Clean Air Engineering

500 W. Wood St. • Palatine, IL 60067 • 708 991-3300

REPORT ON
COMPLIANCE TESTING

Performed For:
TLG ENGINEERING, INC.

Conducted at:
I-95 LANDFILL
LORTON, VIRGINIA

CAE Project No: 6107
April 8, 1992

CONTENTS

SUMMARY

INTRODUCTION

Clean Air Engineering was contracted by TLG Engineering, Inc. to determine the levels of nitrogen oxides, carbon monoxide and total hydrocarbon emissions and to perform visual emissions testing at their facility located in Lorton, Virginia for compliance purposes.

The testing took place at the Stacks of Units 1 through 4 on March 12 and 13, 1992. Coordinating the field testing were:

M. LaFramboise - TLG Engineering, Inc.
J. Busik - Fairfax County Health Department
J. McKie - Virginia Department of Air Pollution Control
N. Merico - Clean Air Engineering

SUMMARY OF TEST RESULTS

The test conditions and results of analysis are presented in Tables 1 through 4 on pages 1-2 through 1-5, respectively.

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

Respectfully submitted,

CLEAN AIR ENGINEERING

Robert Preksta
Manager, Eastern Region

Kimberly Kempf
Manager, Technical Communications

TABLE 1 - Summary of Test Results

EPA Methods 3A, 7E, 9, 10 and 25A
Unit 1 Stack
March 13, 1992

Run No.	1	2	3	Average
Start Time (approx.)	3:22 PM	4:35 PM	5:50 PM	
Stop Time (approx.)	4:22 PM	5:35 PM	6:50 PM	
Gas Conditions				
Temperature (° F)	727	729	729	**728**
Moisture (volume %)	12.8	13.0	12.5	**12.8**
O_2 (dry volume %)	7.0	7.0	7.0	**7.0**
CO_2 (dry volume %)[1]	8.3	8.3	8.3	**8.3**
Volumetric Flow Rate[2]				
acfm	6,362	6,341	6,321	**6,340**
dscfm	2,480	2,460	2,467	**2,470**
Nitrogen Oxides				
ppm dv	195	201	196	**197**
lb/hr	3.5	3.5	3.5	**3.5**
tons/yr	15.2	15.5	15.2	**15.3**
Carbon Monoxide				
ppm dv	500	498	494	**497**
lb/hr	5.4	5.3	5.3	**5.3**
tons/yr	23.7	23.4	23.3	**23.5**
Total Hydrocarbons				
ppm dv	632	659	661	**651**
lb/hr	10.7	11.1	11.2	**11.0**
tons/yr	47.0	48.6	48.9	**48.2**
Opacity				
Percent	0	0	0	**0**

[1] See Comments, page 4-1.
[2] The volumetric flow rates were based on the average of two velocity traverses performed during the test.

TABLE 2 - Summary of Test Results

EPA Methods 3A, 7E, 9, 10 and 25A
Unit 2 Stack
March 13, 1992

Run No.	1	2	3	Average
Start Time (approx.)	11:17 AM	12:38 PM	1:54 PM	
Stop Time (approx.)	12:17 PM	1:38 PM	2:54 PM	
Gas Conditions				
Temperature (° F)	717	718	719	718
Moisture (volume %)	12.8	12.2	12.6	12.5
O_2 (dry volume %)	7.5	7.5	7.5	7.5
CO_2 (dry volume %)[1]	8.0	8.0	8.0	8.0
Volumetric Flow Rate[2]				
acfm	6,415	6,292	6,364	6,360
dscfm	2,523	2,489	2,502	2,500
Nitrogen Oxides				
ppm dv	118	127	120	122
lb/hr	2.1	2.3	2.2	2.2
tons/yr	9.3	9.9	9.4	9.5
Carbon Monoxide				
ppm dv	443	448	448	446
lb/hr	4.9	4.9	4.9	4.9
tons/yr	21.3	21.3	21.4	21.3
Total Hydrocarbons				
ppm dv	573	574	580	576
lb/hr	9.9	9.8	9.9	9.9
tons/yr	43.4	42.9	43.5	43.3
Opacity				
Percent	0	0	0	0

[1] See Comments, page 4-1.
[2] The volumetric flow rates were based on the average of two velocity traverses performed during the test.

TABLE 3 - Summary of Test Results

EPA Methods 3A, 7E, 9, 10 and 25A
Unit 3 Stack
March 12, 1992

Run No.	1	2	3	Average
Start Time (approx.)	3:25 PM	4:49 PM	6:07 PM	
Stop Time (approx.)	4:25 PM	5:49 PM	7:07 PM	
Gas Conditions				
Temperature (° F)	702	702	708	**704**
Moisture (volume %)	9.2	11.8	12.2	**11.1**
O_2 (dry volume %)	7.4	7.6	7.5	**7.5**
CO_2 (dry volume %)[1]	8.1	8.0	8.0	**8.0**
Volumetric Flow Rate[2]				
acfm	6,266	6,202	6,107	**6,190**
dscfm	2,587	2,487	2,425	**2,500**
Nitrogen Oxides				
ppm dv	166	155	169	**163**
lb/hr	3.1	2.8	2.9	**2.9**
tons/yr	13.4	12.1	12.8	**12.8**
Carbon Monoxide				
ppm dv	485	473	482	**480**
lb/hr	5.5	5.1	5.1	**5.2**
tons/yr	23.9	22.5	22.3	**22.9**
Total Hydrocarbons				
ppm dv	477	500	811	**596**
lb/hr	8.5	8.5	13.5	**10.2**
tons/yr	37.1	37.3	59.0	**44.5**
Opacity				
Percent	0	0	0	**0**

[1] See Comments, page 4-1.
[2] The volumetric flow rates were based on the average of two velocity traverses performed during the test.

TABLE 4 - Summary of Test Results

EPA Methods 3A, 7E, 9, 10 and 25A
Unit 4 Stack
March 13, 1992

Run No.	1	2	3	Average
Start Time (approx.)	7:28 AM	8:42 AM	9:58 AM	
Stop Time (approx.)	8:28 AM	9:42 AM	10:58 AM	
Gas Conditions				
Temperature (° F)	713	710	711	**711**
Moisture (volume %)	12.3	13.0	13.2	**12.8**
O_2 (dry volume %)	7.4	7.4	6.2	**7.0**
CO_2 (dry volume %)[1]	8.1	8.1	8.8	**8.3**
Volumetric Flow Rate[2]				
acfm	6,097	6,081	6,207	**6,130**
dscfm	2,421	2,401	2,442	**2,420**
Nitrogen Oxides				
ppm dv	146	130	121	**132**
lb/hr	2.5	2.2	2.1	**2.3**
tons/yr	11.1	9.8	9.3	**10.1**
Carbon Monoxide				
ppm dv	452	440	435	**442**
lb/hr	4.8	4.6	4.6	**4.7**
tons/yr	20.9	20.2	20.3	**20.5**
Total Hydrocarbons				
ppm dv	610	616	605	**610**
lb/hr	10.1	10.1	10.1	**10.1**
tons/yr	44.3	44.4	44.4	**44.4**
Opacity				
Percent	0	0	0	**0**

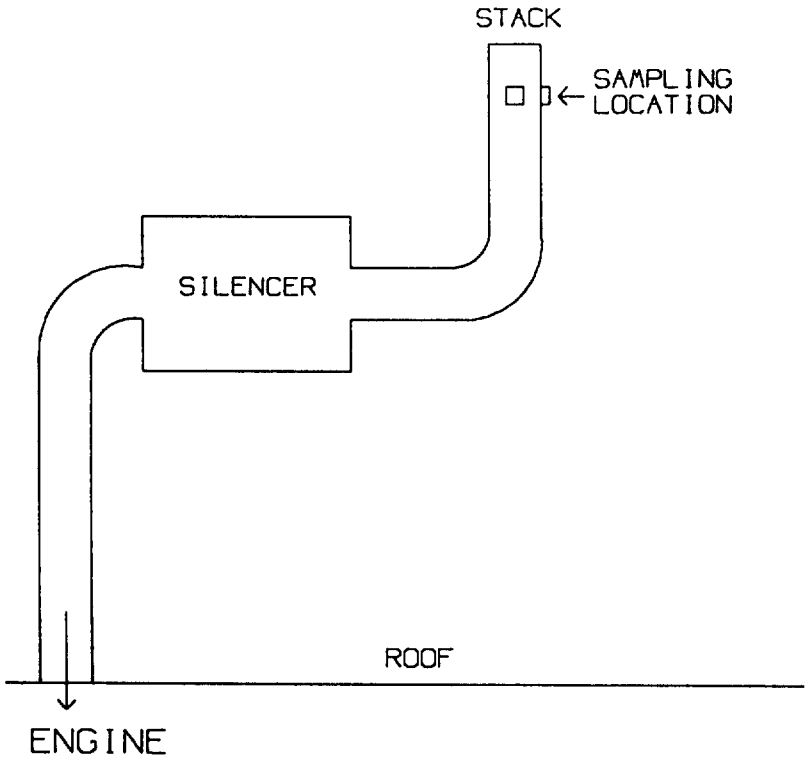
[1] See Comments, page 4-1.
[2] The volumetric flow rates were based on the average of two velocity traverses performed during the test.

DESCRIPTION OF INSTALLATION

TLG Engineering, Inc.'s I-95 Landfill, located in Lorton, Virginia, generates electrical power through the combustion of landfill gas. The facility consists of four Caterpillar Model 3516 Gas-Fired Reciprocating Engines. Each engine is rated at 8.5 MBtu/hr maximum fuel input. Landfill gas is filtered and compressed prior to injection into the engines. The exhaust from each engine is transported to the roof via steel ductwork. The gas is then directed into a silencer and vented to the atmosphere. Emissions from each engine are controlled through carburetor air to fuel mixtures. This ratio is set to produce a very lean fuel to air ratio.

The testing reported in this document was performed at the Stacks of Units 1 through 4.

A schematic of the process is shown below.



SUMMARY OF PROCEDURES

SAMPLING PROCEDURES

The sampling followed procedures as detailed in U.S. Environmental Protection Agency (EPA) Methods 1, 2, 3A, 4, 7E, 9, 10 and 25A. These methods are titled:

- Method 1 — "Sample and Velocity Traverses for Stationary Sources;"
- Method 2 — "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube);"
- Method 3A - "Determination of Oxygen and Carbon Dioxide Concentrations in Emissions from Stationary Sources (Instrumental Analyzer Procedure);"
- Method 4 — "Determination of Moisture Content in Stack Gases;"
- Method 7E - "Determination of Nitrogen Oxides Emissions from Stationary Sources (Instrumental Analyzer Procedure);"
- Method 9 — "Visual Determination of the Opacity of Emissions from Stationary Sources;"
- Method 10 - "Determination of Carbon Monoxide Emissions from Stationary Sources;"
- Method 25A - "Determination of Total Gaseous Organic Concentrations using a Flame Ionization Analyzer (FIA)."

These methods appear in detail in Title 40 of the Code of Federal Regulations (CFR), Part 60, Appendix A.

The sampling apparatus is shown in Figure 1 on page 3-2. The sampling equipment was designed and manufactured by the Research Appliance Co. and Clean Air Engineering to meet U.S. EPA standards. All equipment was calibrated at the Clean Air Engineering laboratory prior to shipment to the job site.

Sampling Locations

The Unit 1 through 4 Stacks are identical. Each stack has two ports. For velocity traversing, eight points were traversed in each port. For the oxygen, nitrogen oxides, carbon monoxide and total hydrocarbons testing a single point was sampled for 60 minutes. The traverse point locations are shown in Figure 2 on page 3-3.

Figure 1

The EPA Methods 3A, 7E, 10 and 25A sampling apparatus is shown.

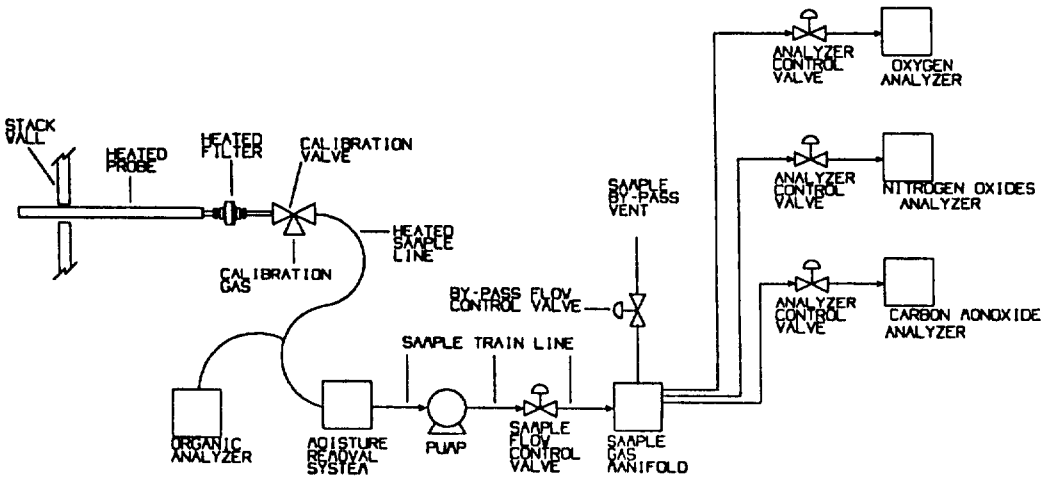
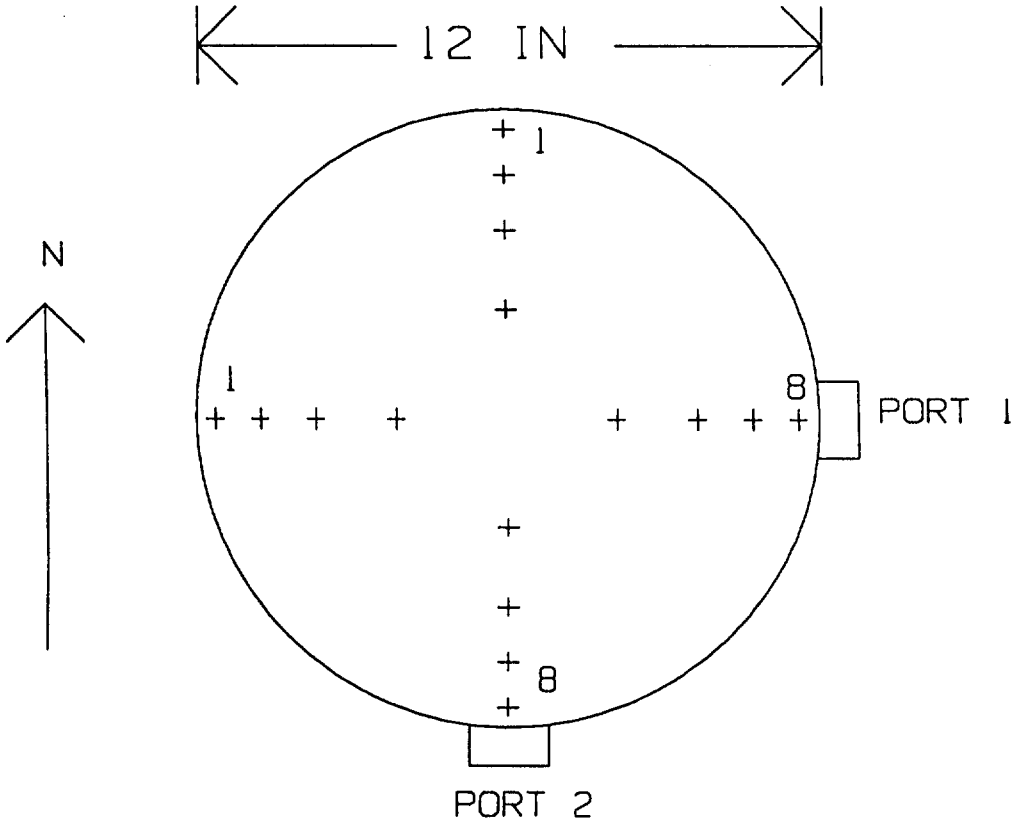


Figure 2

The cross section of the Stack shows traverse point locations.

One of four identical locations.



TRAVERSE POINT	PORT TO POINT DISTANCE (IN)
1	11.6
2	10.7
3	9.7
4	8.1
5	3.9
6	2.3
7	1.3
8	0.4

SUMMARY OF PROCEDURES (Continued)

ANALYTICAL PROCEDURES

Continuous Emissions Monitoring

Oxygen

The oxygen concentration was determined using procedures detailed in EPA Method 3A. A sample was extracted continuously from the flue gas stream, and a portion was conveyed to a Teledyne Percent Oxygen Analyzer.

Nitrogen Oxides

The nitrogen oxides emission rate was determined using procedures detailed in EPA Method 7E. A sample was extracted continuously from the flue gas stream, and a portion was conveyed to a TECO chemiluminescent nitrogen oxides analyzer.

Carbon Monoxide

The carbon monoxide emission rate was determined following procedures detailed in EPA Method 10. An integrated gas sample was extracted from the flue gas stream, and a portion was conveyed to a Luft-type nondispersive infrared analyzer (NDIR).

Total Hydrocarbons

The total hydrocarbons emission rate was determined using procedures detailed in EPA Method 25A. A sample was extracted continuously from the flue gas stream, and a portion was conveyed to a flame ionization analyzer.

Before and after each run, the monitors were zeroed and calibrated with a certified calibration gas. These calibrations were used to correct the raw data for zero and calibration drift occurring during the test runs.

QUALITY CONTROL PROCEDURES

Quality control procedures for all aspects of field sampling; sample preservation and holding time; reagent quality; analytical method; analyst training and safety; and instrument cleaning, calibration and safety were followed. These procedures are generally consistent with EPA guidelines documented in "Quality Assurance Manuals for Air Pollution Measurement Systems," Vol 3, "Stationary Source Specific Methods" (EPA-600/4-77-027b).

COMMENTS

The carbon dioxide values were determined by using the stated fuel parameters and deriving them from the relationship between the Fd and Fc factors. This procedure is shown in a step-by-step presentation in the Sample Calculations Section of the Appendix.

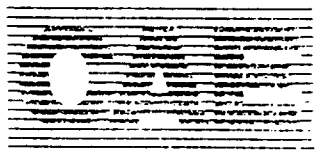
No deviations from standard U.S. EPA testing procedures were noted.

APPENDIX 5-0

NOMENCLATURE

Nomenclature

A	-	absorbance
A_n	-	cross sectional area of nozzle (ft^2)
A_S	-	cross sectional area of stack (ft^2)
B_{wo}	-	proportion of water vapor in the gas stream by volume
B_{ws}	-	proportion of water vapor in the gas stream by volume at saturated conditions
C_p	-	pitot tube coefficient (dimensionless)
D_f	-	dilution factor
F_d	-	ratio of dry gas generated to gross calories (dscf/MBtu)
F_c	-	ratio of gas generated
GCV	-	gross calorific value of fuel (Btu/lb)
$\overline{DH}$	-	average pressure drop across meter box orifice (in. H_2O)
$\overline{\sqrt{DP}}$	-	average square roots of velocity heads of stack gas ($\sqrt{\text{in. } H_2O}$)
DH@	-	meter orifice calibration coefficient (in. H_2O)
%I	-	percent of isokinetic sampling (acceptable: $90 \leq \%I \leq 110\%$)
K_p	-	pitot tube constant: 85.49 (ft/sec) $\frac{\sqrt{(lb/lb\text{-}mole)(in.\ Hg)}}{\sqrt{(^\circ R)(in.\ H_2O)}}$
K_c	-	spectrophotometer calibration factor
M_d	-	dry molecular weight of stack gas (lb/lb-mole)
M_S	-	molecular weight of stack gas, wet basis (lb/lb-mole)
M_n	-	total amount of particulate matter collected (gm)
N	-	normality of titrant (meq/ml)
P_b	-	barometric pressure (in. Hg)
P_f	-	final absolute pressure of flask (in. Hg)
P_i	-	initial absolute pressure of flask (in. Hg)
P_S	-	absolute stack gas pressure (in. Hg)
Q_a	-	volumetric flow rate, actual conditions
Q_{std}	-	volumetric flow rate, standard conditions, dry basis
std	-	standard conditions, 29.92 in. Hg, 68 ° F
T_f	-	final absolute temperature of flask (° R)
T_i	-	initial temperature of flask (° R)
T_m	-	average dry gas meter temperature (° F)



T_s	-	average stack temperature (° F)
T_{std}	-	absolute temperature, standard conditions (528 ° R)
Θ	-	total sampling time (min)
V_a	-	volume of aliquot (ml)
V_f	-	volume of flask (ml)
V_{lc}	-	total volume of liquid collected in impingers and silica gel (ml)
V_m	-	volume of gas sample through the dry gas meter at meter conditions (ft^3)
V_{mstd}	-	volume of gas sample through the dry gas meter, standard conditions (ft^3)
V_{sc}	-	volume of flask sample, standard conditions (ml)
V_{soln}	-	total volume of solution (ml)
V_t	-	volume of titrant used to titrate aliquot (ml)
V_{tb}	-	volume of titrant used to titrate blank (ml)
V_{wstd}	-	volume of water collected, standard conditions (ft^3)
V_s	-	stack gas velocity (ft/sec)
Y_d	-	gas meter correction factor (dimensionless)

Nomenclature

CAL GAS	actual concentration of the upscale calibration gas
CAL I	initial system calibration bias check response for the upscale calibration gas, ppm
CAL F	final system calibration bias check response for the upscale calibration gas, ppm
ZERO I	initial system calibration bias check response for the zero gas, ppm
ZERO F	final system calibration bias check response for the zero gas, ppm
ppm	measured concentration as parts per million in the gas stream
ppm (drift calibrated)	concentration calibrated for drift as per Eq. 6C-1 of EPA Method 6C
DRE	destruction removal efficiency

SAMPLE CALCULATIONS

TLG ENGINEERING, INC.
CAE Project No : 6107

SAMPLE CALCULATIONS - RUN 1, UNIT 1 STACK

(Note : results are taken from computer analysis)

1. Volume of water collected

$$V_{wstd} = (0.04707\ ft^3/ml)\ (V_{lc})$$
$$= (0.04707)\ (69.5)$$
$$= 3.271\ wscf$$

2. Volume of gas metered, standard conditions

$$V_{mstd} = \frac{(17.64\ ^\circ R/in.\ Hg)\ (V_m)\left[P_b + \frac{DH}{13.6}\right]}{(460 + T_m)}(Y_d)$$
$$= \frac{(17.64)\ (23.38)\left[29.98 + \frac{1.5}{13.6}\right]}{(460 + 86)}(0.9836)$$
$$= 22.37\ dscf$$

3. Moisture content

$$B_{wo} = \frac{V_{wstd}}{V_{mstd} + V_{wstd}}$$
$$= \frac{3.271}{22.37 + 3.271}$$
$$= 0.1276$$
$$= 12.8\ \%$$

4. Molecular weight of dry gas stream

$$M_d = 0.44(\%CO_2) + 0.32(\%O_2) + 0.28(\%CO + \%N_2)$$
$$= 0.44(8.3) + 0.32(7.0) + 0.28(84.7)$$
$$= 29.61$$

5. Molecular weight of stack gas

$$M_s = M_d\ (1 - B_{wo}) + 18(B_{wo})$$
$$= 29.61\ (1 - 0.1276) + 18(0.1276)$$
$$= 28.13$$

6. Stack pressure (in. Hg)

$$P_s = P_b + \left(\frac{STATIC\ P}{13.6}\right)$$
$$= 29.98 + \left(\frac{1.3}{13.6}\right)$$
$$= 30.08$$

SAMPLE CALCULATIONS (Continued)

7. Velocity of stack gas

$$V_s = K_p C_p (DP)^{\frac{1}{2}} \frac{[T_s + 460]^{\frac{1}{2}}}{[(M_s)(P_s)]^{\frac{1}{2}}}$$

$$= 85.49\,(0.84)\,(1.588)\,\frac{[727+460]^{\frac{1}{2}}}{[(28.13)(30.08)]^{\frac{1}{2}}}$$

$$= 135.07 \text{ ft/sec}$$

8. Total flow of stack gas

$$Q_a = (60)(A_s)(V_s)$$
$$= (60)(0.785)(135.07)$$
$$= 6,362 \text{ acfm}$$

$$Q_{std} = \frac{Q_a P_s (17.64\,^{\circ}\text{R/in. Hg})(1 - B_{wo})}{T_s + 460}$$
$$= \frac{(6,362)(30.08)(17.64)(1 - 0.1276)}{727 + 460}$$
$$= 2,480 \text{ dscfm}$$

9. Total Hydrocarbons (as propane)

$$ppm_{wet,\ drift\ calibrated} = \left(C_{avg} - C_o\right)\frac{C_{ma}}{(C_m - C_o)}$$
$$= (565 - 20)\frac{551.6}{(565 - 20)}$$
$$= 551$$

C_{avg} = Average gas concentration indicated by gas analyzer, wet basis, ppm.
C_o = Average of initial and final system calibration bias check responses for the zero gas, ppm.
C_m = Average of initial and final system calibration bias check responses for the upscale calibration gas, ppm.
C_{ma} = Actual concentration of the upscale calibration gas, ppm.

SAMPLE CALCULATIONS (Continued)

9. Total Hydrocarbons (continued)

$$ppm_{dry} = \frac{ppm_{wet,\ drift\ calibrated}}{1 - B_{wo}}$$

$$= \frac{551}{1 - 0.1275}$$

$$= 632$$

$$lb/hr_{propane} = \left(\frac{(ppm_{dry})\ (MW)}{385.3 \times 10^6\ ft^3/lb\ mole} \right) (dscfm)\ (60)$$

$$= \left(\frac{(632)\ (44)}{385.3 \times 10^6} \right) (2,480)\ (60)$$

$$= 10.7$$

$$tons/year = \left(\frac{lb}{hr}\right)\left(\frac{8,760\ operating\ hrs}{year}\right)\left(\frac{ton}{2,000\ lb}\right)$$

$$= \frac{(10.7)(8,760)}{2,000}$$

$$= 47.0$$

10. Molecular Weight of Landfill Gas (LFG)

Landfill Gas : 56.2% CH_4, 9.0% CO_2, 34.3% N_2, 0.5% O_2, 0% S in volume percentage

$$MW\ of\ LFG = (0.562)\left(\frac{16\ lb}{lb\text{-}mole} CH_4\right) + (0.09)\left(\frac{44\ lb}{lb\text{-}mole} CO_2\right) + (0.343)\left(\frac{28\ lb}{lb\text{-}mole} N_2\right) +$$

$$(.005)\left(\frac{32\ lb}{lb\text{-}mole} O_2\right)$$

$$= 22.716\ lb/lb\text{-}mole$$

11. Percent Weight of Landfill Gas Components

$$\%\ CH4 = (0.562)\left(\frac{\frac{16\ lb}{lb\text{-}mole} CH_4}{\frac{22.716\ lb}{lb\text{-}mole} LFG}\right)$$

$$= 0.396$$

$$= 39.6\%$$

SAMPLE CALCULATIONS (Continued)

11. Continued

$$\%\text{ C in Landfill Gas} = (0.396CH_4)\left(\frac{\frac{12\text{ lb}}{\text{lb mole}}C}{\frac{16\text{ lb}}{\text{lb mole}}CH_4}\right)$$

$$= 0.344$$

$$= 34.4\,\%$$

Calculations performed for remaining components in a similar manner.

12. Fuel Factor Ratio

$$\frac{F_d}{F_c} = \frac{(K_{hd}\%H) + (K_c\%C) + (K_s\%S) + (K_n\%N) - (K_o\%O)}{(K_{cc}\%C)}$$

$$= \frac{(3.64\,\frac{\text{scf}}{\text{lb}/\%})(9.8) + (1.53\,\frac{\text{scf}}{\text{lb}/\%})(34.4) + (0.14\,\frac{\text{scf}}{\text{lb}/\%})(42.3) - (0.46\,\frac{\text{scf}}{\text{lb}/\%})(13.4)}{(0.321\,\frac{\text{scf}}{\text{lb}/\%})(34.4)}$$

$$= 7.97$$

13. F_o Factor

$$F_o = 0.209\left(\frac{F_d}{F_c}\right)$$

$$= 1.67$$

14. Carbon Dioxide (Run 1, Unit 1 Stack)

$$\%CO_2 = \frac{20.9 - \%O_2}{F_o}$$

$$= \frac{20.9 - 7.0}{1.67}$$

$$= 8.3\%$$

PARAMETERS

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 1 Stack
March 13, 1992

VELOCITY AND MOISTURE PARAMETERS

RUN NO.	**1**	**2**	**3**
Start Time (approx.)	3:25 PM	4:35 PM	5:50 PM
Stop Time (approx.)	4:00 PM	5:10 PM	6:25 PM
%CO2*	8.3	8.3	8.3
%O2	7.0	7.0	7.0
Pb	29.98	29.98	29.98
STATIC P	1.3	1.3	1.3
Cp	0.84	0.84	0.84
As	0.785	0.785	0.785
Vlc	69.5	71.5	69
Vm	23.38	23.40	23.55
DH	1.5	1.5	1.5
Yd	0.9836	0.9836	0.9836
Tm	86	84	81

CALCULATED RESULTS

Vwstd	3.271	3.366	3.248
Vmstd	22.37	22.46	22.74
Bwo	0.1276	0.1303	0.1250
AVG VEL ROOT	1.588	1.580	1.577
AVG TEMP	727	729	729
Md	29.61	29.61	29.61
Ms	28.13	28.10	28.16
Ps	30.08	30.08	30.08
Vs	135.07	134.62	134.21
Qa (acfm)**	6,362	6,341	6,321
Qstd (dscfm)**	2,480	2,460	2,467

* See Comments, page 4-1.
** The volumetric flow rates were based on the average of two velocity traverses performed during the test.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 2 Stack
March 13, 1992

VELOCITY AND MOISTURE PARAMETERS

RUN NO.	**1**	**2**	**3**
Start Time (approx.)	11:22 AM	12:37 PM	1:53 PM
Stop Time (approx.)	11:57 AM	1:12 PM	2:28 PM
%CO2*	8.0	8.0	8.0
%O2	7.5	7.5	7.5
Pb	29.98	29.98	29.98
STATIC P	1.5	1.5	1.5
Cp	0.84	0.84	0.84
As	0.785	0.785	0.785
Vlc	68	66	68.5
Vm	22.67	23.36	23.22
DH	1.5	1.5	1.5
Yd	0.9836	0.9836	0.9836
Tm	81	84	84

CALCULATED RESULTS

Vwstd	3.201	3.107	3.224
Vmstd	21.86	22.42	22.28
Bwo	0.1277	0.1217	0.1264
AVG VEL ROOT	1.607	1.578	1.594
AVG TEMP	717	718	719
Md	29.58	29.58	29.58
Ms	28.10	28.17	28.12
Ps	30.09	30.09	30.09
Vs	136.20	133.60	135.11
Qa (acfm)**	6,415	6,292	6,364
Qstd (dscfm)**	2,523	2,489	2,502

* See Comments, page 4-1.
** The volumetric flow rates were based on the average of two velocity traverses performed during the test.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 3 Stack
March 12, 1992

VELOCITY AND MOISTURE PARAMETERS

RUN NO.	**1**	**2**	**3**
Start Time (approx.)	3:30 PM	4:51 PM	6:07 PM
Stop Time (approx.)	4:05 PM	5:24 PM	6:42 PM
%CO2*	8.1	8.0	8.0
%O2	7.4	7.6	7.5
Pb	29.85	29.85	29.85
STATIC P	1.2	1.2	1.4
Cp	0.84	0.84	0.84
As	0.785	0.785	0.785
Vlc	46	62.5	65
Vm	21.82	22.63	22.89
DH	1.3	1.5	1.5
Yd	1.0098	1.0098	1.0098
Tm	83	88	95

CALCULATED RESULTS

Vwstd	2.165	2.942	3.060
Vmstd	21.42	22.05	22.03
Bwo	0.0918	0.1177	0.1220
AVG VEL ROOT	1.589	1.564	1.534
AVG TEMP	702	702	708
Md	29.59	29.58	29.58
Ms	28.53	28.22	28.17
Ps	29.94	29.94	29.95
Vs	133.04	131.68	129.66
Qa (acfm)**	6,266	6,202	6,107
Qstd (dscfm)**	2,587	2,487	2,425

* See Comments, page 4-1.
* The volumetric flow rates were based on the average of two velocity traverses performed during the test.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 4 Stack
March 13, 1992

VELOCITY AND MOISTURE PARAMETERS

RUN NO.	**1**	**2**	**3**
Start Time (approx.)	7:35 AM	8:42 AM	9:57 AM
Stop Time (approx.)	8:10 AM	9:17 AM	10:32 AM
%CO2*	8.1	8.1	8.8
%O2	7.4	7.4	6.2
Pb	29.98	29.98	29.98
STATIC P	1.5	1.5	1.5
Cp	0.84	0.84	0.84
As	0.785	0.785	0.785
Vlc	67	70.5	72
Vm	22.48	22.55	22.89
DH	1.5	1.5	1.5
Yd	0.9836	0.9836	0.9836
Tm	61	68	76

CALCULATED RESULTS

Vwstd	3.154	3.318	3.389
Vmstd	22.53	22.30	22.28
Bwo	0.1228	0.1295	0.1320
AVG VEL ROOT	1.533	1.528	1.560
AVG TEMP	713	710	711
Md	29.59	29.59	29.66
Ms	28.17	28.09	28.12
Ps	30.09	30.09	30.09
Vs	129.46	129.12	131.79
Qa (acfm)**	6,097	6,081	6,207
Qstd (dscfm)**	2,421	2,401	2,442

