

PERFORMANCE TEST - NO_x, CO & SO₂

No. 2 SRU Tail Gas Incinerator

**TPI Petroleum, Inc.
Ardmore Petroleum Refinery**

Ardmore, Oklahoma

August 3-4, 2005

PERFORMANCE TEST - METHODS 1, 2, 3A, 4, 6C, 7E & 10

No. 2 SRU Tail Gas Incinerator

TPI Petroleum, Inc.

Ardmore Petroleum Refinery

Ardmore, Oklahoma

Test Date:

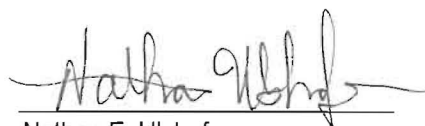
August 3-4, 2005

Report Date: September 2, 2005

CETCON Job Number: CJ-4022A

" 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."


L. Kelly Sandberg
Sr. Project Coordinator


Nathan E. Ulshafer
Sr. Environmental Specialist

CETCON

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EXECUTIVE SUMMARY

Compliance testing was conducted for Valero (TPI Petroleum, Inc.) at their Petroleum Refinery in Ardmore, Oklahoma on Wednesday and Thursday, August 3-4, 2005. Testing was conducted on the Stack of the Number 2 Sulfur Recovery Unit (SRU) Tail Gas Unit to document emissions of Nitrogen Oxides (NO_x), Carbon Monoxide (CO) and Sulfur Dioxide (SO₂).

Testing was conducted according to the procedures and guidelines presented in the Code Of Federal Regulations, Title 40 (CFR40), Part 60, Appendix A, Reference Methods (RM's) 1, 2, 3A, 4, 6C, 7E and 10. This source is regulated under CFR40, Part 60, Subpart J, Part 63, Subpart UUU and Oklahoma Department Of Environmental Quality (ODEQ) Permit Number 98-172-C (M-15) PSD.

Three (3) tests were conducted to document compliance with the SO₂ limits of CFR40, Part 60, Subpart J and Part 63, Subpart UUU. Each test consisted of four (4) individual test segments of sixty (60) minutes duration. In order to incorporate a Relative Accuracy Test Audit (RATA) into the test schedule, the second test consisted of nine (9) test segments of thirty (30) minutes duration. The average results of these three (3) test runs conducted are summarized in the following table:

Pollutant	ppmvd	ppmvd @ 0% O ₂	permit
SO ₂	20.07	29.05	250.00

Three (3) tests were also conducted to document compliance with state permit limits for NO_x, CO and SO₂. These tests were sixty (60) minutes in duration. The average results of these three (3) test runs conducted are summarized in the following table:

Pollutant	ppmvd	lb/hr	permit	ton/yr	permit
NO _x	32.54	1.95	4.00	8.55	17.40
CO	1.01	0.04		0.16	
SO ₂	18.36	1.53	26.20	6.71	114.70

Detailed summaries of the test data can be found on the following pages of this test report in tables titled "Summary Of Results".

CETCON, Inc.

Summary Of Results

Unit Designation: TPI Petroleum, Inc. - Ardmore Refinery
No. 2 SRU Tail Gas Incinerator

PARAMETERS:

	C1	C2	C3
Test Number:			
Date:	08/03/05	08/04/05	08/04/05
Start Time:	1500	1016	1658
End Time:	2000	1635	2138
Test Duration, min.	240	270	240

OPERATING DATA:

				Average:
Amine Acid Gas Feed, mscfh	185.1	184.8	182.3	184.1
Amine Acid Gas H ₂ S, %	78.0	78.0	78.0	78.0
Sour Water Stripper Acid Gas Feed, mscfh	63.6	43.8	43.3	50.2
Sour Water Stripper Acid Gas H ₂ S, %	33.0	33.0	33.0	33.0
Sulfur Production, LT/D	141.3	135.2	133.4	136.6
Maximum Production, LT/D	130.0	130.0	130.0	130.0
Unit Load, %	108.7	104.0	102.6	105.1

FLUE GAS:

O ₂ , % dry	6.72	6.59	6.07	6.46
CO ₂ , % dry	4.02	3.95	4.02	4.00

EMISSION DATA:

SO ₂ , ppmvd	18.18	21.65	20.38	20.07	Permit:
SO ₂ , ppmvd @ 0% O ₂	26.80	31.61	28.74	29.05	250.00

CETCON, Inc.

Summary Of Results

Unit Designation: TPI Petroleum, Inc. - Ardmore Refinery
No. 2 SRU Tail Gas Incinerator

PARAMETERS:

	C1A	C1B	C1C
Test Number:	8/3/2005	8/3/2005	8/3/2005
Date:	1500	1620	1740
Start Time:	1600	1720	1840
End Time:	60	60	60
Test Duration, min.			

OPERATING DATA:

				Average:
Amine Acid Gas Feed, mscfh	185.1	185.1	185.1	185.1
Amine Acid Gas H ₂ S, %	78.0	78.0	78.0	78.0
Sour Water Stripper Acid Gas Feed, mscfh	63.6	63.6	63.6	63.6
Sour Water Stripper Acid Gas H ₂ S, %	33.0	33.0	33.0	33.0
Sulfur Production, LT/D	141.3	141.3	141.3	141.3
Maximum Production, LT/D	130.0	130.0	130.0	130.0
Unit Load, %	108.7	108.7	108.7	108.7

FLUE GAS:

Stack Temperature, °F	1430	1431	1427	1429
O ₂ , % dry	6.60	6.70	6.78	6.70
CO ₂ , % dry	4.07	4.02	4.00	4.03
% Moisture	10.59	10.68	10.51	10.59
Stack Flow, ACFM	35821	33951	33755	34509
Stack Flow, DSCFM	8697	8220	8201	8373

EMISSION DATA:

					Permit:
NO _x , ppmvd	32.49	33.00	32.12	32.54	
NO _x , lb/hr	2.02	1.94	1.89	1.95	4.00
NO _x , ton/yr	8.87	8.51	8.27	8.55	17.40
CO, ppmvd	1.30	0.99	0.75	1.01	
CO, lb/hr	0.05	0.04	0.03	0.04	
CO, ton/yr	0.22	0.16	0.12	0.16	
SO ₂ , ppmvd	17.74	17.73	19.60	18.36	
SO ₂ , ppmvd @ 0% O ₂	25.94	26.10	29.02	27.02	250.00
SO ₂ , lb/hr	1.54	1.45	1.60	1.53	26.20
SO ₂ , ton/yr	6.74	6.37	7.02	6.71	114.70

SAMPLING METHODS

Pollutants are measured according to EPA Reference Methods (RM'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. |
| 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. |

DESCRIPTION OF TEST

Personnel from CETCON, Inc. (Combustion & Environmental Testing Consultants) arrived at the Valero (TPI Petroleum, Inc.) Petroleum Refinery located in Ardmore, Oklahoma at approximately 8:00 AM on Tuesday, August 2, 2005. Compliance testing was conducted on Hot Oil Heater H-5602, the results of which are contained in a separate report. The testing equipment was removed from the stack of Heater H-5602 and relocated to the stack of Number 2 Sulfur Recovery Unit (SRU) Tail Gas Incinerator. The testing equipment necessary to measure mass emission rates of Nitrogen Oxides (NO_x), Carbon Monoxide (CO) and Sulfur Dioxide (SO_2) was lifted to the stack platform and setup. The area was secured for the evening and CETCON left the plant at approximately 6:00 PM.

CETCON returned to the plant at approximately 8:00 AM on Wednesday, August 3, 2005. CETCON was informed that the SRU was not yet at the required production rate for the test. There also appeared to be a problem with the Oxygen (O_2) analyzer of the Continuous Emissions Monitoring System (CEMS). Valero instrument technicians were contacted to diagnose and remedy the problem. CETCON personnel left the plant for approximately one hour to eat lunch. CETCON personnel returned to the plant at approximately 1:00 PM and were informed by Valero personnel that the SRU was ready for the performance test. The Relative Accuracy Test Audit (RATA) of the CEMS would be conducted the following day. Calibration error, sampling system bias and system response time tests were conducted on the Reference Method (RM) analyzers and sampling equipment. A moisture train was lifted to the stack platform, assembled and successfully leak tested. The probes were inserted into the stack and the analyzers were allowed to achieve stable responses. The first sixty (60) minute test (designated C1A) began at 3:00 PM and concluded at 4:00 PM. A sampling system bias test was conducted at the conclusion of the test to correct the data for calibration drift. Three (3) additional tests (designated C1B, C1C and C1D), identical in procedure and duration to test C1A, were conducted concluding at 8:00 PM. Velocity traverses and moisture tests were conducted with the first three (3) pollutant tests. These three (3) tests were used to document compliance with the NO_x , CO and SO_2 emission limits found in the state permit. The results of all four (4) tests for SO_2 were averaged together and reported as a single test run to document compliance with the emission limits found in the Code of Federal Regulations, Title 40 (CFR40), Part 60, Subpart J and Part 63, Subpart UUU. The area was secured for the evening and CETCON left the plant at approximately 8:30 PM.

CETCON returned to the plant at approximately 8:00 AM on Thursday, August 4, 2005. Calibration procedures were conducted and CETCON's clocks were synchronized with the plant's Data Acquisition and Handling System. The probes were inserted into the stack and the analyzers were allowed to achieve stable responses. The first test run of the day (designated C2A/R1) began at 10:16 AM and concluded at 10:46 AM. Sampling was conducted at each of three (3) sample traverse points for a duration of ten (10) minutes, resulting in a total run length of thirty (30) minutes. A sampling system bias test was conducted at the conclusion of the test to correct the data for calibration drift. Eight additional test runs (designated C2B/R2 through C2I/R9) were conducted concluding at 4:44 PM. The Relative Accuracy (RA) was calculated

DESCRIPTION OF TEST, continued

and it was determined that the CEMS had passed the RATA. The nine (9) RATA test runs were averaged and reported as the second SO₂ compliance test run.

Four (4) additional test runs (designated C3A, C3B, C3C and C3D) were conducted starting at 4:58 PM and concluding at 9:38 PM. These test runs were identical in procedure and duration to test runs C1A through C1D conducted the previous day. The area was secured for the evening and CETCON left the plant at approximately 10:00 PM.

CETCON returned to the plant at approximately 10:30 AM on Friday, August 5, 2005. The test equipment was removed from the stack and secured in the trailer. CETCON completed all work at the Valero Ardmore Refinery and departed at approximately 12:00 PM.

The following people were present for the testing conducted on Wednesday and Thursday, August 3-4, 2005:

<u>Name</u>	<u>Affiliation</u>
Kelly Sandberg	CETCON, Inc.
Nathan Ulshafer	CETCON, Inc.
Tracy Watson	Valero (TPI Petroleum, Inc.)
Greg Elliott	Valero (TPI Petroleum, Inc.)
Dave Schutz	Oklahoma Department of Environmental Quality
Donna Lautzenhiser	Oklahoma Department of Environmental Quality
Dejay Famuagun	Oklahoma Department of Environmental Quality

Unit Diagram
and
Sample Point Location

CETCON, Inc.

Job No: CJ-4022A
Customer: TPI Petroleum, Inc.
Unit: No. 2 SRU Tail Gas
Date: August 2, 2005
Time: 4:00 PM

PRELIMINARY VELOCITY TRAVERSE DATA
AND
SAMPLING LOCATION DATA

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

Number of Ports:	2	Port A	Port B	Port C	Port D	Port E	Average
Port & Inside Diameter (in.)		97-15/16	97-06/16				97.66
Port & Wall Thickness (in.)		29-00/16	29-08/16				29.25
Inside Stack Diameter, D (in.)		68-15/16	67-14/16				68.41
Sampling Ports are	75 ft.	0 in.	Distance A-Port to downstream disturbance =				13.16 stack diameters
	30 ft.	0 in.	Distance B-Port to upstream disturbance =				5.26 stack diameters

Stack Schematic

Cross Section

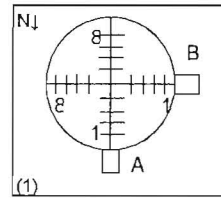
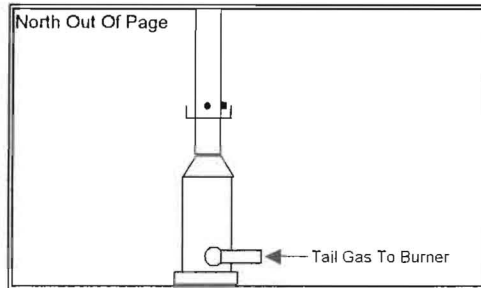
Pitot Tube No: 3

$C_P =$ 0.810

$P_B =$ 29.20 Hg

$P_S =$ 0.20 H₂O

$A_S^{(2)} =$ 3675.20 in.²
25.52 ft.²



Stack Height	<u>150</u>	ft.
Sampling Port Hgt	77	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																			
1	3.2	31.44	31 7 / 16	0.040	1415	2	0.025	1410	10										
2	10.5	36.43	36 7 / 16	0.050	1436	-8	0.030	1424	12										
3	19.4	42.52	42 8 / 16	0.060	1436	14	0.055	1442	0										
4	32.3	51.35	51 6 / 16	0.060	1430	10	0.060	1441	-4										
5	67.7	75.56	75 9 / 16	0.065	1442	-4	0.060	1439	-8										
6	80.6	84.39	84 6 / 16	0.065	1433	0	0.055	1437	0										
7	89.5	90.47	90 8 / 16	0.070	1428	8	0.050	1430	9										
8	96.8	95.47	95 7 / 16	0.030	1411	-10	0.025	1409	16										
Performance Specification 2 Pollutant Traverse Points																			
1	16.7	40.67	40 11 / 16																
2	50.0	63.45	63 7 / 16																
3	83.3	86.23	86 4 / 16																

RATA Test ? (Y/N) _____ Y

Metric Points ? (Y/N) _____ N

Average Absolute Value of Cyclonic Flow Null Angle, $\alpha = 7.1^\circ$ α Must Be $\leq 20^\circ$ For Acceptable Flow Conditions

Average Stack Temperature, $T_s = 1430^\circ\text{F}$ Average $\Delta P_s = 0.050$ in. H_2O Average $\sqrt{\Delta P_s} = 0.221$ 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.

$$(2) \quad A_S = \pi D^2 + 4$$

(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. ($D \leq 24$ in.) or 1.0 in. ($D > 24$ in.).

QA/QC Check:

Completeness X Legibility X Accuracy X Specifications X Reasonableness X

Checked by.

8/3/2005

Operator (Signature/Date)
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Project Coordinator (Signature/Date)
PRELIM.XLS

Plant Operational Data

Valero Ardmore Refinery
#2 Sulfur Recovery Unit Engineering Performance Tests
August 3rd & 4th, 2005

PI TAG NO	DESCRIPTION	UNITS	8/3/2005 15:00 8/3/2005 20:00	8/4/2005 10:16 8/4/2005 16:35	8/4/2005 16:58 8/4/2005 21:38
29:FC56215	ACID GAS TO HI-5601 BRNR #1	MSCFH	106.8	104.7	102.7
Amine Acid Gas H2S Concentration = 78.0 Mole%					
Amine H2S Stripper Estimated Sulfur Input (LTPD) =			75.0	73.5	72.2

PI TAG NO	DESCRIPTION	UNITS	8/3/2005 15:00 8/3/2005 20:00	8/4/2005 10:16 8/4/2005 16:35	8/4/2005 16:58 8/4/2005 21:38
29:FC56216	ACID GS TO H5601 RC FRN # 2	MSCFH	78.27	80.06	79.55
Amine Acid Gas H2S Concentration = 78.0 Mole%					
Amine H2S Stripper Estimated Sulfur Input (LTPD) =			55.0	56.2	55.9

PI TAG NO	DESCRIPTION	UNITS	8/3/2005 15:00 8/3/2005 20:00	8/4/2005 10:16 8/4/2005 16:35	8/4/2005 16:58 8/4/2005 21:38
MATERIAL BALANCE	TGTU ACID GAS TO V-5601	MSCFH	20.6	20.5	20.2
Tailgas Treating Unit Recycle Acid Gas H2S Concentration = 75.0 Mole%					
TGTU Recycle Gas Sulfur Input to Amine Acid Gas KO Drum (LTPD) =			7.6	7.6	7.5

PI TAG NO	DESCRIPTION	UNITS	8/3/2005 15:00 8/3/2005 20:00	8/4/2005 10:16 8/4/2005 16:35	8/4/2005 16:58 8/4/2005 21:38
29:FC56217	SOUR WATER STRIPPER GAS TO HI-5601 BRNR	MSCFH	63.6	43.8	43.3
Sour Water Stripper Acid Gas H2S Concentration = 33.0 Mole %					
Sour Water Stripper Estimated Sulfur Production (LTPD) =			18.9	13.0	12.9

	8/3/2005 15:00 8/3/2005 20:00	8/4/2005 10:16 8/4/2005 16:35	8/4/2005 16:58 8/4/2005 21:38
Total #2 SRU Sulfur Input Rate (LTPD)	148.9	142.8	140.9

#2 SRU Average Sulfur Input Rate (LTPD): Includes TGTU Recycle Gas **144.2**

	8/3/2005 15:00 8/3/2005 20:00	8/4/2005 10:16 8/4/2005 16:35	8/4/2005 16:58 8/4/2005 21:38
Total #2 SRU Sulfur Production Rate (LTPD)	141.3	135.2	133.4

#2 SRU Average Sulfur Production Rate (LTPD) **136.6**

#2 SRU Average Efficiency (Sulfur Production/Sulfur Input) = **94.75%**

Field Data

CETCON, Inc.

REFERENCE METHOD 4 SAMPLING WORKSHEET

Job Number: CJ-4022A
 Customer: TPI Petroleum, Inc.
 Unit: No. 2 SRU Tail Gas Incinerator
 Date: 8/3/2005

**Assumed Or
 Preliminary
 Flue Gas Data:**

P _B , in. Hg	29.22
%O ₂	8.50
%CO ₂	4.00
%N ₂	87.50
M _d , lb/lbmole	28.98

Calibration Data: CM#

ΔH@, in. H₂O

**Assumed Or
 Preliminary
 Test Data:**

T_m, °F
 T_{mR}, °R
 T_R, min.

1
1.558
75
535
60

Shaded Cells Above Are Calculated

What Is The Desired Sample Volume In DSCF? 30.00 Must Be ≥ 21.00 DSCF
 The Sample Rate In DSCFM Would Be: 0.500 Must Be ≤ 0.750 DSCFM

The ΔH Required To Sample At This Rate Is: 0.72 in. H₂O

NOMENCLATURE

P_B = Barometric Pressure, in. Hg
 %O₂ = Stack Oxygen Concentration, % dry
 %CO₂ = Stack Carbon Dioxide Concentration, % dry
 %N₂ = Stack Nitrogen Concentration, % dry
 M_d = Stack Gas Dry Molecular Weight, lb/lbmole

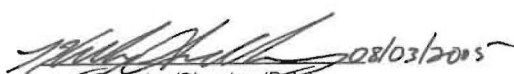
ΔH@ = Orifice Calibration Factor, in. H₂O
 T_m = Average Dry Gas Meter Temperature, °F
 T_{mR} = Average Dry Gas Meter Temperature, °R
 T_R = Test Duration, min

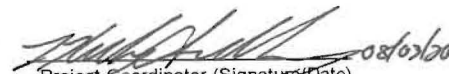
QA/QC Check:

Completeness X Legibility X Accuracy X Specifications X Reasonableness X

Checked by:

8/3/2005


 Operator (Signature/Date)
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 Project Coordinator (Signature/Date)
 RM4SHEET.XLS

CETCON, Inc.

Job No.: CJ-4022A Field Data: Velocity Moisture Barometer No.: CET III Barometric Pressure, P_B : 29.17 C_F : 1.008
 Date: 8/3/2005 Run No.: C1A Pitot Tube No.: 3 Ambient Temp., °F: 97 $\Delta H@$: 1.558
 Customer: TPI Petroleum, Inc. InTime of Run, T_R : 60 in. Pitot Tube, C_P : 0.810 Stack Pressure, P_S : -1.04 in. H₂O = 29.09 in. Hg
 Unit: No. 2 SRU Tail Gas Sample Box No.: 2 Initial Pitot Leak: X Initial Leak @: 15.0 in. Hg = 0.000 cfm
 Operator: LKS/NEU Meter Box No.: CM#1 Final Pitot Leak: X Final Leak @: 3.0 in. Hg = 0.000 cfm
 File Name: C1A Stack Area, A_S : 3675.20 ft² Assumed %M: (default only)

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	
A 8	1500	511.050	0.030	0.72	0.72	3.0	1411	NA	NA	68	72	71	
7	1505	513.580	0.070	0.72	0.72	3.0	1428	NA	NA	68	71	71	
6	1510	516.105	0.065	0.72	0.72	3.0	1433	NA	NA	68	71	70	
5	1515	518.550	0.065	0.72	0.72	3.0	1442	NA	NA	67	71	70	
4	1520	521.040	0.060	0.72	0.72	3.0	1439	NA	NA	66	72	70	
3	1525	523.530	0.060	0.72	0.72	3.0	1436	NA	NA	65	72	70	
2	1530	526.070	0.050	0.72	0.72	3.0	1436	NA	NA	68	73	70	
1	1535	528.575	0.040	0.72	0.72	3.0	1415	NA	NA	68	73	70	
B 8	1540	531.110	0.025	0.72	0.72	3.0	1409	NA	NA	68	73	70	
7	1545	533.585	0.050	0.72	0.72	3.0	1430	NA	NA	68	73	70	
6	1550	536.100	0.055	0.72	0.72	3.0	1437	NA	NA	68	74	70	
5	1555	538.620	0.060	0.72	0.72	3.0	1439	NA	NA	68	74	70	
4 END	1600	541.125	0.060				1441						
3			0.055				1442						
2			0.030				1424						
1			0.025				1410						

$C_{ga} = 1.031$ % Δ Must Avg $\Delta P_S = 0.050$ Avg $P_M = 0.720$ Avg $T_S = 1430$ Avg $T_M = 71$
 % $\Delta = 2.3$ Be ≤ 5.0 Avg (ΔP_S) = 0.221 Max Vacuum = 3.0 Volume DGM = 30.075 ft³ x C_F 1.008 = V_M 30.316 ft³

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total
Final Wt, gm	691.7	702.2	511.7	879.0			2784.6
Initial Wt, gm	634.3	693.8	509.8	872.8			2710.7
Difference, gm	57.4	8.4	1.9	6.2			73.9

RM 3 or 3A Data	
%CO ₂	4.070
%O ₂	6.602
%CO	0.000
%N ₂	89.328
% Excess Air	38.673

Avg ΔP	0.050	in. H ₂ O
Avg (ΔP_S)	0.221	
Avg. P_M	0.720	in. H ₂ O
Avg. T_S	1430	*F
Avg. T_S	1890	*R
Avg. T_M	71	*F
Avg. T_M	531	*R

$V_{M \text{ std}} = 17.64 \times V_M \times [(P_B + (P_M / 13.6)) + T_M]$	29.430	DSCF
$Q_{M \text{ std}} = V_{M \text{ std}} \div T_R$	0.491	DSCFM
$V_{W \text{ gas}} = 0.04715 \times V_W$	3.484	SCF
$\%M = V_{W \text{ gas}} \times 100 \div (V_{M \text{ std}} + V_{W \text{ gas}})$	10.586	%
$M_D = (100 - \%M) \div 100$	0.8941	dry fract.
$MW_D = (\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + ((\%N_2 + \%CO) \times 0.28)$	28.915	lb/lbmole
$MW = M_D \times MW_D + 18 (1 - M_D)$	27.760	lb/lbmole
$V_S = 5129.4 \times C_P \times (T_S \div (P_S \times MW))^{1/2} \times \text{Avg}(\Delta P_S)$	1403.5	FPM
$Q_A = (V_S \times A_S) \div 144$	35821	ACFM
$Q_S = (0.1225 \times V_S \times M_D \times P_S \times A_S) \div T_S$	8697	DSCFM
$Q_W = Q_S \div M_D$	9727	WSCFM

QA/QC Check:

Completeness ☒
 Legibility ☒
 Accuracy ☒
 Specifications ☒
 Reasonableness ☒

Checked by:

Operator (Signature/Date) *[Signature]* 08/03/2005
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Project Coordinator (Signature/Date) *[Signature]* 08/03/2005
 FIELDAT.XLS

CJ-4022/NO. 2 SRU/C1A

TEST DATE : 08-03-2005

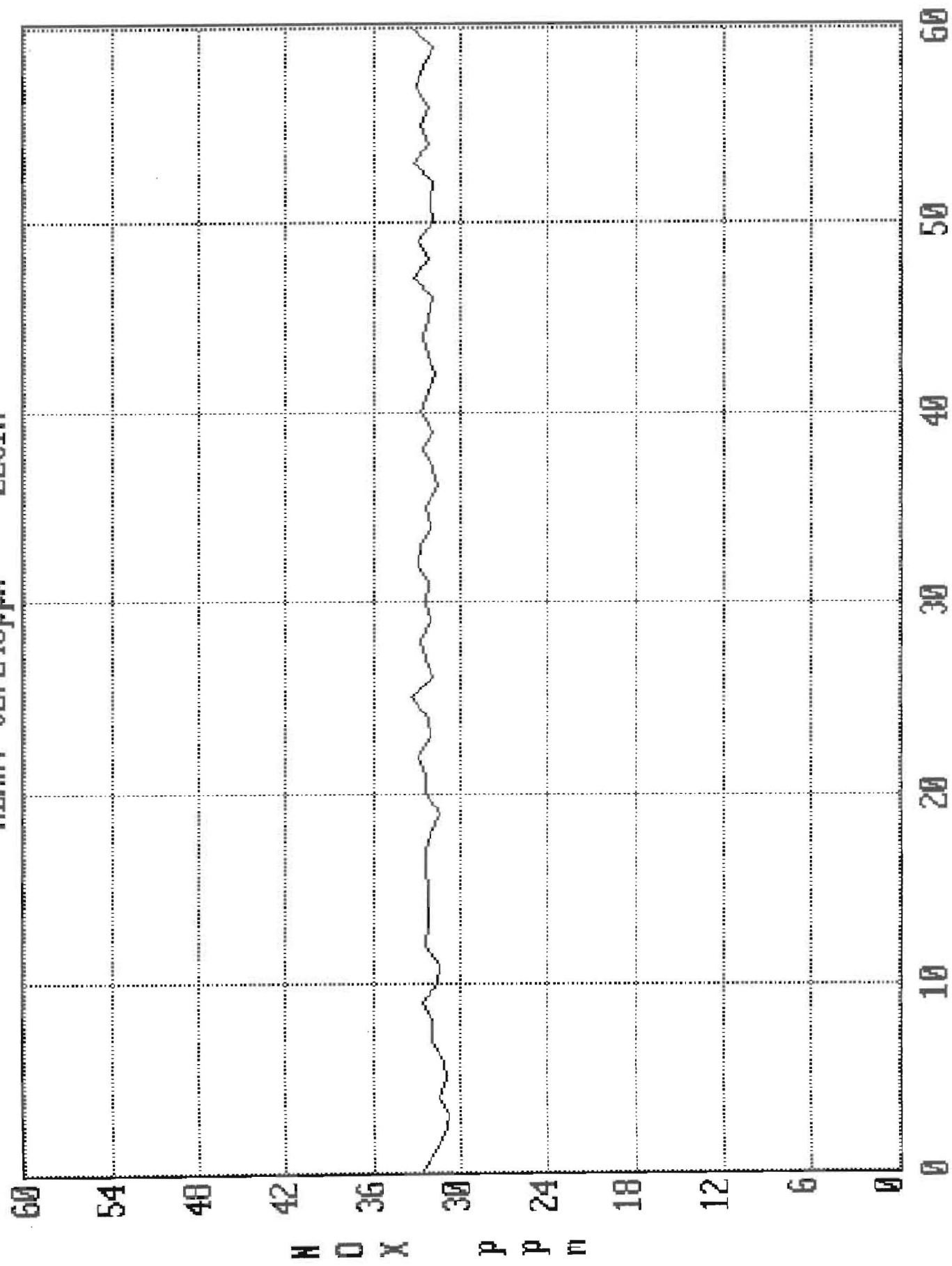
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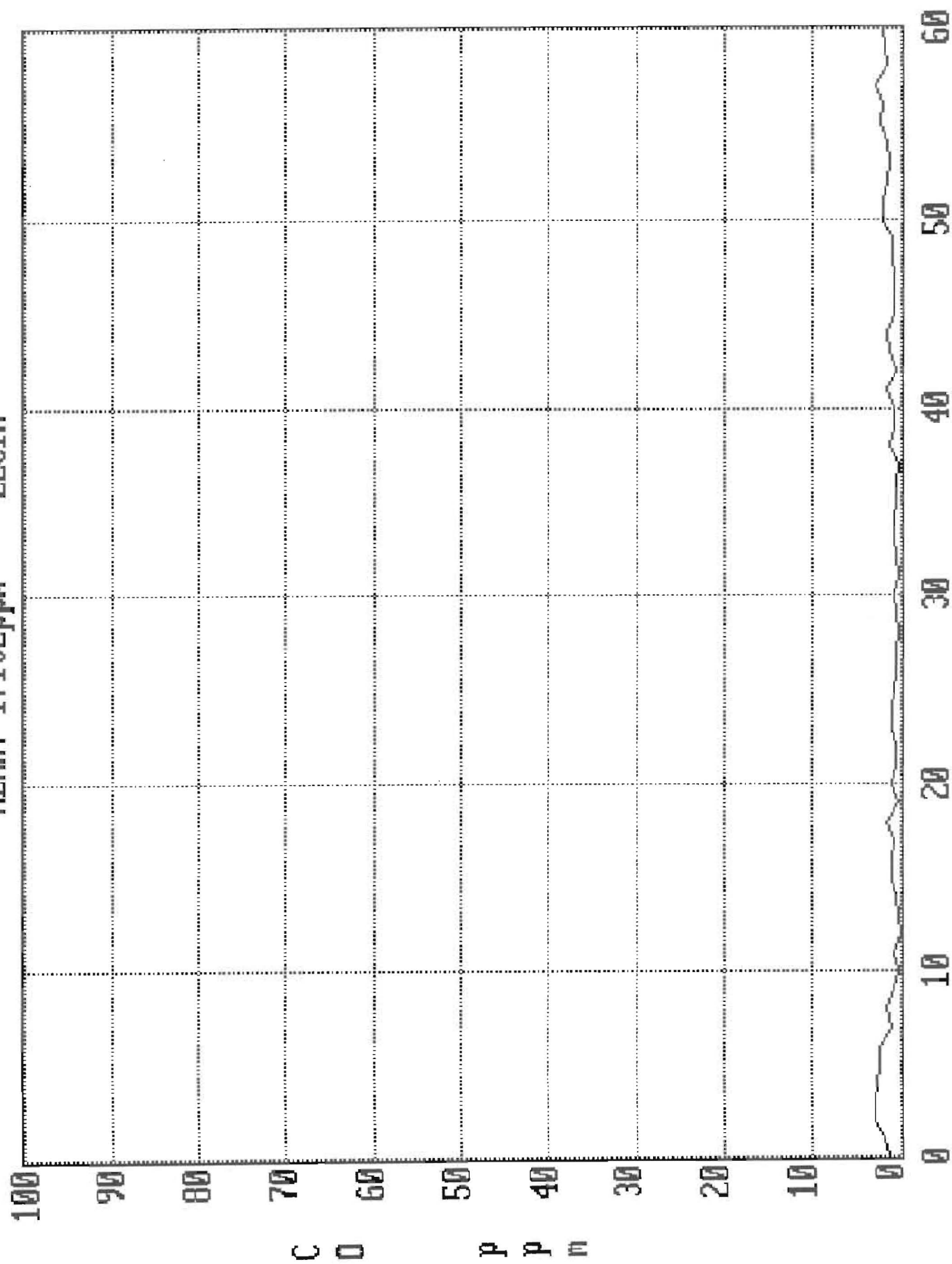
CHANNEL# CH.UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
			<ANALYZER OUTPUT-VDC>					
0	5.361	0.139	2.605	0.701	0.000	1.626	1.211	0.000
1	5.251	0.183	2.635	0.697	0.003	1.597	1.004	0.000
2	5.116	0.300	2.648	0.721	0.002	1.590	0.979	0.022
3	5.076	0.285	2.629	0.731	0.005	1.592	0.963	0.023
4	5.164	0.258	2.627	0.732	0.001	1.583	0.948	0.062
5	5.087	0.237	2.638	0.754	0.003	1.583	0.958	0.005
6	5.115	0.241	2.640	0.748	0.004	1.600	0.970	0.024
7	5.267	0.094	2.613	0.749	0.003	1.597	0.973	0.090
8	5.257	0.156	2.642	0.751	0.000	1.583	0.981	0.044
9	5.369	0.064	2.613	0.760	0.007	1.619	0.996	0.044
10	5.194	0.014	2.621	0.747	0.000	1.615	0.994	0.022
11	5.163	0.072	2.649	0.748	0.001	1.602	0.983	0.042
12	5.335	0.000	2.612	0.738	0.000	1.622	0.974	0.017
13	5.308	0.028	2.645	0.745	0.001	1.606	0.991	0.031
14	5.316	0.060	2.658	0.760	0.001	1.593	0.978	0.066
15	5.302	0.094	2.633	0.741	0.006	1.619	0.980	0.022
16	5.329	0.103	2.645	0.745	0.000	1.628	0.989	0.064
17	5.320	0.082	2.672	0.717	0.002	1.608	0.983	0.020
18	5.291	0.144	2.650	0.712	0.003	1.619	0.994	0.018
19	5.181	0.019	2.638	0.732	0.000	1.593	0.992	0.076
20	5.328	0.088	2.657	0.736	0.006	1.586	0.994	0.000
21	5.337	0.059	2.633	0.697	0.000	1.609	0.976	0.040
22	5.420	0.048	2.622	0.667	0.004	1.622	0.986	0.027
23	5.278	0.099	2.640	0.636	0.002	1.608	0.968	0.006
24	5.319	0.088	2.637	0.623	0.003	1.619	0.970	0.000
25	5.483	0.066	2.620	0.606	0.000	1.614	0.977	0.070
26	5.261	0.039	2.647	0.611	0.004	1.602	0.996	0.043
27	5.344	0.037	2.622	0.602	0.002	1.615	0.992	0.000
28	5.400	0.022	2.607	0.622	0.000	1.637	0.994	0.000
29	5.272	0.046	2.624	0.627	0.002	1.641	1.008	0.080
30	5.344	0.076	2.629	0.645	0.000	1.632	0.999	0.133
31	5.317	0.030	2.652	0.672	0.005	1.609	0.983	0.033
32	5.406	0.044	2.616	0.629	0.001	1.624	0.983	0.047
33	5.393	0.061	2.623	0.664	0.000	1.630	0.983	0.019
34	5.273	0.075	2.633	0.645	0.001	1.627	0.988	0.074
35	5.340	0.054	2.603	0.697	0.000	1.645	1.008	0.014
36	5.212	0.059	2.668	0.679	0.000	1.617	0.996	0.043
37	5.242	0.033	2.633	0.685	0.003	1.622	1.004	0.000
38	5.352	0.123	2.641	0.695	0.000	1.607	1.013	0.047
39	5.241	0.076	2.654	0.682	0.002	1.618	0.994	0.001
40	5.395	0.076	2.616	0.693	0.000	1.632	0.994	0.098
41	5.302	0.151	2.656	0.703	0.002	1.615	0.982	0.043
42	5.239	0.046	2.649	0.690	0.000	1.626	0.991	0.000
43	5.312	0.126	2.632	0.693	0.000	1.622	0.990	0.037
44	5.351	0.146	2.650	0.686	0.000	1.602	0.981	0.000
45	5.301	0.085	2.625	0.711	0.000	1.619	0.999	0.045
46	5.258	0.064	2.640	0.728	0.002	1.624	0.996	0.000
47	5.474	0.086	2.617	0.722	0.000	1.634	1.001	0.009
48	5.308	0.106	2.632	0.730	0.000	1.609	1.007	0.038
49	5.422	0.111	2.661	0.716	0.000	1.618	1.029	0.041
50	5.266	0.208	2.618	0.720	0.000	1.622	0.994	0.000
51	5.290	0.204	2.638	0.745	0.000	1.612	0.980	0.038

52	5.242	0.159	2.661	0.728	0.000	1.592	0.982	0.046
53	5.471	0.134	2.639	0.734	0.002	1.606	0.969	0.015
54	5.313	0.150	2.656	0.732	0.000	1.606	0.972	0.096
55	5.401	0.233	2.607	0.735	0.004	1.629	0.993	0.067
56	5.319	0.215	2.616	0.744	0.000	1.616	0.975	0.032
57	5.437	0.283	2.623	0.744	0.002	1.640	0.999	0.000
58	5.353	0.146	2.628	0.741	0.003	1.629	1.007	0.000
59	5.241	0.174	2.640	0.732	0.000	1.633	1.021	0.063
60	5.492	0.203	2.632	0.745	0.007	1.632	1.022	0.085
MEAN	5.304	0.113	2.635	0.705	0.002	1.614	0.992	0.035
END TIME:	15:59:50							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.418	9.102	0.000	4.568	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.592	3.914	0.000	2.244	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.010	0.000	0.000	0.024	0.000	0.000

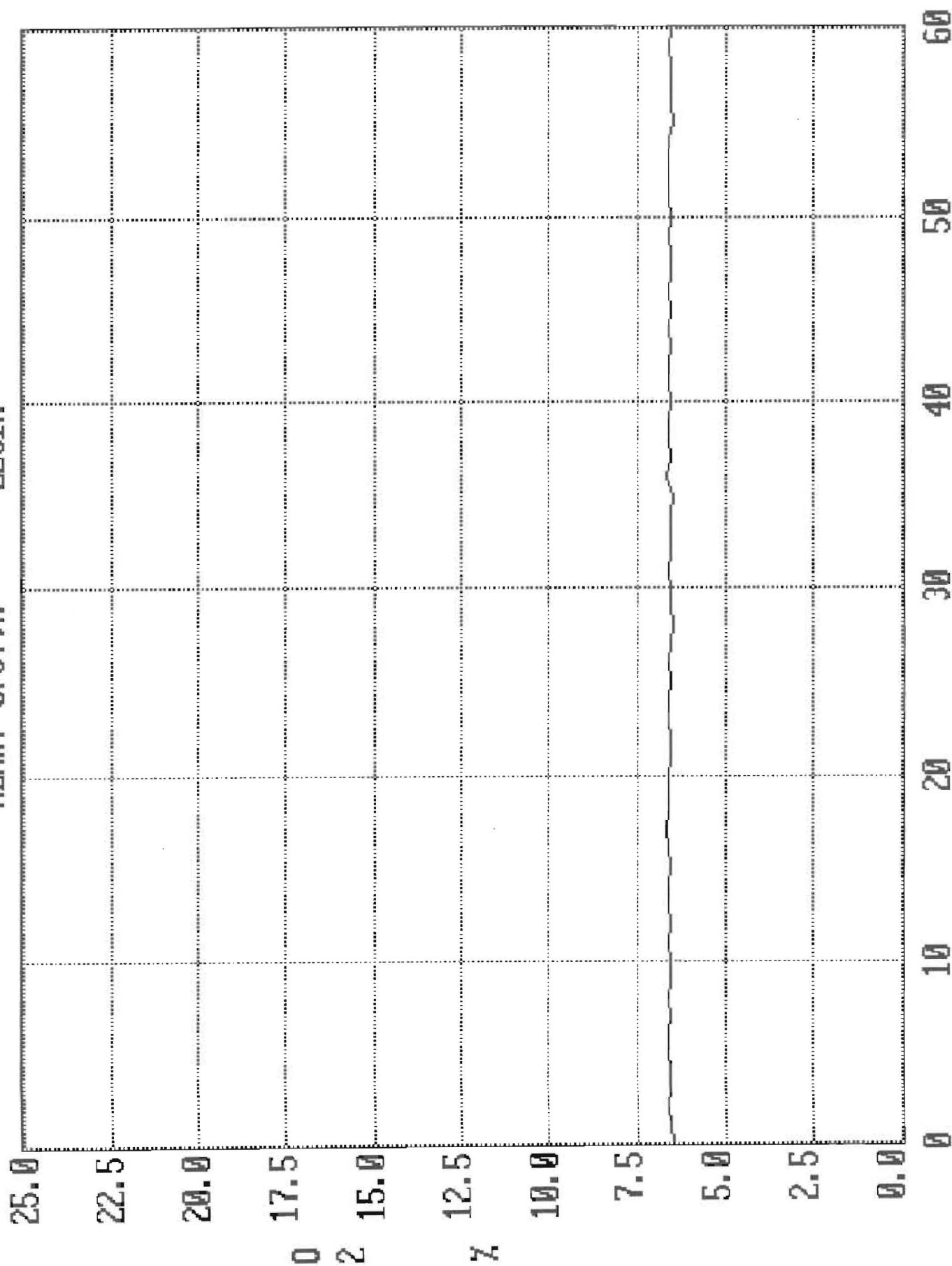
MEAN: 32.248ppm 22C1A



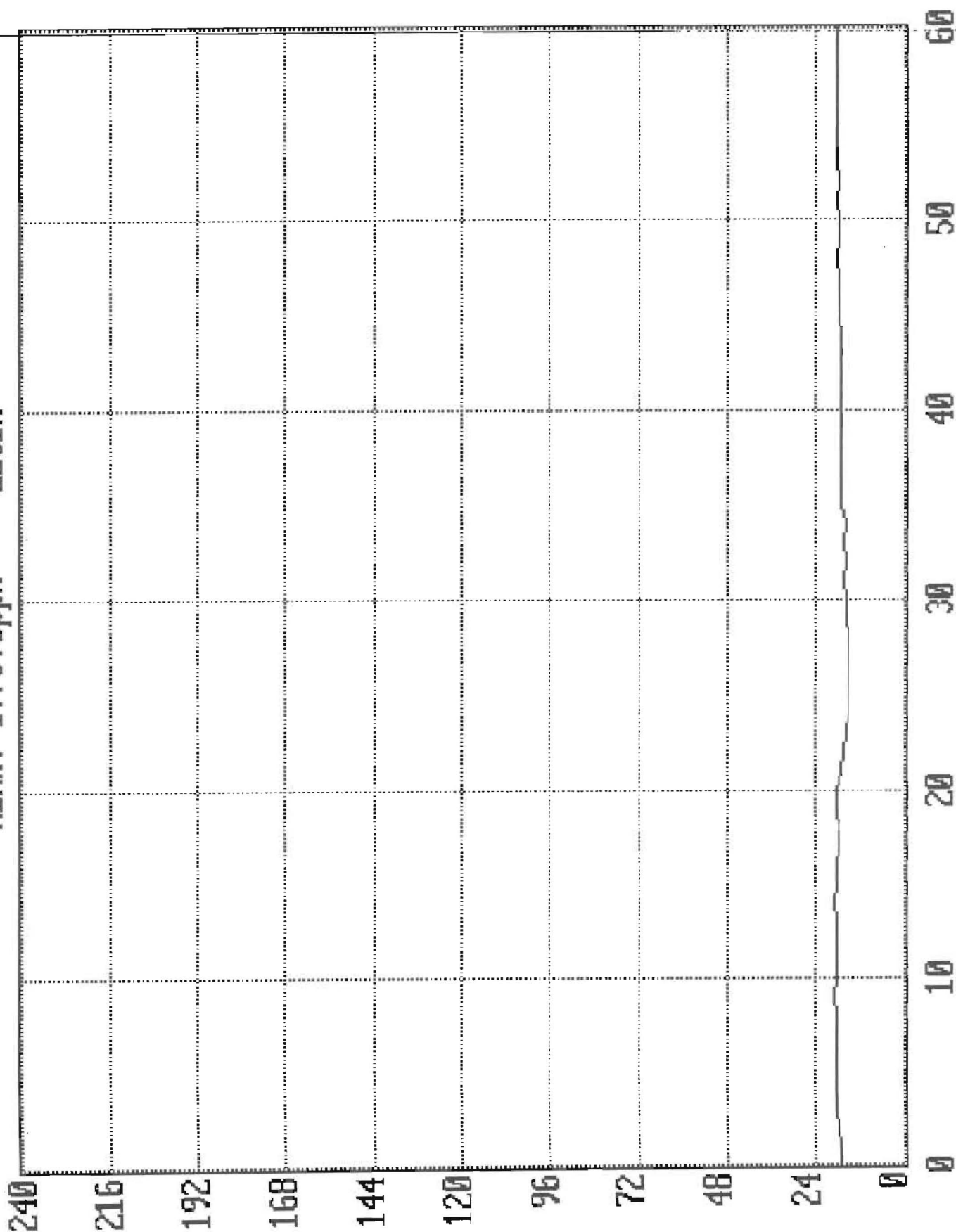
MEAN: 1.132ppm 22C1A



MEAN: 6.579% 22C1A

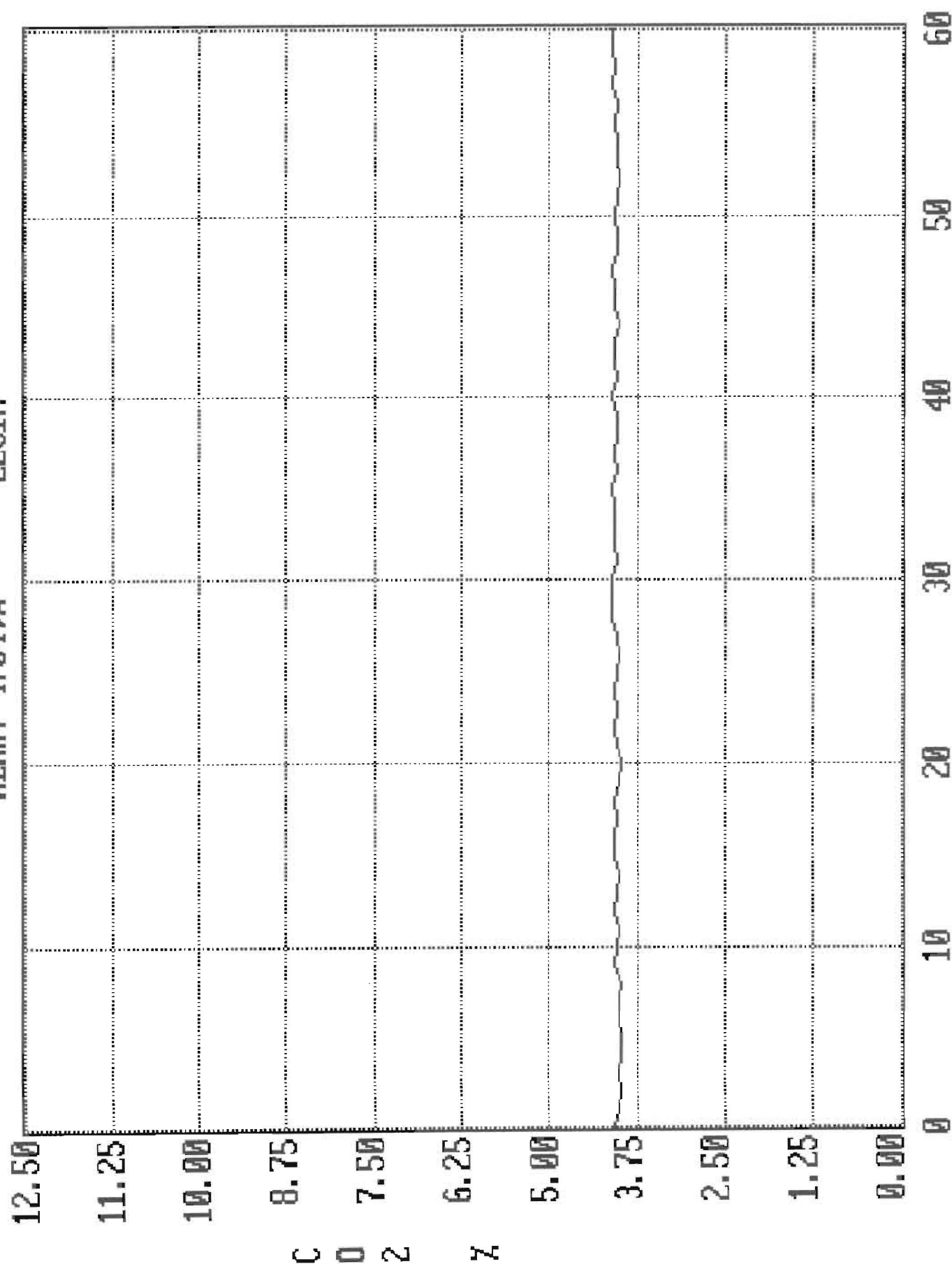


MEAN: 17.576ppm 22C1A



+

MEAN: 4.049% 22C1A



CETCON, Inc.

Job No.: CJ-4022A Field Data: Velocity Moisture Barometer No.: CET III Barometric Pressure, P_B : 29.14 C_F : 1.008
 Date: 8/3/2005 Run No.: C1B Pitot Tube No.: 3 Ambient Temp., °F: 102 $\Delta H @$: 1.558
 Customer: TPI Petroleum, Inc. Time of Run, T_R : 60 in. Pitot Tube, C_P : 0.810 Stack Pressure, P_S : -1.09 in. H₂O = 29.06 in. Hg
 Unit: No. 2 SRU Tail Gas Sample Box No.: 1 Initial Pitot Leak: X Initial Leak @: 15.0 in. Hg = 0.000 cfm
 Operator: LKS/NEU Meter Box No.: CM#1 Final Pitot Leak: X Final Leak @: 2.0 in. Hg = 0.000 cfm
 File Name: C1B Stack Area, A_S : 3675.20 in.² Assumed %M: (default only)

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	
A 8	1620	541.560	0.025	0.72	0.72	2.0	1408	NA	NA	68	72	71	
7	1625	544.115	0.050	0.72	0.72	2.0	1430	NA	NA	68	72	71	
6	1630	546.650	0.055	0.72	0.72	2.0	1432	NA	NA	63	73	71	
5	1635	549.160	0.055	0.72	0.72	2.0	1443	NA	NA	62	73	71	
4	1640	551.650	0.050	0.72	0.72	2.0	1441	NA	NA	63	74	71	
3	1645	554.175	0.060	0.72	0.72	2.0	1438	NA	NA	62	74	71	
2	1650	556.660	0.035	0.72	0.72	2.0	1432	NA	NA	64	74	71	
1	1655	559.215	0.025	0.72	0.72	2.0	1407	NA	NA	68	75	71	
B 8	1700	561.730	0.015	0.72	0.72	2.0	1415	NA	NA	68	75	71	
7	1705	564.245	0.050	0.72	0.72	2.0	1440	NA	NA	68	75	71	
6	1710	566.740	0.060	0.72	0.72	2.0	1440	NA	NA	68	75	71	
5	1715	569.230	0.060	0.72	0.72	2.0	1440	NA	NA	68	75	71	
4 END	1720	571.740	0.060				1443						
3			0.055				1442						
2			0.050				1434						
1			0.020				1410						

$C_{qa} = 1.029$ % Δ Must Avg $\Delta P_S = 0.045$ Avg $P_M = 0.720$ Avg $T_S = 1431$ Avg $T_M = 72$
 % $\Delta = 2.1$ Be ≤ 5.0 Avg $(\Delta P_S)^{1/2} = 0.209$ Max Vacuum = 2.0 Volume DGM = 30.180 ft³ x $C_F = 1.008$ = $V_M = 30.421$ ft³

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total
Final Wt, gm	673.4	611.2	614.3	916.1			2815.0
Initial Wt, gm	616.3	600.3	612.3	911.4			2740.3
Difference, gm	57.1	10.9	2.0	4.7			74.7

QA/QC Check:

Completeness ☒
 Legibility ☒
 Accuracy ☒
 Specifications ☒
 Reasonableness ☒

RM 3 or 3A Data	
%CO ₂	4.020
%O ₂	6.701
%CO	0.000
%N ₂	89.279
% Excess Air	39.519

Avg ΔP	0.045	in. H ₂ O
Avg $(\Delta P_S)^{1/2}$	0.209	
Avg. P_M	0.720	in. H ₂ O
Avg. T_S	1431	°F
Avg. T_S	1891	°R
Avg. T_M	72	°F
Avg. T_M	532	°R

$V_{M std} = 17.64 \times V_M \times [(P_B + (P_M / 13.6)) \div T_M]$	29.447	DSCF
$Q_{M std} = V_{M std} \div T_R$	0.491	DSCFM
$V_{W gas} = 0.04715 \times V_W$	3.522	SCF
$\%M = V_{W gas} \times 100 \div (V_{M std} + V_{W gas})$	10.683	%
$M_D = (100 - \%M) \div 100$	0.8932	dry fract.
$MW_D = (\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + ((\%N_2 + \%CO) \times 0.28)$	28.911	lb/lbmole
$MW = M_D \times MW_D + 18 (1 - M_D)$	27.746	lb/lbmole
$V_S = 5129.4 \times C_P \times (T_S \div (P_S \times MW))^{1/2} \times \text{Avg}(\Delta P_S)$	1330.2	FPM
$Q_A = (V_S \times A_S) \div 144$	33951	ACFM
$Q_S = (0.1225 \times V_S \times M_D \times P_S \times A_S) \div T_S$	8220	DSCFM
$Q_W = Q_S \div M_D$	9203	WSCFM

Checked by:

Operator (Signature/Date)
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Project Coordinator (Signature/Date)
 FIELDAT.XLS

TEST DATE : 08-03-2005

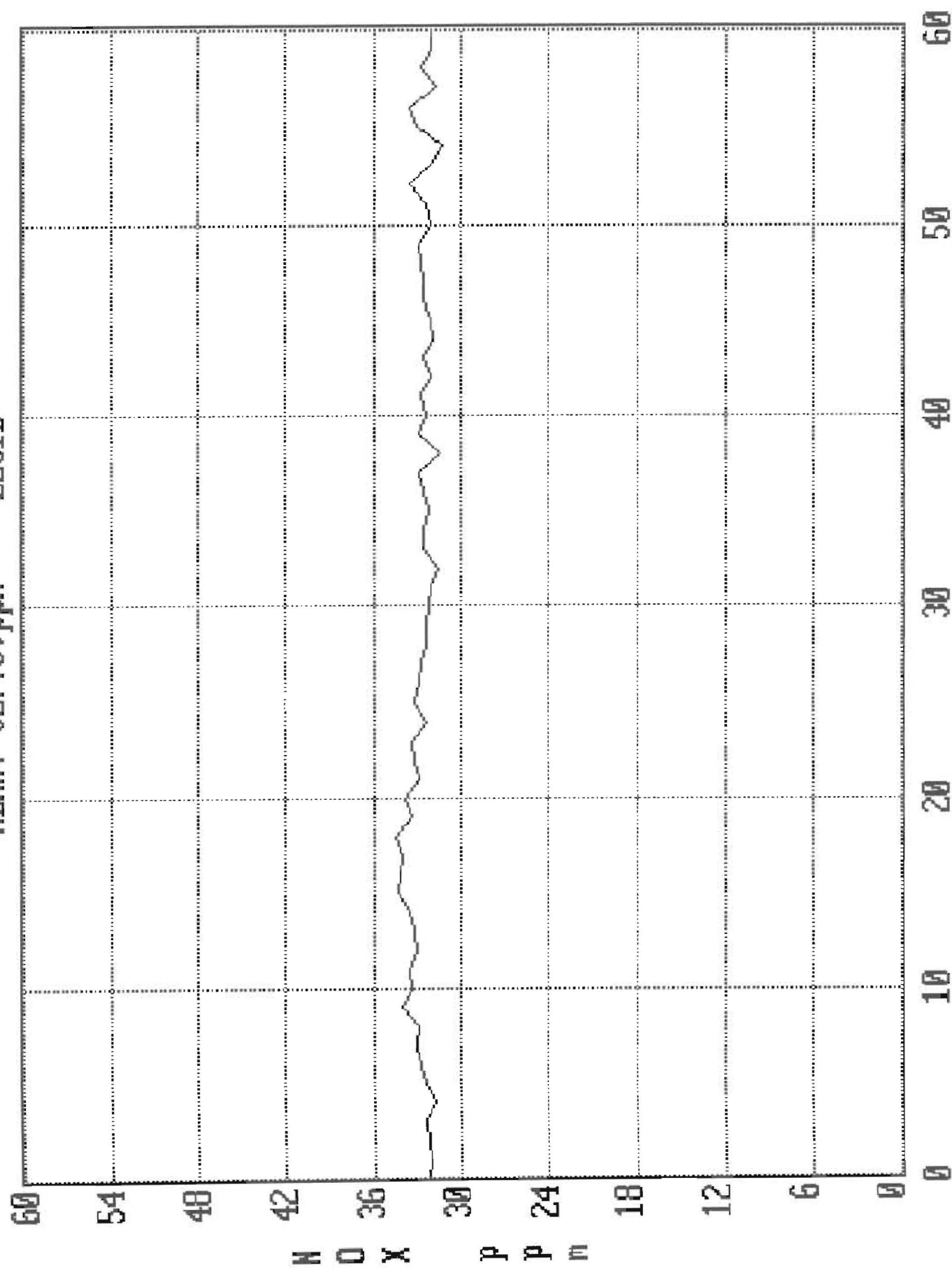
START TIME: 16:19:54

FILE NAME : C:\DAQ\22C1B .ID%

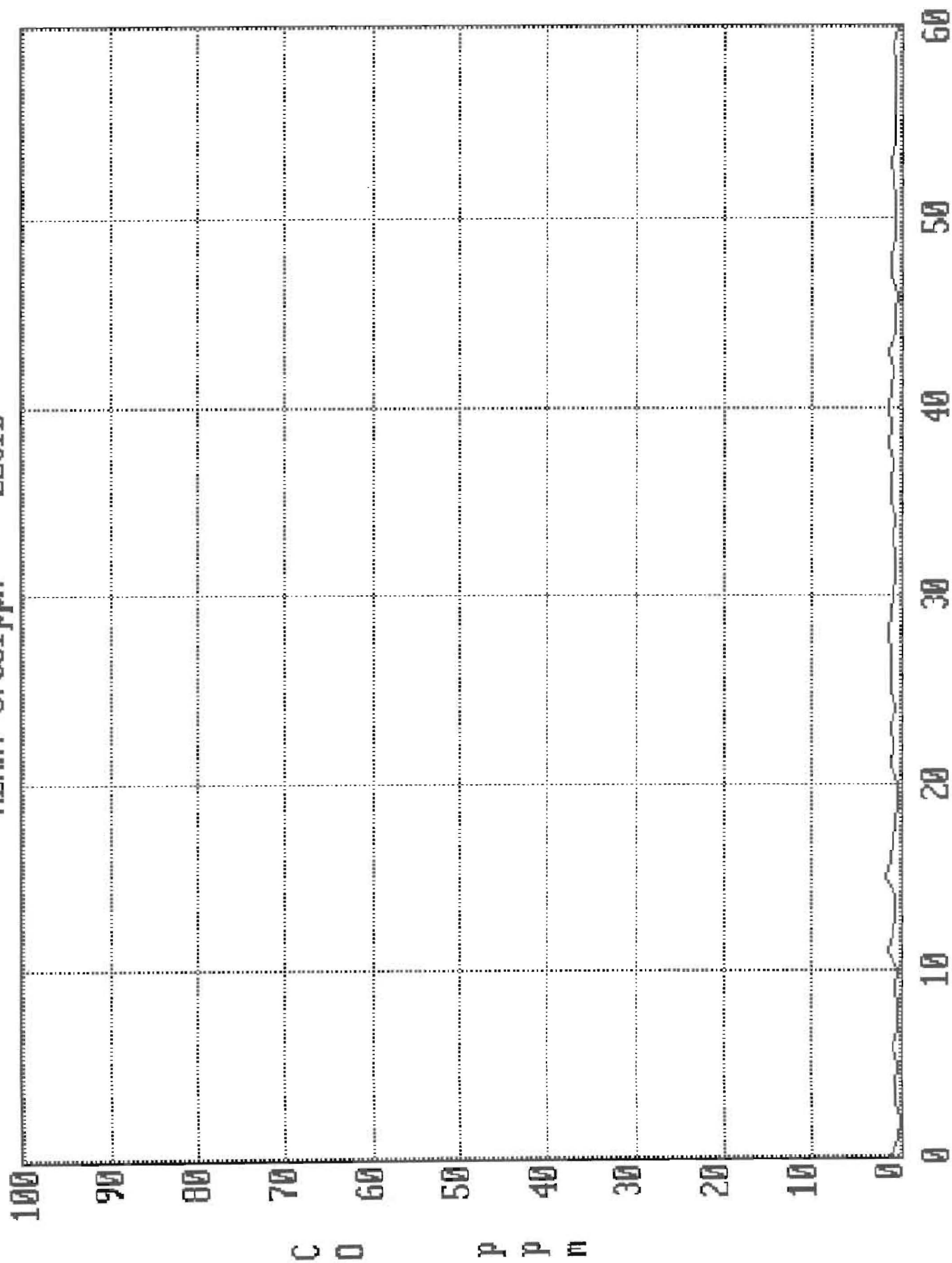
CHANNEL# CH. UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
			<ANALYZER	OUTPUT-VDC>				
0	5.317	0.093	2.622	0.759	0.000	1.619	1.189	0.000
1	5.280	0.015	2.663	0.738	0.003	1.611	1.001	0.069
2	5.319	0.000	2.649	0.711	0.002	1.599	0.967	0.000
3	5.337	0.050	2.629	0.714	0.006	1.608	0.970	0.000
4	5.224	0.037	2.672	0.710	0.007	1.597	0.975	0.039
5	5.343	0.016	2.695	0.701	0.005	1.572	0.954	0.018
6	5.393	0.068	2.654	0.695	0.000	1.587	0.950	0.000
7	5.444	0.031	2.661	0.700	0.000	1.616	0.977	0.134
8	5.405	0.030	2.656	0.672	0.000	1.619	0.986	0.057
9	5.592	0.048	2.600	0.684	0.002	1.667	1.020	0.024
10	5.491	0.033	2.627	0.698	0.000	1.631	1.017	0.028
11	5.528	0.121	2.652	0.743	0.000	1.645	1.006	0.036
12	5.453	0.079	2.625	0.736	0.002	1.646	1.004	0.037
13	5.478	0.059	2.637	0.723	0.000	1.648	0.994	0.000
14	5.513	0.057	2.653	0.697	0.004	1.634	0.997	0.038
15	5.662	0.146	2.638	0.642	0.001	1.641	0.987	0.034
16	5.615	0.091	2.695	0.659	0.000	1.600	0.973	0.037
17	5.606	0.070	2.681	0.658	0.002	1.597	0.976	0.000
18	5.667	0.060	2.659	0.671	0.003	1.621	1.001	0.034
19	5.495	0.029	2.660	0.672	0.000	1.628	1.001	0.037
20	5.584	0.024	2.654	0.671	0.000	1.627	1.000	0.026
21	5.409	0.094	2.677	0.670	0.002	1.614	0.989	0.032
22	5.461	0.076	2.650	0.672	0.003	1.614	1.007	0.014
23	5.496	0.111	2.693	0.675	0.000	1.600	0.994	0.037
24	5.344	0.060	2.696	0.668	0.001	1.591	0.971	0.001
25	5.474	0.101	2.665	0.664	0.002	1.593	0.976	0.077
26	5.412	0.091	2.682	0.669	0.002	1.584	0.972	0.000
27	5.396	0.098	2.667	0.688	0.003	1.594	0.977	0.032
28	5.343	0.137	2.692	0.686	0.000	1.581	0.962	0.086
29	5.339	0.102	2.646	0.688	0.002	1.615	1.000	0.000
30	5.313	0.072	2.649	0.692	0.000	1.618	1.001	0.040
31	5.282	0.050	2.659	0.684	0.002	1.631	0.998	0.045
32	5.211	0.047	2.671	0.703	0.002	1.624	0.996	0.064
33	5.360	0.071	2.666	0.696	0.006	1.610	0.977	0.042
34	5.350	0.051	2.640	0.696	0.002	1.630	0.983	0.020
35	5.302	0.109	2.664	0.701	0.003	1.608	0.967	0.012
36	5.365	0.113	2.677	0.701	0.000	1.609	0.980	0.058
37	5.408	0.072	2.669	0.704	0.004	1.617	0.998	0.027
38	5.184	0.129	2.692	0.704	0.002	1.598	0.979	0.048
39	5.402	0.091	2.660	0.698	0.002	1.602	0.991	0.050
40	5.332	0.116	2.669	0.710	0.002	1.602	0.999	0.051
41	5.381	0.113	2.669	0.705	0.003	1.611	0.982	0.048
42	5.288	0.085	2.681	0.706	0.000	1.618	0.995	0.000
43	5.369	0.133	2.672	0.732	0.003	1.632	0.985	0.000
44	5.256	0.037	2.658	0.726	0.001	1.630	0.983	0.028
45	5.274	0.055	2.689	0.736	0.002	1.613	0.974	0.000
46	5.356	0.031	2.659	0.727	0.001	1.624	0.986	0.023
47	5.359	0.090	2.673	0.741	0.002	1.614	0.993	0.000
48	5.401	0.097	2.691	0.728	0.002	1.600	0.986	0.000
49	5.404	0.037	2.665	0.743	0.005	1.615	1.006	0.085
50	5.272	0.037	2.724	0.734	0.000	1.583	0.973	0.080
51	5.343	0.038	2.690	0.728	0.004	1.588	0.990	0.037

52	5.527	0.063	2.664	0.750	0.000	1.611	1.007	0.015
53	5.274	0.089	2.691	0.758	0.005	1.602	0.972	0.046
54	5.155	0.037	2.679	0.744	0.000	1.606	0.984	0.121
55	5.436	0.048	2.667	0.757	0.000	1.619	0.980	0.084
56	5.508	0.040	2.664	0.752	0.000	1.628	0.990	0.045
57	5.229	0.038	2.676	0.767	0.000	1.612	0.997	0.026
58	5.396	0.051	2.673	0.759	0.007	1.620	1.005	0.017
59	5.273	0.073	2.676	0.784	0.006	1.616	1.000	0.042
60	5.271	0.013	2.696	0.767	0.002	1.604	0.992	0.026
MEAN	5.388	0.068	2.666	0.709	0.002	1.613	0.991	0.035
END TIME: 17:19:43								
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.418	9.102	0.000	4.568	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.592	3.914	0.000	2.244	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.010	0.000	0.000	0.024	0.000	0.000

