the analyzers are recorded by a personal computer equipped with an analog to digital converter and data acquisition software. CEDAQ (CETCON Data Acquisition) software is configured to sample the output of the analyzers every fifteen seconds and record the data as 1-minute averages (average of four readings). A strip chart recorder is used for backup and visual purposes.

Reference Method 4 is used to measure the moisture content of the stack gas. Flue gas is extracted from the stack through a heated probe and filter into a standard impinger train. The first, third and fourth impingers are of the Greenburg-Smith design, modified by replacing the tip with a 1/2 inch I.D. glass tube extending to 1/2 inch from the bottom of the flask. The second impinger is of the Greenburg-Smith design with the standard tip. The first two impingers contain known quantities of water and the fourth impinger contains a known quantity of silica gel. The dried flue gas leaving the impinger train is pumped through a dry gas meter to measure sample volume. The dry gas meter is equipped with an orifice and inclined manometer to measure the sample. A minimum sample volume of 21 dscf is required at a sample rate no greater than 0.75 cfm. At the conclusion of the test run, the quantities of water and silica gel in the impingers are determined gravimetrically. The difference between the final and initial weights of water and silica gel is recorded and used to calculate the stack gas moisture content.

EMISSIONS TESTING PROCEDURE – METHODS 1, 2, 3A, & 4, cont.

Analysis

O₂ and CO₂ concentrations are determined using Servomex 1400 Series analyzers. The O₂ measuring version of the instrument uses a magneto-dynamic paramagnetic detector. The CO₂ measuring version of the instrument uses a single beam, single wavelength infrared detector. The analyzers are equipped to output a 0-1 Volt D.C. signal that is proportional to the O₂ and CO₂ concentrations. The full-scale range of both instruments is 25%.

The moisture content is determined gravimetrically using an impinger train containing known quantities of water and silica gel.

The velocity and volumetric flow rate is determined using an S-Type pitot tube. The pressure drop of the pitot tube and the stack gas temperature are measured at each traverse point. The barometric pressure and differential stack pressure are measured and used to calculate the absolute stack pressure. The O₂, CO₂, N₂ (assumed to be the balance of the dry gas) and H₂O concentrations are used to calculate the actual molecular weight of the stack gas. This data is then used to calculate the average stack gas velocity. The volumetric flow rate is calculated by multiplying the velocity by the area of the stack cross section.

Conclusion

Oxygen (O₂) and Carbon Dioxide (CO₂) concentrations are measured by Reference Method 3A using Paramagnetic and Infrared analyzers, respectively. The analyzers are calibrated using standards that have been prepared according to EPA Protocol Number 1. The concentrations measured by the analyzers are recorded by computer data acquisition and on a strip chart recorder.

Moisture (H₂O) concentration is measured by Reference Method 4 using a standard impinger train. The quantity of water collected is measured gravimetrically.

Stack gas velocity and volumetric flow rate is measured by Reference Methods 1 and 2 using an S-Type pitot tube. Data obtained from Reference Methods 3A and 4 is also used in the velocity calculations.

EMISSIONS TESTING PROCEDURE – METHOD 6C

Sulfur Dioxide (SO₂) concentration in flue gas streams is determined according to procedures set forth in the Code of Federal Regulations, Title 40 (CFR40), Part 60, Appendix A, Reference Method 6C.

Sampling Procedure

Flue gas is extracted continuously from the stack through a heated probe, filter and sample line, all of which are heated sufficiently to prevent condensation. A thermo-electrically cooled sample conditioner equipped with a sample pump is used to dry and cool the sample. Condensed water is continuously removed from the system by a peristaltic pump. The conditioned sample is conveyed to the testing trailer at grade through unheated 3/8 inch O.D. Teflon tubing. The flow panel in the trailer distributes a portion of the sample to the SO₂ analyzer and the remainder is vented to the outside. The SO₂ concentration measured by the analyzer is recorded by a personal computer equipped with an analog to digital converter and data acquisition software. CEDAQ (CETCON Data Acquisition) software is configured to sample the output of the analyzer every fifteen seconds and record the data as 1-minute averages (average of four readings). A strip chart recorder is also used to record the analyzer output for backup and visual purposes.