* See Comments, page 4-1.
** The volumetric flow rates were based on the average of two velocity traverses performed during the test.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 1 Stack
March 13, 1992

OXYGEN CONCENTRATION
percent

RUN NO.	**1**	**2**	**3**
Start Time (approx)	3:22 PM	4:35 PM	5:50 PM
Stop Time (approx)	4:22 PM	5:35 PM	6:50 PM
ZERO I	0.25	0.25	0.25
CAL I	14.75	14.75	14.75
ZERO F	0.25	0.25	0.25
CAL F	14.75	14.75	14.75
percent	7.5	7.5	7.5
CAL GAS	13.99	13.99	13.99
percent (drift calibrated)	7.0	7.0	7.0

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 2 Stack
March 13, 1992

OXYGEN CONCENTRATION
percent

RUN NO.	**1**	**2**	**3**
Start Time (approx)	11:17 AM	12:38 PM	1:54 PM
Stop Time (approx)	12:17 PM	1:38 PM	2:54 PM
ZERO I	0.25	0.25	0.25
CAL I	14.75	14.75	14.75
ZERO F	0.25	0.25	0.25
CAL F	14.75	14.75	14.75
percent	8.0	8.0	8.0
CAL GAS	13.99	13.99	13.99
percent (drift calibrated)	7.5	7.5	7.5

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 3 Stack
March 12, 1992

OXYGEN CONCENTRATION
percent

RUN NO.	**1**	**2**	**3**
Start Time (approx)	3:25 PM	4:49 PM	6:07 PM
Stop Time (approx)	4:25 PM	5:49 PM	7:07 PM
ZERO I	0.5	0.5	0.5
CAL I	15	14.75	14.75
ZERO F	0.5	0.5	0.5
CAL F	14.75	14.75	15
percent	8.2	8.3	8.2
CAL GAS	13.99	13.99	13.99
percent (drift calibrated)	7.4	7.6	7.5

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 4 Stack
March 13, 1992

OXYGEN CONCENTRATION
percent

RUN NO.	**1**	**2**	**3**
Start Time (approx)	7:28 AM	8:42 AM	9:58 AM
Stop Time (approx)	8:28 AM	9:42 AM	10:58 AM
ZERO I	0.25	0.5	5
CAL I	14.75	14.75	14.75
ZERO F	0.5	0.5	0.25
CAL F	14.75	14.75	14.75
percent	8.0	8.0	8.0
CAL GAS	13.99	13.99	13.99
percent (drift calibrated)	7.4	7.4	6.2

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 1 Stack
March 13, 1992

NITROGEN OXIDES CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	3:22 PM	4:35 PM	5:50 PM
Stop Time (approx)	4:22 PM	5:35 PM	6:50 PM
dscfm*	2,480	2,460	2,467
ZERO I	20	20	20
CAL I	850	850	850
ZERO F	20	20	20
CAL F	850	850	850
ppm	217	223	219
CAL GAS	821.0	821.0	821.0
ppm (drift calibrated)	195	201	196
lb/hr	3.5	3.5	3.5
tons/yr**	15.2	15.5	15.2

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 2 Stack
March 13, 1992

NITROGEN OXIDES CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	11:17 AM	12:38 PM	1:54 PM
Stop Time (approx)	12:17 PM	1:38 PM	2:54 PM
dscfm*	2,523	2,489	2,502
ZERO I	20	20	20
CAL I	855	850	850
ZERO F	20	20	20
CAL F	850	850	850
ppm	139	149	142
CAL GAS	821.0	821.0	821.0
ppm (drift calibrated)	118	127	120
lb/hr	2.1	2.3	2.2
tons/yr**	9.3	9.9	9.4

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 3 Stack
March 12, 1992

NITROGEN OXIDES CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	3:25 PM	4:49 PM	6:07 PM
Stop Time (approx)	4:25 PM	5:49 PM	7:07 PM
dscfm*	2,587	2,487	2,425
ZERO I	20	20	20
CAL I	860	830	845
ZERO F	20	20	20
CAL F	830	845	840
ppm	187	174	189
CAL GAS	821.0	821.0	821.0
ppm (drift calibrated)	166	155	169
lb/hr	3.1	2.8	2.9
tons/year**	13.4	12.1	12.8

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 4 Stack
March 13, 1992

NITROGEN OXIDES CONCENTRATION
ppm

RUN NO.	1	2	3
Start Time (approx)	7:28 AM	8:42 AM	9:58 AM
Stop Time (approx)	8:28 AM	9:42 AM	10:58 AM
dscfm*	2,421	2,401	2,442
ZERO I	20	20	20
CAL I	850	850	855
ZERO F	20	20	20
CAL F	850	855	855
ppm	168	152	143
CAL GAS	821.0	821.0	821.0
ppm (drift calibrated)	146	130	121
lb/hr	2.5	2.2	2.1
tons/yr**	11.1	9.8	9.3

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 1 Stack
March 13, 1992

CARBON MONOXIDE CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	3:22 PM	4:35 PM	5:50 PM
Stop Time (approx)	4:22 PM	5:35 PM	6:50 PM
dscfm*	2,480	2,460	2,467
ZERO I	20	20	20
CAL I	870	870	880
ZERO F	20	20	20
CAL F	870	880	880
ppm	516	517	516
CAL GAS	857.0	857.0	857.0
ppm (drift calibrated)	500	498	494
lb/hr	5.4	5.3	5.3
tons/yr**	23.7	23.4	23.3

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 2 Stack
March 13, 1992

CARBON MONOXIDE CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	11:17 AM	12:38 PM	1:54 PM
Stop Time (approx)	12:17 PM	1:38 PM	2:54 PM
dscfm*	2,523	2,489	2,502
ZERO I	20	20	20
CAL I	880	880	870
ZERO F	20	20	20
CAL F	880	870	870
ppm	464	467	464
CAL GAS	857.0	857.0	857.0
ppm (drift calibrated)	443	448	448
lb/hr	4.9	4.9	4.9
tons/yr**	21.3	21.3	21.4

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 3 Stack
March 12, 1992

CARBON MONOXIDE CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	3:25 PM	4:49 PM	6:07 PM
Stop Time (approx)	4:25 PM	5:49 PM	7:07 PM
dscfm*	2,587	2,487	2,425
ZERO I	20	20	20
CAL I	880	880	890
ZERO F	20	20	20
CAL F	880	890	880
ppm	506	497	507
CAL GAS	857.0	857.0	857.0
ppm (drift calibrated)	485	473	482
lb/hr	5.5	5.1	5.1
tons/year**	23.9	22.5	22.3

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 4 Stack
March 13, 1992

CARBON MONOXIDE CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	7:28 AM	8:42 AM	9:58 AM
Stop Time (approx)	8:28 AM	9:42 AM	10:58 AM
dscfm*	2,421	2,401	2,442
ZERO I	20	20	20
CAL I	880	880	880
ZERO F	20	20	20
CAL F	880	880	880
ppm	474	462	456
CAL GAS	857	857	857
ppm (drift calibrated)	452	440	435
lb/hr	4.8	4.6	4.6
tons/yr**	20.9	20.2	20.3

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 1 Stack
March 13, 1992

TOTAL HYDROCARBONS CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	3:22 PM	4:35 PM	5:50 PM
Stop Time (approx)	4:22 PM	5:35 PM	6:50 PM
dscfm*	2,480	2,460	2,467
Bwo	0.1276	0.1303	0.1250
ZERO I	20	20	20
CAL I	560	570	570
ZERO F	20	20	20
CAL F	570	570	570
ppm	565	591	597
CAL GAS	551.6	551.6	551.6
ppm, wet (drift calibrated)	551	573	578
ppm, dry	632	659	661
lb/dscf	7.21E-05	7.53E-05	7.55E-05
lb/hr	10.7	11.1	11.2
tons/yr**	47.0	48.6	48.9

* The volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 2 Stack
March 13, 1992

TOTAL HYDROCARBONS CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	11:17 AM	12:38 PM	1:54 PM
Stop Time (approx)	12:17 PM	1:38 PM	2:54 PM
dscfm**	2,523	2,489	2,502
Bwo	0.1277	0.1217	0.1264
ZERO I	20	20	20
CAL I	570	570	560
ZERO F	20	20	20
CAL F	570	560	560
ppm	518	518	516
CAL GAS	551.6	551.6	551.6
ppm, wet (drift calibrated)	499	504	507
ppm, dry	573	574	580
lb/dscf	6.54E-05	6.55E-05	6.62E-05
lb/hr	9.9	9.8	9.9
tons/year **	43.4	42.9	43.5

* The volumetric flow rates were based on velocity traverses performed before and after the test.
** Based on 8,760 operaing hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 3 Stack
March 12, 1992

TOTAL HYDROCARBONS CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	3:25 PM	4:49 PM	6:07 PM
Stop Time (approx)	4:25 PM	5:49 PM	7:07 PM
dscfm*	2,587	2,487	2,425
Bwo	0.0918	0.1177	0.1220
ZERO I	20	40	40
CAL I	570	580	560
ZERO F	40	40	15
CAL F	580	560	140
ppm	458	464	444
CAL GAS	551.6	551.6	551.6
ppm, wet (drift calibrated)	434	441	712
ppm, dry	477	500	811
lb/dscf	5.45E-05	5.71E-05	9.26E-05
lb/hr	8.5	8.5	13.5
tons/year**	37.1	37.3	59.0

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

TLG ENGINEERING, INC.
CAE Project No: 6107
Unit 4 Stack
March 13, 1992

TOTAL HYDROCARBONS CONCENTRATION
ppm

RUN NO.	**1**	**2**	**3**
Start Time (approx)	7:28 AM	8:42 AM	9:58 AM
Stop Time (approx)	8:28 AM	9:42 AM	10:58 AM
dscfm*	2,421	2,401	2,442
Bwo	0.1228	0.1295	0.1320
ZERO I	20	20	20
CAL I	570	570	560
ZERO F	20	20	20
CAL F	570	560	570
ppm	553	550	539
CAL GAS	551.6	551.6	551.6
ppm, wet (drift calibrated)	535	536	525
ppm, dry	610	616	605
lb/dscf	6.96E-05	7.04E-05	6.91E-05
lb/hr	10.1	10.1	10.1
tons/yr**	44.3	44.4	44.4

* Volumetric flow rates were based on the average of two velocity traverses performed during the test.
** Based on 8,760 operating hours per year.

CALIBRATION DATA

POST TEST CALIBRATION CHECK

Client/Owner: TLG

Project Number: 6107

Operator: Tim RODAK

Date: 3/17/92

Meter Box No.:	Meter Box Vacuum:	Meter Box Yd:	Barometric Press.:
J	3	0.983	28.77
		ΔH@ 1.777	

				Standard Meter Gas Volume ft^3			Meter Box Gas Volume ft^3			Std. Meter Temperature °F			Meter Box Temperature °F					
Q	ΔH	ΔP	Yds	Initial	Final	Vds Net	Initial	Final	Vd Net	In	Out	Tds Avg	In	Out	Td Avg	Time θ	Yd	ΔH
.666	1.5	-5.0	0.9975	518.43	526.72	8.29	79.71	88.42	8.71	66 67	66 66	66	104 106	86 87	98	12	0.9902	1.72
.665	1.5	-5.1	0.9976	526.72	537.08	10.36	88.42	99.33	10.91	67 68	66 67	67	106 104	87 90	97	75	0.9844	1.73
.669	1.5	-5.1	0.9974	537.08	548.22	11.14	99.33	111.07	11.74	68 68	67 68	68	104 106	90 90	98	16	0.9834	1.71

Nomenclature

Pb	Barometric Pressure
Q	Flow Rate (cfm)
ΔH	Orifice Pressure Differential ("H_2O)
ΔP	Inlet Pressure Differential ("H_2O)
Vd	Volume Dry Gas Meter (ft^3)
Vds	Volume Dry Standard (ft^3)
Yd	Meter Correction Factor (unitless)
Yds	Standard Meter Correction Factor (unitless)
ΔH@	Orifice Pressure Differential that gave 0.75 cfm of air at 70° F and 29.92 "Hg ("H_2O)

Calculations

$$Yd = (Yds)\left[\frac{Vds}{Vd}\right]\left[\frac{Td + 460}{Tds + 460}\right]\left[\frac{Pb + \Delta P/13.6}{Pb + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{0.0317\,\Delta H}{Pb\,(Td + 460)}\left[\frac{(Tds + 460)\,\theta}{(Vds)\,(Yds)}\right]^2$$

$$Q = \frac{17.64\,(Vds)\,(Pb)}{(Tds + 460)\,\theta}$$

METER BOX FULL TEST CALIBRATION

Date: 2/5/92 Operator: CLG

Meter Box No.:	Meter Box ΔH@:	Meter Box Yd:	Barometric Pressure:
J	.9836	1.777	28.96

				Standard Meter Gas Volume ft³			Meter Box Gas Volume ft³			Std. Meter Temperature °F			Meter Box Temperature °F					
Q	ΔH	ΔP	Yds	Initial	Final	Vds Net	Initial	Final	Vds Net	In	Out	Tds Avg	In	Out	Tds Avg	Time θ	Yd	ΔH@
.389	.50	-.9	1.006	520.30	530.00	9.70	456.17	466.61	10.44	72 72	70 70	71	108 110	94 96	102	24	.98553	1.662
.385	.50	-.9	1.006	533.60	547.23	13.63	470.50	485.22	14.72	72 73	70 72	72	110 110	96 96	103	34	.98221	1.692
.689	1.7	-2.1	.9966	556.38	567.89	11.51	495.00	507.35	12.35	74 74	72 72	73	118 120	98 100	109	16	.98209	1.808
.698	1.7	-2.1	.9963	579.73	586.39	11.66	514.70	527.23	12.53	74 74	72 72	73	120 122	100 100	111	16	.98365	1.756
.901	3.0	-3.3	.9938	599.02	611.27	12.25	540.70	553.78	13.08	75 75	72 72	74	125 125	102 104	114	13	.98460	1.860
.895	3.0	-3.3	.9937	611.27	621.56	10.29	553.78	564.80	11.02	75 75	72 72	74	125 125	104 104	115	11	.98328	1.885
																	.9836	1.777

Nomenclature

Pb	Barometric Pressure
Q	Flow Rate (cfm)
ΔH	Orifice Pressure Differential ("H_2O)
ΔP	Inlet Pressure Differential ("H_2O)
Vd	Volume Dry Gas Meter (ft^3)
Vds	Volume Dry Standard (ft^3)
Yd	Meter Correction Factor (unitless)
Yds	Standard Meter Correction Factor (unitless)
ΔH@	Orifice Pressure Differential that gave 0.75 cfm of air at 70°F and 29.92 "Hg ("H_2O)

Calculations

$$Yd = (Yds)\left[\frac{Vds}{Vd}\right]\left[\frac{Td + 460}{Tds + 460}\right]\left[\frac{Pb + \Delta P/13.6}{Pb + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{0.0317\,\Delta H}{Pb(Td + 460)}\left[\frac{(Tds + 460)\theta^2}{(Vds)(Yds)}\right]$$

$$Q = \frac{17.64\,(Vds)(Pb)}{(Tds + 460)\theta}$$

Vacuum Gauge Calibration

Standard (Hg)	Vacuum Gauge
15"	15"

Thermometer Calibration

Standard	Inlet	Outlet
32°	33°	34°
68°	68°	70°
205°	205°	206°

METER BOX FULL TEST CALIBRATION

DATE: 9/10/91 METER BOX Yd: 1.0098 METER BOX: KK

OPERATOR: CLG METER BOX ΔH@: 1.828 BAROMETRIC PRESSURE (Pb): 28.94

				Standard Meter Gas Volume (ft^3)			Meter Box Gas Volume (ft^3)			Standard Meter Temperature			Meter Box Temperature			Time (Min.)		
Q	ΔH	ΔP	Yds	Initial	Final	(Vds) Net	Initial	Final	(Vd) Net	In	Out	Tds Avg	In	Out	Td Avg	θ	Yd	ΔH@
.366	.50	-.7	1.007	638.47	643.89	5.42	560.00	565.69	5.69	80 80	80 80	80	116 118	100 102	109	14	1.0073	1.848
.363	.50	-.7	1.007	643.89	650.90	7.01	565.69	573.04	7.35	80 80	80 80	80	118 118	102 102	110	18	1.0102	1.823
.686	1.7	-1.9	.9968	665.25	676.13	10.88	588.00	599.36	11.36	80 80	80 80	80	128 130	104 106	117	15	1.0108	1.800
.682	1.7	-1.9	.9969	676.13	687.67	11.54	599.36	611.45	12.09	80 80	80 80	80	130 130	106 106	118	16	1.0093	1.817
.897	3.0	-3.0	.9938	697.80	710.14	12.34	622.00	634.84	12.84	80 80	80 80	80	134 134	108 108	121	13	1.0120	1.853
.902	3.0	-3.0	.9938	710.14	721.59	11.45	634.84	646.81	11.97	80 80	80 80	80	134 134	108 108	122	12	1.0091	1.831
																	1.0098	1.828

Q - Flow Rate (cfm)
ΔH - Orifice Pressure Differential (in. H O)
ΔP - Inlet Pressure Differential Standard Meter (in. H O)
Yds - Standard Meter Correction Factor (Unitless)
Yd - Meter Box Correction Factor (Unitless)
ΔH@ - Orifice Pressure Differential that gives 0.75 cfm of air at 70°F and 29.92" Hg (in. H O)

$$Yd = (Yds)\left(\frac{Vds}{Vd}\right)\left(\frac{Td + 460}{Tds + 460}\right)\left(\frac{Pb + \Delta P/13.6}{Pb + \Delta H/13.6}\right)$$

$$\Delta H@ = \frac{0.0317\ \Delta H}{Pb\ (T + 460)}\left[\frac{(Tds + 460)\ \theta}{Vds.\ Yds}\right]^2$$

$$Q = \frac{17.64 \cdot Vds \cdot Pb}{(Tds + 460)\ \theta}$$

POST TEST CALIBRATION CHECK

Client/Owner: TLG

Project Number: 6107

Operator: TIM RODAK

Date: 3/17/92

Meter Box No.: KK	Meter Box Vacuum: 3	Meter Box Yd: 1.0098 ΔH@ 1.825	Barometric Press.: 28.77

				Standard Meter Gas Volume ft³			Meter Box Gas Volume ft³			Std. Meter Temperature °F			Meter Box Temperature °F					
Q	ΔH	ΔP	Yds	Initial	Final	Vds Net	Initial	Final	Vd Net	In	Out	Tds Avg	In	Out	Td Avg	Time θ	Yd	ΔH@
.63	1.5	-5.1	0.9976	580.14	591.89	11.75	67.30	79.22	11.92	69 69	69 69	69	94 96	86 82	88	17	1.0016	1.775
.62	1.5	-5.1	0.9977	591.89	603.62	11.73	79.22	91.14	11.92	69 69	69 69	69	96 94	82 82	89	17	1.0018	1.778
.61	1.5	-5.1	0.9981	603.62	619.90	16.28	91.14	107.71	16.57	69 69	69 69	69	94 96	82 82	89	24	1.0006	1.838

Nomenclature

Pb	Barometric Pressure
Q	Flow Rate (cfm)
ΔH	Orifice Pressure Differential ("H_2O)
ΔP	Inlet Pressure Differential ("H_2O)
Vd	Volume Dry Gas Meter (ft^3)
Vds	Volume Dry Standard (ft^3)
Yd	Meter Correction Factor (unitless)
Yds	Standard Meter Correction Factor (unitless)
ΔH@	Orifice Pressure Differential that gave 0.75 cfm of air at 70° F and 29.92 "Hg ("H_2O)

Calculations

$$Yd = (Yds)\left[\frac{Vds}{Vd}\right]\left[\frac{Td + 460}{Tds + 460}\right]\left[\frac{Pb + \Delta P/13.6}{Pb + \Delta H/13.6}\right]$$

$$\Delta H@ = \frac{0.0317\,\Delta H}{Pb\,(Td + 460)}\left[\frac{(Tds + 460)\,\theta}{(Vds)\,(Yds)}\right]^2$$

$$Q = \frac{17.64\,(Vds)\,(Pb)}{(Tds + 460)\,\theta}$$

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 532068

Your P.O. # : 4068

Expiration Date : 7-15-93

Cylinder Number : ALM-010028

Cylinder Pressure 1900 psig

stomer :
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE IL 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES # # #
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # 1982

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
RBON DIOXIDE	5.96 %	1675	ALM-001324	14.02 %	HORIBA	11-23-91	NON-DISPERSIVE INFRARED
		GMIS#	ALM-004805	18.35 %	PIR-2000		

LANCE GAS : NITROGEN

ANALYSIS DATE : 1-13-92

ERO AS mV)	TEST GAS (mV)	RESULTS %	REFERENCE GAS CONC.	(mV)	RESULTS %
00	60.20	5.97	14.02 %	110.50	14.03
00	60.20	5.97		110.50	14.03
00	60.20	5.97		110.50	14.03
CALCULATED RESULTS		5.96			
		5.96			
		5.96			
AVERAGE :		5.96 %			

CALIBRATION CURVE 3 rd DEGREE

SRM # (CRM #)	CONC. %	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
	18.35	100	130.00	18.34	-0.00
1675	14.02	76	110.50	14.03	0.08
	9.999	55	88.30	9.992	-0.07
	5.013	27	52.30	5.017	0.07
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
GMIS	5.013	LOW	52.30	5.017	0.07
1675	14.02		110.50	14.03	0.08

GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Tom Scott Jr

Approved By : P Shanin

Scott Specialty Gases

Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Customer :
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE IL 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # 1922

Certified Accuracy 1 % NBS Traceable

Our Project # : 532068

Your P.O. # : 4068

Expiration Date : 7-13-93

Cylinder Number ALM-010023

Cylinder Pressure 1900 psig

		REFERENCE STD			GAS ANALYZER	
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	MAKE/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
OXYGEN	13.99 %	2659	AAL-18601	20.67 %	BECKMAN/755/1001192	1-13-92	PARAMAGNETIC
		2658	AAL-18521	10.08 %			

BALANCE GAS : NITROGEN

ANALYSIS DATE : 1-13-92

ZERO GAS (mV)	TEST GAS (mV)	RESULTS %	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS %
0.00	66.40	13.99	20.67 %	98.20	20.67
0.00	66.40	13.99		98.20	20.67
0.00	66.40	13.99		98.20	20.67

CALCULATED RESULTS 13.99
13.99
13.99

AVERAGE : 13.99 %

CALIBRATION CURVE 1 st DEGREE

SRM # (CRM #)	CONC. %	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
2659	20.67	100	98.20	20.67	-0.00
	10.08	49	47.80	10.09	-0.02
	9.994	48	47.20	9.951	-0.43
	6.018	29	28.40	6.000	-0.30
	3.007	15	14.10	2.995	-0.41
	0.0000	0	0.00	0.0000	0.00
		0		0.00	0.00
2658	10.08	LOW	47.80	10.08	-0.02
2659	20.67	HIGH	98.20	20.67	-0.00

‡ GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Don Eckler Jr.

Approved By : L Shapiro

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Troy

Our Project # : 530469

Your P.O. # : 3750-71500

Expiration Date : 5-25-93

Cylinder Number ALM008991

Cylinder Pressure 1900 psig

Customer :
C A E INSTRUMENT RENTAL

246 WOODWORK LANE

PALATINE IL 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO-1605

Certified Accuracy 1 % NBS Traceable

		REFERENCE STD			GAS ANALYZER		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	MAKE/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
OXYGEN	6.065 %	2659	AAL-18601	20.67 %	BECKMAN/755/1001192	9-17-91	PARAMAGNETIC
		2658	AAL-18521	10.08 %			

BALANCE GAS : NITROGEN

ANALYSIS DATE : 11-25-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS %	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS %
0.00	28.70	6.063	10.08 %	47.80	10.08
0.00	28.70	6.063		47.80	10.08
0.00	28.70	6.063		47.80	10.08
CALCULATED RESULTS		6.065			
		6.065			
		6.065			
AVERAGE :		6.065 %			

CALIBRATION CURVE 1 st DEGREE

SRM # (CRM #)	CONC. %	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
2659	20.67	100	98.20	20.67	-0.00
	10.08	49	47.80	10.08	-0.02
	9.994	48	47.20	9.951	-0.43
	6.018	29	28.40	6.000	-0.30
	3.007	15	14.10	2.995	-0.41
	0.0000	0	0.00	0.0000	0.00
		0		0.00	0.00
2658	10.08	LOW	47.80	10.08	-0.02
2659	20.67	HIGH	98.20	20.67	-0.00

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

Scott Specialty Gases a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 530469

Your P.O. # : 3750-71500

Expiration Date : 5-25-93

Cylinder Number : ALM008991

Cylinder Pressure 1900 psig

Customer :
C A E INSTRUMENT RENTAL

246 WOODWORK LANE

PALATINE IL 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES # # #
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO-1599

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER

COMPONENT	CERTIFIED CONC.
CARBON DIOXIDE	13.960 %

BALANCE GAS : NITROGEN

REFERENCE STD

SRM # (CRM #)	CYLINDER NUMBER	CONC.
1675	ALM-001324	14.02 %
GMIS#	ALM-004805	18.35 %

INSTRUMENTATION

INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
HORIBA PIR-2000	8-28-91	NON-DISPERSIVE INFRARED

ANALYSIS DATE : 11-25-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS %	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS %
0.00	110.20	13.971	14.02 %	110.50	14.03
0.00	110.20	13.971		110.50	14.03
0.00	110.20	13.971		110.50	14.03
CALCULATED RESULTS		13.960			
		13.960			
		13.960			
AVERAGE :		13.960 %			

CALIBRATION CURVE 3 rd DEGREE

SRM # (CRM #)	CONC. %	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
	18.35	100	130.00	18.34	-0.00
1675	14.02	76	110.50	14.03	0.08
	9.999	55	88.30	9.992	-0.07
	5.013	27	52.30	5.017	0.07
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
GMIS	5.013	LOW	52.30	5.017	0.07
1675	14.02		110.50	14.03	0.08

The only liability of this Company for gas which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

Scott Specialty Gases

Division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Our Project # : 522275

Your P.O. # : 2097-71500

Expiration Date : 10-17-92

Cylinder Number ALM-016594

Cylinder Pressure 1900 psig

Customer :
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL. 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES # # #
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO-0162

Certified Accuracy 1 % NBS Traceable

COMPONENT	CERTIFIED CONC.	REFERENCE STD SRM # (CRM #)	REFERENCE STD CYLINDER NUMBER	REFERENCE STD CONC.	GAS ANALYZER MAKE/MODEL	GAS ANALYZER LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	216.5 PPM	1685	AAL-9851	236.0 PPM	BECKMAN 951A	4-24-91	CHEMILUMINESCENCE
		GMIS#	AAL-14484	145.3 PPM			
		1684	ALM-003623	97.28 PPM			

BALANCE GAS : NITROGEN

NITROGEN DIOXIDE 0.88 PPM

FIRST ANALYSIS DATE : 4-10-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	73.40	216.6	236.0 PPM	80.00	236.0
0.00	73.40	216.6		80.00	236.0
0.00	73.50	216.9		80.00	236.0

CALCULATED RESULTS 216.6, 216.6, 216.9

AVERAGE : 216.7 PPM

SECOND ANALYSIS DATE : 4-17-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	73.30	216.3	236.0 PPM	80.00	236.0
0.00	73.30	216.3		80.00	236.0
0.00	73.30	216.3		80.00	236.0
0.00	73.60 NOX	217.2			

CALCULATED RESULTS 216.3, 216.3, 216.3

AVERAGE : 216.3 PPM

217.2 PPM NOX

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1685	236.0	100	80.00	236.0	-0.00
	207.6	88	70.50	208.1	0.23
	145.3	62	49.10	145.1	-0.17
1684	97.28	41	32.80	96.95	-0.34
	0.0000	0	0.00	0.0000	0.00
		0		0.00	0.00
		0		0.00	0.00
1684	97.28	LOW	33.00	97.54	0.27
1685	236.0	HIGH	80.00	236.0	-0.00

GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Don Eichler

Approved By : R. Don Coppenbarger

Scott Specialty Gases

Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Our Project # : 522275

Your P.O. # : 2097-71500

Expiration Date : 10-18-92

Cylinder Number : ALM-016214

Cylinder Pressure 1900 psig

Customer :
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL. 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES # # #
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO-0173

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
NITRIC OXIDE	821.0 PPM	2630	FF-16158	1428 PPM	BECKMAN	3-4-91	CHEMILUMINESCENCE
		GMIS#	AAL1111	513.0 PPM	951A		

BALANCE GAS : NITROGEN

NITROGEN DIOXIDE 1.43 PPM (FROM SECOND ANALYSIS)

FIRST ANALYSIS DATE : 4-11-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	57.50	821.7	1428 PPM	100.00	1428
0.00	57.50	821.7		100.00	1428
0.00	57.50	821.7		100.00	1428
CALCULATED RESULTS		821.7			
		821.7			
		821.7			
AVERAGE :		821.7 PPM			

SECOND ANALYSIS DATE : 4-18-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	57.40	820.3	1428 PPM	100.00	1428
0.00	57.40	820.3		100.00	1428
0.00	57.40	820.3		100.00	1428
0.00	57.50 NOX	821.7			
CALCULATED RESULTS		820.3			
		820.3			
		820.3	821.7 PPM NOX		
AVERAGE :		820.3 PPM			

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
2630	1428	100	100.00	1428	0.00
	513.0	36	35.70	510.7	-0.45
	489.0	34	34.20	489.3	0.06
	250.3	18	17.40	249.6	-0.26
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
1683B	250.3	LOW	17.40	249.6	-0.26
N/A	513.0	GMIS#	35.70	510.7	-0.45

GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Jon Eichler Jr

Approved By : R VanCoppenolle

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 527476

Your P.O. # : 3114-71500

Expiration Date : 3-5-93

Cylinder Number : ALM-004880

Cylinder Pressure 1900 psig

Customer :
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL. 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES # # #
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO-1101

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER		REFERENCE STD			INSTRUMENTATION		
COMPONENT	CERTIFIED CONC.	SRM # (CRM #)	CYLINDER NUMBER	CONC.	INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
CARBON MONOXIDE	857.0 PPM	1681	ALM-010502	967.1 PPM	HORIBA	6-4-91	NON-DISPERSIVE INFRARED
		2636	ALM-013363	243.4 PPM	OPE-144E		
					560172153		

BALANCE GAS : NITROGEN

FIRST ANALYSIS DATE : 8-28-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	89.20	857.5	967.1 PPM	100.00	967.1
0.00	89.20	857.5		100.00	967.1
0.00	89.20	857.5		100.00	967.1
CALCULATED RESULTS		857.5			
		857.5			
		857.5			
AVERAGE :		857.5 PPM			

SECOND ANALYSIS DATE : 9-5-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	89.10	856.5	967.1 PPM	100.00	967.1
0.00	89.10	856.5		100.00	967.1
0.00	89.10	856.5		100.00	967.1
CALCULATED RESULTS		856.5			
		856.5			
		856.5			
AVERAGE :		856.5 PPM			

CALIBRATION CURVE 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1681	967.1	100	100.00	967.1	0.00
	650.4	67	68.30	648.8	-0.24
2636	243.4	25	26.40	244.5	0.45
	100.5	10	11.00	100.6	0.07
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
GMIS	100.5	LOW	11.00	100.6	0.07
1681	967.1	HIGH	100.00	967.1	0.00

GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Laurie L. Moore

Approved By : Shapiro

Scott Specialty Gases

Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Our Project # : 526802

Your P.O. # : 2961-71-500

Expiration Date : 2-21-93

Cylinder Number : ALM-008586

Cylinder Pressure 1900 psig

Customer :
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL. 60067

 # # # # CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES # # # #
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO-0970

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER

COMPONENT	CERTIFIED CONC.
CARBON MONOXIDE	166.8 PPM

BALANCE GAS : NITROGEN

REFERENCE STD

SRM # (CRM #)	CYLINDER NUMBER	CONC.
1681	ALM-010502	967.1 PPM
2636	ALM-013363	243.4 PPM

INSTRUMENTATION

INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE
HORIBA OPE-144E 560172153	6-4-91

ANALYTICAL PRINCIPLE
NON-DISPERSIVE INFRARED

FIRST ANALYSIS — DATE : 8-14-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	18.20	167.6	243.4 PPM	26.40	244.5
0.00	18.20	167.6		26.40	244.5
0.00	18.20	167.6		26.40	244.5
	CALCULATED RESULTS	166.8			
		166.8			
		166.8			
	AVERAGE :	166.8 PPM			

SECOND ANALYSIS — DATE : 8-21-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	18.20	167.6	243.4 PPM	26.40	244.5
0.00	18.20	167.6		26.40	244.5
0.00	18.20	167.6		26.40	244.5
	CALCULATED RESULTS	166.8			
		166.8			
		166.8			
	AVERAGE :	166.8 PPM			

CALIBRATION CURVE — 2 nd DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
1681	967.1	100	100.00	967.1	0.00
	650.4	67	68.30	648.8	-0.24
2636	243.4	25	26.40	244.5	0.45
	100.5	10	11.00	100.6	0.07
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
GMIS	100.5	LOW	11.00	100.6	0.07
1681	967.1	HIGH	100.00	967.1	0.00

GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst : Jim Eichler

Approved By : L. Shapiro

Scott Specialty Gases

a division of Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Troy

Our Project # : 527476

Your P.O. # : 3114-71500

Expiration Date : 2-27-93

Cylinder Number ALM-023248

Cylinder Pressure 1900 psig

Customer :
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL. 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES
PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO-1145

Certified Accuracy 1 % NBS Traceable

COMPONENT	CERTIFIED CONC.	REFERENCE STD SRM # (CRM #)	REFERENCE STD CYLINDER NUMBER	REFERENCE STD CONC.	GAS ANALYZER MAKE/MODEL/SERIAL #	GAS ANALYZER LAST CALIBRATION DATE	ANALYTICAL PRINCIPLE
PROPANE	551.6 PPM	2646	AAL-18432	973.2 PPM	BECKMAN/400/1002059	6-20-91	FLAME IONIZATION DETECTOR
		GMIS‡	XA-4258	279.7 PPM			

BALANCE GAS : NITROGEN

ANALYSIS DATE : 8-27-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	REFERENCE GAS (mV)	RESULTS PPM
0.00	54.60	552.6	973.3 PPM	96.40	975.1
0.00	54.60	552.6		96.40	975.1
0.00	54.60	552.6		96.40	975.1

CALCULATED RESULTS 551.6
551.6
551.6

AVERAGE : 551.6 PPM

CALIBRATION CURVE 1 st DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
	1012	100	100.00	1012	0.00
2646	973.2	96	96.40	975.1	0.20
	799.8	79	79.10	800.3	0.05
	279.7	28	27.60	279.7	0.00
	189.2	19	18.60	188.7	-0.24
	0.0000	0	-0.01	0.0000	0.00
		0		0.00	0.00
	189.2	LOW	18.60	188.7	-0.24
2646	973.2	HIGH	96.40	975	0.20

‡ GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Liability of this Company for which fails to comply with this analysis shall be replacement thereof by the Company without extra cost.