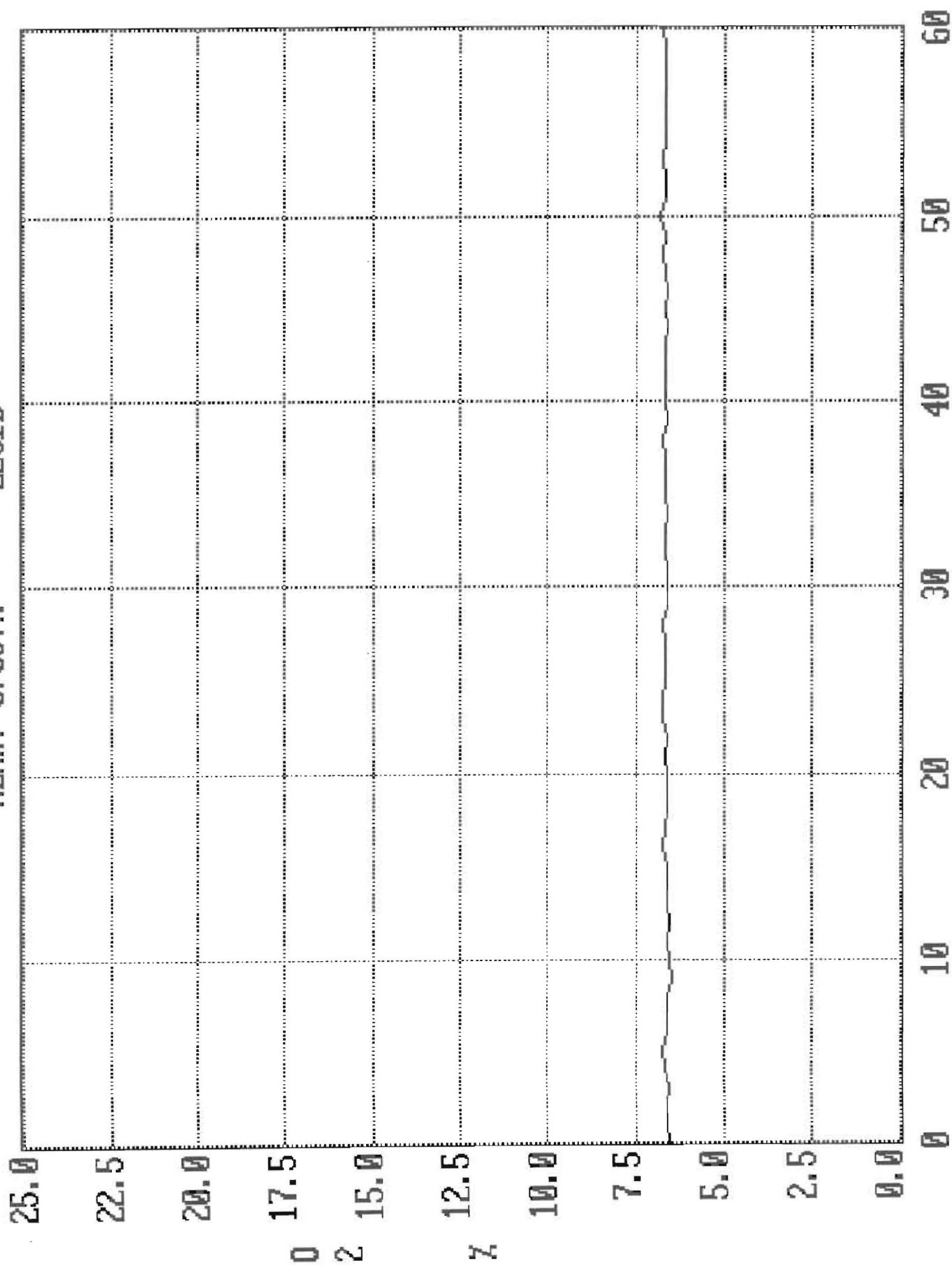
MEAN: 32.759ppm 22C1B



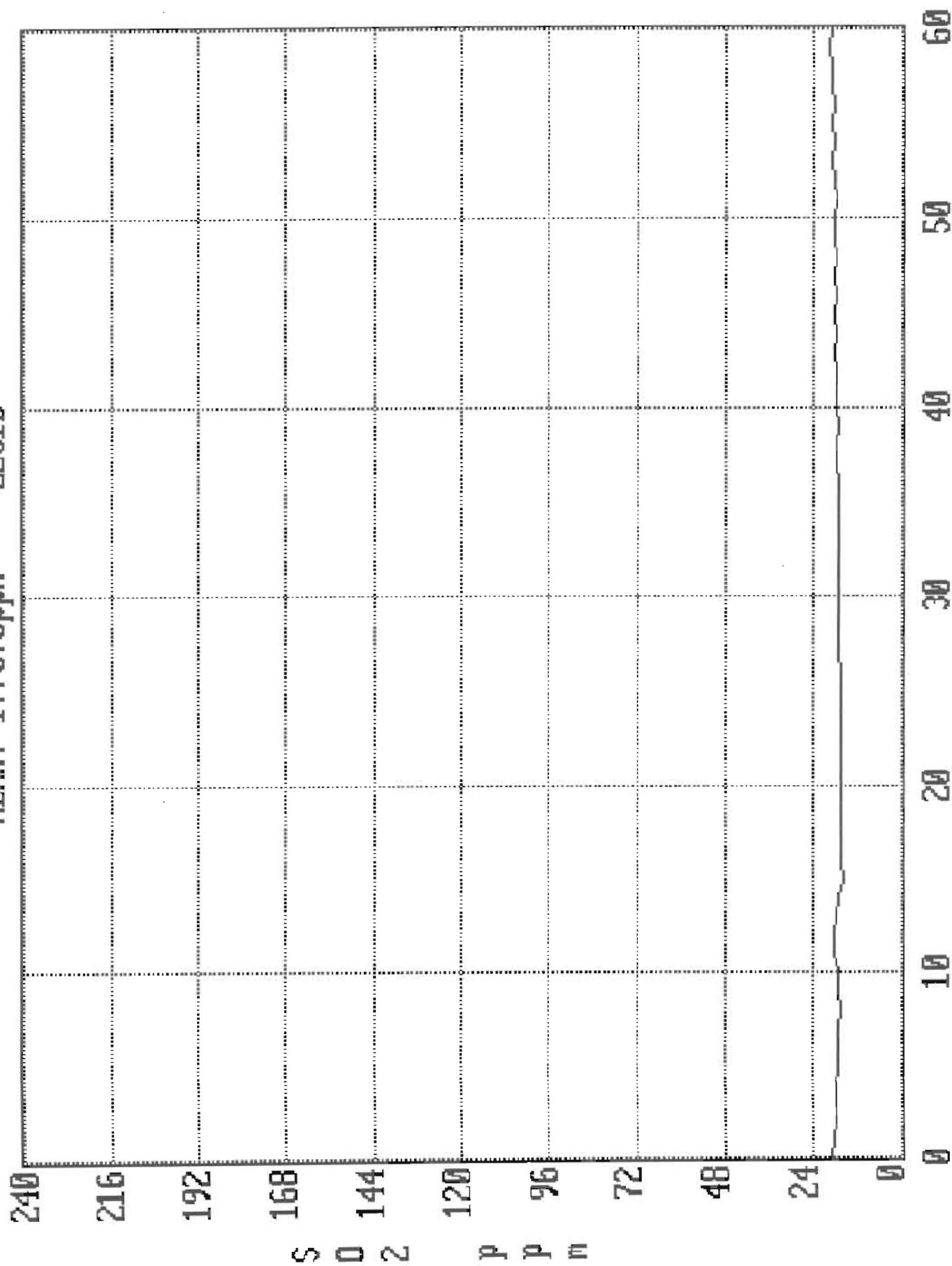
MEAN: 0.681 ppm 22C1B



MEAN: 6.657Z 22C1B

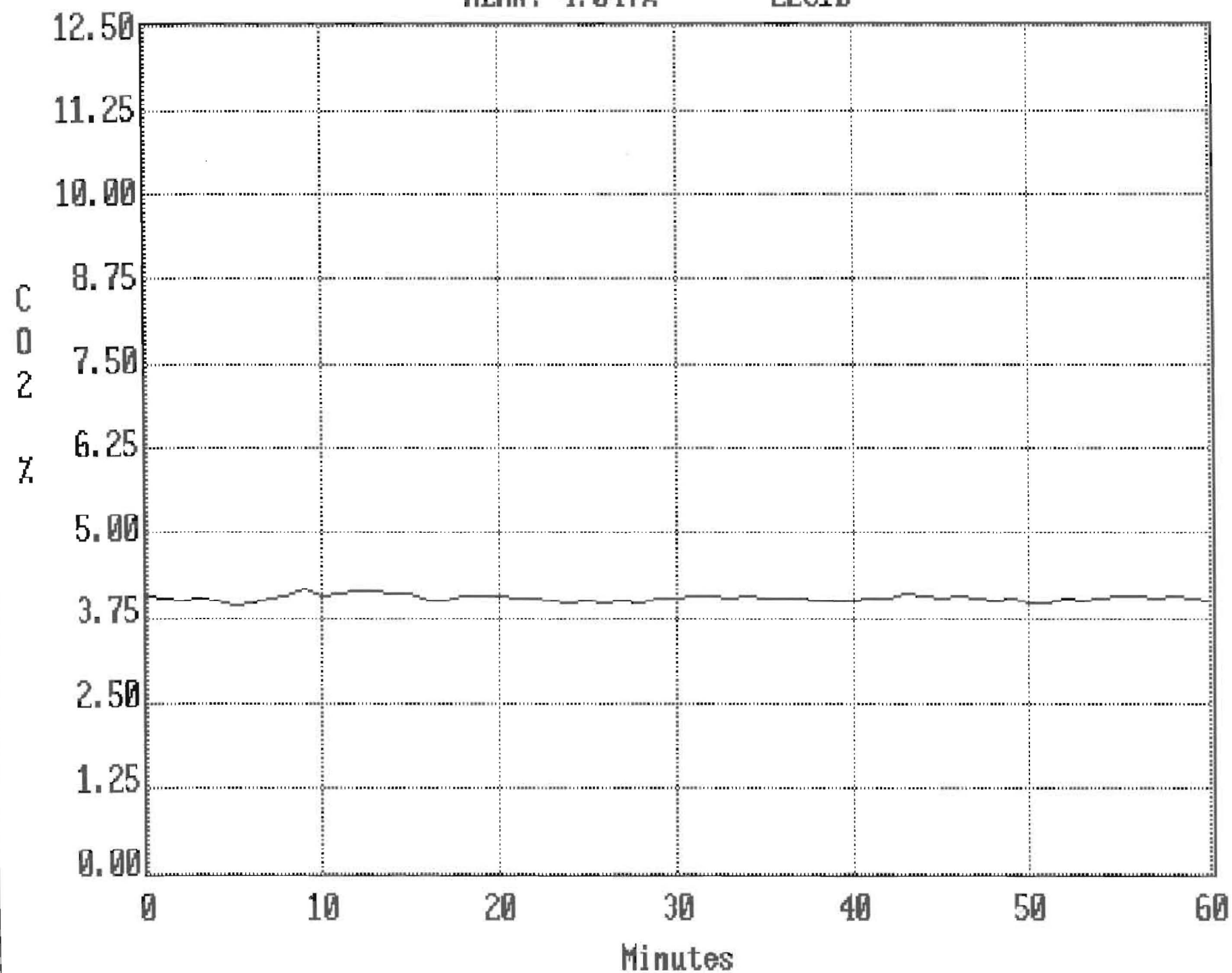


MEAN: 17.676ppm 22C1B



MEAN: 4.047%

22C1B



CETCON, Inc.

Job No.: CJ-4022A Field Data: Velocity Moisture Barometer No.: CET III Barometric Pressure, P_B : 29.12 C_F : 1.008
 Date: 8/3/2005 Run No.: C1C Pitot Tube No.: 3 Ambient Temp., °F: 100 $\Delta H@$: 1.558
 Customer: TPI Petroleum, Inc. Time of Run, T_R : 60 in. Pitot Tube, C_P : 0.810 Stack Pressure, P_S : -1.04 in. H₂O = 29.04 in. Hg
 Unit: No. 2 SRU Tail Gas Sample Box No.: 2 Initial Pitot Leak $\sqrt{}$: X Initial Leak @: 15.0 in. Hg = 0.000 cfm
 Operator: LKS/NEU Meter Box No.: CM#1 Final Pitot Leak $\sqrt{}$: X Final Leak @: 3.0 in. Hg = 0.000 cfm
 File Name: C1C Stack Area, A_S : 3675.20 ft² Assumed %M: (default only)

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	
A 8	1740	572.179	0.020	0.72	0.72	3.0	1410	NA	NA	68	73	72	
7	1745	574.725	0.045	0.72	0.72	3.0	1432	NA	NA	68	73	72	
6	1750	577.270	0.055	0.72	0.72	3.0	1440	NA	NA	66	74	72	
5	1755	579.745	0.055	0.72	0.72	3.0	1434	NA	NA	66	74	72	
4	1800	582.250	0.055	0.72	0.72	3.0	1440	NA	NA	67	74	71	
3	1805	584.725	0.050	0.72	0.72	3.0	1435	NA	NA	68	74	71	
2	1810	587.195	0.040	0.72	0.72	3.0	1428	NA	NA	68	75	71	
1	1815	589.715	0.030	0.72	0.72	3.0	1405	NA	NA	68	75	71	
B 8	1820	592.260	0.020	0.72	0.72	3.0	1414	NA	NA	64	75	71	
7	1825	594.805	0.050	0.72	0.72	3.0	1433	NA	NA	66	75	71	
6	1830	597.335	0.060	0.72	0.72	3.0	1434	NA	NA	67	76	72	
5	1835	599.870	0.050	0.72	0.72	3.0	1433	NA	NA	68	75	72	
4 END	1840	602.404	0.055				1428						
3			0.045				1428						
2			0.035				1418						
1													

$C_{qa} = 1.029$ % Δ Must Avg ΔP_S 0.044 Avg P_M 0.720 Avg T_S 1427 Avg T_M 73
 % $\Delta = 2.1$ Be ≤ 5.0 Avg $(\Delta P_S)^{1/2}$ 0.208 Max Vacuum 3.0 Volume DGM 30.225 ft³ x C_L 1.008 = V_M 30.467 ft³

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total
Final Wt, gm	749.8	710.6	513.1	884.4			2857.9
Initial Wt, gm	691.7	702.2	511.7	879.0			2784.6
Difference, gm	58.1	8.4	1.4	5.4			73.3

QA/QC Check:

Completeness ☒
 Legibility ☒
 Accuracy ☒
 Specifications ☒
 Reasonableness ☒

RM 3 or 3A Data	
%CO ₂	3.996
%O ₂	6.784
%CO	0.000
%N ₂	89.220
% Excess Air	40.239

Avg ΔP	0.044	in. H ₂ O
Avg $(\Delta P_S)^{1/2}$	0.208	
Avg. P_M	0.720	in. H ₂ O
Avg. T_S	1427	°F
Avg. T_S	1887	°R
Avg. T_M	73	°F
Avg. T_M	533	°R

$V_{M std} = 17.64 \times V_M \times [(P_B + (P_M / 13.6)) \div T_M]$	29.416	DSCF
$Q_{M std} = V_{M std} \div T_R$	0.490	DSCFM
$V_{W gas} = 0.04715 \times V_W$	3.456	SCF
$\%M = V_{W gas} \times 100 \div (V_{M std} + V_{W gas})$	10.514	%
$M_D = (100 - \%M) \div 100$	0.8949	dry fract.
$MW_D = (\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + ((\%N_2 + \%CO) \times 0.28)$	28.911	lb/lbmole
$MW = M_D \times MW_D + 18 (1 - M_D)$	27.764	lb/lbmole
$V_S = 5129.4 \times C_P \times (T_S \div (P_S \times MW))^{1/2} \times \text{Avg}(\Delta P_S)$	1322.6	FPM
$Q_A = (V_S \times A_S) \div 144$	33755	ACFM
$Q_S = (0.1225 \times V_S \times M_D \times P_S \times A_S) \div T_S$	8201	DSCFM
$Q_W = Q_S \div M_D$	9164	WSCFM

Checked by:

CJ-4022/NO. 2 SRU/C1C

TEST DATE : 08-03-2005

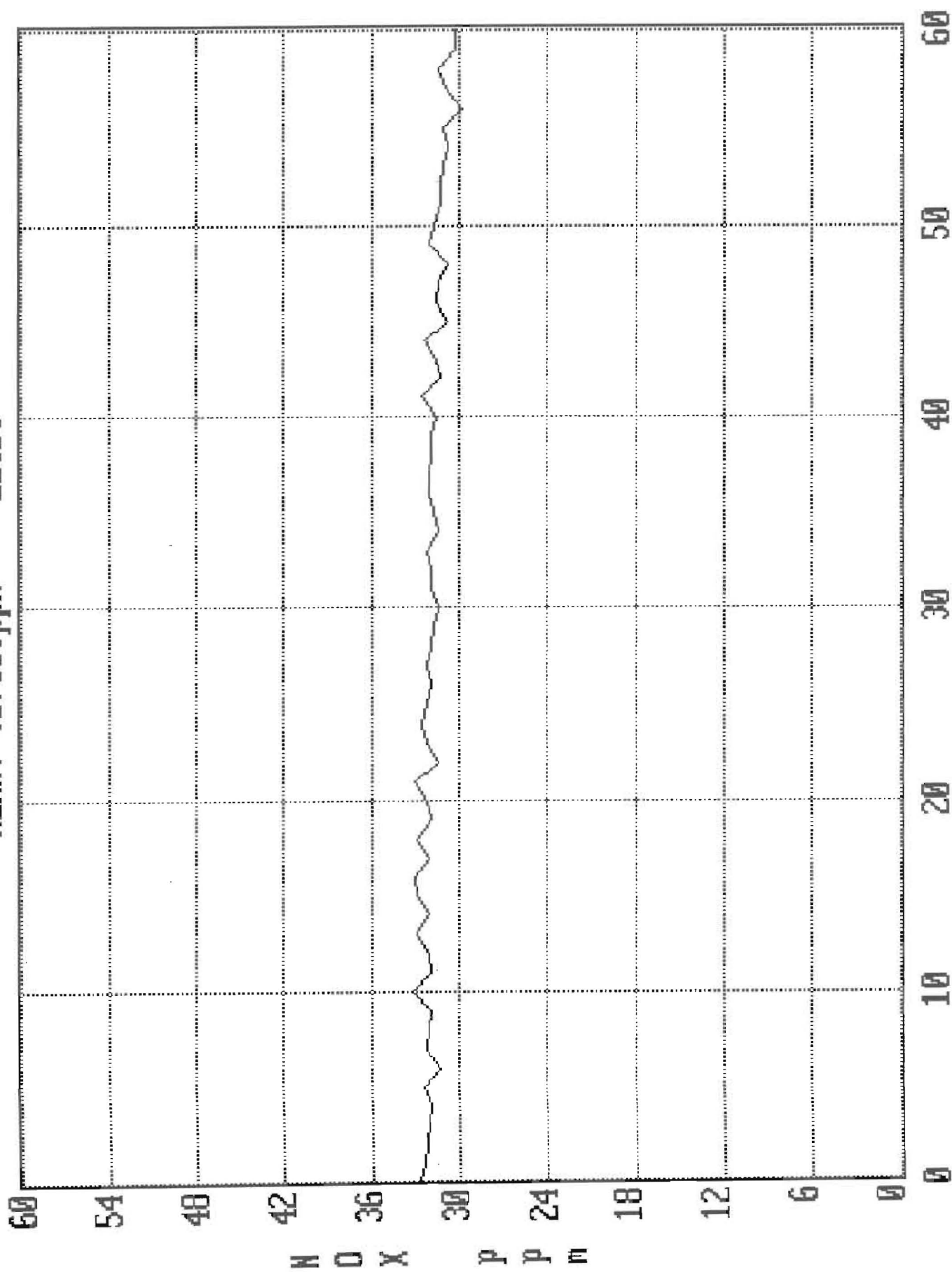
START TIME: 17:39:54

FILE NAME : C:\DAQ\22C1C .ID%

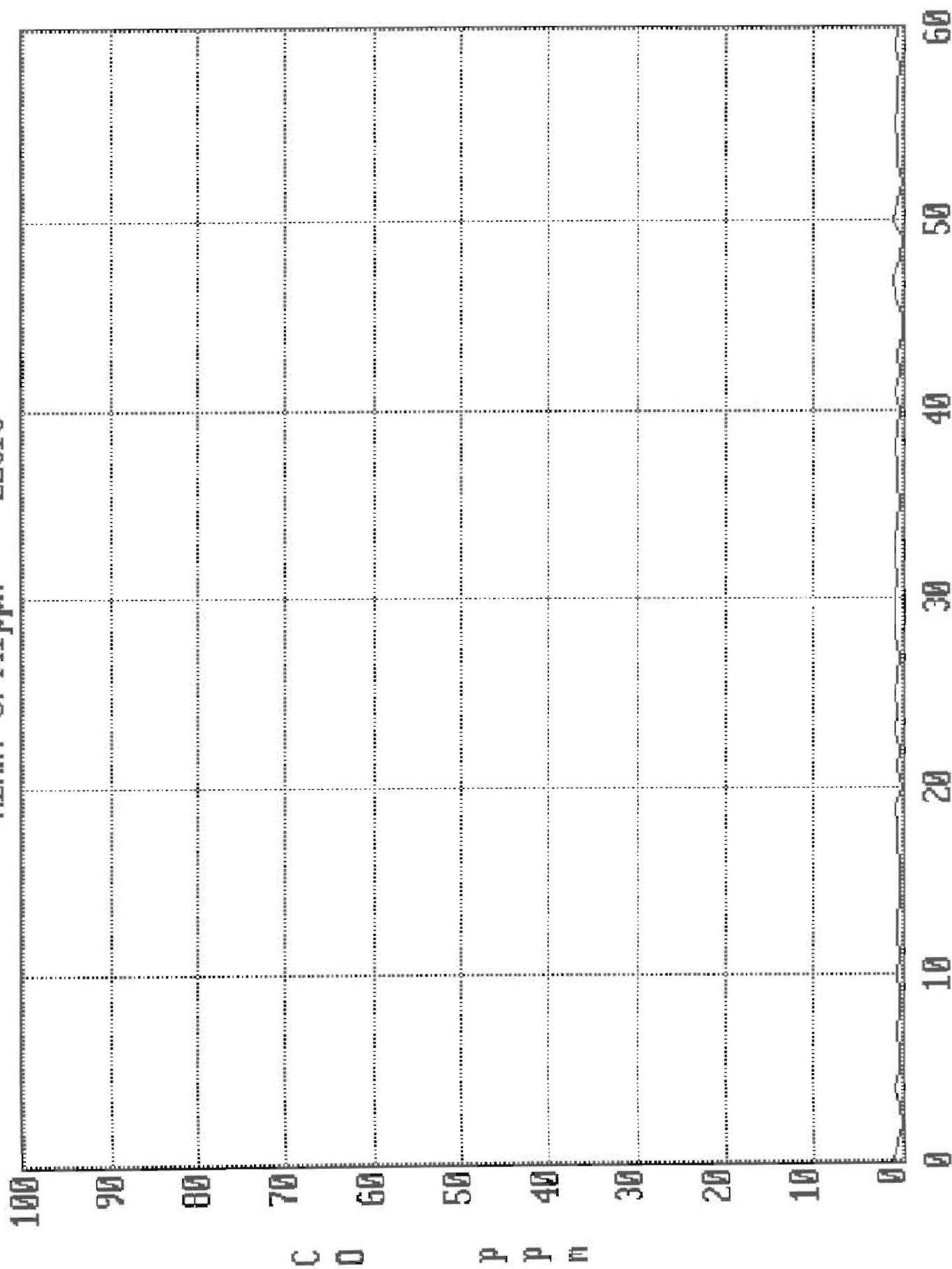
CHANNEL#	NOX	CO	O2	SO2	OFF	CO2	OFF	OFF
CH. UNITS	ppm	ppm	%	ppm	off	%	off	off
<MIN>			<ANALYZER OUTPUT-VDC>					
0	5.388	0.107	2.634	0.823	0.007	1.609	1.208	0.000
1	5.335	0.046	2.682	0.821	0.003	1.610	1.005	0.000
2	5.316	0.005	2.700	0.812	0.000	1.589	0.971	0.056
3	5.284	0.018	2.691	0.798	0.000	1.580	0.975	0.025
4	5.260	0.062	2.681	0.790	0.004	1.605	0.990	0.040
5	5.332	0.025	2.694	0.800	0.001	1.604	0.987	0.022
6	5.161	0.011	2.660	0.812	0.003	1.633	0.997	0.045
7	5.309	0.059	2.683	0.811	0.001	1.624	0.997	0.037
8	5.289	0.033	2.647	0.785	0.007	1.639	1.001	0.000
9	5.257	0.016	2.679	0.791	0.009	1.615	0.980	0.007
10	5.462	0.056	2.680	0.759	0.000	1.609	0.970	0.056
11	5.257	0.033	2.693	0.756	0.004	1.596	0.986	0.033
12	5.282	0.050	2.673	0.794	0.000	1.603	0.975	0.078
13	5.408	0.045	2.682	0.800	0.003	1.602	0.986	0.004
14	5.287	0.019	2.717	0.807	0.005	1.571	0.971	0.001
15	5.413	0.027	2.688	0.787	0.000	1.587	0.983	0.014
16	5.447	0.022	2.668	0.771	0.007	1.615	0.997	0.103
17	5.282	0.039	2.703	0.780	0.000	1.597	0.994	0.000
18	5.405	0.055	2.663	0.781	0.003	1.638	0.994	0.024
19	5.248	0.072	2.694	0.784	0.002	1.612	0.978	0.000
20	5.305	0.004	2.692	0.776	0.000	1.611	0.960	0.045
21	5.451	0.039	2.699	0.796	0.004	1.609	0.977	0.042
22	5.162	0.025	2.716	0.791	0.007	1.586	0.984	0.089
23	5.308	0.081	2.694	0.793	0.003	1.597	0.989	0.001
24	5.360	0.056	2.697	0.784	0.002	1.593	0.995	0.029
25	5.312	0.085	2.724	0.798	0.002	1.567	0.972	0.017
26	5.246	0.041	2.708	0.790	0.001	1.581	1.003	0.000
27	5.314	0.010	2.684	0.799	0.000	1.585	0.977	0.015
28	5.248	0.066	2.685	0.790	0.001	1.606	0.970	0.111
29	5.223	0.068	2.705	0.789	0.002	1.600	0.958	0.087
30	5.173	0.086	2.695	0.799	0.000	1.592	0.970	0.037
31	5.260	0.047	2.691	0.785	0.007	1.602	0.977	0.000
32	5.243	0.085	2.716	0.776	0.005	1.594	0.981	0.077
33	5.301	0.069	2.714	0.769	0.005	1.580	0.998	0.000
34	5.171	0.043	2.690	0.772	0.000	1.595	0.994	0.091
35	5.239	0.016	2.712	0.782	0.004	1.577	0.990	0.037
36	5.289	0.057	2.712	0.772	0.001	1.574	0.978	0.037
37	5.273	0.058	2.690	0.734	0.000	1.582	0.948	0.007
38	5.243	0.063	2.681	0.737	0.003	1.598	0.956	0.046
39	5.254	0.037	2.687	0.800	0.004	1.590	0.965	0.033
40	5.208	0.012	2.685	0.797	0.002	1.602	0.966	0.000
41	5.357	0.061	2.677	0.798	0.008	1.606	0.985	0.012
42	5.146	0.028	2.721	0.792	0.006	1.597	0.993	0.008
43	5.208	0.042	2.669	0.774	0.002	1.607	0.992	0.000
44	5.336	0.003	2.678	0.776	0.000	1.627	0.984	0.047
45	5.080	0.002	2.718	0.764	0.004	1.583	0.968	0.066
46	5.194	0.063	2.729	0.758	0.000	1.575	0.964	0.029
47	5.178	0.097	2.705	0.748	0.004	1.566	0.957	0.049
48	5.068	0.015	2.719	0.760	0.000	1.554	0.956	0.036
49	5.283	0.005	2.692	0.758	0.001	1.576	0.955	0.080
50	5.216	0.091	2.660	0.762	0.007	1.601	0.981	0.063
51	5.160	0.044	2.698	0.751	0.000	1.578	0.983	0.024

52	5.161	0.000	2.683	0.748	0.011	1.596	0.980	0.015
53	5.126	0.040	2.692	0.753	0.000	1.576	0.977	0.054
54	5.059	0.056	2.725	0.759	0.006	1.575	0.973	0.028
55	5.130	0.085	2.697	0.746	0.001	1.588	0.975	0.007
56	4.902	0.039	2.715	0.731	0.002	1.588	0.951	0.058
57	5.095	0.034	2.702	0.732	0.003	1.561	0.945	0.002
58	5.179	0.024	2.676	0.746	0.000	1.584	0.952	0.014
59	4.984	0.083	2.712	0.737	0.002	1.567	0.949	0.031
60	4.998	0.044	2.694	0.731	0.003	1.573	0.954	0.059
MEAN	5.244	0.044	2.693	0.777	0.003	1.594	0.981	0.033
END TIME:	18:39:44							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.418	9.102	0.000	4.568	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.592	3.914	0.000	2.244	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.010	0.000	0.000	0.024	0.000	0.000

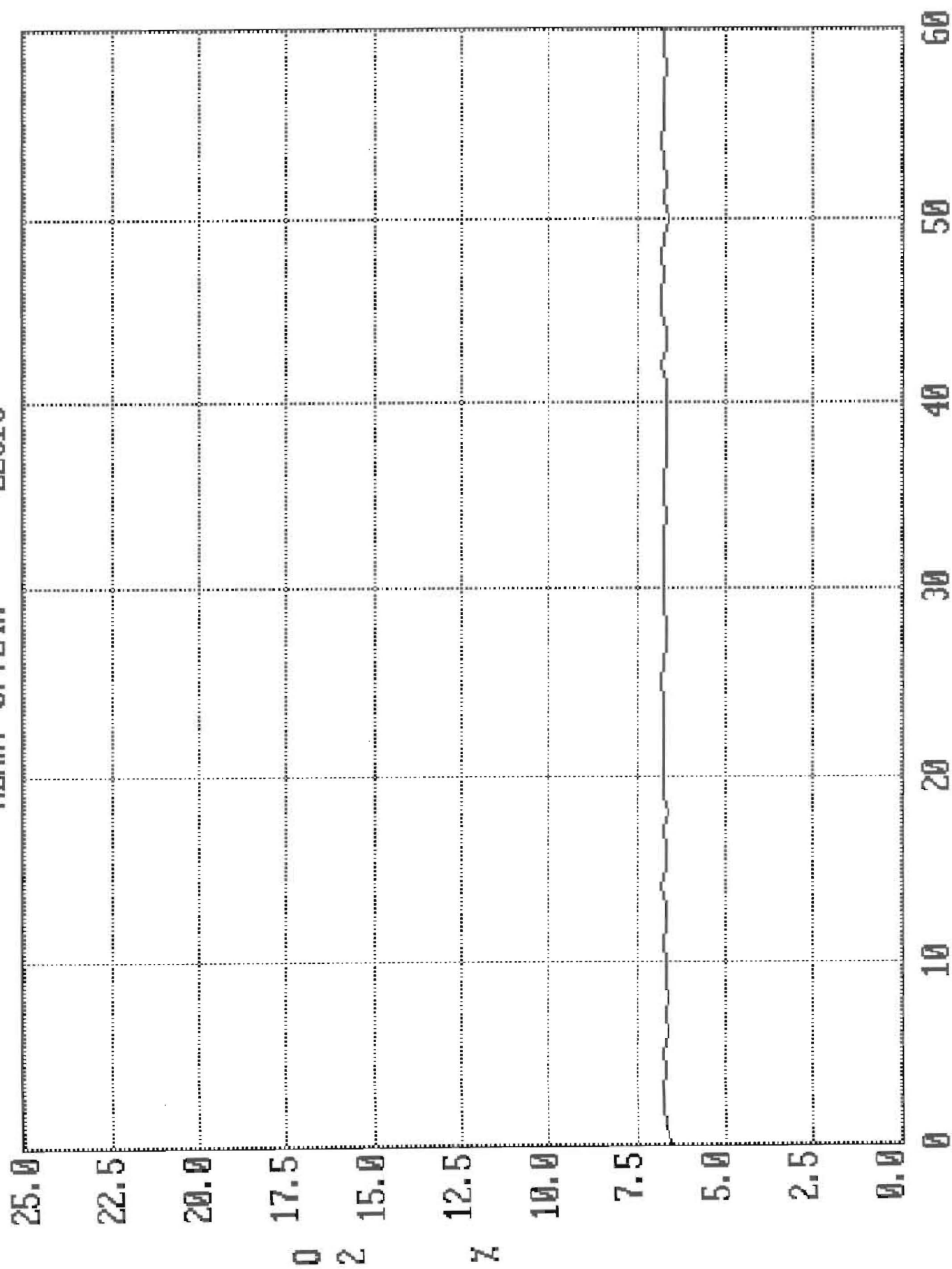
MEAN: 31.883ppm 22C1C



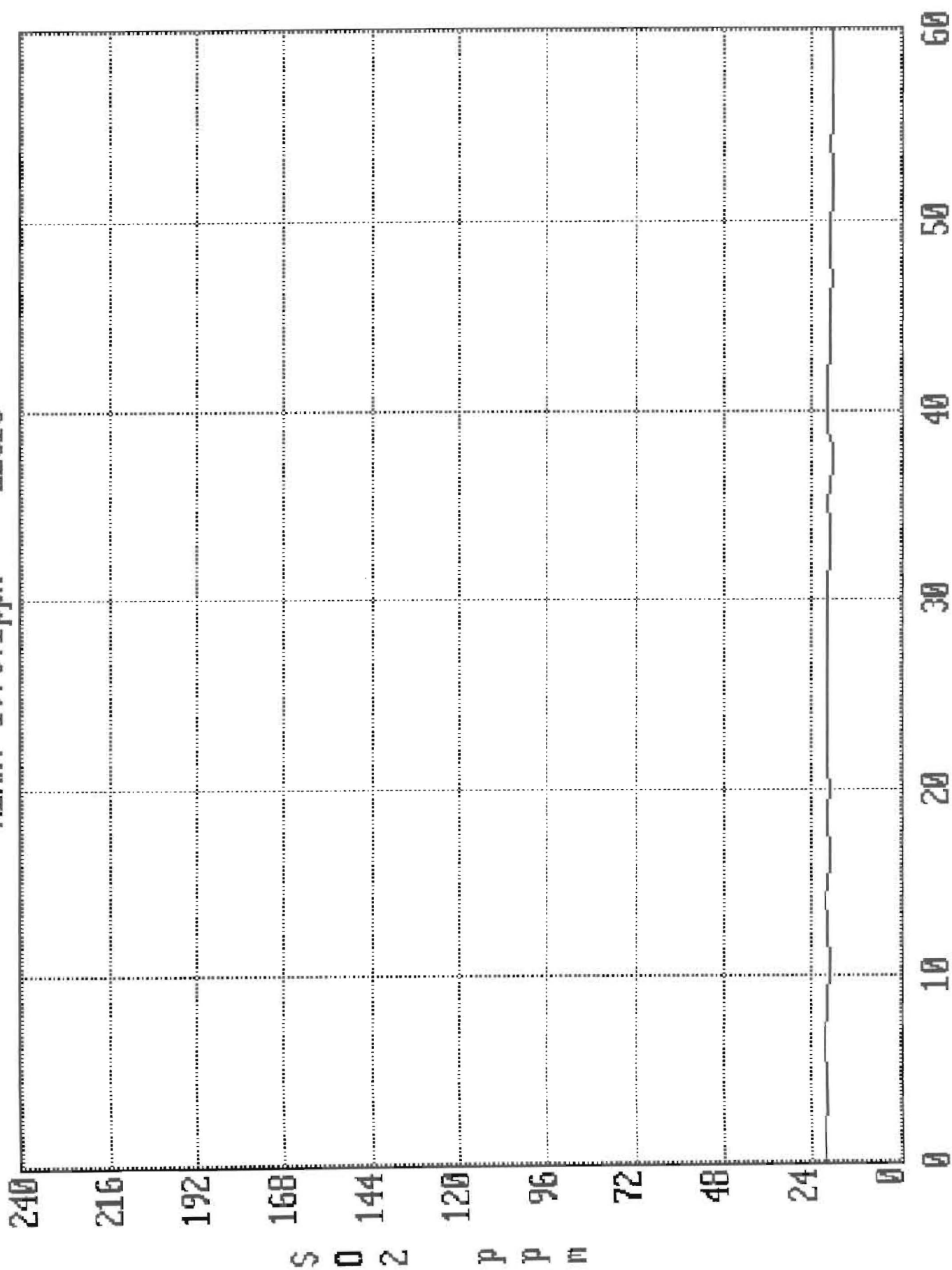
MEAN: 0.441ppm 22C1C



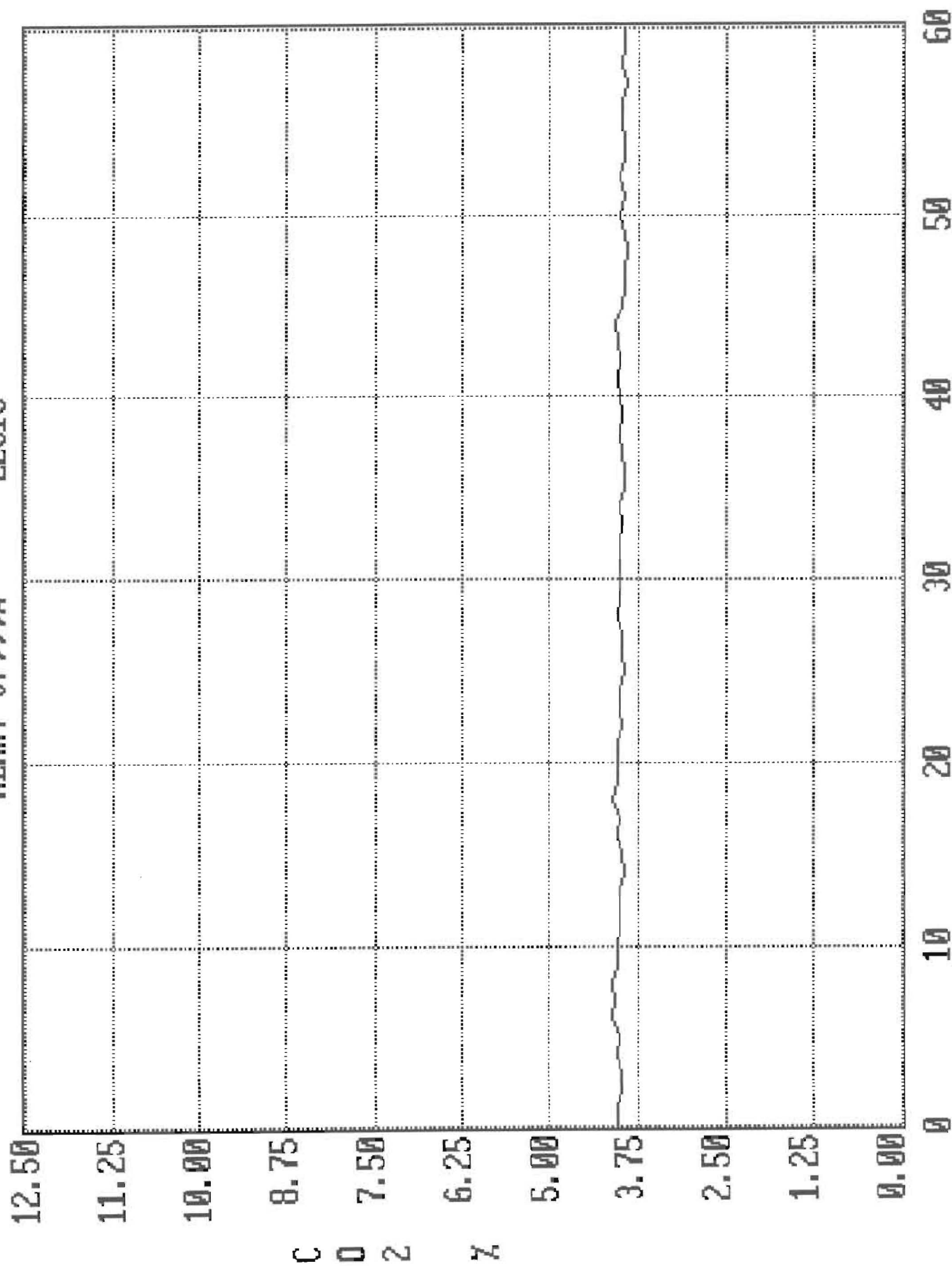
MEAN: 6.724% 22C1C



MEAN: 19.371ppm 22C1C



MEAN: 3.999% 22C1C



CJ-4022/NO. 2 SRU/C1D

TEST DATE : 08-03-2005

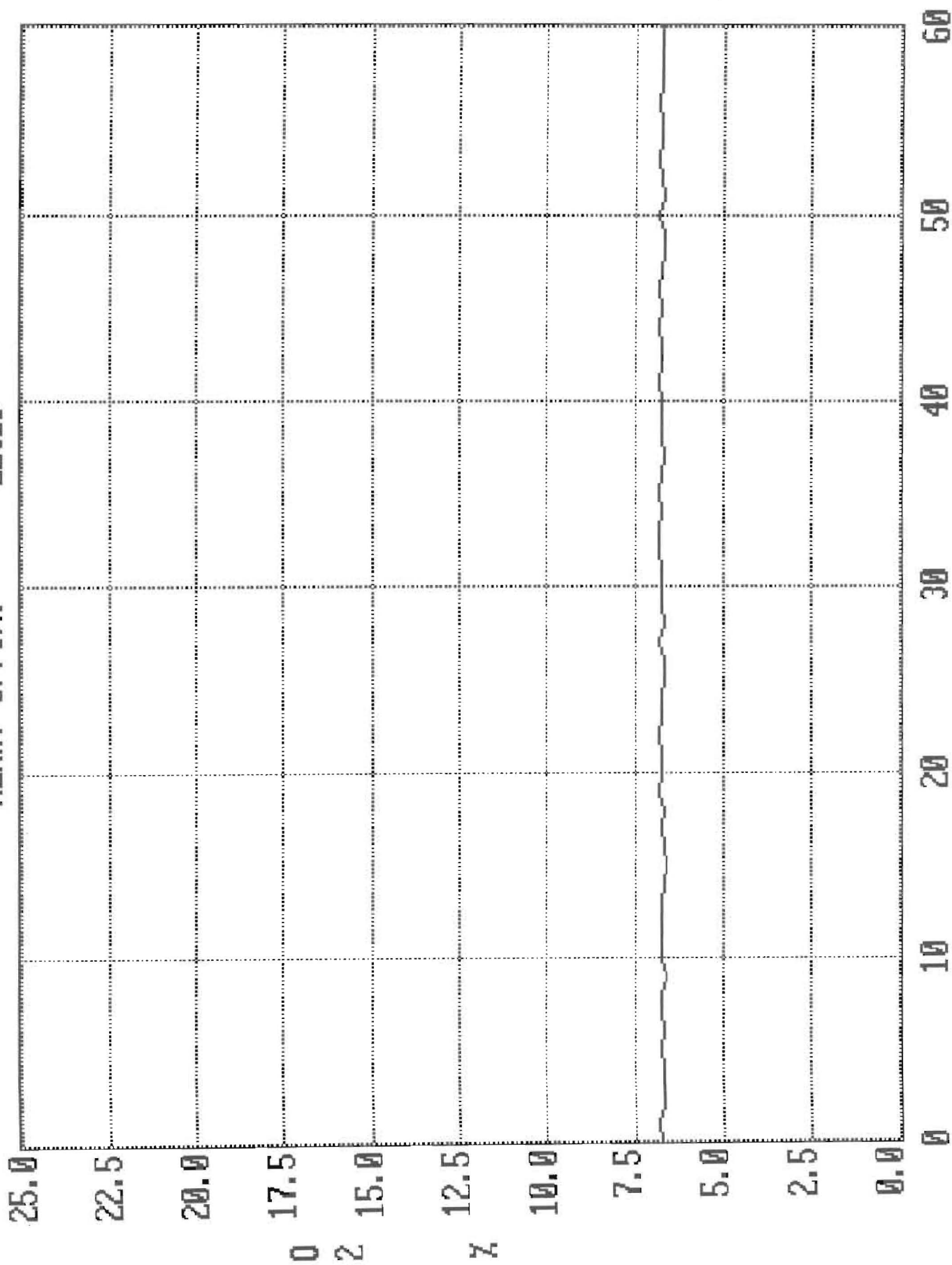
START TIME: 18:59:54

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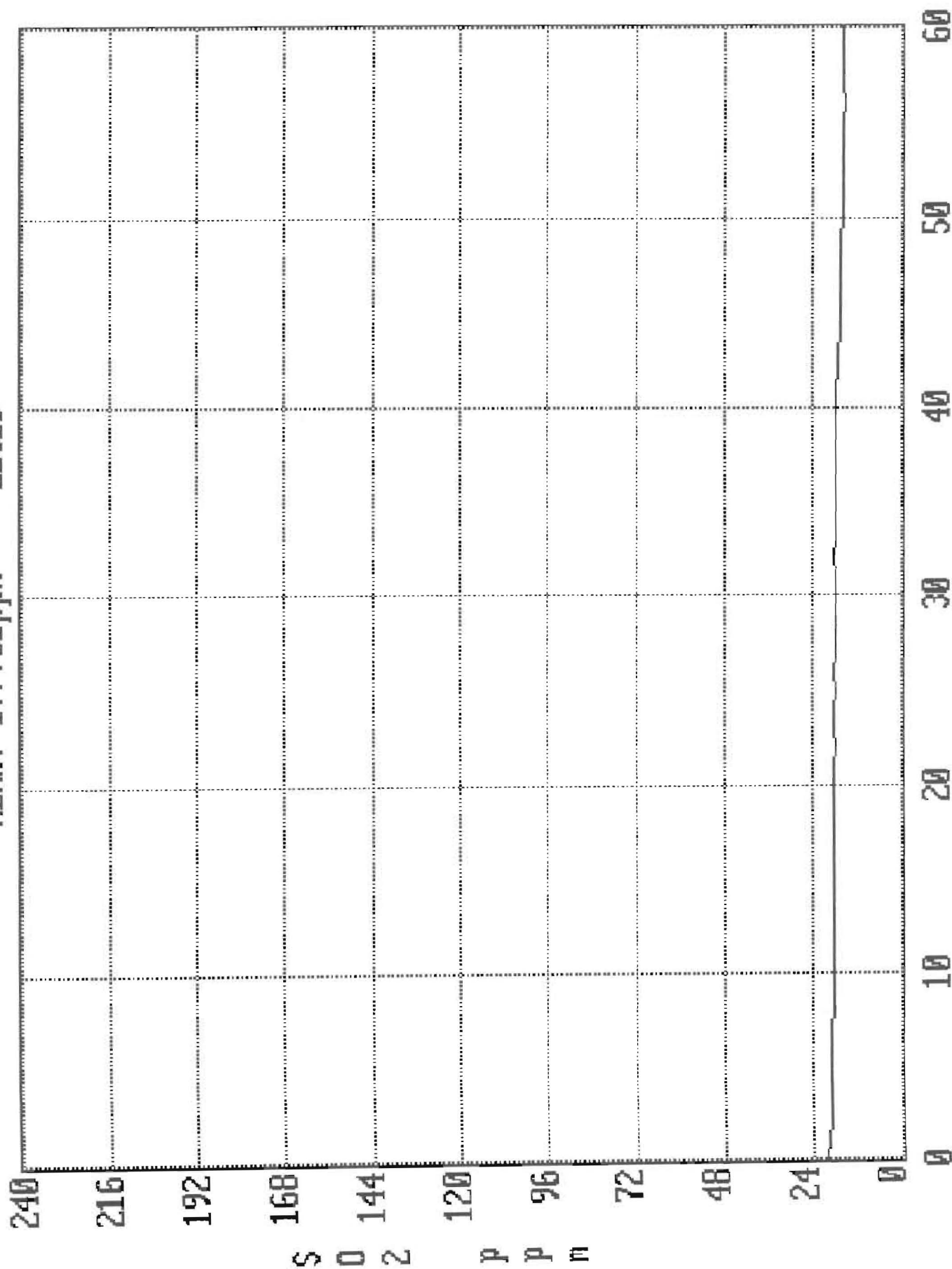
CHANNEL#	NOX	CO	O2	SO2	OFF	CO2	OFF	OFF
CH.UNITS	ppm	ppm	%	ppm	off	%	off	off
<MIN>			<ANALYZER	OUTPUT-VDC>				
0	5.093	0.000	2.693	0.830	0.000	1.567	1.274	0.093
1	5.087	0.035	2.722	0.800	0.001	1.566	0.994	0.065
2	5.228	0.000	2.677	0.780	0.000	1.594	0.964	0.000
3	5.209	0.002	2.668	0.777	0.003	1.613	0.992	0.002
4	5.104	0.016	2.681	0.761	0.000	1.600	0.994	0.000
5	5.042	0.018	2.702	0.759	0.002	1.599	0.993	0.081
6	5.278	0.076	2.667	0.756	0.002	1.617	0.984	0.014
7	5.003	0.059	2.698	0.757	0.000	1.601	0.970	0.000
8	5.217	0.000	2.700	0.736	0.002	1.602	0.964	0.033
9	5.295	0.048	2.662	0.754	0.007	1.623	0.976	0.023
10	5.094	0.037	2.696	0.740	0.000	1.611	0.980	0.000
11	5.228	0.000	2.706	0.739	0.000	1.586	0.965	0.014
12	5.202	0.064	2.693	0.742	0.004	1.601	0.979	0.098
13	5.264	0.000	2.703	0.731	0.003	1.597	0.987	0.000
14	5.219	0.047	2.681	0.741	0.000	1.609	0.999	0.014
15	5.222	0.042	2.663	0.734	0.002	1.635	1.016	0.000
16	5.251	0.031	2.677	0.743	0.000	1.619	1.033	0.009
17	5.197	0.033	2.701	0.733	0.002	1.617	1.016	0.042
18	5.307	0.043	2.674	0.738	0.001	1.631	0.995	0.045
19	5.235	0.025	2.721	0.745	0.006	1.597	0.977	0.071
20	5.133	0.044	2.716	0.731	0.001	1.613	0.964	0.035
21	5.240	0.005	2.701	0.739	0.000	1.597	0.974	0.003
22	5.037	0.022	2.722	0.726	0.002	1.592	0.960	0.046
23	5.194	0.000	2.715	0.732	0.000	1.578	0.973	0.068
24	5.199	0.055	2.702	0.736	0.004	1.592	0.986	0.083
25	5.020	0.002	2.681	0.715	0.000	1.600	0.986	0.042
26	5.237	0.032	2.684	0.733	0.005	1.614	0.990	0.014
27	5.007	0.042	2.725	0.719	0.002	1.586	0.968	0.000
28	5.090	0.007	2.688	0.725	0.005	1.606	0.988	0.085
29	5.037	0.016	2.703	0.723	0.002	1.606	0.981	0.022
30	5.069	0.016	2.711	0.706	0.000	1.602	0.967	0.090
31	5.133	0.023	2.710	0.716	0.000	1.611	0.977	0.090
32	5.211	0.035	2.725	0.732	0.004	1.602	0.989	0.048
33	5.175	0.014	2.732	0.717	0.000	1.588	0.994	0.094
34	5.120	0.007	2.713	0.710	0.002	1.595	1.026	0.045
35	5.224	0.020	2.718	0.714	0.000	1.593	1.119	0.049
36	5.223	0.055	2.692	0.718	0.000	1.601	1.048	0.000
37	5.074	0.029	2.681	0.707	0.002	1.614	1.014	0.078
38	5.191	0.036	2.716	0.708	0.000	1.597	0.977	0.046
39	5.169	0.025	2.708	0.710	0.000	1.597	0.974	0.076
40	5.107	0.046	2.698	0.724	0.003	1.606	0.969	0.043
41	5.068	0.015	2.729	0.711	0.000	1.574	0.977	0.003
42	5.028	0.026	2.711	0.693	0.001	1.587	0.986	0.037
43	5.071	0.028	2.714	0.689	0.000	1.585	1.011	0.005
44	4.956	0.037	2.726	0.671	0.000	1.581	1.125	0.007
45	5.145	0.059	2.715	0.668	0.000	1.587	1.080	0.065
46	5.183	0.050	2.733	0.662	0.004	1.584	1.010	0.012
47	4.986	0.020	2.704	0.662	0.000	1.589	0.977	0.050
48	5.162	0.000	2.690	0.654	0.002	1.606	0.977	0.058
49	5.156	0.006	2.685	0.657	0.002	1.602	0.990	0.046
50	4.984	0.032	2.735	0.651	0.000	1.590	0.988	0.046
51	5.163	0.028	2.690	0.651	0.000	1.591	0.975	0.046

52	5.144	0.004	2.709	0.643	0.000	1.602	1.011	0.075
53	5.153	0.034	2.736	0.627	0.000	1.576	1.152	0.031
54	5.133	0.107	2.693	0.636	0.000	1.607	1.182	0.065
55	5.055	0.047	2.714	0.631	0.001	1.605	1.047	0.000
56	5.041	0.053	2.734	0.622	0.000	1.584	0.974	0.044
57	5.063	0.011	2.701	0.631	0.001	1.602	0.956	0.048
58	5.140	0.039	2.712	0.639	0.000	1.608	0.968	0.021
59	5.087	0.036	2.707	0.636	0.000	1.597	0.977	0.063
60	5.111	0.024	2.693	0.636	0.000	1.598	0.986	0.039
MEAN	5.139	0.029	2.703	0.710	0.001	1.599	1.004	0.040
END TIME:	19:59:44							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.418	9.102	0.000	4.568	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.592	3.914	0.000	2.244	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.010	0.000	0.000	0.024	0.000	0.000

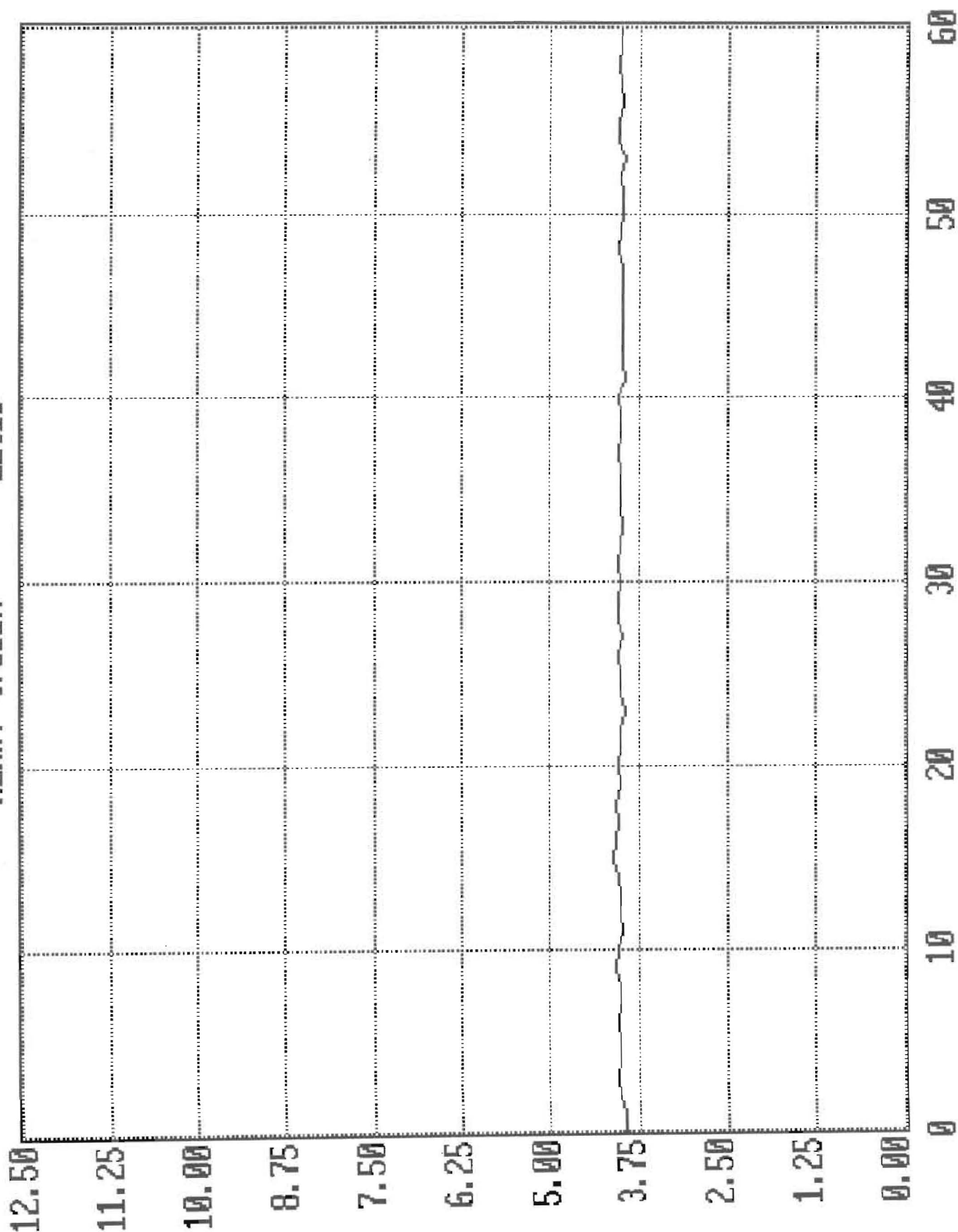
MEAN: 6.749% 22C1D



MEAN: 17.701ppm 22C1D



MEAN: 4.011% 22C1D



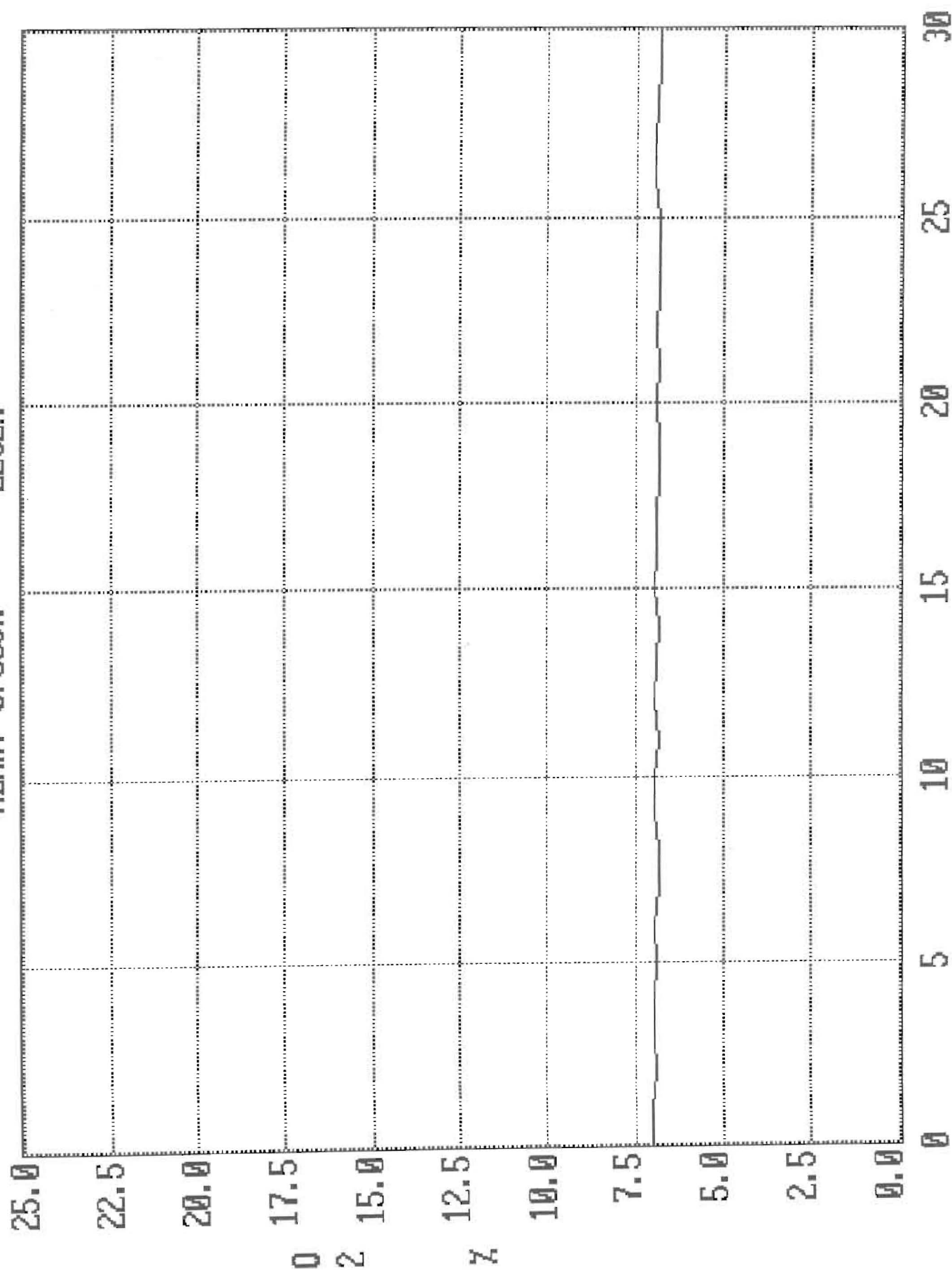
TEST DATE : 08-04-2005

START TIME: 10:16:00

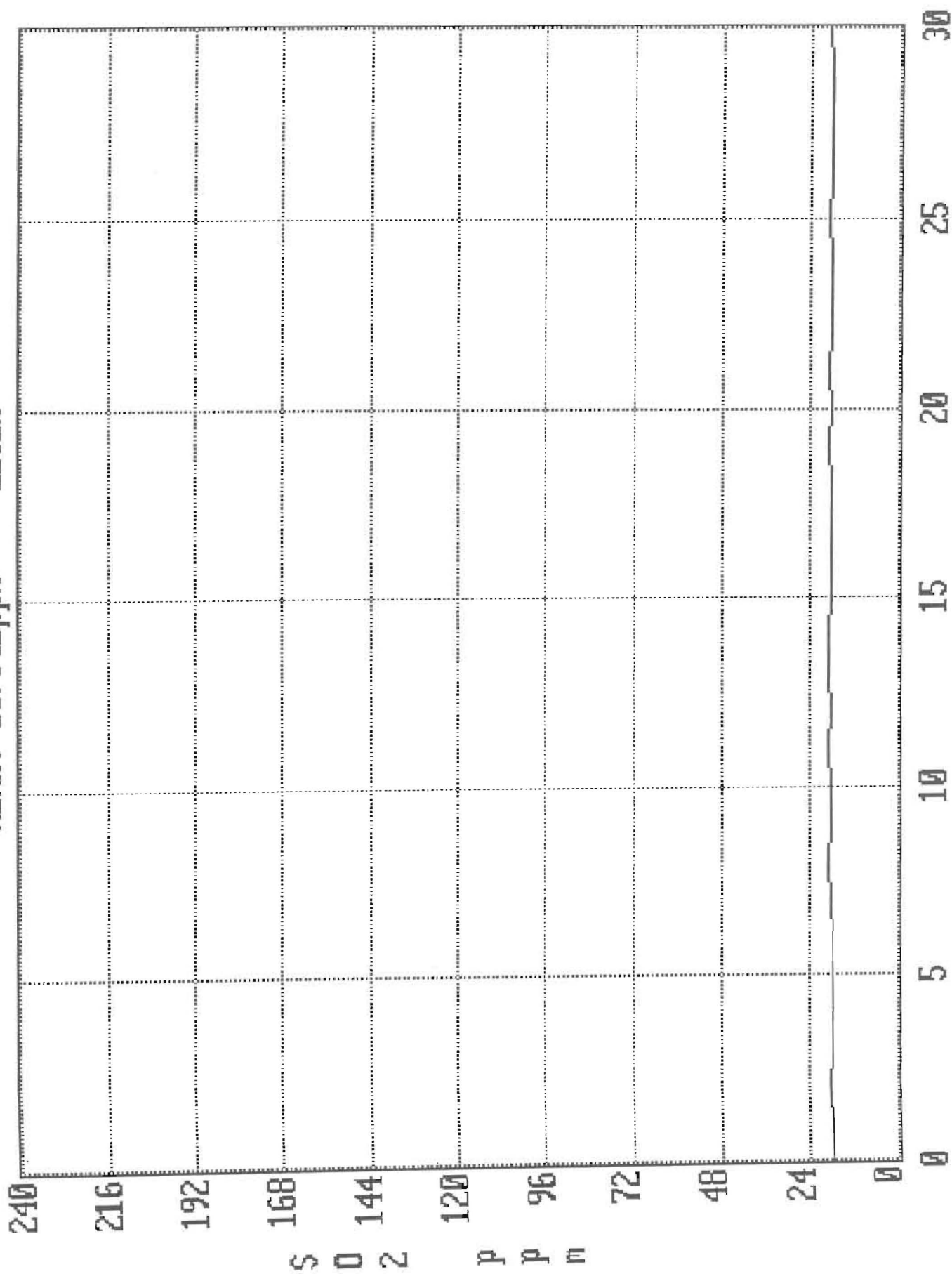
FILE NAME : C:\DAQ\22C2A .ID%

CHANNEL# CH. UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
<ANALYZER OUTPUT-VDC>								
0	5.024	0.000	2.803	0.725	0.000	1.577	1.287	0.000
1	5.056	0.026	2.809	0.714	0.000	1.572	1.037	0.066
2	5.152	0.039	2.765	0.728	0.002	1.585	1.009	0.057
3	4.950	0.033	2.796	0.708	0.002	1.555	1.093	0.001
4	5.054	0.076	2.791	0.709	0.002	1.575	1.264	0.029
5	5.122	0.021	2.764	0.722	0.001	1.580	1.158	0.045
6	5.095	0.084	2.794	0.726	0.010	1.579	1.097	0.059
7	5.100	0.073	2.747	0.733	0.001	1.591	1.051	0.090
8	5.138	0.090	2.739	0.758	0.002	1.619	1.064	0.010
9	5.155	0.000	2.779	0.751	0.005	1.585	1.027	0.122
10	4.973	0.048	2.786	0.735	0.000	1.585	0.990	0.087
11	5.078	0.023	2.738	0.754	0.001	1.602	0.989	0.000
12	4.991	0.039	2.780	0.750	0.002	1.568	0.964	0.037
13	4.913	0.025	2.773	0.754	0.001	1.574	0.968	0.089
14	5.077	0.032	2.734	0.767	0.000	1.599	0.982	0.042
15	4.965	0.055	2.776	0.745	0.001	1.567	0.964	0.042
16	4.976	0.006	2.765	0.745	0.003	1.580	0.977	0.037
17	4.980	0.037	2.769	0.737	0.000	1.567	0.965	0.015
18	4.883	0.072	2.747	0.741	0.000	1.593	0.970	0.012
19	5.036	0.019	2.744	0.763	0.000	1.594	0.977	0.023
20	4.814	0.020	2.762	0.742	0.000	1.570	0.972	0.046
21	5.051	0.049	2.734	0.753	0.000	1.593	0.981	0.023
22	4.919	0.067	2.750	0.743	0.004	1.592	0.985	0.050
23	4.972	0.048	2.731	0.748	0.000	1.588	0.986	0.017
24	4.919	0.028	2.738	0.748	0.002	1.589	0.991	0.037
25	4.919	0.000	2.734	0.753	0.001	1.586	1.042	0.028
26	4.905	0.085	2.779	0.741	0.000	1.564	1.139	0.036
27	4.980	0.010	2.775	0.738	0.000	1.545	1.039	0.033
28	4.973	0.051	2.758	0.738	0.000	1.549	0.975	0.030
29	5.131	0.056	2.729	0.741	0.000	1.595	0.979	0.039
30	5.172	0.028	2.727	0.754	0.000	1.618	0.994	0.015
MEAN	5.015	0.040	2.762	0.741	0.001	1.582	1.030	0.039
END TIME: 10:45:55								
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