Analysis

SO₂ concentration is determined using a Bovar (Western Research) 721-AT2 or 721M analyzer utilizing an Ultraviolet (UV) Photometric detector. The analyzers are equipped to output a 0-10 Volt D.C. signal that is proportional to the SO₂ concentration. A full-scale range is selected based on the expected concentration of the flue gas. Typical ranges used are 0-100 ppm, 0-250 ppm, 0-500 ppm and 0-1000 ppm.

Conclusion

Sulfur dioxide (SO₂) concentration is measured by Reference Method 6C using a UV Photometric analyzer. The analyzer is calibrated using standards that have been prepared according to EPA Protocol Number 1. The concentration measured by the analyzer is recorded by computer data acquisition and on a strip chart recorder.

EMISSIONS TESTING PROCEDURE – METHODS 7E & 10

Nitrogen Oxides (NO_x), and Carbon Monoxide (CO) concentrations in flue gas streams are determined according to procedures set forth in the Code of Federal Regulations, Title 40 (CFR40), Part 60, Appendix A, Reference Method (RM) 7E, and 10.

Sampling Procedure

Flue gas is extracted continuously from the stack through a heated probe, filter and sample line, all of which are heated sufficiently to prevent condensation. A moisture removal system equipped with a sample pump is used to dry and cool the sample. Condensed water is continuously removed from the system by a peristaltic pump. The conditioned sample is conveyed to the testing trailer at grade through unheated 3/8 inch O.D. Teflon tubing. The flow panel in the trailer distributes a portion of the sample to the NO_x and CO analyzers and the remainder is vented to the outside. The NO_x and CO concentrations measured by the analyzers are recorded by a personal computer equipped with an analog to digital converter and data acquisition software. CEDAQ (CETCON Data Acquisition) software is configured to sample the output of the analyzer every fifteen seconds and record the data as 1 minute averages (average of four readings). A strip chart recorder is also used to record the analyzer output for backup and visual purposes.

Analysis

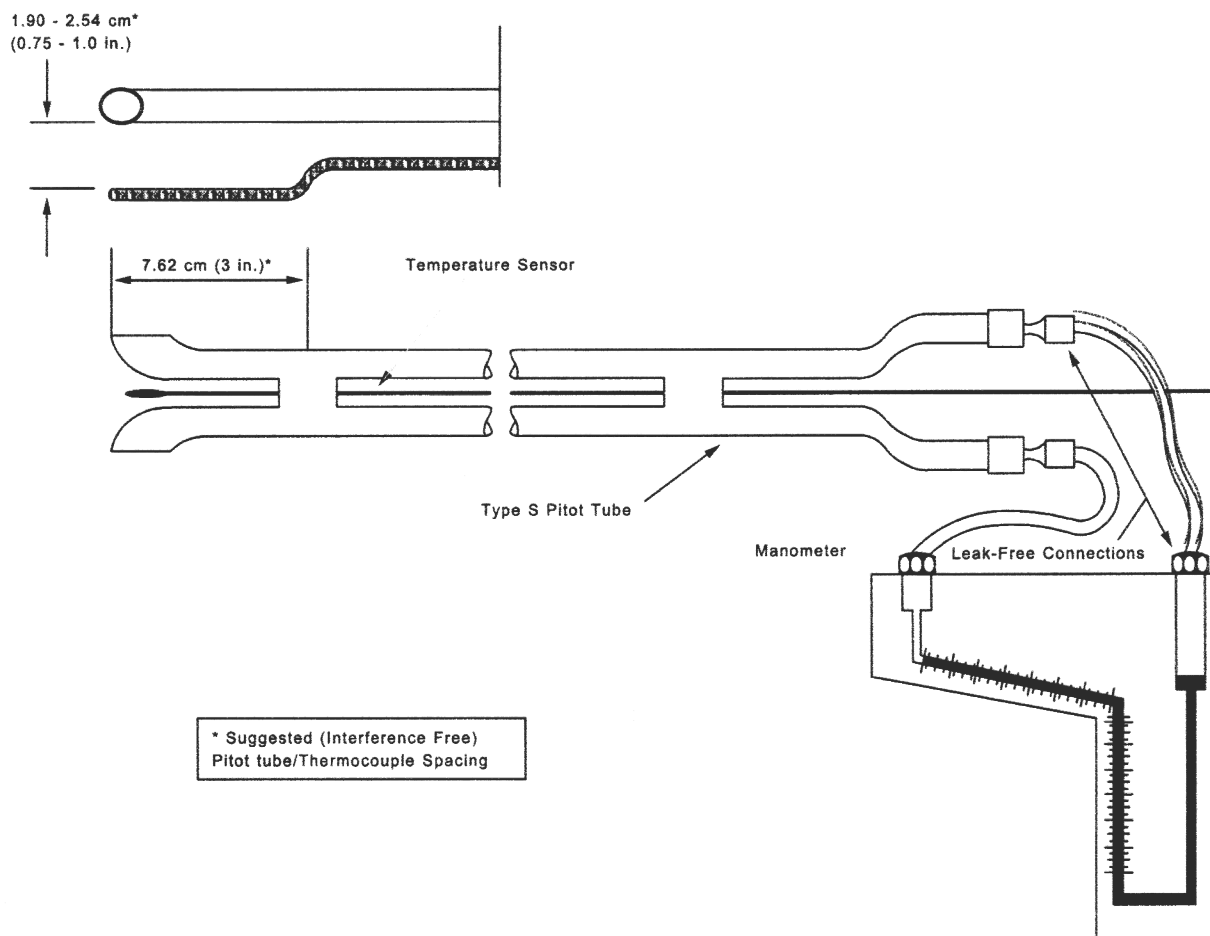
NO_x concentration is determined using a Thermo Environmental Instruments Company (TECO) Model 10S, 42C or 42i chemiluminescent analyzer. The analyzers are equipped to output a 0-10 Volt D.C. signal that is proportional to the NO_x concentration. A full scale range is selected based on the expected concentration of the flue gas.