Approved by: L Shapiro

Scott Specialty Gases

Scott Environmental Technology, Inc.

1290 COMBERMERE STREET, TROY, MICHIGAN 48084 (313) 589-2950

Shipped From : Scott Michigan

Our Project # : 527476

Your P.O. # : 3114-71500

Expiration Date : 2-27-93

Cylinder Number : ALM-023249

Cylinder Pressure 1900 psig

Customer :
C A E INSTRUMENT RENTAL
246 WOODWORK LANE
PALATINE, IL. 60067

CERTIFICATE OF ANALYSIS - EPA PROTOCOL GASES

PERFORMED ACCORDING TO SECTION 3.0.4

Certified Per Traceability Procedure # G1
Protocol # 1

File # PO-1142

Certified Accuracy 1 % NBS Traceable

ANALYZED CYLINDER

COMPONENT	CERTIFIED CONC.
PROPANE	251.4 PPM

BALANCE GAS : NITROGEN

REFERENCE STD

SRM # (CRM #)	CYLINDER NUMBER	CONC.
2645A	FF-26816	498.5 PPM
GMIS‡	A-10236	189.2 PPM

INSTRUMENTATION

INSTR/MODEL/SERIAL #	LAST CALIBRATION DATE
BECKMAN	8-14-91
400	
1002059	

ANALYTICAL PRINCIPLE
FLAME IONIZATION DETECTOR

ANALYSIS

DATE : 8-27-91

ZERO GAS (mV)	TEST GAS (mV)	RESULTS PPM	REFERENCE GAS CONC.	(mV)	RESULTS PPM
0.00	50.50	251.4	498.5 PPM	100.00	498.5
0.00	50.50	251.4		100.00	498.5
0.00	50.50	251.4		100.00	498.5

CALCULATED RESULTS
251.4
251.4
251.4

AVERAGE : 251.4 PPM

CALIBRATION CURVE 1 st DEGREE

SRM # (CRM #)	CONC. PPM	SPLIT PT (%)	DVM (mV)	FITTED VALUE	PERCENT ERROR
2645A	498.5	100	100.00	498.5	-0.00
	189.2	38	38.20	189.9	0.40
	100.0	20	20.30	100.6	0.58
2643	98.54	20	19.90	98.58	0.04
	0.0000	0	0.00	0.0000	0.00
		0		0.0000	0.00
		0		0.00	0.00
2643	98.54	LOW	19.90	98.58	0.04
2645A	498.5	HIGH	100.00	498.5	-0.00

‡ GMIS - GAS MANUFACTURER'S INTERNAL STANDARD

Analyst: [signature]

Approved by: [signature]

FIELD DATA

Location: STACK Run: 1

Velocity Determination Field Data Sheet

Page 1 of 1

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 1
Date 3/13/92	Inlet/Outlet/(Stack)
Data Recorder D. DRESKA	
Probe Operator D. BARBISH	

Pyrometer Number F-10	Pitot Cp .84
Pitot Leak Check: ✓ Before	✓ After
Static Pressure (inches H_2O) (+/-)	1.3

Schematic of Testing Location

First point all the way	(IN)	OUT
Area (ft^2) .785	Port Len (in) 1/2	Gas Flow IN (OUT)

Ambient Temp. (°F) 48	Bar. Press. (in. Hg) 29.98
IGS Bag ID Number	
% O_2	% CO_2
% Moisture:	Assumed/(Measured)
Start Time AM/PM	Stop Time AM/PM

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Notes
1-1	3.1	725		1-1	2.5	730		1-1	2.8	727		1-1	2.6	728		
2	3.0	725		2	2.6	730		2	2.7	728		2	2.4	730		
3	2.8	726		3	2.5	730		3	2.6	728		3	2.4	731		
4	2.6	727		4	2.5	731		4	2.6	729		4	2.6	732		
5	2.5	727		5	2.4	732		5	2.5	729		5	2.5	732		
6	2.2	725		6	2.4	728		6	2.2	726		6	2.3	730		
7	2.2	724		7	2.1	726		7	2.1	724		7	2.1	727		
8	2.1	721		8	2.2	727		8	2.2	720		8	2.1	726		
2-1	2.4	723		2-1	2.5	729		1-1	2.8	728			2.6	729		
2	2.5	723		2	2.6	729			2.4	729			2.5	730		
3	2.5	724		3	2.8	730			2.4	730			2.5	731		
4	2.6	725		4	2.5	731			2.4	732			2.6	732		
5	2.6	725		5	2.6	733			2.5	733			2.6	732		
6	2.7	725		6	2.6	733			2.7	733			2.7	733		
7	2.6	725		7	2.6	733			2.7	732			2.6	731		
8	2.5	723		8	2.5	733			2.5	729			2.5	730		
Total	25.545	11543			25.253	11685			25.308	11657			25.156	11684		
Average	1.577	725			1.578	730			1.582	729			1.572	730		

Location: STACK 2 Run: 2

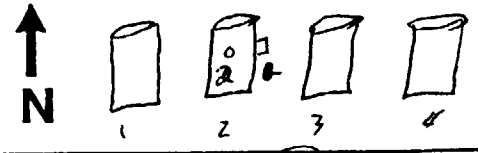
Velocity Determination Field Data Sheet

Page 1 of 1

Client TLG	Project Number 6107
Plant MICHIGEN COGEN	Unit 2
Date 3/13/92	Inlet/Outlet/Stack
Data Recorder D. DRESKA	
Probe Operator D. BARBISH	

Pyrometer Number F-10	Pitot Cp .84
Pitot Leak Check: ✓	Before ✓ After
Static Pressure (inches H_2O) (+)/(-)	1.5

Schematic of Testing Location



First point all the way IN OUT

Area (ft^2)	Port Len (in)	Gas Flow IN OUT
.785	1/2	

Ambient Temp. (°F) 45	Bar. Press. (in. Hg) 29.98
IGS Bag ID Number	
% O_2	% CO_2
% Moisture:	Assumed/Measured
Start Time AM/PM	Stop Time AM/PM

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Notes
1-1	2.9	717		1-1	2.7	717		1-1	2.6	722		1-1	2.9	719		
2	2.8	717		2	2.8	718		2	2.5	723		2	2.9	719		
3	2.8	719		3	2.8	719		3	2.6	724		3	2.8	719		
4	2.8	719		4	2.8	719		4	2.6	724		4	2.6	720		
5	2.7	719		5	2.7	719		5	2.3	719		5	2.6	720		
6	2.6	719		6	2.5	716		6	2.3	718		6	2.4	719		
7	2.5	717		7	2.4	715		7	2.3	718		7	2.5	717		
8	2.4	715		8	2.4	714		8	2.2	717		8	2.4	715		
2-1	2.3	715		2-1	2.2	716		2-1	2.2	715		2-1	2.5	718		
2	2.3	715		2	2.3	716		2	2.1	716		2	2.6	719		
3	2.4	716		3	2.3	718		3	2.3	718		3	2.6	720		
4	2.5	718		4	2.5	719		4	2.3	718		4	2.6	721		
5	2.7	719		5	2.5	720		5	2.6	719		5	2.7	722		
6	2.8	718		6	2.6	720		6	2.7	720		6	2.8	722		
7	2.8	715		7	2.7	719		7	2.7	720		7	2.8	722		
8	2.7	712		8	2.6	714		8	2.7	718		8	2.7	719		
Total	25.905	11470			25.533	11479			24.959	11509			26.035	11510		
Average	1.619	717			1.596	717			1.560	719			1.627	719		

D:\v:forms\vel

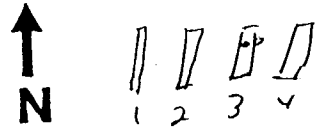
Velocity Determinatio... Field Data Sheet

Location: Roof Run: 1 Page 1 of 1

Client JLG	Project Number 6107
Plant Lorton	Unit 3
Date 3/12/92	Inlet/Outlet/(Stack)
Data Recorder Dick Proska	
Probe Operator Doug Barbish	

Pyrometer Number F-10	Pitot Cp .54
Pitot Leak Check: ✓ Before ✓	After
Static Pressure (Inches H_2O) (+)(-) 1.2	

Schematic of Testing Location



First point all the way (IN) OUT

Area (ft^2)	Port Len (in)	Gas Flow IN (OUT)
.785	.2	up

Ambient Temp. (°F) 25		Bar. Press. (in. Hg) 27.55	
IGS Bag ID Number B13			
% O_2		% CO_2	
% Moisture: 9.2		Assumed/(Measured)	
Start Time 3:22	AM/PM	Stop Time	AM/PM

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Notes:
1-1	2.0	700														
2	2.1	702														
3	2.1	703														
4	2.4	706														
5	2.7	708														
6	2.7	708														
7	3.0	708														
8	3.0	707														
9																
2-1	2.6	708														
2	2.5	700														
3	2.5	702														
4	2.4	704														
5	2.8	706														
6	2.9	707														
7	3.0	706														
8	2.7	704														
Total	25.688	11271														
Average	1.605	704														

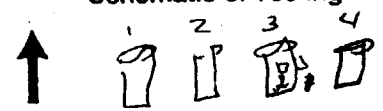
Location: STACK #3 Run: 2

Velocity Determination Field Data Sheet

Page 1 of 1

Client TLG	Project Number
Plant MICHIGAN COKEN	Unit 3
Date 3/2/92	Inlet/Outlet/Stack
Data Recorder D. DREGKA	
Probe Operator D. BARBISH	

Schematic of Testing Location



First point all the way (IN) OUT

Area (ft^2)	Port Len (in)	Gas Flow IN OUT
.785	1 1/2	✓

Ambient Temp. (°F)	25	Bar. Press. (in. Hg)	29.55
IGS Bag ID Number	BB		
% O_2		% CO_2	
% Moisture:	9.2 / 8.3	Assumed/Measured	
Start Time	11.20 AM/PM	Stop Time	AM/PM

Pyrometer Number	F-10	Pitot Cp	.84
Pitot Leak Check:	✓ Before	✓ After	
Static Pressure (Inches H_2O) (+/-)	1.2		

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Notes:
1-1	2.2	695														
2	2.6	696														
3	2.6	697														
4	2.5	699														
5	2.7	702														
6	2.7	702														
7	2.6	703														
8	2.4	703														
	2.0															
2-1	~~69~~	696														
2	2.1	695														
3	2.4	696														
4	2.4	698														
5	2.4	~~80~~1														
6	2.7	701														
7	2.7	700														
8	2.6	698														
Total	25.147	11132														
Average	1.572	699														

D:\vpforms\vel

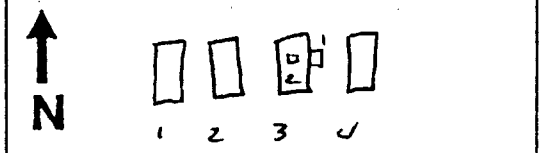
Location: STACK #3 Run: 3

Velocity Determination Field Data Sheet

Page 1 of 1

Client TLG	Project Number 96107
Plant MICHIGAN COGEN	Unit 3
Date 3/12/92	Inlet/Outlet/(Stack)
Data Recorder D. DZIEKA	
Probe Operator D. BARBISH	

Schematic of Testing Location



First point all the way (IN) OUT

Area (ft^2)	Port Len (in)	Gas Flow IN (OUT)
.755	1.5 IN	UP

Ambient Temp. (°F) 46 F	Bar. Press. (in. Hg) 29.54
IGS Bag ID Number	
% O_2	% CO_2
% Moisture: 6.3	Assumed/(Measured)
Start Time AM/PM	Stop Time AM/PM

Pyrometer Number F-10	Pitot Cp .84	
Pitot Leak Check: ✓	Before ✓	After
Static Pressure (Inches H_2O) (+/-)	+1.2	

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Notes:
1-1	2.1	696														
2	2.4	696														
3	2.5	699														
4	2.4	702														
5	2.5	703														
6	2.5	703														
7	2.5	704														
8	2.3	704														
2-1	2.0	706														
2	2.1	707														
3	2.2	709														
4	2.4	713														
5	2.6	712														
6	2.8	711														
7	2.8	700														
8	2.7	709														
Total	24.667	11285														
Average	1.555	706														

D:\vp\forms\vel

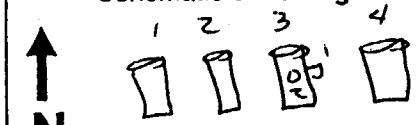
Location: STACK 3 Run: 4

Velocity Determination Field Data Sheet

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 3
Date 3/12/98	Inlet/Outlet/Stack
Data Recorder D. DRESKA	
Probe Operator D. BARBISH	

Pyrometer Number F-10	Pitot Cp .84
Pitot Leak Check: ✓ Before	✓ After
Static Pressure (Inches H_2O) (+/-)	1.5

Schematic of Testing Location



First point all the way IN		OUT
Area (ft^2)	Port Len (in) .5 in	Gas Flow IN OUT

Ambient Temp. (°F) 41		Bar. Press. (in. Hg) 29.82	
IGS Bag ID Number			
% O_2		% CO_2	
% Moisture: 12.2		Assumed/Measured	
Start Time	AM/PM	Stop Time	AM/PM

Traverse Point Number	Veocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Notes
1-1	2.1	707														
2	2.2	709														
3	2.5	710														
4	2.5	711														
5	2.3	712														
6	2.2	714														
7	2.3	716														
8	2.3	716														
	2.0															
2-1	~~2.8~~	708														
2	2.1	708														
3	2.1	709														
4	2.2	710														
5	2.4	713														
6	2.6	712														
7	2.5	712														
8	2.4	710														
Total	24.215	11427														
Average	1.514	714														

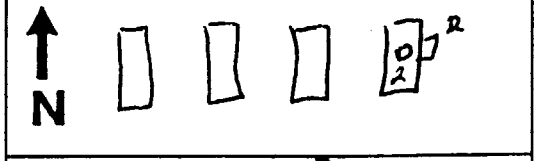
Location: STACK 4 Run: 1

Velocity Determination Field Data Sheet

Page 1 of 1

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 4
Date 3/13/92	Inlet/Outlet/Stack
Data Recorder D. DRESKA	
Probe Operator D. BARBISH	

Schematic of Testing Location



First point all the way IN OUT

Area (ft^2)	Port Len (in)	Gas Flow IN OUT
.785	1/2	

Ambient Temp. (°F) 42		Bar. Press. (in. Hg) 29.98	
IGS Bag ID Number			
% O_2		% CO_2	
% Moisture:		Assumed/Measured	
Start Time	AM/PM	Stop Time	AM/PM

Pyrometer Number F-10		Pitot Cp .84	
Pitot Leak Check: ✓	Before ✓		After
Static Pressure (inches H_2O) (+/-)	1.5		

Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Traverse Point Number	Velocity Head ΔPs	Stack Temp (°F)		Notes
1-1	1.9	709		1-1	1.6	697		1-1	2.1	706		1-1	2.4	714		
2	2.1	713		2	1.8	699		2	2.1	706		2	2.5	709		
3	2.0	713		3	2.1	702		3	2.2	706		3	2.5	709		
4	2.2	715		4	2.4	706		4	2.2	707		4	2.6	708		
5	2.5	717		5	2.5	708		5	2.3	708		5	2.8	710		
6	2.6	719		6	2.6	709		6	2.4	709		6	2.8	712		
7	2.6	719		7	2.6	709		7	2.4	710		7	2.7	718		
8	2.5	719		8	2.5	707		8	2.3	708		8	2.9	708		
2-1	2.3	715		2-1	2.4	709		2-1	2.5	716		2-1	2.4	708		
2	2.4	718		2	2.5	708		2	2.3	716		2	2.5	709		
3	2.5	719		3	2.5	709		3	2.2	717		3	2.5	710		
4	2.5	719		4	2.6	712		4	2.3	719		4	2.6	710		
5	2.4	719		5	2.6	714		5	2.3	717		5	2.6	711		
6	2.3	719		6	2.6	716		6	2.4	716		6	2.6	711		
7	2.1	717		7	2.4	716		7	2.4	717		7	2.5	708		
8	2.0	716		8	2.5	715		8	2.3	717		8	2.4	707		
		NJM														
Total	24.269	11546		7	24.671	11336			24.225	11395			25.696	11354		
Average	1.517	716			1.542	709			1.514	712			1.606	710		

11450

D:\vpforms\vel

Location: STACK Unit:

Moisture Determination Field Data Sheet

Client: TLG	Project Number: 6167
Plant: MICHIGAN	Unit: 1
Date: 3/13/92	Inlet/outlet/stack
Meter Operator: D. Draska	
Probe Operator: NA	

Sample Box Number: NA	
Pyrometer Number: E-10	
Meter Box Number: J	
Meter ΔH@: 1.777	Meter Y_d: .9836

Leak Rate Before: 000	cc/m cf/m @ 15	"Hg
Leak Rate After: 000	cc/m cf/m @ 7	"Hg

4:23

Schematic of Testing Location

First point all the way IN OUT	Method 4	
Area (ft^2): .785	Port Len. (in.): 1/2	Gas Flow IN OUT
Filter Material		

Ambient Temp. (°F): 48	Bar. Press. (in. Hg): 29.98
Assumed Moisture (%)	

Heater Box Setting: NA	Probe Heater Setting: NA
Probe Length: 6 IN	Probe Number: NA
Probe Material: SS	

IGS Bag ID Number	
% O_2	% CO_2
H_2O (ml): 62 ml	Silica Gel (gm): 7.5
Total V_{lc}: 69.5	

Start Time: 3:25 AM PM Stop Time: 4:00 AM PM

Traverse Point Number	Min/pt Clock Time	Pump Vacuum (in. Hg)	Stack Temp. Ts (°F)	Bath Temp. (°F)	Orifice Setting ΔH (in. H_2O)	Initial Volume 923.20 / Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5.0	3		38	1.5	926.57	82	82				V_{mSTD}
	10	3		40		928.87	90	82				22.36
	15	3		46		933.21	90	82				
	20	3	NA	50		936.34	90	82				V_{wSTD}
	25	3		52		939.89	90	82	NA			3.27
	30	3		52		943.22	92	82				
	35	3		52	1.5	946.58	92	82				B_{WO}
												1128
							626					
Average						2358	626	584				
Total												

D:\vpforms\moisture

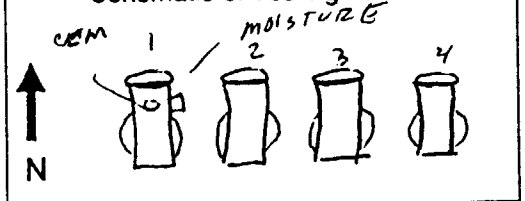
Moisture Determination Field Data Sheet

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 1
Date 3/13/92	Inlet/outlet/stack
Meter Operator D. DRESKA	
Probe Operator NA	

Sample Box Number NA	
Pyrometer Number ~~8~~ F-10	
Meter Box Number J	
Meter ΔH@ 1.777	Meter Y_d .9836

Leak Rate Before: 000	cc/m	cf/m @ 15	"Hg
Leak Rate After: 000	cc/m	cf/m @ 15	"Hg

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2) .765	Port Len. (in.) 1/2	Gas Flow ~~IN~~ OUT
Filter Material NA		

Ambient Temp. (°F) 42	Bar. Press. (in. Hg) 29.98
Assumed Moisture (%)	

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 IN	Probe Number NA
Probe Material SS	

IGS Bag ID Number		
% O_2	% CO_2	
H_2O (ml) 63 ml	Silica Gel (gm) 8.5	
Total V_{lc} ~~8.5~~	71.5	

Start Time: 4:35 AM (PM) Stop Time: 5:10 AM (PM)

Traverse Point Number	Min/pt Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Orifice Setting ΔH (in. H_2O)	Initial Volume 955.30 Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5.0	3		38	1.5	958.54	80	80				$V_{m\,STD}$
	10	3		42		962.10	88	82				22.46
	15	3		44		965.44	90	82				
	20	3	NA	46		968.77	88	80				$V_{w\,STD}$
	25	3		48		972.18	88	80	NA			3.37
	30	3		50		975.40	88	80				
	35	3		52	1.5	978.70	90	80				$B_{w\,o}$
												.130
Average						23.40	61.2	5~~6~~4				
Total												

O:\vpforms\moisture

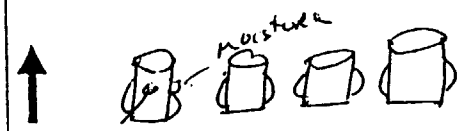
Field Data Sheet

Client TLG	Project Number
Plant MICHIGAN COGEN	Unit 1
Date 3/13/92	Inlet/outlet/stack
Meter Operator D Preska	
Probe Operator N A	

Sample Box Number N/A	
Pyrometer Number F-10	
Meter Box Number J	
Meter ΔH@ 1.777	Meter Y_d .9636

Leak Rate Before:	000 cc/m cf/m @	15	"Hg
Leak Rate After:	000 cc/m cf/m @	15	"Hg

Schematic of Testing Location



First point all the way IN OUT	Method 2	
Area (ft^2) .765	Port Len. (in.) 1/2	Gas Flow IN OUT
Filter Material N/A		

Ambient Temp. (°F) 42	Bar. Press. (in. Hg) 29.98
Assumed Moisture (%) 12	

Heater Box Setting N/A	Probe Heater Setting N/A
Probe Length 6"	Probe Number N/A
Probe Material	

IGS Bag ID Number	
% O_2	% CO_2
H_2O (ml) 61	Silica Gel (gm) 8
Total V_{lc} 69	

Start Time: 5:50 AM (PM) Stop Time: 6:25 AM (PM)

Traverse Point Number	Min/pt Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Orifice Setting ΔH (in. H_2O)	Initial Volume 988.90 Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5.0	3		38	1.5	992.47	80	80				V_{mstd}
	10	3		40		995.72	84	80				22.44
	15	3		42		999.00	86	78				
	20	3		44		1002.25	84	76				V_{wstd}
	25	3		48		1005.84	84	76				3.25
	30	3		50		1008.95	84	76				
	35	3		52	1.5	1012.45	84	76				B_{wo}
												.127
Average						23.55	586	542				
Total												

Location: STACK 2 Run: 1

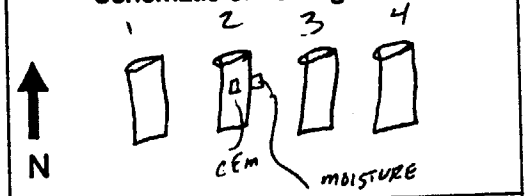
Moisture Determination Field Data Sheet

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 2
Date 3/13/92	Inlet/outlet/stack
Meter Operator D. DRESHA	
Probe Operator NA	

Sample Box Number NA	
Pyrometer Number F-10	
Meter Box Number 5	
Meter ΔH@ 1.777	Meter Y_d .9836

Leak Rate Before: .001	cc/m cf/m @ 15	"Hg
Leak Rate After: .001	cc/m cf/m @ 15	"Hg

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2) .765	Port Len. (in.) 1/2	Gas Flow IN OUT
Filter Material		

Ambient Temp. (°F) 45	Bar. Press. (in. Hg) 29.98
Assumed Moisture (%)	

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 IN	Probe Number NA
Probe Material SS	

IGS Bag ID Number	
% O_2	% CO_2
H_2O (ml) 58 mL	Silica Gel (gm) 10
Total V_{lc} 68	

Start Time: 11:22 AM / PM Stop Time: 11:57 AM / PM

Traverse Point Number	Min/pt. Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Flow Rate or Orifice Setting ΔH ($in. H_2O$)	Initial Volume 827.60 Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter Inlet $T_{m\,in}$ (°F)	Gas Sample Temperature at Dry Gas Meter Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5	3		36	1.5	827.93	76	76				$V_{m\,STD}$
	10	3		38	1.5	830.22	84	78				21.68
	15	3		42		833.44	86	78				
	20	3		44		836.64	86	78				$V_{w\,STD}$
	25	3	NA	46		839.82	88	78	NA			3.20
	30	3		50	1.5	842.99	88	78				
	35	3		50	1.5	846.27	88	78				B_{ws}
												.128
Average		3			1.5	22.67	596	544				
Total							81	1140				

D:\vpforms\moisture

Page 1 of 1

Location: STACK 2 Run: 2

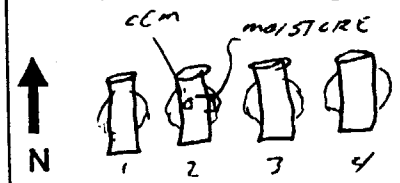
Moisture Determination Field Data Sheet

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 2
Date 3/13/92	Inlet/outlet/~~stack~~
Meter Operator D. DRESKA	
Probe Operator NA	

Sample Box Number	NA
Pyrometer Number	~~5~~ F-10
Meter Box Number	5
Meter ΔH@ 1.777	Meter Y_d .9836

Leak Rate Before:	000	cc/m cf/m @ 15	"Hg
Leak Rate After:	000	cc/m cf/m @ 15	"Hg

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2) .765	Port Len. (in.) 1/2	Gas Flow IN OUT
Filter Material		

Ambient Temp. (°F) 45	Bar. Press. (In. Hg) 29.98
Assumed Moisture (%)	

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 IN	Probe Number NA
Probe Material SS	

IGS Bag ID Number		
% O_2	% CO_2	
H_2O (ml) 57 ml	Silica Gel (gm) 9	
Total V_{lc} 66		

Start Time: 12:37 AM (PM) Stop Time: 1:12 AM / PM

Traverse Point Number	Min/pt 5.0 / Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Flow Rate or Orifice Setting ΔH (in. H_2O)	Initial Volume 853.70 / Gas Sample Volume, V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Gas Sample Temperature at Dry Gas Meter: Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5.0	3		38	1.5	860.19	82	80				V_{mSTD}
	10	3		40		863.55	86	82				22.46
	15	3		42		866.86	90	82				
	20	3		46		870.11	88	80				V_{WSTD}
	25	3	NA	48		873.38	88	80	NA			3.11
	30	3		50		876.72	88	80				
	35	3		52	1.5	880.06	88	80				B_{WO}
												.122
Average		3			1.5	23.36	600	564				
Total							83	1164				

D:\vpforms\moisture

Location: STACK 2 Run: 3

Moisture Determination Field Data Sheet

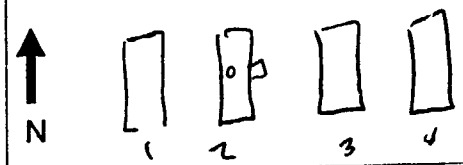
Page 1 of 1

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 2
Date 3-13-92	Inlet/outlet/stack
Meter Operator D. DRESKA	
Probe Operator NA	

Sample Box Number	
Pyrometer Number	F-10
Meter Box Number	J
Meter ΔH@ 1.777	Meter Y_d .9836

Leak Rate Before: 000	cc/m	cf/m @ 15	"Hg
Leak Rate After: 000	cc/m	cf/m @ 16	"Hg

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2) .785	Port Len. (in.) 1/2	Gas Flow IN OUT
Filter Material NA		

Ambient Temp. (°F) 46	Bar. Press. (in. Hg) 29.98
Assumed Moisture (%)	

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 IN	Probe Number NA
Probe Material S.S	

IGS Bag ID Number		
% O_2	% CO_2	
H_2O (ml) 101 ml	Silica Gel (gm) 7.5	
Total V_{lc} 68.5		

Start Time: 1:53 AM / PM Stop Time: 2:28 AM / PM

Traverse Point Number	Min/pt 5.0 / Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Flow Rate or Orifice Setting ΔH (in. H_2O)	Initial Volume 890.30 / Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Gas Sample Temperature at Dry Gas Meter: Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5.0	3		38	1.5	893.69	78	78				V_{lmstd}
	10	3		40		896.97	86	80				22.28
	15	3		42		900.31	90	80				
	20	3	NA	46		903.64	91	81				V_{wstd}
	25	3		48		906.95	90	80	NA			3.22
	30	3		50		910.24	88	80				
	35	3		52	1.5	913.52	88	80				B_{wo}
												.126
Average						23.22	611	559				
Total							84	1170				

D:\vpforms\moisture

Field Data Sheet

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 3
Date 3/12/92	Inlet/outlet/(stack)
Meter Operator D. DRESKA	
Probe Operator D. DRESKA	

Sample Box Number	NA
Pyrcmeter Number	F-10
Meter Box Number	KK
Meter ΔH@ 1.825	Meter Y_d 1.0098

Leak Rate Before:	.001	cc/m cf/m @	15	"Hg
Leak Rate After:	.001	cc/m cf/m @	15	"Hg

Schematic of Testing Location

First point all the way IN OUT	Method 4 ✓	
Area (ft^2) .785	Port Len. (in.) 6 1/2	Gas Flow IN (OUT)
Filter Material	N/A	

Ambient Temp. (°F) 25	Bar. Press. (in. Hg) 24.85
Assumed Moisture (%)	N/A

Heater Box Setting —	Probe Heater Setting —
Probe Length 6 in	Probe Number —
Probe Material SS	

IGS Bag ID Number	BB
% O_2	% CO_2
H_2O (ml) 38 mL	Silica Gel (gm) 8
Total V_{lc} 46	

Start Time: 3:30 AM (PM) Stop Time: 4:05 AM (PM)

Traverse Point Number	Min/pt 5.0 / Clock Time	Pump Vacuum (in. Hg)	Stack Temp. Ts (°F)	Bath Temp. (°F)	Orifice Setting ΔH (in. H_2O)	Initial Volume 944.83 / Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5.0	2		50	1.3	948.04	74	74				V_{mSTD}
	10.0	2		50	1.3	951.22	84	78				21.32
	15	2		50	1.3	954.45	88	78				
	20	2		50	1.3	957.51	94	80				V_{wSTD}
	25	2	NA	50	1.3	960.46	94	80				2.17
	30	2		50	1.3	963.54	92	80	NM			
	35	2		50	1.3	966.65	90	80				B_{wo}
	40											.092
Average		2		50	1.3		656	550				
Total						21.82	86	1206				

D:\vpforms\moisture

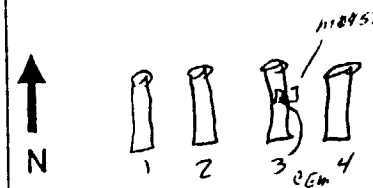
Moisture Determination
Field Data Sheet

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 3
Date 3/12/92	Inlet/outlet/stack
Meter Operator D DRESHA	
Probe Operator NA	

Sample Box Number NA	
Pyrometer Number F-10	
Meter Box Number KK	
Meter ΔH@ 1.835	Meter Y_d 1.0098

Leak Rate Before: .001	cc/m cf/m @	15	"Hg
Leak Rate After: .001	cc/m cf/m @	15	"Hg

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2) .785	Port Len. (in.) .5	Gas Flow IN OUT
Filter Material NA		

Ambient Temp. (°F) 45	Bar. Press. (in. Hg) 29.85
Assumed Moisture (%)	

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 FT	Probe Number NA
Probe Material S.S	

IGS Bag ID Number		
% O_2	% CO_2	
H_2O (ml) 58	Silica Gel (gm) 4.5	
Total V_{lc} 42.5	67.5	

Start Time: 4:51 AM / PM Stop Time: 4:24 5:24 AM PM

975.90 DD

Traverse Point Number	Min/pt 5.0 Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Orifice Setting ΔH (in. H_2O)	Initial Volume 975.90 Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5.0	3		46	1.5	979.18	80	78				V_{mSTD}
	10	3		48	1.5	982.39	90	82				22.08
	15	3		50	1.5	985.59	92	82				
	20	3		50	1.5	988.78	96	82				V_{WSTD}
	25	3	NA	50	1.5	992.04 DD	98	84	NA			2.00
	30	3		50	1.5	995.28	98	84				
	35	3		50	1.5	998.53	98	84				B_{WO}
												.083
Average		3			1.5	22.63	62	576				
Total							87	1218				

D:\vpforms\moisture

Location: STACK #3 Run: 3

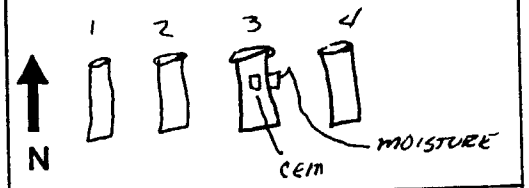
Moisture Determination Field Data Sheet

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 3
Date 3/12/92	Inlet/outlet/stack
Meter Operator D. DRESNA	
Probe Operator NA	

Sample Box Number NA	
Pyrometer Number F-10	
Meter Box Number KK	
Meter ΔH@ 1.825	Meter Y_d 1.0098

Leak Rate Before: 000	cc/m cf/m @ 15	"Hg
Leak Rate After: 000	cc/m cf/m @ 15	"Hg

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2) .765	Port Len. (in.) .5 in	Gas Flow IN OUT
Filter Material NA		

Ambient Temp. (°F) 41	Bar. Press. (in. Hg) 29.85
Assumed Moisture (%)	

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 in	Probe Number NA
Probe Material SS	

IGS Bag ID Number	
% O_2	% CO_2
H_2O (ml) 58	Silica Gel (gm) 7g
Total V_{lc} 65	

Start Time: 6:07 AM (PM) Stop Time: 6:42 AM / PM

Traverse Point Number	Min/pt. / Clock Time	Pump Vacuum (in. Hg)	Stack Temp. T_s (°F)	Bath Temp. (°F)	Flow Rate or Orifice Setting ΔH (in. H_2O)	Initial Volume 5.00 / Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5	2		42	1.5	8.35	84	82				V_{mSTD}
	10	2		48	1.5	11.60	96	84				22.01
	15	2		52	1.5	14.81	102	86				
	20	2		54	1.5	17.93	106	90				V_{wSTD}
	25	2	NA	56	1.5	21.25	108	92	NA			3.06
	30	2		56	1.5	24.58	108	92				
	35	2		56	1.5	27.89	104	90				B_{wo}
												.122
Average							706	616				
Total					1.5	22.89	94.1	1324				

95

D:\vpforms\moisture

Location: STACK 4 Run: 1

Moisture Determination Field Data Sheet

Client TLG	Project Number 6107
Plant MICHIGAN COKE	Unit 4
Date 3/13/97	Inlet/outlet/stack
Meter Operator D. DRESKA	
Probe Operator NA	

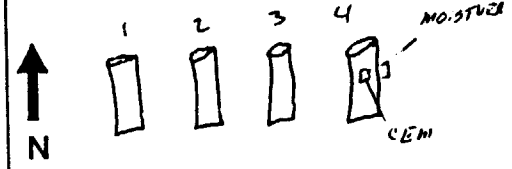
Ambient Temp. (°F) 33	Bar. Press. (in. Hg) 29.78
Assumed Moisture (%)	

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 IN	Probe Number NA
Probe Material S.S.	