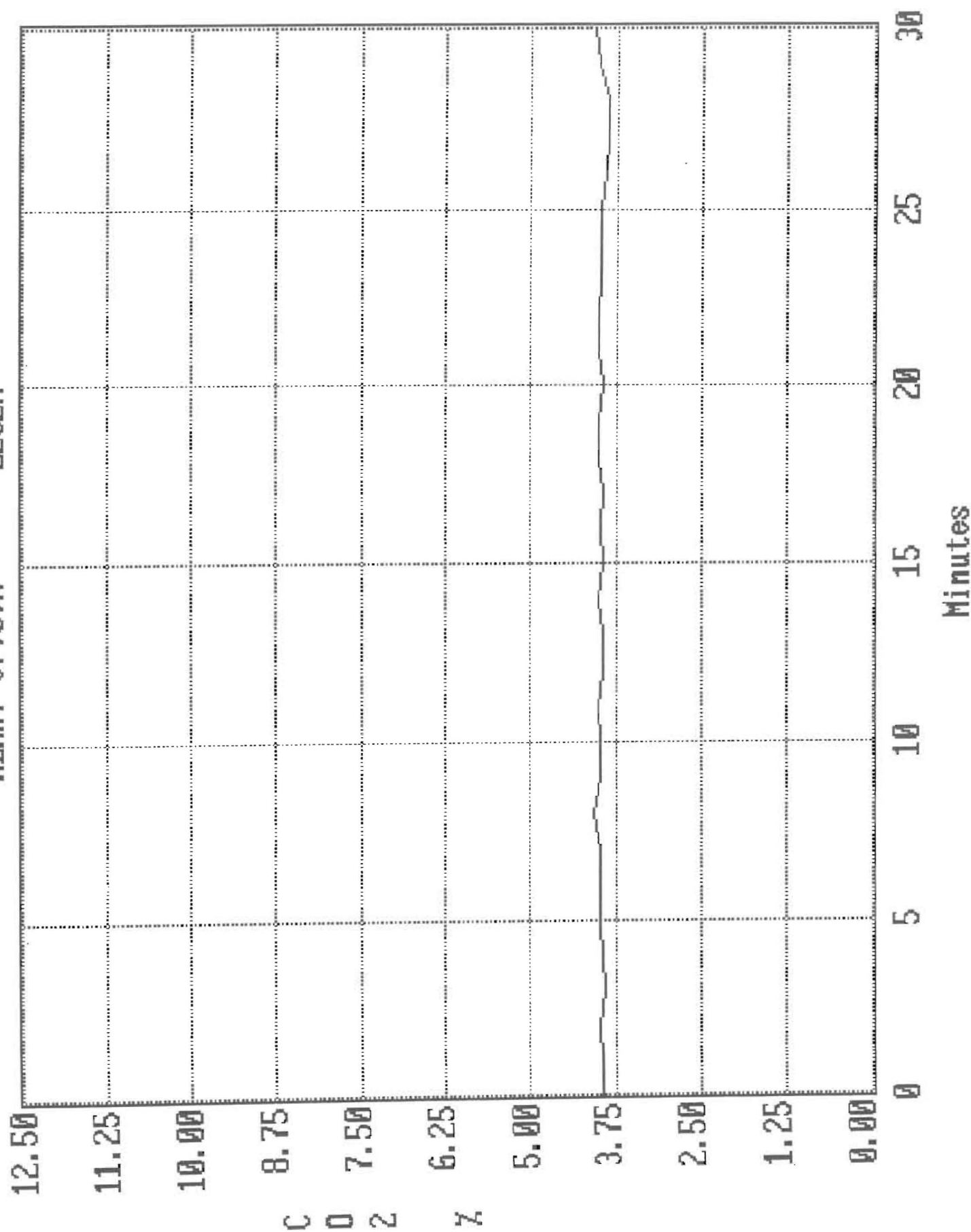
MEAN: 6.885% 22C2A



MEAN: 18.541 ppm 22C2A



MEAN: 3.969% 22C2A



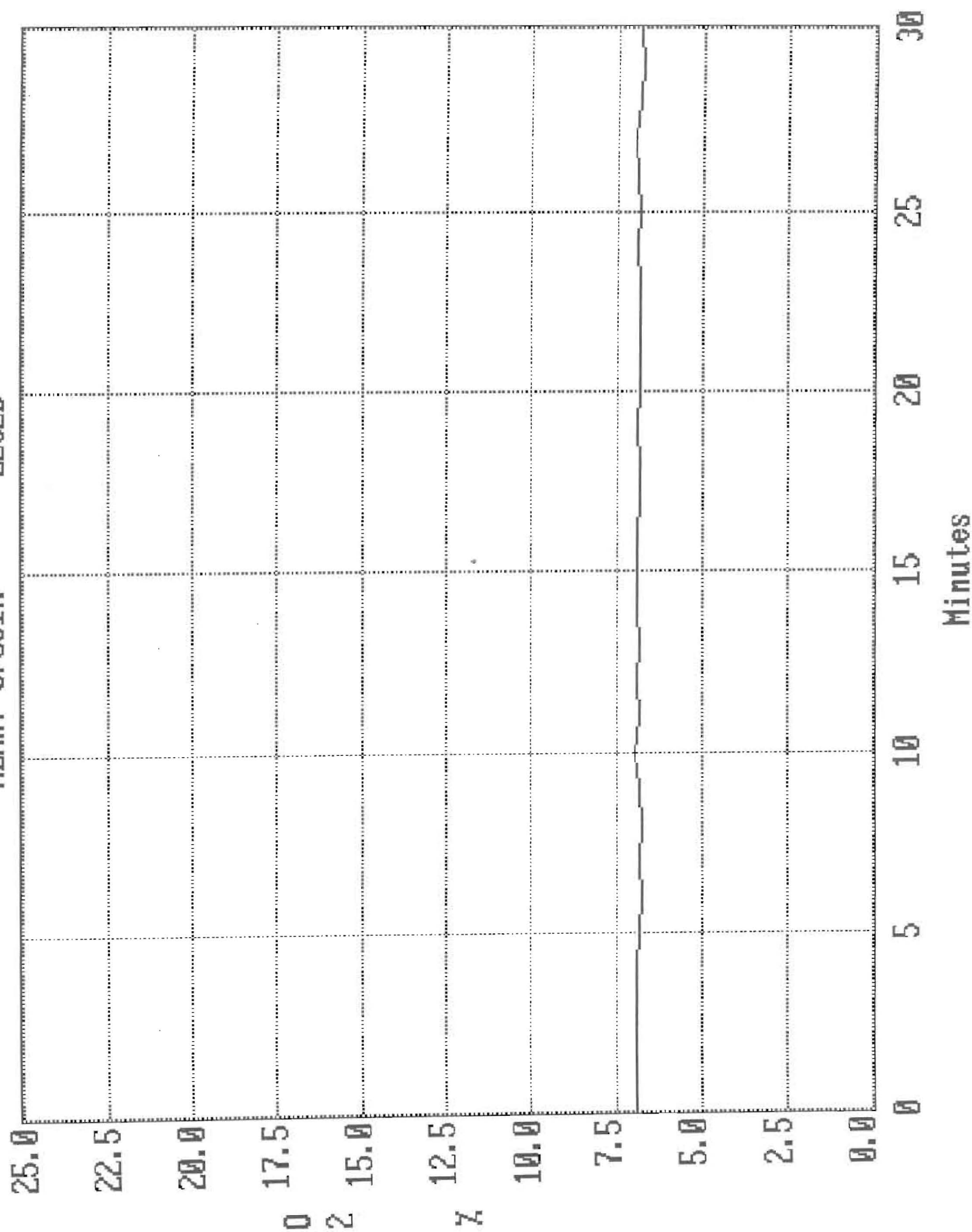
TEST DATE : 08-04-2005

START TIME: 11:01:00

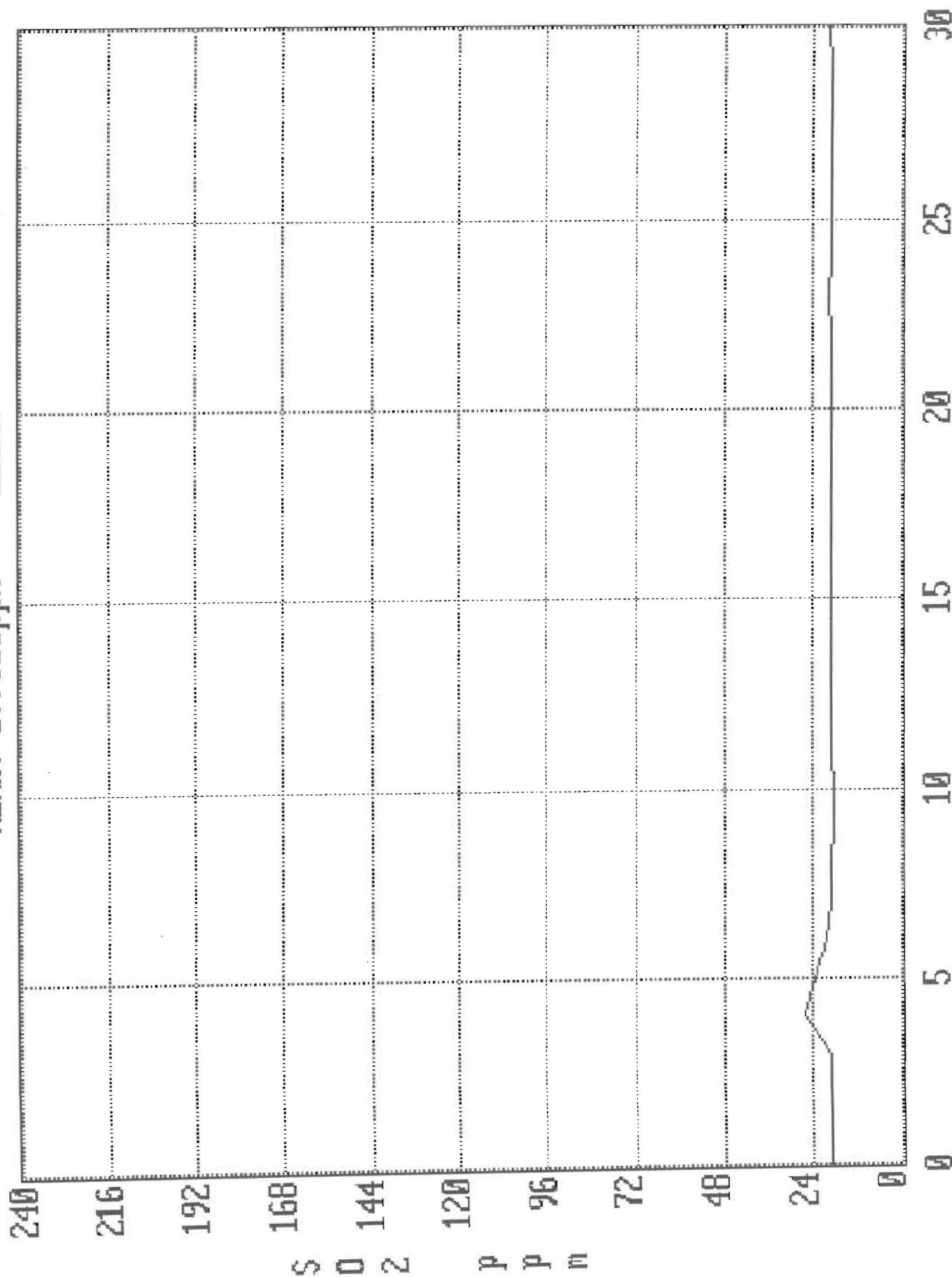
FILE NAME : C:\DAQ\22C2B .ID%

CHANNEL# CH. UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
<ANALYZER OUTPUT-VDC>								
0	5.034	0.034	2.754	0.762	0.000	1.572	1.208	0.076
1	4.806	0.082	2.750	0.755	0.000	1.571	0.979	0.034
2	4.875	0.029	2.754	0.770	0.002	1.576	0.974	0.000
3	4.957	0.055	2.760	0.767	0.004	1.558	0.956	0.059
4	5.068	0.007	2.755	1.040	0.002	1.580	0.971	0.019
5	5.033	0.021	2.735	0.941	0.004	1.589	0.978	0.000
6	5.083	0.098	2.718	0.818	0.002	1.598	0.984	0.090
7	5.140	0.064	2.738	0.777	0.004	1.606	0.990	0.116
8	5.235	0.039	2.712	0.754	0.000	1.629	1.004	0.000
9	5.074	0.067	2.742	0.742	0.002	1.603	0.997	0.000
10	5.048	0.000	2.775	0.742	0.000	1.597	0.982	0.000
11	4.984	0.007	2.724	0.754	0.000	1.610	0.990	0.000
12	5.022	0.098	2.768	0.764	0.000	1.587	0.987	0.048
13	5.019	0.001	2.741	0.772	0.000	1.593	0.974	0.000
14	4.969	0.055	2.763	0.765	0.003	1.586	0.959	0.020
15	4.875	0.009	2.769	0.760	0.005	1.577	0.958	0.011
16	4.824	0.040	2.769	0.754	0.003	1.567	0.963	0.026
17	4.831	0.010	2.747	0.754	0.000	1.546	0.948	0.040
18	4.731	0.061	2.747	0.763	0.000	1.563	0.960	0.000
19	4.839	0.032	2.760	0.763	0.000	1.550	0.981	0.039
20	4.796	0.031	2.732	0.756	0.000	1.570	1.081	0.000
21	4.791	0.056	2.743	0.757	0.000	1.554	1.139	0.033
22	4.948	0.000	2.741	0.760	0.000	1.576	1.189	0.048
23	4.940	0.015	2.747	0.778	0.000	1.583	1.199	0.040
24	4.942	0.003	2.773	0.773	0.000	1.568	1.073	0.097
25	5.007	0.018	2.740	0.767	0.000	1.577	1.020	0.039
26	5.040	0.009	2.756	0.771	0.000	1.577	0.979	0.000
27	5.102	0.054	2.799	0.770	0.002	1.559	0.966	0.039
28	5.141	0.020	2.728	0.775	0.000	1.606	0.986	0.047
29	5.055	0.000	2.721	0.770	0.000	1.589	0.980	0.000
30	5.185	0.020	2.737	0.779	0.000	1.588	0.985	0.036
MEAN	4.980	0.033	2.748	0.780	0.001	1.581	1.011	0.031
END TIME: 11:30:55								
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

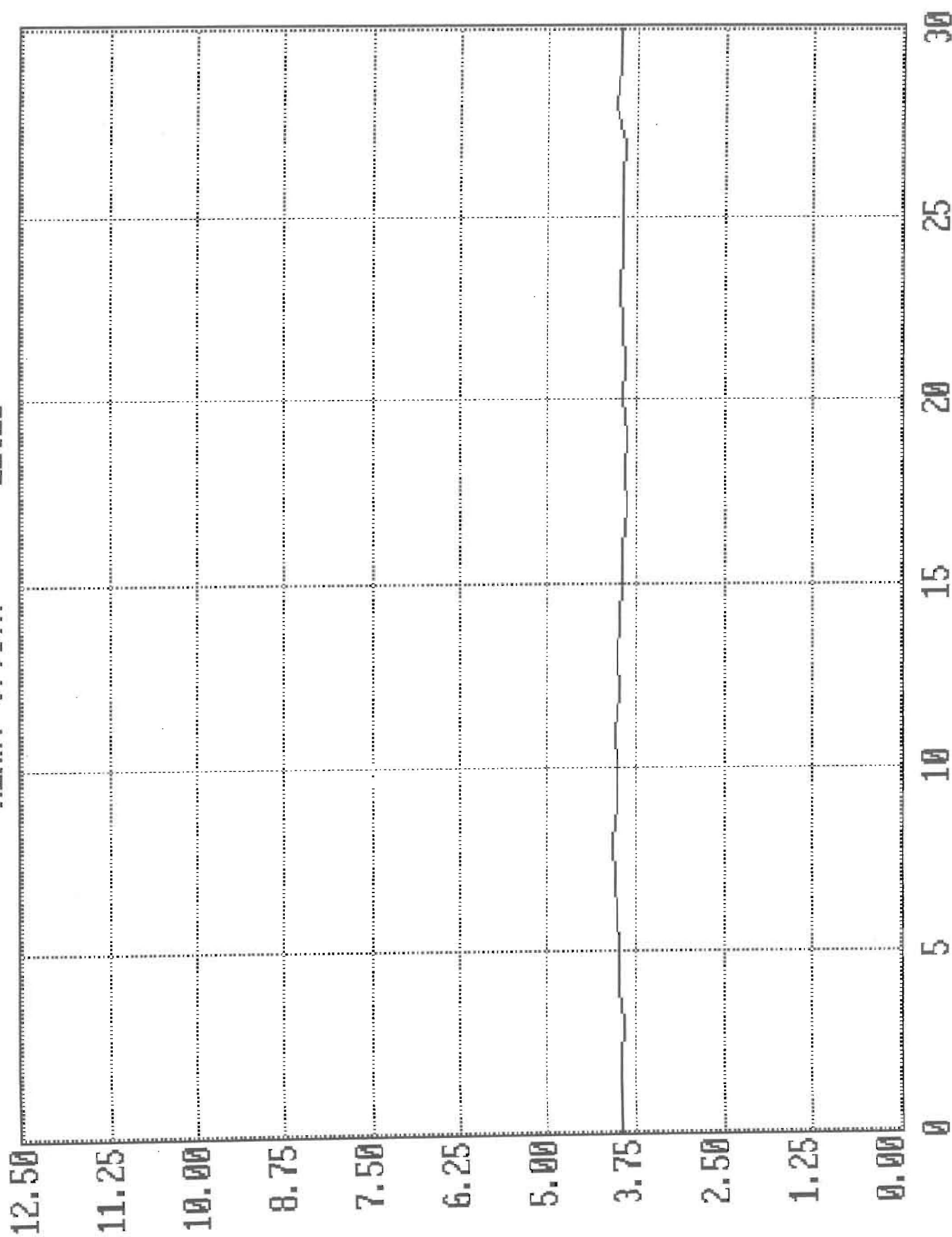
MEAN: 6.851% 22C2B



MEAN: 19.516ppm 22C2B



MEAN: 3.967% 22C2B



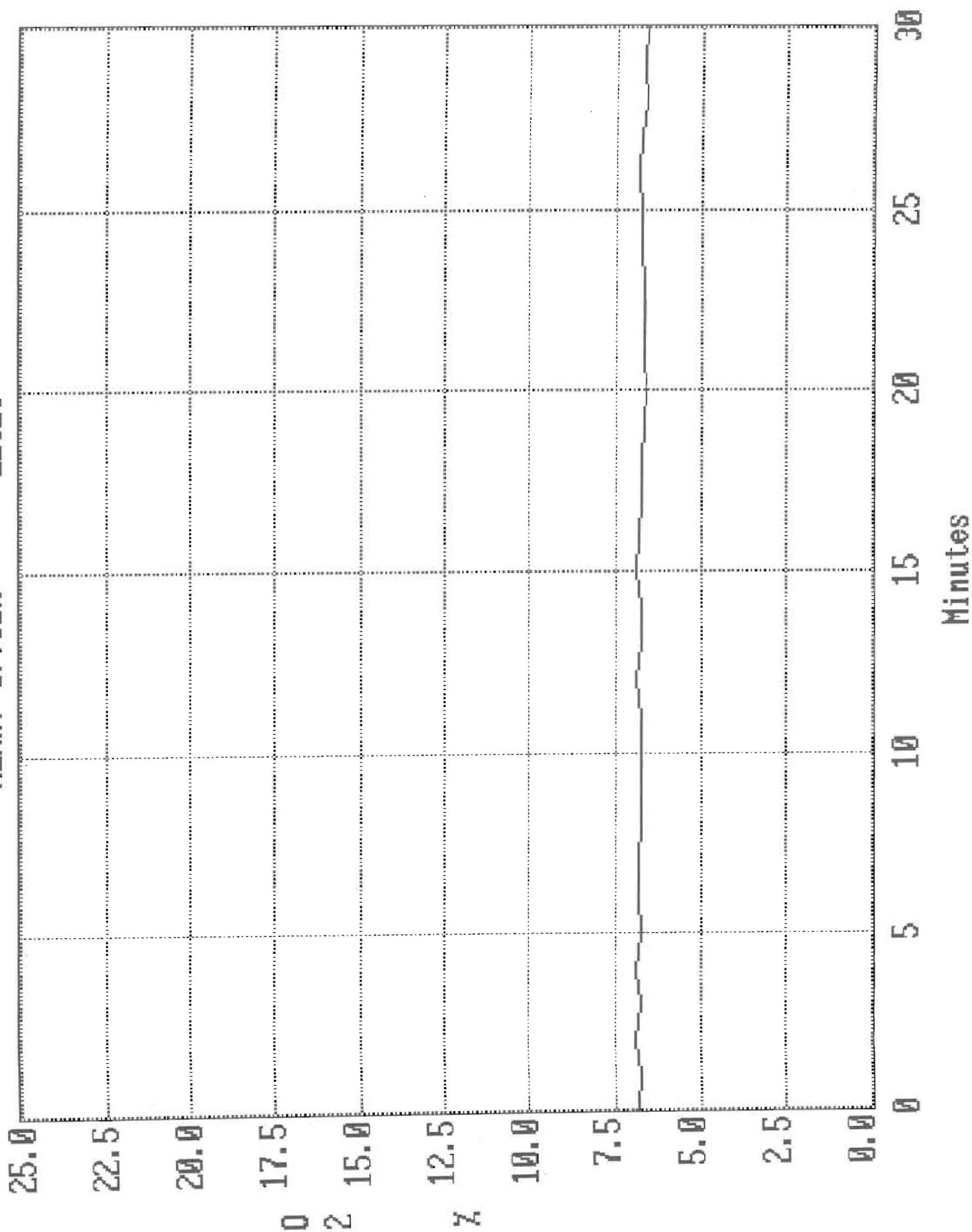
TEST DATE : 08-04-2005

START TIME: 11:46:00

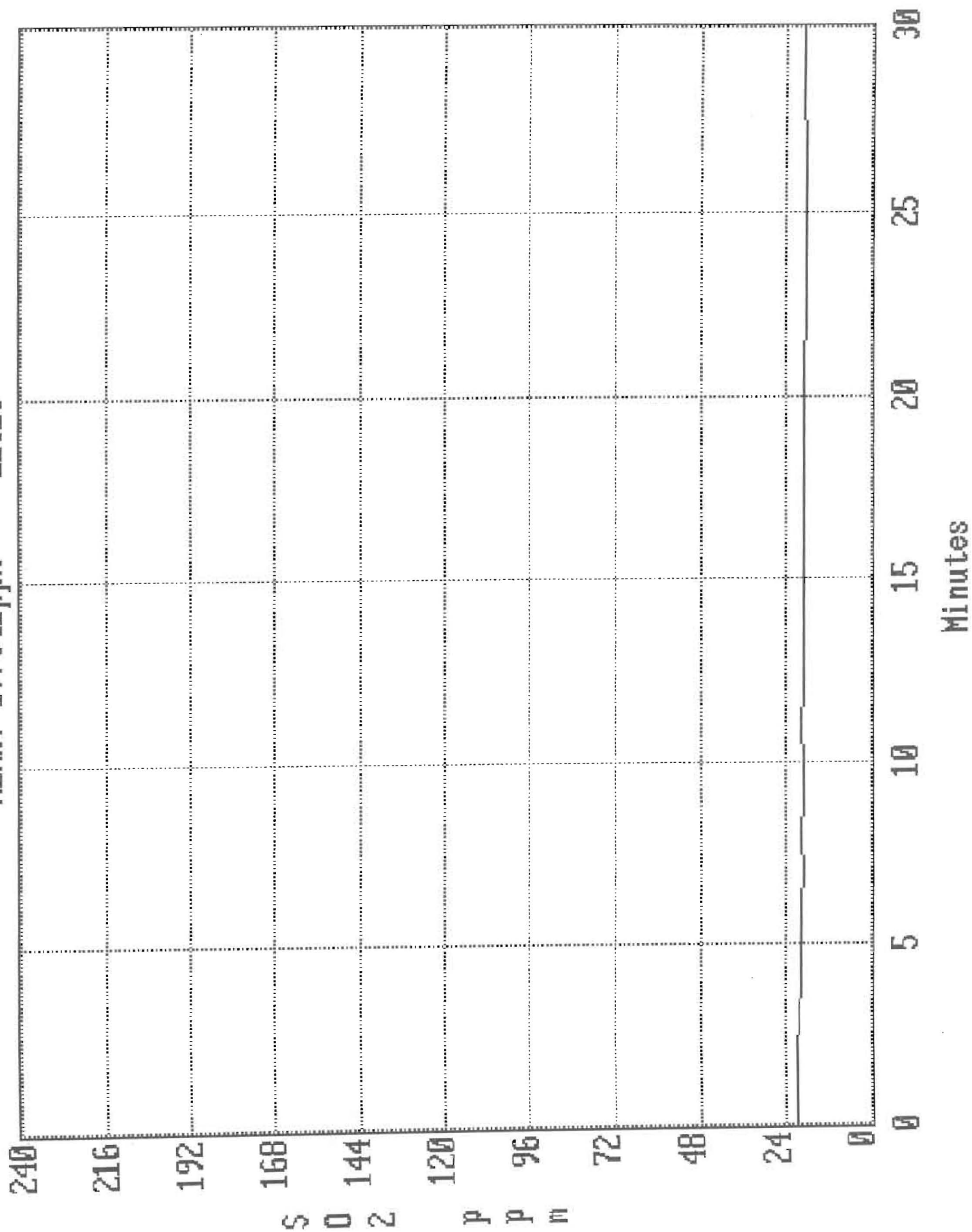
FILE NAME : C:\DAQ\22C2C .ID%

CHANNEL# CH. UNITS	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
<MIN>								
0	5.115	0.000	2.727	0.833	0.000	1.582	1.277	0.059
1	4.876	0.007	2.707	0.846	0.001	1.593	1.013	0.019
2	4.878	0.064	2.764	0.850	0.000	1.557	0.975	0.047
3	4.962	0.001	2.714	0.822	0.000	1.585	0.976	0.012
4	4.954	0.029	2.754	0.792	0.001	1.549	0.970	0.094
5	5.087	0.011	2.719	0.790	0.000	1.566	0.977	0.048
6	4.906	0.031	2.723	0.782	0.000	1.561	0.976	0.015
7	4.959	0.024	2.722	0.773	0.000	1.582	0.977	0.062
8	5.047	0.000	2.713	0.784	0.000	1.586	0.987	0.063
9	4.958	0.015	2.703	0.774	0.000	1.589	0.979	0.000
10	5.024	0.000	2.701	0.768	0.000	1.585	0.983	0.050
11	4.944	0.000	2.720	0.780	0.000	1.585	0.990	0.000
12	4.928	0.000	2.750	0.764	0.000	1.554	0.964	0.033
13	4.995	0.002	2.699	0.774	0.000	1.582	0.986	0.040
14	4.978	0.000	2.702	0.776	0.000	1.563	0.987	0.022
15	4.889	0.015	2.748	0.767	0.000	1.541	0.976	0.075
16	4.993	0.033	2.728	0.760	0.000	1.541	0.973	0.094
17	5.034	0.012	2.708	0.776	0.000	1.545	0.957	0.000
18	4.939	0.008	2.703	0.758	0.000	1.561	0.977	0.058
19	4.954	0.015	2.692	0.769	0.000	1.567	0.986	0.046
20	5.058	0.022	2.664	0.766	0.000	1.579	0.991	0.024
21	5.062	0.000	2.684	0.754	0.000	1.573	0.993	0.040
22	5.054	0.030	2.690	0.729	0.000	1.575	0.999	0.037
23	5.173	0.030	2.672	0.750	0.000	1.590	1.016	0.020
24	4.931	0.059	2.716	0.730	0.000	1.551	1.045	0.063
25	5.090	0.025	2.702	0.727	0.000	1.555	1.093	0.072
26	5.057	0.007	2.729	0.745	0.000	1.541	1.150	0.027
27	5.011	0.011	2.703	0.742	0.000	1.553	1.204	0.039
28	5.067	0.032	2.658	0.767	0.000	1.580	1.150	0.042
29	4.985	0.046	2.678	0.765	0.000	1.582	1.022	0.043
30	5.002	0.000	2.667	0.753	0.000	1.585	0.978	0.000
MEAN	4.997	0.017	2.708	0.773	0.000	1.569	1.017	0.040
END TIME:	12:15:55							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

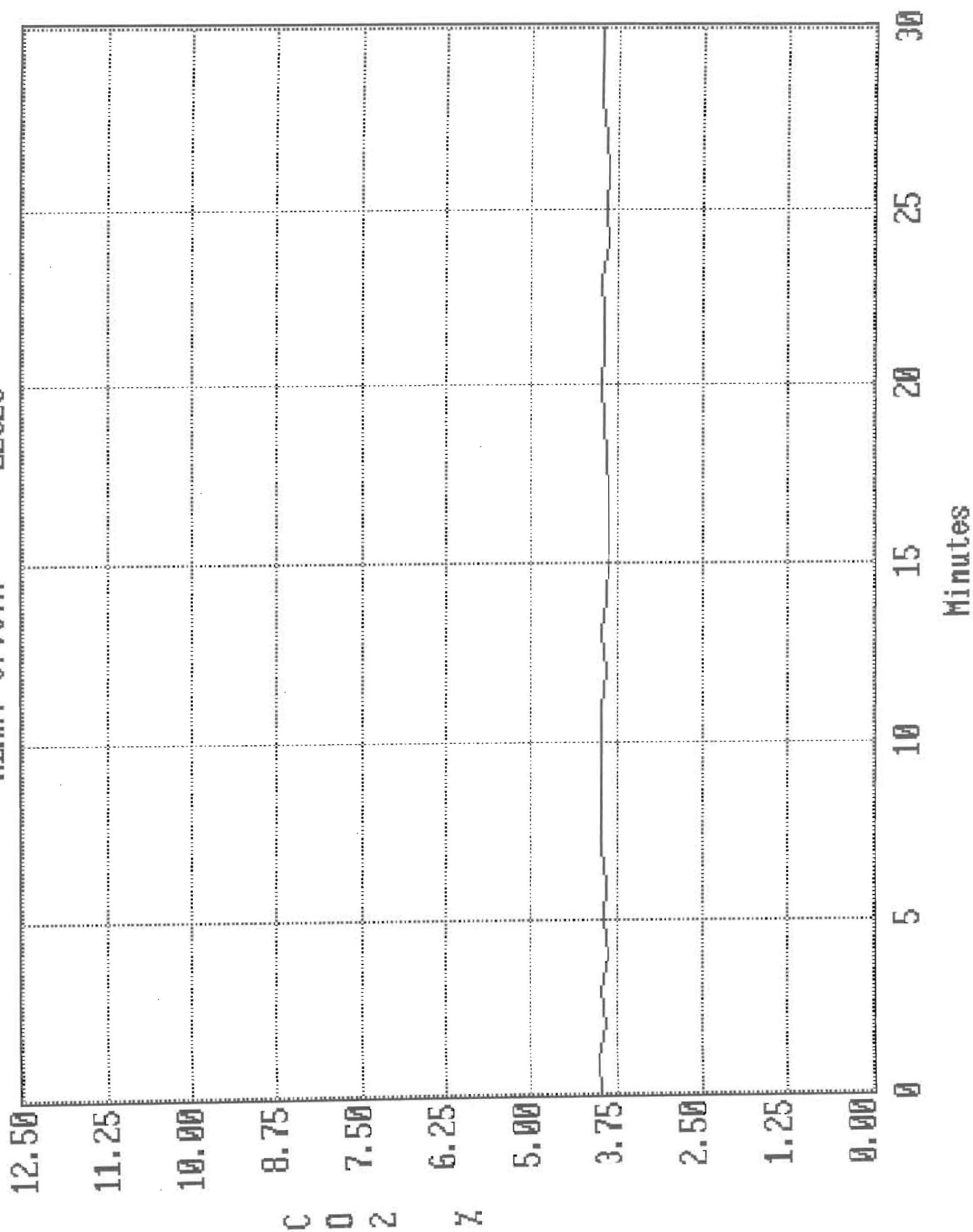
MEAN: 6.751% 22C2C



MEAN: 19.341 ppm 22C2C



MEAN: 3.937% 22C2C



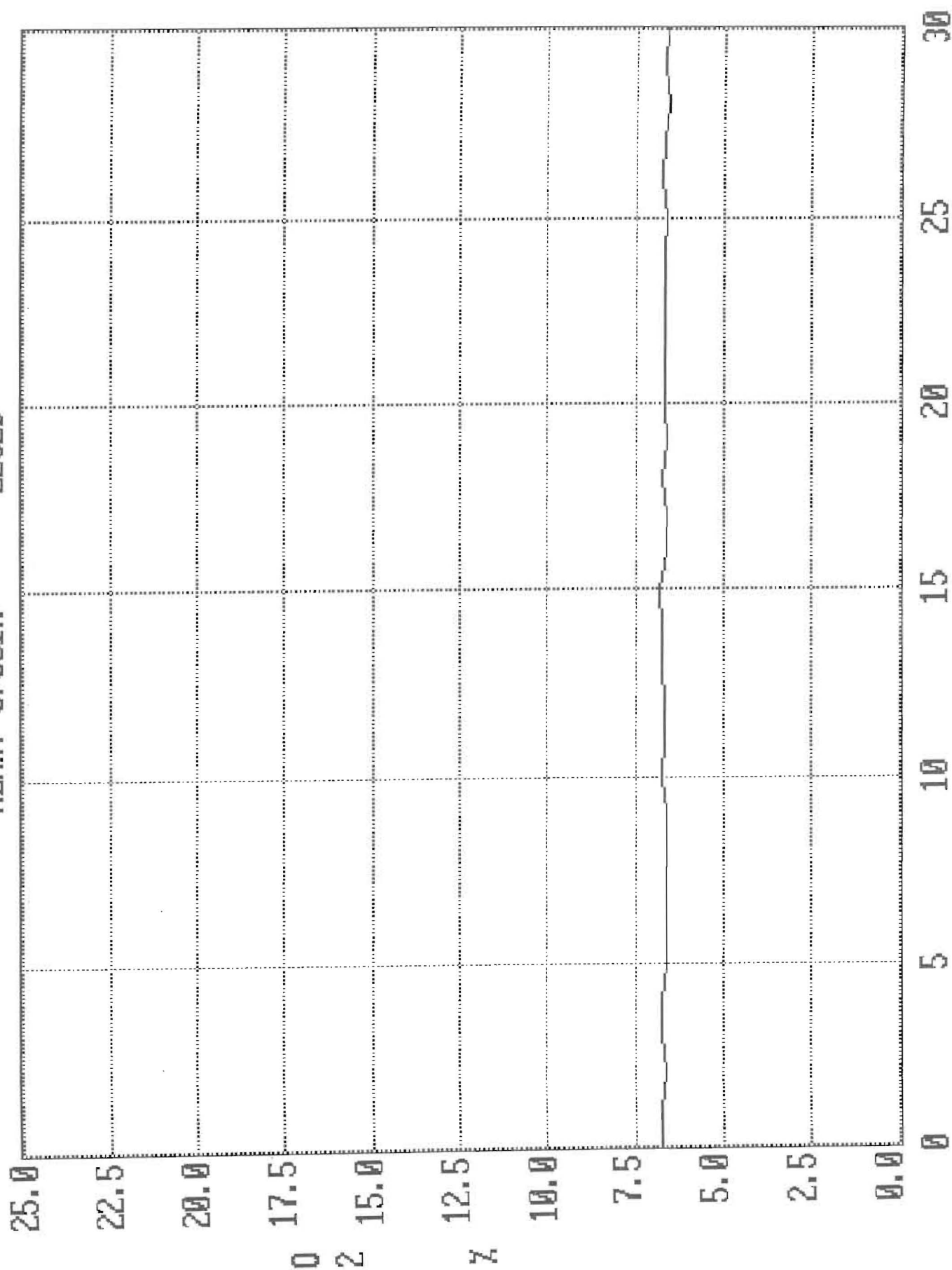
TEST DATE : 08-04-2005

START TIME: 12:31:00

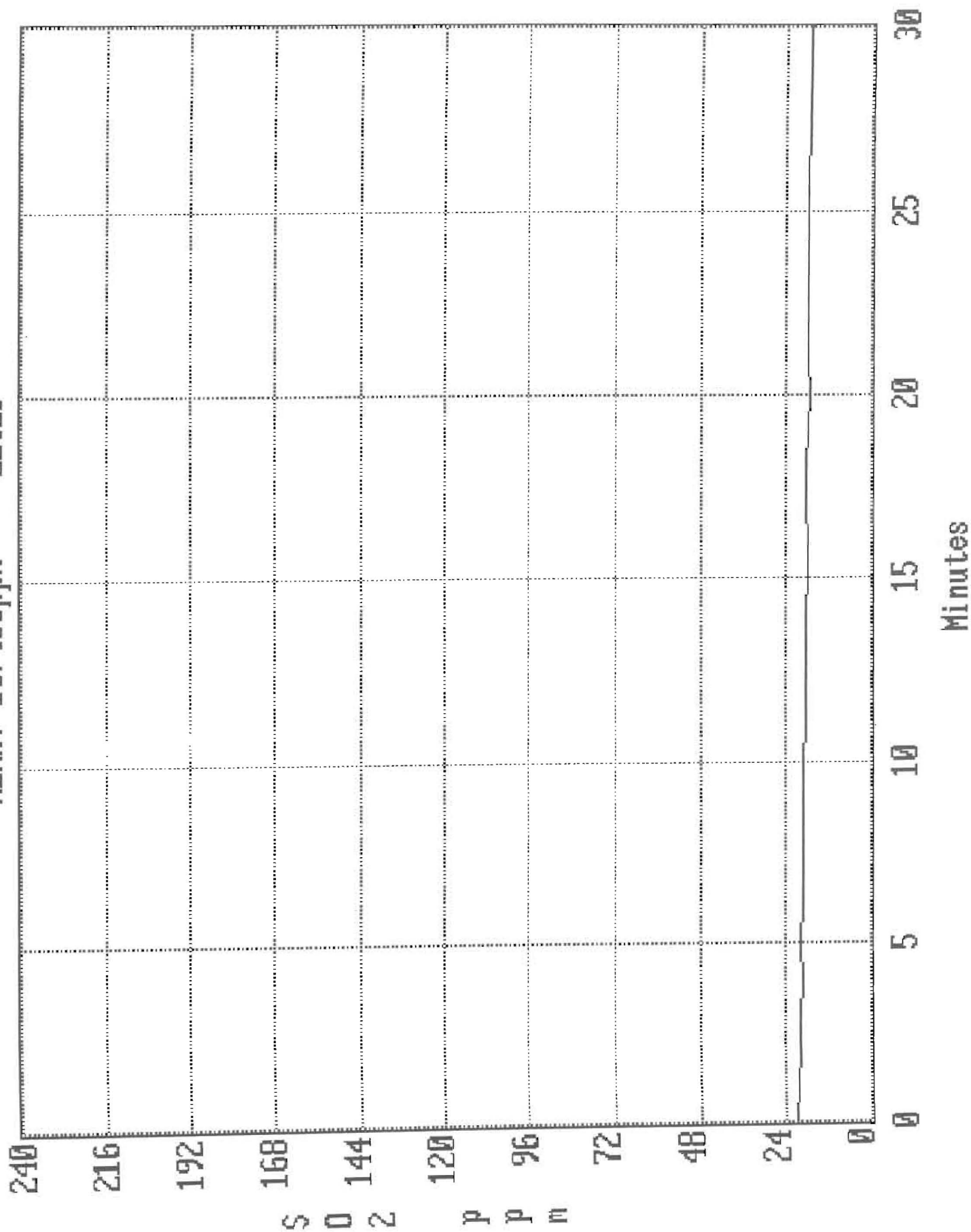
FILE NAME : C:\DAQ\22C2D .ID%

CHANNEL# CH. UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
<ANALYZER OUTPUT-VDC>								
0	5.044	0.000	2.712	0.845	0.000	1.558	1.167	0.103
1	5.015	0.068	2.709	0.825	0.002	1.561	1.004	0.045
2	4.997	0.012	2.652	0.800	0.000	1.579	0.986	0.015
3	4.816	0.021	2.695	0.789	0.000	1.554	0.961	0.060
4	4.980	0.072	2.695	0.773	0.000	1.553	0.961	0.107
5	5.074	0.002	2.657	0.782	0.000	1.586	0.985	0.023
6	5.002	0.034	2.664	0.774	0.000	1.580	0.986	0.036
7	4.990	0.032	2.654	0.760	0.000	1.593	0.990	0.024
8	4.907	0.036	2.651	0.752	0.000	1.589	0.985	0.055
9	5.094	0.043	2.662	0.772	0.000	1.593	0.986	0.085
10	4.834	0.032	2.699	0.754	0.000	1.572	0.982	0.077
11	5.116	0.000	2.680	0.736	0.000	1.578	0.973	0.000
12	5.051	0.031	2.673	0.730	0.000	1.570	0.978	0.043
13	4.849	0.004	2.712	0.727	0.000	1.556	0.981	0.046
14	5.059	0.011	2.708	0.736	0.000	1.554	0.977	0.046
15	4.993	0.037	2.725	0.717	0.000	1.530	0.967	0.042
16	5.105	0.033	2.665	0.708	0.000	1.562	0.957	0.088
17	5.157	0.035	2.662	0.732	0.000	1.586	0.982	0.022
18	4.975	0.011	2.699	0.729	0.000	1.570	0.981	0.040
19	5.171	0.042	2.653	0.717	0.000	1.597	0.985	0.000
20	4.951	0.038	2.686	0.694	0.000	1.562	0.971	0.000
21	5.052	0.000	2.681	0.715	0.000	1.569	0.980	0.108
22	4.954	0.000	2.669	0.712	0.000	1.577	0.976	0.087
23	5.057	0.015	2.686	0.715	0.001	1.567	0.982	0.023
24	4.966	0.016	2.681	0.704	0.000	1.562	0.991	0.071
25	5.033	0.064	2.662	0.718	0.000	1.582	0.990	0.020
26	4.958	0.015	2.708	0.706	0.000	1.548	0.979	0.050
27	4.845	0.059	2.693	0.684	0.000	1.571	0.982	0.051
28	5.010	0.016	2.640	0.682	0.000	1.564	0.996	0.083
29	5.030	0.033	2.677	0.688	0.000	1.571	0.975	0.042
30	5.155	0.000	2.664	0.695	0.000	1.583	0.985	0.000
MEAN	5.008	0.026	2.680	0.738	0.000	1.570	0.986	0.048
END TIME: 13:00:55								
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

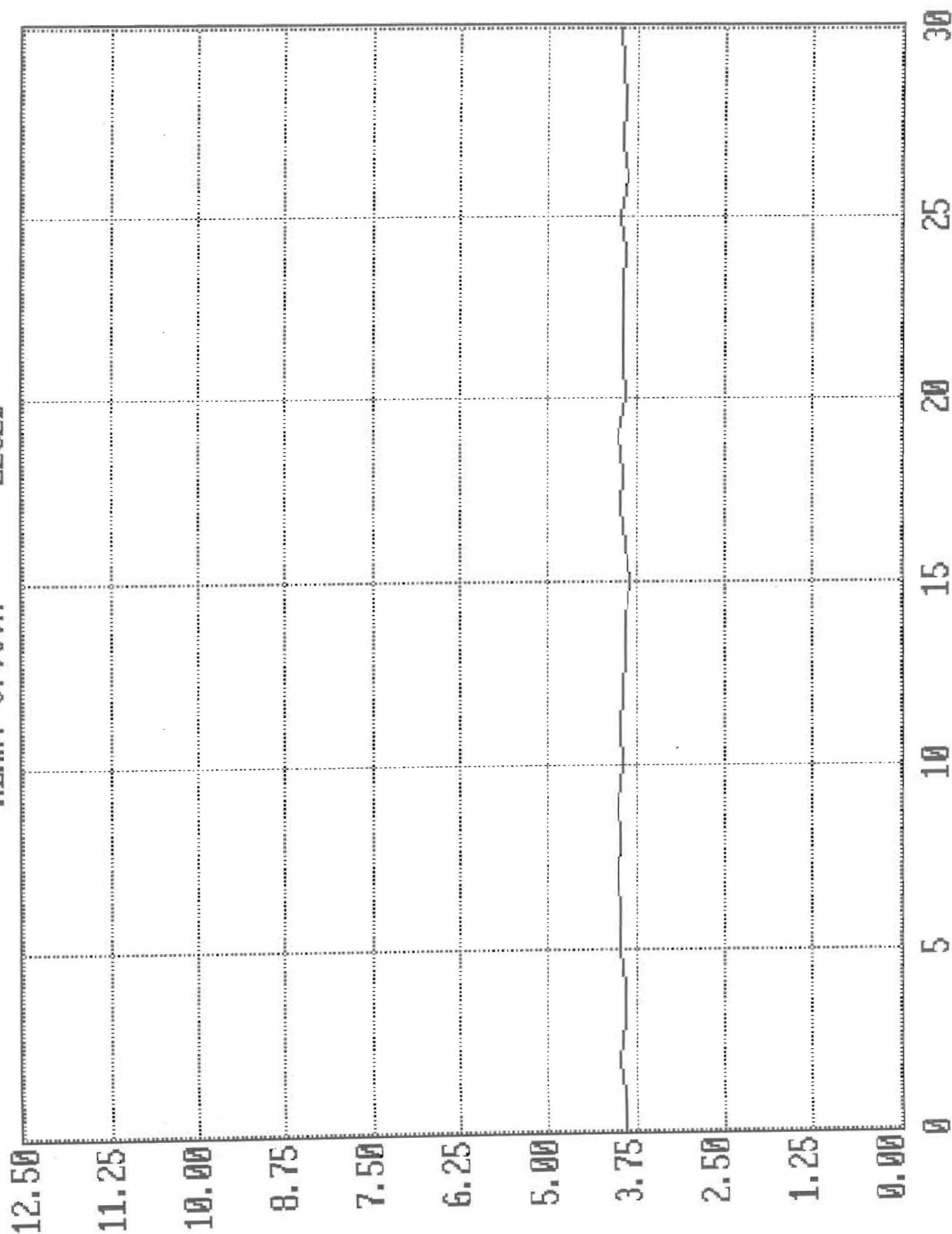
MEAN: 6.681% 22C2D



MEAN: 18.466ppm 22C2D



MEAN: 3.939% 22C2D



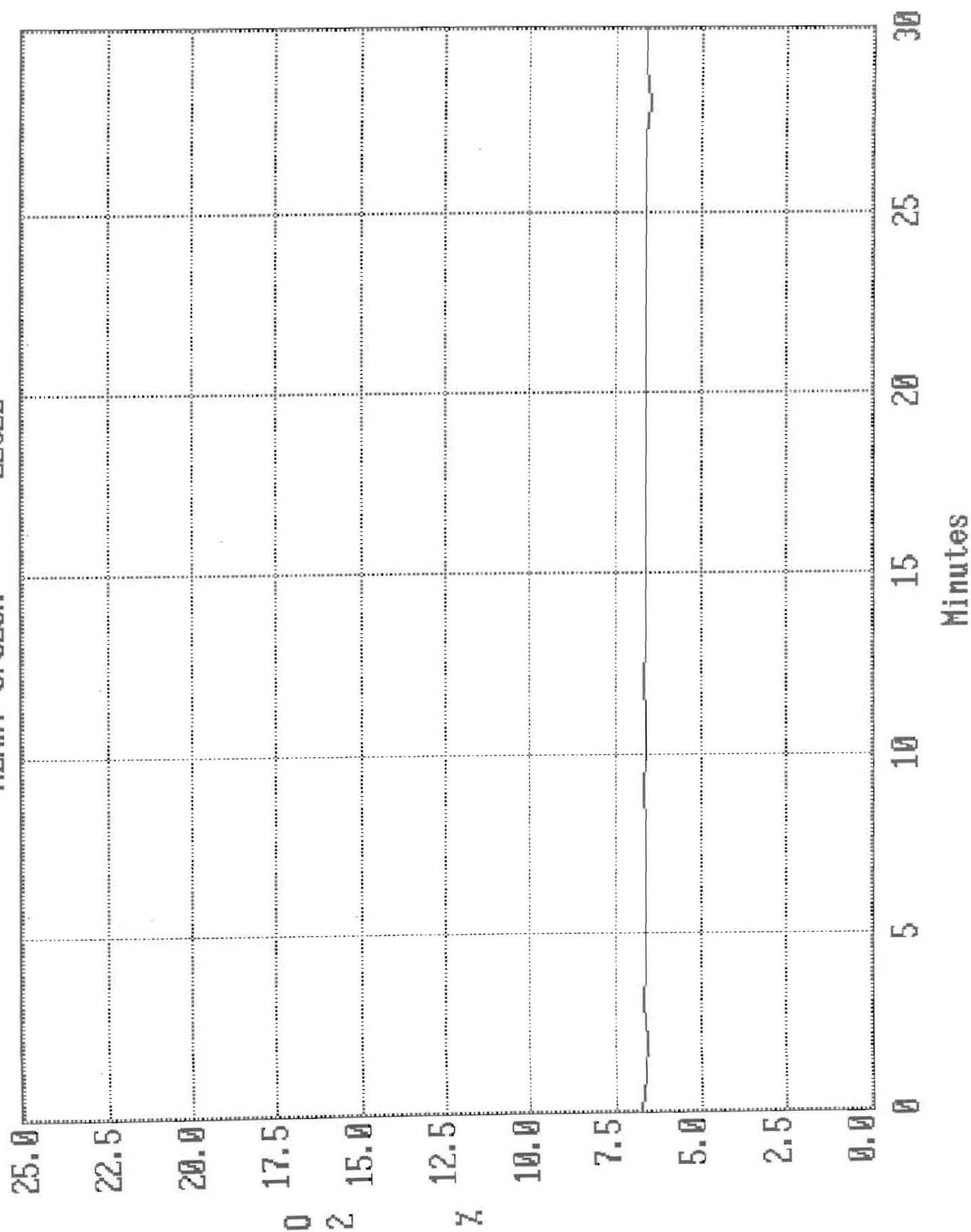
TEST DATE : 08-04-2005

START TIME: 13:16:00

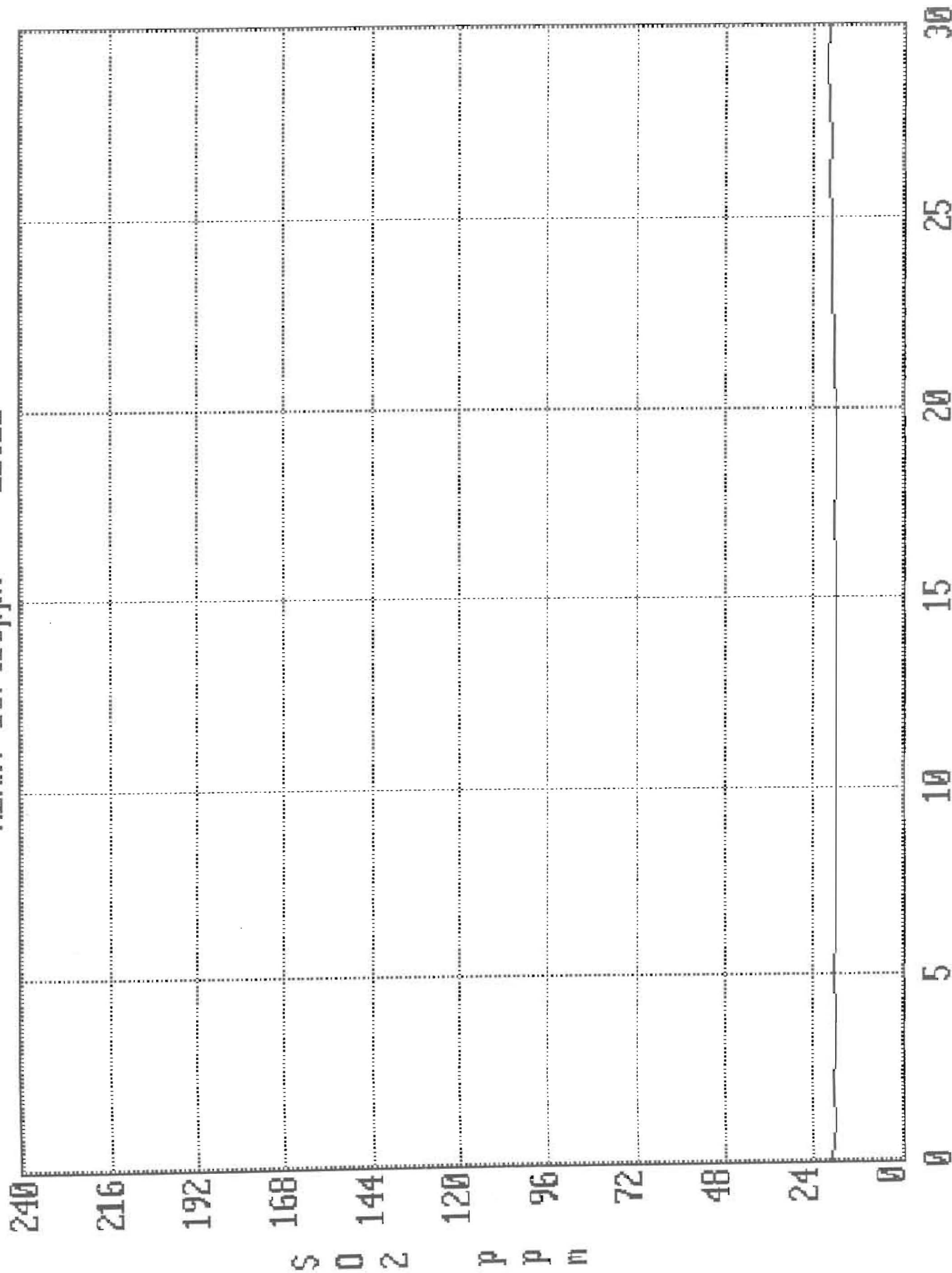
FILE NAME : C:\DAQ\22C2E .ID%

CHANNEL# CH. UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
<ANALYZER OUTPUT-VDC>								
0	4.929	0.000	2.700	0.764	0.000	1.553	1.182	0.129
1	4.941	0.038	2.662	0.726	0.000	1.563	1.029	0.073
2	5.110	0.037	2.635	0.729	0.002	1.582	1.015	0.047
3	4.950	0.000	2.690	0.708	0.002	1.547	0.991	0.107
4	4.984	0.000	2.659	0.724	0.002	1.567	1.004	0.000
5	5.128	0.024	2.644	0.728	0.001	1.573	1.012	0.050
6	4.941	0.033	2.657	0.719	0.001	1.564	0.991	0.000
7	5.164	0.002	2.644	0.722	0.000	1.594	1.004	0.070
8	5.027	0.000	2.660	0.723	0.000	1.589	1.012	0.034
9	4.854	0.045	2.668	0.713	0.002	1.586	1.017	0.077
10	4.937	0.042	2.652	0.702	0.002	1.595	1.007	0.044
11	4.991	0.009	2.658	0.714	0.000	1.587	1.007	0.051
12	4.827	0.014	2.690	0.715	0.000	1.580	0.995	0.043
13	4.948	0.040	2.660	0.710	0.000	1.584	1.003	0.037
14	5.036	0.033	2.644	0.708	0.000	1.602	1.020	0.039
15	4.982	0.002	2.655	0.715	0.002	1.585	1.017	0.013
16	4.873	0.002	2.661	0.717	0.002	1.583	1.015	0.046
17	5.003	0.049	2.655	0.730	0.000	1.583	1.034	0.075
18	5.024	0.008	2.665	0.718	0.004	1.587	1.012	0.069
19	5.010	0.052	2.665	0.715	0.000	1.580	0.998	0.021
20	4.969	0.025	2.659	0.720	0.002	1.593	1.004	0.066
21	4.969	0.027	2.663	0.729	0.000	1.580	1.003	0.046
22	4.913	0.003	2.660	0.745	0.000	1.585	0.996	0.000
23	4.762	0.033	2.651	0.754	0.000	1.574	1.002	0.047
24	4.923	0.000	2.655	0.764	0.000	1.575	1.016	0.000
25	5.025	0.009	2.665	0.755	0.001	1.569	1.014	0.000
26	4.888	0.002	2.650	0.780	0.003	1.593	1.030	0.067
27	4.960	0.017	2.642	0.771	0.000	1.584	1.016	0.020
28	5.007	0.017	2.612	0.785	0.003	1.606	1.016	0.000
29	4.943	0.024	2.660	0.804	0.004	1.591	1.025	0.043
30	5.022	0.000	2.651	0.802	0.002	1.595	1.015	0.024
MEAN	4.969	0.019	2.658	0.736	0.001	1.582	1.016	0.043
END TIME:	13:45:55							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

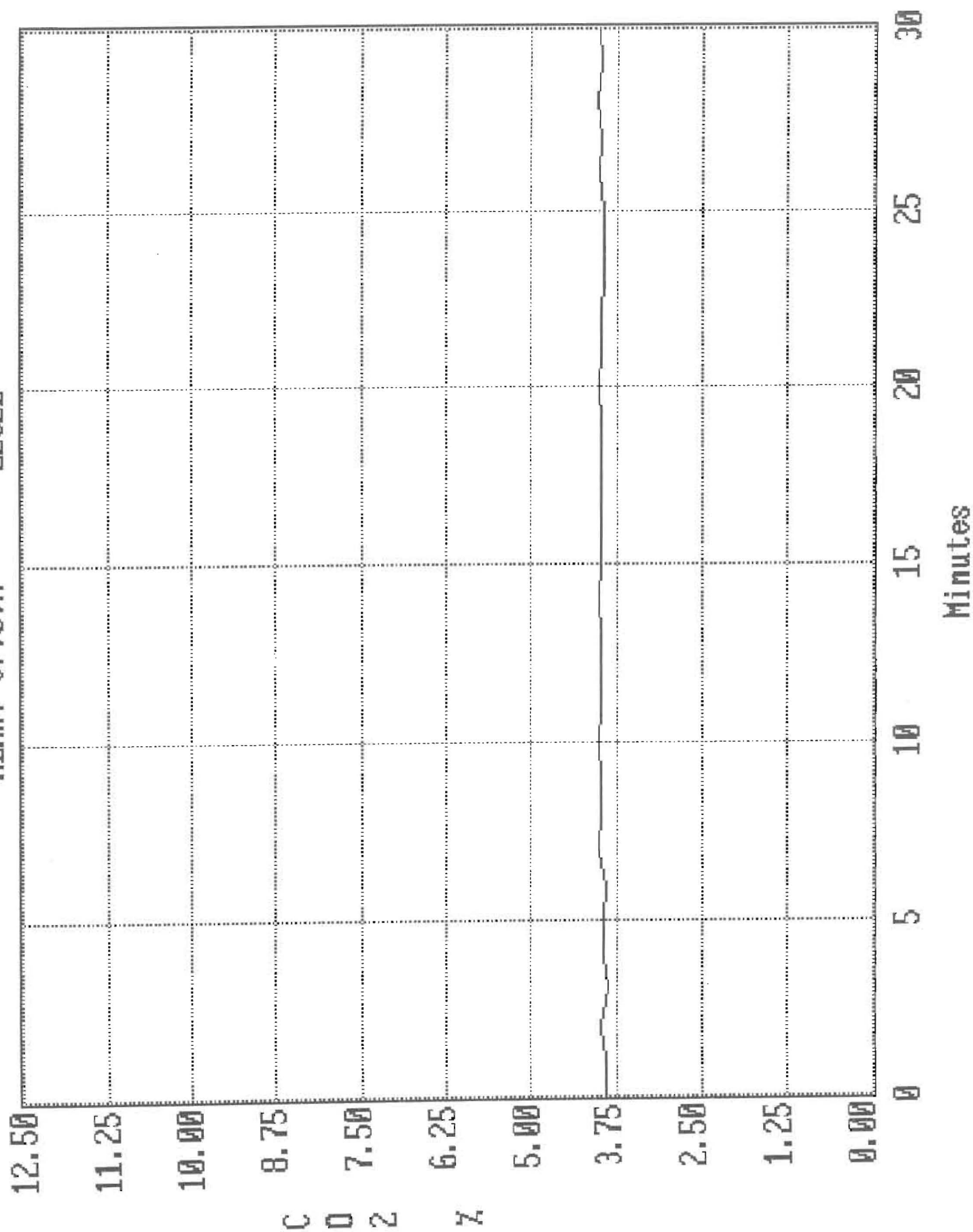
MEAN: 6.626% 22C2E



MEAN: 18.416ppm 22C2E



MEAN: 3.969% 22C2E



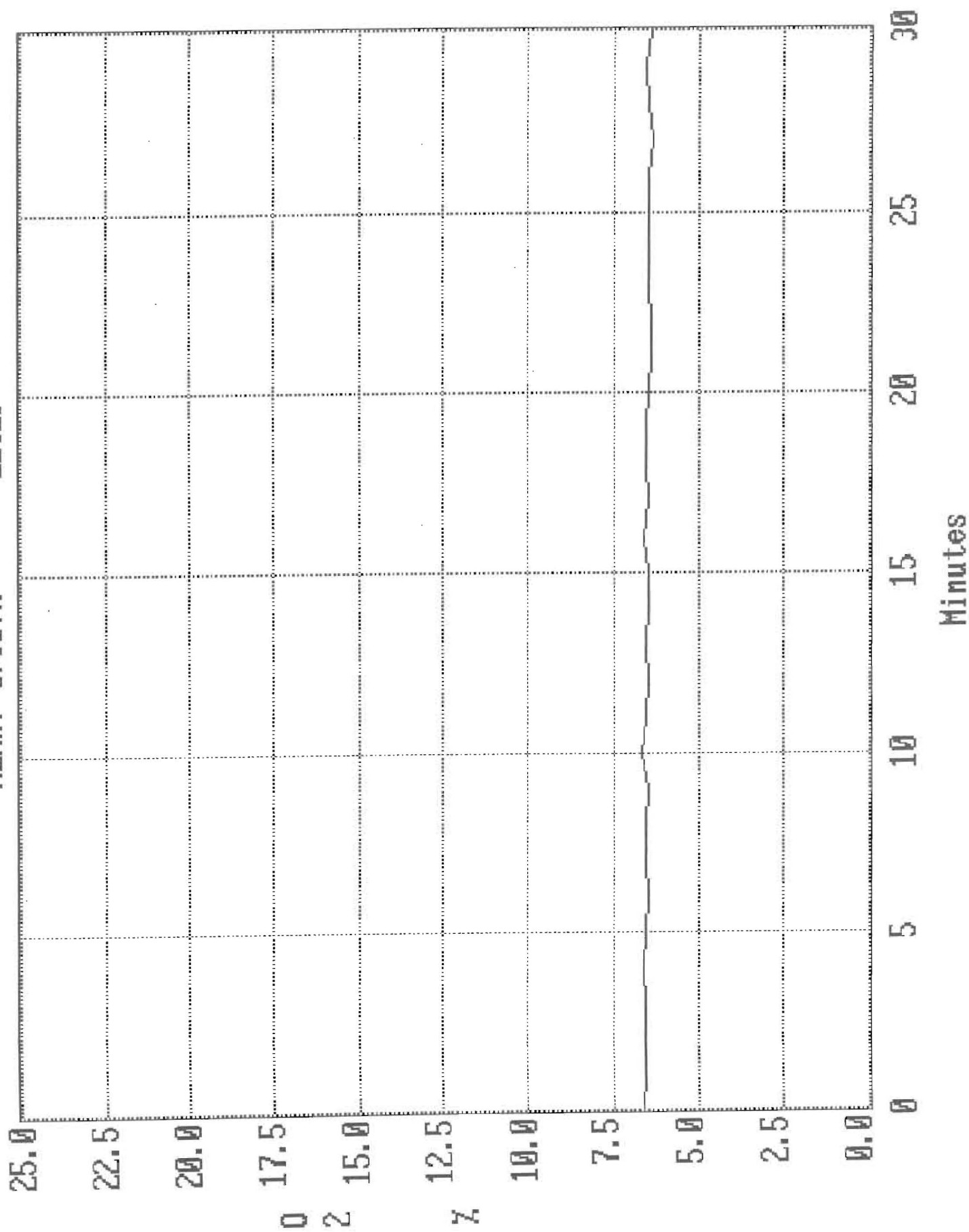
TEST DATE : 08-04-2005

START TIME: 14:00:00

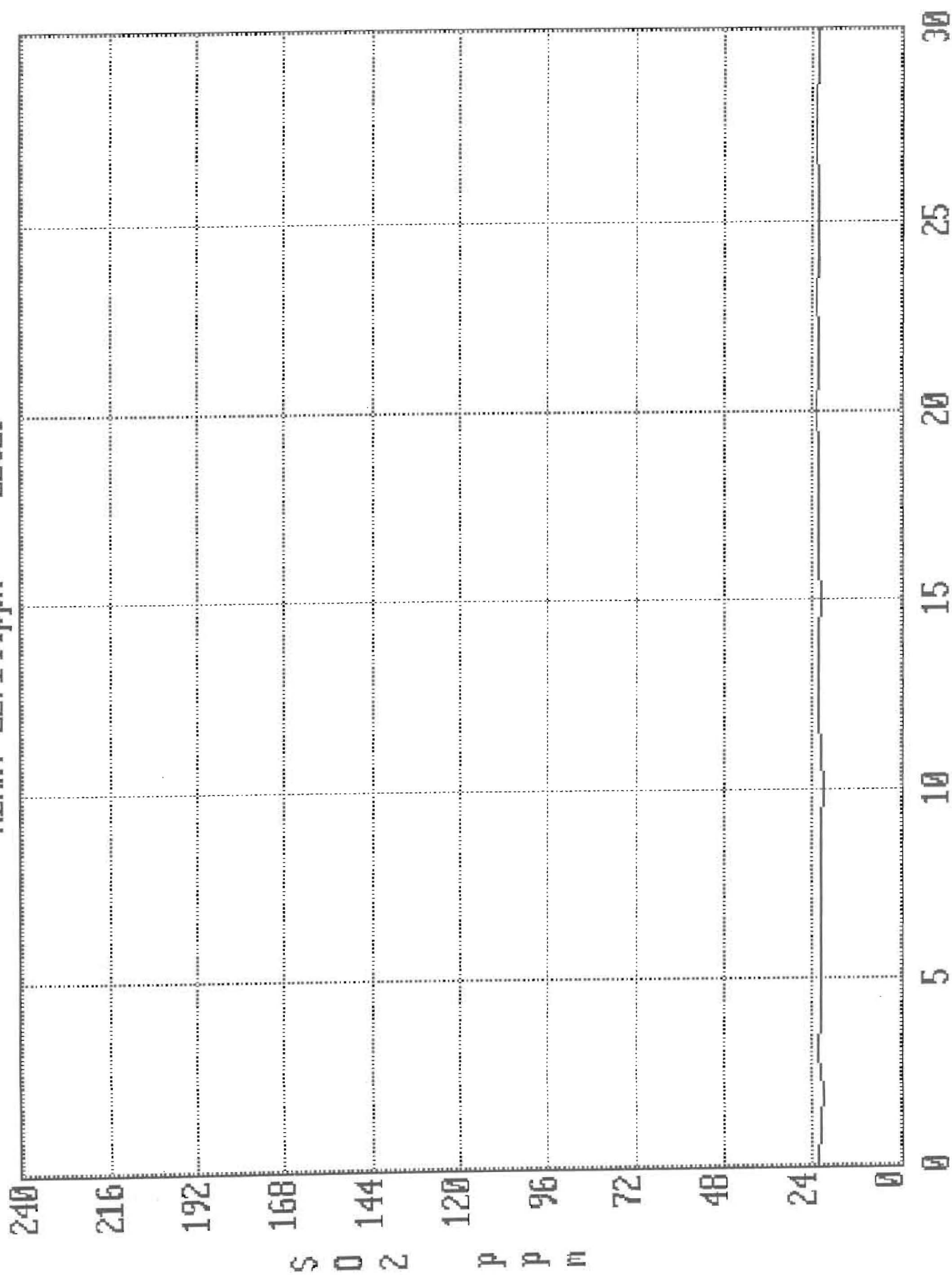
FILE NAME : C:\DAQ\22C2F .ID%

CHANNEL#	NOX	CO	O2	SO2	OFF	CO2	OFF	OFF
CH.UNITS	ppm	ppm	%	ppm	off	%	off	off
<MIN>			<ANALYZER OUTPUT-VDC>					
0	5.027	0.115	2.646	0.903	0.000	1.599	1.177	0.000
1	5.020	0.046	2.638	0.866	0.002	1.576	1.060	0.000
2	5.091	0.034	2.619	0.847	0.002	1.576	1.022	0.072
3	5.107	0.075	2.616	0.883	0.000	1.578	1.020	0.059
4	4.967	0.046	2.659	0.871	0.001	1.564	1.025	0.000
5	5.236	0.026	2.616	0.857	0.007	1.587	1.034	0.046
6	5.080	0.042	2.596	0.864	0.001	1.588	1.043	0.087
7	5.013	0.000	2.621	0.863	0.000	1.584	1.043	0.024
8	5.095	0.092	2.637	0.877	0.005	1.571	1.039	0.050
9	5.192	0.000	2.606	0.859	0.004	1.593	1.047	0.037
10	5.033	0.081	2.669	0.847	0.002	1.561	1.021	0.072
11	5.012	0.091	2.620	0.859	0.004	1.574	1.019	0.070
12	5.106	0.024	2.608	0.884	0.003	1.580	1.037	0.044
13	5.123	0.031	2.637	0.903	0.002	1.579	1.021	0.024
14	5.164	0.026	2.603	0.881	0.005	1.591	1.017	0.083
15	5.142	0.006	2.613	0.864	0.006	1.581	1.033	0.010
16	5.133	0.014	2.649	0.889	0.005	1.559	1.025	0.072
17	4.987	0.029	2.602	0.890	0.003	1.585	1.016	0.029
18	5.096	0.070	2.620	0.887	0.000	1.564	1.015	0.000
19	4.967	0.033	2.623	0.889	0.002	1.571	1.020	0.024
20	5.146	0.037	2.599	0.914	0.000	1.587	1.026	0.045
21	5.069	0.050	2.586	0.898	0.002	1.593	1.042	0.005
22	5.008	0.064	2.581	0.895	0.004	1.594	1.034	0.012
23	5.111	0.112	2.590	0.914	0.006	1.589	1.041	0.079
24	5.173	0.011	2.590	0.903	0.004	1.580	1.038	0.047
25	4.992	0.027	2.611	0.895	0.004	1.569	1.043	0.031
26	5.072	0.039	2.613	0.898	0.002	1.575	1.039	0.078
27	5.194	0.042	2.555	0.909	0.002	1.609	1.039	0.000
28	5.182	0.037	2.595	0.912	0.004	1.595	1.046	0.017
29	5.133	0.037	2.623	0.904	0.003	1.588	1.045	0.066
30	5.040	0.063	2.586	0.901	0.005	1.579	1.034	0.035
MEAN	5.087	0.045	2.614	0.885	0.003	1.581	1.038	0.039
END TIME:	14:29:55							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