CO concentration is determined using a Thermo Environmental Instruments Company (TECO) Model 48, 48C or 48i analyzer. This analyzer uses a Gas Filter Correlation - Infrared (GFC-IR) detection system. The analyzer is equipped to output a 0-10 Volt D.C. signal that is proportional to the CO concentration. A full scale range is selected based on the expected concentration of the flue gas.

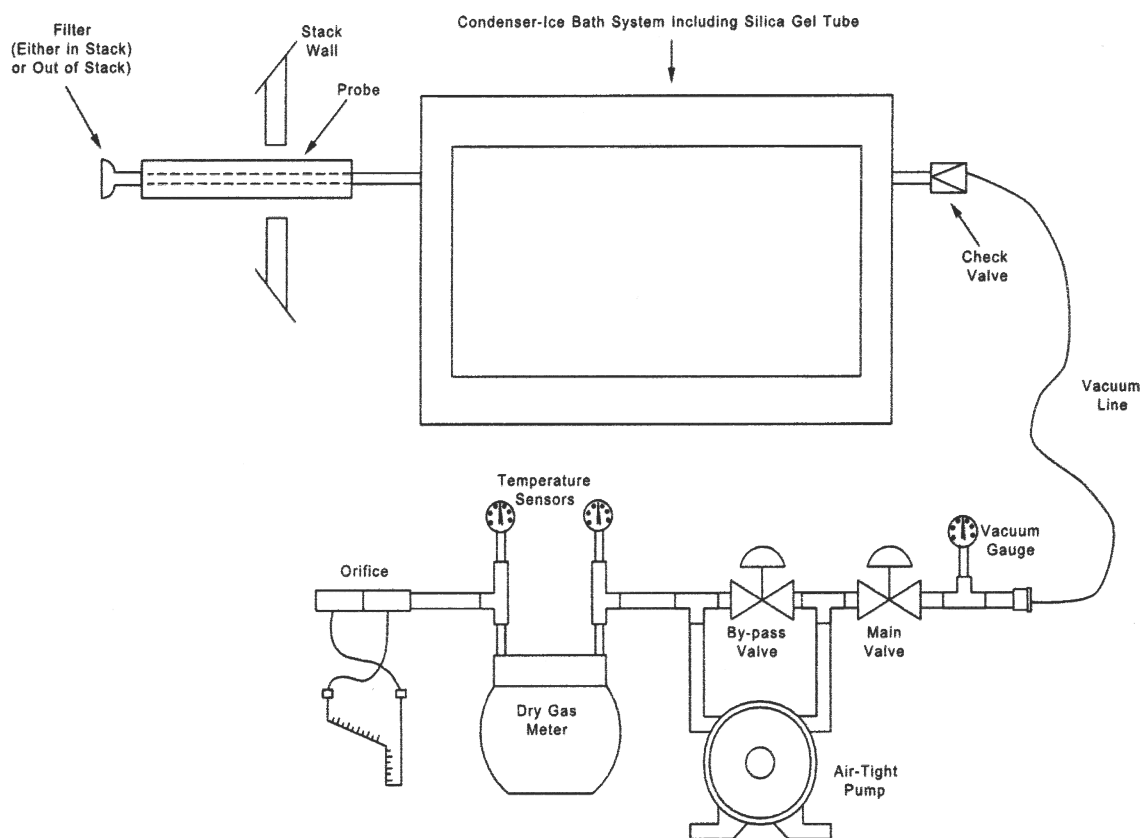
Conclusion

Nitrogen Oxides (NO_x) concentration is measured by Reference Method 7E using a Chemiluminescent analyzer. Carbon Monoxide (CO) concentration is measured by Reference Method 10 using a GFC-IR analyzer. The analyzers are calibrated using standards that have been prepared according to EPA Protocol Number 