Sample Box Number NA	
Pyrometer Number F-10	
Meter Box Number 5	
Meter ΔH@ 1.777	Meter Y_d .9836

IGS Bag ID Number	
% O_2	% CO_2
H_2O (ml) 61	Silica Gel (gm) 6
Total V_{lc} 67	

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2)	Port Len. (in.) 1½	Gas Flow IN (OUT)
Filter Material		

Leak Rate Before: 000	cc/m cf/m @ 15	"Hg	
Leak Rate After: 000	cc/m cf/m @ 15	"Hg	

Start Time: 7:35 (AM) / PM Stop Time: 8:10 (AM) / PM

Traverse Point Number	Min/pt. 5 Min. Clock Time	Pump Vacuum (in. Hg)	Stack Temp. Ts (°F)	Bath Temp. (°F)	Flow Rate or Orifice Setting ΔH (in. H_2O)	Initial Volume 722.50 Gas Sample Volume V_m Circle one: (L) (ft³)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5:40	3		34	1.5	728.61	58	50				$V_{m\,STD}$
	10	3		38	1.5	732.11	64	52				22.53
	15	3		40		735.00	66	54				
	20	3	NA	40		738.16	68	54				$V_{w\,STD}$
	25	3		42		741.30	70	58				3.15
	30	3		42		744.48	70	60	NA			
	35	3		42	1.5	747.58	70	60				B_{WO}
												.123
Average					1.5	22.48	466	388				
Total							66	55				

(61)

D:\vpforms\moisture

Page 1 of 1

Location: STACK 4 Run: 2

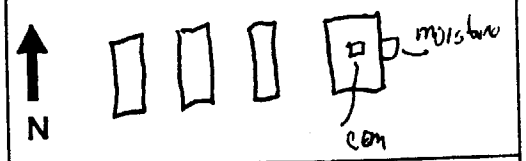
Moisture Determination Field Data Sheet

Client TLG	Project Number 6167
Plant MICHIGAN COGEN	Unit 4
Date 3/13/92	Inlet/outlet/stack
Meter Operator D. DRESKA	
Probe Operator NA	

Ambient Temp. (°F) 40	Bar. Press. (in. Hg) 29.98
Assumed Moisture (%) 12	

Sample Box Number NA	
Pyrometer Number F-10	
Meter Box Number 3	
Meter ΔH@ 1.77	Meter Y_d .9836

Schematic of Testing Location



First point all the way IN OUT	Method 4	
Area (ft^2) .785	Port Len. (in.) 1/2	Gas Flow IN OUT
Filter Material		

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 IN	Probe Number NA
Probe Material SS	

IGS Bag ID Number	
% O_2	% CO_2
H_2O (ml) 62	Silica Gel (gm) 8.5
Total V_{lc} 70.5	

Leak Rate Before: 000 cc/m cf/m @ 15 "Hg	
Leak Rate After: 000 cc/m cf/m @ 15 "Hg	

Start Time: 9:42 (AM) / PM Stop Time: 9:17 (AM) / PM

Traverse Point Number	Min/pt. (Min. 3 Pts.) Clock Time	Pump Vacuum (in. Hg)	Stack Temp, Ts (°F)	Bath Temp, (°F)	Flow Rate or Orifice Setting ΔH (in. H_2O)	Initial Volume 752.26 Gas Sample Volume, V_m Circle one: (L) (ft³)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5	3		40	1.5	760.95	64	62				$V_{m\,STD}$
	10	3		42	1.5	764.18	68	62				22.30
	15	3		46		767.39	72	62				
	20	3	NA	48		770.59	74	64				$V_{w\,STD}$
	25	3		50		773.78	74	64	NA			3.32
	30	3		50	1.5	776.98	76	66				
	35	3		52	1.5	780.25	78	66				BWO
												.130
Average					1.5	22.55	506	446				
Total							68	950				

D:\vpforms\moisture

Location: STACK 4 Run: 3

Moisture Determination Field Data Sheet

10:57

Client TLG	Project Number 6107
Plant MICHIGAN COGEN	Unit 4
Date 3/13/93	Inlet/outlet/Stack
Meter Operator D DRESKA	
Probe Operator NA	

Sample Box Number NA	
Pyrometer Number F-10	
Meter Box Number 5	
Meter ΔH@ 1.777	Meter Y_d .9836

Leak Rate Before: 000	cc/m cf/m @ 15	"Hg
Leak Rate After: 000	cc/m cf/m @ 15	"Hg

Schematic of Testing Location

First point all the way (IN) OUT	Method 4	
Area (ft^2) .765	Port Len. (in.) 1/2	Gas Flow IN OUT
Filter Material		

Ambient Temp. (°F) 42	Bar. Press. (in. Hg) 29.98
Assumed Moisture (%) 12	

Heater Box Setting NA	Probe Heater Setting NA
Probe Length 6 IN	Probe Number NA
Probe Material SS	

IGS Bag ID Number	
% O_2	% CO_2
H_2O (ml) 62 ml	Silica Gel (gm) 10
Total V_{lc} 72	

Start Time: 9:57 (AM) / PM Stop Time: 10:32 AM / PM

Traverse Point Number	Min/pt. Clock Time	Pump Vacuum (in. Hg)	Stack Temp. T_s (°F)	Bath Temp. (°F)	Flow Rate or Orifice Setting ΔH (in. H_2O)	Initial Volume 791.47 Gas Sample Volume V_m Circle one: (L) (ft^3)	Gas Sample Temperature at Dry Gas Meter: Inlet $T_{m\,in}$ (°F)	Outlet $T_{m\,out}$ (°F)	Probe Temp. T_p (°F)			Notes
	5	4		38	1.5	794.80	68	70				$V_{m\,STD}$
	10	4		38	1.5	798.09	80	72				22.30
	15	4		38		801.35	82	72				
	20	4		40		804.60	82	72				$V_{w\,STD}$
	25	4	NA	40		807.85	82	72	NA			3.39
	30	4		42	1.5	811.18	84	74				
	35	4		42	1.5	814.30	84	76				B_{wo}
												.132
Average		4			1.5	22.69	562	506				
Total							76	1068				

D:\vpforms\moisture

VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

OBSERVER'S NAME (PRINT): William Douglas Barbish

ORGANIZATION: Clean Air Engineering

CERTIFIED BY: Eastern Technical Associates

DATE: 9/26/91

ADDRESS: TLG Engineering
I-95 Landfill
9850 Furnace; Lorton

STATE: VA

ZIP: 22079

TELEPHONE: 680-5028

SOURCE ID NUMBER: Landfill Methane 9898A

OBSERVATION DATE: 3/13/92

PROCESS: Cogeneration

OPERATING MODE: 90%

CONTROL EQUIPMENT: N/A

OPERATING MODE: 90%

DESCRIBE EMISSION POINT: Top of stack

HEIGHT ABOVE GROUND LEVEL: approx. ~ 70' ft

HEIGHT RELATIVE TO OBSERVER: approx. ~ 20' ft

DISTANCE FROM OBSERVER: approx. ~ 60' ft

DIRECTION FROM OBSERVER: NE

DESCRIBE EMISSIONS: N/A

EMISSION COLOR: N/A

PLUME TYPE: CONTINUOUS / INTERMITTENT / FUGITIVE

WATER DROPLETS PRESENT: NO [V] YES [ ]

IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]

AT WHAT POINT WAS OPACITY DETERMINED: Top of stack

DESCRIBE BACKGROUND: sky

BACKGROUND COLOR: Blue

SKY CONDITIONS: clear

WIND SPEED: 15-20mph

WIND DIRECTION: NW

AMBIENT TEMPERATURE: 43°F

RELATIVE HUMIDITY: 45%

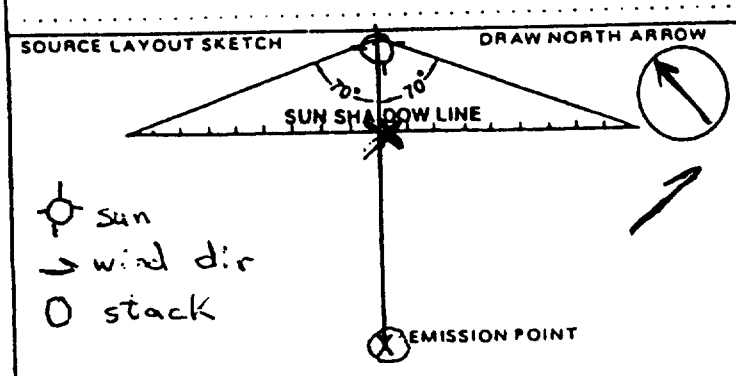
COMMENTS: Stack #1 ..... Run #1

START TIME: 15:23

STOP TIME: 15:53

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

SOURCE LAYOUT SKETCH



AVERAGE OPACITY FOR Run #1 FOR HIGHEST PERIOD: 0

NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 0

OBSERVER'S SIGNATURE: William Douglas Barbish

DATE: 3/13/92

VERIFIED BY

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE

DATE

VISIBLE EMISSION OBSERVATION FORM

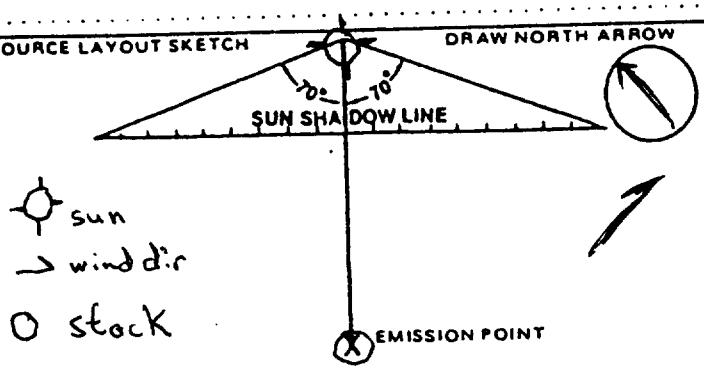
Engineering, Inc.

OBSERVER'S NAME (PRINT)	William Douglas Barbish
ORGANIZATION	Clean Air Engineering
CERTIFIED BY	Eastern Technical Assoc.
DATE	9/26/91
START TIME	16:35
STOP TIME	17:05
ADDRESS	TLG Engineering I-95 Landfill 9850 Furnace, Lorton
STATE	VA
ZIP	22079
TELEPHONE	680-5028
SOURCE ID NUMBER	Landfill Methane 9898A
OBSERVATION DATE	3/13/92
PROCESS	Cogeneration
OPERATING MODE	90%
CONTROL EQUIPMENT	N/A
OPERATING MODE	90%
DESCRIBE EMISSION POINT	Top of stack
HEIGHT ABOVE GROUND LEVEL	approx. ~ 20' ft
HEIGHT RELATIVE TO OBSERVER	approx. ~ 20' ft
DISTANCE FROM OBSERVER	approx. ~ 60' ft
DIRECTION FROM OBSERVER	NE
DESCRIBE EMISSIONS	N/A
EMISSION COLOR	N/A
PLUME TYPE	CONTINUOUS INTERMITTENT FUGITIVE
WATER DROPLETS PRESENT	NO [1] YES [ ]
IF YES, IS PLUME	ATTACHED [ ] DETACHED [ ]
AT WHAT POINT WAS OPACITY DETERMINED	Top of stack
DESCRIBE BACKGROUND	sky
BACKGROUND COLOR	Blue
SKY CONDITIONS	clear
WIND SPEED	15-20mph
WIND DIRECTION	NW
AMBIENT TEMPERATURE	43°F
RELATIVE HUMIDITY	45%

COMMENTS: Stack #1 Run #2

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

SOURCE LAYOUT SKETCH



AVERAGE OPACITY FOR FOR HIGHEST PERIOD	Run #2: 0
NUMBER OF READINGS ABOVE	0 % WERE 0
RANGE OF OPACITY READINGS	MINIMUM 0 MAXIMUM 0
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS	
SIGNATURE	
TITLE	DATE
OBSERVER'S SIGNATURE	William Douglas Barbish
DATE	3/13/92
VERIFIED BY	

VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

OBSERVER'S NAME (PRINT): William Douglas Barbish

ORGANIZATION: Clean Air Engineering

CERTIFIED BY: Eastern Technical Associates — DATE: 9/26/91

ADDRESS: TLG Engineering, I-95 Landfill, 9850 Furnace, Lorton

STATE: VA — ZIP: 22079 — TELEPHONE: 680-5028

SOURCE ID NUMBER: Landfill Methane 9898 A — OBSERVATION DATE: 3/13/92

PROCESS: N/A DB. Cogeneration — OPERATING MODE: 90%

CONTROL EQUIPMENT: N/A — OPERATING MODE: 90%

DESCRIBE EMISSION POINT: Top of stack

HEIGHT ABOVE GROUND LEVEL: approx. ~ 20'ft — HEIGHT RELATIVE TO OBSERVER: approx. ~ 20'ft

DISTANCE FROM OBSERVER: approx. ~ 60'ft — DIRECTION FROM OBSERVER: NE

DESCRIBE EMISSIONS: N/A

EMISSION COLOR: N/A — PLUME TYPE: CONTINUOUS / INTERMITTENT / FUGITIVE

WATER DROPLETS PRESENT: NO [1] YES [ ] — IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]

AT WHAT POINT WAS OPACITY DETERMINED: Top of stack

DESCRIBE BACKGROUND: sky

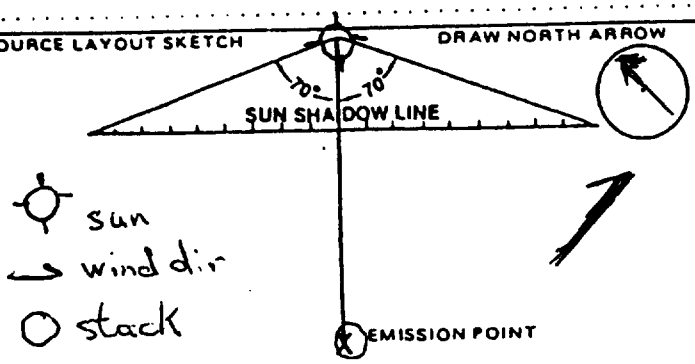
BACKGROUND COLOR: Blue — SKY CONDITIONS: clear

WIND SPEED: 15-20mph — WIND DIRECTION: NW

AMBIENT TEMPERATURE: 43°F — RELATIVE HUMIDITY: 45%

COMMENTS: Stack #1 Run #3

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



START TIME: 17:49 — STOP TIME: 18:09

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

AVERAGE OPACITY FOR Run #3 FOR HIGHEST PERIOD: 0 — NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: MINIMUM 0 — MAXIMUM 0

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE — DATE

OBSERVER'S SIGNATURE: William Douglas Barbish — DATE: 3/13/92

VERIFIED BY

VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

OBSERVER'S NAME (PRINT): William Douglas Barbish

ORGANIZATION: Clean Air Engineering

CERTIFIED BY: Eastern Technical Associates — DATE: 9/26/91

ADDRESS: TLG Engineering, I-95 Landfill, 9850 Furnace, Lorton

STATE: VA — ZIP: 22079 — TELEPHONE: 680-5028

SOURCE ID NUMBER: Landfill Methane 9898A — OBSERVATION DATE: 3/13/92

PROCESS: Cogeneration — OPERATING MODE: 90%

CONTROL EQUIPMENT: N/A — OPERATING MODE: 90%

DESCRIBE EMISSION POINT: Top of stack

HEIGHT ABOVE GROUND LEVEL: approx ~20 ft — HEIGHT RELATIVE TO OBSERVER: approx ~20 ft

DISTANCE FROM OBSERVER: approx ~60 ft — DIRECTION FROM OBSERVER: NW

DESCRIBE EMISSIONS: N/A

EMISSION COLOR: N/A — PLUME TYPE: CONTINUOUS / INTERMITTENT, FUGITIVE

WATER DROPLETS PRESENT: NO ☑ YES ☐ — IF YES, IS PLUME: ATTACHED ☐ DETACHED ☐

AT WHAT POINT WAS OPACITY DETERMINED: Top of stack

DESCRIBE BACKGROUND: sky

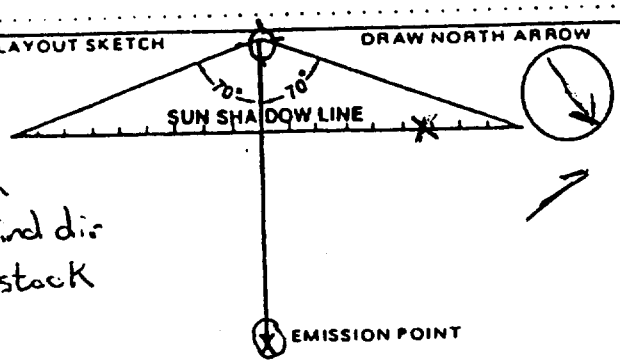
BACKGROUND COLOR: Blue — SKY CONDITIONS: Clear

WIND SPEED: 15-20 mph — WIND DIRECTION: NW

AMBIENT TEMPERATURE: 40° F — RELATIVE HUMIDITY: 54 %

COMMENTS: Stack #2 ..... Run. #. 1 .....

SOURCE LAYOUT SKETCH



START TIME: 11:17 — STOP TIME: 11:

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

AVERAGE OPACITY FOR Run #1 FOR HIGHEST PERIOD: 0 — NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: MINIMUM 0 — MAXIMUM 0

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE — DATE

OBSERVER'S SIGNATURE: William Douglas Barbish — DATE: 3/13/92

VERIFIED BY

VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

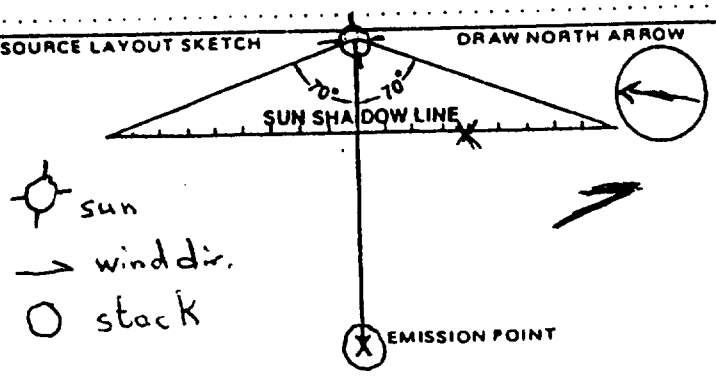
OBSERVER'S NAME (PRINT): William Douglas Burbish
ORGANIZATION: Clean Air Engineering
CERTIFIED BY: Eastern Technical Associates
DATE: 9/26/91

ADDRESS: TLG Engineering I-95 Landfill 9850 Furnace, Lorton
STATE: VA | ZIP: 22079 | TELEPHONE: 680-5028
SOURCE ID NUMBER: Landfill Methane 9848A
OBSERVATION DATE: 3/13/92
PROCESS: Cogeneration
OPERATING MODE: 90%
CONTROL EQUIPMENT: N/A
OPERATING MODE: 90%
DESCRIBE EMISSION POINT: Top of stack
HEIGHT ABOVE GROUND LEVEL: approx. ~ 20ft
HEIGHT RELATIVE TO OBSERVER: approx. ~ 20ft
DISTANCE FROM OBSERVER: approx. ~ 60ft
DIRECTION FROM OBSERVER: NE
DESCRIBE EMISSIONS: N/A
EMISSION COLOR: N/A
PLUME TYPE: CONTINUOUS / INTERMITTENT / FUGITIVE
WATER DROPLETS PRESENT: NO [x] YES [ ]
IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]
AT WHAT POINT WAS OPACITY DETERMINED: Top of stack
DESCRIBE BACKGROUND: Sky
BACKGROUND COLOR: Blue
SKY CONDITIONS: Dk. Clear
WIND SPEED: 15-20mph
WIND DIRECTION: NW
AMBIENT TEMPERATURE: 40 °F
RELATIVE HUMIDITY: 54%
COMMENTS: Stack #2 Run #2

START TIME: 12:36 STOP TIME: 13:06

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

SOURCE LAYOUT SKETCH



AVERAGE OPACITY FOR Run #2 FOR HIGHEST PERIOD: 0
NUMBER OF READINGS ABOVE: 0 % WERE 0
RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 0

OBSERVER'S SIGNATURE: William Douglas Burbish
DATE: 3/13/92
VERIFIED BY:

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE
DATE

VISIBLE EMISSION OBSERVATIONS

Engineering, Inc.

OBSERVER'S NAME (PRINT): William Douglas Barbish

ORGANIZATION: Clean Air Engineering

CERTIFIED BY: Eastern Technical Associates | DATE: 9/26/91

ADDRESS: TLG Engineering, I-95 Landfill, 9850 Furnace, Lorton

STATE: VA | ZIP: 22079 | TELEPHONE: 680-5028

SOURCE ID NUMBER: Landfill Methane 9898 A | OBSERVATION DATE: 3/13/92

PROCESS: Cogeneration | OPERATING MODE: 90%

CONTROL EQUIPMENT: N/A | OPERATING MODE: 90%

DESCRIBE EMISSION POINT: Top of stack

HEIGHT ABOVE GROUND LEVEL: approx. ~ 20 ft | HEIGHT RELATIVE TO OBSERVER: approx. ~ 20 ft

DISTANCE FROM OBSERVER: approx. ~ 60 ft | DIRECTION FROM OBSERVER: NE

DESCRIBE EMISSIONS: N/A

EMISSION COLOR: N/A | PLUME TYPE: CONTINUOUS INTERMITTENT FUGITIVE

WATER DROPLETS PRESENT: NO [x] YES [ ] | IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]

AT WHAT POINT WAS OPACITY DETERMINED: Top of stack

DESCRIBE BACKGROUND: sky

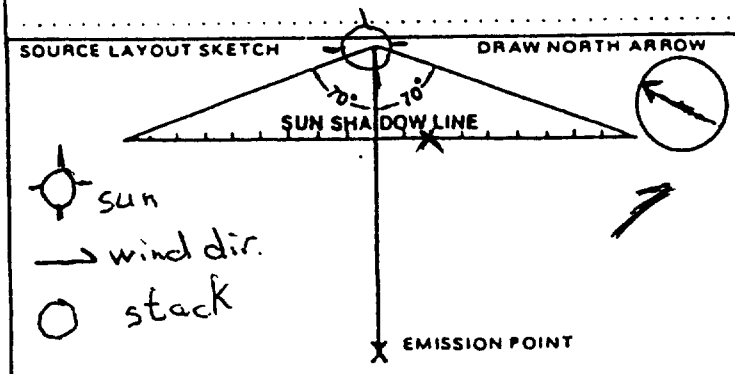
BACKGROUND COLOR: Blue | SKY CONDITIONS: Clear

WIND SPEED: 15-20 mph | WIND DIRECTION: NW

AMBIENT TEMPERATURE: 40° F | RELATIVE HUMIDITY: 54%

COMMENTS: stack # 2, Run # 3

SOURCE LAYOUT SKETCH



	0	15	30	45		0	15	30	45
START TIME 13:54					STOP TIME 14:24				
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

AVERAGE OPACITY FOR Run # 3 FOR HIGHEST PERIOD: 0 | NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 0

OBSERVER'S SIGNATURE: William Douglas Barbish | DATE: 3/13/92

VERIFIED BY

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE | DATE

VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

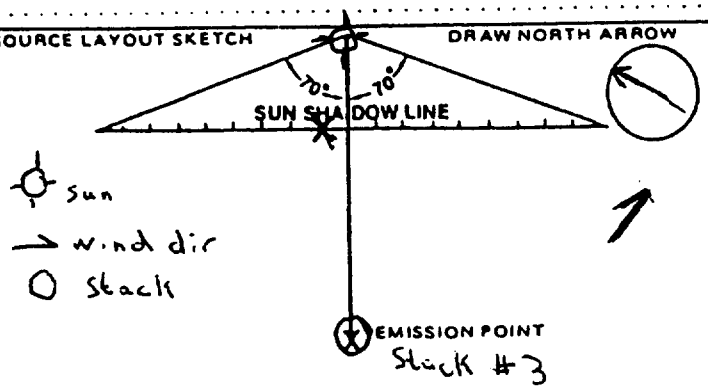
OBSERVER'S NAME (PRINT): William Douglas Barbish
ORGANIZATION: Clean Air Engineering
CERTIFIED BY: Eastern Technical Associates — DATE: 08/26/91

ADDRESS: TLG Engineering, I-95 Landfill, 9850 furnace, Lorton
STATE: VA | ZIP: 22079 | TELEPHONE: 680-5028
SOURCE ID NUMBER: Land fill Methane 9898A — OBSERVATION DATE: 3/12/92
PROCESS: Cogeneration — OPERATING MODE: 90%
CONTROL EQUIPMENT: N/A — OPERATING MODE: 90%
DESCRIBE EMISSION POINT: Top of stack
HEIGHT ABOVE GROUND LEVEL: approx. ~ 20ft — HEIGHT RELATIVE TO OBSERVER: approx. ~ 20ft
DISTANCE FROM OBSERVER: approx. ~ 60ft — DIRECTION FROM OBSERVER: NE
DESCRIBE EMISSIONS: N/A
EMISSION COLOR: N/A — PLUME TYPE: CONTINUOUS / INTERMITTENT / FUGITIVE
WATER DROPLETS PRESENT: NO [x] YES [ ] — IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]
AT WHAT POINT WAS OPACITY DETERMINED: Top of stack
DESCRIBE BACKGROUND: Sky
BACKGROUND COLOR: Blue — SKY CONDITIONS: partly cloudy
WIND SPEED: 15-20 mph — WIND DIRECTION: NW
AMBIENT TEMPERATURE: 48 °F — RELATIVE HUMIDITY: 45 %
COMMENTS: Stack # 3 ; Run # 1

START TIME 15:35 — STOP TIME 16:05

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



AVERAGE OPACITY FOR Run #1 FOR HIGHEST PERIOD: 0 — NUMBER OF READINGS ABOVE: 0 % WERE 0
RANGE OF OPACITY READINGS: MINIMUM 0 — MAXIMUM 0
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE — DATE

OBSERVER'S SIGNATURE: William Douglas Barbish — DATE: 3/12/92
VERIFIED BY

VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

ADDRESS: TLG Engineering I-95 Landfill 9850 Furnace, Lorton

STATE: VA | ZIP: 22079 | TELEPHONE: 680-5028

SOURCE ID NUMBER: Land fill Methane 9870A | OBSERVATION DATE: 3/12/92

PROCESS: Cogeneration | OPERATING MODE: 90%

CONTROL EQUIPMENT: N/A | OPERATING MODE: 90%

DESCRIBE EMISSION POINT: Top of stack

HEIGHT ABOVE GROUND LEVEL: approx ~ 20 ft | HEIGHT RELATIVE TO OBSERVER: approx ~ 20 ft

DISTANCE FROM OBSERVER: approx ~ 60 ft | DIRECTION FROM OBSERVER: NE

DESCRIBE EMISSIONS: N/A

EMISSION COLOR: N/A | PLUME TYPE: CONTINUOUS / INTERMITTENT / FUGITIVE

WATER DROPLETS PRESENT: NO [X] YES [ ] | IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]

AT WHAT POINT WAS OPACITY DETERMINED: Top of stack

DESCRIBE BACKGROUND: Sky

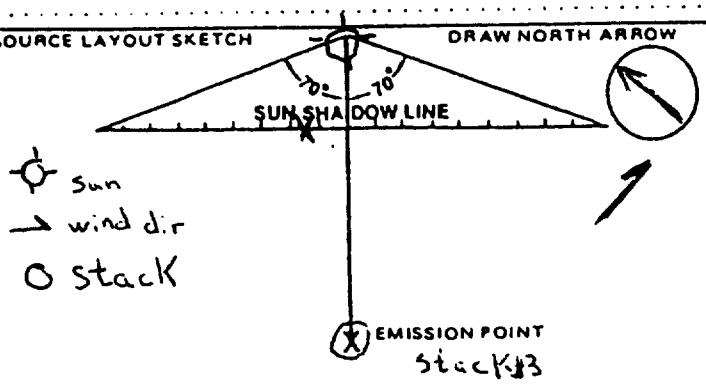
BACKGROUND COLOR: Blue | SKY CONDITIONS: partly cloudy

WIND SPEED: 15-20 mph | WIND DIRECTION: NW

AMBIENT TEMPERATURE: 48° F | RELATIVE HUMIDITY: 45%

COMMENTS: Stack #3 Run #2

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



OBSERVER'S NAME (PRINT): William Douglas Barbish

ORGANIZATION: Clean Air Engineering

CERTIFIED BY: Eastern Technical Associates | DATE: 9/26/91

START TIME: 16:53 | STOP TIME: 17:23

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

AVERAGE OPACITY FOR Run #2 FOR HIGHEST PERIOD: 0 | NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: MINIMUM 0 | MAXIMUM 0

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE | TITLE | DATE

OBSERVER'S SIGNATURE: William Douglas Barbish | DATE: 3/12/92

VERIFIED BY

VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

OBSERVER'S NAME (PRINT): William Douglas Barbish

ORGANIZATION: Clean Air Engineering

CERTIFIED BY: Eastern Technical Associates — DATE: 9/26/91

ADDRESS: TLG Engineering, I-95 Landfill, 9850 Furnace, Lorton

STATE: VA — ZIP: 22079 — TELEPHONE: 680-5028

SOURCE ID NUMBER: Landfill Methane 9898A — OBSERVATION DATE: 3/12/92

PROCESS: Cogeneration — OPERATING MODE: 90%

CONTROL EQUIPMENT: N/A — OPERATING MODE: 90°

DESCRIBE EMISSION POINT: Top of stack

HEIGHT ABOVE GROUND LEVEL: approx 20 ft — HEIGHT RELATIVE TO OBSERVER: approx ~ 20 ft

DISTANCE FROM OBSERVER: approx ~ 60 ft — DIRECTION FROM OBSERVER: NE

DESCRIBE EMISSIONS: N/A

EMISSION COLOR: N/A — PLUME TYPE: CONTINUOUS / INTERMITTENT / FUGITIVE

WATER DROPLETS PRESENT: NO [x] YES [ ] — IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]

AT WHAT POINT WAS OPACITY DETERMINED: Top of stack

DESCRIBE BACKGROUND: sky

BACKGROUND COLOR: Blue — SKY CONDITIONS: partly cloudy

WIND SPEED: 15-20 mph — WIND DIRECTION: NW

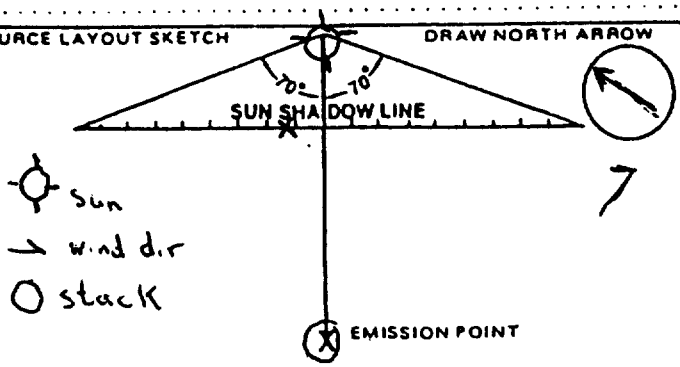
AMBIENT TEMPERATURE: 48° F — RELATIVE HUMIDITY: 45 %

COMMENTS: Stack #3 Run #3

START TIME: 18:05 — STOP TIME: 18:35

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

SOURCE LAYOUT SKETCH



AVERAGE OPACITY FOR Run #3 FOR HIGHEST PERIOD: 0

NUMBER OF READINGS ABOVE: 0 % WERE 0

RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 0

OBSERVER'S SIGNATURE: William Douglas Barbish — DATE: 3/12/92

VERIFIED BY

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE — DATE

VISIBLE EMISSION OBSERVATION FORM

cL

Engineering, Inc.