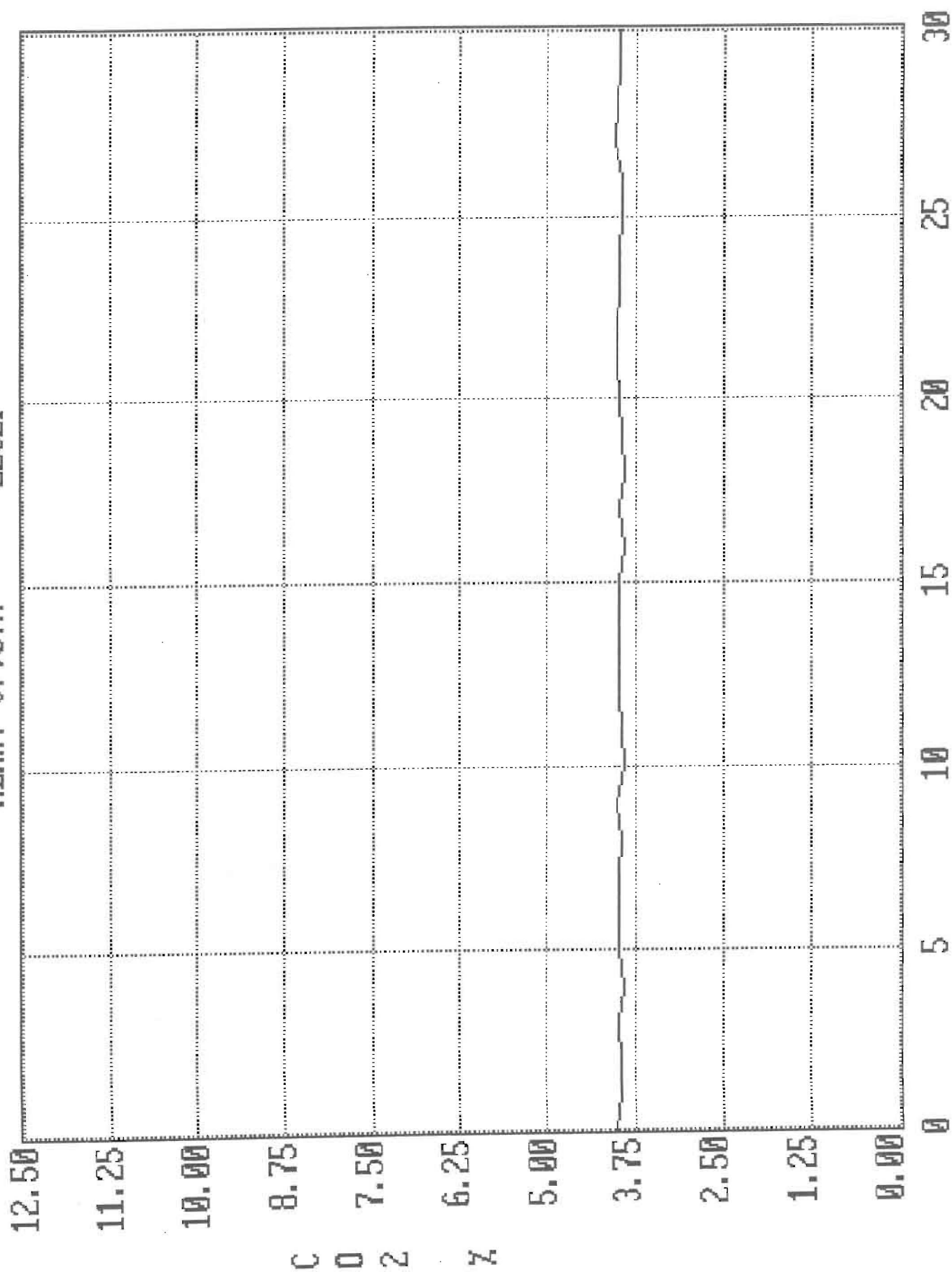
MEAN: 6.517Z 22C2F



MEAN: 22.144ppm 22C2F



MEAN: 3.967% 22C2F



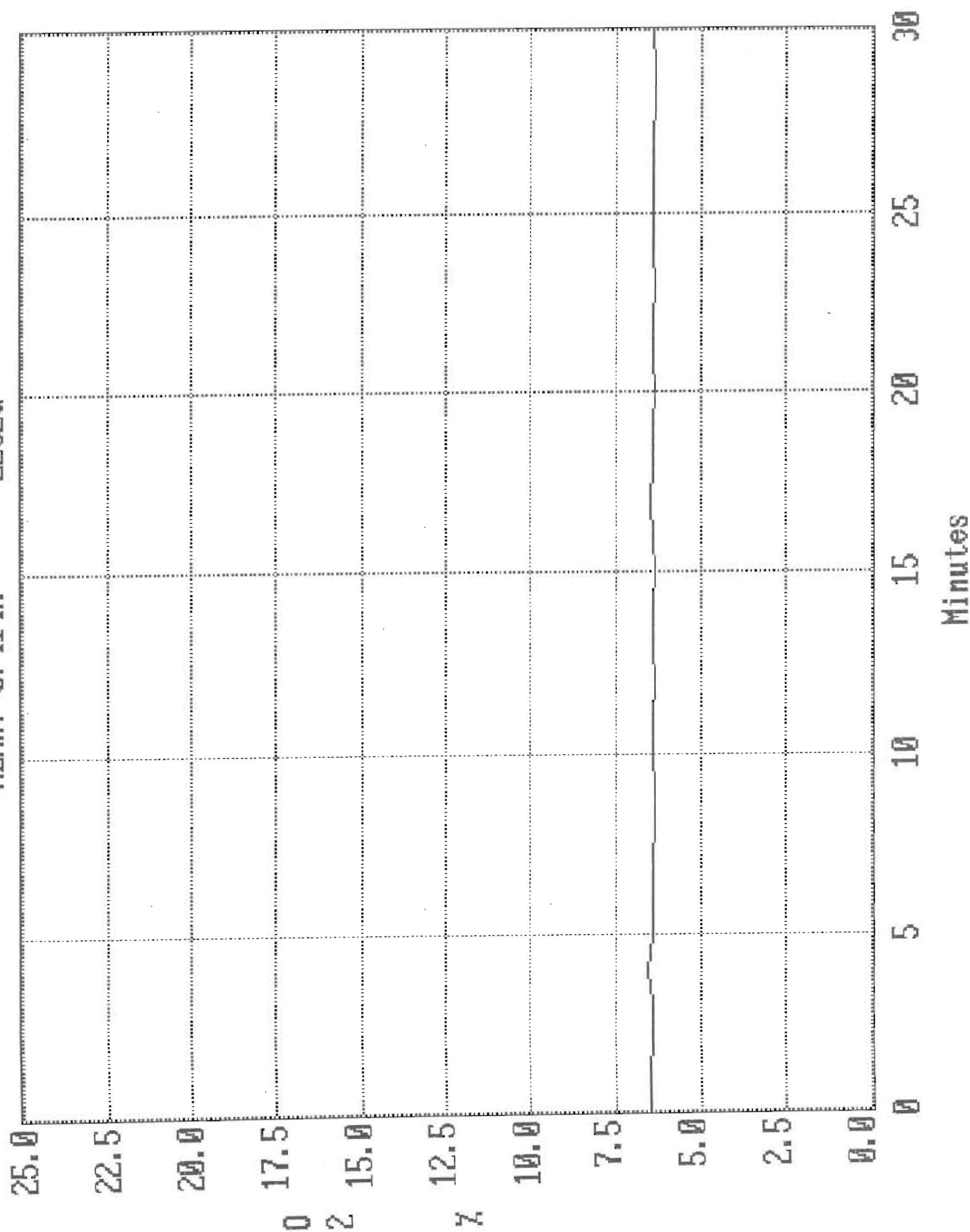
TEST DATE : 08-04-2005

START TIME: 14:44:00

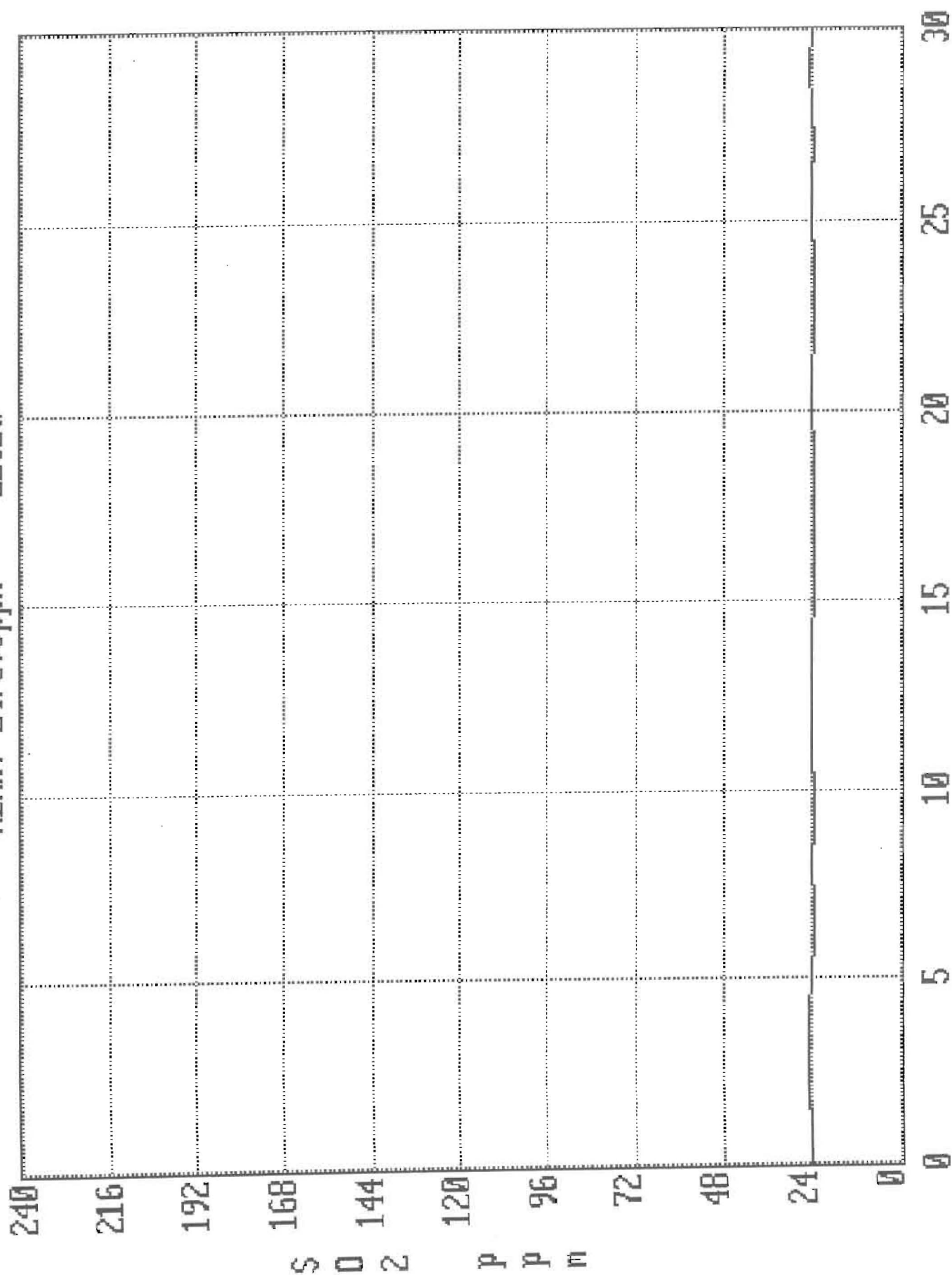
FILE NAME : C:\DAQ\22C2G .ID%

CHANNEL# CH. UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
<ANALYZER OUTPUT-VDC>								
0	4.985	0.000	2.605	0.962	0.000	1.577	1.187	0.054
1	5.046	0.058	2.593	0.964	0.006	1.585	1.050	0.058
2	5.093	0.000	2.564	0.986	0.003	1.601	1.018	0.015
3	5.113	0.028	2.587	0.991	0.010	1.582	1.007	0.048
4	5.026	0.002	2.619	0.984	0.000	1.563	0.995	0.000
5	5.203	0.040	2.587	0.974	0.007	1.566	0.995	0.000
6	5.197	0.072	2.572	0.950	0.012	1.575	0.999	0.077
7	5.168	0.016	2.573	0.951	0.000	1.569	1.004	0.045
8	5.201	0.042	2.557	0.969	0.000	1.592	1.028	0.042
9	5.137	0.055	2.558	0.952	0.008	1.572	1.029	0.019
10	5.000	0.076	2.578	0.950	0.008	1.571	1.025	0.018
11	5.116	0.037	2.569	0.968	0.001	1.579	1.029	0.082
12	5.022	0.001	2.556	0.962	0.002	1.587	1.039	0.000
13	5.062	0.015	2.566	0.962	0.000	1.596	1.043	0.083
14	5.184	0.024	2.580	0.966	0.007	1.587	1.046	0.000
15	5.011	0.022	2.555	0.946	0.007	1.588	1.034	0.003
16	5.321	0.031	2.566	0.954	0.000	1.575	1.034	0.095
17	5.198	0.007	2.591	0.955	0.000	1.570	1.047	0.076
18	5.110	0.091	2.571	0.948	0.001	1.563	1.049	0.023
19	5.256	0.000	2.572	0.955	0.000	1.573	1.044	0.000
20	5.280	0.030	2.545	0.965	0.001	1.585	1.059	0.004
21	5.174	0.039	2.575	0.968	0.000	1.570	1.047	0.017
22	5.185	0.078	2.582	0.954	0.007	1.582	1.059	0.000
23	5.229	0.014	2.555	0.951	0.002	1.573	1.064	0.089
24	5.185	0.044	2.559	0.955	0.005	1.571	1.030	0.037
25	5.211	0.047	2.570	0.972	0.004	1.586	0.996	0.014
26	5.233	0.048	2.578	0.968	0.005	1.592	1.016	0.014
27	5.082	0.006	2.585	0.954	0.005	1.567	1.010	0.000
28	5.306	0.007	2.557	0.959	0.002	1.579	1.018	0.050
29	5.272	0.000	2.548	0.986	0.007	1.580	1.020	0.026
30	5.129	0.033	2.585	0.978	0.005	1.561	1.013	0.006
MEAN	5.153	0.031	2.573	0.963	0.004	1.578	1.033	0.032
END TIME: 15:13:55								
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

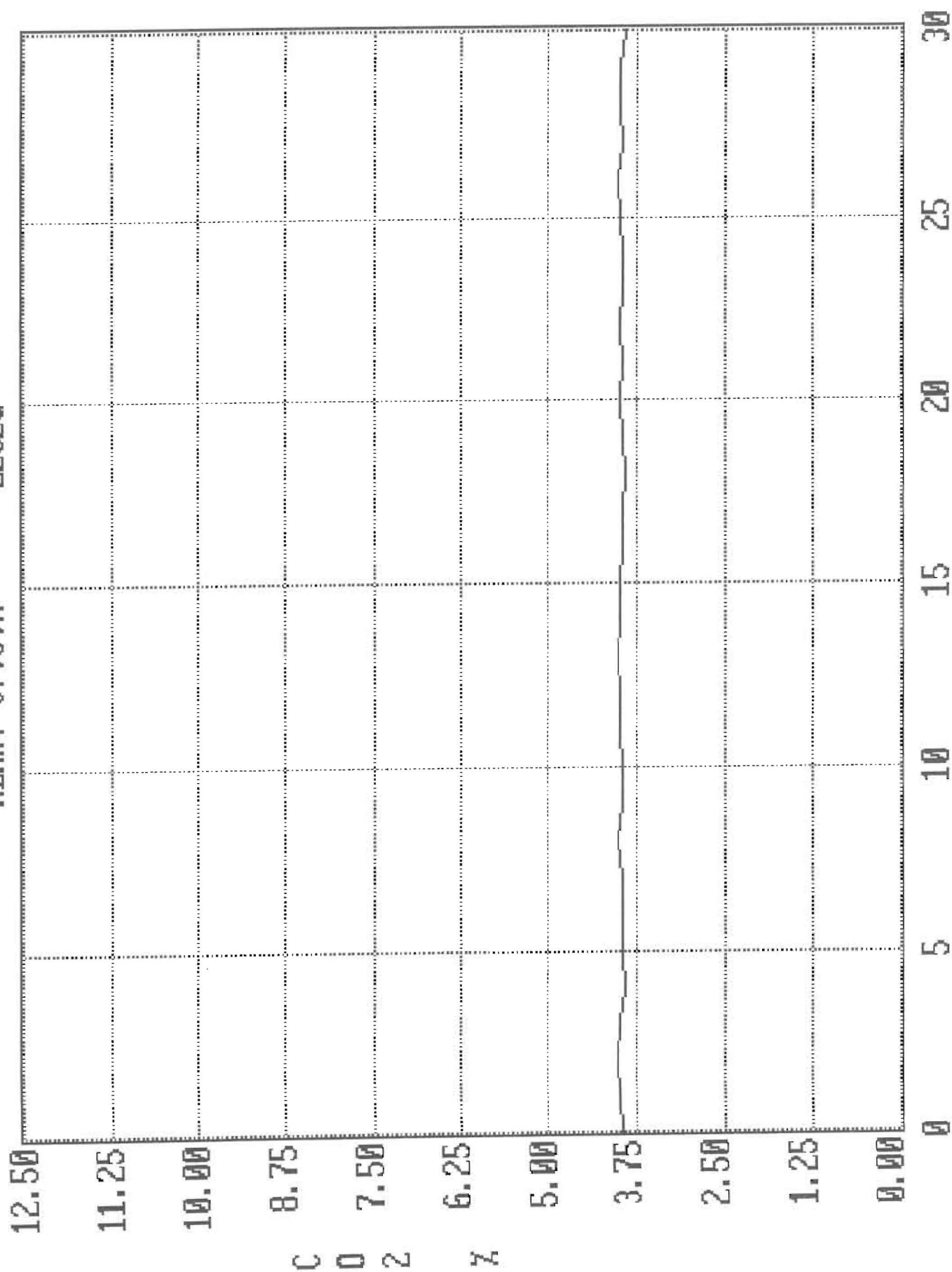
MEAN: 6.414% 22C2G



MEAN: 24.095ppm 22C2G



MEAN: 3.959% 22C2G



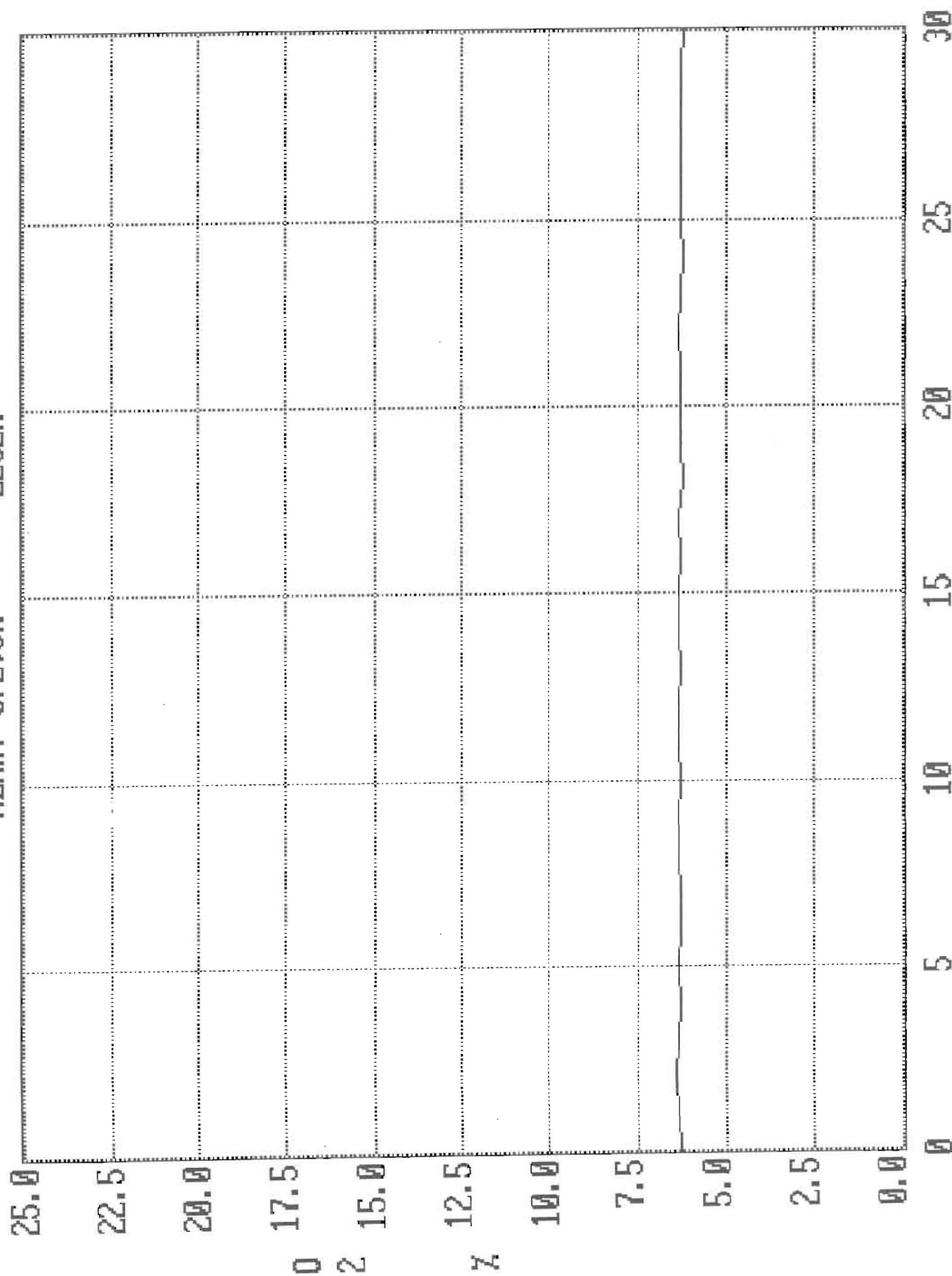
TEST DATE : 08-04-2005

START TIME: 15:28:00

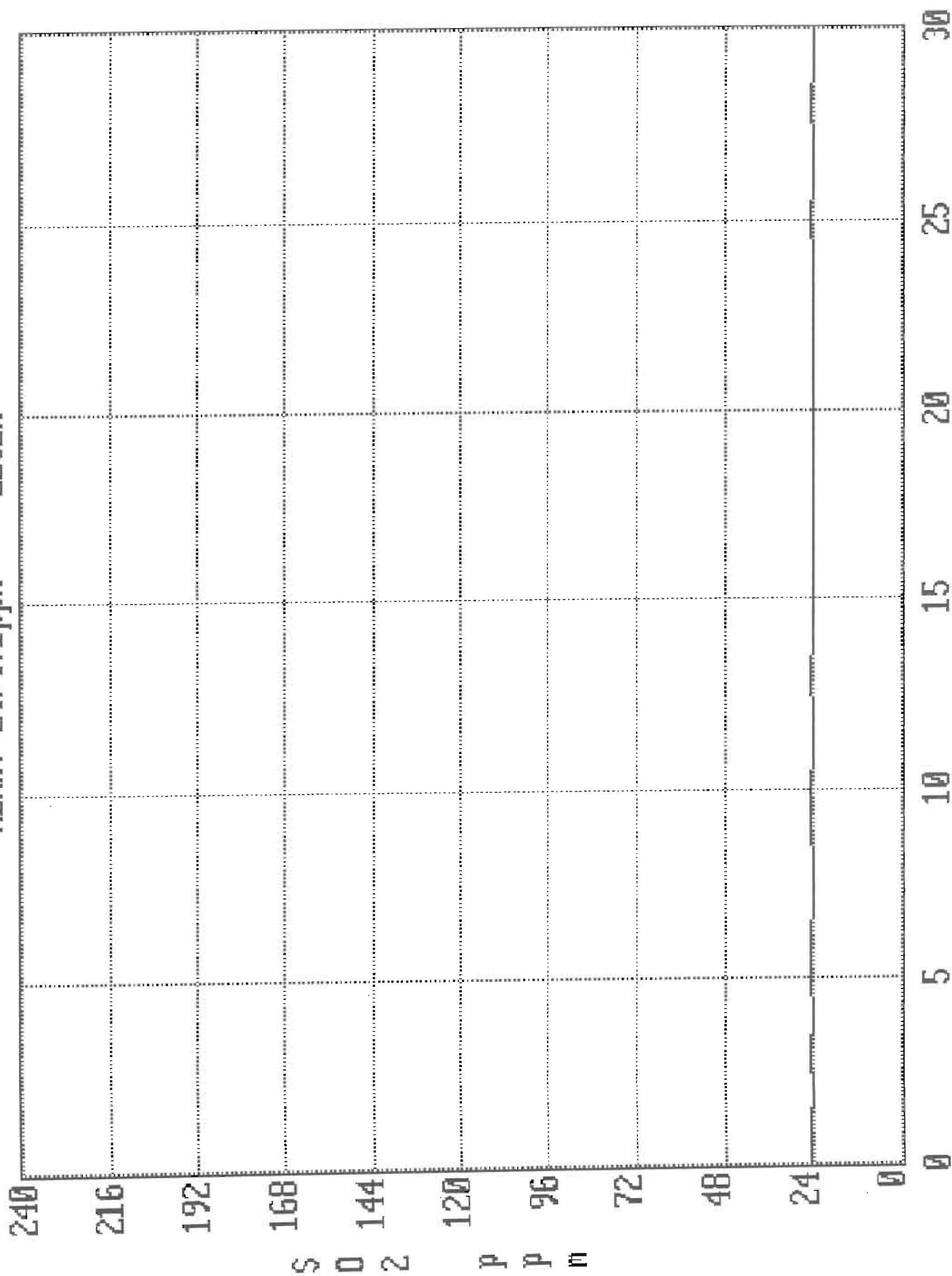
FILE NAME : C:\DAQ\22C2H .ID%

CHANNEL#	NOX	CO	O2	SO2	OFF	CO2	OFF	OFF
CH.UNITS	ppm	ppm	%	ppm	off	%	off	off
<MIN>			<ANALYZER OUTPUT-VDC>					
0	5.518	0.000	2.520	0.994	0.002	1.592	1.213	0.149
1	5.150	0.074	2.534	0.984	0.005	1.588	1.050	0.085
2	5.258	0.054	2.560	0.982	0.002	1.578	1.012	0.013
3	5.205	0.062	2.537	0.983	0.005	1.593	1.016	0.055
4	5.343	0.038	2.518	0.976	0.003	1.597	1.014	0.019
5	5.266	0.052	2.547	0.986	0.007	1.589	1.013	0.057
6	5.202	0.023	2.523	0.992	0.007	1.594	1.041	0.033
7	5.335	0.042	2.528	0.978	0.006	1.577	1.041	0.039
8	5.231	0.024	2.544	0.977	0.010	1.565	1.038	0.042
9	5.457	0.070	2.537	1.002	0.002	1.589	1.048	0.066
10	5.316	0.043	2.522	0.984	0.006	1.581	1.061	0.025
11	5.424	0.008	2.545	0.981	0.001	1.576	1.053	0.051
12	5.408	0.065	2.549	0.969	0.010	1.569	1.042	0.087
13	5.317	0.000	2.524	0.983	0.000	1.578	1.040	0.050
14	5.250	0.030	2.548	0.978	0.007	1.560	1.054	0.049
15	5.361	0.085	2.539	0.968	0.004	1.580	1.042	0.045
16	5.417	0.034	2.520	0.961	0.008	1.587	1.017	0.064
17	5.424	0.043	2.558	0.977	0.000	1.567	1.001	0.033
18	5.330	0.033	2.497	0.963	0.004	1.593	1.017	0.050
19	5.304	0.041	2.524	0.960	0.003	1.570	1.015	0.056
20	5.344	0.004	2.527	0.973	0.003	1.579	1.003	0.037
21	5.340	0.000	2.507	0.976	0.002	1.577	1.011	0.066
22	5.434	0.003	2.535	0.969	0.003	1.586	1.021	0.078
23	5.306	0.072	2.512	0.979	0.003	1.572	1.031	0.052
24	5.146	0.028	2.480	0.973	0.005	1.593	1.025	0.046
25	5.334	0.042	2.526	0.986	0.003	1.580	1.034	0.059
26	5.212	0.003	2.508	0.976	0.003	1.582	1.036	0.045
27	5.380	0.000	2.506	0.981	0.002	1.594	1.046	0.035
28	5.268	0.065	2.507	0.994	0.006	1.585	1.049	0.078
29	5.239	0.005	2.507	0.980	0.007	1.584	1.040	0.017
30	5.155	0.000	2.498	0.963	0.000	1.580	1.032	0.000
MEAN	5.312	0.034	2.525	0.978	0.004	1.582	1.037	0.051
END TIME:	15:57:55							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

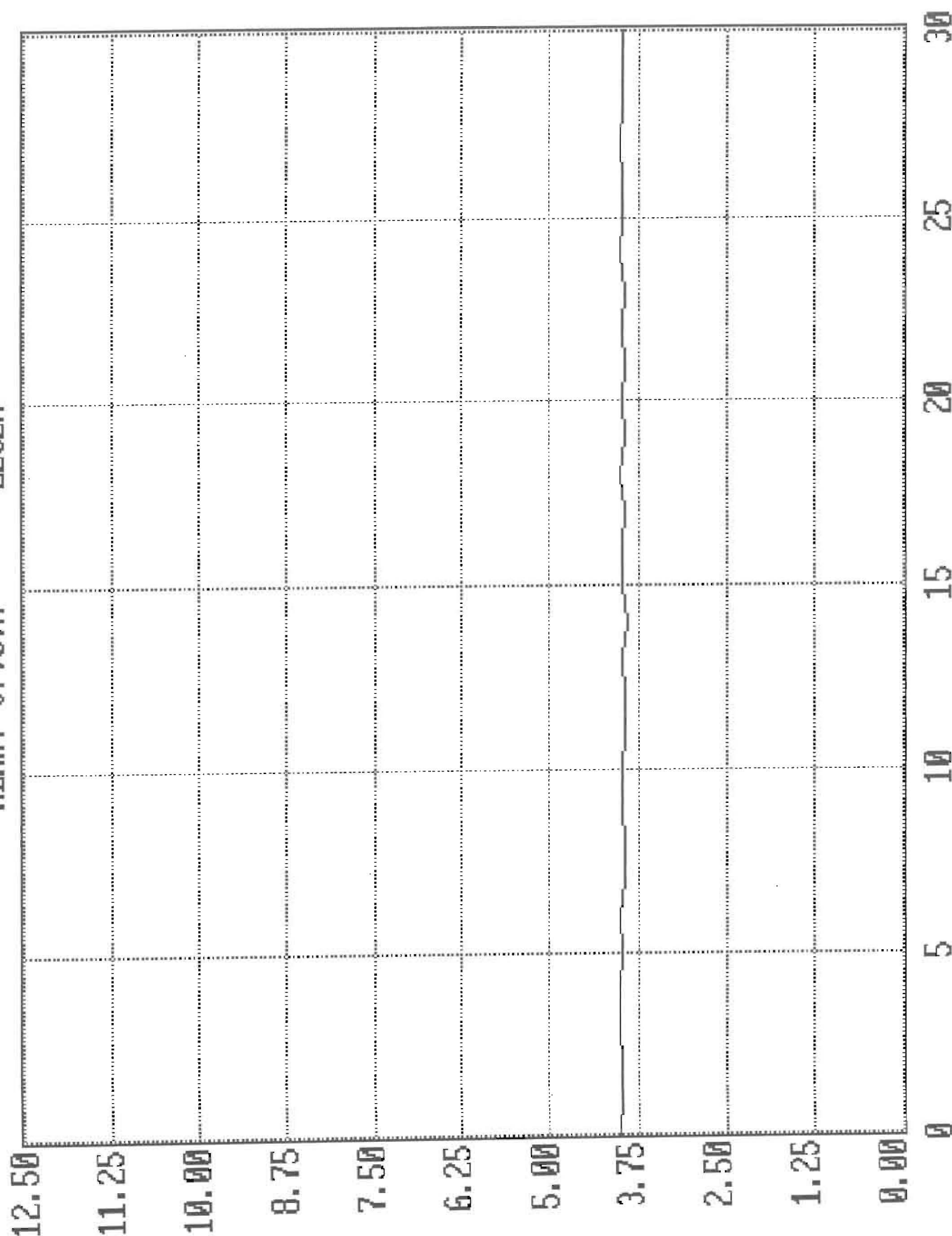
MEAN: 6.295% 22C2H



MEAN: 24.471 ppm 22C2H



MEAN: 3.969% 22C2H



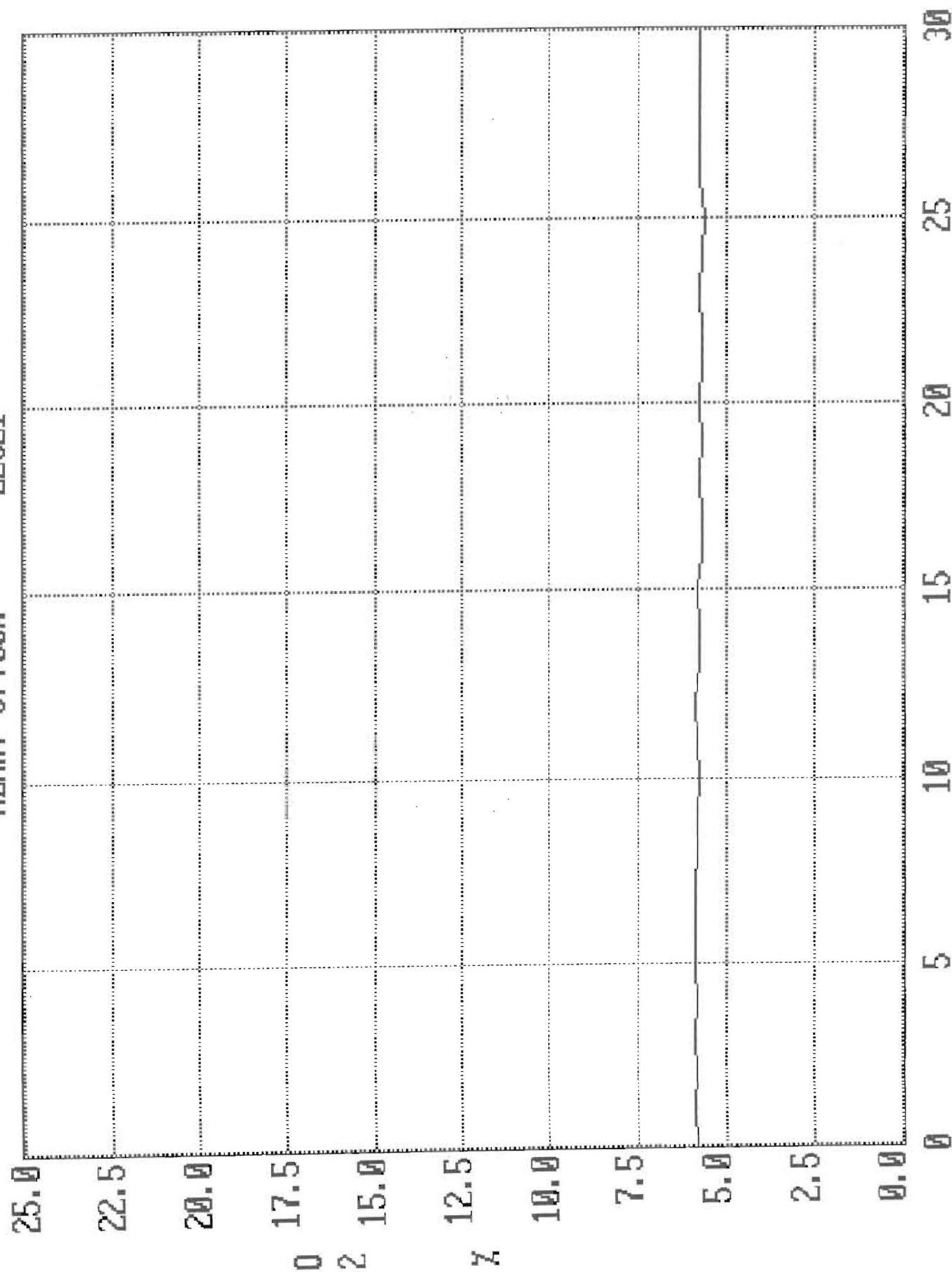
TEST DATE : 08-04-2005

START TIME: 16:14:00

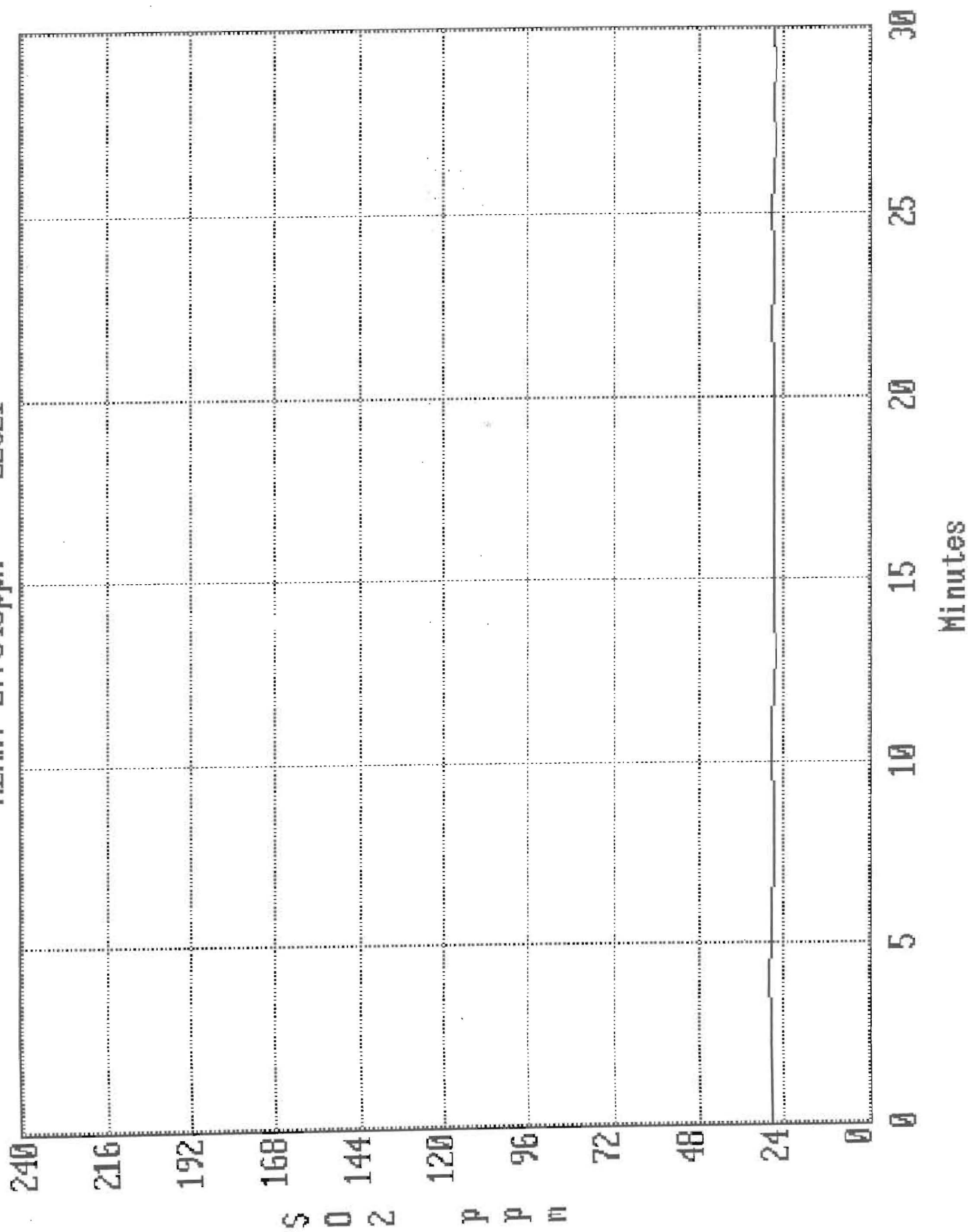
FILE NAME : C:\DAQ\22C2I .ID%

CHANNEL#	NOX	CO	O2	SO2	OFF	CO2	OFF	OFF
CH.UNITS	ppm	ppm	%	ppm	off	%	off	off
<MIN>			<ANALYZER OUTPUT-VDC>					
0	5.317	0.039	2.336	1.106	0.000	1.619	1.194	0.000
1	5.391	0.076	2.344	1.090	0.007	1.623	1.100	0.059
2	5.288	0.017	2.335	1.098	0.000	1.608	1.066	0.037
3	5.177	0.079	2.347	1.098	0.000	1.597	1.031	0.060
4	5.391	0.000	2.339	1.118	0.000	1.602	1.110	0.035
5	5.282	0.029	2.363	1.096	0.000	1.602	1.330	0.065
6	5.352	0.065	2.345	1.086	0.009	1.611	1.251	0.076
7	5.352	0.011	2.364	1.081	0.005	1.596	1.184	0.000
8	5.429	0.000	2.335	1.082	0.001	1.612	1.104	0.048
9	5.321	0.019	2.327	1.082	0.007	1.602	1.051	0.090
10	5.383	0.000	2.317	1.086	0.000	1.602	1.032	0.028
11	5.360	0.072	2.318	1.090	0.007	1.610	1.042	0.007
12	5.273	0.018	2.355	1.075	0.005	1.589	1.039	0.002
13	5.308	0.036	2.314	1.057	0.007	1.608	1.036	0.062
14	5.365	0.016	2.304	1.073	0.007	1.611	1.041	0.037
15	5.352	0.045	2.330	1.064	0.005	1.603	1.037	0.016
16	5.388	0.060	2.275	1.068	0.006	1.630	1.047	0.088
17	5.222	0.024	2.281	1.063	0.002	1.628	1.055	0.079
18	5.363	0.015	2.307	1.082	0.011	1.611	1.050	0.077
19	5.347	0.013	2.274	1.078	0.000	1.626	1.050	0.027
20	5.158	0.066	2.299	1.069	0.007	1.608	1.057	0.045
21	5.383	0.016	2.284	1.077	0.002	1.616	1.042	0.002
22	5.433	0.031	2.270	1.097	0.007	1.625	1.069	0.022
23	5.290	0.059	2.301	1.077	0.005	1.595	1.054	0.013
24	5.226	0.003	2.269	1.084	0.005	1.604	1.021	0.007
25	5.301	0.000	2.262	1.107	0.004	1.621	1.031	0.011
26	5.249	0.024	2.306	1.067	0.004	1.620	1.048	0.008
27	5.510	0.058	2.292	1.058	0.005	1.652	1.055	0.090
28	5.409	0.038	2.299	1.061	0.011	1.655	1.072	0.007
29	5.425	0.026	2.307	1.058	0.007	1.648	1.060	0.050
30	5.523	0.023	2.295	1.084	0.007	1.639	1.062	0.044
MEAN	5.341	0.032	2.313	1.081	0.005	1.615	1.078	0.038
END TIME:	16:43:55							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

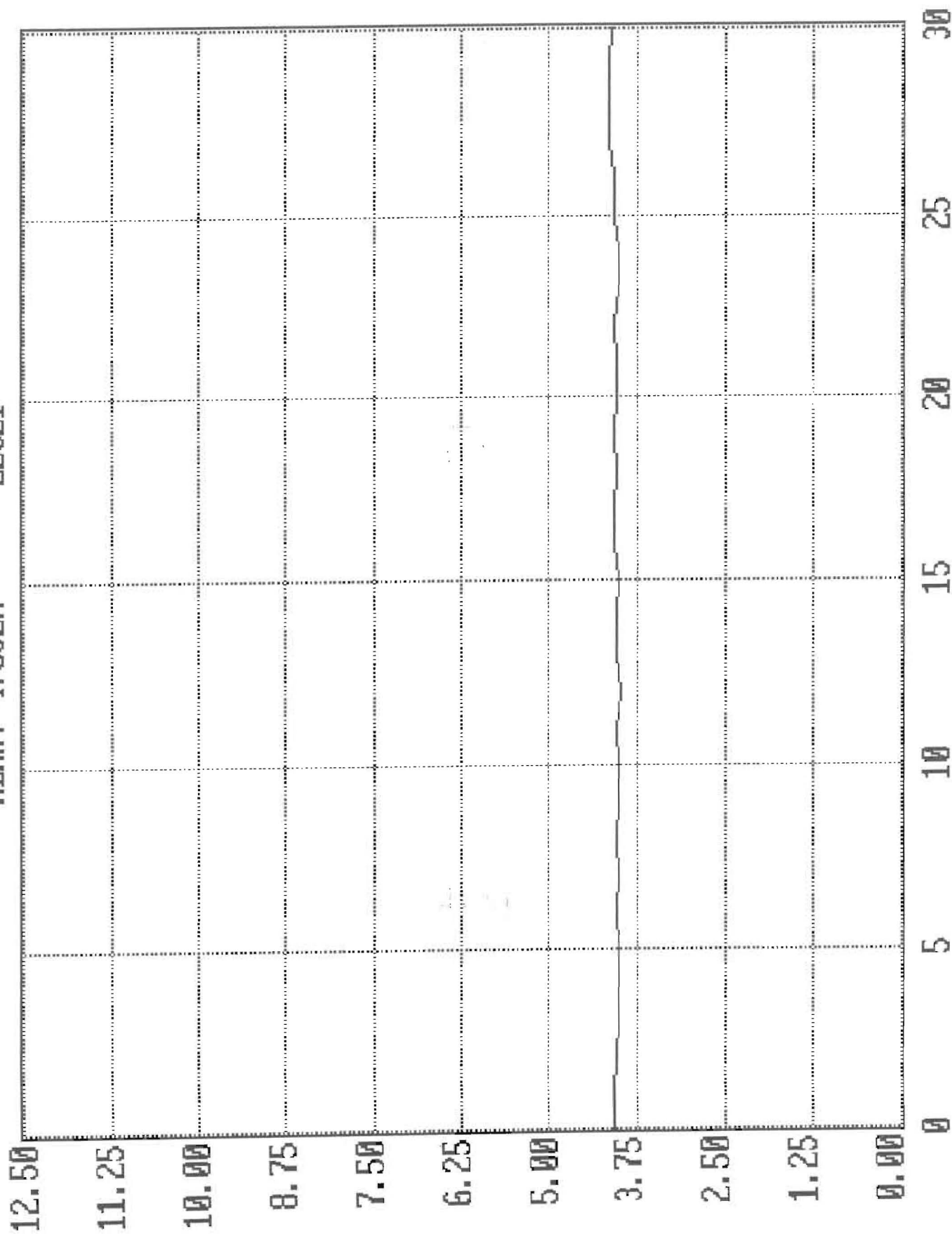
MEAN: 5.766% 22C2I



MEAN: 27.048ppm 22C2I



MEAN: 4.052% 22C2I



C 0 2 %

TEST DATE : 08-04-2005

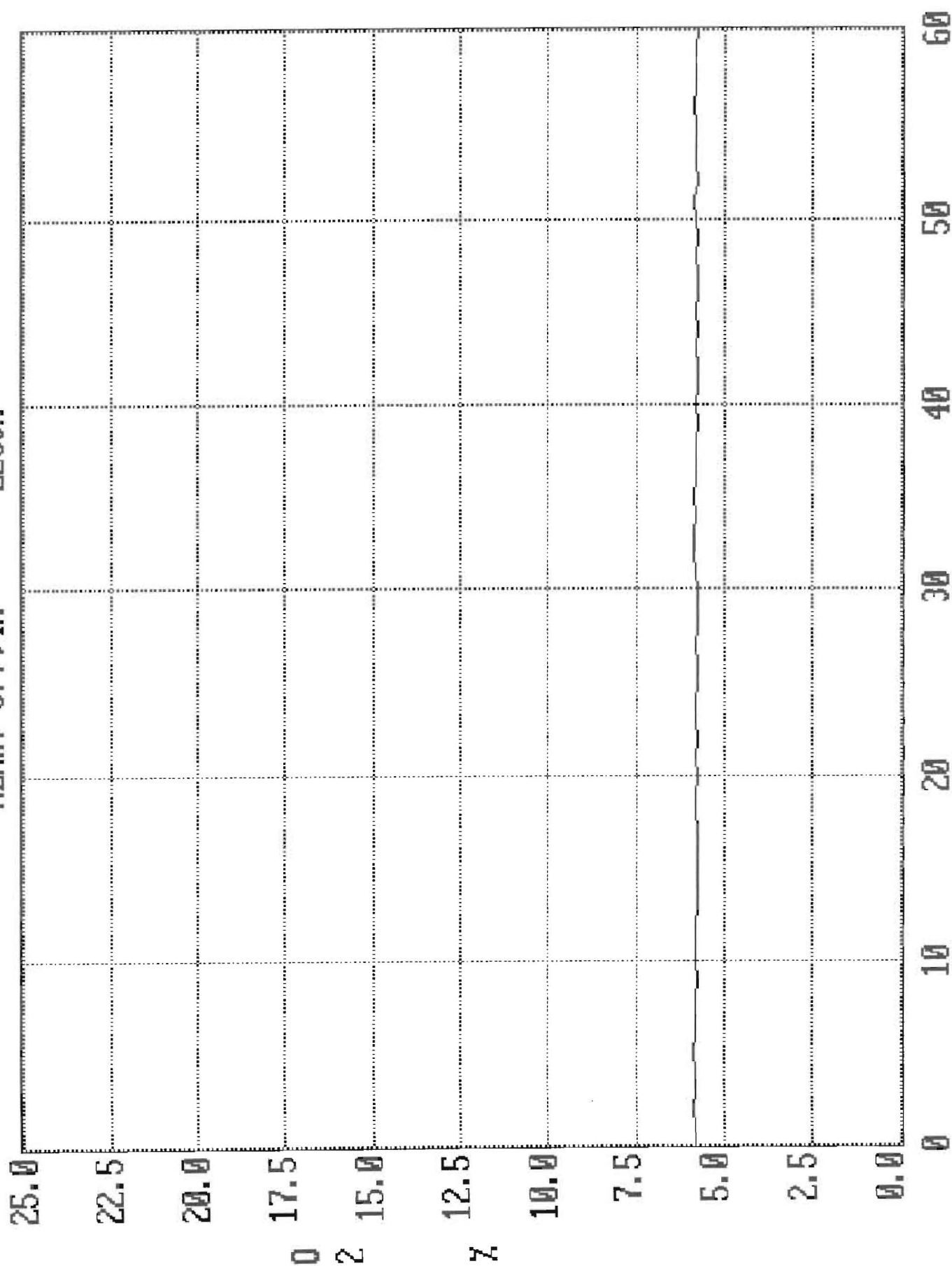
START TIME: 16:58:00

FILE NAME : C:\DAQ\22C3A .ID%

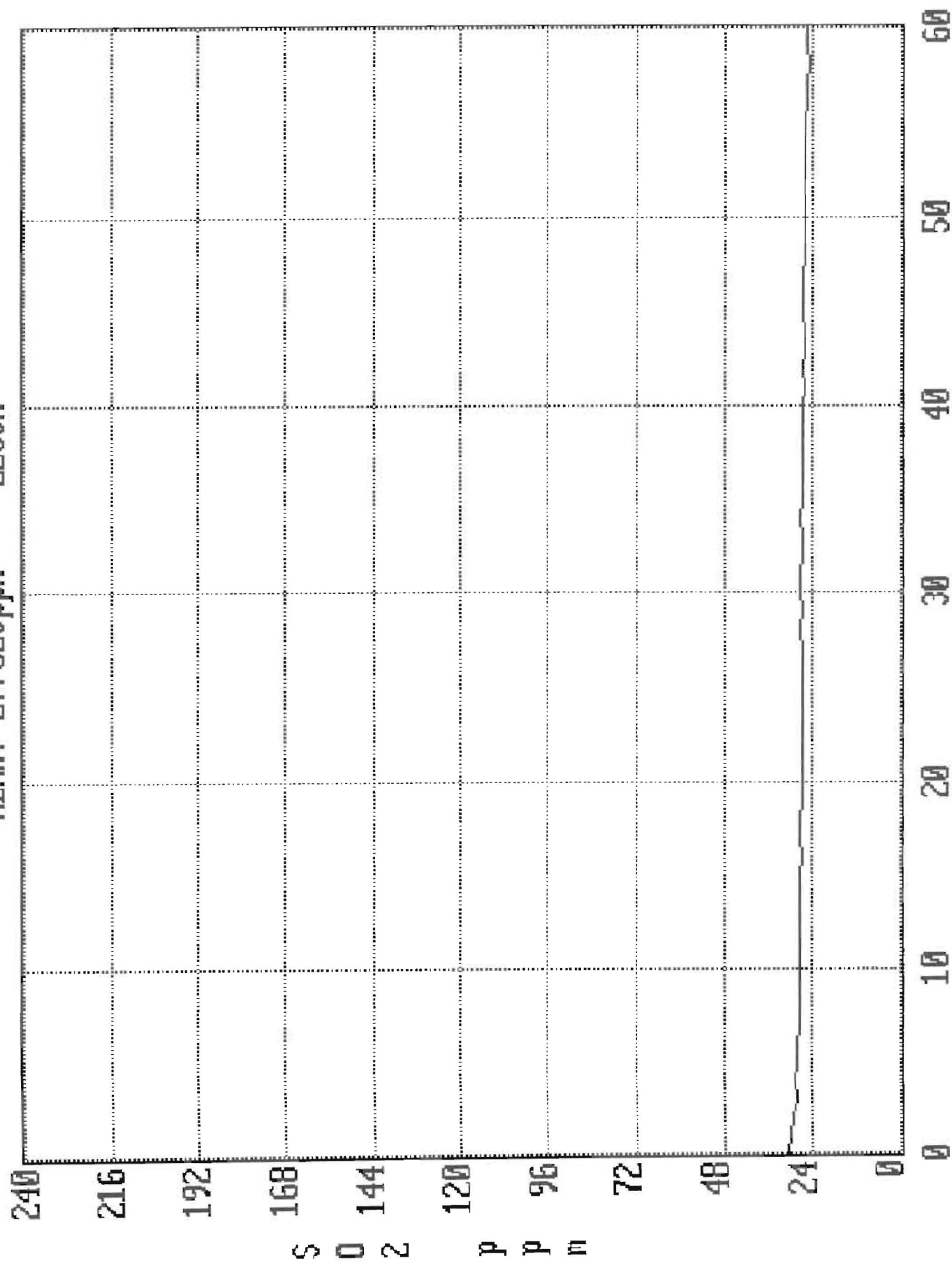
CHANNEL# CH. UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
			<ANALYZER OUTPUT-VDC>					
0	5.344	0.020	2.322	1.216	0.005	1.599	1.255	0.000
1	5.586	0.074	2.329	1.194	0.005	1.591	1.051	0.082
2	5.400	0.032	2.359	1.165	0.007	1.574	1.006	0.008
3	5.486	0.032	2.323	1.138	0.007	1.585	1.023	0.051
4	5.457	0.070	2.320	1.146	0.017	1.588	1.027	0.052
5	5.353	0.067	2.345	1.133	0.004	1.575	1.024	0.071
6	5.433	0.000	2.319	1.123	0.007	1.606	1.041	0.000
7	5.278	0.078	2.327	1.111	0.002	1.604	1.043	0.064
8	5.238	0.050	2.338	1.101	0.006	1.581	1.039	0.046
9	5.492	0.051	2.306	1.106	0.008	1.605	1.053	0.053
10	5.387	0.022	2.324	1.112	0.003	1.598	1.056	0.000
11	5.189	0.000	2.341	1.090	0.006	1.602	1.041	0.047
12	5.465	0.015	2.321	1.099	0.005	1.600	1.046	0.011
13	5.291	0.008	2.317	1.096	0.011	1.597	1.053	0.006
14	5.489	0.000	2.294	1.091	0.005	1.603	1.055	0.004
15	5.426	0.027	2.314	1.098	0.000	1.612	1.061	0.080
16	5.425	0.030	2.305	1.078	0.002	1.612	1.052	0.029
17	5.452	0.028	2.299	1.085	0.015	1.617	1.043	0.028
18	5.296	0.080	2.323	1.086	0.002	1.597	1.035	0.096
19	5.349	0.040	2.321	1.082	0.002	1.606	1.023	0.033
20	5.417	0.044	2.313	1.070	0.006	1.615	1.023	0.025
21	5.295	0.038	2.322	1.069	0.006	1.622	1.024	0.001
22	5.523	0.107	2.313	1.077	0.006	1.632	1.015	0.062
23	5.499	0.054	2.318	1.071	0.000	1.620	1.021	0.000
24	5.500	0.051	2.331	1.067	0.000	1.611	1.021	0.000
25	5.616	0.015	2.306	1.072	0.014	1.619	1.051	0.056
26	5.474	0.019	2.314	1.081	0.006	1.615	1.052	0.007
27	5.443	0.014	2.319	1.077	0.005	1.611	1.047	0.000
28	5.506	0.073	2.297	1.086	0.003	1.638	1.053	0.018
29	5.524	0.000	2.317	1.075	0.006	1.624	1.060	0.014
30	5.518	0.039	2.306	1.086	0.007	1.625	1.064	0.058
31	5.593	0.016	2.327	1.090	0.004	1.630	1.068	0.050
32	5.387	0.075	2.363	1.069	0.004	1.615	1.071	0.029
33	5.476	0.000	2.355	1.069	0.002	1.622	1.071	0.081
34	5.426	0.019	2.332	1.090	0.007	1.606	1.048	0.023
35	5.313	0.002	2.356	1.078	0.007	1.585	1.012	0.040
36	5.287	0.032	2.341	1.084	0.007	1.586	1.016	0.029
37	5.278	0.007	2.340	1.077	0.009	1.577	1.015	0.050
38	5.339	0.051	2.341	1.060	0.004	1.579	1.015	0.023
39	5.518	0.018	2.306	1.081	0.002	1.614	1.032	0.000
40	5.419	0.035	2.328	1.064	0.003	1.604	1.031	0.057
41	5.405	0.063	2.293	1.059	0.000	1.622	1.036	0.050
42	5.400	0.042	2.298	1.081	0.013	1.640	1.046	0.057
43	5.544	0.000	2.335	1.057	0.003	1.629	1.043	0.078
44	5.551	0.020	2.303	1.057	0.007	1.663	1.061	0.066
45	5.492	0.000	2.331	1.073	0.008	1.640	1.062	0.007
46	5.547	0.007	2.313	1.069	0.005	1.645	1.065	0.000
47	5.518	0.013	2.307	1.076	0.003	1.652	1.083	0.044
48	5.404	0.057	2.333	1.056	0.008	1.633	1.073	0.046
49	5.439	0.068	2.317	1.056	0.003	1.637	1.076	0.081
50	5.370	0.000	2.340	1.059	0.006	1.619	1.076	0.009
51	5.555	0.015	2.349	1.056	0.005	1.620	1.073	0.000

52	5.557	0.015	2.313	1.051	0.002	1.626	1.049	0.000
53	5.269	0.038	2.343	1.035	0.004	1.631	1.028	0.072
54	5.356	0.053	2.327	1.034	0.004	1.624	1.051	0.061
55	5.454	0.037	2.320	1.040	0.007	1.635	1.063	0.021
56	5.163	0.000	2.345	1.025	0.002	1.611	1.041	0.041
57	5.416	0.027	2.339	1.020	0.012	1.617	1.064	0.021
58	5.486	0.052	2.342	1.007	0.005	1.600	1.045	0.055
59	5.379	0.015	2.326	1.015	0.008	1.611	1.038	0.036
60	5.493	0.039	2.306	1.022	0.002	1.628	1.051	0.042
MEAN	5.426	0.033	2.324	1.080	0.005	1.613	1.049	0.036
END TIME:	17:57:50							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