1. The concentration measured by the analyzer is recorded by computer data acquisition and on a strip chart recorder.

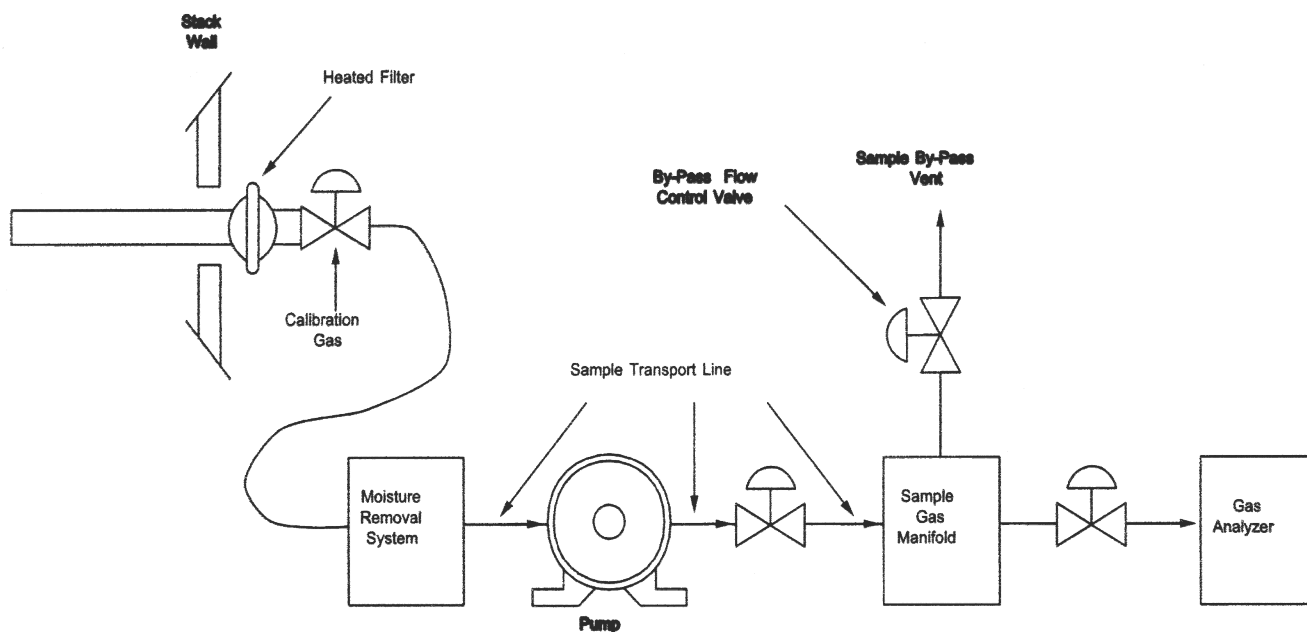
Reference Method 2 Type S Pitot Tube Manometer Assembly



Reference Method 4 Moisture Train



Reference Methods 3A, 6C, 7E and 10 Sampling Train



APPENDIX H

Resumes

John Van Meter
Sr. Project Coordinator

QUALIFICATION SUMMARY

During the two years preceding his employment with CETCON, Inc., Mr. Van Meter was providing engineering services to vendors of fired equipment and incinerators for the petrochemical and petroleum industries. Mr. Van Meter has participated in the design, fabrication, field installation, and start up of instrumentation / control systems for fired equipment.