OBSERVER'S NAME (PRINT): William Douglas Barbish

ORGANIZATION: Clean Air Engineering

CERTIFIED BY: Eastern Technical Associates — DATE: 9/26/91

ADDRESS: TLG Engineering
I-95 Landfill
9850 Furnace, Lorton

STATE: VA — ZIP: 22079 — TELEPHONE: 680-5028

SOURCE ID NUMBER: Landfill Methane 9698A — OBSERVATION DATE: 3/13/92

PROCESS: Cogeneration — OPERATING MODE: 90%

CONTROL EQUIPMENT: N/A — OPERATING MODE: 90%

DESCRIBE EMISSION POINT: Top of stack

HEIGHT ABOVE GROUND LEVEL: approx ~ 20 ft — HEIGHT RELATIVE TO OBSERVER: approx. ~ 25 ft

DISTANCE FROM OBSERVER: approx ~ 60 ft — DIRECTION FROM OBSERVER: SW

DESCRIBE EMISSIONS: N/A

EMISSION COLOR: N/A — PLUME TYPE: CONTINUOUS / INTERMITTENT — FUGITIVE

WATER DROPLETS PRESENT: NO [X] YES [ ] — IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]

AT WHAT POINT WAS OPACITY DETERMINED: Top of stack

DESCRIBE BACKGROUND: sky

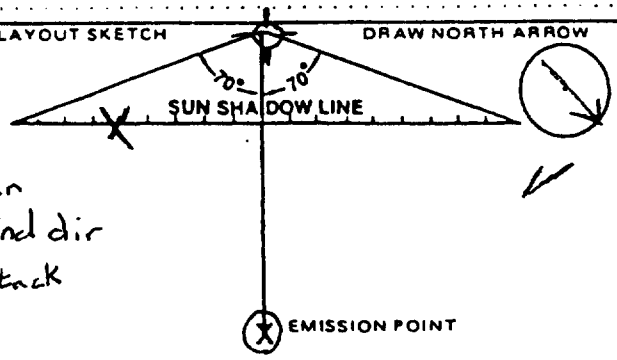
BACKGROUND COLOR: Blue — SKY CONDITIONS: clear

WIND SPEED: 15-20 mph — WIND DIRECTION: NW

AMBIENT TEMPERATURE: 30° F — RELATIVE HUMIDITY: 58%

COMMENTS: Stack #4
Run #1

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



START TIME 7:40					STOP TIME 8:10				
	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

AVERAGE OPACITY FOR Run #1 FOR HIGHEST PERIOD: 0 — NUMBER OF READINGS ABOVE 0 % WERE 0

RANGE OF OPACITY READINGS: MINIMUM 0 — MAXIMUM 0

OBSERVER'S SIGNATURE: William Douglas Barbish — DATE: 3/13/92

VERIFIED BY

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS

SIGNATURE

TITLE — DATE

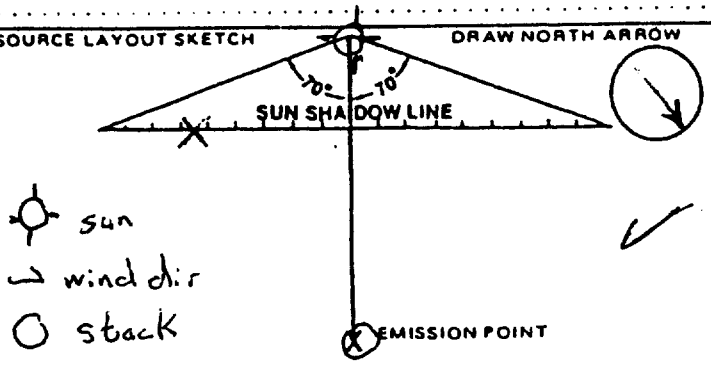
VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

OBSERVER'S NAME (PRINT): William Douglas Barbish
ORGANIZATION: Clean Air Engineering
CERTIFIED BY: Eastern Technical Associates
DATE: 9/26/91

ADDRESS: TLG Engineering, I-95 Land fill, 9850 Furnace, Lorton
STATE: VA
ZIP: 22079
TELEPHONE: 680-5028
SOURCE ID NUMBER: Landfill Methane 9898A
OBSERVATION DATE: 3/13/92
PROCESS: Cogeneration
OPERATING MODE: 90%
CONTROL EQUIPMENT: N/A
OPERATING MODE: 90%
DESCRIBE EMISSION POINT: Top of stack
HEIGHT ABOVE GROUND LEVEL: approx ~ 20' ft
HEIGHT RELATIVE TO OBSERVER: approx ~ 20' ft
DISTANCE FROM OBSERVER: approx ~ 60' ft
DIRECTION FROM OBSERVER: SW
DESCRIBE EMISSIONS: N/A
EMISSION COLOR: N/A
PLUME TYPE: CONTINUOUS / INTERMITTENT / FUGITIVE
WATER DROPLETS PRESENT: NO [✓] YES [ ]
IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]
AT WHAT POINT WAS OPACITY DETERMINED: Top of stack
DESCRIBE BACKGROUND: sky
BACKGROUND COLOR: Blue
SKY CONDITIONS: Clear
WIND SPEED: 15-20 mph
WIND DIRECTION: NW
AMBIENT TEMPERATURE: 30° F
RELATIVE HUMIDITY: 58 %
COMMENTS: stack #4 ..... Run #2

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



START TIME: 8:45 — STOP TIME: 9:15

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

AVERAGE OPACITY FOR Run #2 FOR HIGHEST PERIOD: 0
NUMBER OF READINGS ABOVE: 0 % WERE 0
RANGE OF OPACITY READINGS: MINIMUM / MAXIMUM

OBSERVER'S SIGNATURE: William Douglas Barbish — DATE: 3/13/92
VERIFIED BY

I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE — DATE

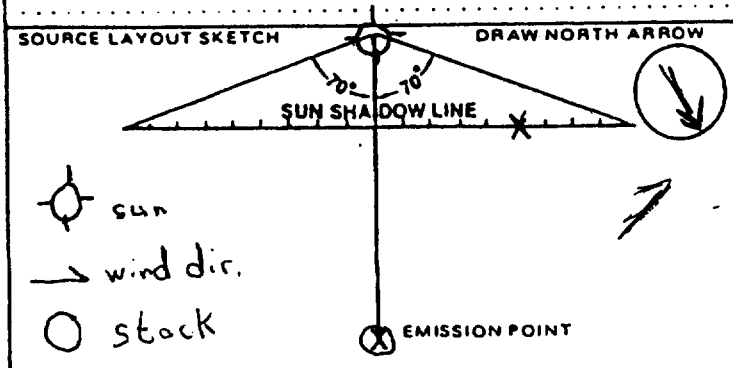
VISIBLE EMISSION OBSERVATION FORM

Engineering, Inc.

OBSERVER'S NAME (PRINT): William Douglas Barbish
ORGANIZATION: Clean Air Engineering
CERTIFIED BY: Eastern Technical Associates — DATE: 9/26/91

ADDRESS: TLG Engineering, I-95 Landfill, 9850 Furnace, Lorton
STATE: VA — ZIP: 22079 — TELEPHONE: 680-5028
SOURCE ID NUMBER: Landfill Methane 9898 A — OBSERVATION DATE: 3/13/92
PROCESS: Cogeneration — OPERATING MODE: 90%
CONTROL EQUIPMENT: N/A — OPERATING MODE: 90%
DESCRIBE EMISSION POINT: Top of stack
HEIGHT ABOVE GROUND LEVEL: approx. 20' f — HEIGHT RELATIVE TO OBSERVER: approx. ~20' ft
DISTANCE FROM OBSERVER: approx. 60ft — DIRECTION FROM OBSERVER: NW
DESCRIBE EMISSIONS: N/A
EMISSION COLOR: N/A — PLUME TYPE: CONTINUOUS / INTERMITTENT / FUGITIVE
WATER DROPLETS PRESENT: NO [✓] YES [ ] — IF YES, IS PLUME: ATTACHED [ ] DETACHED [ ]
AT WHAT POINT WAS OPACITY DETERMINED: Top of stack
DESCRIBE BACKGROUND: sky
BACKGROUND COLOR: Blue — SKY CONDITIONS: Clear
WIND SPEED: 15-20 mph — WIND DIRECTION: NW
AMBIENT TEMPERATURE: 30°F — RELATIVE HUMIDITY: 58%
COMMENTS: Stack #4 ..... Run #3

SOURCE LAYOUT SKETCH — DRAW NORTH ARROW



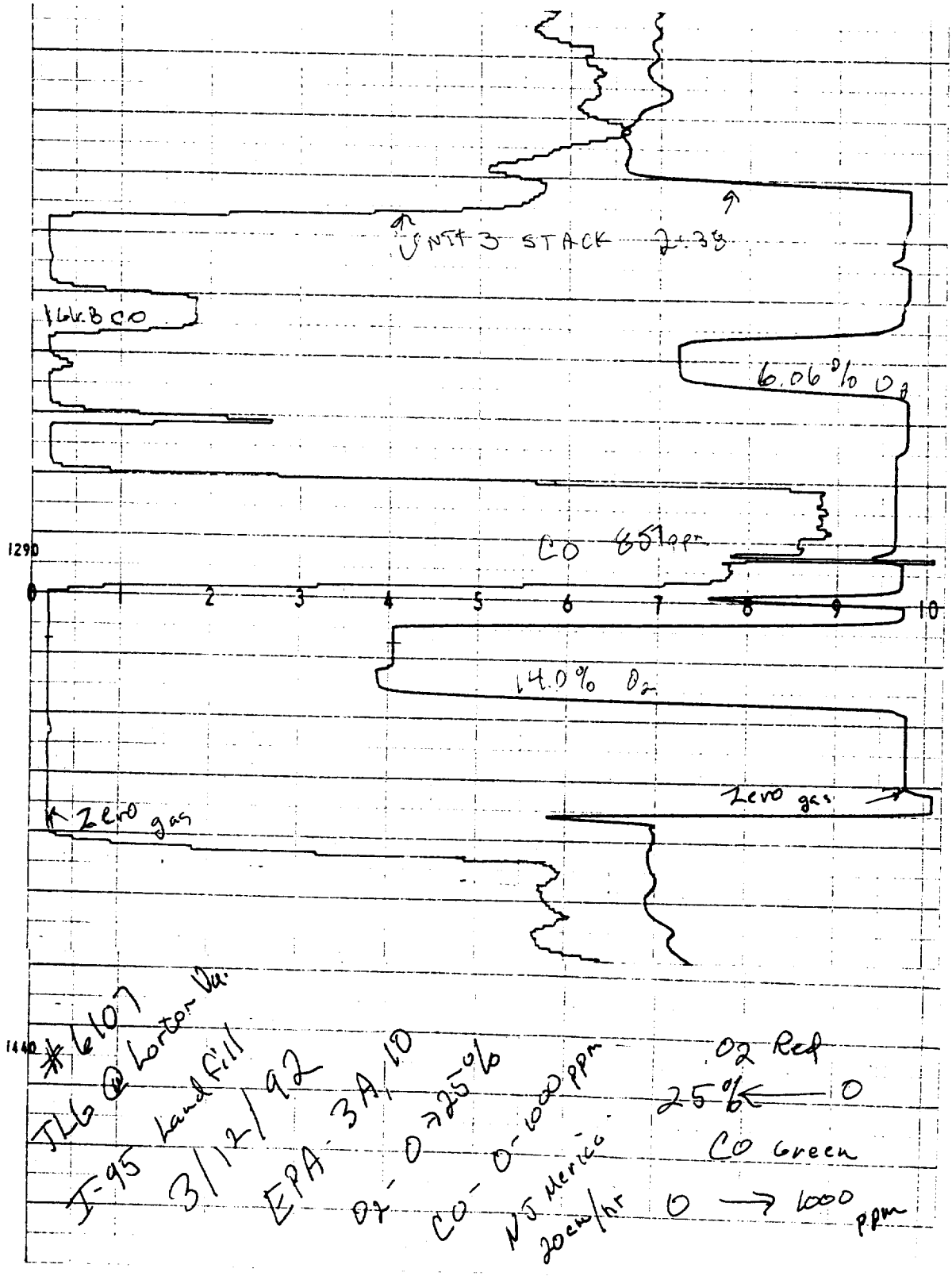
START TIME: 9:58 — STOP TIME: 10:28

	0	15	30	45		0	15	30	45
1	0	0	0	0	31				
2	0	0	0	0	32				
3	0	0	0	0	33				
4	0	0	0	0	34				
5	0	0	0	0	35				
6	0	0	0	0	36				
7	0	0	0	0	37				
8	0	0	0	0	38				
9	0	0	0	0	39				
10	0	0	0	0	40				
11	0	0	0	0	41				
12	0	0	0	0	42				
13	0	0	0	0	43				
14	0	0	0	0	44				
15	0	0	0	0	45				
16	0	0	0	0	46				
17	0	0	0	0	47				
18	0	0	0	0	48				
19	0	0	0	0	49				
20	0	0	0	0	50				
21	0	0	0	0	51				
22	0	0	0	0	52				
23	0	0	0	0	53				
24	0	0	0	0	54				
25	0	0	0	0	55				
26	0	0	0	0	56				
27	0	0	0	0	57				
28	0	0	0	0	58				
29	0	0	0	0	59				
30	0	0	0	0	60				

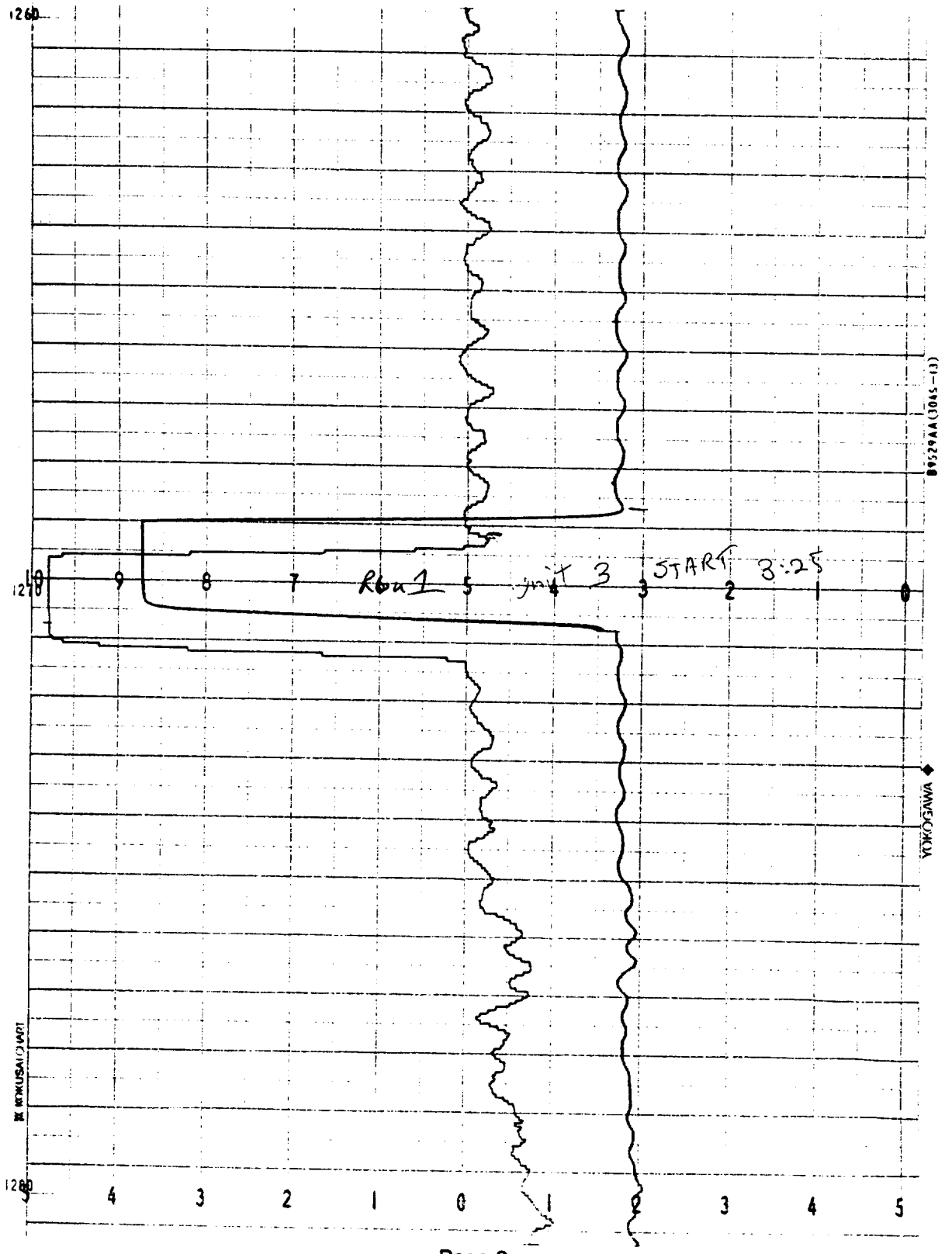
AVERAGE OPACITY FOR Run #3 FOR HIGHEST PERIOD: 0
NUMBER OF READINGS ABOVE: 0 % WERE 0
RANGE OF OPACITY READINGS: MINIMUM 0 MAXIMUM 0

OBSERVER'S SIGNATURE: William Douglas Barbish — DATE: 3/13/92
VERIFIED BY:
I HAVE RECEIVED A COPY OF THESE OPACITY OBSERVATIONS
SIGNATURE
TITLE — DATE

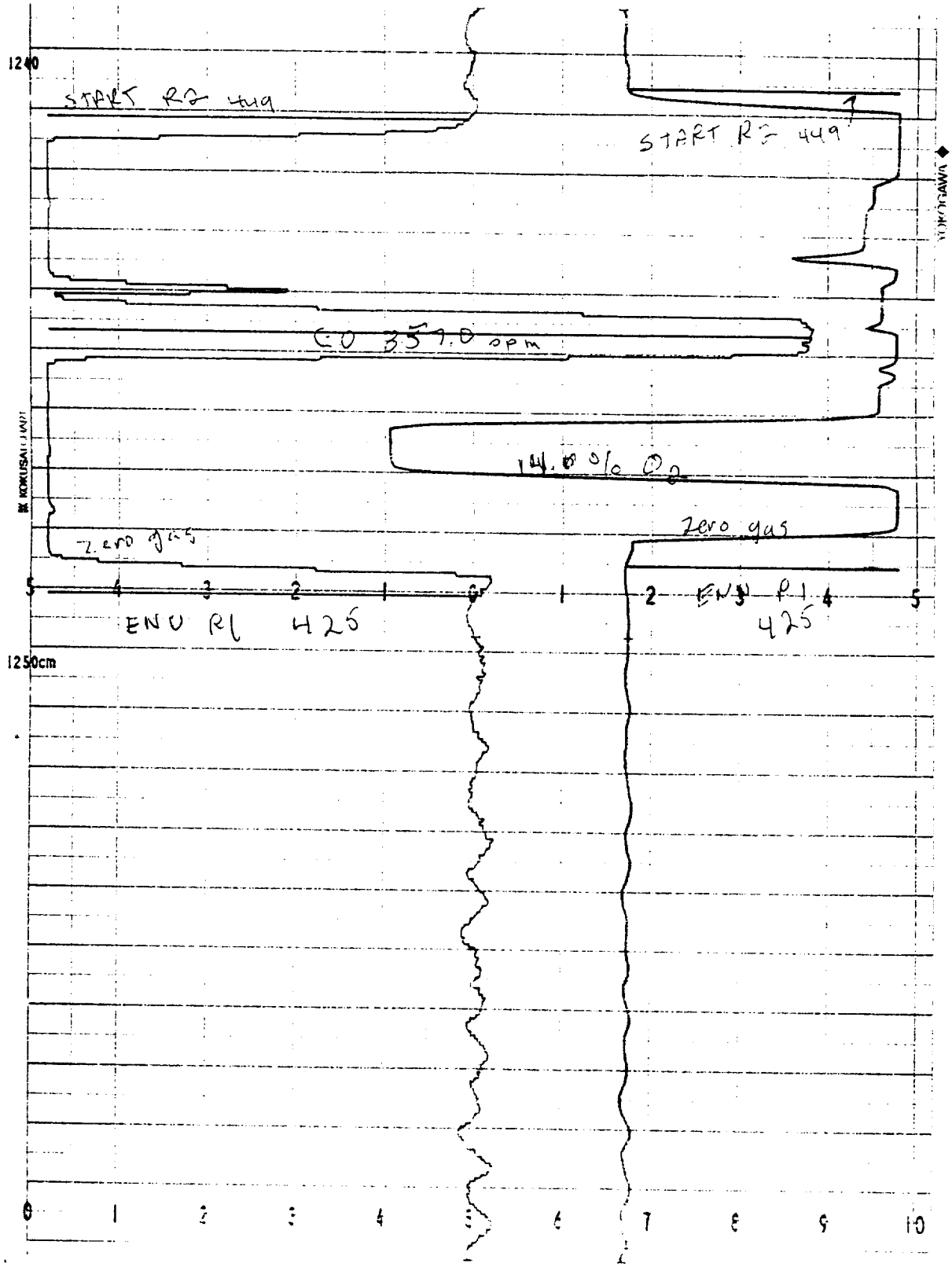
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 3 STACK
March 12, 1992



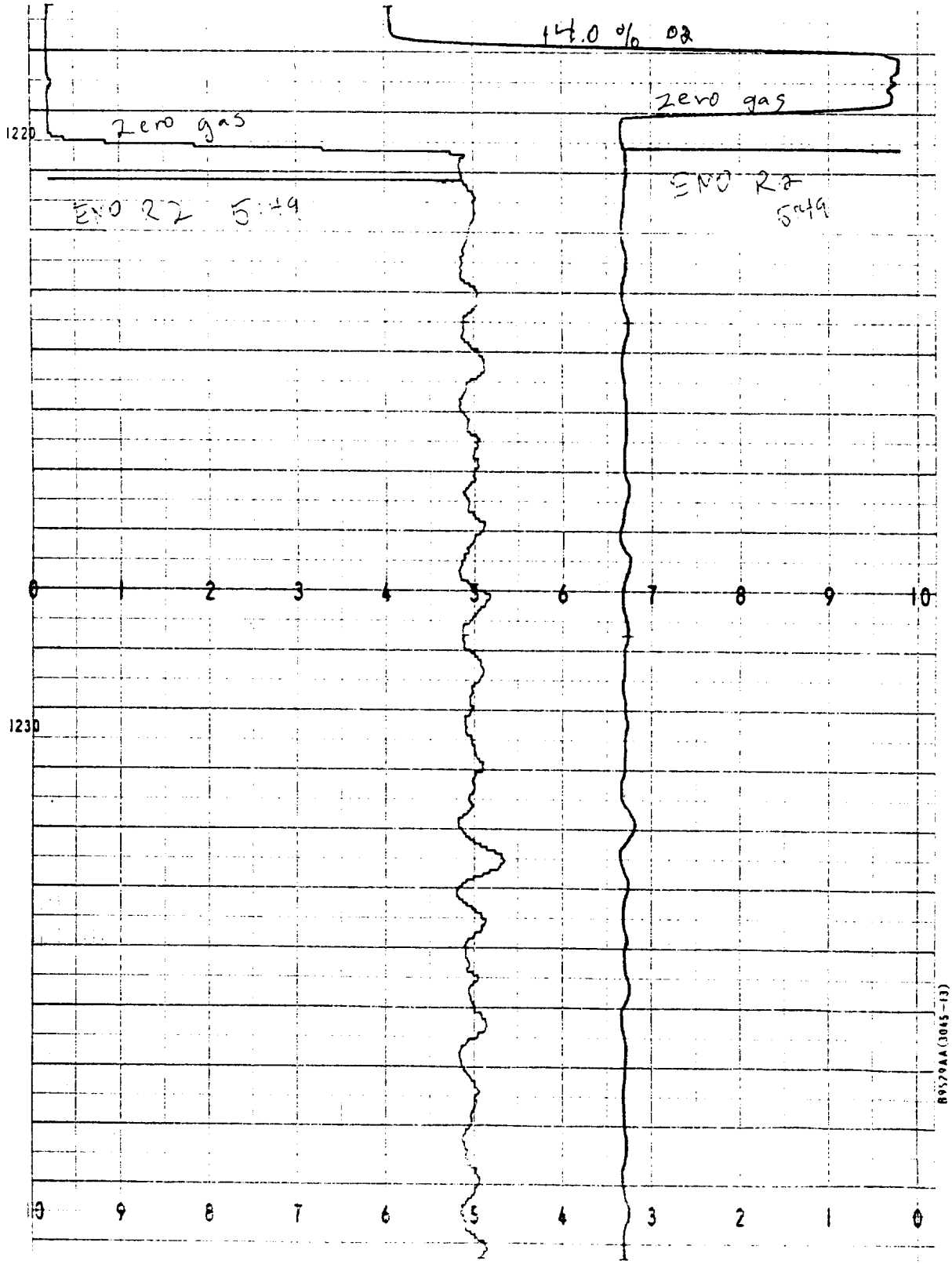
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 3 STACK
March 12, 1992



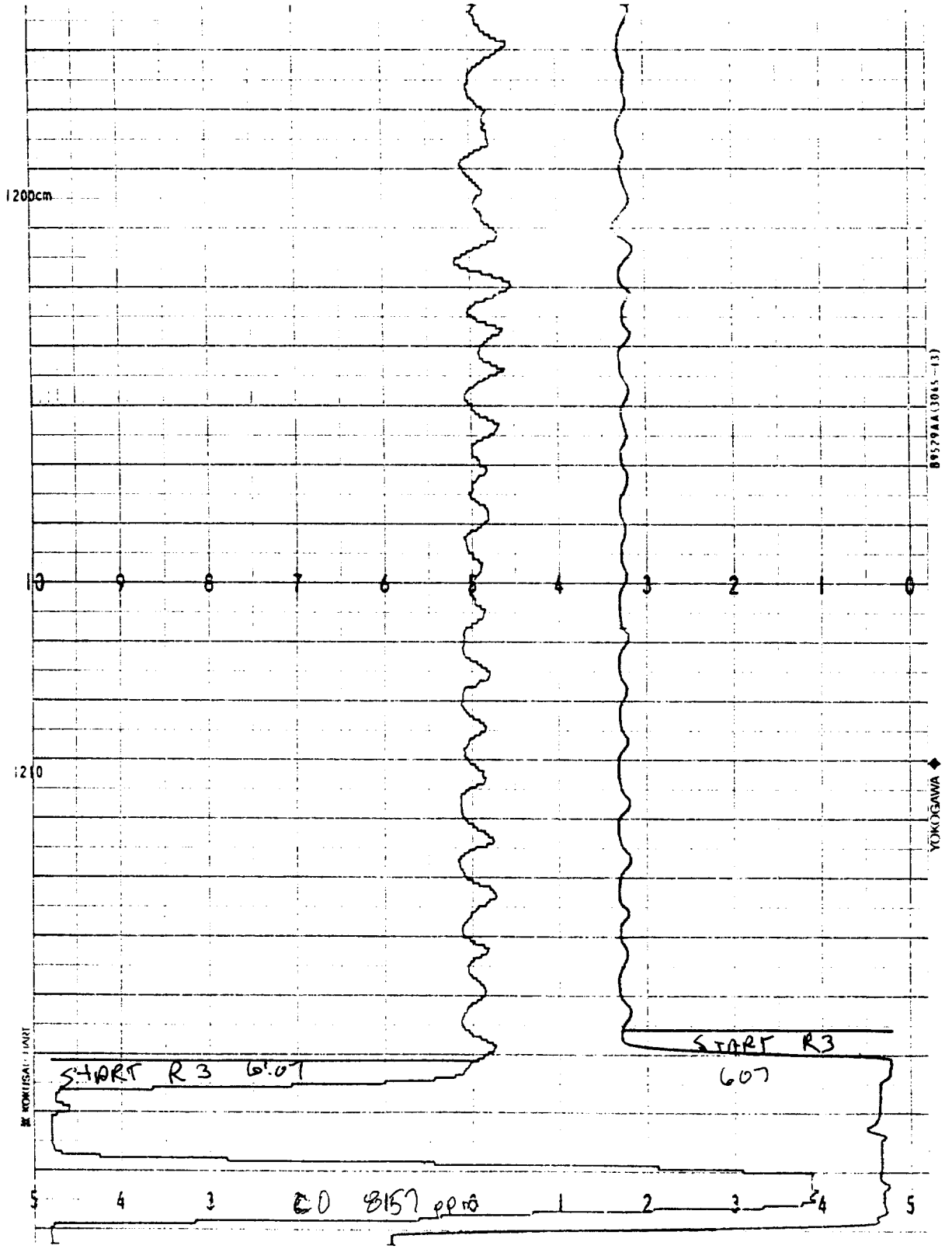
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 3 STACK
March 12, 1992



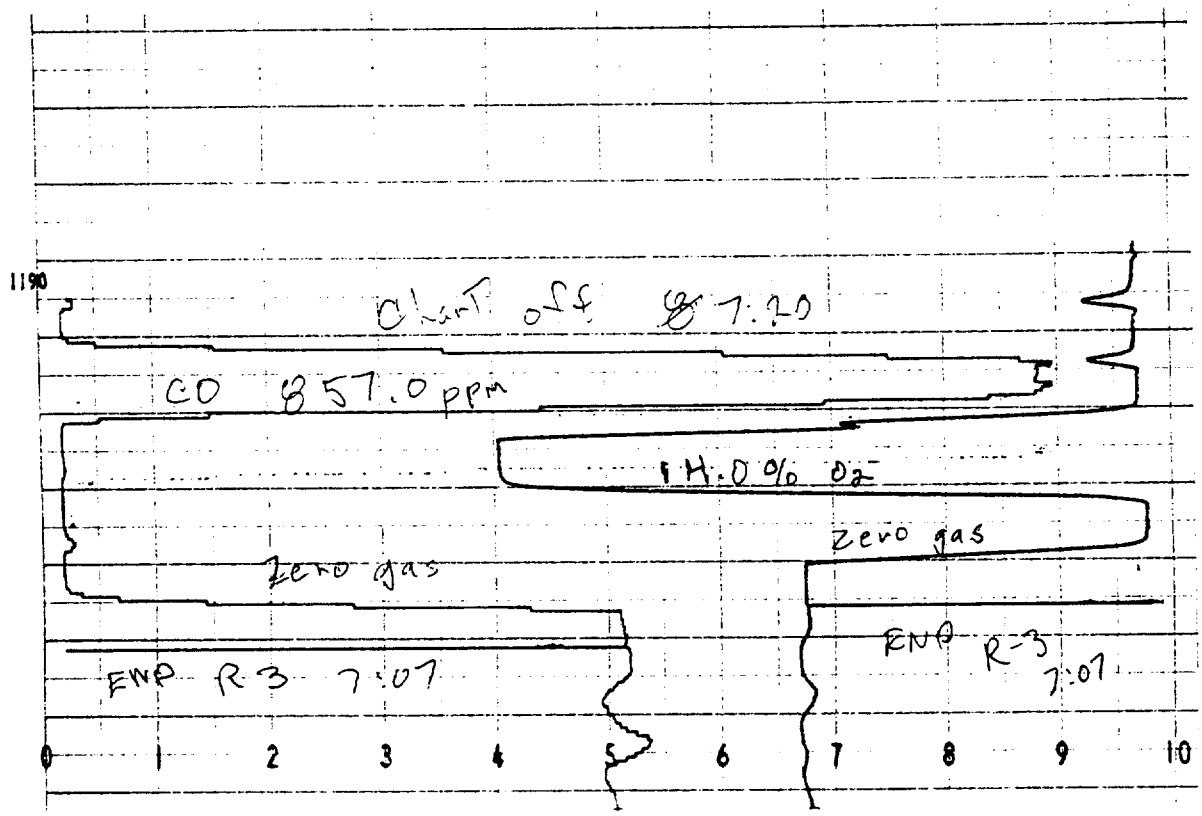
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 3 STACK
March 12, 1992