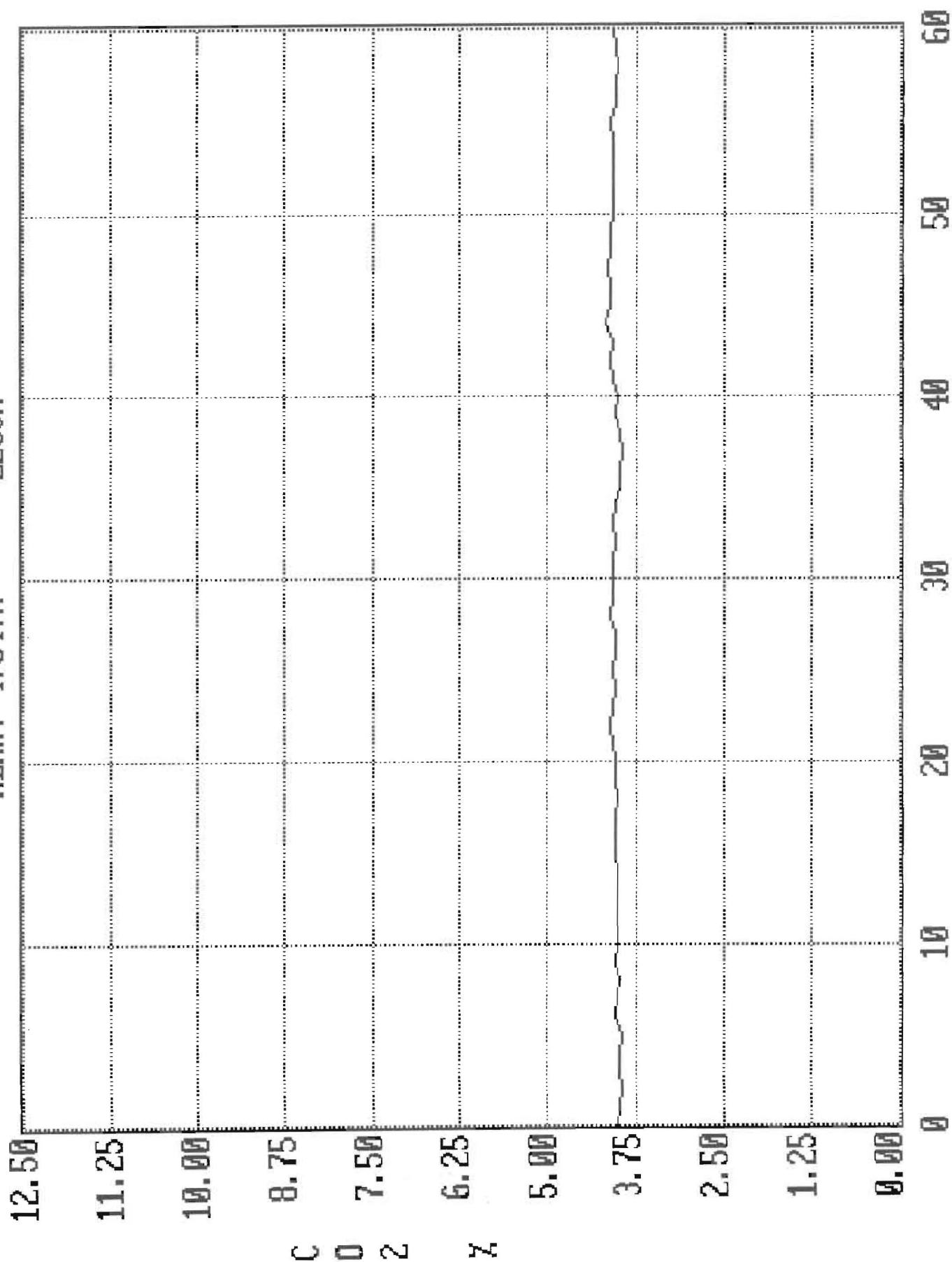
MEAN: 5.794% 22C3A



MEAN: 27.023ppm 22C3A



MEAN: 4.047% 22C3A



CJ-4022/NO. 2 SRU/C3B

TEST DATE : 08-04-2005

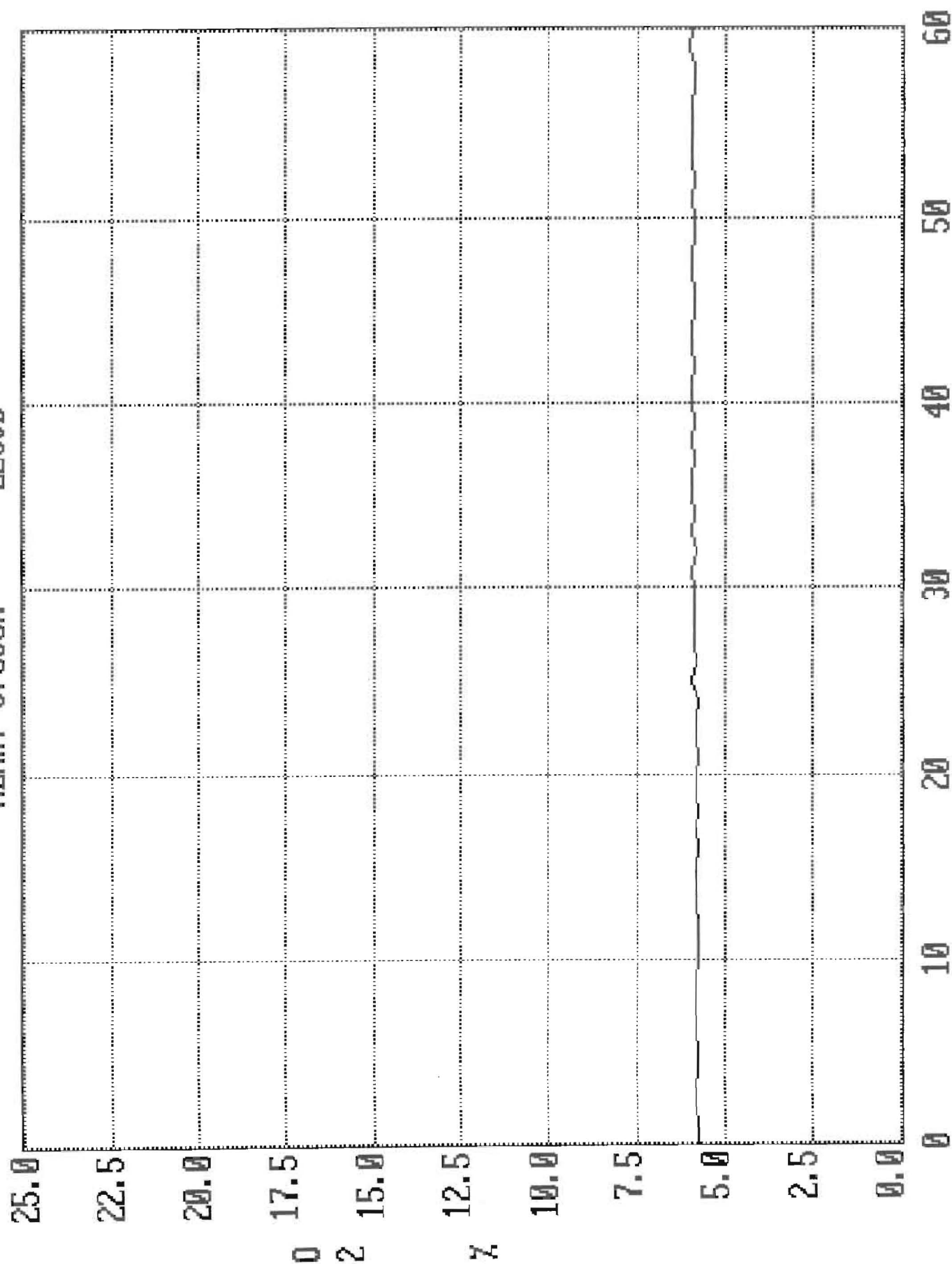
START TIME: 18:11:01

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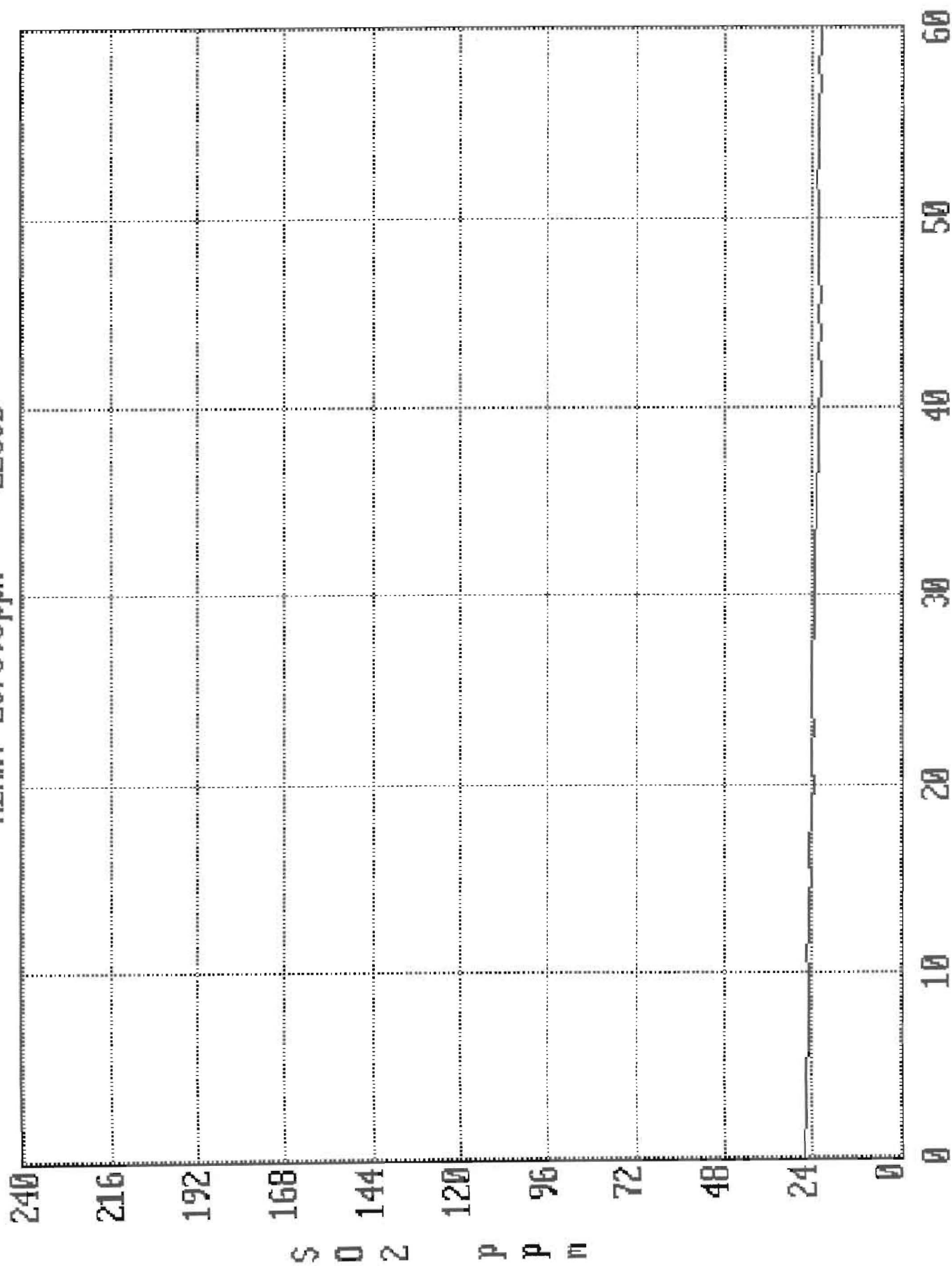
CHANNEL#	NOX	CO	O2	SO2	OFF	CO2	OFF	OFF
CH.UNITS	ppm	ppm	%	ppm	off	%	off	off
<MIN>			<ANALYZER OUTPUT-VDC>					
0	5.288	0.000	2.314	1.052	0.017	1.646	1.265	0.010
1	5.563	0.060	2.315	1.044	0.005	1.642	1.077	0.010
2	5.444	0.031	2.326	1.029	0.002	1.638	1.042	0.045
3	5.531	0.050	2.325	1.029	0.002	1.647	1.051	0.077
4	5.581	0.081	2.312	1.016	0.004	1.643	1.055	0.020
5	5.591	0.043	2.311	1.025	0.004	1.649	1.062	0.000
6	5.536	0.037	2.331	0.996	0.002	1.652	1.073	0.042
7	5.585	0.044	2.332	1.006	0.005	1.656	1.066	0.014
8	5.564	0.054	2.323	1.004	0.006	1.663	1.066	0.000
9	5.530	0.063	2.334	0.994	0.000	1.659	1.071	0.004
10	5.601	0.047	2.306	0.998	0.005	1.666	1.083	0.044
11	5.605	0.103	2.316	1.008	0.008	1.669	1.100	0.064
12	5.496	0.060	2.310	0.997	0.002	1.650	1.076	0.036
13	5.597	0.000	2.319	0.989	0.002	1.667	1.082	0.000
14	5.478	0.000	2.338	0.986	0.005	1.646	1.060	0.024
15	5.517	0.033	2.338	0.981	0.006	1.648	1.042	0.085
16	5.426	0.032	2.309	0.986	0.005	1.650	1.043	0.017
17	5.282	0.000	2.329	1.000	0.006	1.652	1.038	0.028
18	5.513	0.031	2.313	0.979	0.002	1.664	1.045	0.000
19	5.371	0.000	2.336	0.972	0.002	1.652	1.043	0.026
20	5.415	0.029	2.338	0.955	0.005	1.642	1.025	0.000
21	5.495	0.076	2.314	0.980	0.005	1.653	1.048	0.044
22	5.346	0.001	2.340	0.963	0.004	1.632	1.042	0.073
23	5.368	0.076	2.334	0.954	0.000	1.649	1.051	0.089
24	5.474	0.037	2.313	0.969	0.011	1.650	1.072	0.002
25	5.276	0.000	2.371	0.957	0.000	1.637	1.061	0.000
26	5.287	0.020	2.330	0.957	0.003	1.646	1.069	0.013
27	5.326	0.000	2.345	0.968	0.007	1.662	1.083	0.000
28	5.312	0.042	2.358	0.955	0.004	1.641	1.056	0.000
29	5.422	0.033	2.350	0.951	0.005	1.647	1.036	0.073
30	5.287	0.021	2.366	0.950	0.002	1.628	1.025	0.069
31	5.299	0.041	2.377	0.948	0.001	1.624	1.029	0.000
32	5.272	0.018	2.342	0.946	0.002	1.637	1.043	0.028
33	5.149	0.022	2.374	0.934	0.001	1.632	1.029	0.044
34	5.225	0.072	2.345	0.926	0.005	1.639	1.052	0.000
35	5.086	0.038	2.374	0.918	0.003	1.619	1.031	0.042
36	5.216	0.007	2.381	0.908	0.000	1.619	1.031	0.043
37	5.252	0.062	2.370	0.904	0.002	1.627	1.044	0.002
38	5.224	0.072	2.377	0.895	0.011	1.638	1.047	0.006
39	5.203	0.062	2.362	0.884	0.001	1.640	1.061	0.000
40	5.249	0.000	2.391	0.881	0.007	1.653	1.051	0.072
41	5.191	0.079	2.384	0.873	0.004	1.632	1.034	0.033
42	5.371	0.010	2.354	0.866	0.001	1.629	1.027	0.003
43	5.164	0.000	2.373	0.883	0.008	1.626	1.029	0.000
44	5.285	0.000	2.387	0.870	0.002	1.637	1.016	0.000
45	5.274	0.077	2.364	0.890	0.006	1.637	1.023	0.000
46	5.275	0.032	2.348	0.874	0.000	1.646	1.033	0.000
47	5.361	0.090	2.373	0.894	0.002	1.635	1.052	0.035
48	5.125	0.057	2.396	0.889	0.000	1.619	1.049	0.066
49	5.181	0.000	2.362	0.887	0.002	1.638	1.054	0.043
50	5.293	0.011	2.362	0.896	0.007	1.645	1.069	0.002
51	5.183	0.044	2.388	0.905	0.004	1.624	1.039	0.097

52	5.251	0.038	2.362	0.906	0.001	1.633	1.034	0.000
53	5.072	0.045	2.376	0.887	0.005	1.608	1.030	0.000
54	5.254	0.022	2.384	0.882	0.000	1.608	1.023	0.034
55	5.304	0.038	2.375	0.896	0.000	1.627	1.030	0.037
56	5.151	0.042	2.392	0.882	0.006	1.608	1.020	0.007
57	5.264	0.028	2.354	0.879	0.006	1.617	1.032	0.020
58	5.312	0.049	2.370	0.895	0.004	1.632	1.051	0.000
59	5.217	0.032	2.403	0.872	0.003	1.610	1.060	0.037
60	5.209	0.049	2.378	0.872	0.000	1.630	1.043	0.082
MEAN	5.345	0.037	2.350	0.943	0.004	1.640	1.052	0.027
END TIME:	19:10:50							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

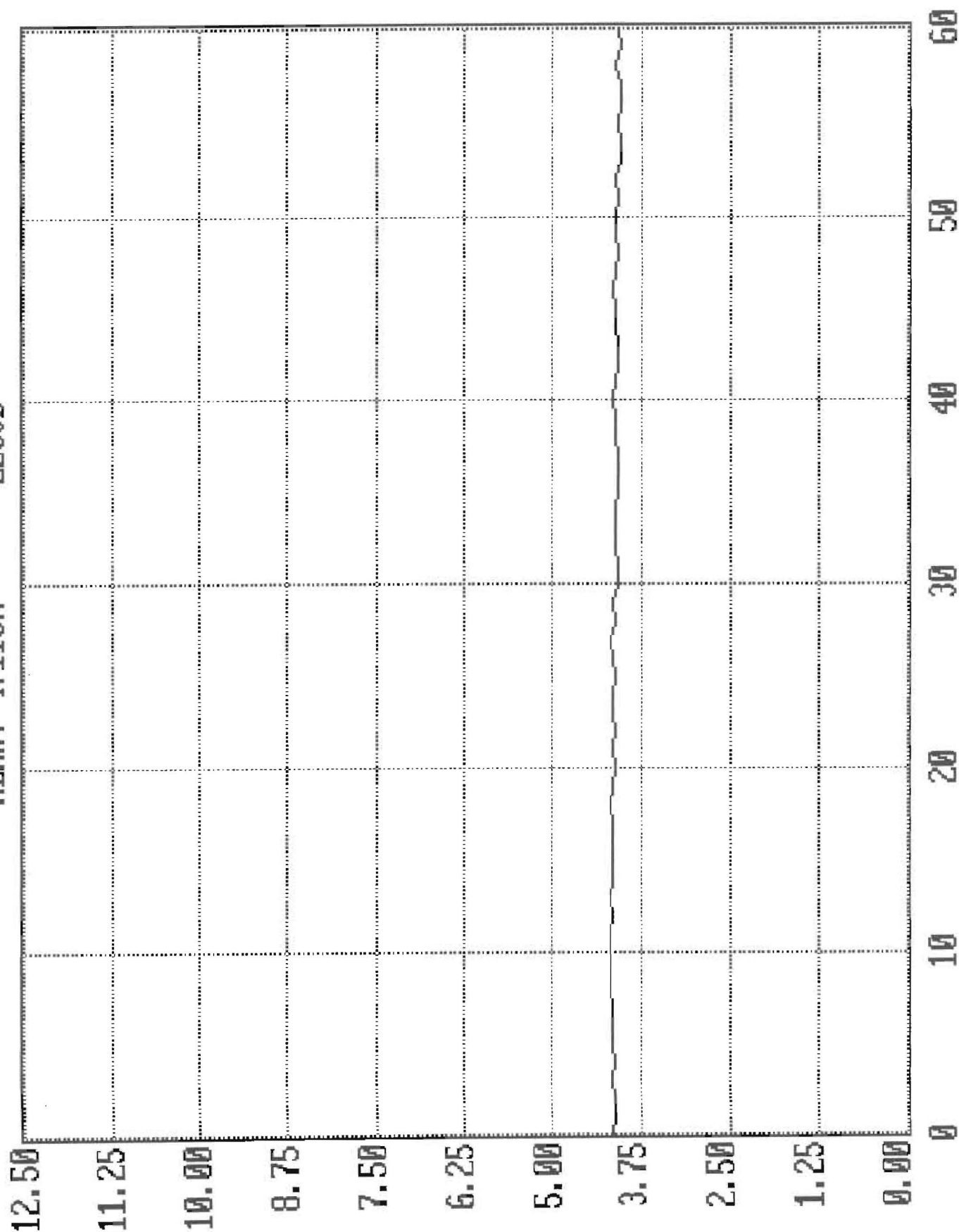
MEAN: 5.858% 22C3B



MEAN: 23.595ppm 22C3B



MEAN: 4.115% 22C3B



CJ-4022/NO. 2 SRU/C3C

TEST DATE : 08-04-2005

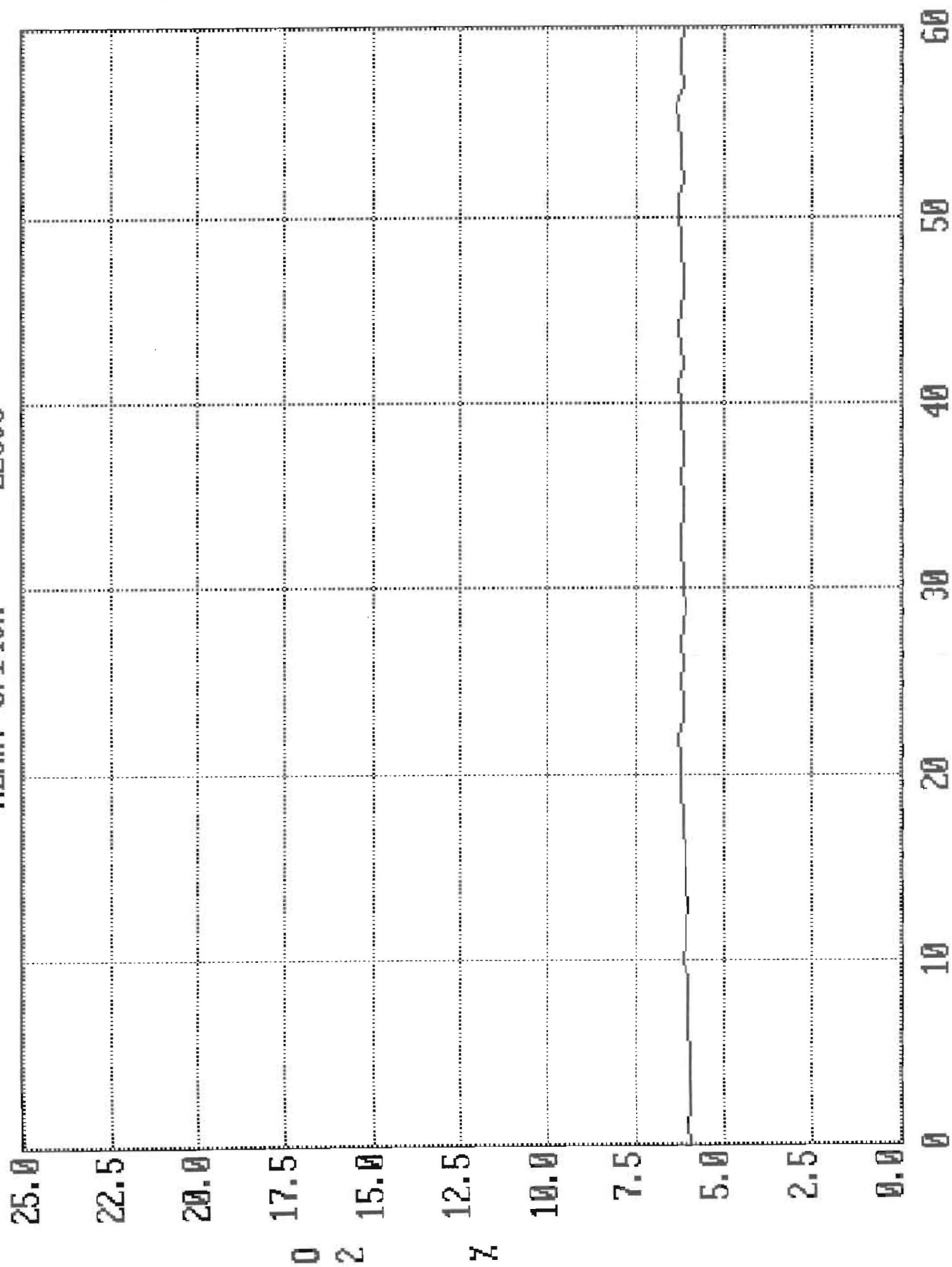
START TIME: 19:25:01

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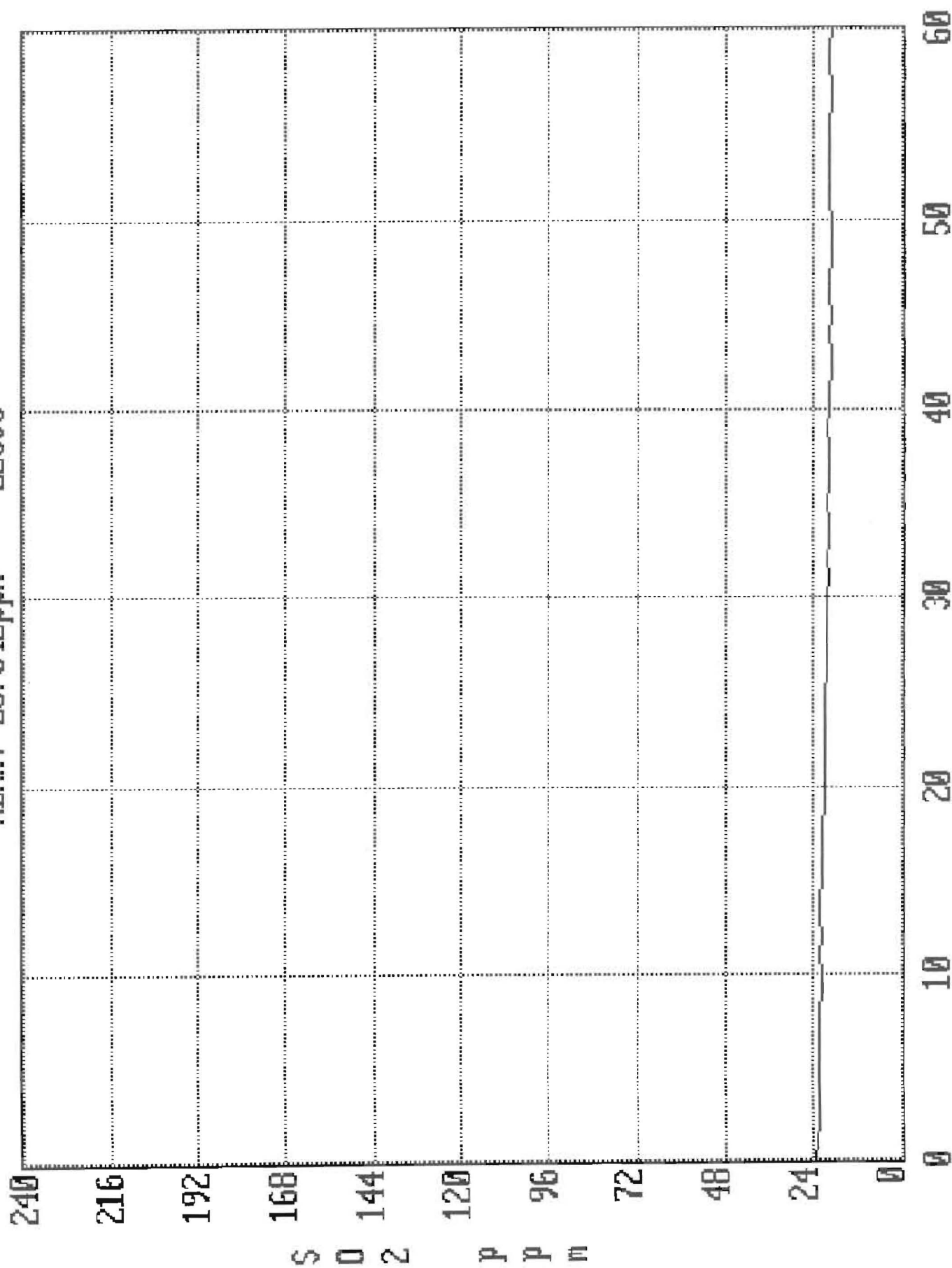
CHANNEL#	NOX	CO	O2	SO2	OFF	CO2	OFF	OFF
CH.UNITS	ppm	ppm	%	ppm	off	%	off	off
<MIN>			<ANALYZER OUTPUT-VDC>					
0	5.442	0.017	2.395	0.938	0.000	1.619	1.191	0.000
1	5.254	0.028	2.403	0.908	0.000	1.621	1.057	0.020
2	5.431	0.013	2.381	0.897	0.010	1.637	1.042	0.091
3	5.265	0.007	2.371	0.884	0.011	1.639	1.060	0.077
4	5.438	0.017	2.371	0.894	0.005	1.646	1.064	0.020
5	5.390	0.037	2.389	0.903	0.004	1.632	1.078	0.070
6	5.405	0.023	2.405	0.888	0.011	1.646	1.090	0.000
7	5.442	0.012	2.418	0.883	0.000	1.634	1.056	0.015
8	5.485	0.001	2.410	0.880	0.005	1.664	1.066	0.012
9	5.404	0.015	2.404	0.878	0.000	1.665	1.062	0.058
10	5.470	0.012	2.454	0.878	0.007	1.646	1.056	0.000
11	5.690	0.039	2.431	0.883	0.004	1.633	1.050	0.027
12	5.574	0.009	2.446	0.863	0.004	1.619	1.041	0.072
13	5.658	0.000	2.424	0.884	0.006	1.648	1.073	0.127
14	5.668	0.037	2.448	0.885	0.002	1.641	1.095	0.028
15	5.476	0.026	2.436	0.859	0.003	1.653	1.092	0.023
16	5.462	0.041	2.441	0.860	0.002	1.654	1.076	0.030
17	5.494	0.066	2.472	0.863	0.007	1.634	1.068	0.048
18	5.344	0.050	2.454	0.862	0.006	1.652	1.054	0.000
19	5.337	0.000	2.490	0.847	0.000	1.615	1.044	0.062
20	5.411	0.000	2.489	0.838	0.006	1.617	1.040	0.019
21	5.234	0.127	2.502	0.845	0.002	1.584	1.032	0.000
22	5.157	0.102	2.524	0.834	0.001	1.575	1.003	0.009
23	5.098	0.000	2.473	0.830	0.003	1.604	1.034	0.071
24	5.130	0.014	2.465	0.834	0.002	1.619	1.060	0.029
25	4.997	0.000	2.486	0.842	0.007	1.593	1.043	0.046
26	4.906	0.033	2.458	0.815	0.007	1.614	1.031	0.028
27	5.061	0.051	2.486	0.818	0.006	1.593	1.032	0.003
28	4.963	0.067	2.465	0.816	0.002	1.620	1.042	0.031
29	5.028	0.014	2.448	0.821	0.002	1.624	1.037	0.026
30	5.008	0.004	2.472	0.804	0.002	1.620	1.034	0.044
31	4.993	0.053	2.468	0.799	0.002	1.606	1.037	0.089
32	5.219	0.000	2.483	0.806	0.002	1.608	1.042	0.059
33	5.109	0.000	2.494	0.794	0.002	1.580	1.041	0.000
34	5.142	0.000	2.472	0.802	0.002	1.601	1.050	0.030
35	5.234	0.041	2.459	0.806	0.007	1.617	1.056	0.020
36	5.067	0.000	2.479	0.788	0.006	1.618	1.060	0.013
37	5.033	0.042	2.469	0.800	0.000	1.623	1.048	0.051
38	5.104	0.078	2.454	0.800	0.004	1.628	1.038	0.048
39	5.024	0.016	2.492	0.806	0.006	1.612	1.016	0.029
40	5.046	0.000	2.492	0.791	0.002	1.610	1.024	0.037
41	5.083	0.000	2.505	0.780	0.004	1.589	1.020	0.000
42	5.148	0.041	2.477	0.774	0.000	1.591	1.032	0.089
43	5.014	0.000	2.489	0.777	0.000	1.596	1.060	0.048
44	5.019	0.015	2.520	0.778	0.002	1.567	1.045	0.033
45	5.076	0.041	2.486	0.777	0.003	1.600	1.042	0.000
46	5.195	0.000	2.472	0.785	0.001	1.617	1.044	0.046
47	4.990	0.035	2.467	0.788	0.000	1.628	1.047	0.046
48	4.965	0.073	2.482	0.777	0.003	1.622	1.034	0.045
49	5.212	0.045	2.494	0.777	0.001	1.615	1.036	0.045
50	5.049	0.011	2.510	0.777	0.000	1.602	1.025	0.052
51	5.194	0.000	2.512	0.782	0.000	1.580	1.021	0.058

52	5.070	0.044	2.468	0.781	0.001	1.610	1.046	0.045
53	5.217	0.030	2.489	0.780	0.005	1.598	1.055	0.000
54	5.138	0.059	2.492	0.779	0.000	1.587	1.177	0.083
55	5.026	0.011	2.527	0.789	0.002	1.575	1.378	0.011
56	5.026	0.042	2.535	0.769	0.003	1.559	1.402	0.120
57	5.213	0.000	2.472	0.774	0.000	1.618	1.416	0.031
58	5.129	0.046	2.487	0.790	0.007	1.619	1.391	0.033
59	4.954	0.024	2.495	0.782	0.000	1.611	1.259	0.033
60	5.070	0.000	2.467	0.772	0.000	1.606	1.160	0.047
MEAN	5.211	0.026	2.464	0.825	0.003	1.616	1.080	0.038
END TIME: 20:24:50								
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

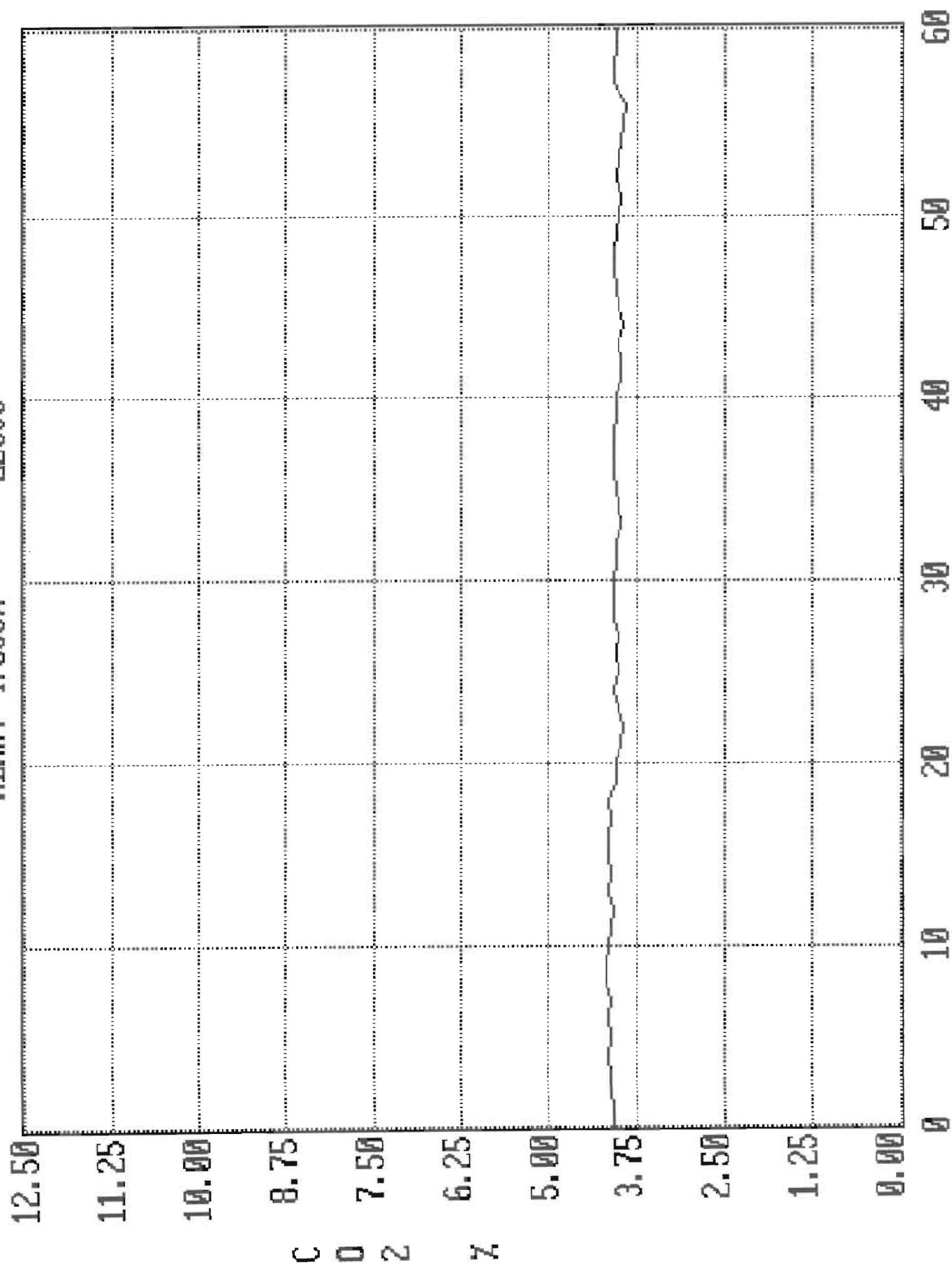
MEAN: 6.143% 22C3C



MEAN: 20.642ppm 22C3C



MEAN: 4.055% 22C3C



CJ-4022/NO. 2 SRU/C3D

TEST DATE : 08-04-2005

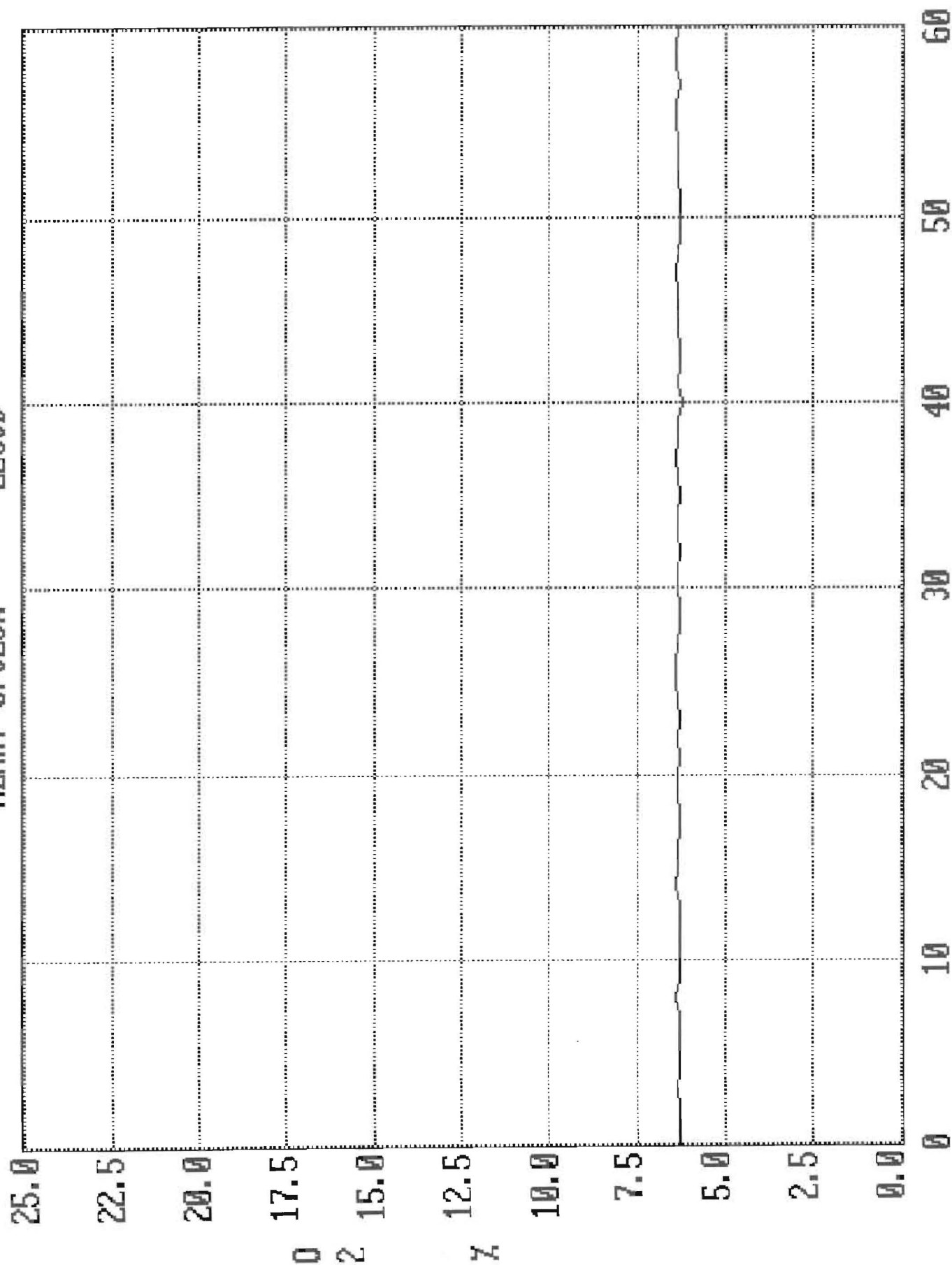
START TIME: 20:38:01

FILE NAME : C:\DAQ\22C3D .ID%

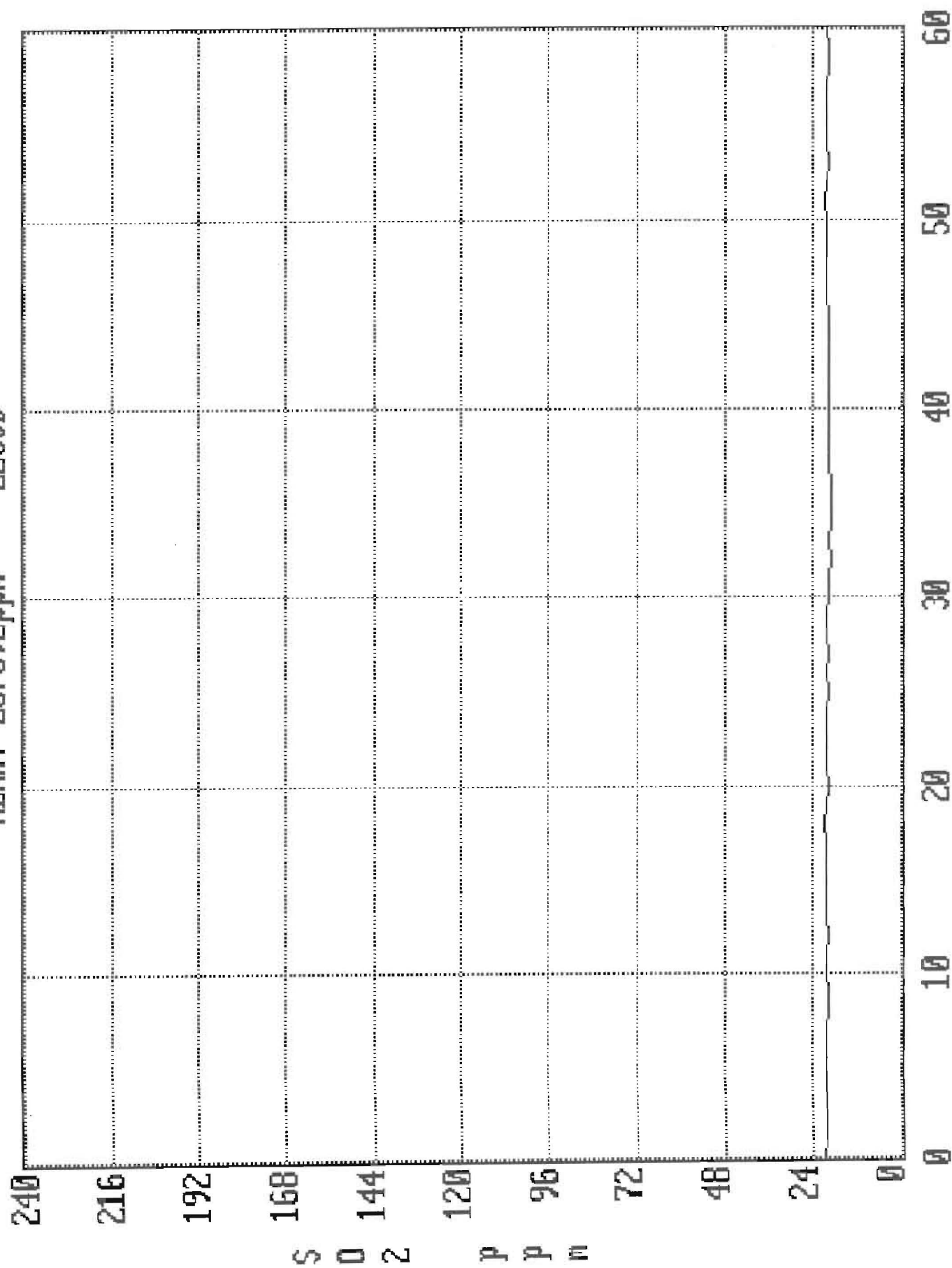
CHANNEL# CH.UNITS <MIN>	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
			<ANALYZER	OUTPUT-VDC>				
0	4.937	0.000	2.529	0.842	0.000	1.577	1.206	0.024
1	5.058	0.048	2.528	0.826	0.000	1.604	1.110	0.000
2	5.203	0.048	2.524	0.819	0.003	1.597	1.086	0.050
3	5.206	0.091	2.540	0.810	0.003	1.578	1.075	0.050
4	5.256	0.035	2.510	0.807	0.002	1.602	1.079	0.068
5	5.101	0.026	2.511	0.810	0.003	1.589	1.060	0.026
6	5.269	0.042	2.510	0.815	0.006	1.612	1.045	0.009
7	5.062	0.013	2.509	0.804	0.002	1.603	1.051	0.023
8	4.867	0.000	2.564	0.795	0.005	1.562	1.038	0.007
9	4.963	0.038	2.531	0.794	0.004	1.584	1.028	0.094
10	5.071	0.079	2.522	0.806	0.005	1.585	1.047	0.006
11	5.087	0.021	2.531	0.807	0.006	1.576	1.118	0.024
12	4.926	0.049	2.515	0.800	0.002	1.564	1.335	0.026
13	4.963	0.043	2.528	0.816	0.004	1.563	1.423	0.046
14	4.963	0.022	2.561	0.820	0.003	1.545	1.396	0.043
15	5.042	0.026	2.541	0.815	0.002	1.545	1.378	0.041
16	4.998	0.000	2.554	0.819	0.005	1.541	1.308	0.046
17	5.002	0.000	2.529	0.825	0.007	1.567	1.175	0.000
18	5.005	0.040	2.515	0.839	0.002	1.595	1.125	0.000
19	4.907	0.063	2.548	0.806	0.004	1.567	1.070	0.035
20	4.926	0.038	2.536	0.799	0.000	1.569	1.045	0.002
21	4.932	0.000	2.524	0.815	0.007	1.581	1.055	0.049
22	4.864	0.059	2.554	0.806	0.002	1.566	1.041	0.000
23	4.819	0.050	2.520	0.811	0.001	1.579	1.059	0.061
24	4.869	0.028	2.549	0.811	0.000	1.559	1.039	0.016
25	4.921	0.038	2.561	0.797	0.002	1.543	1.033	0.041
26	4.967	0.006	2.568	0.804	0.001	1.534	1.028	0.030
27	4.862	0.085	2.546	0.780	0.003	1.545	1.006	0.037
28	4.932	0.042	2.515	0.804	0.010	1.594	1.030	0.099
29	4.978	0.000	2.528	0.803	0.001	1.591	1.025	0.001
30	4.902	0.037	2.536	0.787	0.000	1.589	1.038	0.077
31	4.945	0.008	2.550	0.778	0.000	1.557	1.051	0.002
32	4.894	0.031	2.523	0.776	0.004	1.579	1.141	0.087
33	4.964	0.036	2.556	0.785	0.000	1.557	1.318	0.096
34	5.041	0.003	2.552	0.776	0.008	1.574	1.414	0.055
35	4.967	0.083	2.515	0.771	0.000	1.586	1.431	0.048
36	4.906	0.045	2.548	0.766	0.004	1.565	1.390	0.000
37	5.025	0.000	2.563	0.789	0.002	1.554	1.296	0.073
38	5.014	0.004	2.547	0.789	0.000	1.577	1.176	0.045
39	4.985	0.051	2.548	0.785	0.000	1.576	1.094	0.000
40	5.071	0.000	2.493	0.795	0.006	1.619	1.093	0.050
41	4.997	0.033	2.537	0.786	0.002	1.584	1.064	0.009
42	4.901	0.033	2.525	0.788	0.006	1.593	1.054	0.009
43	5.071	0.000	2.526	0.793	0.002	1.594	1.057	0.081
44	4.784	0.054	2.554	0.790	0.000	1.565	1.033	0.012
45	4.937	0.044	2.536	0.789	0.002	1.578	1.037	0.049
46	5.080	0.000	2.538	0.810	0.004	1.571	1.036	0.080
47	4.835	0.000	2.568	0.806	0.001	1.544	1.013	0.000
48	5.007	0.034	2.532	0.812	0.005	1.580	1.018	0.007
49	5.023	0.026	2.511	0.822	0.004	1.594	1.024	0.090
50	4.956	0.058	2.526	0.807	0.005	1.580	1.022	0.061
51	5.137	0.024	2.515	0.830	0.001	1.603	1.061	0.059

52	4.844	0.011	2.552	0.808	0.003	1.567	1.069	0.044
53	4.906	0.039	2.535	0.802	0.002	1.583	1.232	0.030
54	5.006	0.014	2.533	0.819	0.004	1.582	1.388	0.024
55	4.948	0.000	2.562	0.811	0.006	1.576	1.420	0.044
56	4.930	0.058	2.564	0.807	0.003	1.554	1.387	0.056
57	5.070	0.049	2.509	0.813	0.006	1.589	1.366	0.056
58	4.936	0.039	2.581	0.797	0.000	1.561	1.266	0.048
59	4.884	0.001	2.563	0.801	0.003	1.553	1.130	0.053
60	4.985	0.084	2.546	0.806	0.000	1.567	1.059	0.000
MEAN	4.982	0.032	2.537	0.803	0.003	1.575	1.142	0.038
END TIME:	21:37:50							
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

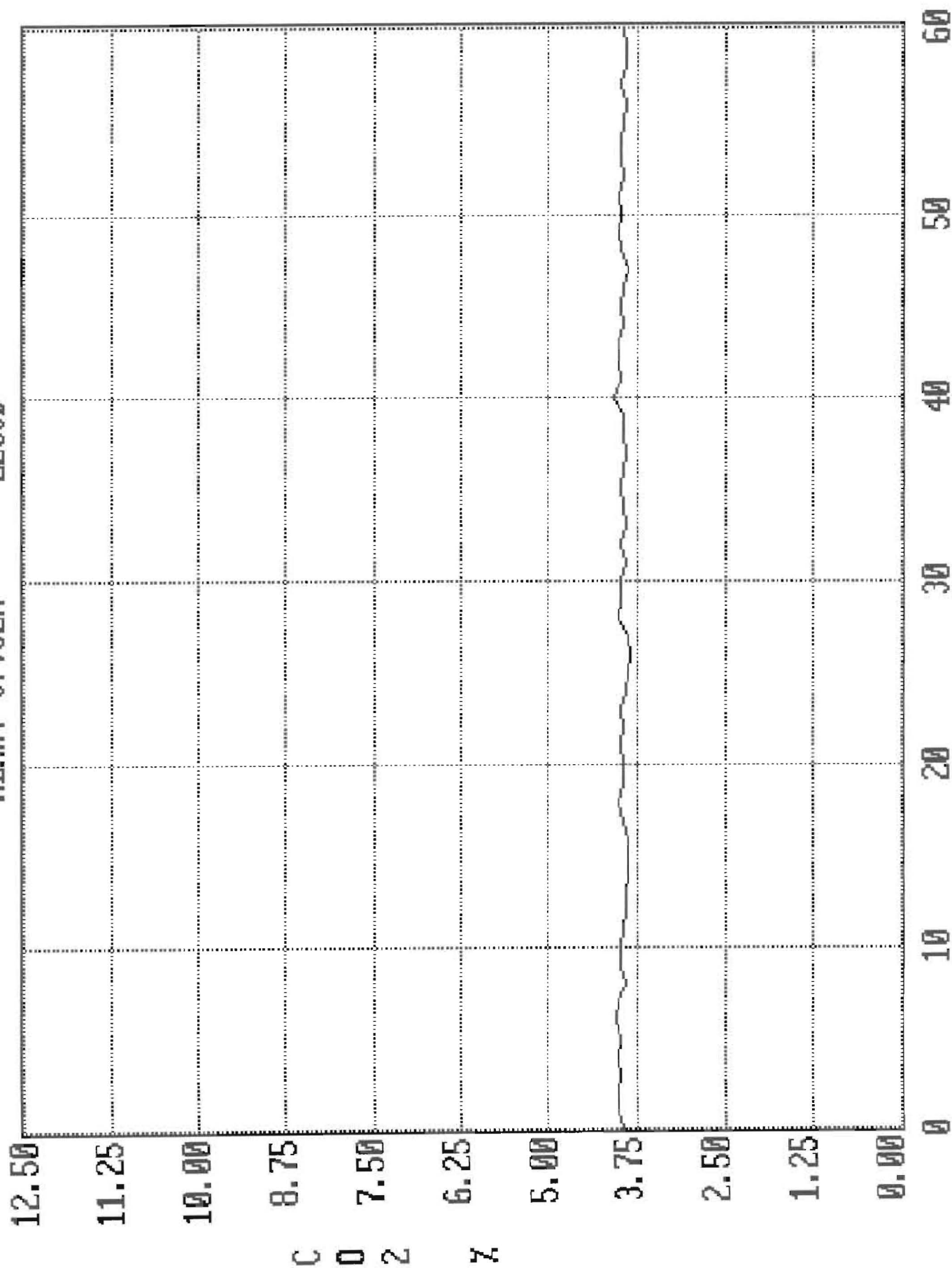
MEAN: 6.325% 22C3D



MEAN: 20.092ppm 22C3D



MEAN: 3.952% 22C3D



Calibration Data

CEDAQ- CALIBRATION TABLE

DATE:08-03-2005

TIME:14:33:17

FILE:C:\DAQ\22C1.CAL

CHANNEL# CH.UNITS	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.418	9.102	0.000	4.568	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
SPAN VDC	4.663	4.568	4.592	3.914	0.000	2.244	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.010	0.000	0.000	0.024	0.000	0.000

CEDAQ- CALIBRATION TABLE

DATE:08-04-2005

TIME:08:59:42

FILE:C:\DAQ\22C2.CAL

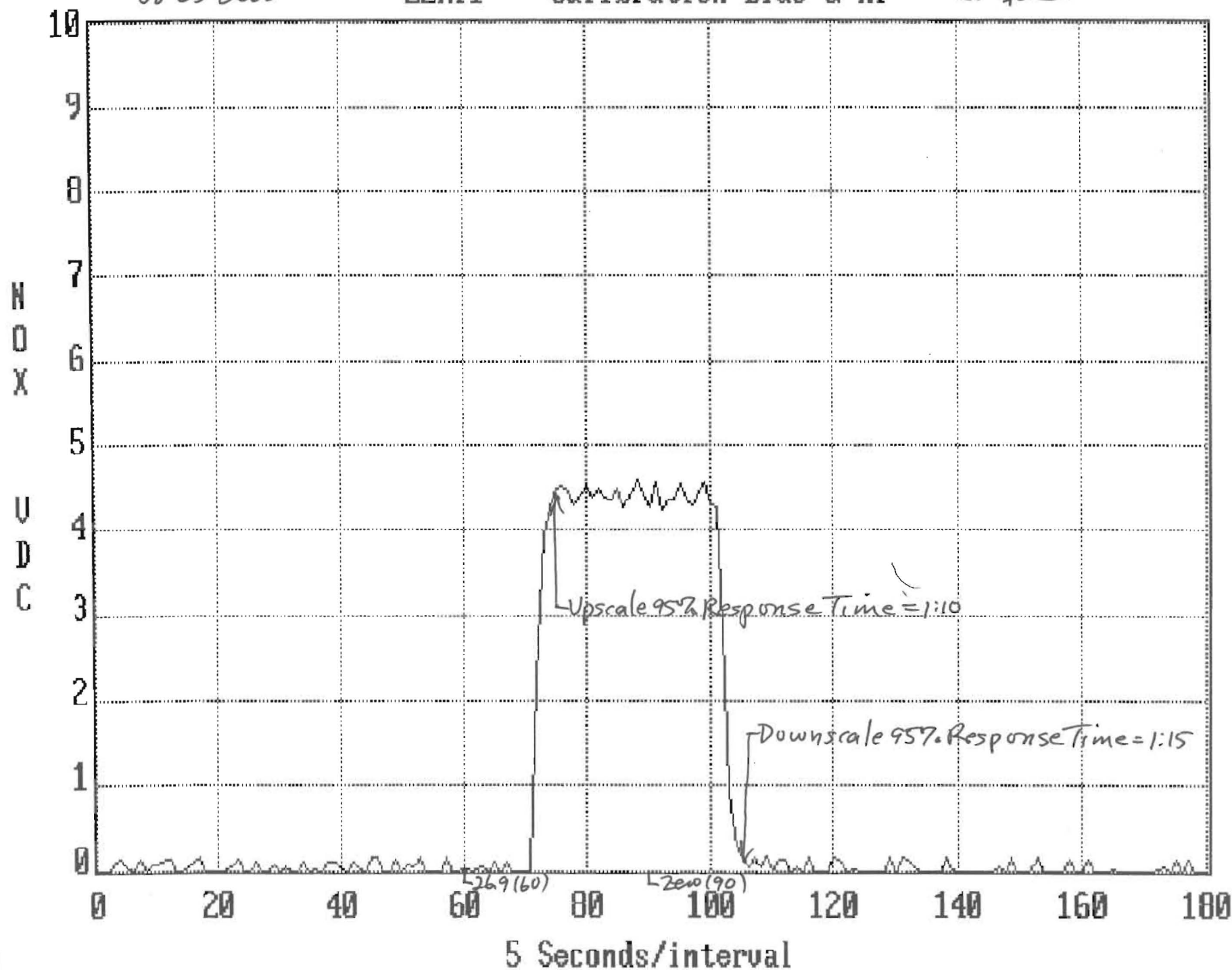
CHANNEL# CH.UNITS	NOX ppm	CO ppm	O2 %	SO2 ppm	OFF off	CO2 %	OFF off	OFF off
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.428	9.070	0.000	4.563	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
SPAN VDC	4.663	4.568	4.595	3.896	0.000	2.251	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.007	0.000	0.000	0.020	0.000	0.000

08-03-2005

22RT1

Calibration Bias & RT

CJ-4022

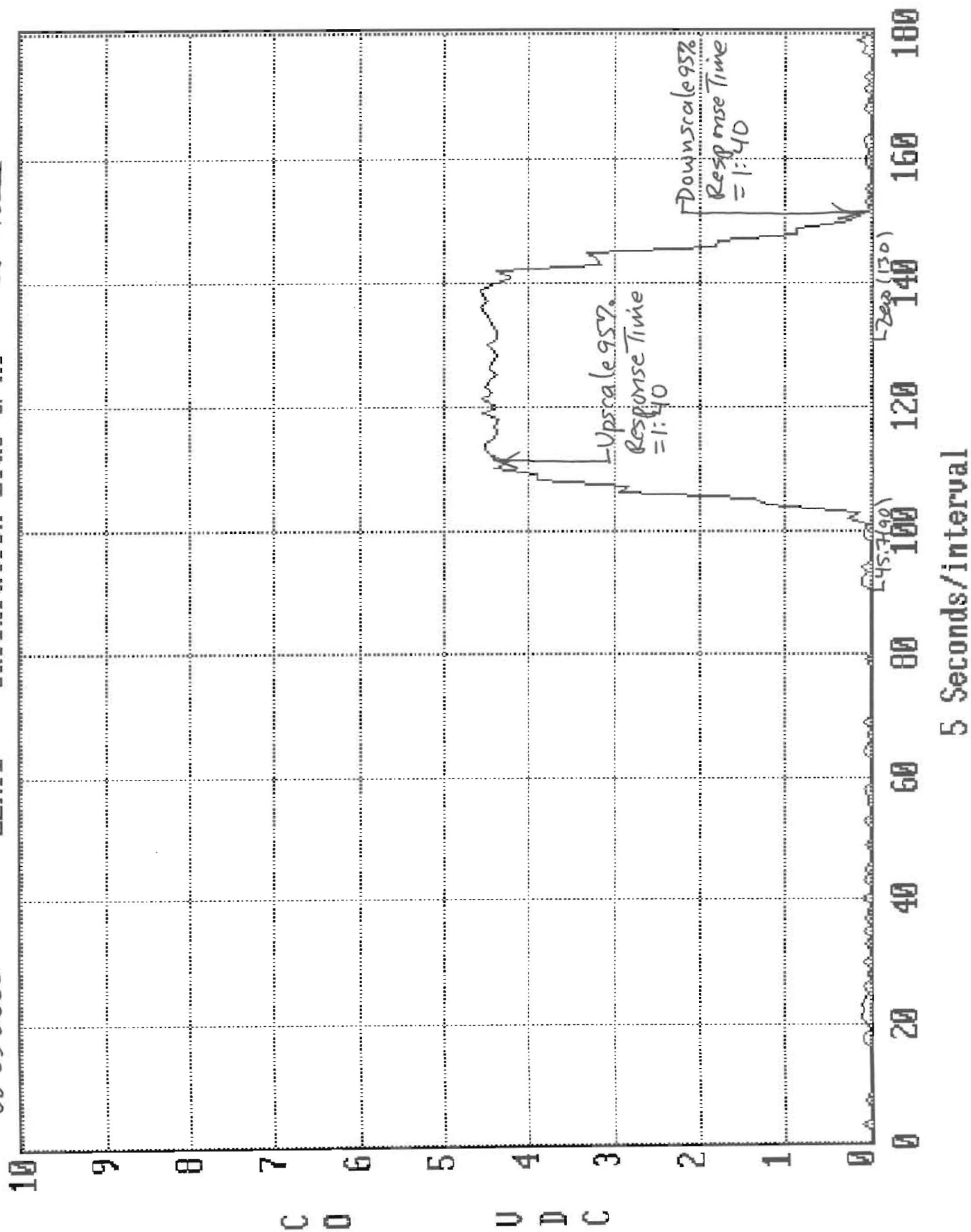


08-03-2005

22RT1

Calibration Bias & RT

CJ-4022

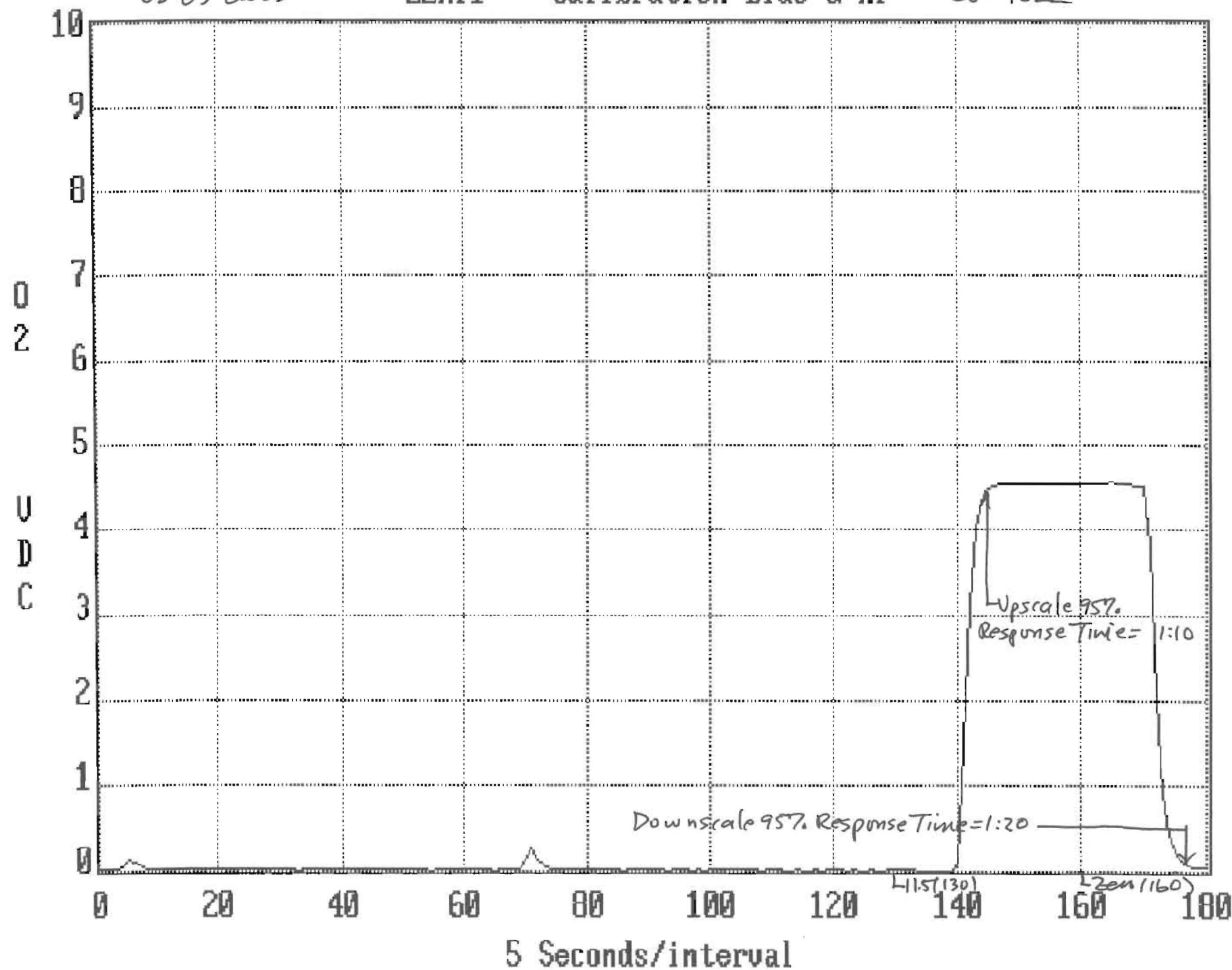


08-03-2005

22RT1

Calibration Bias & RT

CJ-4022

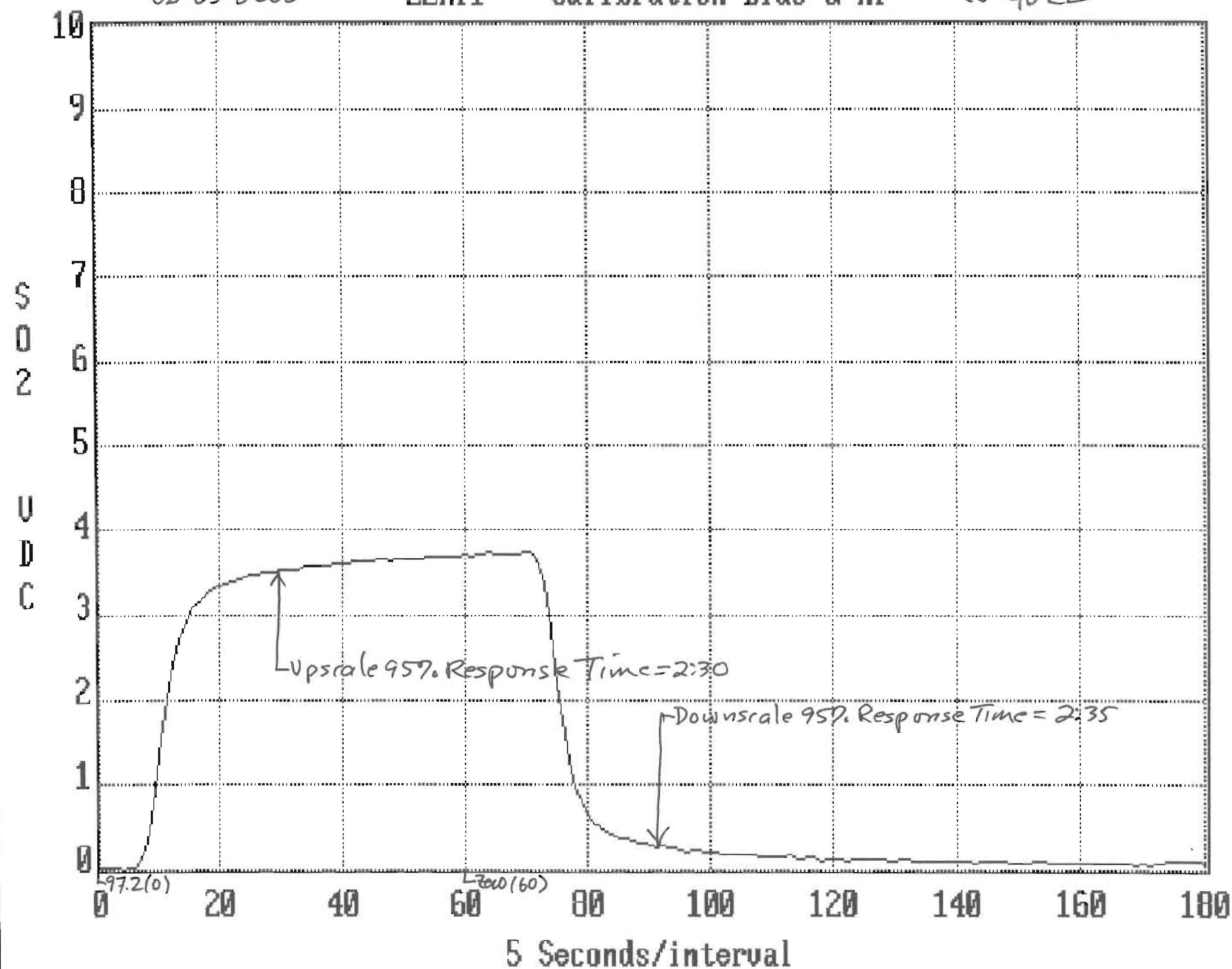


08-03-2005

22RT1

Calibration Bias & RT

CJ-4022

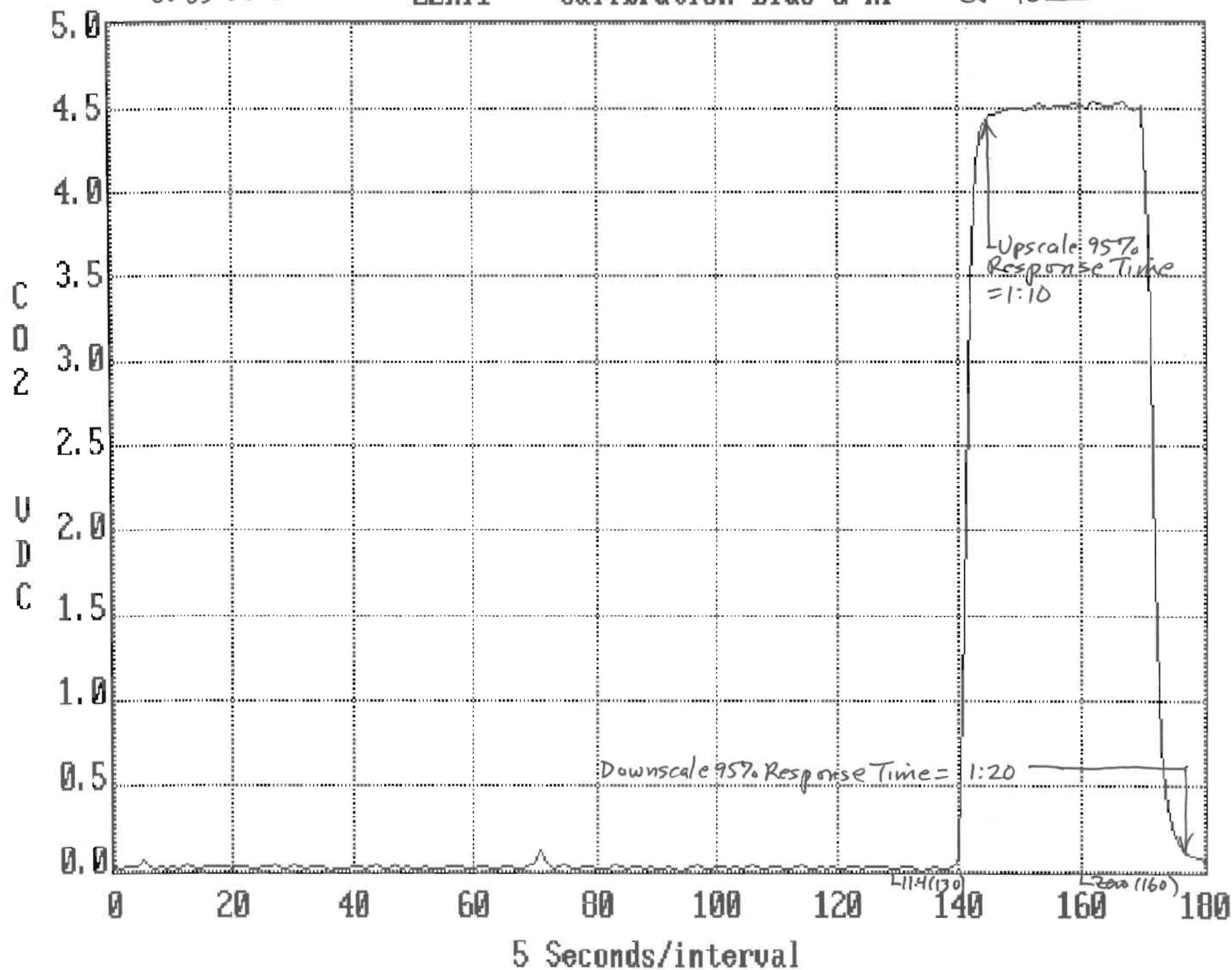


08-03-2005

22RT1

Calibration Bias & RT

CJ-4022



CEDAQ-ANALYZER RESPONSE TIME TEST (each interval=5 sec.)