Since his employment with CETCON, Mr. Van Meter has been involved with all aspects of emissions testing on a variety of emissions sources. Responsibilities have included on stack equipment operation, test equipment troubleshooting, sample gathering / analysis equipment operation, project coordination, and report generation. Mr. Van Meter has also become familiar with EPA Reference Test Methods.

EDUCATION

B.S. Electrical Engineering, May 1990, Texas Tech University, Lubbock, Tx.

Passed the Fundamentals of Engineering Exam for the Texas State Board of Registration for Professional Engineers.

QSTI Group 1 and Group 3 Certification

Additional training in the following areas:

Statistical Process Control	Total Quality Management
Procurement Ethics	Basics of Supervision
Computer Aided Test Systems	Computerized Control Systems

EXPERIENCE

CETCON, INC. - 11/94 to Present

Sr. Project Coordinator. Responsible for customer interface, project organization, quality test performance, and test instrument operations.

TECHSERV, INC. Tulsa, OK. - 3/93 to 11/94

Electrical Engineer. Responsible for design and installation of instrument / control systems for fired equipment.

TEXAS INSTRUMENTS INC, Dallas, Tx. - 5/90 to 12/92

Electrical Engineer. Responsible for product development and testing with the Defense Systems Group (Electronics Division).

CETCON

Alan M. Eason
Environmental Specialist

QUALIFICATION SUMMARY

Alan has extensive knowledge and experience with internal combustion engines through his work in the automotive field. He also has excellent business and customer service skills. With his knowledge of physics and math, Alan has exemplified himself by achieving awards such as the Ellis College Research Award for his work in the area of Astrophysics and Cosmology and being awarded grants such as NASA's Space Grant in 2004. Through environmental testing with CETCON Inc., Alan is continuously gaining knowledge of EPA methodology and practices.

EDUCATION

El Dorado High School, El Dorado, AR May 2001

Bachelor of Science, Physics, Henderson State University, Arkadelphia, AR May 2005

Masters of Business Management, University of Phoenix, August 2008

EXPERIENCE

CETCON, Inc.:

March 2008 to Present

Title: Environmental Specialist

Responsibilities include but not limited to performing emission testing at various plants while utilizing EPA methodology and processes, maintaining test equipment and fabrication of equipment for purposes of emission testing and processes.

AutoZone, Inc.:

October 2004 to March 2008

Title: Store Manager

Responsibilities include but not limited to maintaining store appearance, providing exceptional customer service through sales and service, training new and seasoned employees on new tactics and product, performing human resource functions at store level for purposes of maintaining store staff.

El Dorado Water Utilities:

May 2002 to August 2002

Title: Summer Worker

Responsibilities include maintaining grounds of water pumping and storage tank locations as well as collecting data from select water pumping stations and sewage reclamation sites.

CAPABILITIES AND ATTRIBUTES

Knowledge of programming circuits using VHDL, programming software using C++ and VBA, fluid dynamics, thermodynamics, classical and quantum mechanics, electromagnetism, optics, acoustics, and advanced mathematical methods.

CETCON

APPENDIX I

RAW FIELD DATA

Date: March 3, 2011 *March 4, 2011*
 Plant: Borger Petroleum Refinery
 Unit: Unit 34 SRU
 Operator: JRV AME
 Job No.: CJ-6483

CETCON, Inc.
EPA REFERENCE METHOD 4
IMPINGER WEIGHTS

Balance Field Calibration Check	
Balance No.	BAL6
Field Weight Number	002-001
Calibration Weight, gm	700.1
Balance Response, gm	700.2
Difference, gm	

Run #	C1	Box #	1	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm				812.1	732.1	637.5	889.0		
Initial Weight, gm				721.4	731.2	637.1	882.4		
Net Weight, gm									
Total Weight Gain, gm									

Run #	C2	Box #	2	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm				820.8	740.0	599.1	910.9		
Initial Weight, gm				730.3	737.2	598.6	904.9		
Net Weight, gm									
Total Weight Gain, gm									

Run #	C3	Box #	1	Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm				820.8	734.3	637.9	894.8		
Initial Weight, gm				753.0	732.1	637.5	889.0		
Net Weight, gm				846.1					
Total Weight Gain, gm									