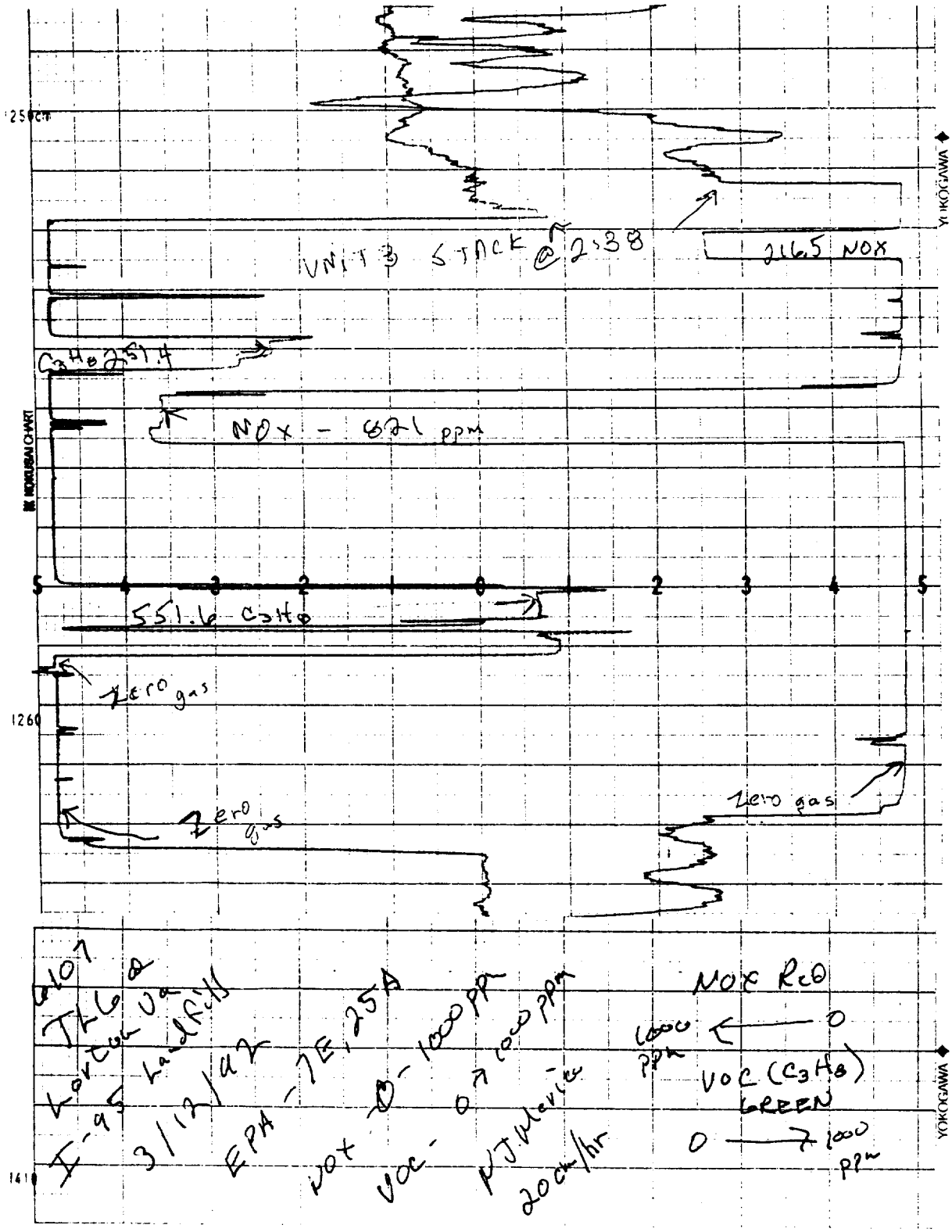
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 3 STACK
March 12, 1992



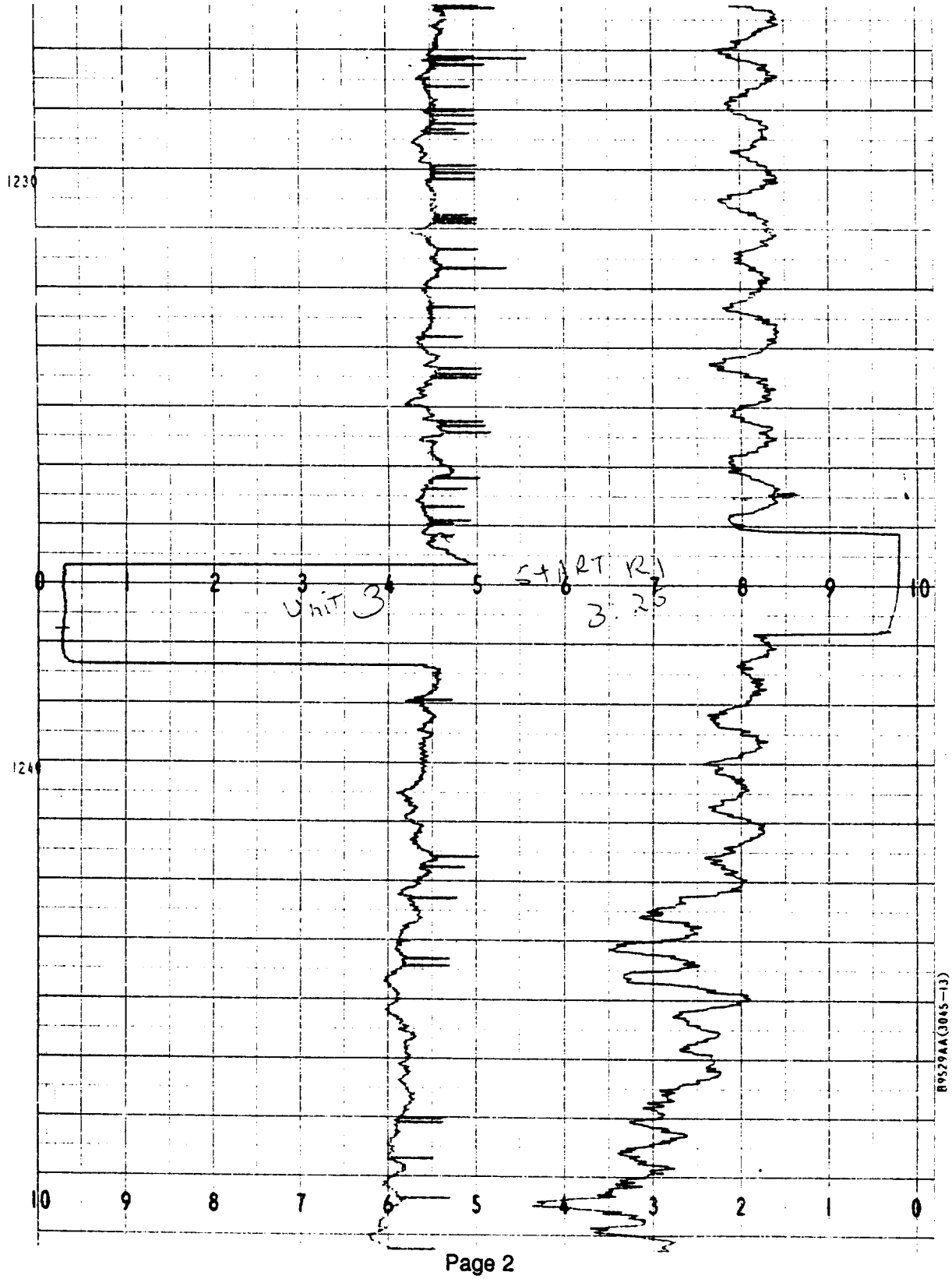
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 3 STACK
March 12, 1992



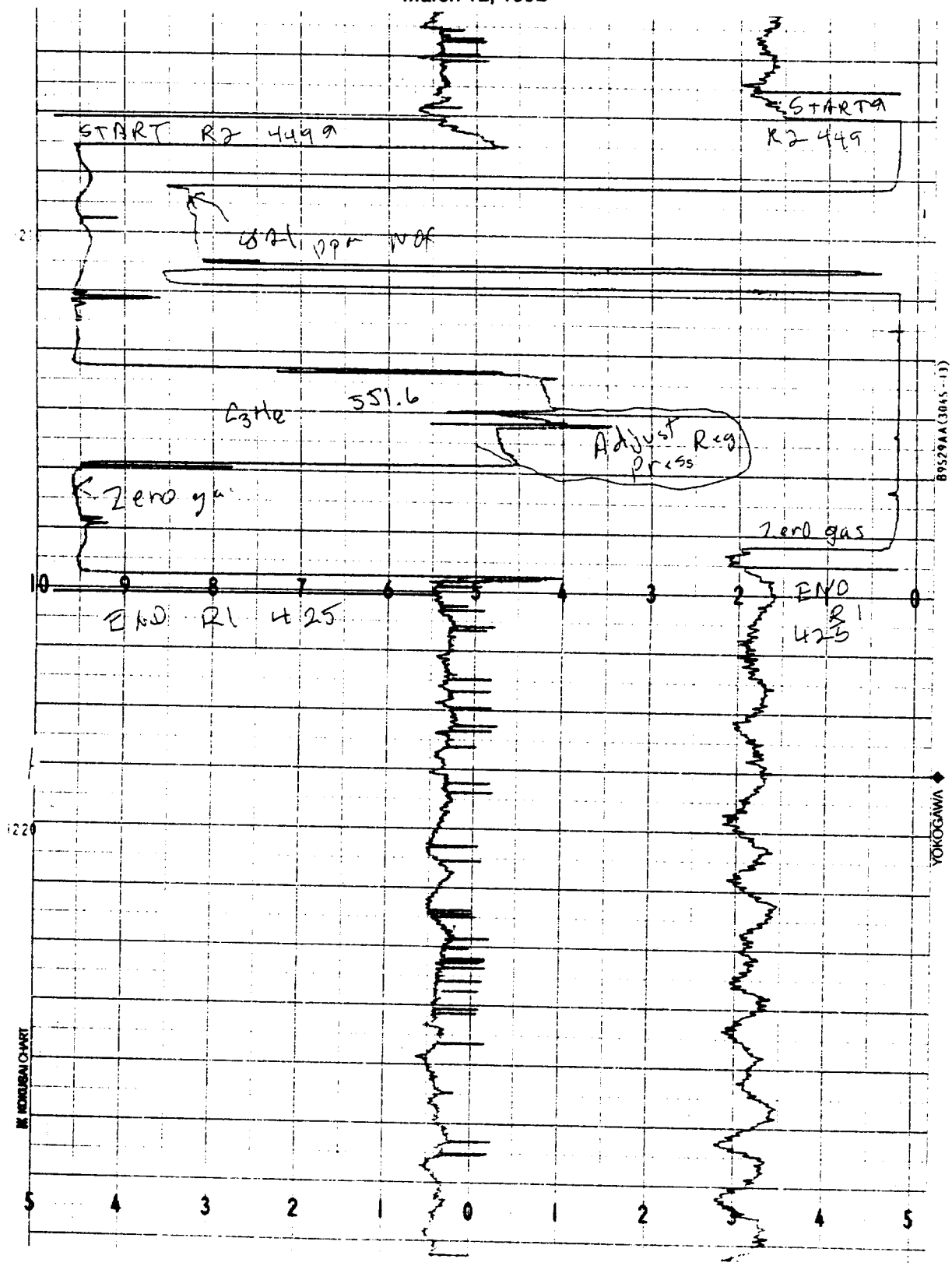
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 3 STACK
March 12, 1992



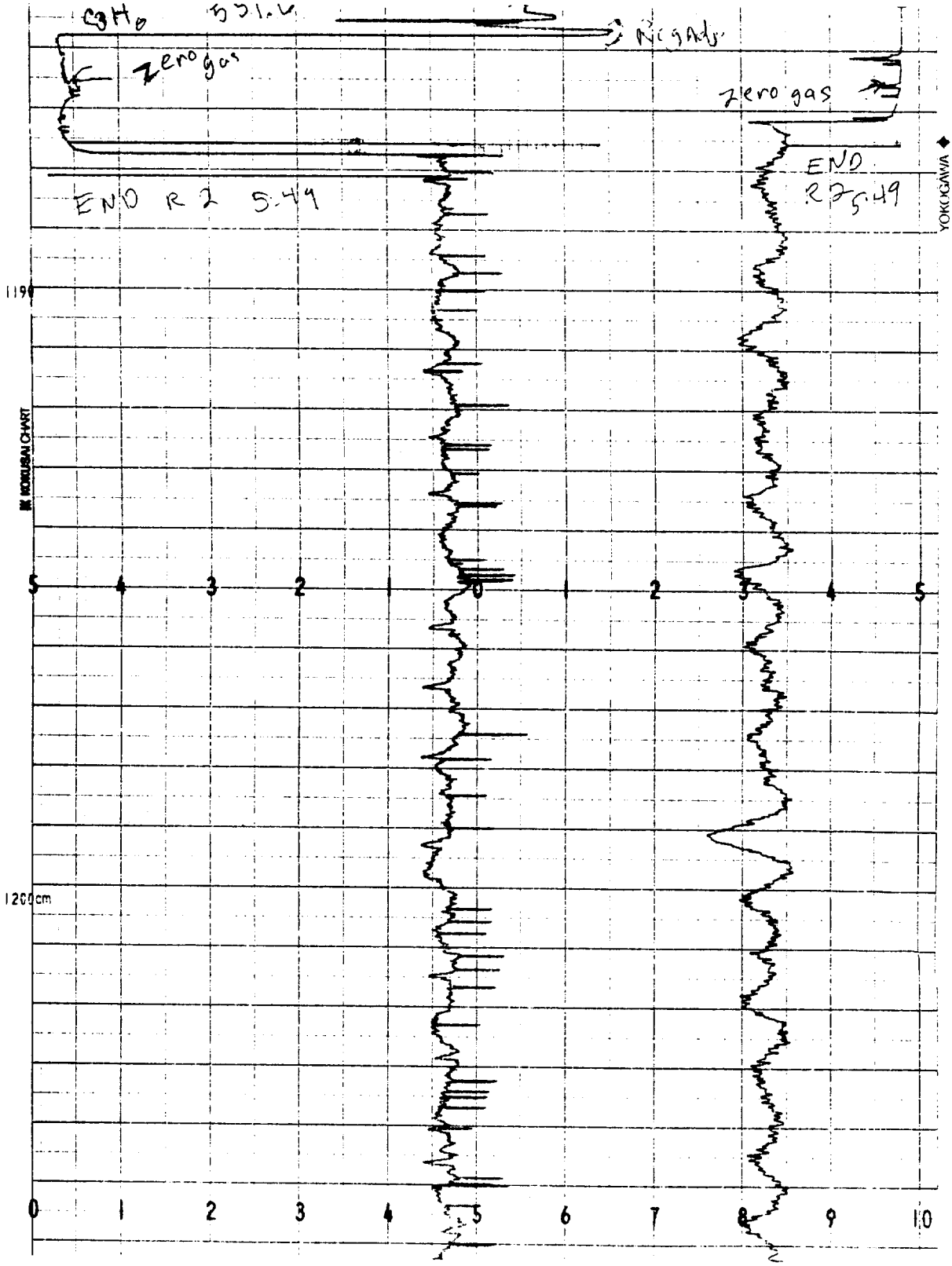
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 3 STACK
March 12, 1992



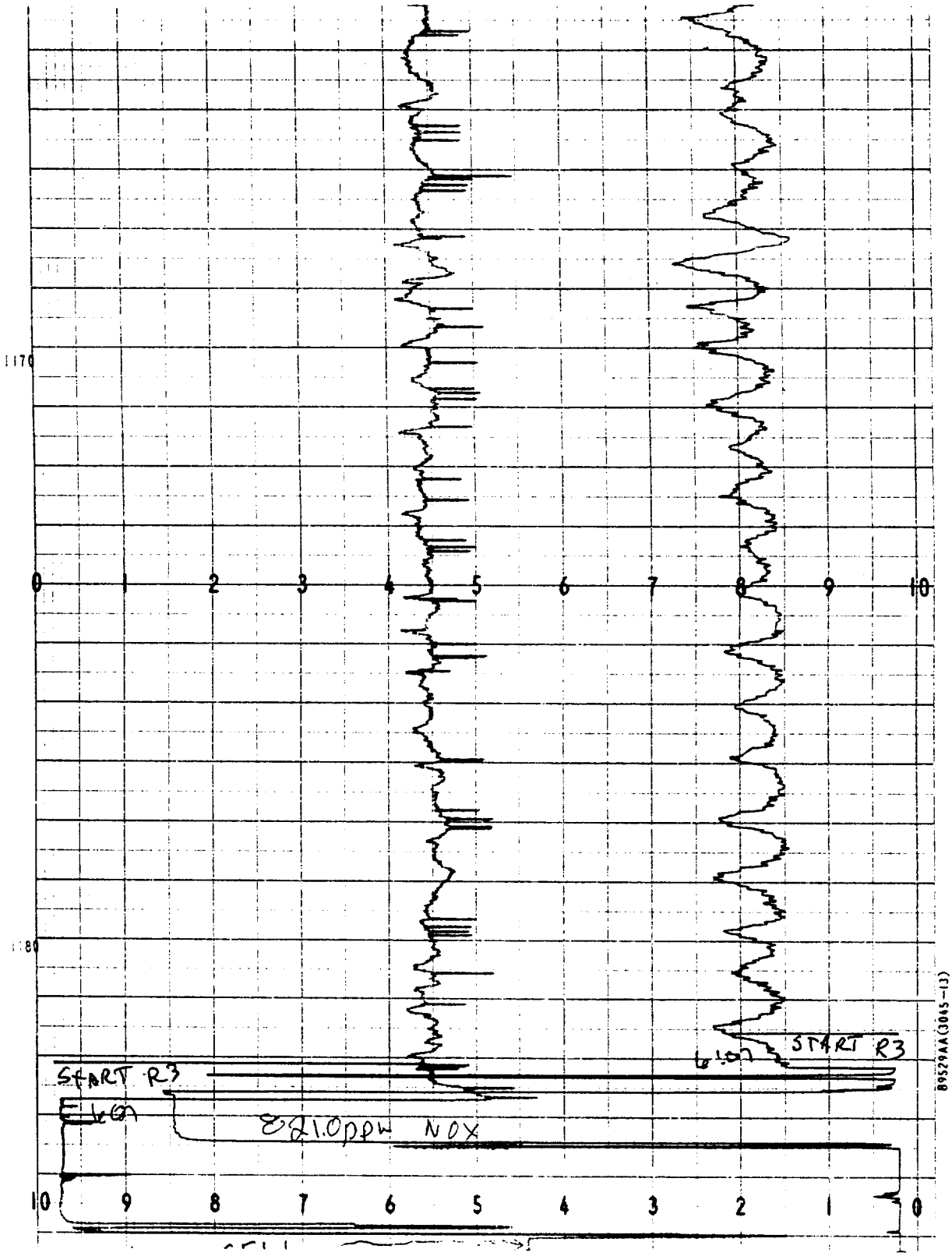
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 3 STACK
March 12, 1992



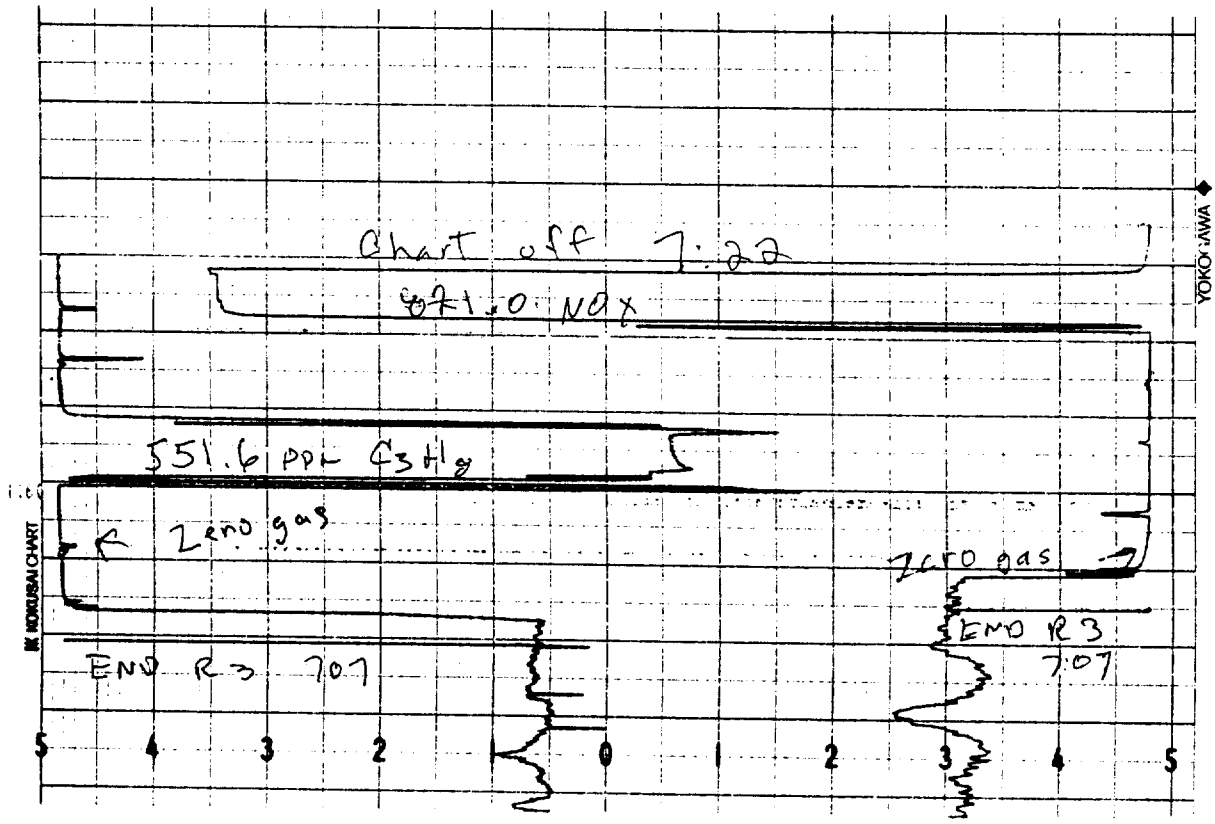
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 3 STACK
March 12, 1992



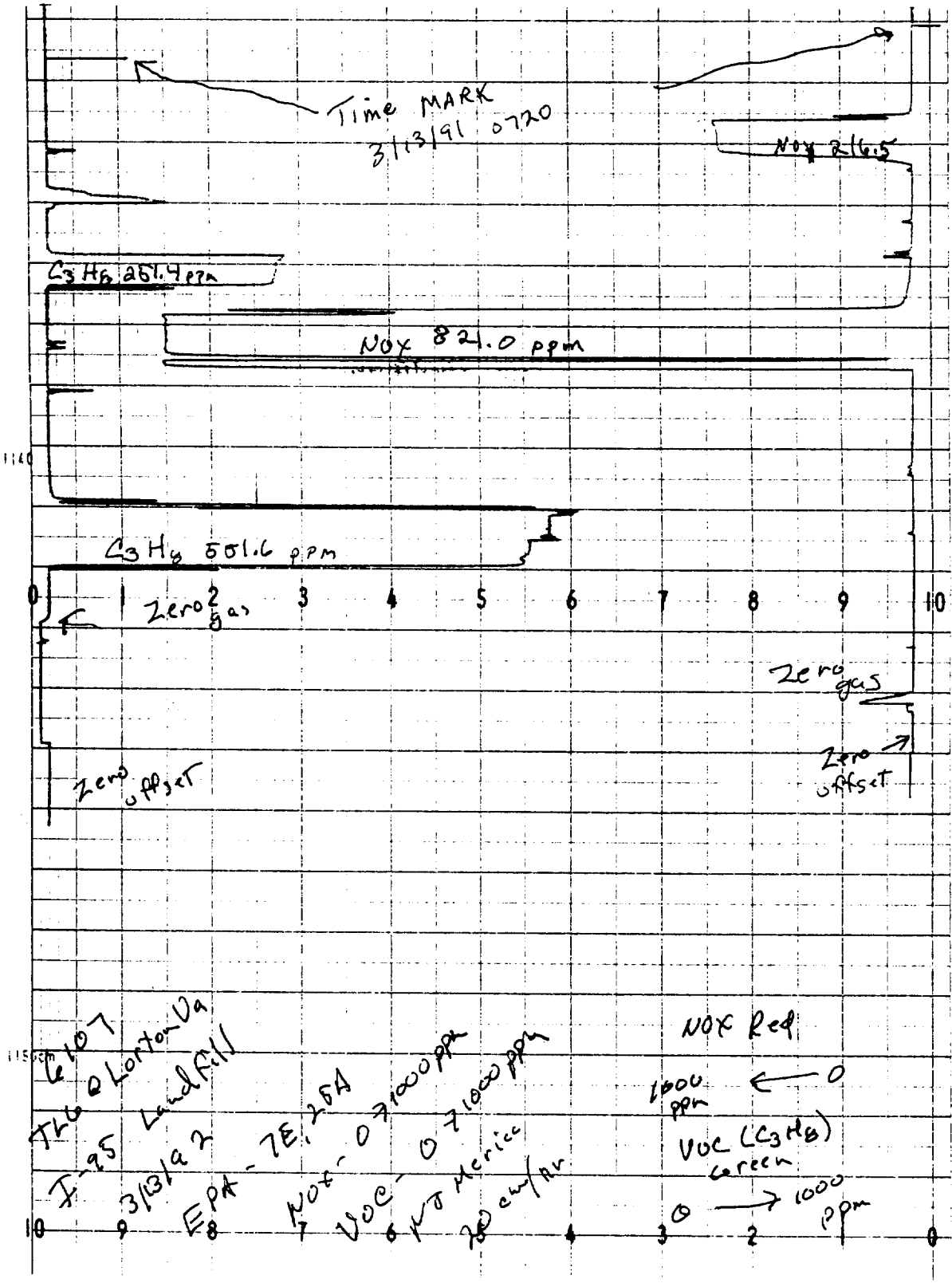
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 3 STACK
March 12, 1992



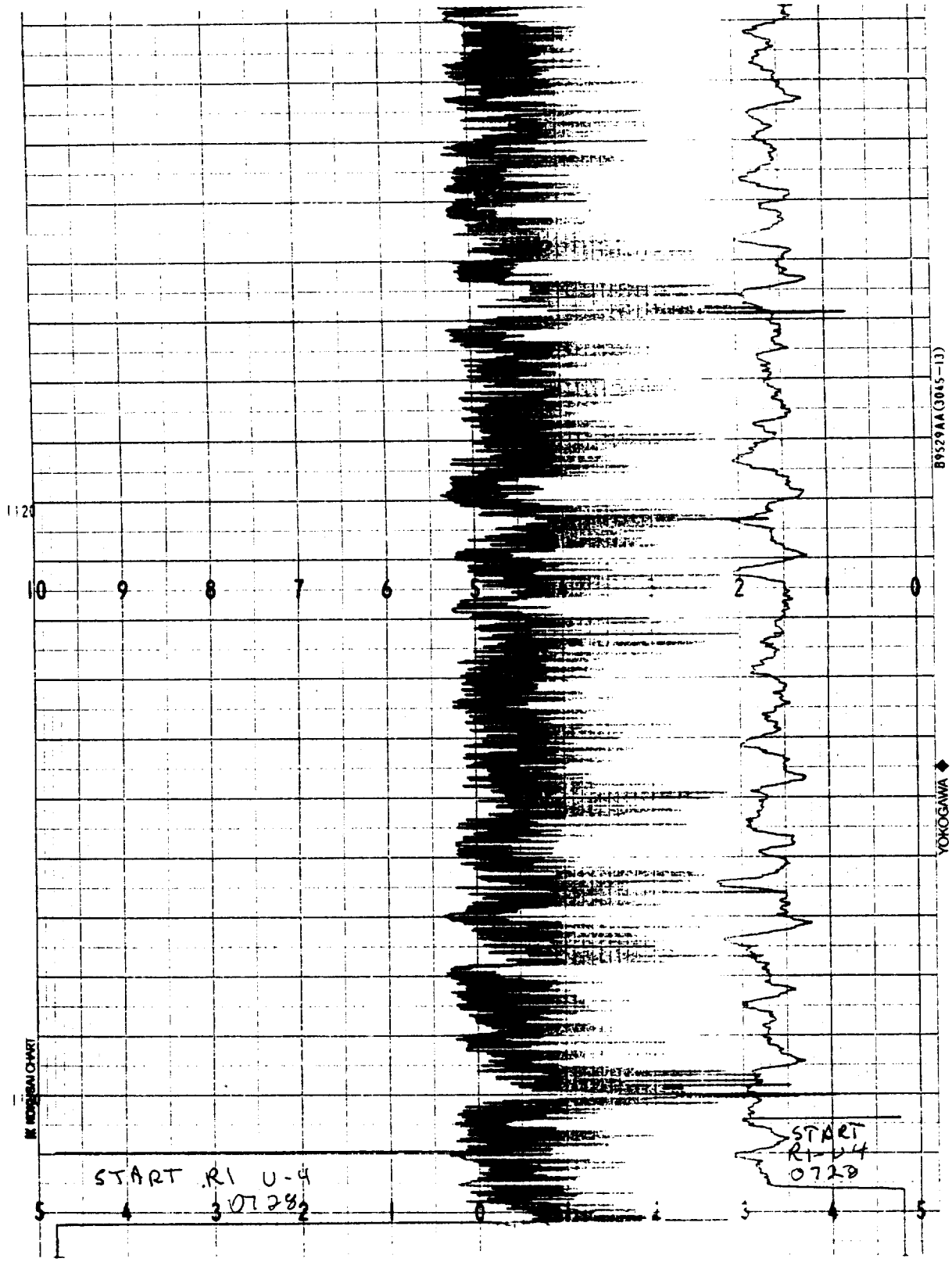
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 3 STACK
March 12, 1992



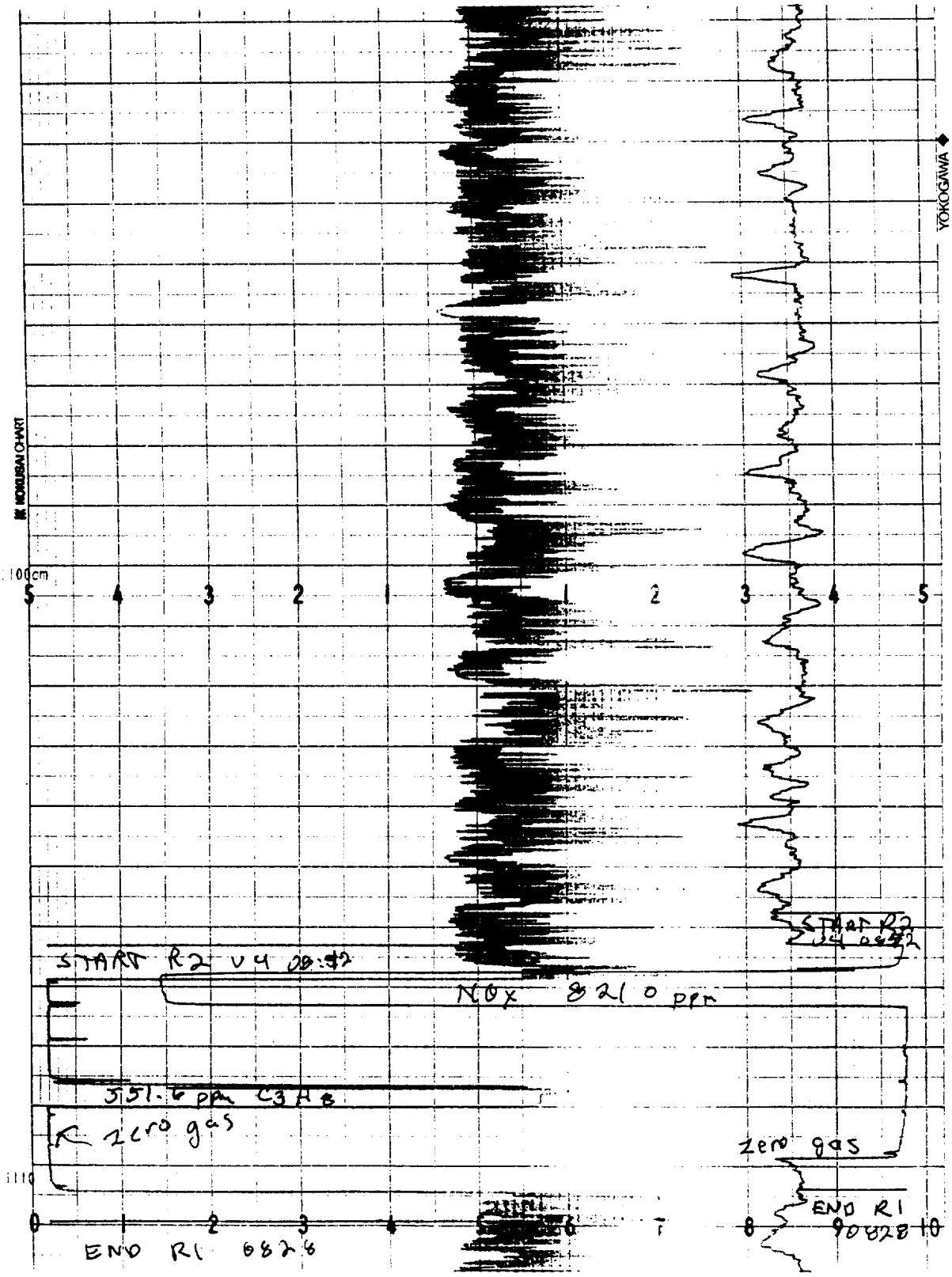
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 4 STACK
March 13, 1992