END TIME: 08-03-2005

START TIME:14:37:29

FILE NAME:C:\DAQ\22RT1 .ID%

TEST NAME:CJ-4022/INITIAL BIAS & RT/RT1

CHANNEL#	NOX	CO	O2	SO2	OFF	CO2	OFF	OFF
CH.UNITS	ppm	ppm	%	ppm	off	%	off	off
SO ₂ → 0	0.000	0.000	0.022	0.015	0.000	0.017	0.349	0.110
1	0.000	0.000	0.027	0.017	0.000	0.007	0.234	0.000
2	0.000	0.007	0.027	0.012	0.000	0.020	0.168	0.054
3	0.093	0.103	0.024	0.027	0.000	0.022	0.127	0.017
4	0.125	0.000	0.046	0.005	0.000	0.020	0.081	0.000
5	0.054	0.000	0.134	0.015	0.000	0.063	0.076	0.000
6	0.000	0.000	0.095	0.032	0.000	0.017	0.078	0.134
7	0.137	0.037	0.049	0.173	0.000	0.010	0.068	0.000
8	0.000	0.000	0.032	0.442	0.000	0.022	0.071	0.000
Upscale 95% RT 9	0.083	0.000	0.032	0.947	0.000	0.012	0.046	0.000
10	0.076	0.000	0.022	1.543	0.002	0.017	0.078	0.000
11	0.129	0.000	0.012	2.041	0.024	0.005	0.081	0.088
NO _x 1:10 12	0.134	0.000	0.020	2.437	0.022	0.020	0.117	0.000
CO 1:40 13	0.000	0.000	0.020	2.688	0.042	0.032	0.107	0.010
O ₂ 1:10 14	0.000	0.000	0.020	2.883	0.063	0.007	0.146	0.012
SO ₂ 2:30 15	0.046	0.000	0.020	3.042	0.034	0.010	0.149	0.000
CO ₂ 1:10 16	0.107	0.000	0.022	3.135	0.044	0.017	0.164	0.115
17	0.142	0.085	0.022	3.193	0.066	0.020	0.154	0.061
18	0.000	0.085	0.017	3.264	0.039	0.022	0.164	0.151
19	0.000	0.000	0.020	3.308	0.051	0.022	0.159	0.000
Downscale 95% RT 20	0.000	0.012	0.020	3.335	0.078	0.007	0.181	0.142
21	0.000	0.093	0.017	3.362	0.039	0.020	0.166	0.017
22	0.042	0.068	0.020	3.386	0.061	0.020	0.173	0.000
NO _x 1:15 23	0.129	0.095	0.012	3.416	0.071	0.007	0.166	0.000
CO 1:45 24	0.000	0.042	0.017	3.445	0.037	0.005	0.173	0.000
O ₂ 1:20 25	0.000	0.027	0.010	3.464	0.066	0.022	0.183	0.000
26	0.098	0.078	0.010	3.472	0.078	0.020	0.198	0.125
SO ₂ 2:35 27	0.000	0.000	0.015	3.496	0.049	0.032	0.178	0.125
CO ₂ 1:20 28	0.000	0.029	0.024	3.501	0.071	0.005	0.203	0.081
29	0.066	0.000	0.022	3.508	0.078	0.005	0.217	0.078
30	0.000	0.085	0.017	953.530	0.049	0.032	0.205	0.107
31	0.059	0.000	0.017	3.533	0.059	0.020	0.217	0.010
32	0.000	0.000	0.017	3.542	0.076	0.012	0.229	0.146
33	0.000	0.037	0.005	3.538	0.051	0.017	0.208	0.000
34	0.095	0.000	0.027	3.572	0.063	0.020	0.210	0.142
35	0.000	0.061	0.010	3.584	0.081	0.022	0.222	0.000
36	0.017	0.000	0.012	3.586	0.051	0.002	0.212	0.125
37	0.000	0.034	0.020	3.589	0.071	0.012	0.210	0.000
38	0.110	0.010	0.012	3.589	0.076	0.007	0.212	0.000
39	0.105	0.000	0.015	3.608	0.049	0.015	0.200	0.078
40	0.024	0.093	0.020	3.604	0.073	0.017	0.210	0.000
41	0.000	0.000	0.010	3.621	0.068	0.020	0.208	0.000
42	0.098	0.000	0.012	3.628	0.054	0.010	0.212	0.127
43	0.032	0.078	0.015	3.625	0.076	0.024	0.212	0.000
44	0.000	0.020	0.012	3.645	0.063	0.034	0.210	0.000
45	0.146	0.059	0.022	3.650	0.046	0.012	0.203	0.088
46	0.151	0.000	0.020	3.652	0.071	0.007	0.203	0.039
47	0.000	0.000	0.012	3.660	0.071	0.032	0.203	0.083
48	0.000	0.000	0.020	3.650	0.044	0.005	0.200	0.027
49	0.127	0.054	0.010	3.672	0.085	0.020	0.203	0.142
50	0.000	0.000	0.017	3.662	0.076	0.010	0.200	0.115

	51	0.061	0.000	0.020	3.665	0.046	0.007	0.195	0.049
	52	0.046	0.000	0.017	3.674	0.068	0.022	0.183	0.000
	53	0.149	0.066	0.015	3.669	0.078	0.015	0.203	0.000
	54	0.000	0.000	0.010	3.687	0.049	0.005	0.186	0.000
	55	0.000	0.000	0.007	3.684	0.066	0.012	0.208	0.034
	56	0.000	0.020	0.015	3.682	0.085	0.017	0.198	0.000
	57	0.142	0.032	0.012	3.687	0.066	0.017	0.188	0.032
	58	0.000	0.063	0.012	3.699	0.051	0.024	0.193	0.000
	59	0.000	0.000	0.015	3.701	0.081	0.005	0.210	0.112
N ₂ →	60	0.056	0.000	0.010	<u>100 3.706</u>	0.068	0.010	0.205	0.000
	61	0.000	0.000	0.012	3.701	0.054	0.027	0.193	0.000
	62	0.020	0.000	0.012	3.713	0.071	0.022	0.205	0.042
	63	0.054	0.000	0.012	3.706	0.081	0.010	0.188	0.015
	64	0.000	0.078	0.012	3.738	0.063	0.010	0.200	0.129
	65	0.098	0.051	0.007	3.726	0.054	0.017	0.193	0.134
	66	0.000	0.000	0.017	3.728	0.085	0.017	0.178	0.000
	67	0.093	0.029	0.017	3.730	0.073	0.012	0.178	0.139
	68	0.000	0.000	0.010	3.728	0.049	0.007	0.178	0.144
	69	0.000	0.063	0.015	3.730	0.076	0.027	0.178	0.076
	70	0.000	0.002	0.125	3.745	0.081	0.054	0.200	0.115
	71	0.000	0.000	0.266	3.743	0.059	0.120	0.220	0.000
	72	2.266	0.000	0.137	3.667	0.061	0.054	0.244	0.107
	73	3.940	0.000	0.054	3.379	0.073	0.015	0.244	0.000
	74	<u>95 4.277</u>	0.000	0.024	2.837	0.046	0.024	0.254	0.012
	75	4.482	0.000	0.015	2.202	0.010	0.034	0.269	0.098
	76	4.531	0.002	0.017	1.750	0.017	0.010	0.273	0.000
	77	4.473	0.000	0.020	1.304	0.010	0.015	0.261	0.005
	78	4.319	0.005	0.012	0.996	0.000	0.020	0.220	0.000
	79	4.409	0.044	0.015	0.789	0.000	0.024	0.220	0.098
	80	4.531	0.000	0.010	0.667	0.007	0.010	0.225	0.000
	81	4.392	0.000	0.010	0.554	0.000	0.010	0.210	0.000
	82	4.502	0.000	0.012	0.500	0.000	0.005	0.215	0.027
	83	4.395	0.000	0.012	0.452	0.002	0.034	0.217	0.000
	84	4.363	0.000	0.012	0.408	0.000	0.027	0.217	0.076
	85	4.497	0.000	0.010	0.378	0.000	0.007	0.198	0.081
	86	4.277	0.000	0.007	0.369	0.000	0.020	0.210	0.142
	87	4.436	0.000	0.010	0.349	0.000	0.017	0.222	0.063
	88	4.590	0.000	0.017	0.313	0.000	0.015	0.210	0.098
	89	4.448	0.000	0.010	0.308	0.000	0.024	0.198	0.000
CO →	90	<u>100 4.285</u>	0.000	0.015	0.283	0.000	0.007	0.208	0.139
	91	4.583	0.098	0.010	<u>95 0.269</u>	0.000	0.007	0.200	0.142
	92	4.265	0.100	0.012	0.283	0.000	0.017	0.200	0.144
	93	4.351	0.020	0.007	0.254	0.005	0.010	0.217	0.105
	94	4.368	0.103	0.020	0.251	0.000	0.000	0.173	0.120
	95	4.546	0.000	0.015	0.237	0.000	0.005	0.198	0.000
	96	4.365	0.000	0.015	0.220	0.000	0.017	0.210	0.000
	97	4.314	0.000	0.005	0.229	0.000	0.032	0.205	0.000
	98	4.458	0.000	0.017	0.225	0.000	0.007	0.171	0.000
	99	4.575	0.083	0.005	0.215	0.000	0.005	0.195	0.076
	100	4.307	0.071	0.020	0.198	0.000	0.027	0.212	0.024
	101	4.287	0.015	0.020	0.200	0.000	0.024	0.186	0.000
	102	2.832	0.251	0.020	0.186	0.000	0.012	0.181	0.000
	103	0.935	0.132	0.015	0.190	0.000	0.020	0.171	0.129
	104	0.295	1.235	0.012	0.181	0.000	0.010	0.127	0.000
	105	<u>95 0.159</u>	1.389	0.012	0.186	0.000	0.017	0.117	0.095
	106	0.049	2.930	0.010	0.178	0.000	0.034	0.142	0.120
	107	0.149	2.834	0.010	0.173	0.000	0.015	0.137	0.132
	108	0.046	3.894	0.000	0.156	0.000	0.005	0.154	0.137
	109	0.181	3.901	0.012	0.164	0.005	0.029	0.178	0.000
	110	0.000	<u>95 4.424</u>	0.010	0.151	0.000	0.024	0.188	0.000

111	0.117	4.258	0.010	0.156	0.000	0.012	0.220	0.000
112	0.134	4.436	0.000	0.154	0.002	0.005	0.227	0.000
113	0.007	4.521	0.007	0.171	0.000	0.020	0.217	0.000
114	0.046	4.507	0.015	0.122	0.000	0.034	0.217	0.000
115	0.000	4.424	0.007	0.132	0.000	0.015	0.229	0.000
116	0.159	4.382	0.007	0.142	0.000	0.007	0.229	0.000
117	0.000	4.421	0.010	0.142	0.000	0.022	0.242	0.024
118	0.000	4.355	0.000	0.100	0.000	0.007	0.212	0.000
119	0.000	4.551	0.010	0.122	0.000	0.017	0.229	0.005
120	0.156	4.392	0.010	0.125	0.000	0.012	0.237	0.134
121	0.100	4.553	0.010	0.122	0.000	0.010	0.232	0.000
122	0.000	4.453	0.007	0.112	0.000	0.020	0.229	0.000
123	0.022	4.519	0.010	0.120	0.000	0.020	0.225	0.000
124	0.000	4.468	0.007	0.120	0.000	0.005	0.237	0.000
125	0.000	4.397	0.007	0.139	0.000	0.020	0.249	0.020
126	0.000	4.480	0.012	0.125	0.000	0.020	0.247	0.144
127	0.000	4.446	0.002	0.127	0.000	0.020	0.232	0.000
128	0.000	4.380	0.005	0.117	0.000	0.029	0.229	0.132
129	0.149	4.421	0.012	0.110	0.000	0.012	0.234	0.000
O ₂ /CO ₂ → 130	0.000	<u>100 4.490</u>	0.010	0.112	0.000	0.007	0.239	0.081
131	0.142	4.382	0.010	0.115	0.000	0.022	0.227	0.000
132	0.139	4.387	0.015	0.115	0.000	0.024	0.217	0.000
133	0.049	4.426	0.015	0.105	0.000	0.007	0.225	0.115
134	0.000	4.468	0.002	0.090	0.000	0.002	0.222	0.039
135	0.000	4.497	0.007	0.088	0.000	0.015	0.239	0.000
136	0.000	4.563	0.007	0.095	0.000	0.024	0.242	0.000
137	0.000	4.482	0.005	0.093	0.000	0.015	0.227	0.000
138	0.142	4.543	0.007	0.088	0.000	0.010	0.225	0.134
139	0.010	4.561	0.005	0.105	0.000	0.017	0.232	0.088
140	0.000	4.387	0.100	0.093	0.000	0.073	0.229	0.000
141	0.000	4.238	1.458	0.103	0.000	1.506	0.425	0.000
142	0.000	4.399	3.140	0.095	0.000	3.455	0.979	0.105
143	0.000	3.157	4.009	0.083	0.000	4.182	1.497	0.042
144	0.000	3.220	<u>95 4.365</u>	0.100	0.000	<u>95 4.395</u>	1.885	0.127
145	0.000	3.313	4.485	0.107	0.000	4.458	2.148	0.129
146	0.000	1.814	4.519	0.100	0.000	4.456	2.307	0.000
147	0.034	1.785	4.543	0.093	0.000	4.468	2.419	0.000
148	0.000	0.872	4.539	0.090	0.000	4.487	2.476	0.000
149	0.149	0.879	4.551	0.083	0.000	4.495	2.515	0.073
150	0.000	0.334	4.543	0.081	0.000	4.502	2.556	0.000
151	0.000	<u>95 0.137</u>	4.546	0.073	0.000	4.487	2.568	0.154
152	0.000	0.000	4.546	0.071	0.000	4.492	2.585	0.061
153	0.142	0.037	4.548	0.090	0.000	4.524	2.588	0.110
154	0.000	0.000	4.551	0.093	0.000	4.512	2.566	0.002
155	0.000	0.051	4.553	0.081	0.000	4.497	2.588	0.056
156	0.000	0.000	4.556	0.063	0.000	4.512	2.598	0.000
157	0.000	0.000	4.551	0.071	0.000	4.514	2.585	0.000
158	0.117	0.000	4.553	0.068	0.000	4.512	2.605	0.059
159	0.000	0.054	4.548	0.083	0.000	4.519	2.603	0.024
N ₂ → 160	0.000	0.037	<u>100 4.558</u>	0.066	0.000	<u>100 4.507</u>	2.590	0.107
161	0.139	0.032	4.551	0.078	0.000	4.502	2.595	0.117
162	0.000	0.056	4.553	0.078	0.000	4.539	2.590	0.051
163	0.000	0.063	4.548	0.068	0.000	4.521	2.593	0.032
164	0.000	0.000	4.553	0.066	0.000	4.512	2.593	0.000
165	0.020	0.000	4.561	0.076	0.000	4.512	2.593	0.000
166	0.000	0.000	4.551	0.073	0.000	4.526	2.571	0.000
167	0.000	0.000	4.556	0.071	0.000	4.534	2.576	0.000
168	0.000	0.063	4.548	0.063	0.000	4.502	2.583	0.000
169	0.000	0.015	4.529	0.056	0.000	4.478	2.568	0.071
170	0.000	0.000	4.524	0.071	0.000	4.512	2.556	0.007

171	0.000	0.063	3.821	0.056	0.000	3.743	2.454	0.127
172	0.015	0.000	2.061	0.066	0.000	1.750	2.007	0.056
173	0.044	0.085	0.942	0.085	0.000	0.737	1.487	0.000
174	0.000	0.000	0.454	0.088	0.000	0.366	1.074	0.000
175	0.132	0.000	0.232	0.105	0.000	0.227	0.779	0.000
176	0.000	0.000	<u>95 0.122</u>	0.095	0.000	<u>95 0.161</u>	0.569	0.000
177	0.139	0.112	0.083	0.103	0.000	0.103	0.410	0.000
178	0.000	0.046	0.059	0.095	0.000	0.088	0.293	0.000
179	0.000	0.146	0.044	0.098	0.000	0.081	0.232	0.000
180	0.000	0.000	0.039	0.083	0.000	0.063	0.181	0.015
MAX	0.139	0.146	4.556	0.098	0.002	4.512	2.583	0.015
END TIME: 14:51:50								
FULLSPAN	52.000	90.500	21.000	227.000	0.000	11.400	0.000	0.000
SPAN VDC	8.579	9.033	8.418	9.102	0.000	4.568	0.000	0.000
MID SPAN	26.900	45.700	11.500	97.200	0.000	5.560	0.000	0.000
MID VDC	4.663	4.568	4.592	3.914	0.000	2.244	0.000	0.000
ZERO GAS	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
ZERO VDC	0.000	0.000	0.010	0.000	0.000	0.024	0.000	0.000

Date: August 3, 2005
Plant: TPI Petroleum, Inc.
Unit: No. 2 SRU Tail Gas Incinerator

CETCON, Inc.

Operator: LKS
Job No.: CJ-4022A

NO_x/CO ANALYZER CALIBRATION DATA

NO _x		Value, ppm	% of Span	Cylinder #
Analyzer:	Serial Number: 65868-350	Zero Gas:	0.0	SSG-1354
Make: TECO	Span: 60 = 10	Mid Range Gas:	26.9	CC-101611
Model: 42C	Units: ppm = VDC	High Range Gas:	52.0	CC-55299

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error ≤ 2% Span		
Analyzer Response	0.0	0.0	27.4	0.8	52.2	0.3		Upscale	Downscale
System Bias Test	Zero	Bias, % Span	Mid	Bias, % Span	Bias	95% Response Time			
System Response	0.0	0.0	26.8	-1.0	≤ 5% Span	Minutes:Seconds		1:10	1:15

Bias Gas Used (Mid/High)? Mid = 26.9 ppm Calibration Error Response = 27.4 ppm

Sample Run #	C _{0i} ppm	C _{0f} ppm	Zero Drift % Span	Zero Bias % Span	C _{mi} ppm	C _{mf} ppm	Cal Drift % Span	Cal Bias % Span	C _{Ave} ppm	Corrected Conc., ppm
C1A	0.0	0.0	0.0	0.0	26.8	26.6	-0.3	-1.3	32.248	32.490
C1B	0.0	0.0	0.0	0.0	26.6	26.8	0.3	-1.0	32.759	33.004
C1C	0.0	0.0	0.0	0.0	26.8	26.6	-0.3	-1.3	31.883	32.122

Drift ≤ 3% Span, Bias ≤ 5% Span

CO		Value, ppm	% of Span	Cylinder #
Analyzer:	Serial Number: 0401404630	Zero Gas:	0.0	SSG-1354
Make: TECO	Span: 100 = 10	Mid Range Gas:	45.7	CC-98319
Model: 48C	Units: ppm = VDC	High Range Gas:	90.5	CC-148498

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error	
Analyzer Response	0.0	0.0	45.0	-0.7	90.5	0.0	≤ 2% Span	
System Bias Test	Zero	Bias, % Span	Mid	Bias, % Span	Bias	95% Response Time	Upscale	Downscale
System Response	0.0	0.0	44.8	-0.2	≤ 5% Span	Minutes:Seconds	1:40	1:45

Bias Gas Used (Mid/High)? Mid = 45.7 ppm Calibration Error Response = 45.0 ppm

Sample Run #	C _{0i} ppm	C _{0f} ppm	Zero Drift % Span	Zero Bias % Span	C _{mi} ppm	C _{mf} ppm	Cal Drift % Span	Cal Bias % Span	C _{Ave} ppm	Corrected Conc., ppm
C1A	0.0	-0.3	-0.3	-0.3	44.8	44.9	0.1	-0.1	1.132	1.302
C1B	-0.3	-0.3	0.0	-0.3	44.9	45.0	0.1	0.0	0.681	0.991
C1C	-0.3	-0.3	0.0	-0.3	45.0	45.0	0.0	0.0	0.441	0.748

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
Drift Corrected Concentration, ppm =

C_{mi}: Initial Span Gas Response, ppm
C_{mf}: Final Span Gas Response, ppm
C_m: Average Span Gas Response, ppm
(C_{Ave} - C₀) • C_{ms} + (C_m - C₀)

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

Method 6C Equation: 6C-1

QA/QC Check:

Completeness ☒ Legibility ☒ Accuracy ☒ Specifications ☒ Reasonableness ☒

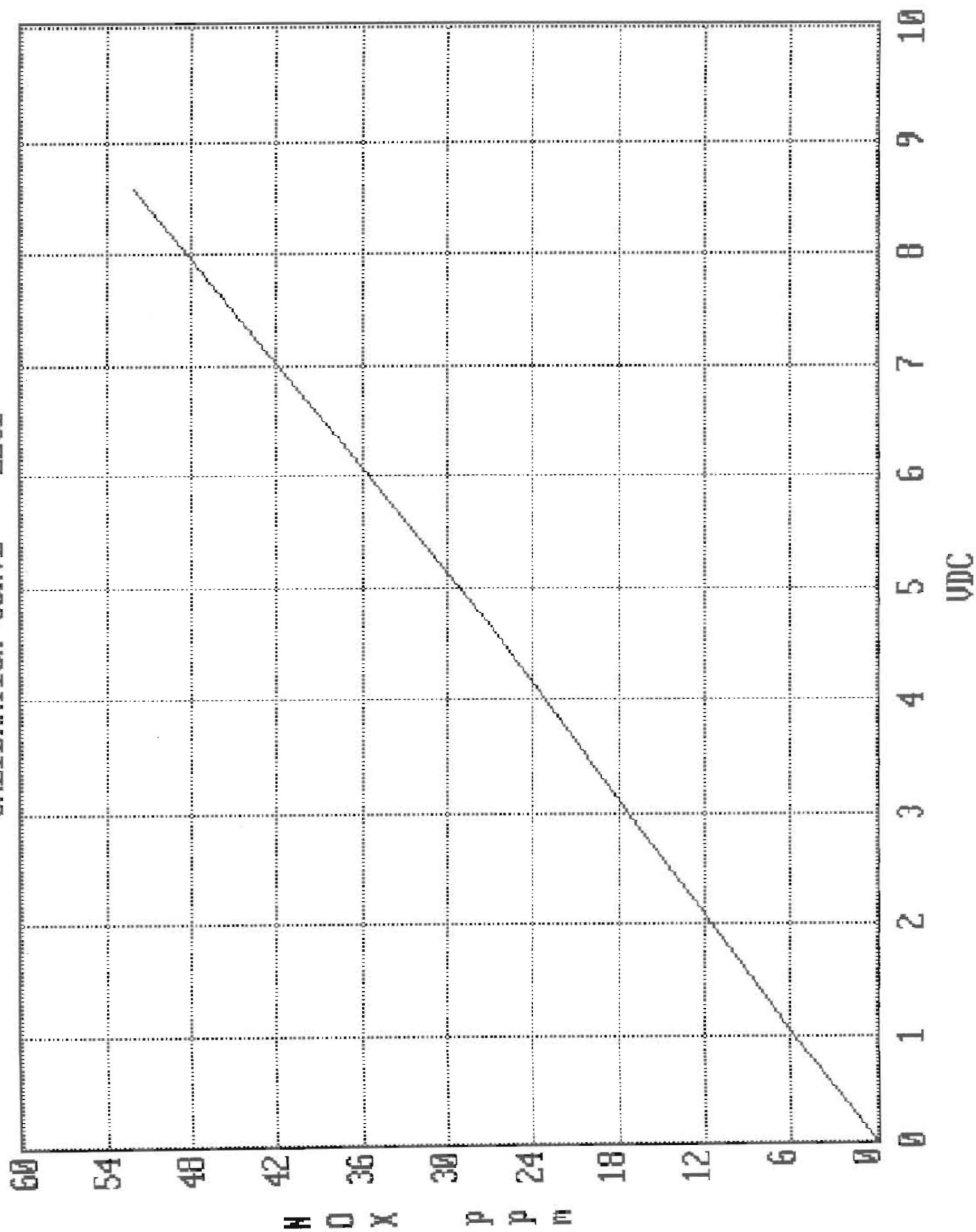
Checked by:

8/3/2005

Operator (Signature/Date) 08/03/2005
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Project Coordinator (Signature/Date) 08/03/2005
CALNOXCO.XLS

CALIBRATION CURVE 22C1



Superior Specialty Gas Services, Inc.

P.O. Box 470466
Tulsa, Ok 74147
(918) 592-0081
Fax: (918) 592-0095

CERTIFICATE OF CONFORMANCE

April 1, 2005

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

Purchase Order: 9068
Product: Nitrogen, Ultra High Purity Grade
Cylinder SN#: RWS-1117, TX60316, SSG-1354, SSG-1087

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: Brian Roper


AIR LIQUIDE

TM

CERTIFICATE of ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Cyl. Number: CC101611	Cyl. Pressure: * 1900psig	Document Number: 14044123	COMPONENT Name	REQUESTED Concentration	ASSAY Concentration
Assay Date: 11/1/2004	Expiration Date: 11/1/2006	Item Number:	Nitric Oxide	27 ppm	26.6 ±0.4 ppm
Customer: Cetcon	P.O. Number: 8795	Notes: CGA660	Total NOX		26.9 ppm
LOT #: LPX106713			Nitrogen	Balance	Balance

EPA-600/R-97/123, Section 2.2 Procedure G-1	REFERENCE STANDARD EMPLOYED FOR ANALYSIS									
NOTE: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/123	Std name	Std #	Conc.	Units	Std. Error	Comp.	Balance	Cyl. No.	Exp. Date	Sample No.
	GMIS261	GMIS261	52.2	ppm	0.6	NO	N2	CC62005	3/25/2006	N.A.

*Cylinder should not be used when gas pressure is below 150 psig

Component 1: Nitric Oxide Gas Analyzer Employed		Component 2: None Gas Analyzer Employed		Component 3: Gas Analyzer Employed	
Manufacturer:	KVB/Analect	Manufacturer:		Manufacturer:	
Model Number:	EN3024	Model Number:		Model Number:	
Serial Number:	3024	Serial Number:		Serial Number:	
Analytical Principle:	FTIR	Analytical Principle:		Analytical Principle:	
MPC Calibrated:	09/29/04 & 10/31/04	MPC Calibrated:		MPC Calibrated:	

10/25/2004	Trial 1	Trial 2	Trial 3	Units		11/1/2004	Trial 1	Trial 2	Trial 3	Units
Zero	-0.20	0.15	0.43		Component 1 Nitric Oxide	Zero	0.13	0.07	-0.12	
Reference 1	53.14	53.83	54.11			Reference 1	54.23	54.86	54.60	
Reference 2						Reference 2				
Candidate	27.69	27.63	27.66			Candidate	27.74	27.45	27.83	
Result	26.87	26.80	26.83	ppm		Result	26.53	26.25	26.61	ppm
Mean Result:				26.83 ppm		Mean Result:				26.46 ppm

Analyst Signature

Bryan Leger

Calculated by:

Yang Qin

Air Liquide America L.P.
11426 Fairmont Parkway, La Porte, Texas 77571-6000
Phone: (281) 474-8400 Fax: (281) 474-8419



CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section No. 2.2, Procedure . G-1

Customer: CETCON TULSA, OK P.O. Number: 9005 Item Number:	Cylinder Number: CC55299	Shipping Order Number: 15331592 Transfer Number: 15331632 Lot Number: SFS77489 Valve: CGA 660 Cyl. Pressure*: 2000PSIG
Assay Date: 1-Mar-05	Expiration Date: 1-Mar-07	*Cylinder should not be used when gas pressure is below 150 psig

Component	REQUESTED Concentration	ASSAY Concentration
Nitric Oxide	50-53.6 ppm	52.0 ± 0.8 ppm
NOx		52.0 ppm
Nitrogen	Balance	Balance

Reference Standard Employed For Analysis:

Concentration	Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
51.2 ± 0.6 ppm	Nitric Oxide	Nitrogen	CC69882	SFS60187	03/25/06	NT	GMIS

Analysis Information:

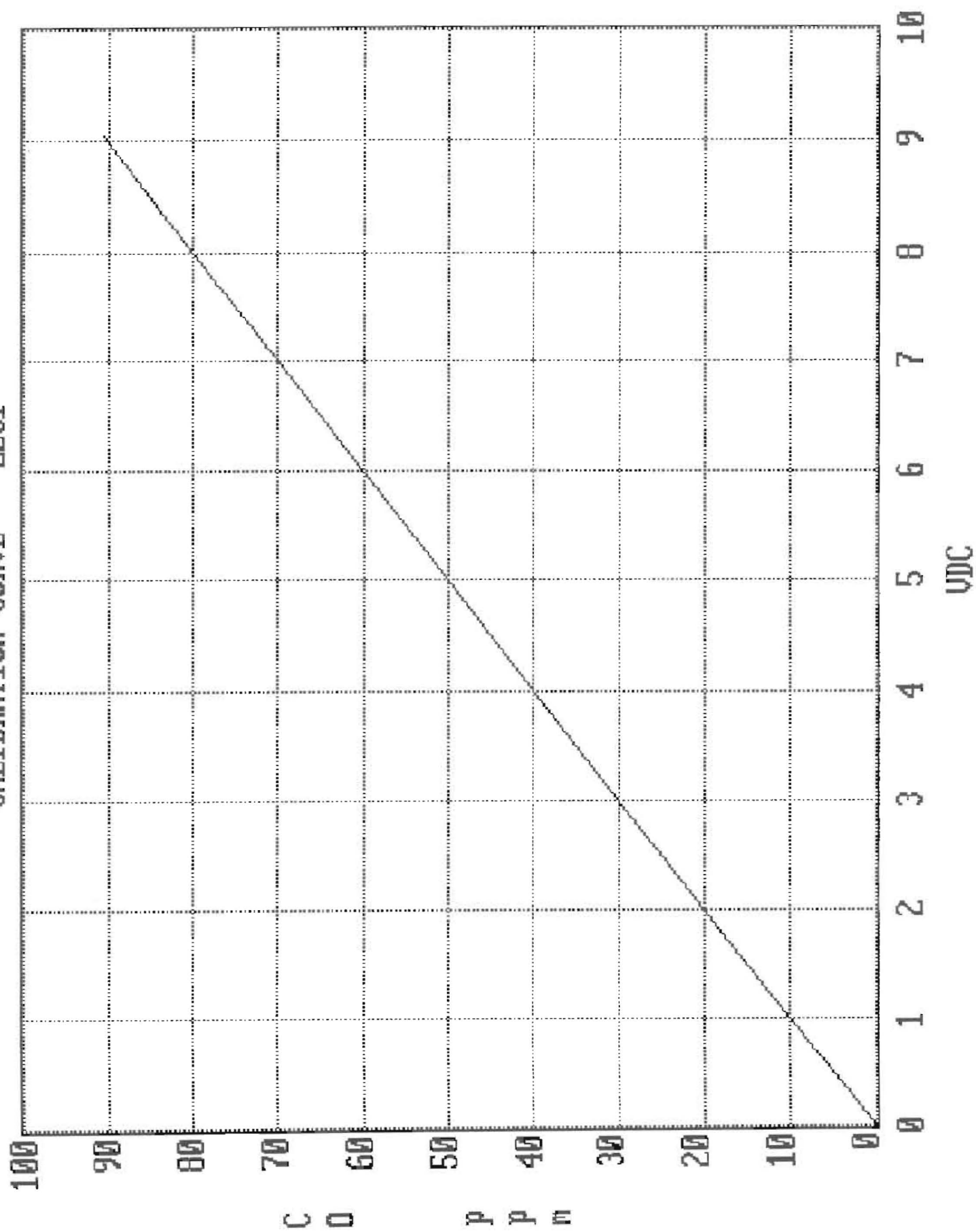
Component		First Triad Analysis 02/22/05				Second Triad Analysis 03/01/05			
Nitric Oxide		Trial 1	Trial 2	Trial 3	Units	Trial 4	Trial 5	Trial 6	Units
Manufacturer:	Beckman	0	0	0	ppm	0	0	0	ppm
Model Number:	951A	509	508	509	ppm	514	515	515	ppm
Serial Number:	00100508	517	517	517	ppm	522	522	522	ppm
MPR Last Calibrated:	02/25/05	52.00	52.11	52.00	ppm	52.00	51.90	51.90	ppm
Analytical Principle:	Chemiluminescent	VALID	VALID	VALID		VALID	VALID	VALID	
		MEAN ANALYTICAL RESULT:				MEAN ANALYTICAL RESULT:			
		52.04 ppm				51.93 ppm			

Analyst Signature: Thuan Tran

Approved by: Eric Barron

Air Liquide America L.P.
 8832 Dice Road, Santa Fe Spring, CA 90670-2516

CALIBRATION CURVE 22C1



**AIR LIQUIDE**

CERTIFICATE of ANALYSIS

EPA Protocol Gases

Cyl. Number: CC98319	Cyl. Pressure: 2000 PSIG	Lot Number: SFS76551	COMPONENT Name: Carbon Monoxide Nitrogen	REQUESTED Concentration: 42.75-47.25 ppm Balance	ASSAY Concentration: 45.7 ± 0.7 ppm Balance
Assay Date: 01/31/05	Expiration Date: 01/31/08	Document Number: 15002048			
Customer: CETCON TULSA, OK	P.O. Number: 8979	Item Number: SO# 15001835			

*Mixture is valid only to 150 psig

EPA Protocol: Section No. 2.2, Procedure: G-1	REFERENCE STANDARD EMPLOYED FOR ANALYSIS Concentration: 51.8 ± 0.6 ppm Component: Carbon Monoxide Nitrogen Balance: CC 103453 Cyl. No.: SFS51959 Exp. Date: 09/08/05 Sample No.: MV Type: GMIS
Analyst: Eric Barron	SRM or GMIS
Approved by: Thuan Tran	
Carbon Monoxide GAS ANALYZER EMPLOYED Manufacturer: Vanan(A) Model Number: 3400 Serial Number: 2805 MPR Last Calibrated: 01/20/05 Analytical Principle: FID & TCD	

ANALYSIS SUMMARY

	01/24/05	01/24/05	01/24/05	Carbon Monoxide		01/31/05	01/31/05	01/31/05	Carbon Monoxide	
	Triad 1	Triad 2	Triad 3	Units		Triad 4	Triad 5	Triad 6	Units	
Zero	0	0	0	Area		0	0	0	Area	
Reference	2355733	2351915	2351144	Area		2771965	2769232	2786495	Area	
Candidate	2063795	2066854	2068715	Area		2460267	2458594	2465112	Area	
Result	45.38	45.52	45.58	ppm		45.98	45.99	45.83	ppm	
Evaluation	VALID	VALID	VALID			VALID	VALID	VALID		
MEAN ANALYTICAL RESULT:				45.49 ppm		MEAN ANALYTICAL RESULT:				45.93 ppm

Analyst: 	Approved by:
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CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121
Section No. 2.2, Procedure . G-1

Customer: CETCON TULSA, OK P.O. Number: 9005 Item Number:	Cylinder Number: CC148498	Shipping Order Number: 15331592 Transfer Number: 15331632 Lot Number: SFS77493 Valve: CGA 350 Cyl. Pressure*: 2000 PSIG *Cylinder should not be used when gas pressure is below 150 psig
Assay Date: 1-Mar-05	Expiration Date: 1-Mar-08	

Component	REQUESTED Concentration	ASSAY Concentration
Carbon Monoxide	85.5-94.5 ppm	90.5 ± 1.3 ppm
Nitrogen	Balance	Balance

Reference Standard Employed For Analysis:

Concentration	Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
101.8 ± 1 ppm	Carbon Monoxide	Nitrogen	CC 70070	970802	02/01/07	97080217	NTRM

Analysis Information:

Component		Carbon Monoxide		First Triad Analysis 02/22/05			Second Triad Analysis 03/01/05								
Analyzer Information				Trial 1	Trial 2	Trial 3	Units						Units		
Manufacturer:	Varian(A)	Zero		0	0	0	ppm	Zero				0	ppm		
Model Number:	3400	Reference		101.6	101.6	101.7	ppm	Reference		101.9	101.8	101.6	ppm		
Serial Number:	2805	Candidate		90.20	90.15	90.19	ppm	Candidate		90.46	90.70	90.50	ppm		
MPR Last Calibrated:	02/18/05	Result		90.38	90.33	90.28	ppm	Result		90.37	90.70	90.68	ppm		
Analytical Principle:	FID & TCD	Evaluation		VALID	VALID	VALID		Evaluation		VALID	VALID	VALID			
		MEAN ANALYTICAL RESULT:						90.33	ppm	MEAN ANALYTICAL RESULT:				90.58	ppm

Analyst Signature: _____

Eric Barron

Approved by: _____

Thuan Tran

Air Liquide America L.P.
8832 Dice Road, Santa Fe Spring, CA 90670-2516

Date: August 3, 2005
 Plant: TPI Petroleum, Inc.
 Unit: No. 2 SRU Tail Gas Incinerator

CETCON, Inc.
O₂/CO₂ ANALYZER CALIBRATION DATA

Operator: LKS
 Job No.: CJ-4022A

Analyzer:	O₂	Serial Number:	X1440D173B	Zero Gas:	0.00	% of Span	0.0	Cylinder #	SSG-1354
Make:	Servomex	Span:	25 = 10	Mid Range Gas:	11.50		46.0		CC-61058
Model:	1440 Series	Units:	% = VDC	High Range Gas:	21.00		84.0		ALM-031386

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error	Upscale	Downscale
Analyzer Response	0.05	0.2	11.50	0.0	21.08	0.3	≤ 2% Span		
System Bias Test	Zero	Bias, % Span	Mid	Bias, % Span	Bias	95% Response Time			
System Response	0.10	0.2	11.40	-0.4	≤ 5% Span	Minutes:Seconds		1:10	1:20

Bias Gas Used (Mid/High)? **Mid** = **11.50** % Calibration Error Response = **11.50** %

Sample Run #	C _{0i} %	C _{0f} %	Zero Drift % Span	Zero Bias % Span	C _{mi} %	C _{mf} %	Cal Drift % Span	Cal Bias % Span	C _{Ave} %	Corrected Conc., %
C1A	0.10	0.09	0.0	0.2	11.40	11.38	-0.1	-0.5	6.579	6.602
C1B	0.09	0.06	-0.1	0.0	11.38	11.36	-0.1	-0.6	6.657	6.701
C1C	0.06	0.05	0.0	0.0	11.36	11.36	0.0	-0.6	6.724	6.784
C1D	0.06	0.04	-0.1	0.0	11.36	11.38	0.1	-0.5	6.749	6.806

Drift ≤ 3% Span, Bias ≤ 5% Span

Analyzer:	CO₂	Serial Number:	X1440C173A	Zero Gas:	0.00	% of Span	0.0	Cylinder #	SSG-1354
Make:	Servomex	Span:	12.5 = 5	Mid Range Gas:	5.56		44.5		ALM-031386
Model:	1440 Series	Units:	% = VDC	High Range Gas:	11.40		91.2		CC-65058

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error	Upscale	Downscale
Analyzer Response	0.04	0.3	5.60	0.3	11.40	0.0	≤ 2% Span		
System Bias Test	Zero	Bias, % Span	High	Bias, % Span	Bias	95% Response Time			
System Response	0.04	0.0	11.30	-0.8	≤ 5% Span	Minutes:Seconds		1:10	1:20

Bias Gas Used (Mid/High)? **High** = **11.40** % Calibration Error Response = **11.40** %

Sample Run #	C _{0i} %	C _{0f} %	Zero Drift % Span	Zero Bias % Span	C _{mi} %	C _{mf} %	Cal Drift % Span	Cal Bias % Span	C _{Ave} %	Corrected Conc., %
C1A	0.04	0.12	0.6	0.6	11.30	11.29	-0.1	-0.9	4.049	4.070
C1B	0.12	0.10	-0.2	0.5	11.29	11.26	-0.2	-1.1	4.047	4.020
C1C	0.10	0.06	-0.3	0.2	11.26	11.26	0.0	-1.1	3.999	3.996
C1D	0.10	0.07	-0.2	0.2	11.26	11.29	0.2	-0.9	4.011	4.000

Drift ≤ 3% Span, Bias ≤ 5% Span

C_{0i}: Initial Zero Gas Response, %
 C_{0f}: Final Zero Gas Response, %
 C_{0i}: Average Zero Gas Response, %
 Drift Corrected Concentration, % =

C_{mi}: Initial Span Gas Response, %
 C_{mf}: Final Span Gas Response, %
 C_{mi}: Average Span Gas Response, %
 (C_{ave} - C₀) = C_{mi} + (C_m - C₀)

C_{mi}: Span Gas Value, %
 C_{ave}: Average From Test, %

Method 6C Equation: 6C-1

QA/QC Check:

Completeness X Legibility X Accuracy X Specifications X Reasonableness X

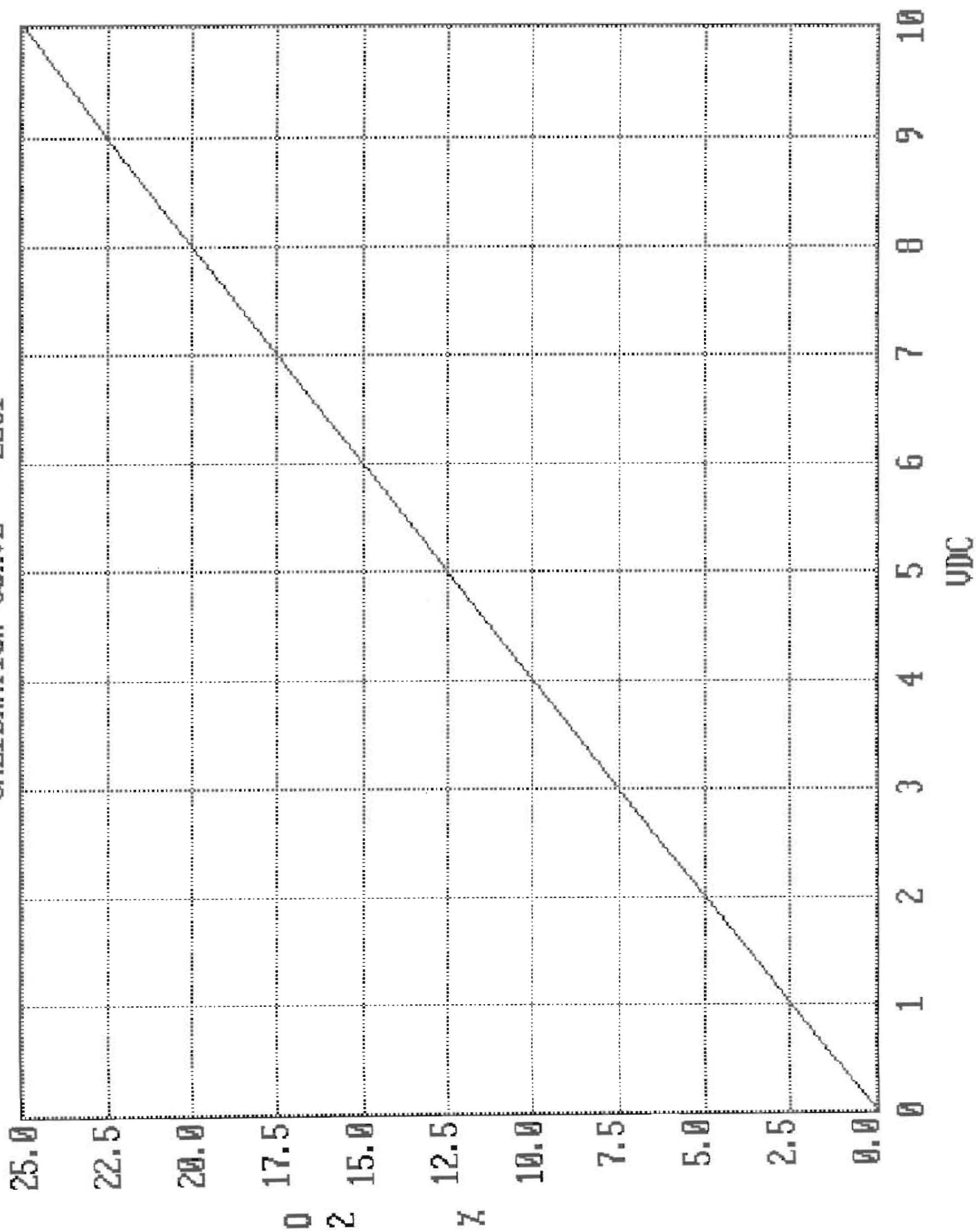
Checked by:

8/3/2005

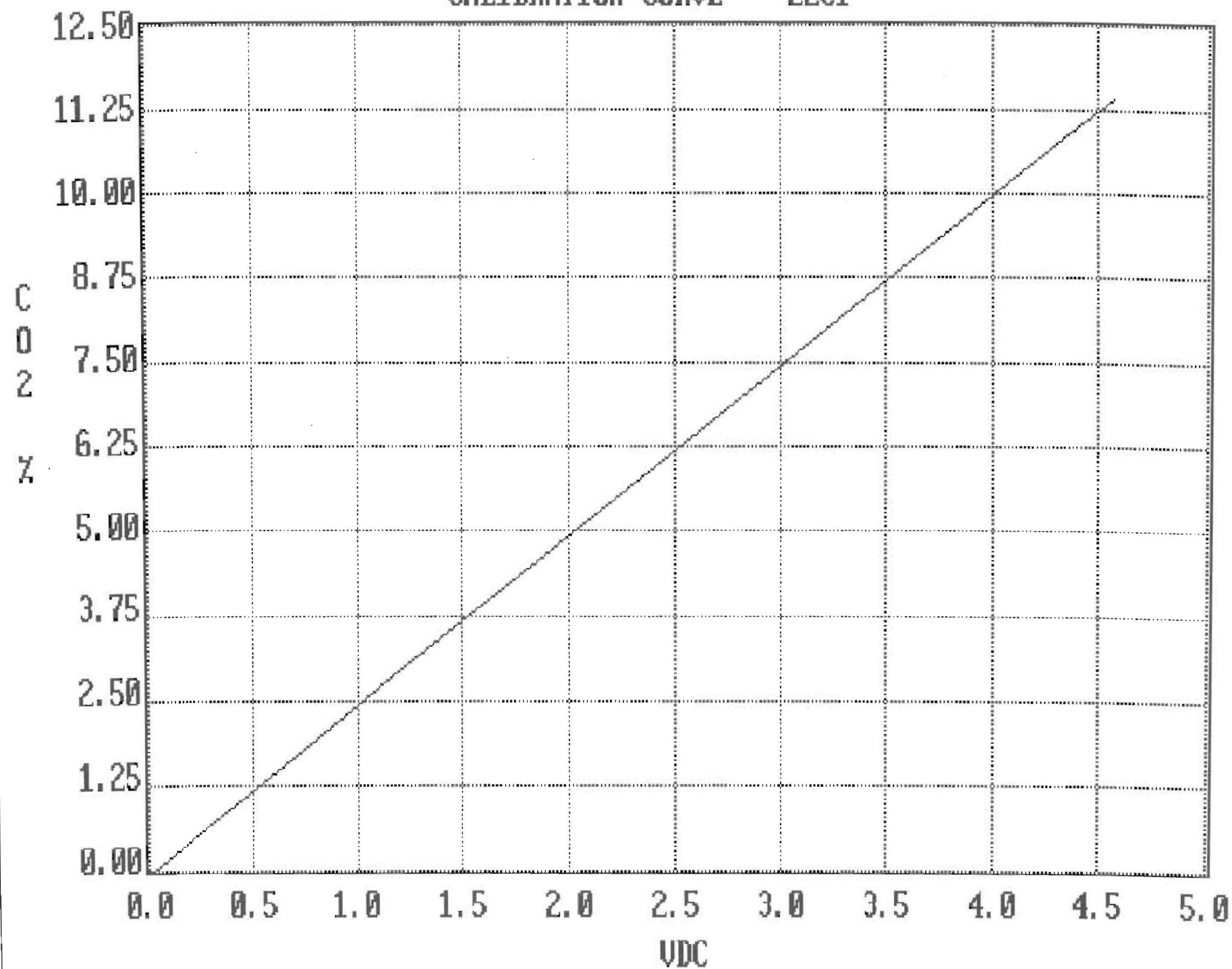
[Signature] 08/03/2005
 Operator (Signature/Date)
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[Signature] 08/03/2005
 Project Coordinator (Signature/Date)
 CAL02CO2.XLS

CALIBRATION CURVE 22C1



CALIBRATION CURVE 22C1



Date: August 4, 2005
 Plant: TPI Petroleum, Inc.
 Unit: No. 2 SRU Tail Gas Incinerator
 Operator: LKS
 Job No.: CJ-4022B

CETCON, Inc.

O₂ ANALYZER CALIBRATION DATA

Analyzer:	O ₂	Serial Number:	X1440D173B	Zero Gas:	Value, %	% of Span	Cylinder #
Make:	Servomex	Span:	25 = 10	Mid Range Gas:	0.00	0.0	SSG-1354
Model:	1440 Series	Units:	% = VDC	High Range Gas:	11.50	46.0	CC-61058
					21.00	84.0	ALM-031386

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error	
Analyzer Response	0.04	0.2	11.50	0.0	21.09	0.4	≤ 2% Span	
System Bias Test	Zero	Bias, % Span	Mid	Bias, % Span	Bias	95% Response Time	Upscale	Downscale
System Response	0.08	0.2	11.46	-0.2	≤ 5% Span	Minutes:Seconds	1:10	1:20

Bias Gas Used (Mid/High)? Mid = 11.50 % Calibration Error Response = 11.50 %

Sample Run #	C _{0i} %	C _{0f} %	Zero Drift % Span	Zero Bias % Span	C _{mi} %	C _{mf} %	Cal Drift % Span	Cal Bias % Span	C _{ave} %	Corrected Conc., %
C2A/R1	0.08	0.06	-0.1	0.1	11.46	11.39	-0.3	-0.4	6.885	6.902
C2B/R2	0.06	0.04	-0.1	0.0	11.39	11.36	-0.1	-0.6	6.851	6.906
C2C/R3	0.04	0.08	0.2	0.2	11.36	11.35	0.0	-0.6	6.751	6.812
C2D/R4	0.08	0.05	-0.1	0.0	11.35	11.34	0.0	-0.6	6.681	6.745
C2E/R5	0.05	0.06	0.0	0.1	11.34	11.31	-0.1	-0.8	6.626	6.705
C2F/R6	0.06	0.09	0.1	0.2	11.31	11.33	0.1	-0.7	6.517	6.588
C2G/R7	0.09	0.09	0.0	0.2	11.33	11.32	0.0	-0.7	6.414	6.473
C2H/R8	0.09	0.09	0.0	0.2	11.32	11.33	0.0	-0.7	6.295	6.351
C2I/R9	0.09	0.10	0.0	0.2	11.33	11.32	0.0	-0.7	5.766	5.807

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_{0is}: Span Gas Value, %
 C_{ave}: Average From Test, %

Drift Corrected Concentration, % =

$$(C_{0is} - C_0) \cdot C_{ms} : (C_m - C_0)$$

Method 6C Equation: 6C-1

QA/QC Check:

Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

Checked by:

8/4/2005

Operator (Signature/Date)  08/04/2005
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Project Coordinator (Signature/Date)  08/04/2005
 CALO2RATA.XLS

Date: August 4, 2005
 Plant: TPI Petroleum, Inc.
 Unit: No. 2 SRU Tail Gas Incinerator
 Operator: LKS
 Job No.: CJ-4022B

CETCON, Inc.

CO₂ ANALYZER CALIBRATION DATA

Analyzer:	CO ₂	Serial Number:	X1440D173A	Zero Gas:	Value, %	% of Span	Cylinder #
Make:	Servomex	Span:	12.5 = 5	Mid Range Gas:	0.00	0.0	SSG-1354
Model:	1440 Series	Units:	% = VDC	High Range Gas:	5.56	44.5	ALM-031386
					11.40	91.2	CC-61058

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error		
Analyzer Response	0.04	0.3	5.60	0.3	11.40	0.0	≤ 2% Span		
System Bias Test	Zero	Bias, % Span	High	Bias, % Span	Bias		95% Response Time	Upscale	Downscale
System Response	0.06	0.2	11.28	-1.0	≤ 5% Span		Minutes:Seconds	1:10	1:20

Bias Gas Used (Mid/High)? **High** = **11.40** % Calibration Error Response = **11.40** %

Sample Run #	C _{0i} %	C _{0f} %	Zero Drift % Span	Zero Bias % Span	C _{mi} %	C _{mf} %	Cal Drift % Span	Cal Bias % Span	C _{Ave} %	Corrected Conc., %
C2A/R1	0.06	0.07	0.1	0.2	11.28	11.29	0.1	-0.9	3.969	3.967
C2B/R2	0.07	0.04	-0.2	0.0	11.29	11.28	-0.1	-1.0	3.967	3.971
C2C/R3	0.04	0.08	0.3	0.3	11.28	11.34	0.5	-0.5	3.937	3.929
C2D/R4	0.08	0.07	-0.1	0.2	11.34	11.32	-0.2	-0.6	3.939	3.914
C2E/R5	0.07	0.09	0.2	0.4	11.32	11.26	-0.5	-1.1	3.969	3.955
C2F/R6	0.09	0.12	0.2	0.6	11.26	11.26	0.0	-1.1	3.967	3.947
C2G/R7	0.12	0.12	0.0	0.6	11.26	11.23	-0.2	-1.4	3.959	3.934
C2H/R8	0.12	0.12	0.0	0.6	11.23	11.24	0.1	-1.3	3.969	3.948
C2I/R9	0.12	0.14	0.2	0.8	11.24	11.23	-0.1	-1.4	4.052	4.026

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, % =

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

Method 6C Equation; 6C-1

QA/QC Check:

Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

Checked by

8/4/2005

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 Operator (Signature/Date)
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[Signature] 08/04/2005
 Project Coordinator (Signature/Date)
 CALCO2RATA.XLS

Date: August 4, 2005
 Plant: TPI Petroleum, Inc.
 Unit: No. 2 SRU Tail Gas Incinerator

CETCON, Inc.