Run #		Box #		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm									
Initial Weight, gm									
Net Weight, gm									
Total Weight Gain, gm									

Run #		Box #		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm									
Initial Weight, gm									
Net Weight, gm									
Total Weight Gain, gm									

Run #		Box #		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm									
Initial Weight, gm									
Net Weight, gm									
Total Weight Gain, gm									

Run #		Box #		Impinger 1	Impinger 2	Impinger 3	Impinger 4	Impinger 5	Impinger 6
Final Weight, gm									
Initial Weight, gm									
Net Weight, gm									
Total Weight Gain, gm									

QA/QC Check: ☒
 Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

Checked by:

3/3/2011

[Signature]
 Operator (Signature/Date) 3/4/2011
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[Signature]
 Project Coordinator (Signature/Date)
 4/18/2011 IMPINGERS.XLS

CETCON, Inc.

Job No.: CJ-6483 *gr*
 Date: ~~3/3/2011~~ 3/4/11
 Customer: ConocoPhillips
 Unit: Unit 34 SRU
 Operator: JRV
 File Name: C1

Field Data: Moisture/Velocity
 Run No.: C1
 Time of Run, T_R: 60 min.
 Sample Box No.: 1
 Meter Box No.: CM#6
 Stack Area, A_S: 5073.78 in²

Barometer No.: BAR6
 Pitot Tube No.: 6
 Pitot Tube, C_p: 0.787
 Initial Pitot Leak: ✓
 Final Pitot Leak: ✓
 Assumed %M: (default only)

Barometric Pressure, P_B: 26.83
 Ambient Temp., °F: 55
 Stack Pressure, P_S:
 Initial Leak @: 15.0 in. Hg =
 Final Leak @: 1.0 in. Hg =
 Balance No.: BAL6

C_F: 1.034
 ΔH@: 1.776
 in. H₂O =
 in. Hg =
 cfm
 cfm

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H ₂ O ΔP _S	Orifice ΔH P _M in. H ₂ O	Sample Vacuum in. Hg	Stack Temp. °F T _S	Probe Temp. °F	Oven Temp. °F	Effluent Temp. °F	Dry Gas Temp. °F T _M	Remarks
A	6	952	182.281	0.018	0.8	1162	262	247	58	66	
5	5	184.824	0.030	0.8	6.5	1177	267	245	55	66	
4	10	187.620	0.034	0.8	6.5	1201	267	263	55	66	
3	15	189.965	0.036	0.8	6.5	1198	268	266	55	66	
2	20	192.500	0.030	0.8	6.5	1192	269	260	56	66	
1	25	195.050	0.024	0.8	6.5	1187	265	257	56	66	
6	30	197.810	0.019	0.8	6.5	1147	264	258	57	66	-0.84
5	35	200.350	0.026	0.8	6.2	1182	263	256	57	67	
4	40	202.720	0.035	0.8	6.2	1199	268	255	57	68	
3	45	205.450	0.037	0.8	6.2	1203	272	246	57	68	
2	50	207.820	0.035	0.8	6.2	1192	268	258	57	68	
1	55	210.390	0.030	0.8	6.2	1184	269	259	57	68	
END	60	213.158									

C_{ga} =
 %Δ =
 %Δ Must Be ≤ 5.0

Avg ΔP_S
 Avg (ΔP_S)^{1/2}

Avg P_M
 Max Vacuum

Avg T_S
 Volume DGM

Avg T_M
 1.034 = V_M ft³ x C_F

V_{M std} = 17.64 x V_M x [(P_B + (P_M / 13.6)) ÷ T_M]
 Q_{M std} = V_{M std} ÷ T_R
 V_{W gas} = 0.04715 x V_W
 %M = V_{W gas} x 100 ÷ (V_{M std} + V_{W gas})
 M_B = (100 - %M) ÷ 100
 MW_B = (%CO₂ × 0.44) + (%O₂ × 0.32) + ((%N₂ + %CO) × 0.28)
 MW = M_B x MW_B + 18 (1 - M_B)
 V_S = 5129.4 x C_p x (T_S + (P_S x MW))^{1/2} x Avg(ΔP_S)^{1/2}
 Q_A = (V_S x A_S) ÷ 144
 Q_S = (0.1225 x V_S x M_B x P_S x A_S) ÷ T_S
 Q_W = Q_S ÷ M_B