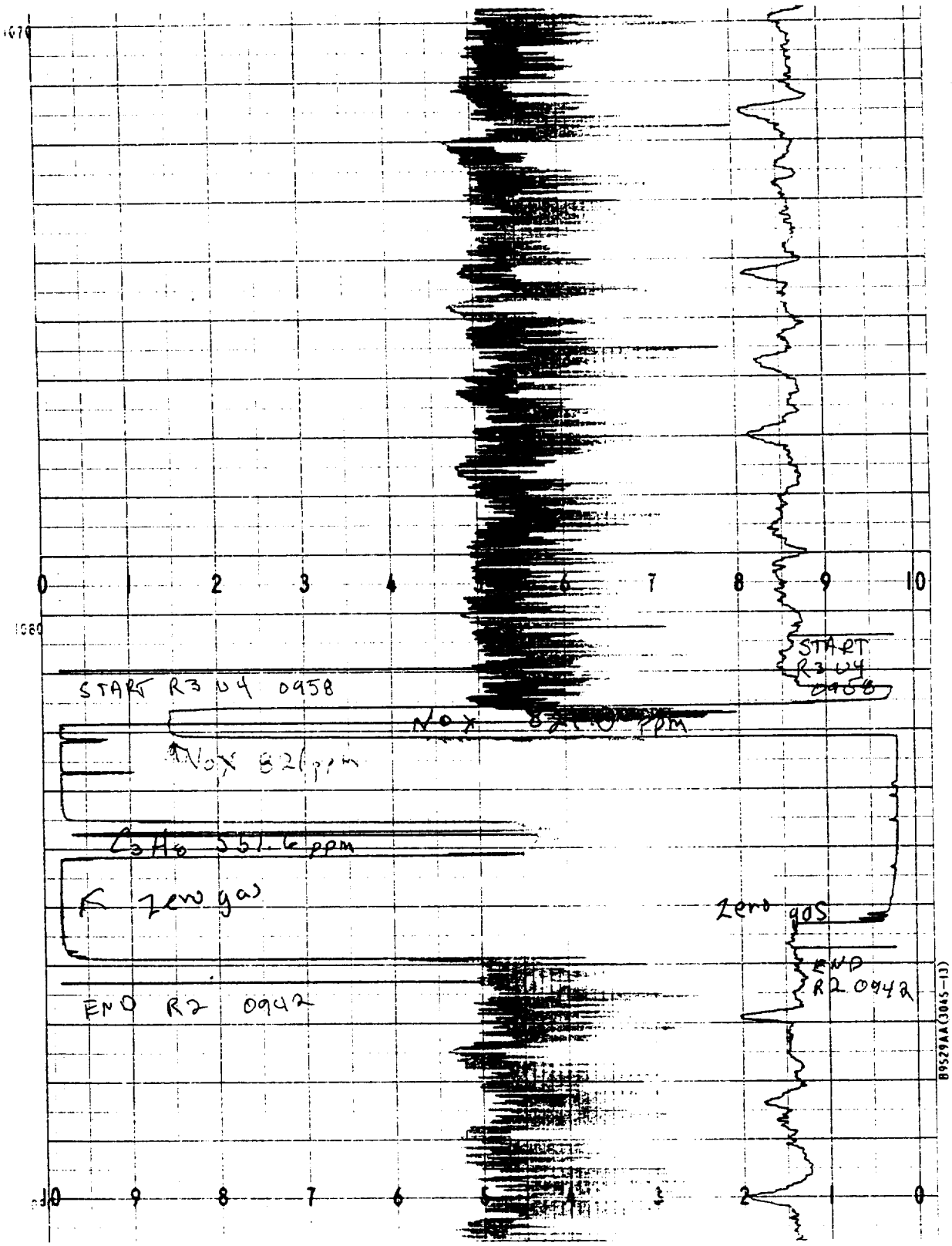
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 4 STACK
March 13, 1992



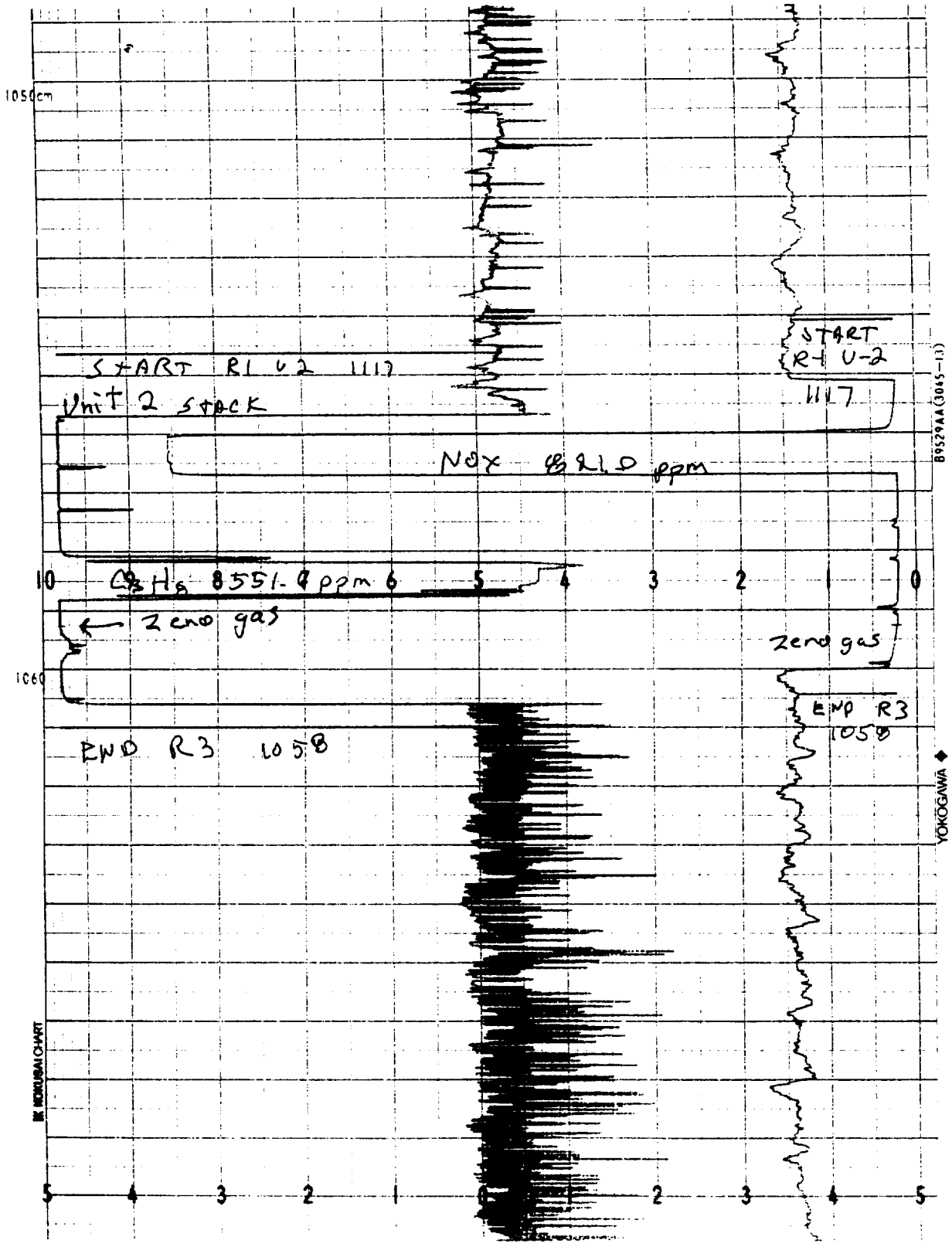
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 4 STACK
March 13, 1992



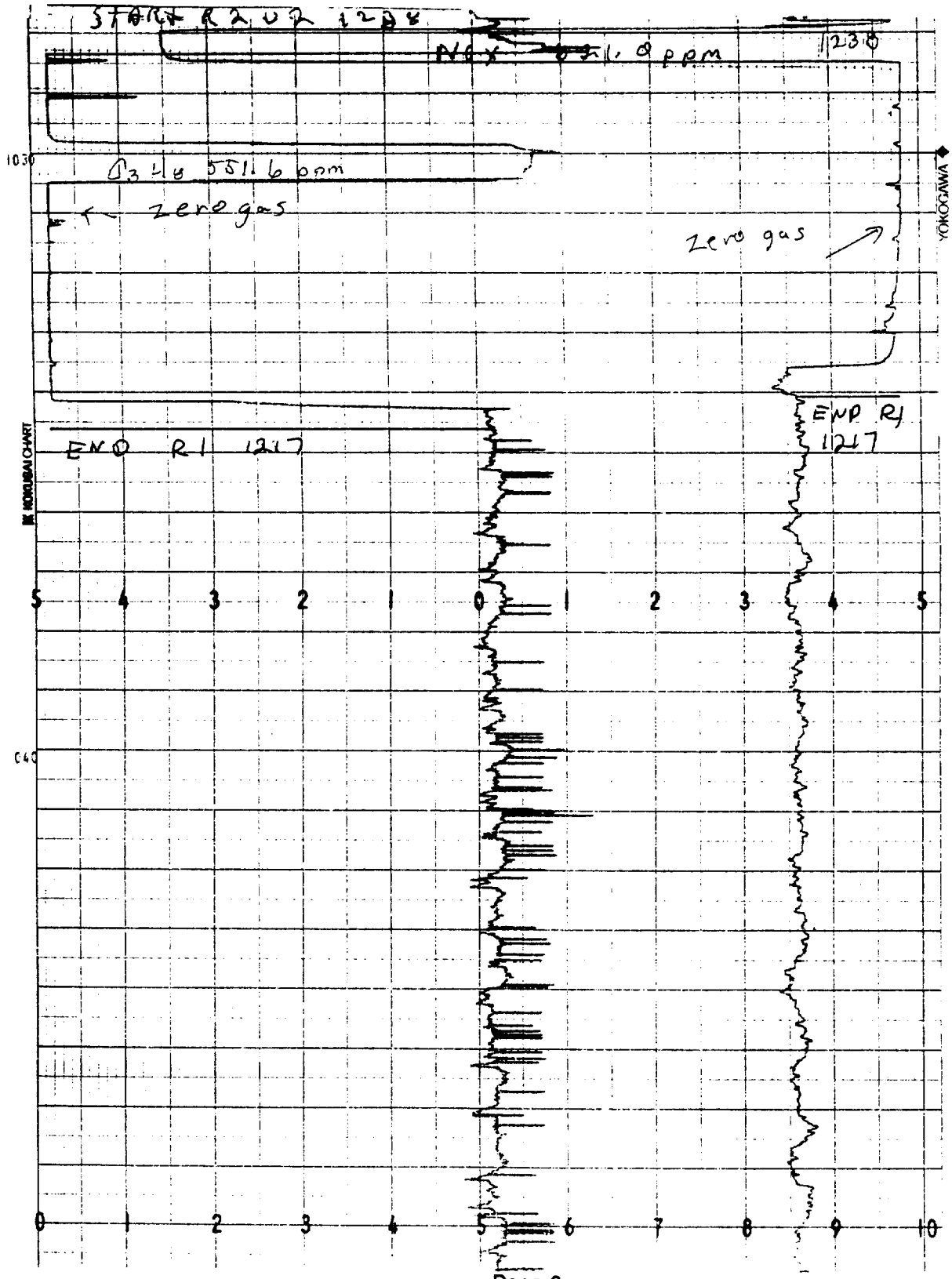
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 4 STACK
March 13, 1992



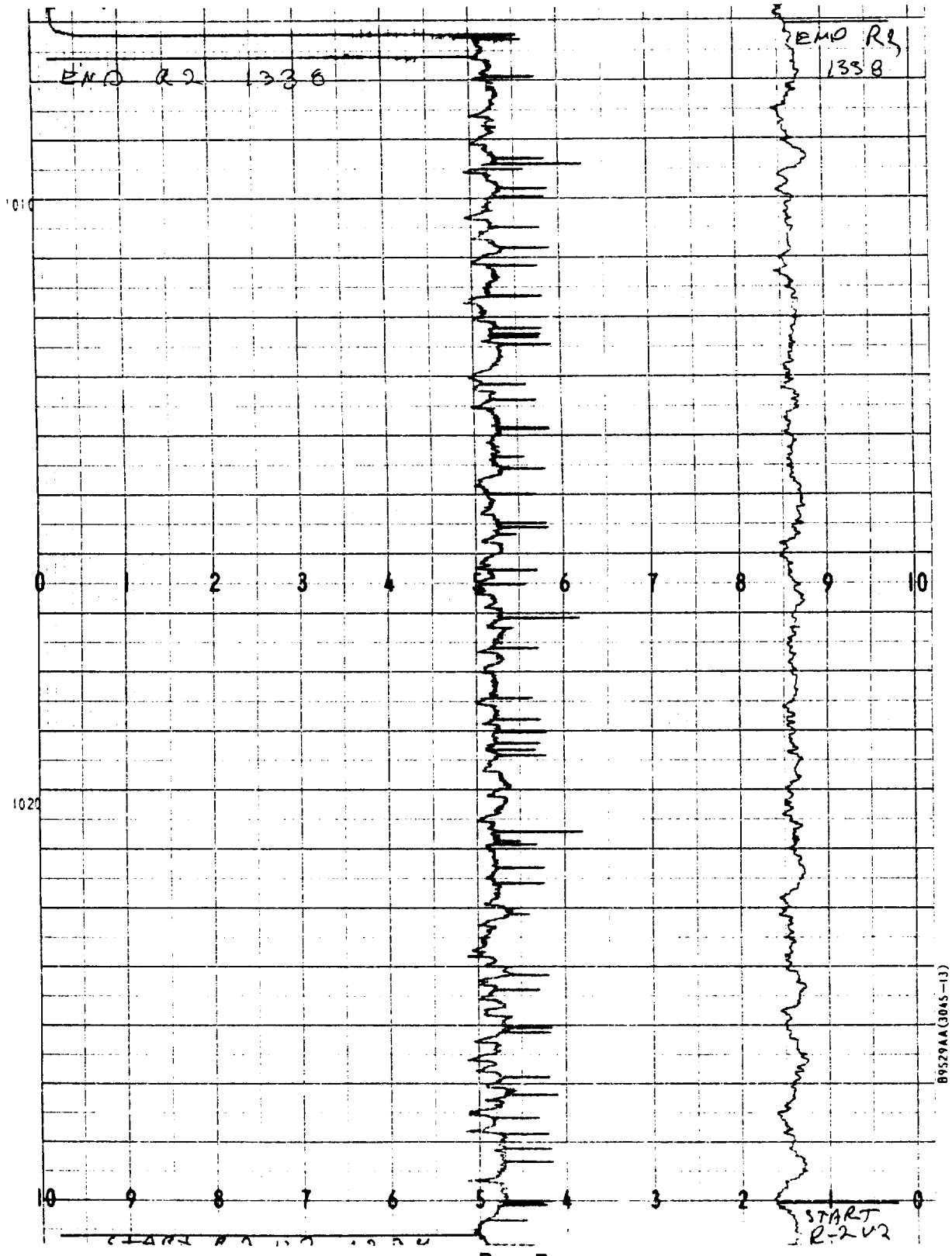
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 4 STACK
March 13, 1992



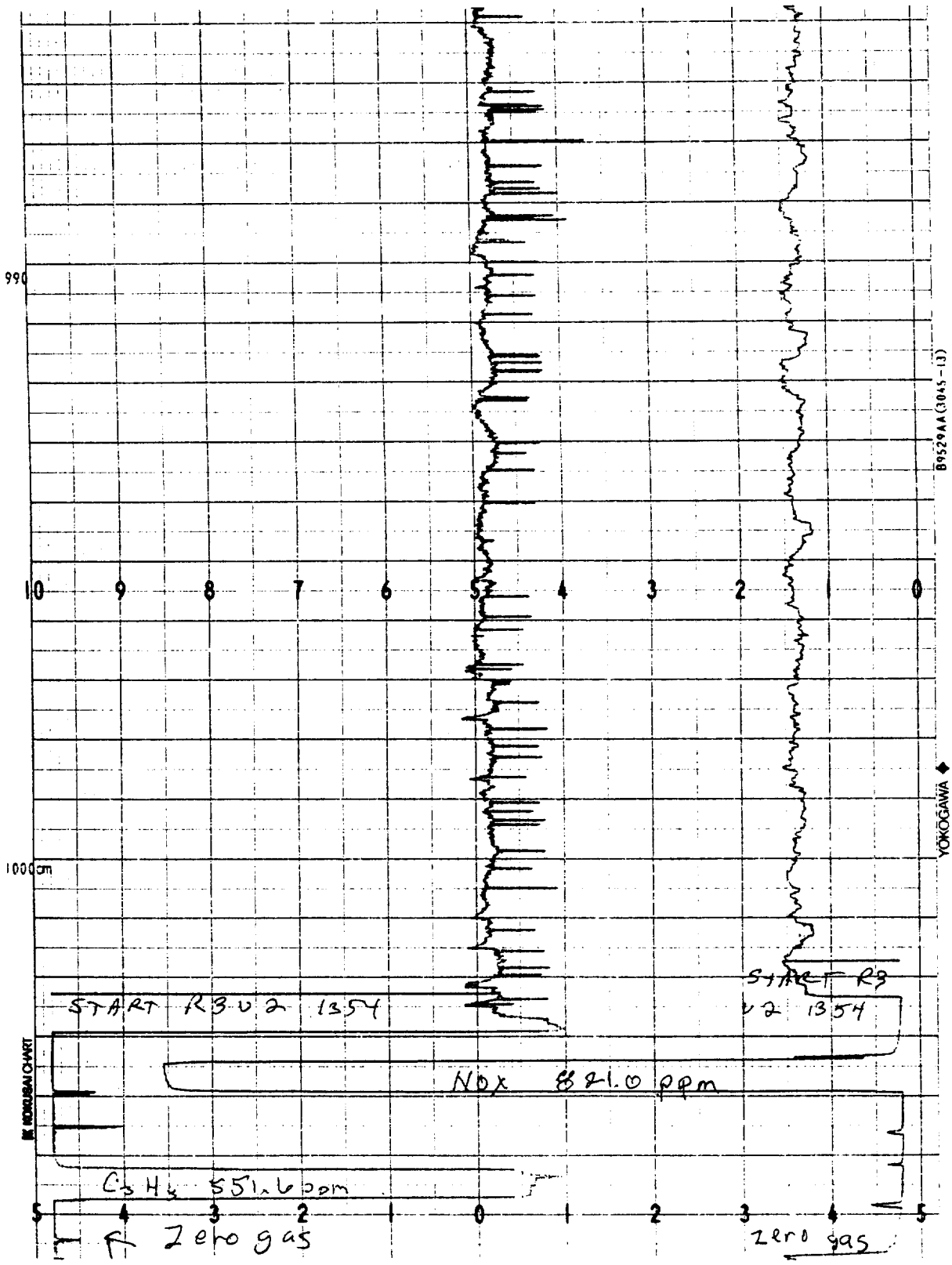
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 2 STACK
March 13, 1992



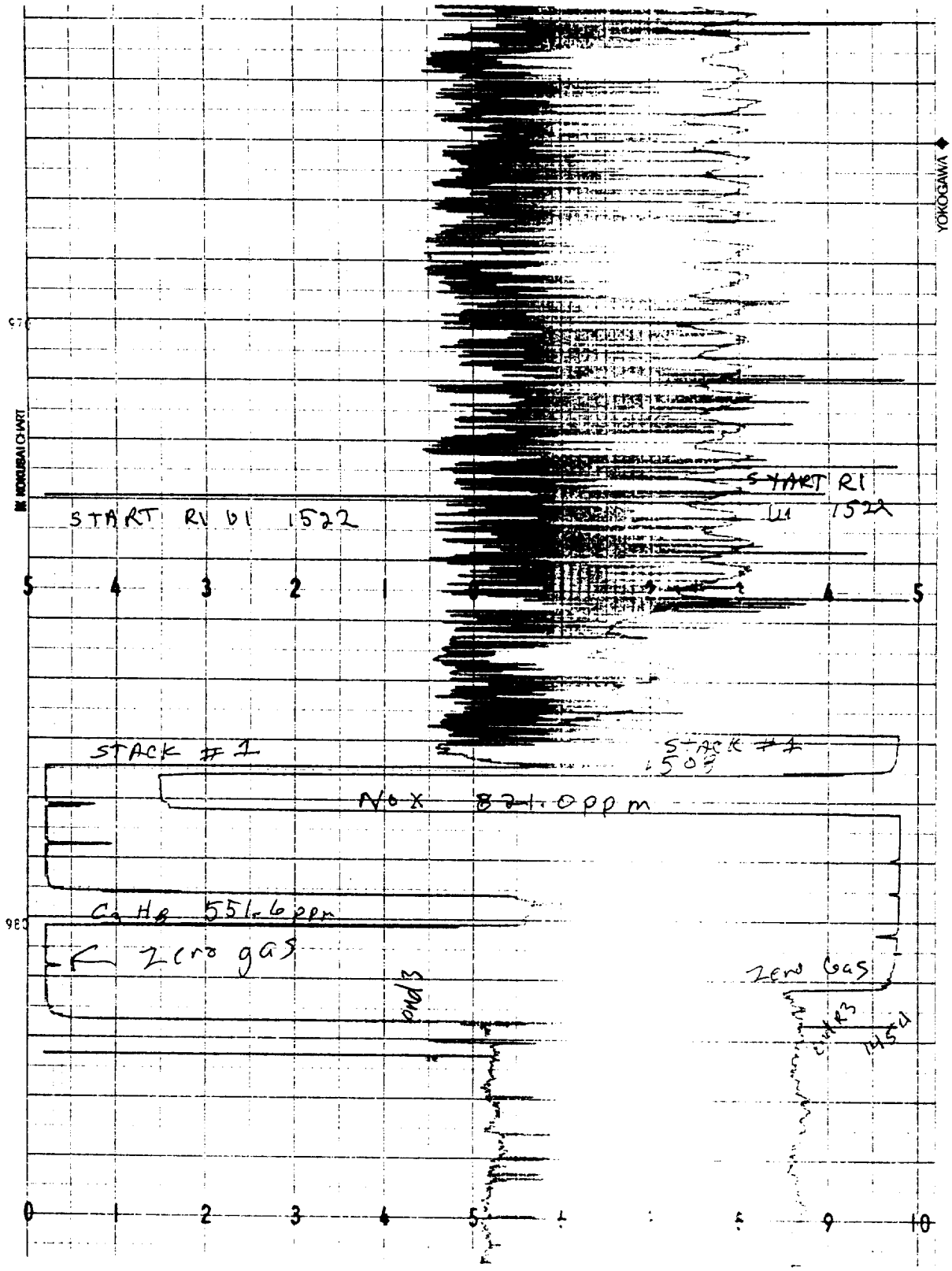
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 2 STACK
March 13, 1992



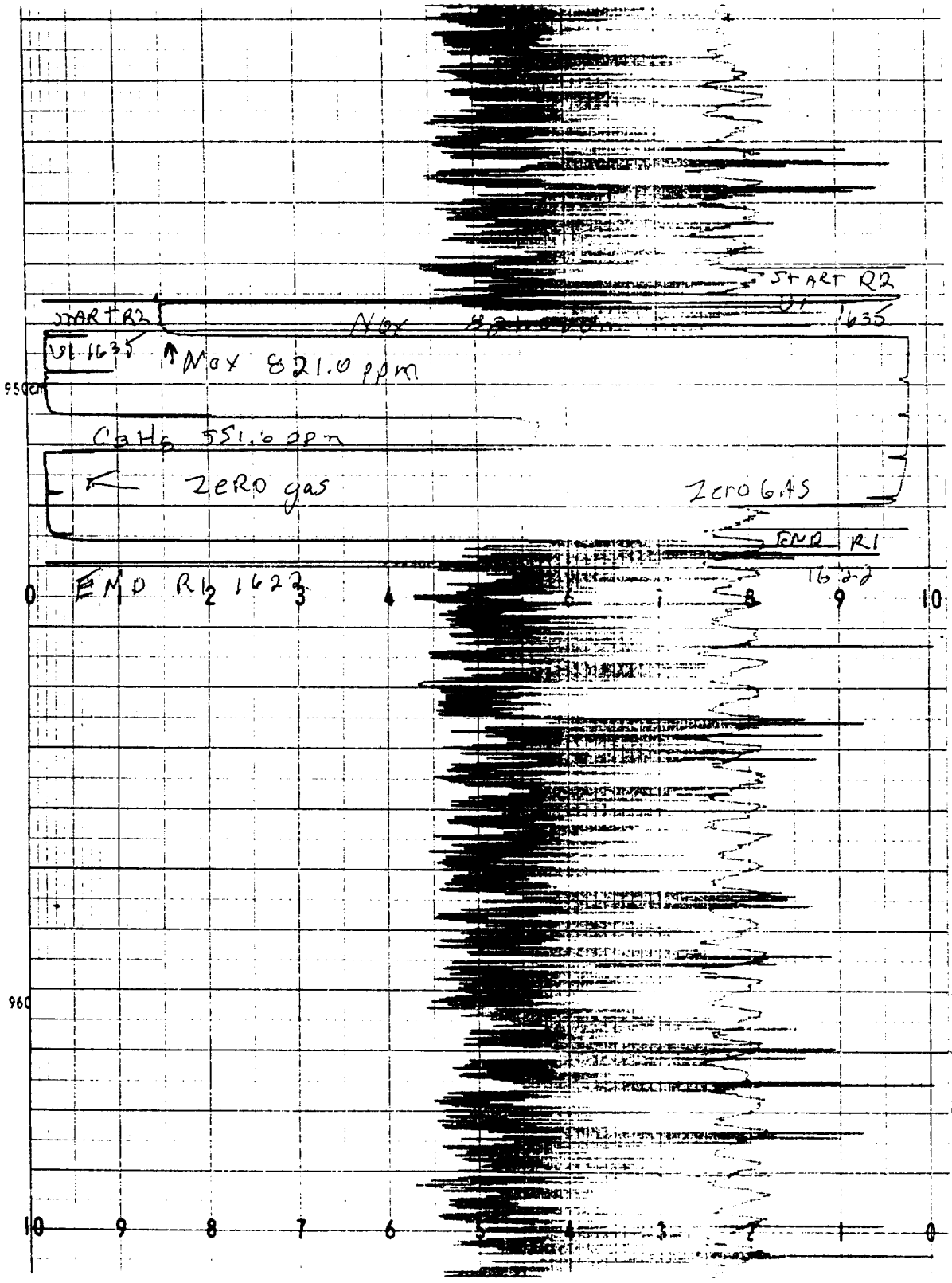
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 2 STACK
March 13, 1992



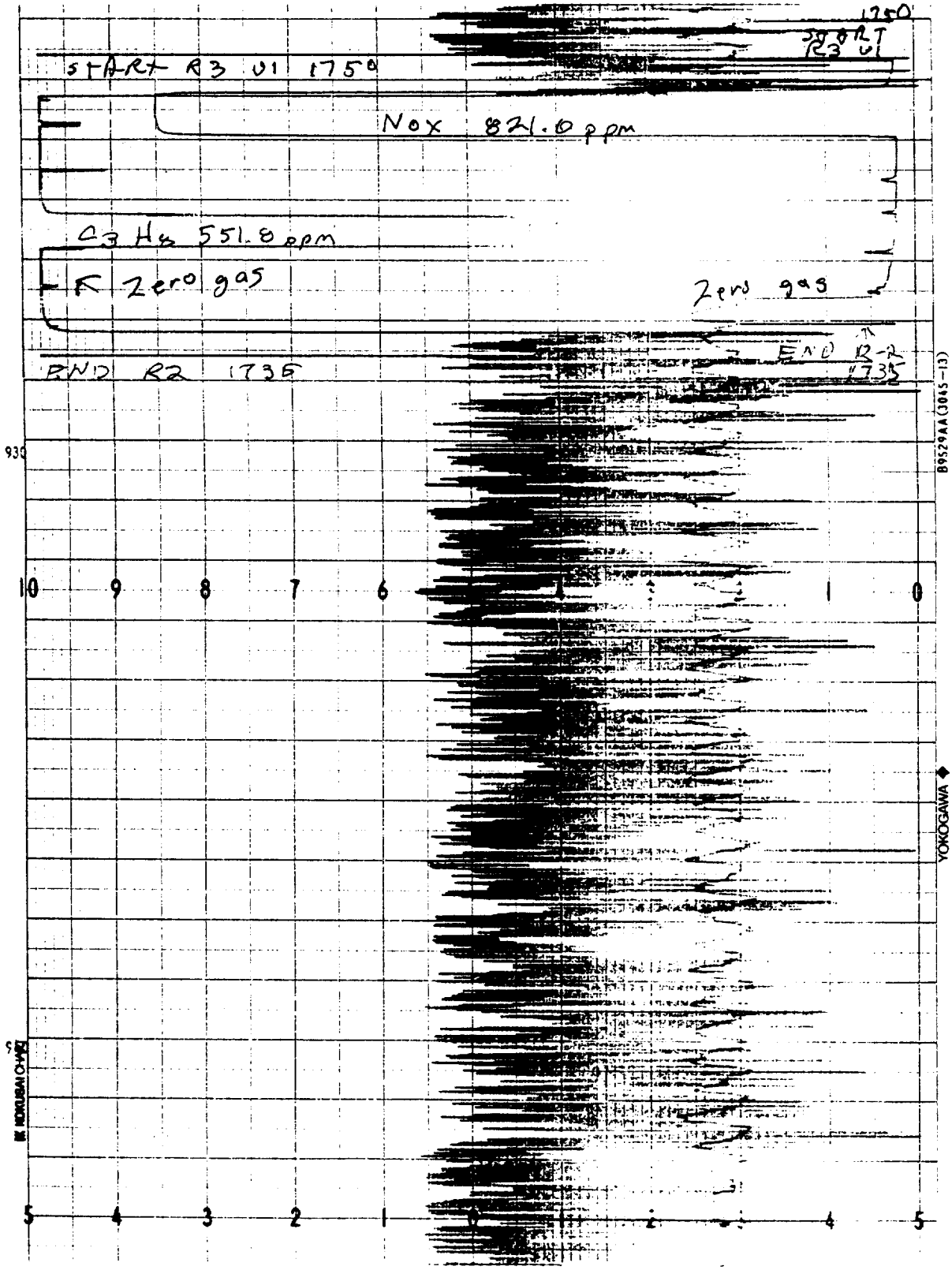
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 2 STACK
March 13, 1992



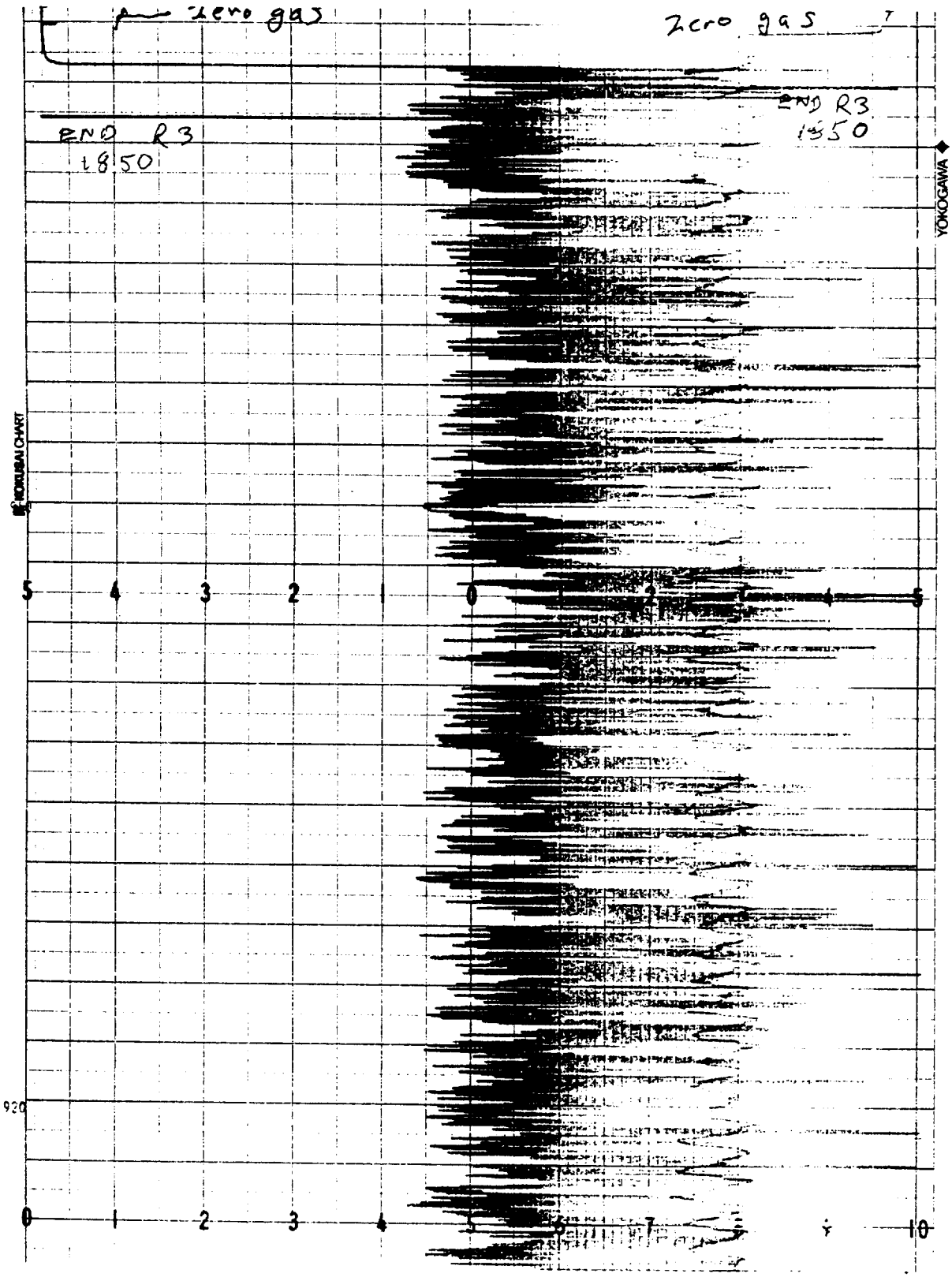
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 1 STACK
March 13, 1992