Operator: LKS
 Job No.: CJ-4022A

O₂/CO₂ ANALYZER CALIBRATION DATA

Analyzer:	O ₂	Serial Number:	X1440D173B	Zero Gas:	0.00	% of Span	0.0	Cylinder #	SSG-1354
Make:	Servomex	Span:	25 = 10	Mid Range Gas:	11.50	% of Span	46.0	Cylinder #	CC-61058
Model:	1440 Series	Units:	% = VDC	High Range Gas:	21.00	% of Span	84.0	Cylinder #	ALM-031386

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error	95% Response Time	Upscale	Downscale
Analyzer Response	0.04	0.2	11.50	0.0	21.09	0.4	≤ 2% Span	Minutes:Seconds	1:10	1:20
System Bias Test	0.04	Bias, % Span	Mid	Bias, % Span	Bias	95% Response Time	Minutes:Seconds	Upscale	Downscale	
System Response	0.08	0.2	11.46	-0.2	≤ 5% Span	Minutes:Seconds		1:10	1:20	

Bias Gas Used (Mid/High)? Mid = 11.50 % Calibration Error Response = 11.50 %

Sample Run #	C _{0i} %	C _{0f} %	Zero Drift % Span	Zero Bias % Span	C _{mi} %	C _{mf} %	Cal Drift % Span	Cal Bias % Span	C _{Ave} %	Corrected Conc., %
C3A	0.10	0.09	0.0	0.2	11.32	11.31	0.0	-0.8	5.794	5.841
C3B	0.09	0.10	0.0	0.2	11.31	11.34	0.1	-0.6	5.858	5.902
C3C	0.10	0.06	-0.2	0.1	11.34	11.37	0.1	-0.5	6.143	6.184
C3D	0.10	0.06	-0.2	0.1	11.34	11.36	0.1	-0.6	6.325	6.372

Drift ≤ 3% Span, Bias ≤ 5% Span

Analyzer:	CO ₂	Serial Number:	X1440C173A	Zero Gas:	0.00	% of Span	0.0	Cylinder #	SSG-1354
Make:	Servomex	Span:	12.5 = 5	Mid Range Gas:	5.56	% of Span	44.5	Cylinder #	ALM-031386
Model:	1440 Series	Units:	% = VDC	High Range Gas:	11.40	% of Span	91.2	Cylinder #	CC-65058

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error	95% Response Time	Upscale	Downscale
Analyzer Response	0.04	0.3	5.60	0.3	11.40	0.0	≤ 2% Span	Minutes:Seconds	1:10	1:20
System Bias Test	Zero	Bias, % Span	High	Bias, % Span	Bias	95% Response Time	Minutes:Seconds	Upscale	Downscale	
System Response	0.06	0.2	11.28	-1.0	≤ 5% Span	Minutes:Seconds		1:10	1:20	

Bias Gas Used (Mid/High)? High = 11.40 % Calibration Error Response = 11.40 %

Sample Run #	C _{0i} %	C _{0f} %	Zero Drift % Span	Zero Bias % Span	C _{mi} %	C _{mf} %	Cal Drift % Span	Cal Bias % Span	C _{Ave} %	Corrected Conc., %
C3A	0.14	0.13	-0.1	0.7	11.23	11.21	-0.2	-1.5	4.047	4.058
C3B	0.13	0.15	0.2	0.9	11.21	11.24	0.2	-1.3	4.115	4.088
C3C	0.15	0.12	-0.2	0.6	11.24	11.27	0.2	-1.0	4.055	4.019
C3D	0.15	0.13	-0.2	0.7	11.24	11.26	0.2	-1.1	3.952	3.912

Drift ≤ 3% Span, Bias ≤ 5% Span

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

C_{mi}: Initial Span Gas Response, %
 C_{mf}: Final Span Gas Response, %
 C_m: Average Span Gas Response, %
 (C_{Ave} - C₀) * C_{mf} ÷ (C_m - C₀)

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

Method 6C Equation: 6C-1

QA/QC Check:

Completeness ☒ Legibility ☒ Accuracy ☒ Specifications ☒ Reasonableness ☒

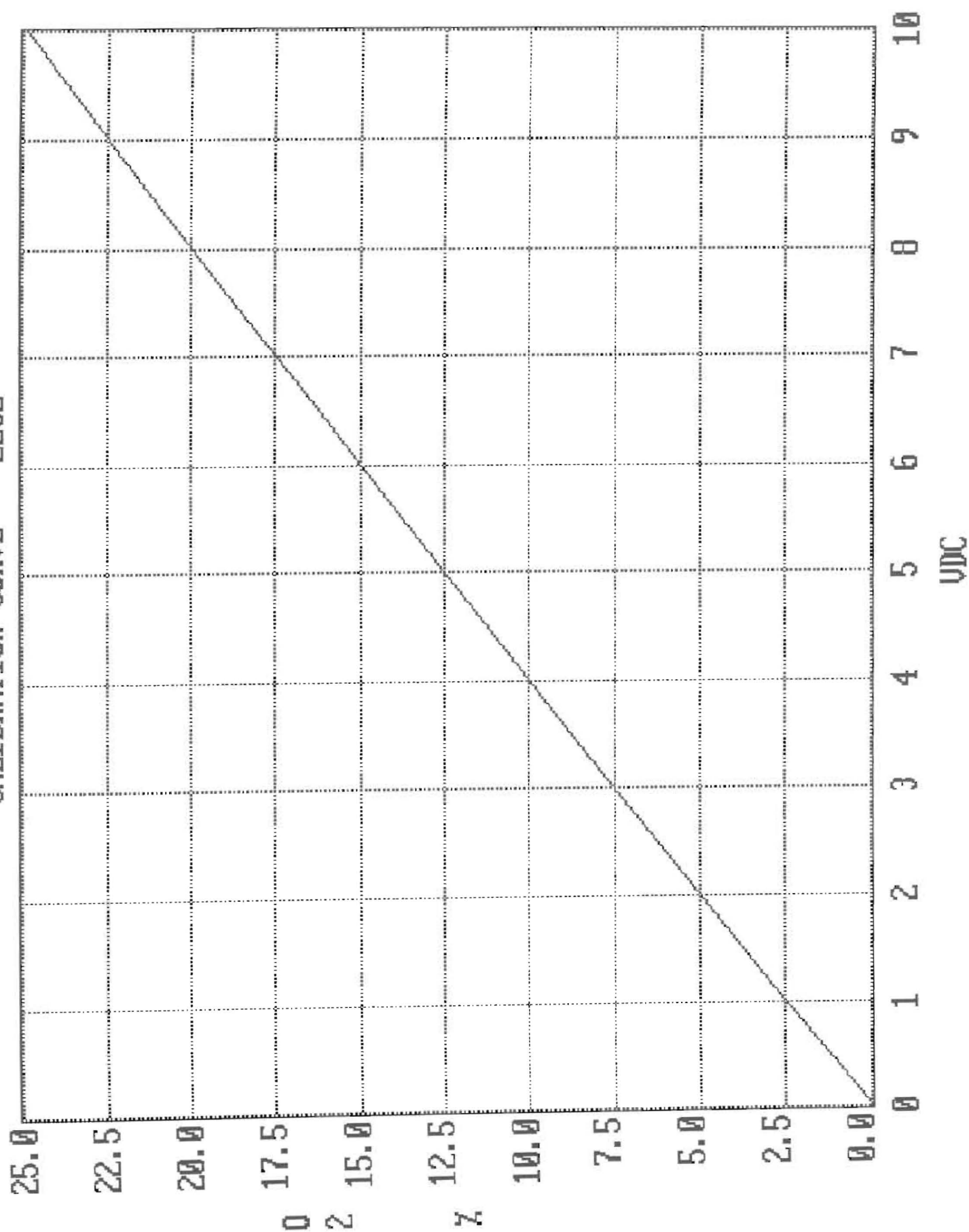
Checked by:

8/4/2005

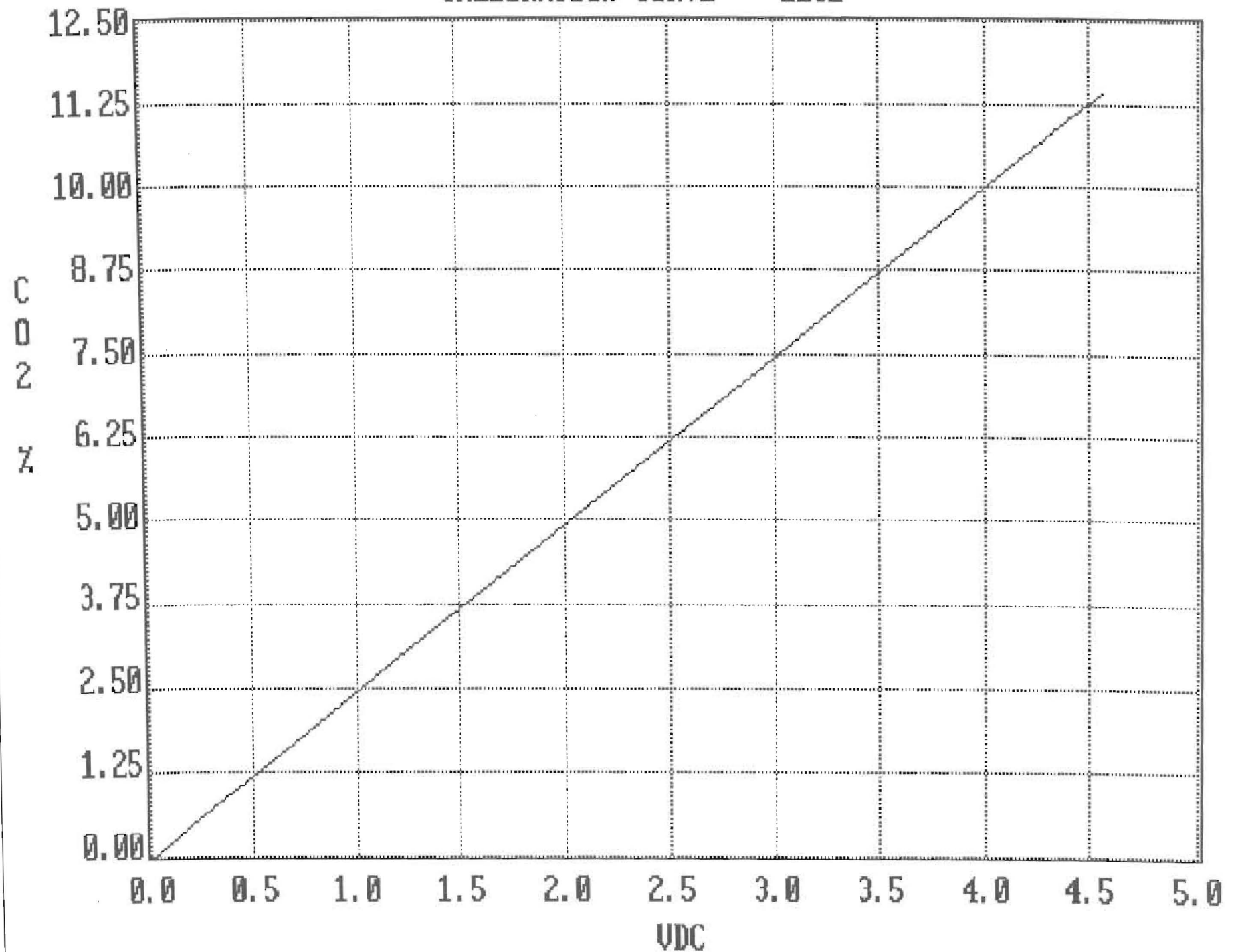
Operator (Signature/Date) 08/04/2005
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Project Coordinator (Signature/Date) 08/04/2005
 CAL02CO2.XLS

CALIBRATION CURVE 22C2



CALIBRATION CURVE 22C2



**AIR LIQUIDE****CERTIFICATE OF ANALYSIS****Interference-Free Multi-Component EPA Protocol Gases**

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section No. 2.2, Procedure . G-1

Cylinder Number: CC61058

Customer: CETCON
TULSA, OK
P.O. Number: 9072
Item Number:

Shipping Order Number: 16011166
Transfer Number: 16011710
Lot Number: SFS85477
Valve: CGA 590
Cyl. Pressure*: 2000PSIG

*Cylinder should not be used when gas
pressure is below 150 psig

Assay Date: 12-Apr-05

Expiration Date: 12-Apr-08

COMPONENT	REQUESTED		ASSAY			
	Concentration		Concentration			
Oxygen	11-12 %		11.5	±	0.2	%
Carbon Dioxide	11-12 %		11.4	±	0.1	%
Nitrogen	Balance		Balance			

Reference Standard Employed For Analysis:

				SRM		NTRM No.	Exp. Date	Sample No.	Type
Concentration				Balance	Cyl. No.				
8.99	±	0.10	%	Oxygen	CC62873	SFS69605	10/26/06	QN	GMIS
5.006	±	0.026	%	Carbon Dioxide	CC62828	950808	04/08/06	PA	GMIS

Analysis Information

Component		First Triad Analysis: 4/12/2005				
Oxygen						
Analyzer Information		Trial 1	Trial 2	Trial 3	Units	
Manufacturer:	Hewlett Packard	Zero	0	0	0	%
Model Number:	5890A	Reference	8.983	8.985	8.989	%
Serial Number:	3336A54620	Candidate	11.505	11.512	11.513	%
MPR Last Calibrated:	03/16/05	Result	11.51	11.52	11.51	%
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID	%
MEAN ANALYTICAL RESULT:						
11.52						

Component	Carbon Dioxide	First Triad Analysis: 4/12/2005					
Analyzer Information		Trial 1	Trial 2	Trial 3	Units		
Manufacturer:	Hewlett Packard	Zero	0	0	%		
Model Number:	5890A	Reference	4.996	5.006	5.008	%	
Serial Number:	3336A54620	Candidate	11.346	11.358	11.361	%	
MPR Last Calibrated:	04/08/05	Result	11.37	11.36	11.36	%	
Analytical Principle:	FID & TCD	Evaluation	VALID	VALID	VALID		
MEAN ANALYTICAL RESULT:						11.36	%

Analyst Signature:

Eric Barron

Approved by:

Thuan Tran

RATA CLASS



Scott Specialty Gases

Dual-Analyzed Calibration Standard

9810 BAY AREA BLVD, PASADENA, TX 77507

Phone: 281-474-5800

Fax: 281-474-5857

CERTIFICATE OF ACCURACY: EPA Protocol Gas

Assay Laboratory

SCOTT SPECIALTY GASES
9810 BAY AREA BLVD
PASADENA, TX 77507

P.O. No.: 7768
Project No.: 04-08942-002

Customer

CETCON
4953 S 45 WEST 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: ALM031086 Certification Date: 8/20/02 Exp. Date: 8/20/2005
Cylinder Pressure***: 2000 PSIG

COMPONENT

CERTIFIED CONCENTRATION (Moles)

ANALYTICAL

ACCURACY**

TRACEABILITY

COMPONENT	CERTIFIED CONCENTRATION (Moles)	ANALYTICAL ACCURACY**	TRACEABILITY
CARBON DIOXIDE	5.56 %	+/- 1 %	Direct NIST and NMI
OXYGEN	21.00 %	+/- 1 %	Direct NIST and NMI
NITROGEN	BALANCE		

*** Do not use when cylinder pressure is below 150 psig.

** Analytical accuracy is based on the requirements of EPA Protocol Procedure G1, September 1997.

Product certified as +/- 1% analytical accuracy is directly traceable to NIST or NMI standards.

REFERENCE STANDARD

TYPE/SRM NO.	EXPIRATION DATE	CYLINDER NUMBER	CONCENTRATION	COMPONENT
NTRM 1674	4/03/03	ALM012588	7.080 %	CARBON DIOXIDE
NTRM 2658	10/01/02	ALM065039	9.930 %	OXYGEN

INSTRUMENTATION

INSTRUMENT/MODEL/SERIAL#

DATE LAST CALIBRATED

ANALYTICAL PRINCIPLE

INSTRUMENT/MODEL/SERIAL#	DATE LAST CALIBRATED	ANALYTICAL PRINCIPLE
MTI-A/M200/171109	08/07/02	GAS CHROMATOGRAPHY
MTI-A/M200/171109	07/30/02	GAS CHROMATOGRAPHY

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: 08/20/02 Response Unit: AREA

Z1 = 24.00000	R1 = 25294.00	T1 = 19848.00
R2 = 25225.00	Z2 = 32.00000	T2 = 19836.00
Z3 = 45.00000	T3 = 19838.00	R3 = 25240.00
Avg. Concentration: 5.560 %		

Concentration = $A + Bx + Cx^2 + Dx^3 + Ex^4$
 $r = 0.99998534$
 Constants: $A = -0.0231047$
 $B = 0.00028295$ $C =$
 $D =$ $E =$

OXYGEN

Date: 08/20/02 Response Unit: AREA

Z1 = 5.00000	R1 = 36891.00	T1 = 77962.00
R2 = 36799.00	Z2 = 66.00000	T2 = 77779.00
Z3 = 53.00000	T3 = 77825.00	R3 = 36820.00
Avg. Concentration: 21.00 %		

Concentration = $A + Bx + Cx^2 + Dx^3 + Ex^4$
 $r = 0.999983353$
 Constants: $A = -0.046816395$
 $B = 0.000272473$ $C =$
 $D =$ $E =$

APPROVED BY:

David Kelly
DAVID KELLY

Date: August 3, 2005
Plant: TPI Petroleum, Inc.
Unit: No. 2 SRU Tail Gas Incinerator

CETCON, Inc.

Operator: LKS
Job No.: CJ-4022A

SO₂/THC ANALYZER CALIBRATION DATA

Analyzer:	SO ₂	Serial Number:	8196-8	Zero Gas:	0.0	% of Span	0.0	Cylinder #	SSG-1354
Make:	Bovar	Span:	240 = 10	Mid Range Gas:	97.2		40.5		CC-61941
Model:	721M	Units:	ppm = VDC	High Range Gas:	227.0		94.6		CC-191214

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error		
Analyzer Response	0.0	0.0	97.6	0.2	227.1	0.0	≤ 2% Span		
System Bias Test	Zero	Bias, % Span	Mid	Bias, % Span	Bias	95% Response Time	Upscale	Downscale	
System Response	0.6	0.3	93.0	-1.9	≤ 5% Span	Minutes:Seconds	2:30	2:35	

Bias Gas Used (Mid/High)? Mid = 97.2 ppm Calibration Error Response = 97.6 ppm

Sample Run #	C _{0i} ppm	C _{0f} ppm	Zero Drift % Span	Zero Bias % Span	C _{mi} ppm	C _{mff} ppm	Cal Drift % Span	Cal Bias % Span	C _{Ave} ppm	Corrected Conc., ppm
C1A	0.6	1.0	0.2	0.4	93.0	92.4	-0.2	-2.2	17.576	17.743
C1B	1.0	1.1	0.0	0.5	92.4	92.0	-0.2	-2.3	17.676	17.730
C1C	1.1	1.0	0.0	0.4	92.0	91.8	-0.1	-2.4	19.371	19.602
C1D	1.1	1.2	0.0	0.5	92.0	92.8	0.3	-2.0	17.701	17.630

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
Drift Corrected Concentration, ppm =

C_{mi}: Initial Span Gas Response, ppm
C_{mff}: Final Span Gas Response, ppm
C_m: Average Span Gas Response, ppm
(C_{Ave} - C₀) • C_{ma} + (C_m - C₀)

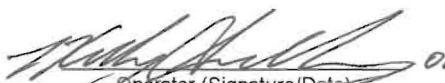
C_{ma}: Span Gas Value, ppm
C_{Ave}: Average From Test, ppm
Method 6C Equation: 6C-1

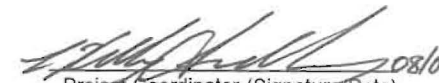
QA/QC Check:

Completeness X Legibility X Accuracy X Specifications X Reasonableness X

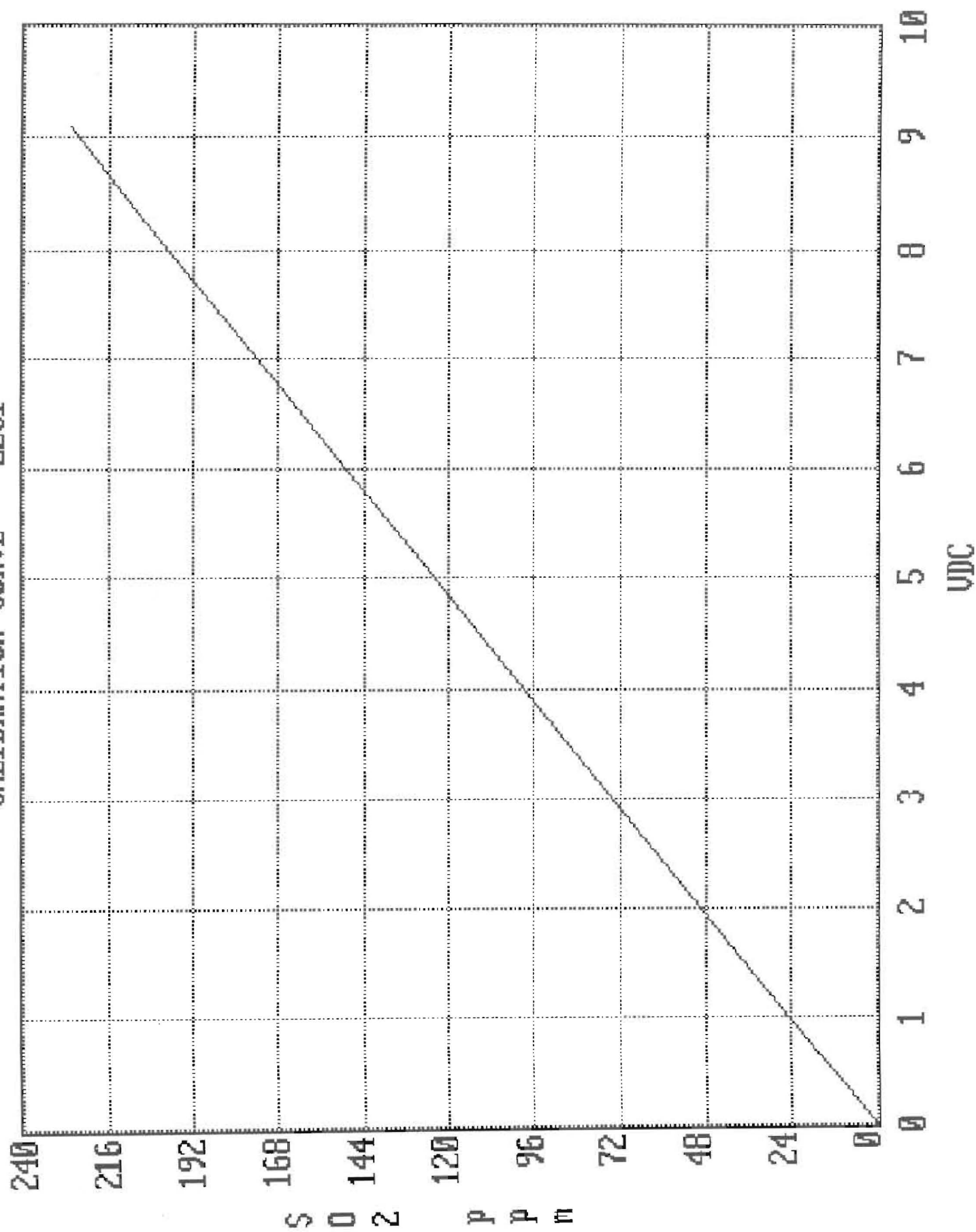
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8/4/2005

 08/04/2005
Operator (Signature/Date)
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 08/04/2005
Project Coordinator (Signature/Date)
CALSO2.XLS

CALIBRATION CURVE 22C1



Date: August 4, 2005
 Plant: TPI Petroleum, Inc.
 Unit: No. 2 SRU Tail Gas Incinerator
 Operator: LKS
 Job No.: CJ-4022B

CETCON, Inc.
SO₂ ANALYZER CALIBRATION DATA

Analyzer:	SO₂	Serial Number:	8196-8	Zero Gas:	0.0	Value, ppm	% of Span	Cylinder #
Make:	Bovar	Span:	240 = 10	Mid Range Gas:	97.2			SSG-1354
Model:	721M	Units:	ppm = VDC	High Range Gas:	227.0			CC-61941
								CC-191214

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error	95% Response Time	Upscale	Downscale
Analyzer Response	0.0	0.0	97.5	0.1	227.0	0.0	≤ 2% Span	Minutes:Seconds	2:30	2:35
System Bias Test	Zero	Bias, % Span	Mid	Bias, % Span	Bias		≤ 5% Span			
System Response	0.6	0.3	93.0	-1.9						

Bias Gas Used (Mid/High)? **Mid** = **97.2** ppm Calibration Error Response = **97.5** ppm

Sample Run #	C _{0i} ppm	C _{0f} ppm	Zero Drift % Span	Zero Bias % Span	C _{mi} ppm	C _{mf} ppm	Cal Drift % Span	Cal Bias % Span	C _{Ave} ppm	Corrected Conc., ppm
C2A/R1	0.6	1.6	0.4	0.7	93.0	92.4	-0.2	-2.1	18.541	18.507
C2B/R2	1.6	2.0	0.2	0.8	92.4	93.7	0.5	-1.6	19.516	18.871
C2C/R3	2.0	1.0	-0.4	0.4	93.7	90.0	-1.5	-3.1	19.341	19.194
C2D/R4	1.0	-0.9	-0.8	-0.4	90.0	87.5	-1.0	-4.2	18.466	20.181
C2E/R5	-0.9	0.0	0.4	0.0	87.5	88.0	0.2	-4.0	18.416	20.791
C2F/R6	0.0	1.1	0.5	0.5	88.0	90.5	1.0	-2.9	22.144	23.663
C2G/R7	1.1	2.4	0.5	1.0	90.5	92.1	0.7	-2.3	24.095	24.254
C2H/R8	2.4	2.8	0.2	1.2	92.1	93.5	0.6	-1.7	24.471	23.568
C2I/R9	2.8	3.4	0.3	1.4	93.5	93.3	-0.1	-1.8	27.048	25.778

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 6C Equation: 6C-1

QA/QC Check:

Completeness X

Legibility X

Accuracy X

Specifications X

Reasonableness X

Checked by:

8/4/2005

[Signature] 08/04/2005
 Operator (Signature/Date)
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[Signature] 08/04/2005
 Project Coordinator (Signature/Date)
 CALSO2RATA.XLS

Date: August 4, 2005
Plant: TPI Petroleum, Inc.
Unit: No. 2 SRU Tail Gas Incinerator

CETCON, Inc.

Operator: LKS
Job No.: CJ-4022A

SO₂/THC ANALYZER CALIBRATION DATA

Analyzer:	SO ₂	Serial Number:	8196-8	Zero Gas:	0.0	% of Span	0.0	Cylinder #	SSG-1354
Make:	Bovar	Span:	240 = 10	Mid Range Gas:	97.2		40.5		CC-61941
Model:	721M	Units:	ppm = VDC	High Range Gas:	227.0		94.6		CC-191214

Mid Range: 40-60%, High Range 80-100%

Calibration Error Test	Zero	Error, % Span	Mid	Error, % Span	High	Error, % Span	Error	
Analyzer Response	0.0	0.0	97.5	0.1	227.0	0.0	≤ 2% Span	
System Bias Test	Zero	Bias, % Span	Mid	Bias, % Span	Bias	95% Response Time	Upscale	Downscale
System Response	0.6	0.3	93.0	-1.9	≤ 5% Span	Minutes:Seconds	2:30	2:35

Bias Gas Used (Mid/High)? Mid = 97.2 ppm Calibration Error Response = 97.5 ppm

Sample Run #	C _{0i} ppm	C _{0f} ppm	Zero Drift % Span	Zero Bias % Span	C _{mi} ppm	C _{mf} ppm	Cal Drift % Span	Cal Bias % Span	C _{Ave} ppm	Corrected Conc., ppm
C3A	3.4	3.7	0.1	1.5	93.3	95.0	0.7	-1.0	27.023	25.183
C3B	3.7	3.9	0.1	1.6	95.0	94.2	-0.3	-1.4	23.595	21.190
C3C	3.9	4.0	0.0	1.7	94.2	95.0	0.3	-1.0	20.642	17.898
C3D	3.9	4.0	0.0	1.7	94.2	95.5	0.5	-0.8	20.092	17.261

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
Drift Corrected Concentration, ppm =

C_{mi}: Initial Span Gas Response, ppm
C_{mf}: Final Span Gas Response, ppm
C_m: Average Span Gas Response, ppm
(C_{Ave} - C₀) • C_{ma} + (C_m - C₀)

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

Method 6C Equation: 6C-1

QA/QC Check:

Completeness X Legibility X Accuracy X Specifications X Reasonableness X

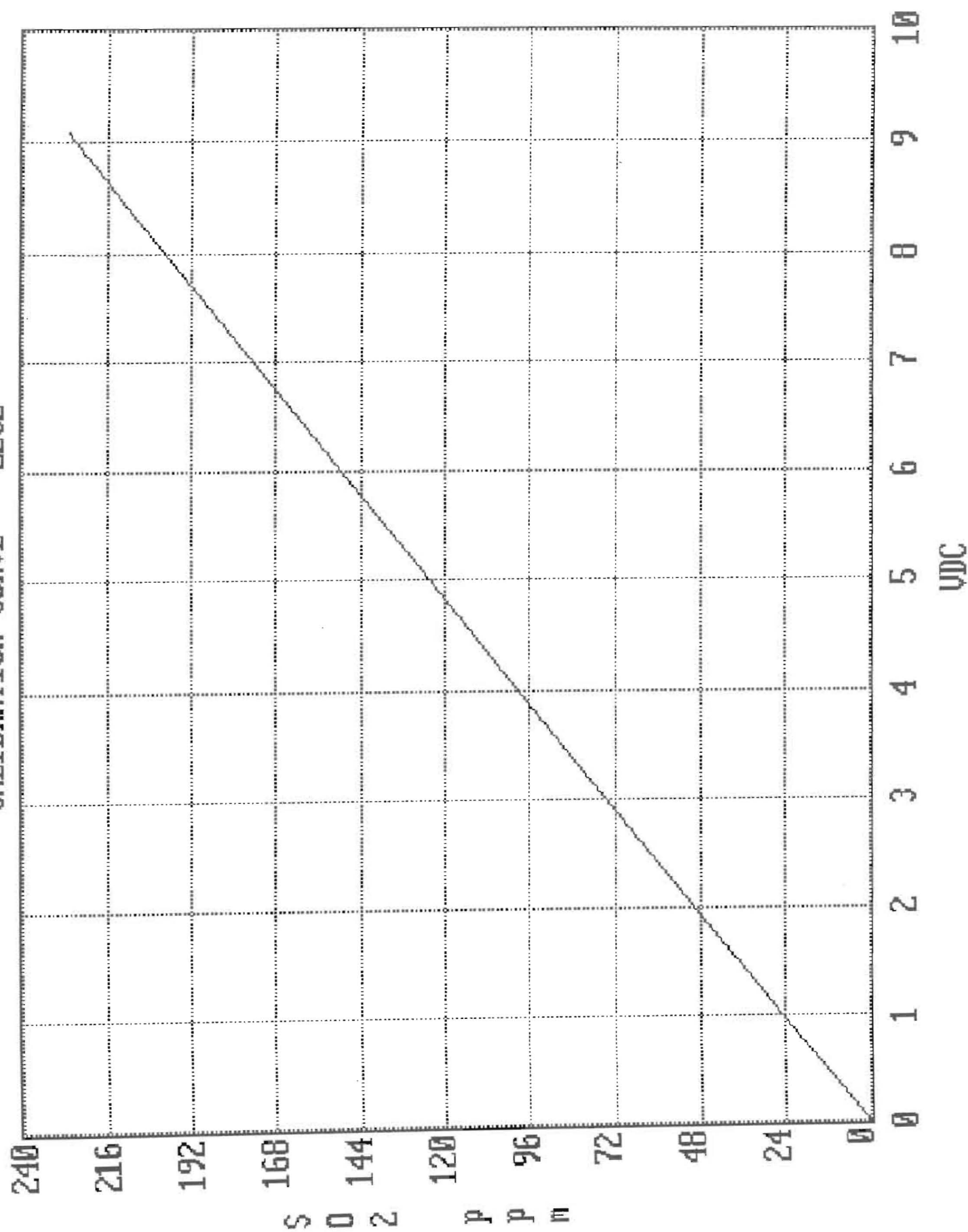
Checked by:

8/4/2005

M. Kelly 08/04/2005
Operator (Signature/Date)
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M. Kelly 08/04/2005
Project Coordinator (Signature/Date)
CALSO2.XLS

CALIBRATION CURVE 22C2



**AIR LIQUIDE****CERTIFICATE OF ANALYSIS****Interference-Free Multi-Component EPA Protocol Gases**

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section No. 2.2, Procedure . G-1

Customer: CETCON
TULSA, OK
P.O. Number: 9113
Item Number:

Cylinder Number: CC61941

Shipping Order Number 16403834
Transfer Number: 16403834
Lot Number: SFS86099
Valve: CGA 660
Cyl. Pressure:* 2000PSIG

Assay Date: 18-May-05

Expiration Date: 18-May-07

*Cylinder should not be used when
gas pressure is below 150 psig

Component	REQUESTED Concentration	ASSAY Concentration
Sulfur Dioxide	96-98 ppm	97.2 ± 1.4 ppm
Nitrogen	Balance	Balance

Reference Standard Employed For Analysis:

Concentration	Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
102.0 ± 1.0 ppm	Sulfur Dioxide	Nitrogen	CC 69288	81694	07/01/06	98080102	NTRM

Analysis Information:

Component		Sulfur Dioxide		First Triad Analysis 05/11/05			Second Triad Analysis 05/18/05										
Analyzer Information				Trial 1	Trial 2	Trial 3	Units		Trial 4	Trial 5	Trial 6	Units					
Manufacturer:	Horiba	Zero		0	0	0	Vdc	Zero	0	0	0	Vdc					
Model Number:	CMA-331A	Reference		107	107	107	Vdc	Reference	106	106	106	Vdc					
Serial Number:	56674503	Candidate		102	102	102	Vdc	Candidate	101	101	101	Vdc					
MPR Last Calibrated:	04/18/05	Result		97.23	97.23	97.23	ppm	Result	97.19	97.19	97.19	ppm					
Analytical Principle:	NDIR	Evaluation		VALID	VALID	VALID		Evaluation	VALID	VALID	VALID						
MEAN ANALYTICAL RESULT:							97.23	ppm	MEAN ANALYTICAL RESULT:							97.19	ppm

Analyst Signature:

Thuan Tran

Approved by:

Eric Barron



AIR LIQUIDE

CERTIFICATE OF ANALYSIS

Interference-Free Multi-Component EPA Protocol Gases

Note: Analytical uncertainty and NIST traceability are in compliance with EPA-600/R-97/121

Section No. 2.2, Procedure . G-1

Customer: CETCON
TULSA, OK
P.O. Number: 9113
Item Number:

Cylinder Number: CC191214

Shipping Order Number: 16403834
Transfer Number: 16403834
Lot Number: SFS86100
Valve: CGA 660
Cyl. Pressure*: 2000PSIG

*Cylinder should not be used when
gas pressure is below 150 psig

Assay Date: 18-May-05

Expiration Date: 18-May-07

Component	REQUESTED Concentration	ASSAY Concentration
Sulfur Dioxide	213.75-236.25 ppm	227 ± 4 ppm
Nitrogen	Balance	Balance

Reference Standard Employed For Analysis:

Concentration	Component	Balance	Cyl. No.	SRM or GMIS NTRM No.	Exp. Date	Sample No.	Type
244 ± 3 ppm	Sulfur Dioxide	Nitrogen	CC 57931	L99-045	09/30/06	LN	GMIS

Analysis Information:

Component	Sulfur Dioxide		First Triad Analysis 05/11/05			Second Triad Analysis 05/18/05							
Analyzer Information			Trial 1	Trial 2	Trial 3	Units		Trial 4	Trial 5	Trial 6	Units		
Manufacturer: Rosemount Analytical	Zero		0	0	0	Vdc	Zero	0	0	0	Vdc		
Model Number: 890192	Reference		212	212	212	Vdc	Reference	208	208	208	Vdc		
Serial Number: 1000130	Candidate		197	197	197	Vdc	Candidate	194	194	193	Vdc		
MPR Last Calibrated: 05/06/05	Result		226.7	226.7	226.7	ppm	Result	227.6	227.6	226.4	ppm		
Analytical Principle: Ultraviolet	Evaluation		VALID	VALID	VALID		Evaluation	VALID	VALID	VALID			
MEAN ANALYTICAL RESULT:						226.7	ppm	MEAN ANALYTICAL RESULT:				227.2	ppm

Analyst Signature: _____

Thuan Tran

Approved by: _____

Eric Barron

CETCON, Inc.

Reference Method 7E or 20 NO_x Analyzer

NO₂ to NO Converter Efficiency Test

Analyzer Model: TECO 42C
Serial Number: 65868-350
Operator: LKS
Date: 8/2/2005

ANALYZER CONVERSION EFFICIENCY DATA

Test Length: 30 Minutes

Analyzer Span: 225 ppm

Comments: Tedlar Bag Mixed ≈1:1 With Air And NO _x Calibration Gas		Cylinder ID#	Cal Gas Value	Initial Value Analyzer Response NO _x ppm	Final Value Analyzer Response NO _x ppm	Decrease In Response ⁽¹⁾ %
Zero gas	Air	Ambient Air	0.00	102.3	100.7	1.6
Mid range	NO _x	CC-192210	209.00			

- NOTES: 1. Final Value Cannot Decrease By More Than 2.0% Of The Initial Peak Value.
2. Concentration Of Oxygen In Tedlar Bag = 10.67 %

QA/QC Check:

Completeness X Legibility X

Accuracy X

Specifications X

Reasonableness X

Checked by:

8/2/2005

[Signature] 08/02/2005
Operator (Signature/Date)
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[Signature] 08/02/2005
Project Coordinator (Signature/Date)
CONVEFF.XLS

CETCON, Inc.
Pitot Tube Calibration

Pitot Tube No: 3 CETCON 1
 Length, ft.: 10'
 P_B (in. Hg): 29.27
 P_A + P_B, in.: 1.110 (6) (7)
 D_t, in.: 0.375
 Room Temp °F: 83 (Using NIST Thermometer)
 Pitot Temp. °F: 83 (8) with Calibrated CM or Transmation)

C_{Pstd}: 0.99
 C_{PA}: 0.810
 C_{PB}: 0.806
 Cal. Date: 7/6/2004
 Due Date: 1/6/2005
 Calibrator: SDW

	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	0.220	0.817	0.007
	2	0.25	2000	0.250	0.370	0.814	0.003
	3	0.50	2830	0.500	0.720	0.825	0.015
	4	0.75	3475	0.750	1.150	0.799	-0.011
	5	0.95	3950	0.840	1.300	0.796	-0.015
	Avg					0.810	0.000
Low Side (B)	1	0.15	1550	0.150	0.220	0.817	0.012
	2	0.25	2000	0.250	0.380	0.803	-0.003
	3	0.50	2830	0.500	0.740	0.814	0.008
	4	0.75	3475	0.750	1.150	0.799	-0.006
	5	0.95	3950	0.840	1.300	0.796	-0.010
	Avg					0.806	0.000

SUMMARY

C _{PA}	C _{PB}	C _P avg. (3)	C _P avg. (A) - C _P avg. (B) (4)	DEV avg. (A)	DEV avg. (B)
0.810	0.806	0.808	0.004	0.002	0.002

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

Geometric Calibration Data	
α ₁ = <u>0</u> °	β ₁ = <u>0.5</u> °
α ₂ = <u>1</u> °	β ₂ = <u>0</u> °
≤ 10°	≤ 5°
Y = <u>0</u> °	T = <u>1.0</u> °
A = P _A + P _B = <u>1.110</u> in.	
Z = A sin Y = <u>0.000</u> in.	W = A sin T = <u>0.019</u> in.
≤ 0.125 in.	≤ 0.031 in.
Wind Tunnel Calibration Required?	No
Thermocouple Replacement Required?	No

QA/QC Check

Checked by:

9/8/2004

S. Deke Wise
Operator (Signature/Date)
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John H. Hester 9/8/04
Project Coordinator (Signature/Date)
PITOTCAL.WK1

CETCON, Inc.

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

Control Module: CM#1
DGM Serial Number: 684551
Calibration Date: 3/28/2005
Calibrator: SDW
Vac. Leak Check, in. Hg: 26
Press. Leak Check, in. H₂O: 6.3
C_F: 1.008
ΔH@: 1.558

Previous Calibration Values:

C_F: 1.019
ΔH@: 1.572

Deviation From Pre-Test Cal:

→ -1.13 %
 → -0.92 %

Orifice Serial Number	1399S-12	1399S-16	1399S-19	1399S-24	1399S-31	1403S-1
Orifice Coefficient, K'	0.3187	0.4365	0.5066	0.6507	0.8347	0.9970
Run Time, R (min)	11.900	8.880	7.500	5.860	4.580	3.860
Barometric Pressure, P _B (in. Hg)	28.97	28.88	28.97	28.97	28.97	28.97
Ambient Temp, T _A (°F)	75	70	78	78	78	78
Pump Vacuum (in. Hg)	23.0	22.0	21.1	19.5	18.0	16.0
Orifice Pressure Drop, ΔH (in. H ₂ O)						
Start	0.49	0.92	1.25	1.91	2.90	4.00
Finish	0.49	0.92	1.25	1.91	2.90	4.00
Average	0.49	0.92	1.25	1.91	2.90	4.00
Inlet Temp DGM, T _i (°F) :						
Start	82	72	86	88	90	91
Finish	81	70	84	87	89	90
Average	82	71	85	88	90	91
Outlet Temp DGM, T _o (°F) :						
Start	80	63	80	80	79	78
Finish	80	64	80	80	80	79
Average	80	64	80	80	80	79
Average Temp DGM, T _m (°F) :	81	67	83	84	85	85
DGM Volume, V _m (ft ³):						
Finish	907.800	947.900	882.400	876.700	869.700	860.000
Start	902.800	942.900	877.400	871.700	864.700	855.000
Difference	5.000	5.000	5.000	5.000	5.000	5.000
V _{crstd} , ft ³ (1)	4.750	4.862	4.746	4.763	4.775	4.807
Flow Rate, Q, scfm	0.399	0.548	0.633	0.813	1.043	1.245
V _{mstd} , ft ³ (2)	4.731	4.842	4.725	4.722	4.727	4.740
C _F (3)	1.004	1.004	1.004	1.009	1.010	1.014
C _F Dev (4)	-0.004	-0.003	-0.003	0.001	0.003	0.006
ΔH@ (5)	1.639	1.676	1.666	1.544	1.430	1.390
ΔH@ Dev (6)	0.082	0.119	0.108	-0.013	-0.128	-0.167

NOTE:

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

Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

Checked by:

3/29/2005

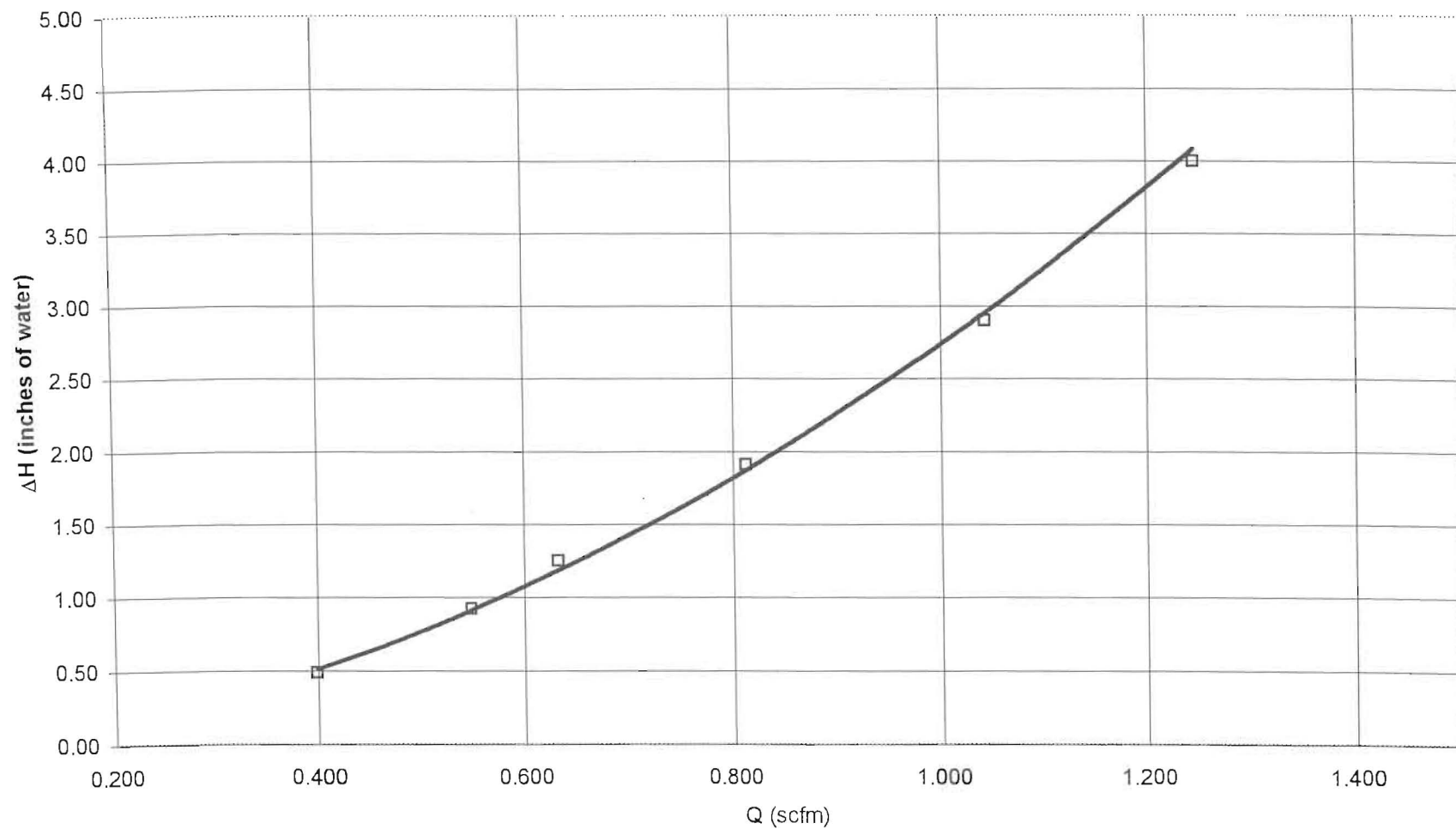
Deke W. W. 3/29/2005
 Operator (Signature/Date)

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John J. ... 3/29/2005
 Project Coordinator (Signature/Date)

CM1CAL.XLS

CETCON, INC.
CM#1 ORIFICE CURVE - March 29, 2005



CETCON, Inc.

INSTRUMENT CALIBRATION DATA

Digital Temperature Indicator (DTI) No: CM #1
SGI AP5500E

Calibration Date: March 28, 2005
 Calibrator: SDW

MEDIA	TIME	Mercury Thermometer (°F)	Temperature Indicator (°F)	Difference (°F)	
ICE BATH	10:40	33	32	-1	(1)
AMBIENT AIR	10:30	57	58	1	(1)
BOILING WATER	10:54	211	211	0	(1)
OVEN	17:50	205	202	-3	(2)
OVEN	14:43	229	232	3	(2)
OVEN	16:06	253	256	3	(2)
OVEN	11:20	310	313	3	(2)

Average 0.9

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

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

Adjustment Required?

YES	NO
	X

Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

Checked by:

3/28/2005

Depe Wise 3/29/2005
 Operator (Signature/Date)
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[Signature]
 Project Coordinator (Signature/Date)
 3/29/2005 CM1TEMP.XLS

CETCON, Inc.

INSTRUMENT CALIBRATION DATA

Digital Temperature Indicator (DTI) No: CET 1 SGI Control Module

CM-1

AP 5500E

Calibration Date: March 28, 2005

Calibrator: SDW

Temperature Simulator: Transmation

Model No.: 1062

Serial No.: B11605JK

Thermocouple Type: K

OMEGA Temp. Simulator (°F)	TIME	Temp. Indicator (°F)	Difference (°F)	Error, %
0	13:38	0	0	NA
NIST 78	13:39	79	1	1.3
100	13:40	101	1	1.0
200	13:41	200	0	0.0
300	13:42	301	1	0.3
400	13:43	400	0	0.0
500	13:44	499	-1	-0.2
600	13:45	598	-2	-0.3
700	13:46	698	-2	-0.3
800	13:47	798	-2	-0.3
900	13:48	899	-1	-0.1
1000	13:49	1000	0	0.0
1100	13:50	1100	0	0.0
1200	13:51	1201	1	0.1
1300	13:52	1301	1	0.1
1400	13:53	1402	2	0.1
1500	13:54	1501	1	0.1
1600	13:55	1602	2	0.1
1700	13:56	1703	3	0.2
1800	13:57	1805	5	0.3
1900	13:58	1905	5	0.3
2000	13:59	2005	5	0.3
2100	14:00	2108	8	0.4

Average:

1.2

0.1

Required Accuracy:

-1.5 ≤ Error, % ≤ 1.5

Adjustment Required?

YES	NO
	X

Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

Checked by:

3/28/2005

Operator (Signature/Date)

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Project Coordinator (Signature/Date)

3/29/2005

CM1SIM.XLS

CETCON, Inc.

INSTRUMENT CALIBRATION DATA

Digital Temperature Indicator (DTI) No: CET I Handheld

HH64A OMEGA

48273 / 4

Calibration Date: March 28, 2005

Calibrator: SDW

Temperature Simulator: Transmation

Model No.: 1062

Serial No.: B11605JK

Thermocouple Type: K

OMEGA Temp. Simulator (°F)	TIME	Temp. Indicator (°F)	Difference (°F)	Error, %
0	950	0	0	NA
NIST 78	952	78	0	0.3
100	953	101	1	0.9
200	954	200	0	0.1
300	955	300	0	0.1
400	956	401	1	0.2
500	957	501	1	0.2
600	958	600	0	0.0
700	959	701	1	0.1
800	1000	800	0	0.0
900	1001	900	0	0.0
1000	1002	1001	1	0.1
1100	1003	1100	0	0.0
1200	1004	1201	1	0.1
1300	1005	1301	1	0.1
1400	1006	1401	1	0.1
1500	1007	1502	2	0.1
1600	1008	1601	1	0.1
1700	1009	1701	1	0.1
1800	1010	1802	2	0.1
1900	1011	1903	3	0.2
2000	1012	2002	2	0.1
2100	1013	2103	3	0.1

Average:

0.9

0.1

Required Accuracy:

-1.5 ≤ Error, % ≤ 1.5

Adjustment Required?

YES	NO
	X

Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

Checked by:

3/29/2005

Operator (Signature/Date)

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Project Coordinator (Signature/Date)

3/29/2005

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CETCON, Inc.

CETCON ELECTRONIC BALANCE INSTRUMENT CALIBRATION VERIFICATION

Model: OHAUS Navigator - 2100
Serial Number: CET-1

Calibration Verification Date: 3/29/2005 SDW

NIST Class S Stainless Steel Weight (g)	Time	Electronic Balance Display (g)	Magnitude of the Difference (g)	Comments
100.0	1014	100.0	0.0	
200.0	1014	200.0	0.0	
300.0	1015	300.0	0.0	
500.0	1015	499.9	-0.1	
800.0	1015	799.9	-0.1	
1000.0	1016	999.9	-0.1	
2000.0	1018	1999.8	-0.2	

Average Difference -0.07
Must be $\leq 0.5g$

Calibration Adjustment?

YES	NO
	X

S.S. Weight, g	Serial Number
100.0	52387
200.0	70041
500.0	70667
1000.0	4280402
2000.0	4280403

Trailer Reference Weight, No. 001 = 699.9 g

QA/QC Check:

Completeness ✓ Legibility ✓ Accuracy ✓ Specifications ✓ Reasonableness ✓

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[Signature]
Project Coordinator (Signature/Date)
3/29/2005 CETCON1CAL.xls

CETCON, Inc.

Barometer Calibration

Date: 28-Mar-05
Barometer ID: CETCON I
Calibrator: SDW

Absolute Pressure at Tulsa International Airport National Weather Service: 29.053
(Station Pressure) 918-838-7838

@ Elevation, ft: 676

@ Temperature, °F: 70

National Weather Service barometer corrected to
elevation of CETCON's Tulsa, Oklahoma Office: 29.00

CETCON Barometer Reading: 29.04

@ Elevation, ft: 730

@ Temperature, °F: 70

Variation: 0.04

Barometer Adjustment Required ? YES _____ NO X

Completeness ✓

Legibility ✓

Accuracy ✓

Specifications ✓

Reasonableness ✓

Checked by:

3/29/2005

Dale W. Wain 3/29/2005
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Project Coordinator (Signature/Date)
3/29/2005 BARO4.XLS

CETCON, Inc.

EPA Reference Method 20 NO_x Analyzer Interference Response Test

CETCON I

Test Gas Concentrations

CO	500 ± 50 ppm	SO ₂	300 ± 20 ppm	CO ₂	10.0 ± 1.0 %	O ₂	20.9 ± 1.0 %
----	--------------	-----------------	--------------	-----------------	--------------	----------------	--------------

Date of Test: 9-23-04
 Analyzer Model: 42C
 Analyzer Type: Chemiluminescent
 Serial Number: 65868-350
 Span Value, ppm: 250

Test Gas	Concentration	Cylinder Number	Analyzer Response, ppm	Interference, % of Span ⁽¹⁾
CO	446.00	CC58893	0.0	0.0
SO ₂	234.00	CC169434	0.6	0.2
CO ₂	11.65%	CC96504	0.0	0.0
O ₂	20.93	Ambient	0.02	0.0

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 ☒

Checked by:

9/24/2004

Derek Wiso 9/24/04
 Operator (Signature/Date)

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John VanHater 9/27/2004
 Project Coordinator (Signature/Date)

NOXINT20.XLS

EPA Reference Method 20
CO Analyzer Interference Response Test

Test Gas Concentrations

Date of Test:	April 8, 2005
Analyzer Model:	48C
Analyzer Type:	Infrared
Serial Number:	401404630
Span Value, ppm:	500

Sum of Interference Responses: $\boxed{0.2}^{(2)}$

(2) Sum of Interference Responses must be $\leq 2.0\%$

Reasonableness

Deke Wise 4/28/2005
Operator (Signature/Date)

Project Coordinator (Signature/Date)
4/29/2005 COINT20.XLS

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CETCON, Inc.

EPA Reference Method 20 O₂ Analyzer Interference Response Test

CETCON I

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: April 8, 2005
Analyzer Model: 1440
Analyzer Type: Paramagnetic
Serial Number: X1440D173B
Span Value, %: 25

Test Gas	Concentration	Cylinder Number	Analyzer Response, %	Interference, % of Span ⁽¹⁾
CO	457.00	CC148526	0.04	0.2
SO ₂	224.00	CC67518	0.03	0.1
CO ₂	10.02%	See Note #3	0.13	0.5
NO _x	209.00	CC192210	0.03	0.1

Sum of Interference Responses:

0.9 ⁽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 10.02% CO₂

QA/QC Check:

Completeness ☒

Legibility ☒

Accuracy ☒

Specifications ☒

Reasonableness ☒

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CETCON, Inc.

**EPA Reference Method 20
CO₂ Analyzer Interference Response Test**

CETCON I

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: April 8, 2005
Analyzer Model: 1440
Analyzer Type: Infrared
Serial Number: X1440D173A
Span Value, %: 25

Test Gas	Concentration	Cylinder Number	Analyzer Response, %	Interference, % of Span ⁽¹⁾
CO	457.00	CC148526	0.07	0.3
SO ₂	224.00	CC67518	0.07	0.3
NO _x	209.00	CC192210	0.07	0.3
O ₂	20.90%	Ambient	0.11	0.4

Sum of Interference Responses:

1.3 ⁽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 ✓

Checked by:

4/28/2005

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[Signature]
Project Coordinator (Signature/Date)
4/28/2005 CO2INT20.XLS

CETCON, Inc.

EPA Reference Method 20 SO₂ Analyzer Interference Response Test

CETCON I

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: April 8, 2005
Analyzer Model: 721-M
Analyzer Type: Photometric
Serial Number: 94-721M-8196-8
Span Value, ppm: 300

Test Gas	Concentration	Cylinder Number	Analyzer Response, ppm	Interference, % of Span ⁽¹⁾
CO	457.00	CC148526	0.0	0.0
NO _x	209.00	CC192210	0.0	0.0
CO ₂	10.60%	See Note #3	0.0	0.0
O ₂	20.90%	Ambient	0.02	0.0

Sum of Interference Responses:

0.0 ⁽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 ✓

Checked by:

7/27/2005

Deke Wise
Operator (Signature/Date)

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John B. Carter
Project Coordinator (Signature/Date)
7/27/2005 SO2INT20.XLS

Lab Analysis

NO DATA FOR THIS APPENDIX

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 corrected to 15% O_2 on a dry basis
C_d	Emission concentration (ppm), 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/MMBtu
%EA	Percent of excess air
F_d	Fuel factor or F-factor, ratio of flue gas volume to fuel volume, dscf/MMBtu
F_c	Fuel factor, ratio of CO_2 volume to fuel volume, dry basis
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, $85.49(ft/s)[(lb/lb-mole)(in. Hg) / (R)(in. H_2O)]^{1/2}$
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	Molecular weight of flue gas
MW_D	Molecular weight of dry flue gas
%M	Percent moisture
% O_2	Percent oxygen in flue gas, dry basis
% O_{2d}	Percent oxygen in flue gas, dry basis
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
P_S	Stack static pressure, in. water or in. Hg
ΔP	Stack gas velocity head, in. water

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NOMENCLATURE, continued

General Equations

PPMVD	Parts per million by volume, dry basis
Q_A	Actual stack flow, acfm
Q_S	Dry stack flow, scfm
Q_{fuel}	Heat input on higher (HHV) or lower (LHV) heating value, MMBtu/hr
RV	Reference value or protocol gas value (Part 75)
SCFM	Standard cubic feet per minute
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}	Wet gas meter volume in std conditions, scf
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

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

$$D_e = \frac{2LW}{(L+W)}, \text{ equivalent stack diameters for rectangular ducts.}$$
2. Dry gas volume samples at standard conditions (29.92" Hg, 528°R)

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

$$MW = M_D \cdot MW_D + 18(1 - M_D)$$
8. Stack velocity, fpm

$$V_s = K_P \cdot 60 \cdot C_P (T_s / (P_s \cdot MW))^{1/2} \cdot \text{Avg}(\Delta P_s^{1/2}) ; K_P = 85.397 \text{ (pitot tube constant)}$$
9. Volumetric flow at stack conditions, ACFM

$$Q_A = (V_s \cdot A_s) / 144$$
10. Volumetric flow at standard conditions, SCFM

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

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

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13. Particulate matter concentrations, lb/dscf

$$C_{PM}(lb/dscf) = 2.20(10^{-6}) \cdot MT(mg)/V_{Mstd}(scf)$$
14. Particulate matter emission, lb/hr

$$PM(lb/hr) = C_{PM}(lb/dscf) \cdot SCFM \cdot 60(min/hr)$$
15. Emission ratio, lb/MMBtu

$$E(lb/MMBtu) = \frac{lb/hr \text{ emission}}{MMBtu/hr}$$
16. Fuel factors or F-factors (CFR Method 19)

$$F_d = 8710 \text{ (Natural Gas)} ; F_d = 9780 \text{ (Bituminous Coal)} ; F_d \text{ (CFR 60, Table 19-1)}$$

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

$$E(lb/MMBtu) = C_d(lb/scf) \cdot F_d \cdot [20/(20.9 - \%O_{2d})]$$

$$E(lb/MMBtu) = C_d(lb/scf) \cdot F_d \cdot [100/(\%CO_{2d})]$$
18. Nitrogen oxide emission, lb/hr

$$NO_x(lb/hr) = 7.17(10^{-6}) \cdot SCFM \cdot NO_x(ppm)$$
19. Nitrogen oxide emission for F-factor method

$$NO_x(lb/hr) = E \cdot Q_{in}$$
20. Carbon monoxide emissions, lb/hr

$$CO(lb/hr) = 4.36(10^{-6}) \cdot SCFM \cdot CO(ppm)$$
21. Carbon monoxide emission for F-factor method

$$CO(lb/hr) = E \cdot Q_{in}$$
22. Sulfur dioxide emissions, lb/hr

$$SO_2(lb/hr) = 9.97(10^{-6}) \cdot SCFM \cdot SO_2(ppm)$$
23. Sulfur dioxide emission for F-factor method

$$SO_2(lb/hr) = E \cdot Q_{in}$$

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24. Total Hydrocarbon emissions (non-methane), lb/hr
 $THC(lb/hr) = 6.87(10^{-6}) \cdot SCFM \cdot THC(ppm)$; [Reported as propane]
 $THC(lb/hr) = 1.87(10^{-6}) \cdot SCFM \cdot THC(ppm)$; [Reported as carbon]
25. Total Hydrocarbon (non-methane) emission for F-factor method
 $THC(lb/hr) = E \cdot Q_{in}$
26. Carbon dioxide (CO₂) emissions, lb/hr (Part 75)
 $CO_2(lb/hr) = 1.90(10^{-5}) \cdot \%CO_2 \cdot (SCFM)$
27. Dry Emission Concentration Oxygen Correction factor

$$C_{d\text{ Corr}} = C_d \frac{(\%O_{2\text{ Corr, desired}} - 20.9)}{(20.9 - \%O_{2d, measured})}$$
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 (TNRCC)

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

$$BAF = 1 + \frac{|\overline{d}|}{|\overline{CEM}|}$$
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)

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

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

$$C_{adj} = C_d \cdot \frac{(5.9)}{(20.9 - \%O_{2d})}$$

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

35. Fuel factor for CO₂ diluent measurements, F_o

$$F_o = 0.209 \cdot \left[\frac{F_d}{F_c} \right]$$

36. Ratio CO₂ volume per GCV gas volume, F_c

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

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

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

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

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

IDEAL GAS LAW EQUATIONS

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

$$\begin{aligned}
 R &= 21.845 && (\text{ft}^3 \cdot \text{in. Hg}) / (^\circ\text{R} \cdot \text{lbmole}) \\
 T, ^\circ\text{R} &= T, ^\circ\text{F} + 459.72 \\
 T_{\text{std}} &= 68 && ^\circ\text{F} \\
 T_{\text{std}} &= 527.72 && ^\circ\text{R} \\
 P_{\text{std}} &= 29.921 && \text{in. Hg} \\
 \text{Molar Volume Of Ideal Gas @ } T_{\text{std}} \text{ \& } P_{\text{std}} &= V_{\text{std}} \div n = R \cdot T_{\text{std}} \div P_{\text{std}} \\
 V_{\text{std}} / n &= 385.3 && \text{ft}^3 / \text{lbmole}
 \end{aligned}$$

Concentration Conversion Factors For Ideal Gas:

$$\begin{aligned}
 f_i &= \text{Fraction Of Ideal Gas (i) In Sample} \\
 \text{ppmvd}_i &= f_i \cdot 1000000 \\
 \% \text{vd}_i &= f_i \cdot 100 \\
 \text{lb}_i / \text{ft}^3 &= \text{MW}_i, (\text{lb} / \text{lbmole}) \cdot f_i \div 385.3, (\text{ft}^3 / \text{lbmole}) \\
 \text{lb}_i / \text{ft}^3 &= \text{MW}_i, (\text{lb} / \text{lbmole}) \cdot \text{ppmvd}_i \div [385.3, (\text{ft}^3 / \text{lbmole}) \cdot 1000000] \\
 \text{lb}_i / \text{ft}^3 &= \text{MW}_i, (\text{lb} / \text{lbmole}) \cdot \% \text{vd}_i \div [385.3, (\text{ft}^3 / \text{lbmole}) \cdot 100]
 \end{aligned}$$

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	$0.4164 \cdot 10^{-7}$
Propane	C ₃ H ₈	44.0968	$1.1445 \cdot 10^{-7}$
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	$0.4420 \cdot 10^{-7}$
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

$$\begin{aligned}
 E_i &= \text{Mass Emission Rate Of Ideal Gas (i), lb/hr} \\
 E_i &= \text{lb}_i / \text{dscf} \cdot \text{Stack Flow (dscf/min)} \cdot 60 (\text{min/hr})
 \end{aligned}$$

REFERENCE METHOD 5 ORIFICE EQUATIONS

General Orifice Equation:

$$Q_o = C_o \times [\Delta H]^{0.5} \times [(T_o + 460) \div (P_o \times M_d)]^{0.5}$$

Q_o = Orifice Flowrate, ft³/min

T_o = Orifice Temperature, °F

C_o = Orifice Coefficient

P_o = Orifice Pressure, in Hg

ΔH = Orifice Pressure Drop, in H₂O

M_d = Dry Molecular Weight, lb/lbmol

By Definition:

$\Delta H@$ is the orifice pressure drop that will result in a flowrate of 0.75 ft³/min flowing ambient air ($M_d = 28.84$) at STP ($P_{std} = 29.921$ and $T_{std} = 68$)

Therefore:

$$0.75 = C_o \times [\Delta H@]^{0.5} \times [(68 + 460) \div (29.921 \times 28.84)]^{0.5}$$

$$C_o = 0.9588 \div [\Delta H@]^{0.5}$$

$$Q_{std} = 17.64 \times Q_o \times P_o \div (T_o + 460)$$

$$Q_{std} = 17.64 \times 0.9588 \times [\Delta H]^{0.5} \times P_o \times [T_o + 460]^{0.5} \div ([\Delta H@ \times P_o \times M_d]^{0.5} \times (T_o + 460))$$

$$Q_{std} = 16.9133 \times [\Delta H \times P_o]^{0.5} \div [\Delta H@ \times M_d \times (T_o + 460)]^{0.5}$$

Assume T_o and P_o = Meter Temperature and Pressure, T_m and P_m

$$[\Delta H]^{0.5} = Q_{std} \times [(\Delta H@ \times M_d \times (T_m + 460))]^{0.5} \div (16.9133 \times [P_m]^{0.5})$$

$$\Delta H = Q_{std}^2 \times \Delta H@ \times M_d \times (T_m + 460) \div (286.0598 \times P_m)$$

$$Q_{std} = V_{mstd} \div T_R$$

V_{mstd} = Dry Standard Sample Volume, ft³

T_R = Sample Time, minutes

$$\Delta H = V_{mstd}^2 \times \Delta H@ \times M_d \times (T_m + 460) \div (286.0598 \times P_m \times T_R^2)$$

$$P_m = P_g + (\Delta H \div 13.6)$$

The Resulting Quadratic Equation Has The Form: $a\Delta H^2 + b\Delta H + c = 0$

$$a = 21.0338 \times T_R^2, b = 286.0598 \times P_g \times T_R^2, c = -(V_{mstd}^2 \times \Delta H@ \times M_d \times (T_m + 460))$$

The Two Solutions For This Quadratic Equation Are: $\Delta H = (-b \pm [b^2 - 4ac]^{0.5}) \div 2a$

$(-b - [b^2 - 4ac]^{0.5}) \div 2a$ Results In A Negative ΔH And Therefore Is Ignored

$(-b + [b^2 - 4ac]^{0.5}) \div 2a$ Results In A Positive ΔH And Is The Actual Solution

Replacing a, b and c With Their Actual Values Results In The Following Equation:

$$\Delta H = \{[(972.6033 \times P_g^2 \times T_R^2) + (V_{mstd}^2 \times \Delta H@ \times M_d \times (T_m + 460))]\}^{0.5} - (31.1866 \times P_g \times T_R) \div (4.5863 \times T_R)$$

This Equation Allows Calculation Of The ΔH Required To Obtain A Given Standard Sample Volume (V_{mstd}) In Any Length Of Time (T_R) Specified.

REFERENCE METHOD 5 ORIFICE EQUATIONS (Isokinetic Sampling)

Prediction Of Standard Sample Volume

$$\Delta H = \left(\left[(972.6033 \times P_B^2 \times T_R^2) + (V_{mstd}^2 \times \Delta H@ \times M_d \times (T_m + 460)) \right]^{0.5} - (31.1866 \times P_B \times T_R) \right) \div (4.5863 \times T_R) \quad \text{From Page 1}$$

Rearranging And Solving For V_{mstd} Results In:

$$V_{mstd} = \left(\left[((4.5863 \times \Delta H \times T_R) + (31.1866 \times P_B \times T_R))^2 - (972.6033 \times P_B^2 \times T_R^2) \right] \div (\Delta H@ \times M_d \times (T_m + 460)) \right)^{0.5}$$

Prediction Of Ideal Nozzle Size

$$\%I = 1039.4 \times V_{mstd} \times (T_s + 460) \div (V_s \times P_s \times D_n^2 \times M_d \times T_R) \quad \text{From Page 2}$$

Setting %I = 100, Rearranging And Solving For D_n Results In:

$$D_n = 3.2240 \times \left[(V_{mstd} \times (T_s + 460)) \div (V_s \times P_s \times M_d \times T_R) \right]^{0.5} \quad V_s \text{ in ft/min}$$

$$V_s = 85.49 \times C_p \times [\Delta P_s]^{0.5} \times [(T_s + 460) \div (M_s \times P_s)]^{0.5} \quad V_s \text{ in ft/sec}$$

$$V_s = 5129.4 \times C_p \times [\Delta P_s]^{0.5} \times [(T_s + 460) \div (M_s \times P_s)]^{0.5} \quad V_s \text{ in ft/min}$$

$$D_n = 0.04501 \times \left[V_{mstd} \div (M_d \times T_R \times C_p \times (\Delta P_s)^{0.5}) \right]^{0.5} \times [(T_s + 460) \times M_s \div P_s]^{0.25}$$

REFERENCE METHOD 5 ORIFICE EQUATIONS (Isokinetic Sampling)

General Isokinetic Equation:

$$V_n = V_s$$

V_n = Velocity Through Nozzle, ft/sec

$$V_n = Q_n \div (A_n \times 60)$$

Q_n = Flowrate Through Nozzle, ft³/min

A_n = Nozzle Area, ft²

$$A_n = \pi \times D_n^2 \div 576$$

D = Nozzle Diameter, in

$$Q_n = Q_{nstd} \times (T_s + 460) \div (17.64 \times P_s)$$

Q_{nstd} = Nozzle Flowrate At STP, ft³/min

$$Q_{nstd} = Q_{mstd} \div M_D$$

Q_{mstd} = Meter Flowrate At STP, ft³/min

M_D = Stack Gas Dry Fraction

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

V_s = Velocity Of Stack Gas, ft/sec

$$V_s = 85.49 \times C_p \times [\Delta P_s]^{0.5} \times [(T_s + 460) \div (P_s \times M_s)]^{0.5}$$

C_p = Pitot Tube Coefficient

ΔP_s = Pitot Tube Pressure Drop, in H₂O

T_s = Stack Temperature, °F

P_s = Stack Pressure, in Hg

M_s = Stack Gas Molecular Weight, lb/lbmol

$$M_s = (M_D \times M_d) + 18 \times (1 - M_D)$$

M_d = Stack Gas Dry Molecular Weight, lb/lbmol

$$M_d = 0.32 \times \%O_2 + 0.44 \times \%CO_2 + 0.28 \times \%N_2$$

$\%M$ = Stack Gas Moisture Content, %v

$$V_n = Q_{mstd} \times (T_s + 460) \div (1.8375 \times \pi \times P_s \times D_n^2 \times M_D)$$

$$Q_{mstd} = 16.9133 \times [\Delta H \times P_m]^{0.5} \div [\Delta H @ \times M_d \times (T_m + 460)]^{0.5} \quad \text{From Page 1}$$

$$V_n = 2.9299 \times [\Delta H \times P_m]^{0.5} \times (T_s + 460) \div ((P_s \times D_n^2 \times M_D) \times [\Delta H @ \times M_d \times (T_m + 460)]^{0.5})$$

$$V_s = 85.49 \times C_p \times [\Delta P_s]^{0.5} \times [(T_s + 460) \div (M_s \times P_s)]^{0.5} \quad \text{From Above}$$

Set $V_n = V_s$, Consolidate Like Terms And Rearrange Into The Form: $\Delta H = K \times \Delta P_s$

$$[\Delta H]^{0.5} = \{29.1785 \times C_p \times D_n^2 \times M_D \times [P_s \times \Delta H @ \times M_d \times (T_m + 460)]^{0.5} \div [M_s \times P_m \times (T_s + 460)]^{0.5}\} \times [\Delta P_s]^{0.5}$$

$$\Delta H = \{851.3831 \times C_p^2 \times D_n^4 \times M_D^2 \times P_s \times \Delta H @ \times M_d \times (T_m + 460) \div (M_s \times P_m \times (T_s + 460))\} \times \Delta P_s$$

$$K = 851.3831 \times C_p^2 \times D_n^4 \times M_D^2 \times P_s \times \Delta H @ \times M_d \times (T_m + 460) \div (M_s \times P_m \times (T_s + 460))$$

If P_m Is Replaced With $P_s + (\Delta H \div 13.6)$ The Result Is A Quadratic Equation Which Can Be Solved.