Impinger No. (1) (2) (3) (4) (5) (6) Total

Final Wt, gm
 Initial Wt, gm
 Difference, gm

QA/QC Check:
 Completeness
 Legibility
 Accuracy
 Specifications
 Reasonableness

RM 3 or 3A Data
 %CO₂
 %O₂
 %CO
 %N₂
 % Excess Air

Avg ΔP
 Avg (ΔP_S)^{1/2}
 Avg. P_M
 Avg. T_S
 Avg. T_M

in. H₂O
 in. H₂O
 °F
 °R
 °F
 °R

DSCF
 DSCFM
 SCF
 %
 dry fract.
 lb/lbmole
 lb/lbmole
 FPM
 ACFM
 DSCFM
 WSCFM

Checked by: *John A. Adams*
 Operator (Signature/Date) 3/4/2011
 Project Coordinator (Signature/Date) 4/18/2011
 FIELD DAT.XLS

CETCON, Inc.

Job No.: CJ-6483
 Date: 3/4/11
 Customer: ConocoPhillips
 Unit: Unit 34 SRU
 Operator: JRV
 File Name: C2

Field Data: Moisture/Velocity
 Run No.: C2
 Time of Run, T_R: 60 min.
 Sample Box No.: 1
 Meter Box No.: CM#6
 Stack Area, A_S: 5073.78 in²

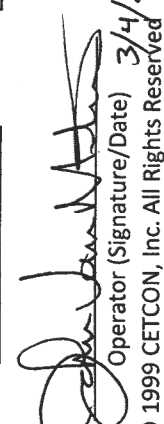
Barometer No.: BAR6
 Pitot Tube No.: 6
 Pitot Tube, C_p: 0.787
 Initial Pitot Leak: ✓
 Final Pitot Leak: ✓
 Assumed %M: (default only)

Barometric Pressure, P_B: 26.83
 Ambient Temp., °F: 62
 Stack Pressure, P_S:
 Initial Leak @: 15.0 in. Hg =
 Final Leak @: 70 in. Hg =
 Balance No.: BAL6

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H ₂ O ΔP _S	Orifice ΔH P _M in. H ₂ O		Sample Vacuum in. Hg	Stack Temp. °F T _S	Probe Temp. °F	Oven Temp. °F	Effluent Temp. °F	Dry Gas Temp. °F T _M		Remarks
				Desired	Actual						Inlet	Outlet	
BA 6	1117	213.610	0.025	0.8	0.8	6.5	1157	265	267	57	69	69	
5	5	216.250	0.032	0.8	0.8	6.2	1176	267	269	55	71	69	
4	10	219.000	0.034			6.0	1189	270	264	55	74	69	
3	15	221.480	0.036			6.0	1195	266	281	55	74	69	
2	20	224.100	0.032			6.0	1184	270	270	57	76	69	
1	25	224.750	0.025			6.0	1178	263	281	57	77	70	-0.80
BA 6	30	229.220	0.024			6.0	1168	277	262	58	77	70	
5	35	231.800	0.028			6.0	1178	267	265	59	78	71	
4	40	234.360	0.035			6.0	1186	267	268	58	78	71	
3	45	236.910	0.036			6.0	1194	267	273	58	78	71	
2	50	239.470	0.031			6.0	1188	269	278	58	78	71	
1	55	242.060	0.028			6.0	1178	264	270	58	78	71	
END	60	244.652											
C _{qa} = %Δ Must Be ≤ 5.0													
Avg ΔP _S Avg (ΔP _S) ^{1/2}													
Avg P _M Max Vacuum													
Avg T _S Avg T _M													
ft ³ x C _F = V _M													

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total	Volume DGM	ft ³ x C _F	Avg T _M	= V _M	ft ³
Final Wt, gm												
Initial Wt, gm												
Difference, gm												
V _{M std} = 17.64 x V _M x [(P _B + (P _M / 13.6)) ÷ T _M] Q _{M std} = V _{M std} ÷ T _R V _{W gas} = 0.04715 x V _W %M = V _{W gas} x 100 ÷ (V _{M std} + V _{W gas}) M _D = (100 - %M) ÷ 100 MW _D = (%CO ₂ × 0.44) + (%O ₂ × 0.32) + (%N ₂ + %CO × 0.28) MW = M _D x MW _D + 18 (1 - M _D) V _S = 5129.4 x C _p x (T _S ÷ (P _S x MW)) ^{1/2} x Avg(ΔP _S) ^{1/2} Q _A = (V _S x A _S) ÷ 144 Q _S = (0.1225 x V _S x M _D x P _S x A _S) ÷ T _S Q _W = Q _S ÷ M _D												
DSCF DSCFM SCF % dry fract. lb/lbmole lb/lbmole FPM ACFM DSCFM WSCFM												

QA/QC Check:		RM 3 or 3A Data
Completeness	✓	%CO ₂
Legibility	✓	%O ₂
Accuracy	✓	%CO
Specifications	✓	%N ₂
Reasonableness	✓	% Excess Air

Checked by:  Operator (Signature/Date) 3/4/2011
 Project Coordinator (Signature/Date) 4/18/2011
 FIELD DAT.XLS

CETCON, Inc.

Job No.: CJ-6483
 Date: 3/4/11
 Customer: ConocoPhillips
 Unit: Unit 34 SRU
 Operator: JRV
 File Name: C3

Field Data: Moisture/Velocity
 Run No.: C3
 Time of Run, T_R: 60 min.
 Sample Box No.: 1
 Meter Box No.: CM#6
 Stack Area, A_S: 5073.78 in²

Barometer No.: BAR6
 Pitot Tube No.: 6
 Pitot Tube, C_p: 0.787
 Initial Pitot Leak: ✓
 Final Pitot Leak: ✓
 Assumed %M: (default only)

Barometric Pressure, P_B: 26.82
 Ambient Temp., °F: 67
 Stack Pressure, P_S:
 Initial Leak @: 15.0 in. Hg =
 Final Leak @: 7.0 in. Hg =
 Balance No.: BAL6

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H ₂ O ΔP _S	Orifice ΔH P _M in. H ₂ O	Sample Vacuum in. Hg	Stack Temp. °F T _S	Probe Temp. °F	Oven Temp. °F	Effluent Temp. °F	Dry Gas Temp. °F T _M	Remarks
6	1302	245.200	0.022	0.8	6.5	7157	267	274	67	71	
5	5	247.900	0.029	0.8	6.2	1178	271	270	60	71	
4	10	250.470	0.033	0.8	6.2	1192	270	249	58	71	
3	15	253.010	0.035	0.8	6.2	1189	269	273	57	70	
2	20	254.220	0.026	0.8	6.2	1175	263	276	58	70	
1	25	255.590	0.021	0.8	6.2	1164	264	248	59	70	
6	30	260.760	0.018	0.8	6.2	1148	267	266	58	70	-0.82
5	35	263.550	0.025	0.8	6.2	1174	269	255	58	70	
4	40	266.470	0.032	0.8	6.2	1167	265	270	58	70	
3	45	268.520	0.036	0.8	6.2	1188	264	268	60	70	
2	50	271.100	0.029	0.8	6.2	1178	267	273	60	71	
1	55	273.950	0.024	0.8	6.2	1169	264	269	59	70	
END	60	276.276									

C_{qa} =
 %Δ =
 %Δ Must Be ≤ 5.0

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total
Final Wt, gm							
Initial Wt, gm							
Difference, gm							

Volume DGM = V_{M std} = 17.64 x V_M x [(P_B + (P_M / 13.6)) ÷ T_M]
 Q_{M std} = V_{M std} ÷ T_R
 V_{W gas} = 0.04715 x V_W
 %M = V_{W gas} x 100 ÷ (V_{M std} + V_{W gas})
 M_D = (100 - %M) ÷ 100
 MW_D = (%CO₂ x 0.44) + (%O₂ x 0.32) + ((%N₂ + %CO) x 0.28)
 MW = M_D x MW_D + 18 (1 - M_D)
 V_S = 5129.4 x C_p x (T_S ÷ (P_S x MW))^{1/2} x Avg(ΔP_S)^{1/2}
 Q_A = (V_S x A_S) ÷ 144
 Q_S = (0.1225 x V_S x P_S x A_S) ÷ T_S
 Q_W = Q_S ÷ M_D

QA/QC Check:
 Completeness
 Legibility
 Accuracy
 Specifications
 Reasonableness

Operator (Signature/Date) 3/4/2011
 Project Coordinator (Signature/Date) 4/18/2011
 FIELD DAT.XLS

Checked by:
 3/3/2011 Page #1