However, The Result Would No Longer Have The Form $\Delta H = K \times \Delta P_s$ And Would Not Be Practical For

Use In The Field. The Practical Approach Is To Use Iteration To Obtain The Value Of The K-Factor (K)

Assume $P_m = P_s$ For The First Iteration And Calculate K_1 . Multiply K_1 By The Average ΔP_s To Obtain ΔH_1

For The Second Iteration, Use ΔH_1 To Calculate P_{m2} And Use P_{m2} To Calculate K_2 . Multiply K_2 By The

Average ΔP_s To Obtain ΔH_2 . Conduct The Iteration One Final Time Using ΔH_2 To Calculate P_{m3} And K.

Three Iterations Will Provide Accuracy Greater Than The Precision Of The ΔH Or ΔP_s Measurements.

Calculation Of Percent Isokinetic From Test Data

$$\%I = V_n \times 100 \div V_s$$

$$V_n = Q_{mstd} \times (T_s + 460) \div (1.8375 \times \pi \times P_s \times D_n^2 \times M_D) \quad \text{From Above}$$

$$Q_{mstd} = V_{mstd} \div T_R$$

$$V_n = V_{mstd} \times (T_s + 460) \div (1.8375 \times \pi \times P_s \times D_n^2 \times M_D \times T_R)$$

$$\%I = 17.3230 \times V_{mstd} \times (T_s + 460) \div (V_s \times P_s \times D_n^2 \times M_D \times T_R) \quad V_s \text{ in ft/sec}$$

$$\%I = 1039.4 \times V_{mstd} \times (T_s + 460) \div (V_s \times P_s \times D_n^2 \times M_D \times T_R) \quad V_s \text{ in ft/min}$$

ORIFICE.WK1 Page 2

CETCON

Original Test Proposal

EMISSION TESTING PROPOSAL

**TPI Petroleum, Inc.
Engineering Performance Test
& Relative Accuracy Test Audit
#2 SRU Incinerator
Oklahoma Department of Environmental Quality
Permit No.:98-172-C (M-17) (PSD)
Emission Unit: SBH-001
Point No.: P-170
Ardmore Petroleum Refinery – Ardmore, Oklahoma**

An Engineering Performance test and a Relative Accuracy Test Audit (RATA) will be conducted on the #2 SRU stack and CEMS for Sulfur Dioxide (SO₂), Nitrogen Oxide (NO_x) and Carbon Monoxide (CO) emissions. Test will be conducted in accordance with procedures and guidelines presented in Code of Federal Regulations, Title 40 (CFR40), Part 60, Appendix A, Reference Methods (RM's) 1, 2, 4, 3A, 6C, 7E, 10 and Appendix B, Performance Specifications 2 and 3.

Project Specifics

An engineering performance test for NO_x and CO emissions will be performed by conducting a series of three one-hour test runs to document NO_x and CO concentrations using RM's 7E and 10, respectively. During each sixty-minute test run a velocity traverse and a moisture determination will be performed using RM's 1, 2, 3A & 4 to determine volumetric stack flow. The volumetric stack flow rate and the pollutant concentrations obtained during each test run will be used to determine mass emission rates. The results from each test run will be averaged to determine emission rates in units of pounds per hour (lb/hr) and tons per year (TPY).

An engineering performance test will be performed measuring SO₂ and O₂ concentrations using RM's 6C and 3A, respectively. The arithmetic average of (9) nine 30-minute test runs will constitute run one of the performance test. The nine runs will also be used as the SO₂ CEMS RATA as described below. The second and third performance test run will each be the arithmetic average of (4) four, 1-hour runs. During each performance test run a velocity traverse and a moisture determination will be performed using RM's 1, 2, 3A & 4 to determine volumetric stack flow. The volumetric stack flow rate and the pollutant concentrations obtained during each test run will be used to determine mass emission rates. The average SO₂ emission rate will be reported in units consistent with Title 40 (CFR40), Part 60, Subpart J, section 60.104 (a)(2)(i): ppm by volume (dry basis) of SO₂ at zero percent excess air and per the applicable permit in units of pounds per hour (lb/hr) and tons per year (TPY).

The Relative Accuracy (RA) testing will be conducted for SO₂ and O₂. A minimum of nine and maximum of twelve test runs are conducted to determine the Relative Accuracy (RA) of the CEMS. Each test run is 30 minutes in duration. Each 30 minute RA test run will be performed concurrently with run one of the engineering performance test.

Project Specifics, cont.

Pollutant concentration measurements are collected for an equal amount of time at each of three traverse points (16.7, 50.0, and 83.3 percent of the stack). The pollutant concentration, recorded by the CEMS will be compared to the same parameters measured by the RM's. The RM sampling time will be synchronized with the CEMS clock time so that data from the same time intervals can be compared.

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 performance 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 TPI Petroleum, Inc. personnel coinciding with each test run and will be forwarded to CETCON, Inc. for inclusion into the test report.

CETCON would like to take exception to RM 10. Attached is a detailed description of the analytical method exception.

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 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 (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.

SAMPLE METHODS SUMMARY, cont.

- PS-2 Specifications and test procedures for SO₂ and NO_x continuous emission monitoring systems (CEMS) in stationary sources.
- PS-3 Specifications and test procedures for O₂ and CO₂ continuous emission monitoring systems (CEMS) in stationary sources.
- RATA Quality Control and Quality Assurance requirements for annual relative accuracy test audits of CEMS.

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 operated at approximately 250 °F. 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 or have been certified using an Orsat analyzer (Reference Method 3). 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 operated at approximately 250 °F. 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 an 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) 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 (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 operated at approximately 250 °F. 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 or 42H 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 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

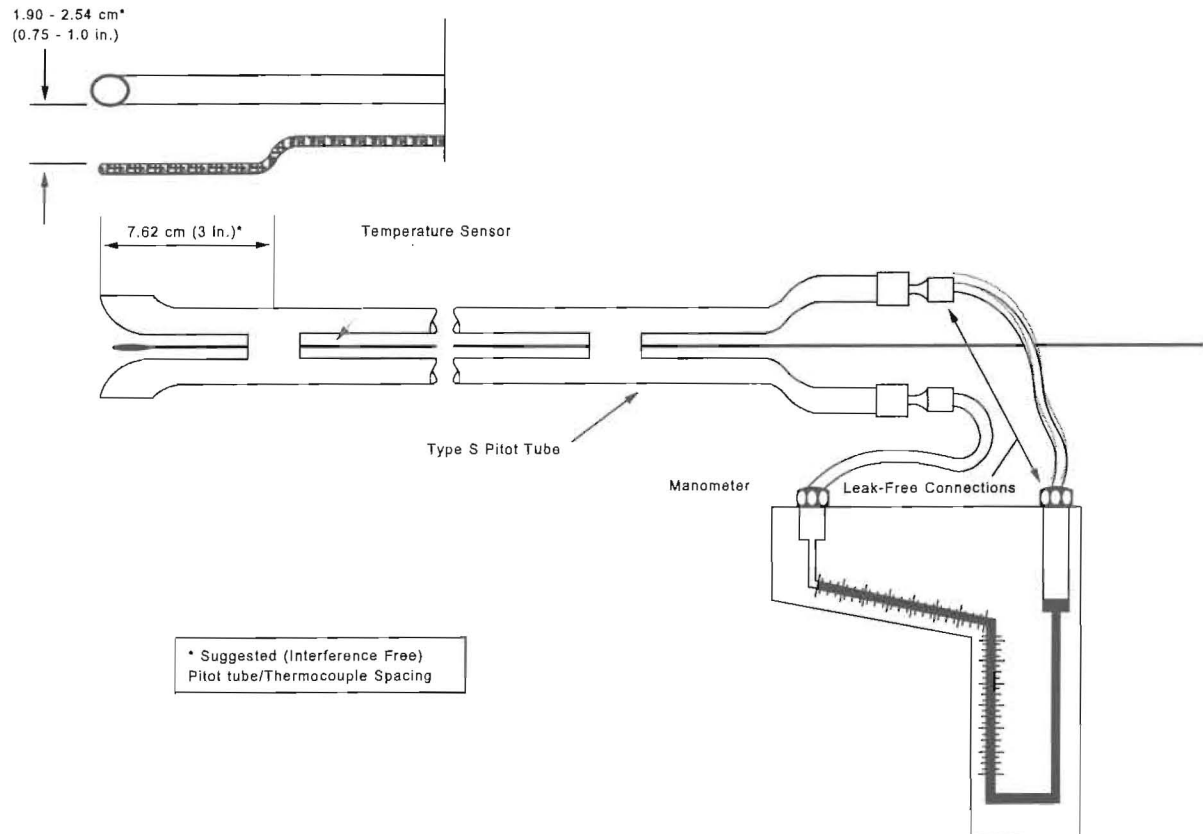
Nitrogen Oxides (NO_x) concentration is measured by Reference Method 7E using a Chemiluminescent analyzer. Carbon Monoxide (CO) concentration is measured by Reference Method 10 using a GFC-IR analyzer. The analyzers are calibrated using standards that have been prepared according to EPA Protocol Number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

REFERENCE METHOD EXCEPTIONS

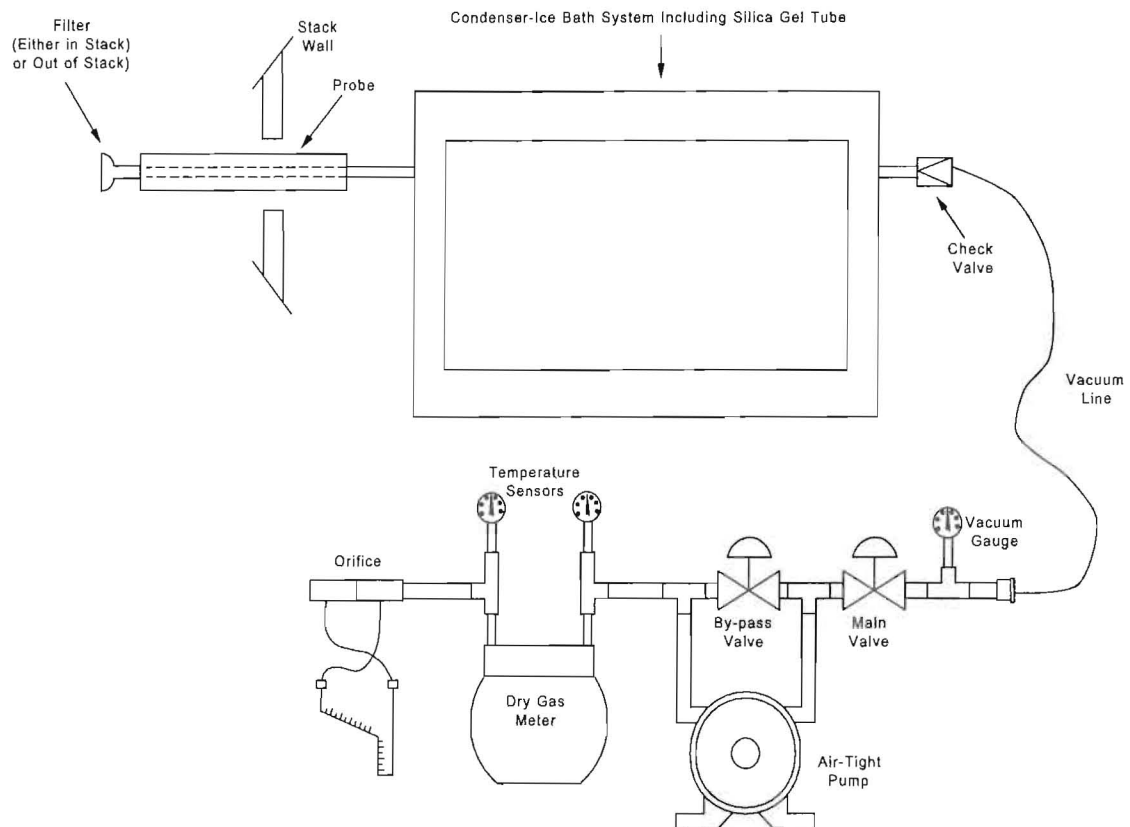
CETCON would like to propose the following exceptions to Reference Method 10:

1. Use of the calibration procedures of RM-6C. RM-10 specifies calibration gas values of approximately 100%, 60%, 30% and 0% of analyzer span. There are no procedures in RM-10 for correcting the data for calibration bias and drift. CETCON proposes to use calibration gases of 80-100%, 40-60% and 0% of analyzer span. The mid range gas will be used to conduct a bias test before and after each test run. The average concentration recorded for the test run will be corrected for calibration bias and drift using these data. CETCON feels that this exception will improve the quality of the data obtained.
2. Elimination of the Carbon Dioxide (CO₂) removal tube from the sample train, which eliminates the need to correct the measured concentration of Carbon Monoxide (CO) for the CO₂ concentration of the stack gas. CETCON can demonstrate that there is no interference caused by CO₂ in the TECO Model 48 or 48C CO analyzer. These analyzers use a Gas Filter Correlation Infrared (GFC-IR) detection principle, which eliminates the CO₂ interference common in Non-Dispersive Infrared (NDIR) CO analyzers. CETCON feels that this exception will improve the quality of the data obtained.

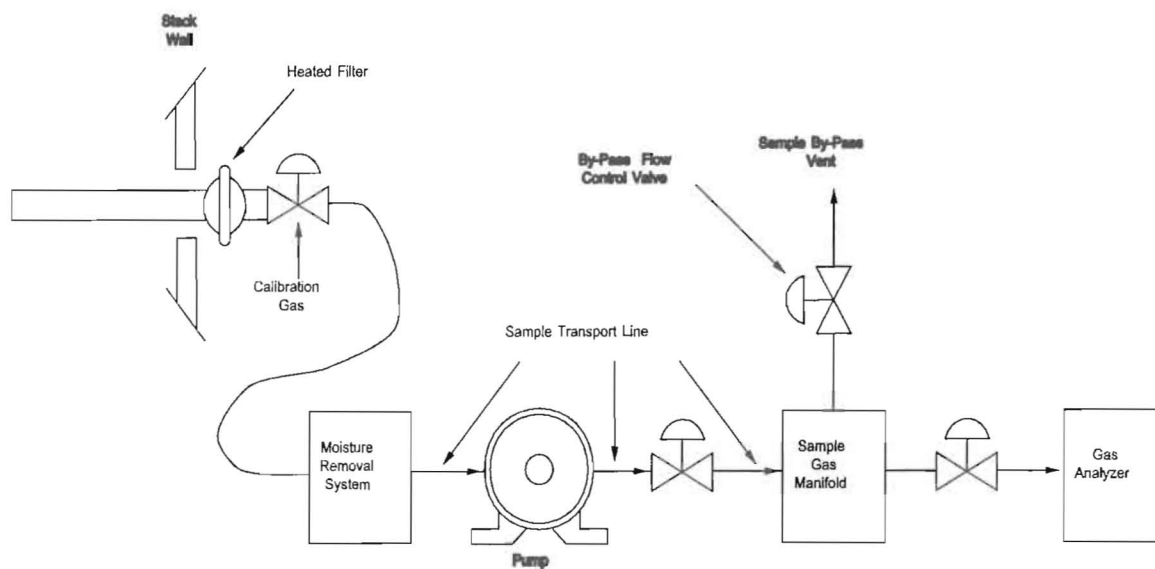
Reference Method 2 Type S Pitot Tube Manometer Assembly



Reference Method 4 Moisture Train



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



Resumes

L. Kelly Sandberg
Chemical Engineer

QUALIFICATION SUMMARY

Chemical Engineer with 18 years of environmental testing experience. Diversified background with expertise in analytical testing, client/agency relations, EPA compliance and project management. Maintain high standards of professionalism and am known for my dependability and problem solving capabilities.

EDUCATION

MICHIGAN TECHNOLOGICAL UNIVERSITY, Houghton, MI - Bachelor of Science
Degree in Chemical Engineering - 1985

Engineer in Training (EIT) Certification - 1985

EXPERIENCE

CETCON, Inc., Tulsa, OK 2/94 to present.

Title: Sr. Project Coordinator. Responsible for all aspects of stack test projects (planning, field work, report writing, etc.)

CLEAN AIR ENGINEERING, Inc., Palatine, IL 3/86 to 1/94

Title: Senior Test Leader, Chicago Source Testing Department. Responsible for supervising crews of 2 to 15 people in stack emissions testing. Have tested at a variety of sources such as: coal-fired boilers, gas turbines, steel mills, aluminum plants, pulp and paper mills, municipal, medical and hazardous waste incinerators, cement plants, glass plants and others. Position sometimes requires laboratory analysis and data reduction in the field to provide client with on-site results. Responsible for the reviewing of emissions testing reports for technical merit.

CAPABILITIES AND ATTRIBUTES

Knowledge of theory behind combustion and how it relates to the formation of pollutants. Familiar with EPA Reference Methods for measuring Sulphur Dioxide, Nitrogen Oxides, Particulate Matter (Including PM10) and others. Experienced in testing Hazardous Waste Boilers and Incinerators for Metals, Dioxins/Furans, Hydrogen Chloride and others. Extensive experience with instrumental analyzers used for measuring Hydrocarbons, Carbon Monoxide and other products of combustion.

CETCON

Nathan E. Ulshafer
Environmental Specialist

QUALIFICATION SUMMARY

Environmental testing knowledge obtained through continued work with CETCON, Inc.

EDUCATION

Fayetteville High School, Fayetteville, AR.

Completed a course in methods measurement of visible emissions as specified by Federal Reference Methods 9 and 22 conducted by Eastern Technical Associates, October 2001

Walter Smith & Associates, Inc.
Source Sampling & CEMS Workshop

EXPERIENCE

CETCON, Inc.: July 2001 to Present

Title: Environmental Specialist

Performs emission testing on various types of plants and processes.

GENCORP, Inc.: May 1999 to May 2001

Title: United Rubber Worker

Responsible for the production of rubber used in the manufacturing of Ford Motor Company vehicles.

Noland Company, Inc.: May 1996 to May 1999

Title: Assistant Manager

Company provides plumbing, HVAC and industrial supplies. Responsible for the day-to-day operations of the business.

CETCON

Raw Field Data

CETCON, Inc.

Job No.: CJ-4022A Field Data: Velocity Moisture Barometer No.: CET III
 Date: 8/3/2005 Run No.: C1A Pitot Tube No.: 3
 Customer: TPI Petroleum, Inc. InTime of Run, T_R: 60 in. Pitot Tube, C_p: 0.810
 Unit: No. 2 SRU Tail Gas Sample Box No.: 2 Initial Pitot Leak: X
 Operator: LKS/NEU Meter Box No.: CM#1 Final Pitot Leak: X
 File Name: C1A Stack Area, A_S: 3675.20 in.² Assumed %M: (default only)

Barometric Pressure, P_B: 29.17 C_F: 1.008
 Ambient Temp., °F: 97 ΔH@: 1.558
 Stack Pressure, P_S: 1.04 in. H₂O = 29.09 in. Hg
 Initial Leak @: 15.0 in. Hg = 0.000 cfm
 Final Leak @: 3.0 in. Hg = 0.000 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
				Desired	Actual						Inlet	Outlet	
A	8	1500	511.050	0.030	0.72	3.0	1411	NA	NA	68	72	71	-10
	7	1505	513.580	0.070	0.72	3.0	1428	NA	NA	68	71	71	8
	6	1510	516.105	0.065	0.72	3.0	1433	NA	NA	68	71	70	0
	5	1515	518.550	0.065	0.72	3.0	1442	NA	NA	67	71	70	-4
	4	1520	521.040	0.060	0.72	3.0	1439	NA	NA	66	72	70	10
	3	1525	523.530	0.060	0.72	3.0	1436	NA	NA	65	72	70	14
	2	1530	526.070	0.050	0.72	3.0	1436	NA	NA	68	73	70	-6
	1	1535	528.575	0.040	0.72	3.0	1415	NA	NA	68	73	70	+2
B	8	1540	531.110	0.025	0.72	3.0	1409	NA	NA	68	73	70	16
	7	1545	533.585	0.050	0.72	3.0	1430	NA	NA	68	73	70	9
	6	1550	536.100	0.055	0.72	3.0	1437	NA	NA	68	74	70	0
	5	1555	538.620	0.060	0.72	3.0	1439	NA	NA	68	74	70	-8
	4 END	1600	541.125	0.060			1441						-4
	3			0.055			1442						0
	2			0.036			1424						12
	1			0.025			1410						10

C_{qa} = 1.031 %Δ Must Avg ΔP_S Avg P_M Avg T_S Avg T_M
 %Δ = 2.3 Be ≤ 5.0 Avg (ΔP_S%) Max Vacuum Volume DGM ft³ x C_i 1.008 = V_M ft³

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total
Final Wt, gm	691.7	702.2	511.7	879.0			
Initial Wt, gm	634.3	693.8	509.8	872.8			
Difference, gm							

QA/QC Check:

Completeness X
 Legibility X
 Accuracy X
 Specifications X
 Reasonableness X

RM 3 or 3A Data	
%CO ₂	4.070
%O ₂	6.602
%CO	0.000
%N ₂	89.328
% Excess Air	38.673

Avg ΔP	in. H ₂ O
Avg (ΔP _S) ^{1/2}	
Avg. P _M	in. H ₂ O
Avg. T _S	°F
Avg. T _S	°R
Avg. T _M	°F
Avg. T _M	°R

V _{M std} = 17.64 x V _M x [(P _S + (P _M / 13.6)) ÷ T _M]	DSCF
Q _{M std} = V _{M std} ÷ T _R	DSCFM
V _{W gas} = 0.04715 x V _W	SCF
%M = V _{W gas} x 100 ÷ (V _{M std} + V _{W gas})	%
M _D = (100 - %M) ÷ 100	dry fract.
MW _D = (%CO ₂ x 0.44) + (%O ₂ x 0.32) + ((%N ₂ + %CO) x 0.28)	lb/lbmole
MW = M _D x MW _D + 18 (1 - M _D)	lb/lbmole
V _S = 5129.4 x C _p x (T _S ÷ (P _S x MW)) ^{1/2} x Avg(ΔP _S)	FPM
Q _A = (V _S x A _S) ÷ 144	ACFM
Q _S = (0.1225 x V _S x M _D x P _S x A _S) ÷ T _S	DSCFM
Q _W = Q _S ÷ M _D	WSCFM

Checked by:

Operator (Signature/Date) 08/03/2005
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Project Coordinator (Signature/Date) 08/03/2005
 FIELDAT.XLS

CETCON, Inc.

Job No.: CJ-4022A

Field Data: Velocity Moisture Barometer No.: CET III

Barometric Pressure, P_B : 29.14

C_F : 1.008

Date: 8/3/2005

Run No.: C1B

Pitot Tube No.: 3

Ambient Temp., °F: 90.2

$\Delta H @$: 1.558

Customer: TPI Petroleum, Inc. Time of Run, T_R : 60 in.

Pitot Tube, C_p : 0.810

Stack Pressure, P_S : -1.09 in. H_2O = 29.06 in. Hg

Unit: No. 2 SRU Tail Gas Sample Box No.: 1

Initial Pitot Leak: X

Initial Leak @: 15.0 in. Hg = 0.000 cfm

Operator: LKS/NEU

Meter Box No.: CM#1

Final Pitot Leak: X

Final Leak @: 2.0 in. Hg = 0.000 cfm

File Name: C1B

Stack Area, A_S : 3675.20 in^2

Assumed %M: (default only)

Point	Clock Time	Dry Gas Meter, CF	Pitot in. H_2O ΔP_S	Orifice ΔH P_M , in. H_2O		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	
A	8	1620	541.560	0.025	0.72	2.0	1408	NA	NA	68	72	71	
	7	1625	544.115	0.050	0.72	2.0	1430	NA	NA	68	72	71	
	6	1630	546.650	0.055	0.72	2.0	1432	NA	NA	63	73	71	
	5	1635	549.160	0.055	0.72	2.0	1443	NA	NA	62	73	71	
	4	1640	551.650	0.050	0.72	2.0	1441	NA	NA	63	74	71	
	3	1645	554.175	0.060	0.72	2.0	1438	NA	NA	62	74	71	
	2	1650	556.660	0.035	0.72	2.0	1432	NA	NA	64	74	71	
	1	1655	559.215	0.025	0.72	2.0	1407	NA	NA	68	75	71	
B	8	1700	561.730	0.015	0.72	2.0	1415	NA	NA	68	75	71	
	7	1705	564.245	0.050	0.72	2.0	1440	NA	NA	68	75	71	
	6	1710	566.740	0.060	0.72	2.0	1440	NA	NA	68	75	71	
	5	1715	569.230	0.060	0.72	2.0	1440	NA	NA	68	75	71	
	4 END	1720	571.740	0.060			1443						
	3			0.055			1442						
	2			0.050			1434						
	1			0.020			1410						

$P_{10} = 1.95$

$C_{qa} = 1.029$ % Δ Must Avg ΔP_S Avg P_M Avg T_S Avg T_M
 % $\Delta = 2.1$ Be ≤ 5.0 Avg (ΔP_S)² Max Vacuum Volume DGM $ft^3 \times C_i$ 1.008 $= V_M$ ft^3

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total
Final Wt, gm	673.4	611.2	614.3	916.1			
Initial Wt, gm	616.3	600.3	612.3	911.4			
Difference, gm							

$V_{M std} = 17.64 \times V_M \times [(P_B + (P_M / 13.6)) \div T_M]$	DSCF
$Q_{M std} = V_{M std} \div T_R$	DSCFM
$V_{W gas} = 0.04715 \times V_W$	SCF
$\%M = V_{W gas} \times 100 \div (V_{M std} + V_{W gas})$	%
$M_D = (100 - \%M) \div 100$	dry fract.
$MW_D = (\%CO_2 \times 0.44) + (\%O_2 \times 0.32) + ((\%N_2 + \%CO) \times 0.28)$	lb/lbmole
$MW = M_D \times MW_D + 18 (1 - M_D)$	lb/lbmole
$V_S = 5129.4 \times C_p \times (T_S \div (P_S \times MW))^{1/2} \times \text{Avg}(\Delta P_S)$	FPM
$Q_A = (V_S \times A_S) \div 144$	ACFM
$Q_S = (0.1225 \times V_S \times M_D \times P_S \times A_S) \div T_S$	DSCFM
$Q_W = Q_S \div M_D$	WSCFM

QA/QC Check:

Completeness ☒
 Legibility ☒
 Accuracy ☒
 Specifications ☒
 Reasonableness ☒

RM 3 or 3A Data	
% CO_2	4.020
% O_2	6.701
%CO	0.000
% N_2	89.279
% Excess Air	39.519

Avg ΔP	in. H_2O
Avg (ΔP_S) ²	
Avg. P_M	in. H_2O
Avg. T_S	°F
Avg. T_S	°R
Avg. T_M	°F
Avg. T_M	°R

Checked by:

8/3/2005 Page #1

Operator (Signature/Date) 08/03/2005
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Project Coordinator (Signature/Date) 08/03/2005
 FIELD.DAT.XLS

CETCON, Inc.

Job No.: CJ-4022A Field Data: Velocity Moisture Barometer No.: CET III
 Date: 8/3/2005 Run No.: C1C Pitot Tube No.: 3
 Customer: TPI Petroleum, Inc. Time of Run, T_R: 60 in. Pitot Tube, C_p: 0.810
 Unit: No. 2 SRU Tail Gas Sample Box No.: 2 Initial Pitot Leak: X
 Operator: LKS/NEU Meter Box No.: CM#1 Final Pitot Leak: X
 File Name: C1C Stack Area, A_S: 3675.20 ft² Assumed %M: (default only)

Barometric Pressure, P_B: 29.12 C_F: 1.008
 Ambient Temp., °F: 100 ΔH@: 1.558
 Stack Pressure, P_S: -1.04 in. H₂O = 29.04 in. Hg
 Initial Leak @: 15.0 in. Hg = 0.000 cfm
 Final Leak @: 3.0 in. Hg = 0.000 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
				Desired	Actual						Inlet	Outlet	
A	8	1740	572.179	0.020	0.72	3.0	1410	NA	NA	68	73	72	
	7	1745	574.725	0.045	0.72	3.0	1432	NA	NA	68	73	72	
	6	1750	577.270	0.055	0.72	3.0	1440	NA	NA	66	74	72	
	5	1755	579.745	0.055	0.72	3.0	1434	NA	NA	66	74	72	
	4	1800	582.250	0.055	0.72	3.0	1440	NA	NA	67	74	71	
	3	1805	584.725	0.050	0.72	3.0	1435	NA	NA	68	74	71	
	2	1810	587.195	0.040	0.72	3.0	1428	NA	NA	68	75	71	
	1	1815	589.715	0.030	0.72	3.0	1405	NA	NA	68	75	71	
B	8	1820	592.260	0.020	0.72	3.0	1414	NA	NA	64	75	71	
	7	1825	594.805	0.050	0.72	3.0	1433	NA	NA	66	75	71	
	6	1830	597.335	0.060	0.72	3.0	1434	NA	NA	67	76	72	
	5	1835	599.870	0.050	0.72	3.0	1433	NA	NA	68	75	72	
	4 END	1840	602.404	0.055			1428						
	3			0.045			1428						
	2			0.035			1418						
	1			0.025			1401						

P₁₀ = 1.05

C_{qa} = 1.029 %Δ Must Avg ΔP_S Avg P_M Avg T_S Avg T_M
 %Δ = 2.1 Be ≤ 5.0 Avg (ΔP_S)^{1/2} Max Vacuum Volume DGM ,ft³ x C_i 1.008 = V_M ft³

Impinger No.	(1)	(2)	(3)	(4)	(5)	(6)	Total
Final Wt, gm	749.8	710.6	513.1	884.4			
Initial Wt, gm	691.7	702.2	511.7	879.0			
Difference, gm							

QA/QC Check:

Completeness ☒
 Legibility ☒
 Accuracy ☒
 Specifications ☒
 Reasonableness ☒

RM 3 or 3A Data	
%CO ₂	3.996
%O ₂	6.784
%CO	0.000
%N ₂	89.220
% Excess Air	40.239

Avg ΔP		in. H ₂ O
Avg (ΔP _S) ^{1/2}		
Avg. P _M		in. H ₂ O
Avg. T _S		°F
Avg. T _S		°R
Avg. T _M		°F
Avg. T _M		°R

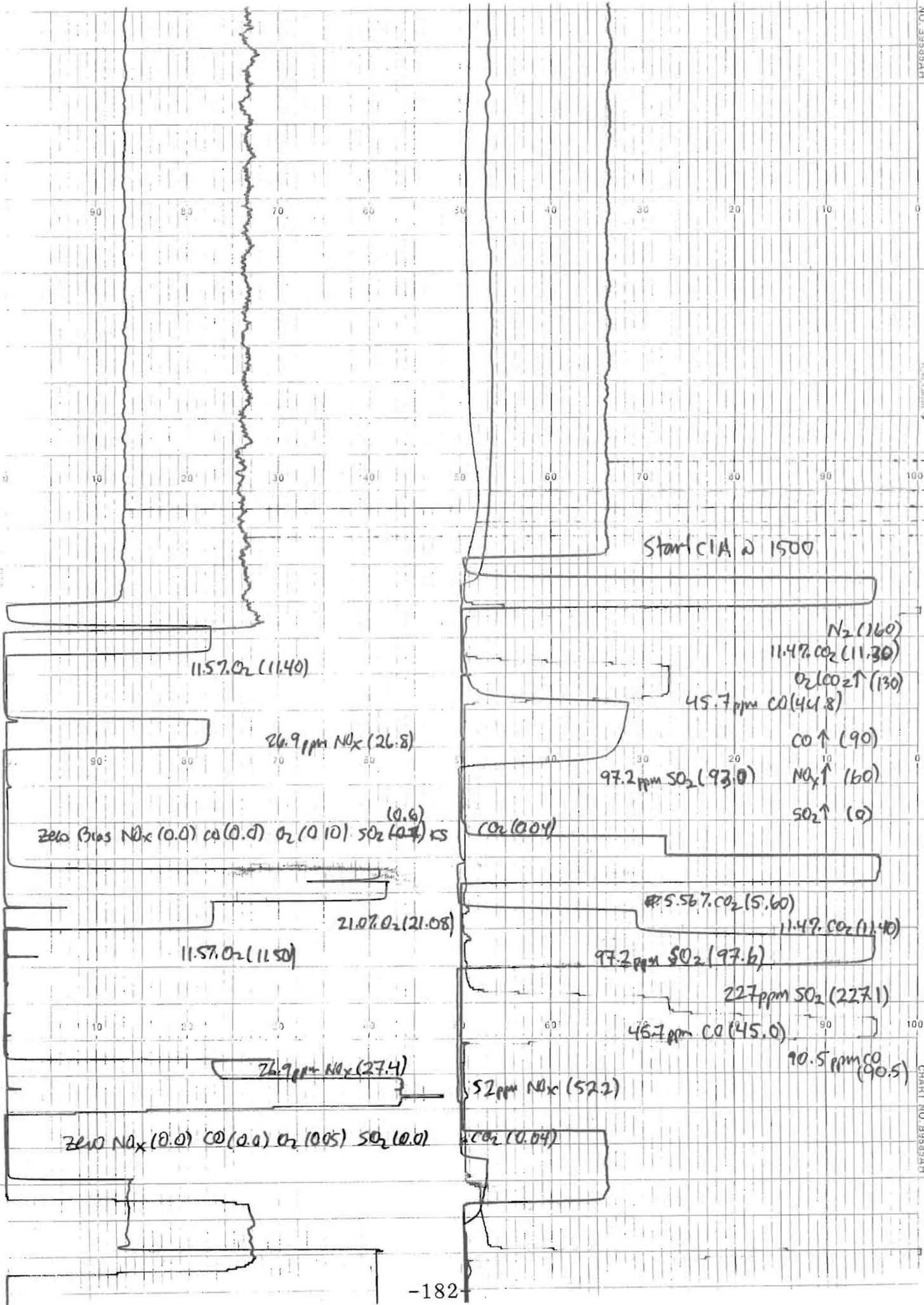
V _{M std} = 17.64 x V _M x [(P _B + (P _M / 13.6)) ÷ T _M]	DSCF
Q _{M std} = V _{M std} ÷ T _R	DSCFM
V _{W gas} = 0.04715 x V _W	SCF
%M = V _{W gas} x 100 ÷ (V _{M std} + V _{W gas})	%
M _D = (100 - %M) ÷ 100	dry fract.
MW _D = (%CO ₂ x 0.44) + (%O ₂ x 0.32) + ((%N ₂ + %CO) x 0.28)	lb/lbmole
MW = M _D x MW _D + 18 (1 - M _D)	lb/lbmole
V _S = 5129.4 x C _p x (T _S ÷ (P _S x MW)) ^{1/2} x Avg(ΔP _S)	FPM
Q _A = (V _S x A _S) ÷ 144	ACFM
Q _S = (0.1225 x V _S x M _D x P _S x A _S) ÷ T _S	DSCFM
Q _W = Q _S ÷ M _D	WSCFM

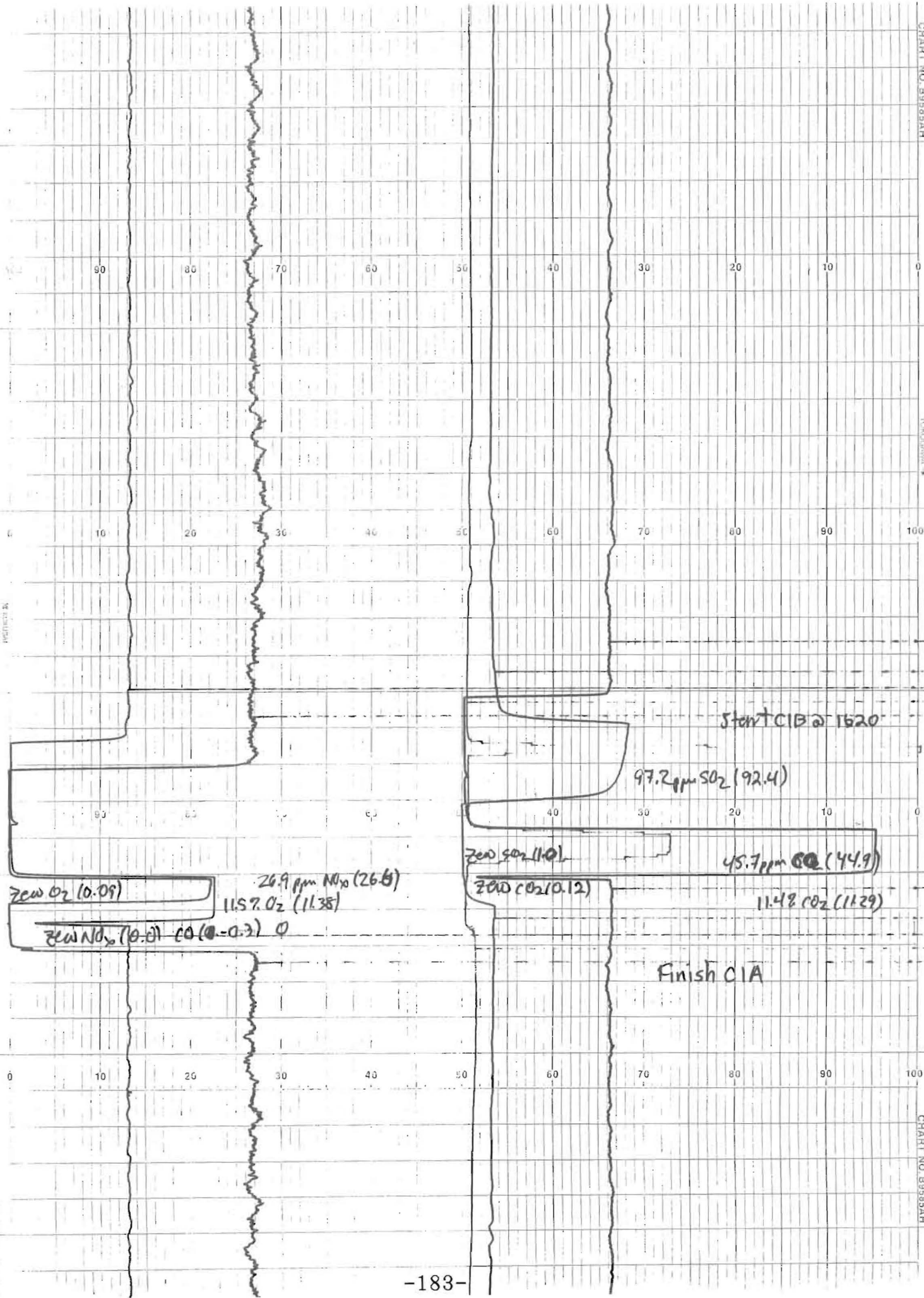
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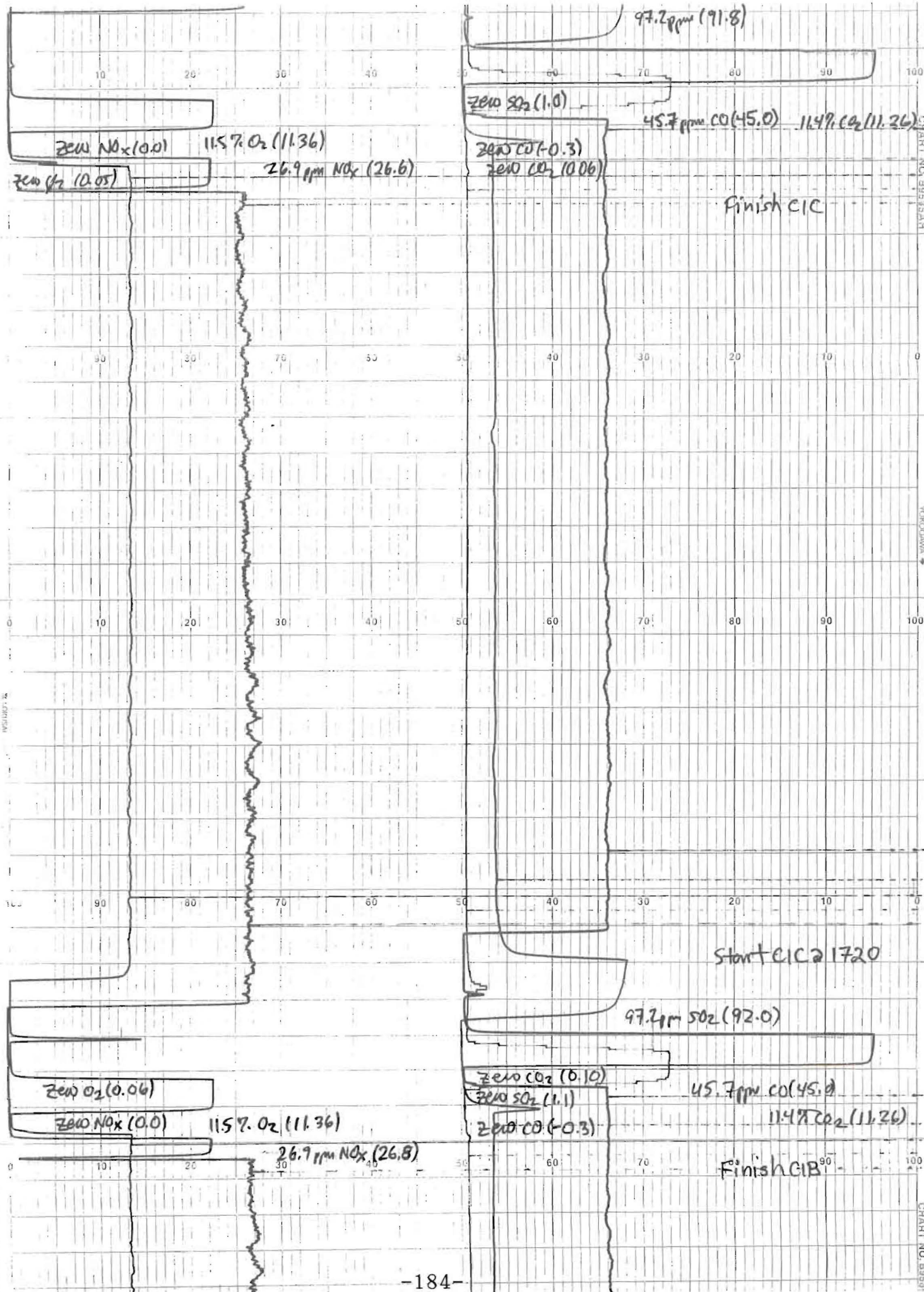
[Signature] 08/03/2005
 Operator (Signature/Date)
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[Signature] 08/03/2005
 Project Coordinator (Signature/Date)
 FIELDAT.XLS

NU. 3955AH
CHART NO. 3955AH







97.2 ppm SO₂ (97.5)

227 ppm SO₂ (227.0)

5.56% CO₂ (5.60)

11.4% CO₂ (11.40)

21.0% O₂ (21.09)

11.5% O₂ (11.50)

zero O₂ (0.04) SO₂ (0.0) CO₂ (0.04)

8-4-2005

97.2 ppm SO₂ (92.8)

zero CO₂ (0.97)

zero SO₂ (1.2)

zero O₂ (0.04)

11.5% O₂ (11.38)

11.4% CO₂ (11.29)

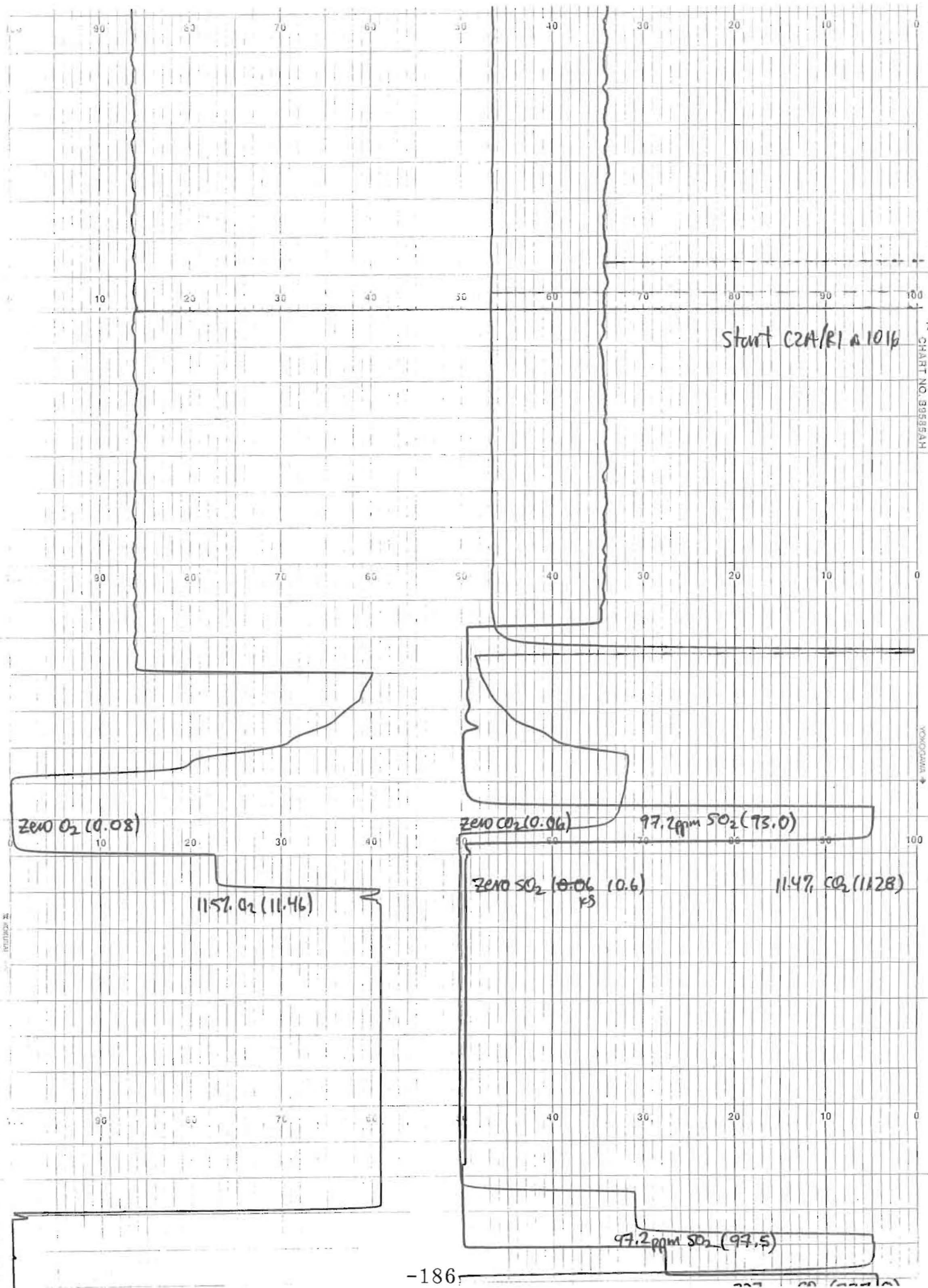
Finish CID

Start CID @ 1900

97.2 ppm (91.8)

zero SO₂ (1.0)

-185-



Finish C2C/R3

0.4

CHART NO. 39885A

WIND DIRECTION

Start C2C/R3 @ 1146

ZERO O₂ (0.04)

ZERO CO₂ (0.04)

97.2 ppm SO₂ (93.7)

ZERO SO₂ (2.0)

11.5% O₂ (11.36)

11.4% CO₂ (11.28)

Finish C2A/R2

Start C2B/R2 @ 1101

ZERO O₂ (0.06)

ZERO CO₂ (0.07)

97.2 ppm SO₂ (92.4)

11.5% O₂ (11.38)

ZERO SO₂ (1.8)

11.4% CO₂ (11.29)

Finish C1A/R1

20 cm

REVIEW CHART

40 cm

Change Chart Paper
(Almost Out)

97.2 ppm SO₂ (87.5)

zero O₂ (0.05)

zero CO₂ (0.07)

11.52 O₂ (11.34)

zero SO₂ (0.9)

11.42 CO₂ (11.32)

Finish C3D/R4

Start C2D/R4 1231

zero O₂ (0.08)

97.2 ppm SO₂ (90.0)

11.52 O₂ (11.35)

zero CO₂ (0.08)

zero SO₂ (1.0)

11.42 CO₂ (11.34)

Finish C2C/R3

Start C2C/R3 1146

zero O₂ (0.04)

zero CO₂ (0.04)

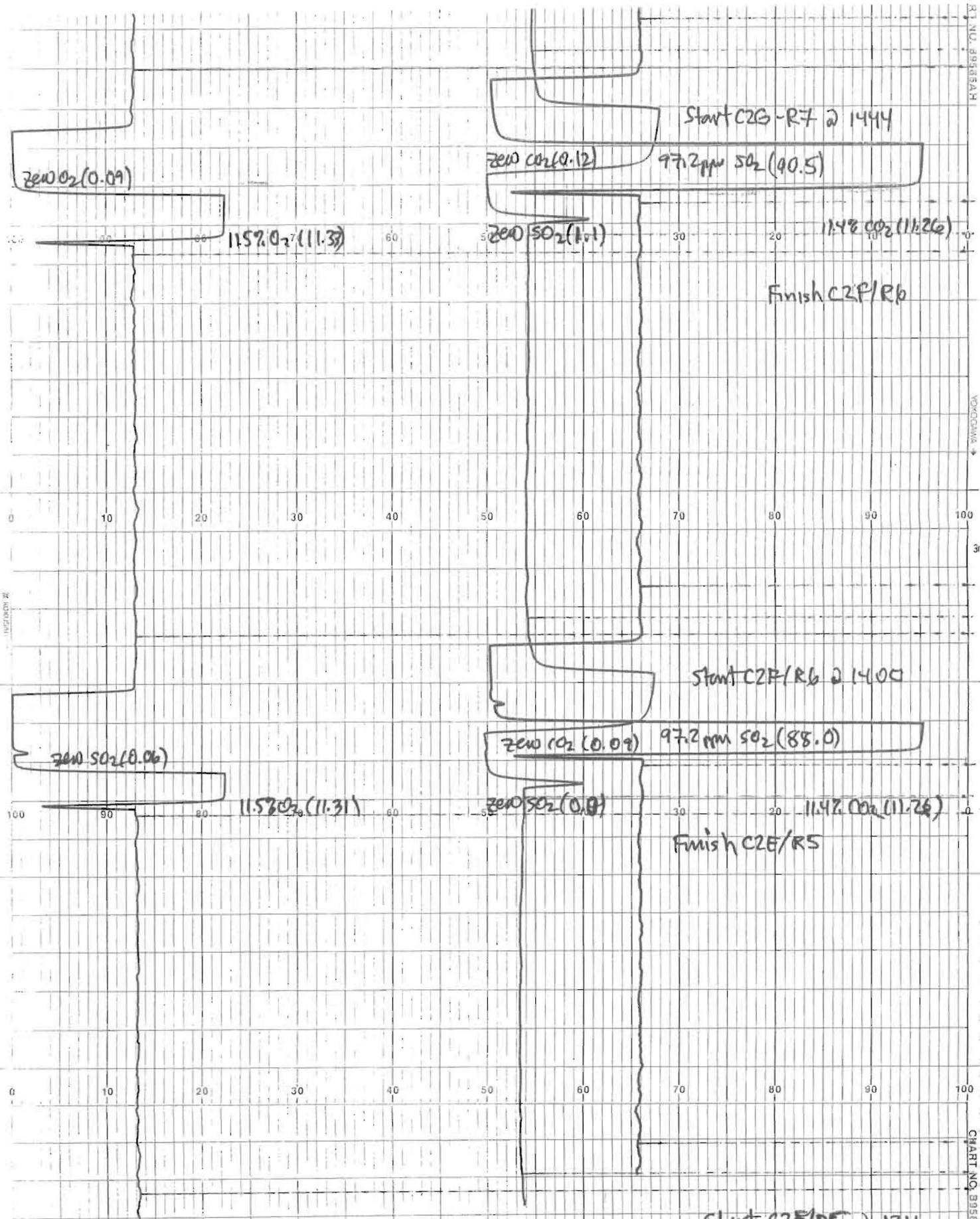
97.2 ppm SO₂ (93.7)

11.52 O₂ (11.36)

zero SO₂ (2.0)

11.42 CO₂ (11.28)

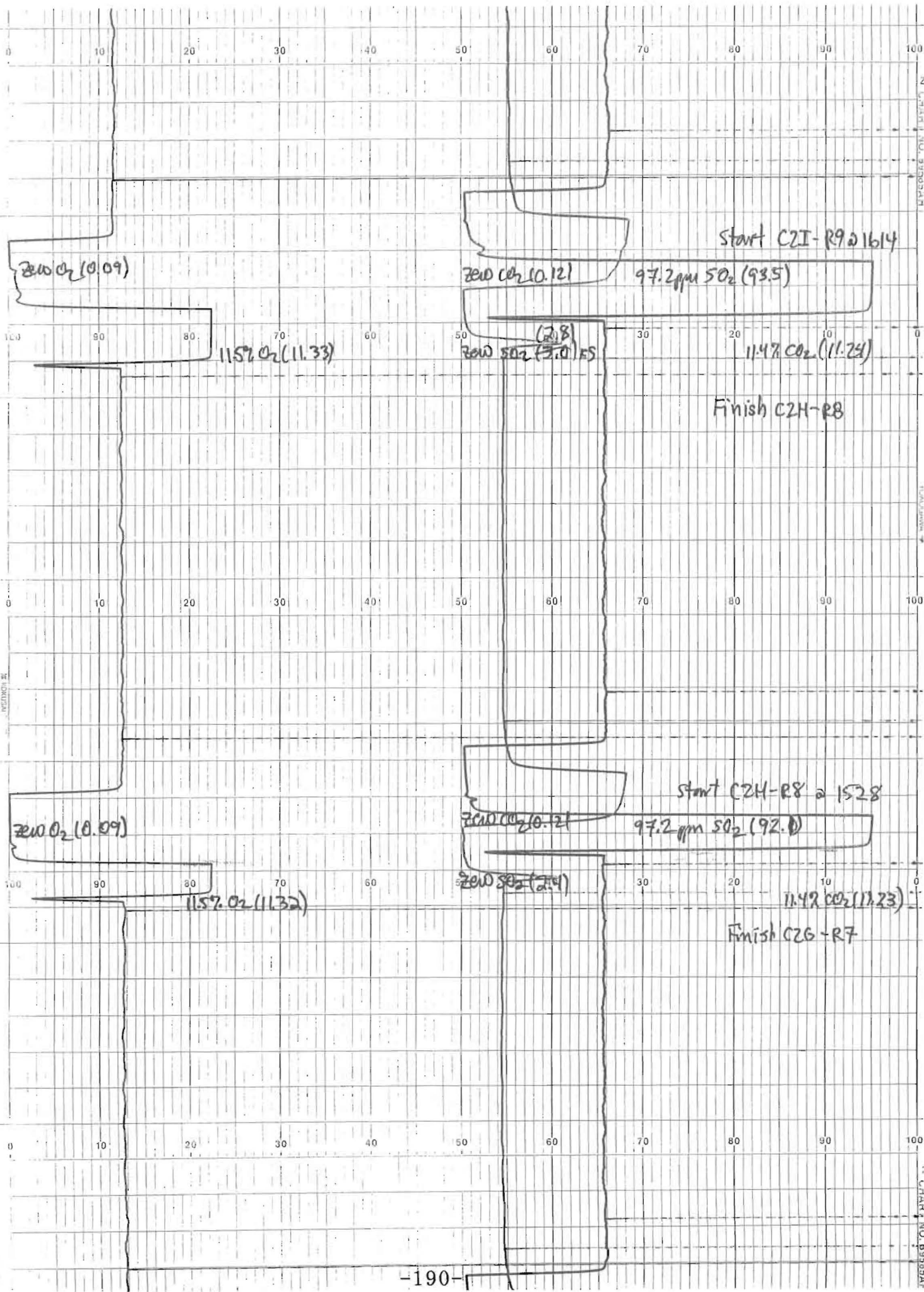
RT NO. 89585AH
VOLUME 4
CHART NO. 89585AH

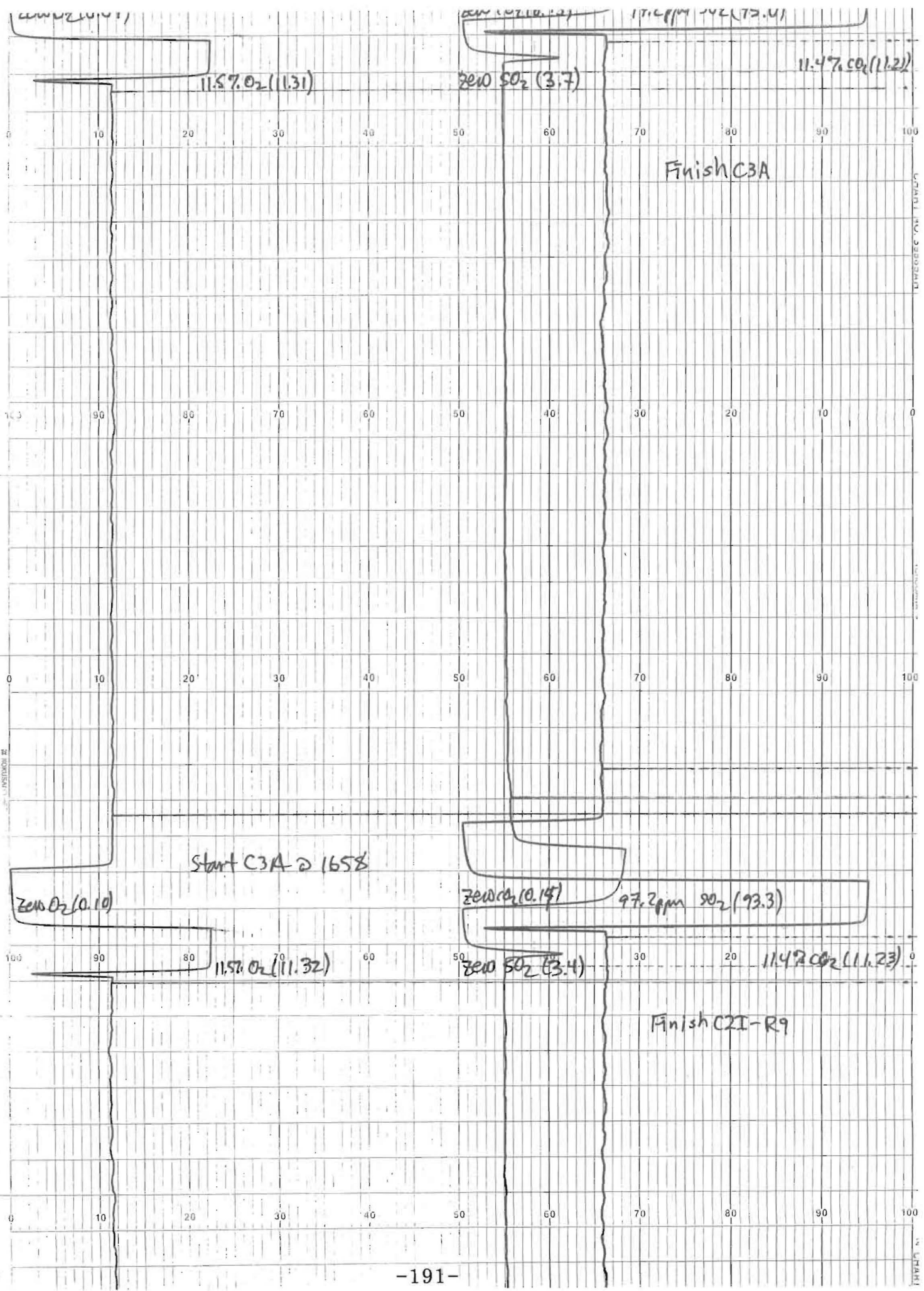


8-4-2005

New Chart Paper

Start C2E/R5 @ 1316





11.5% O₂ (1.31)

Zero SO₂ (3.7)

11.4% CO₂ (1.22)

Finish C3A

Start C3A @ 1658

Zero O₂ (0.10)

Zero CO₂ (0.14)

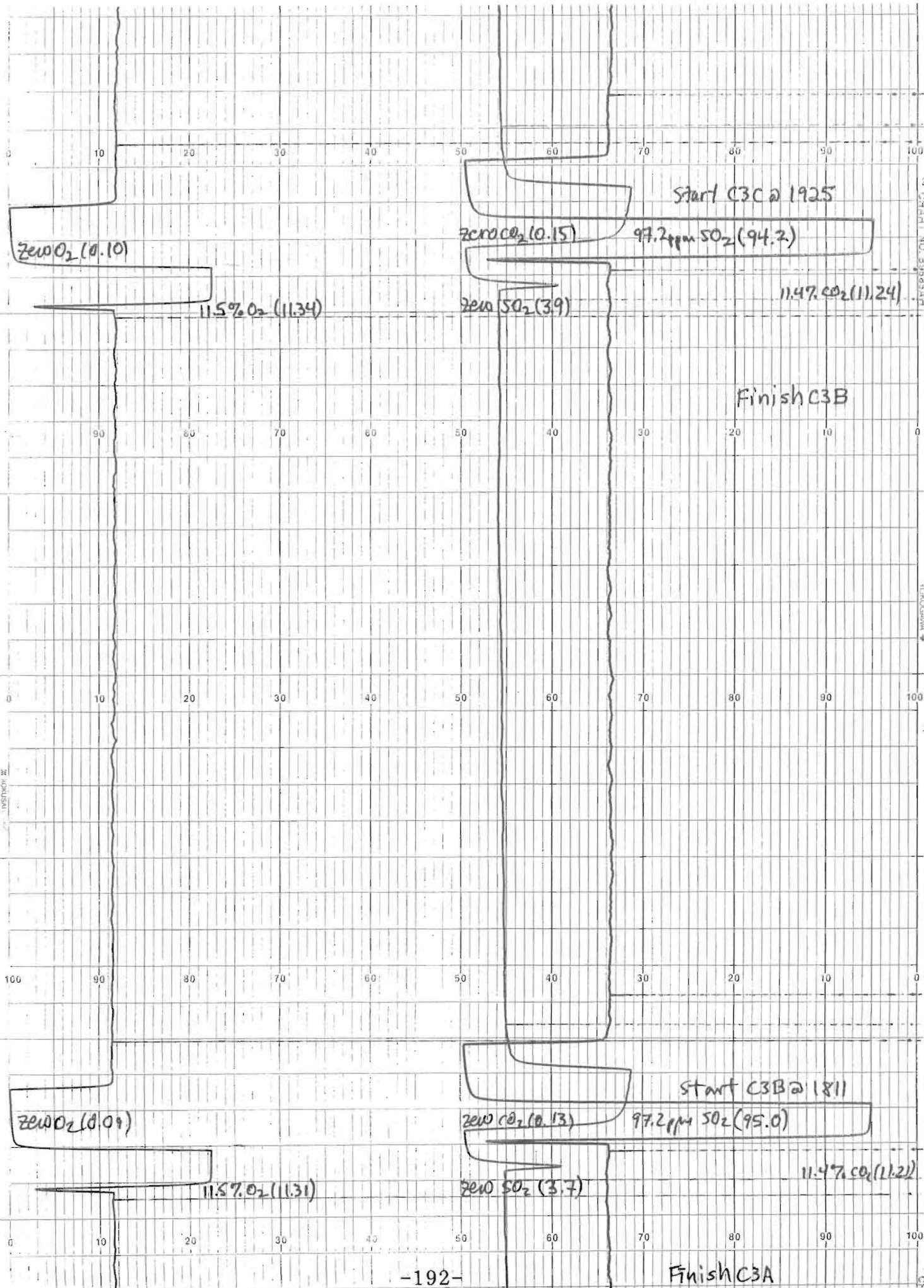
97.2 ppm SO₂ (93.3)

11.5% O₂ (1.32)

Zero SO₂ (3.4)

11.4% CO₂ (1.23)

Finish C2I-R9



10 20 30 40 50 60 70 80 90 100

100 90 80 70 60 50 40 30 20 10 0

zero O₂ (0.06)

11.5% O₂ (11.37)

zero CO₂ (0.12)

97.2 ppm SO₂ (95.0)

zero SO₂ (4.0)

11.4% CO₂ (11.27)

Finish C3C

0 10 20 30 40 50 60 70 80 90 100

100 90 80 70 60 50 40 30 20 10 0

10 20 30 40 50 60 70 80 90 100

Zero O₂ (0.06)

11.5% O₂ (11.36)

Zero CO₂ (0.13)

97.2 ppm (95.5)

Zero SO₂ (4.0)

11.4% CO₂ (11.26)

Finish C3D

Zero O₂ (0.06)

11.5% O₂ (11.37)

Zero CO₂ (0.12)

97.2 ppm SO₂ (95.0)

Zero SO₂ (4.0)

11.4% CO₂ (11.27)

Finish C3C