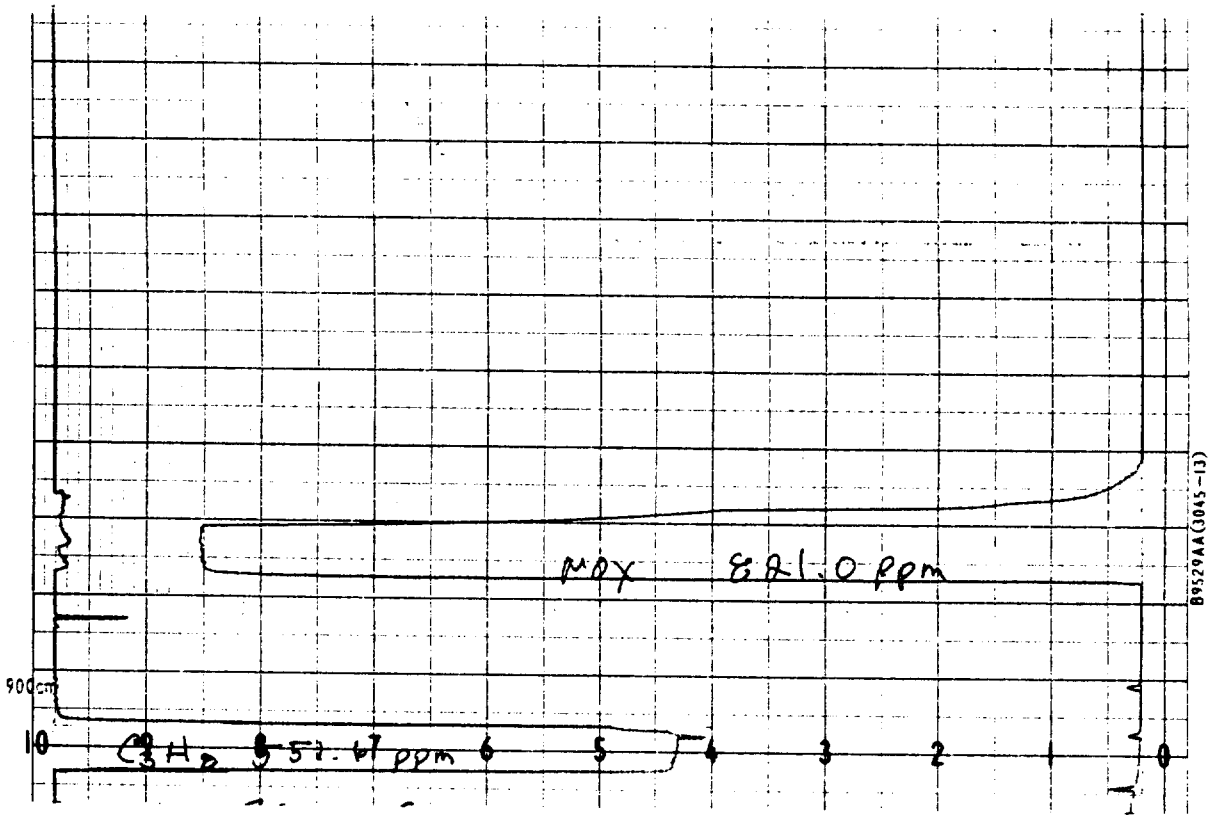
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 1 STACK
March 13, 1992



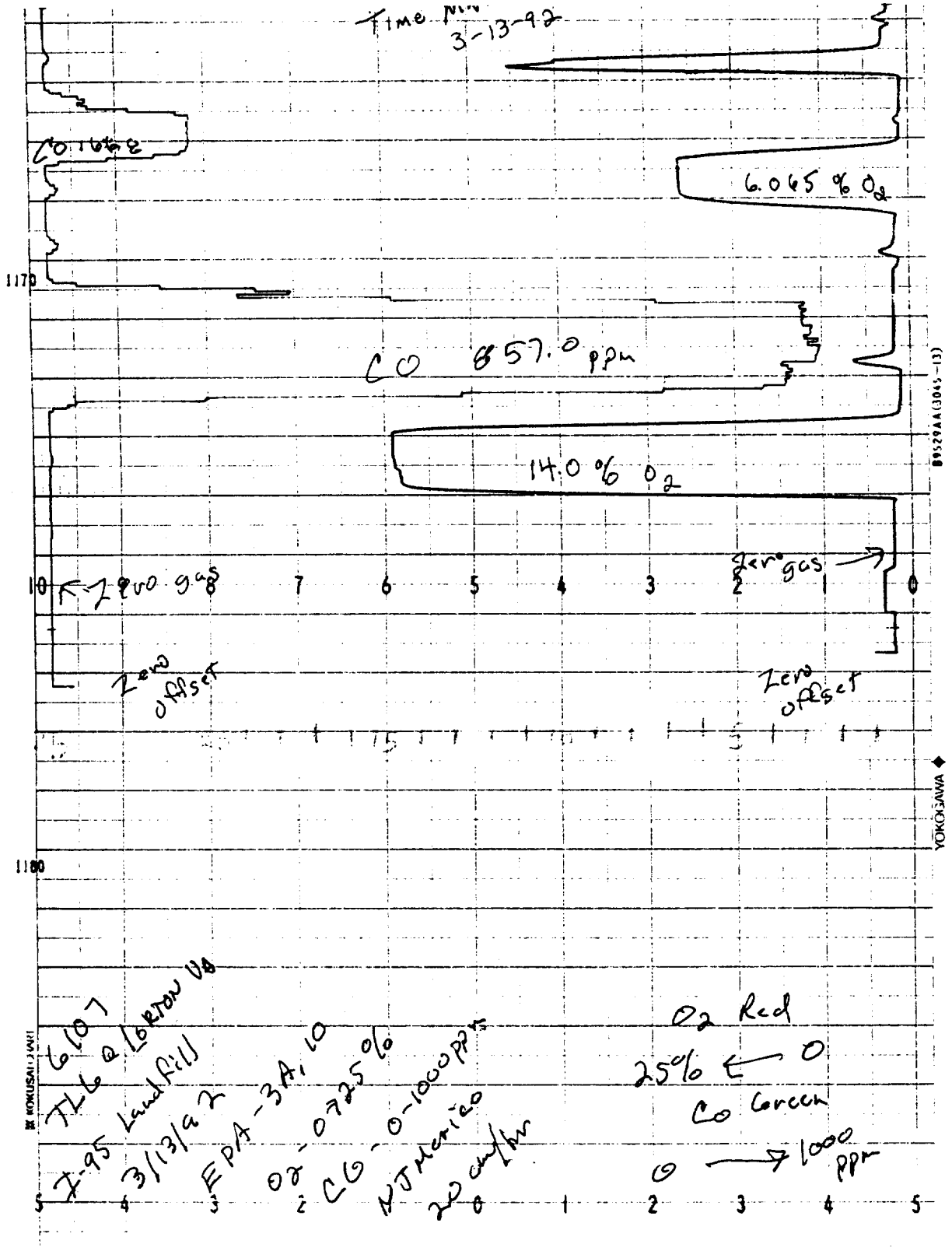
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 1 STACK
March 13, 1992



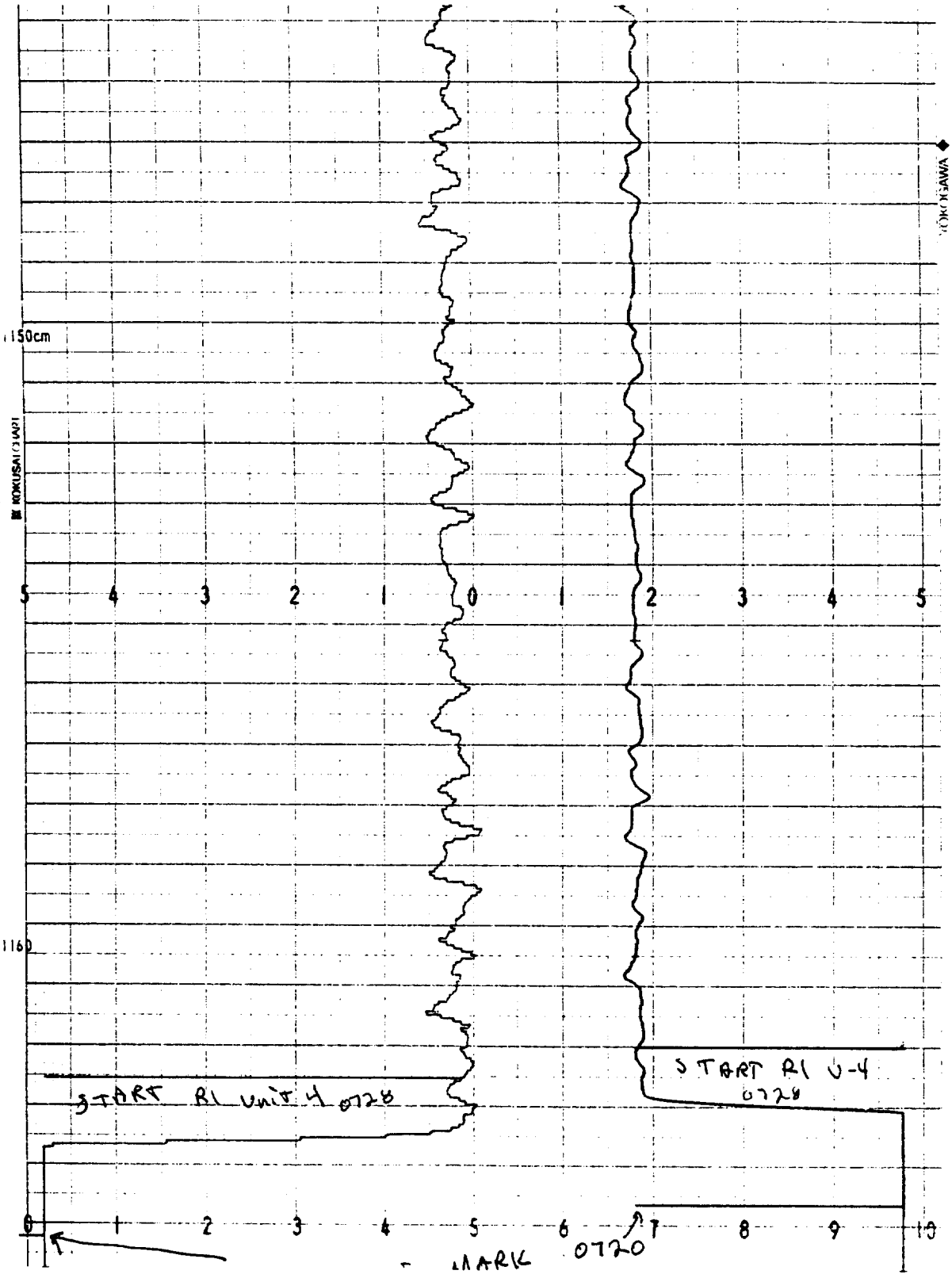
TLG ENGINEERING, INC.
TOTAL HYDROCARBONS CONCENTRATION (ppm)
NITROGEN OXIDES CONCENTRATION (ppm)
UNIT 1 STACK



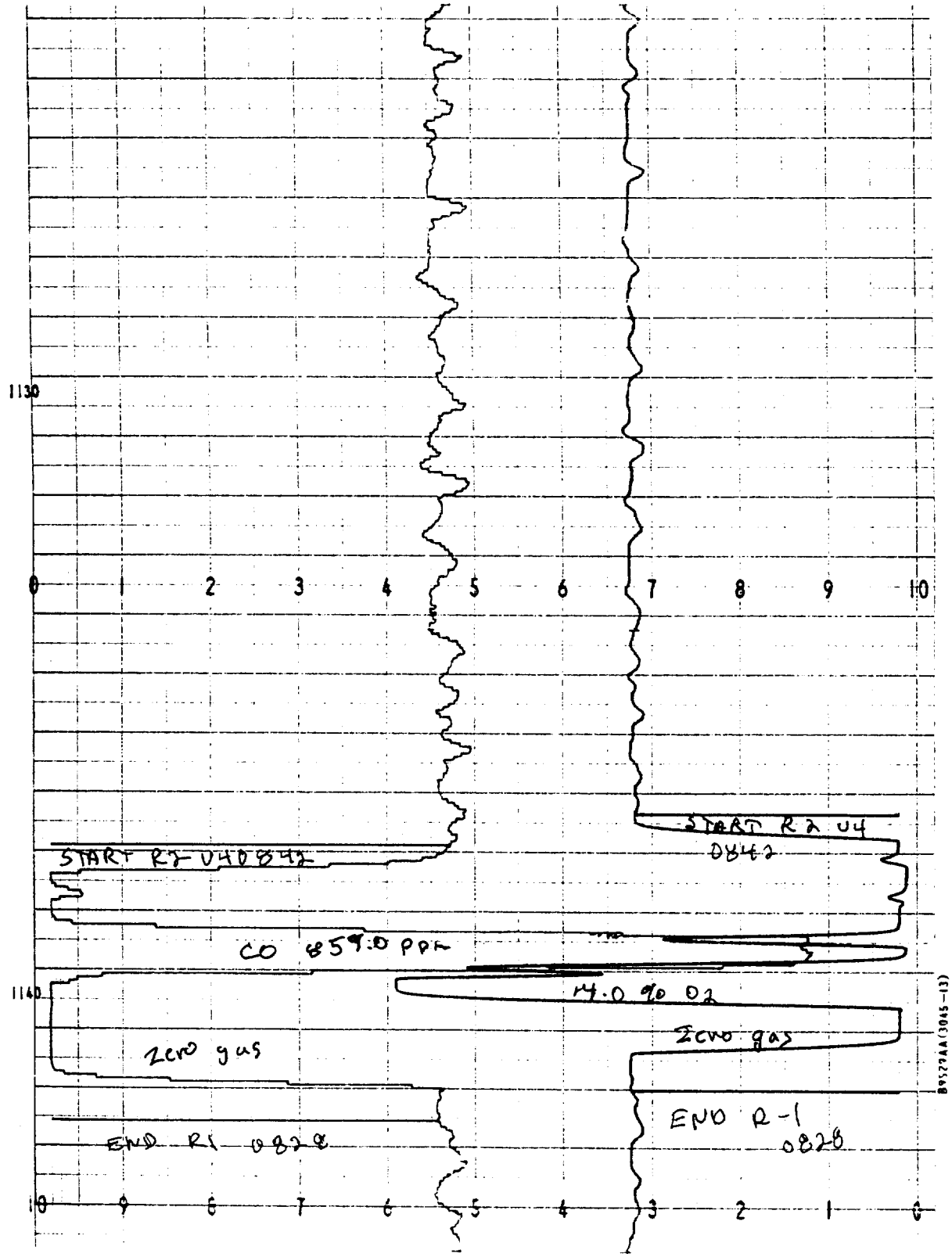
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 4 STACK
March 13, 1992



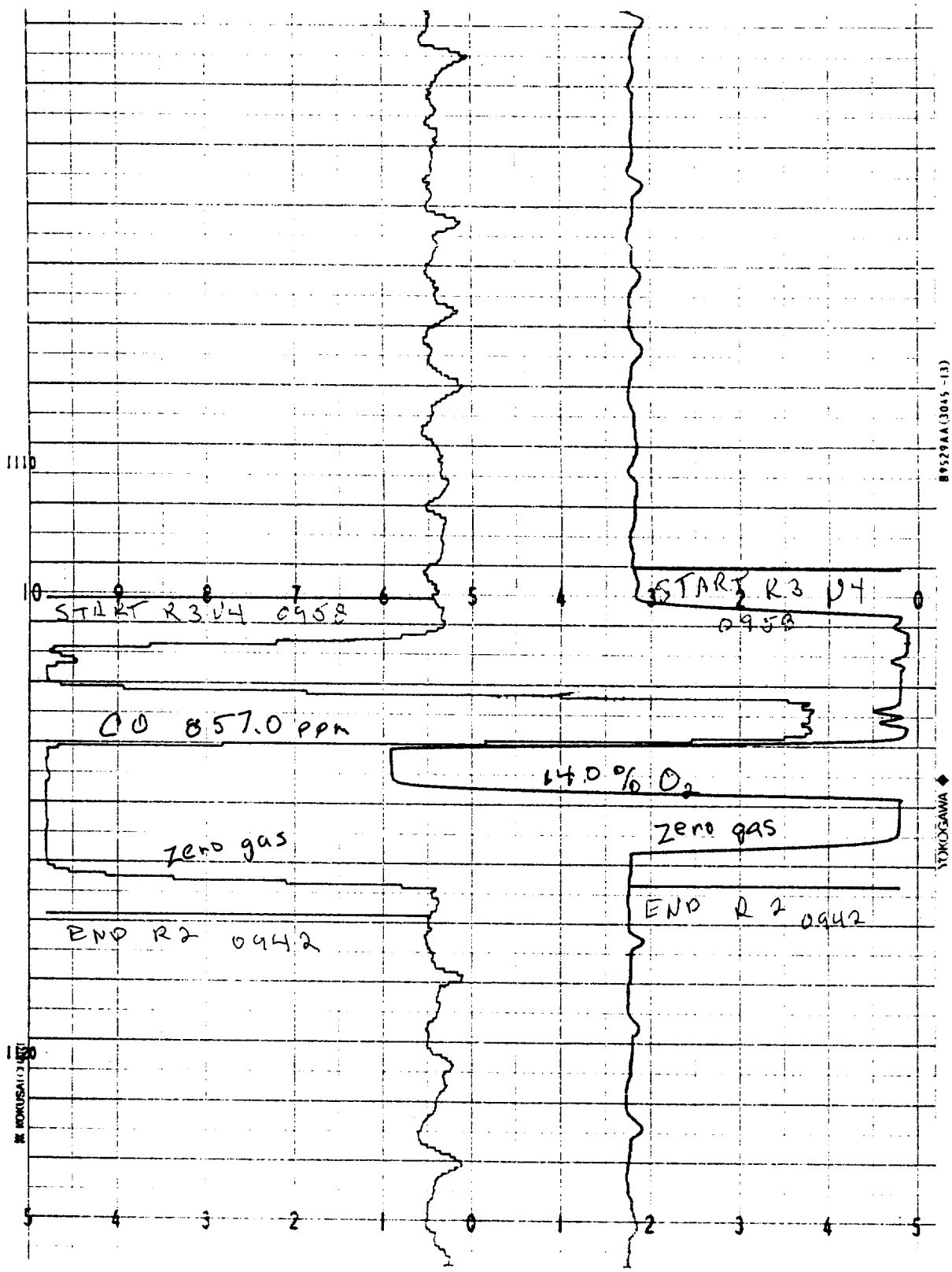
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 4 STACK
March 13, 1992



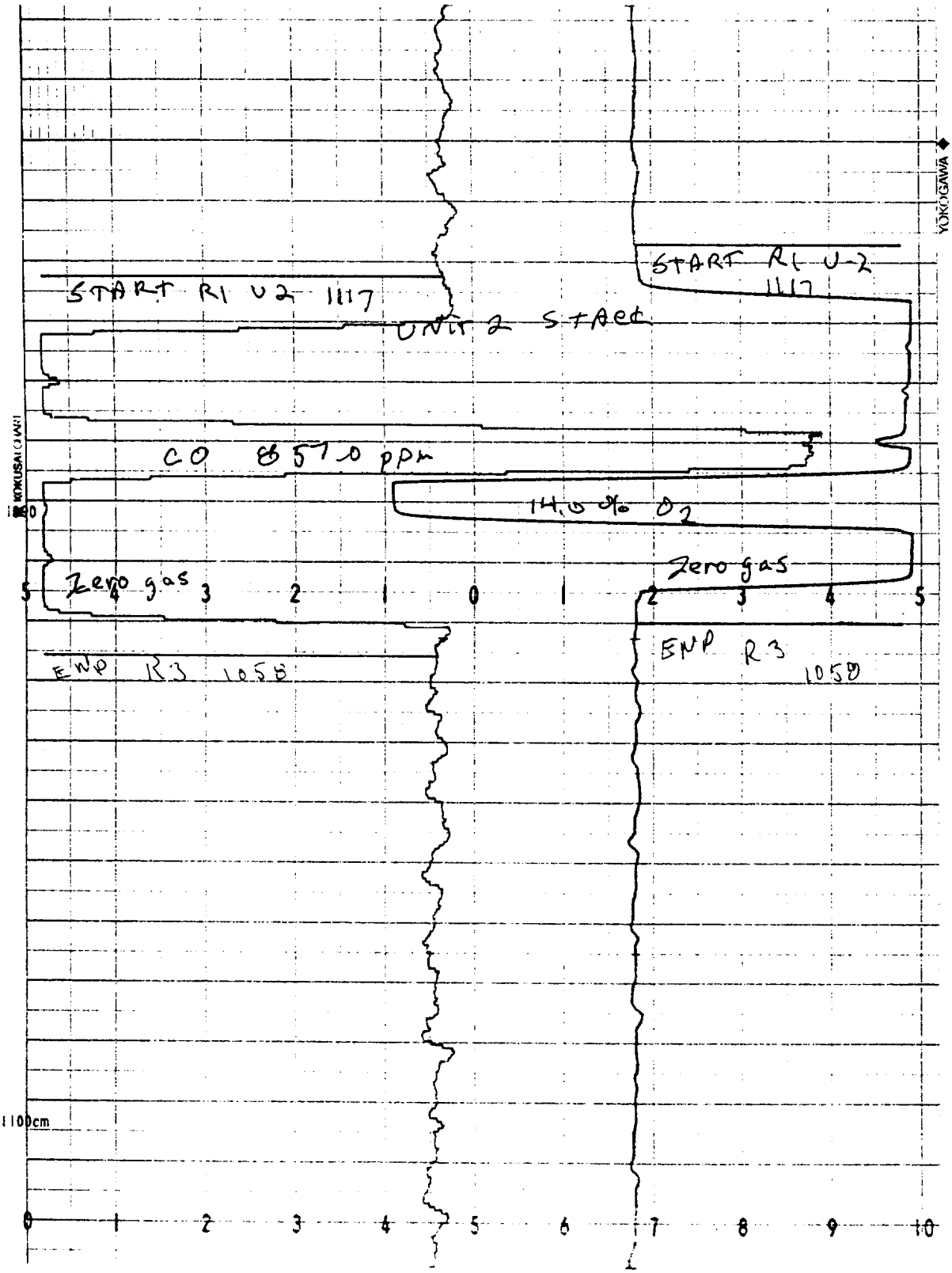
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 4 STACK
March 13, 1992



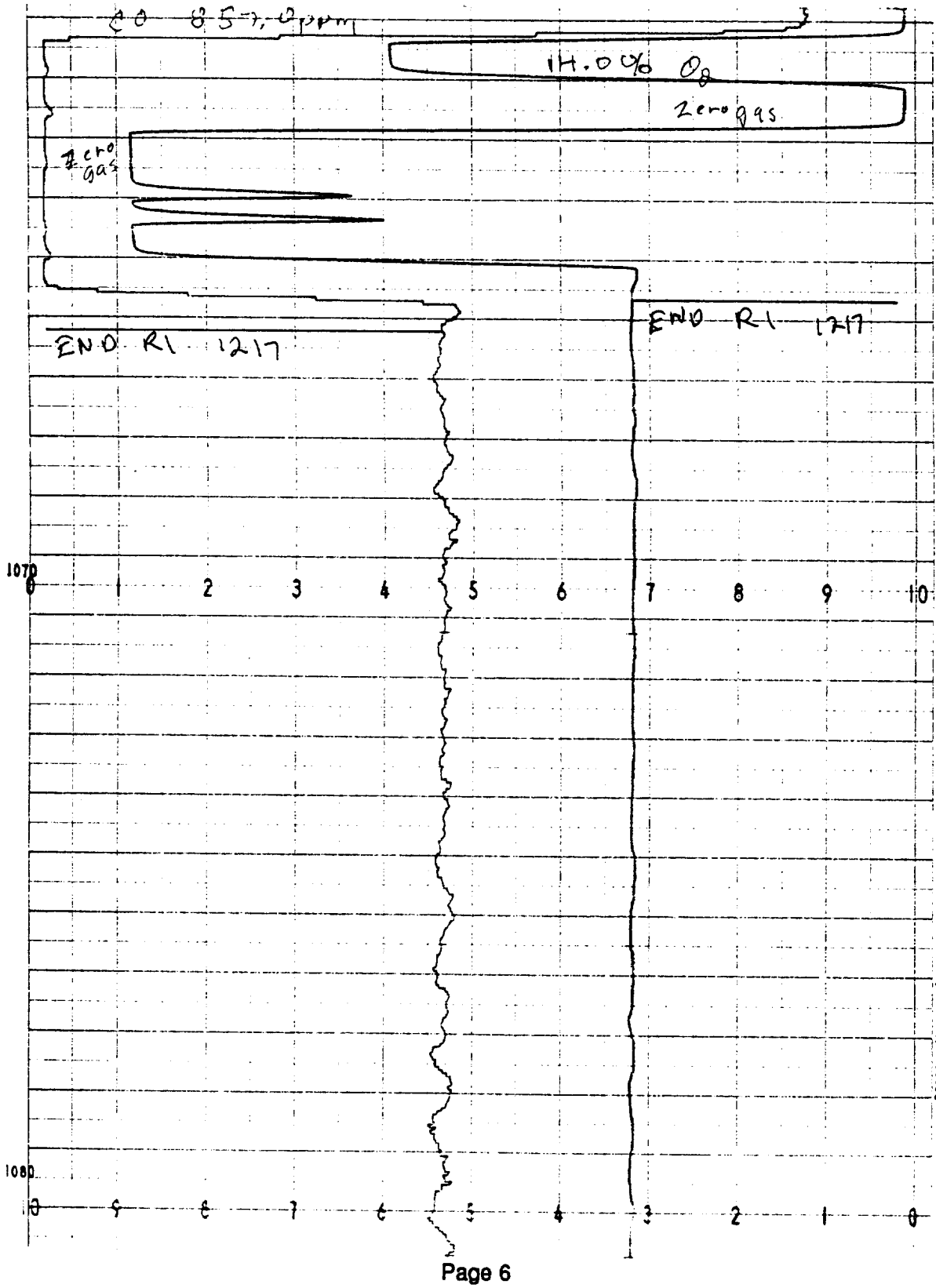
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 4 STACK
March 13, 1992



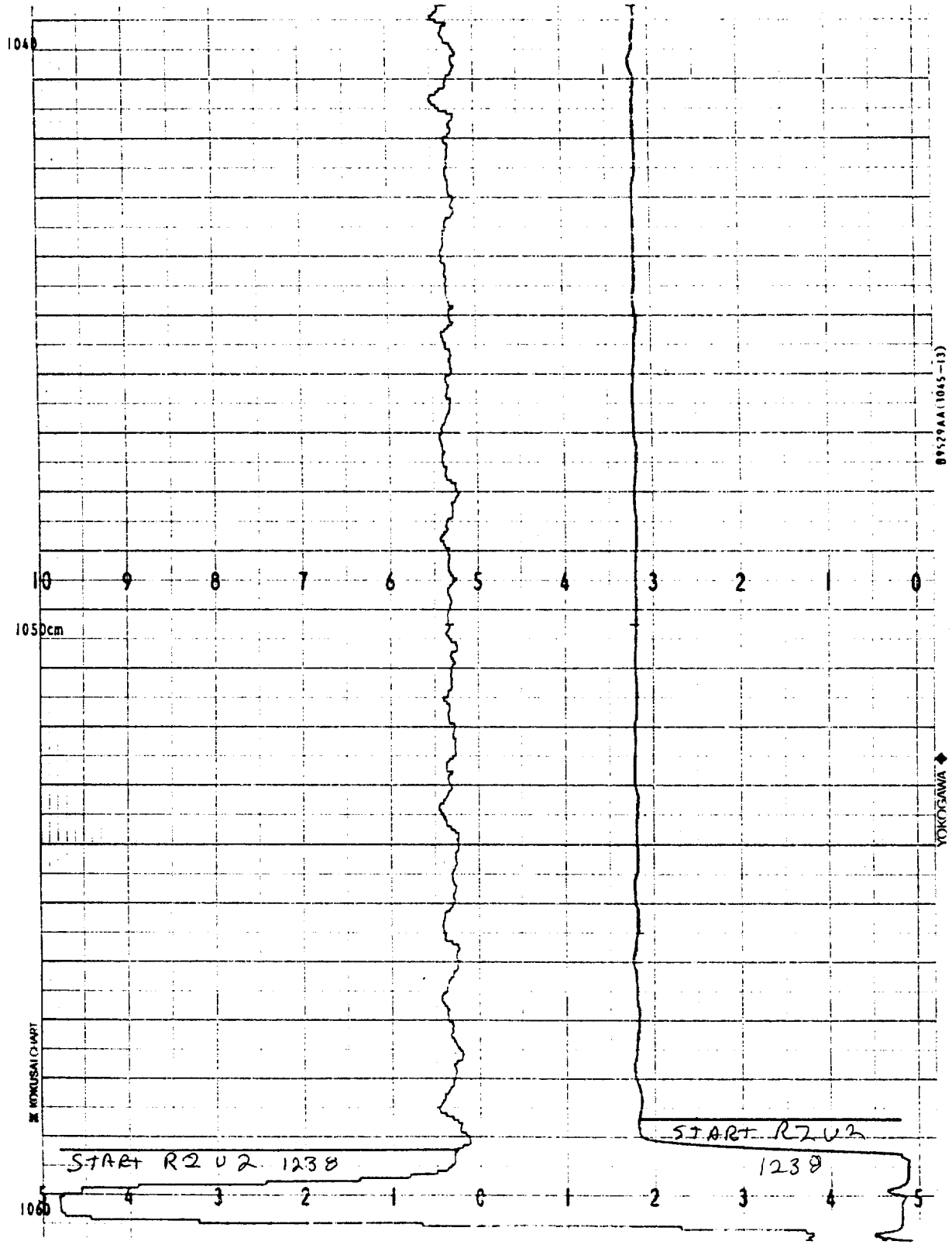
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 4 STACK
March 13, 1992



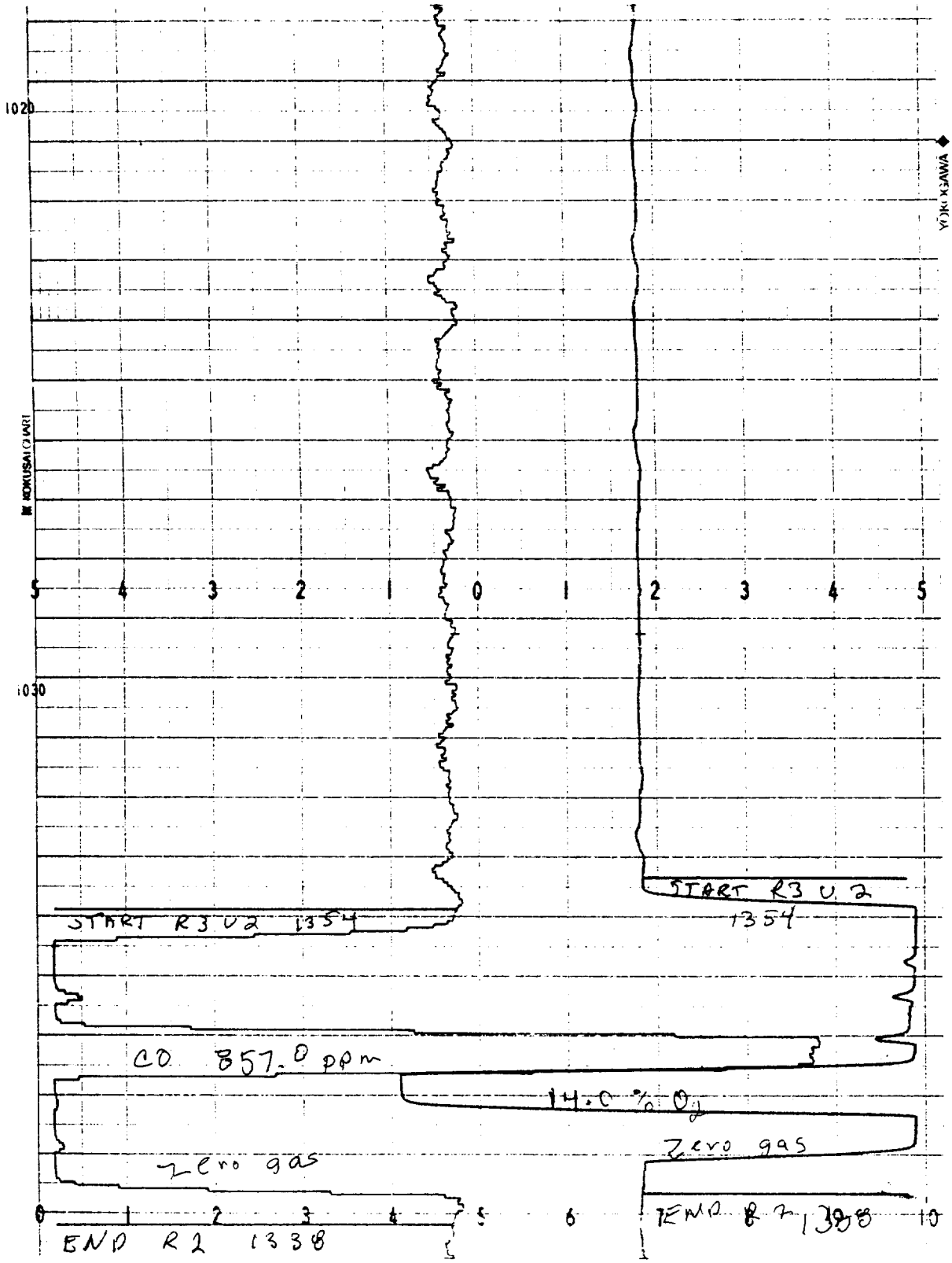
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 2 STACK
March 13, 1992



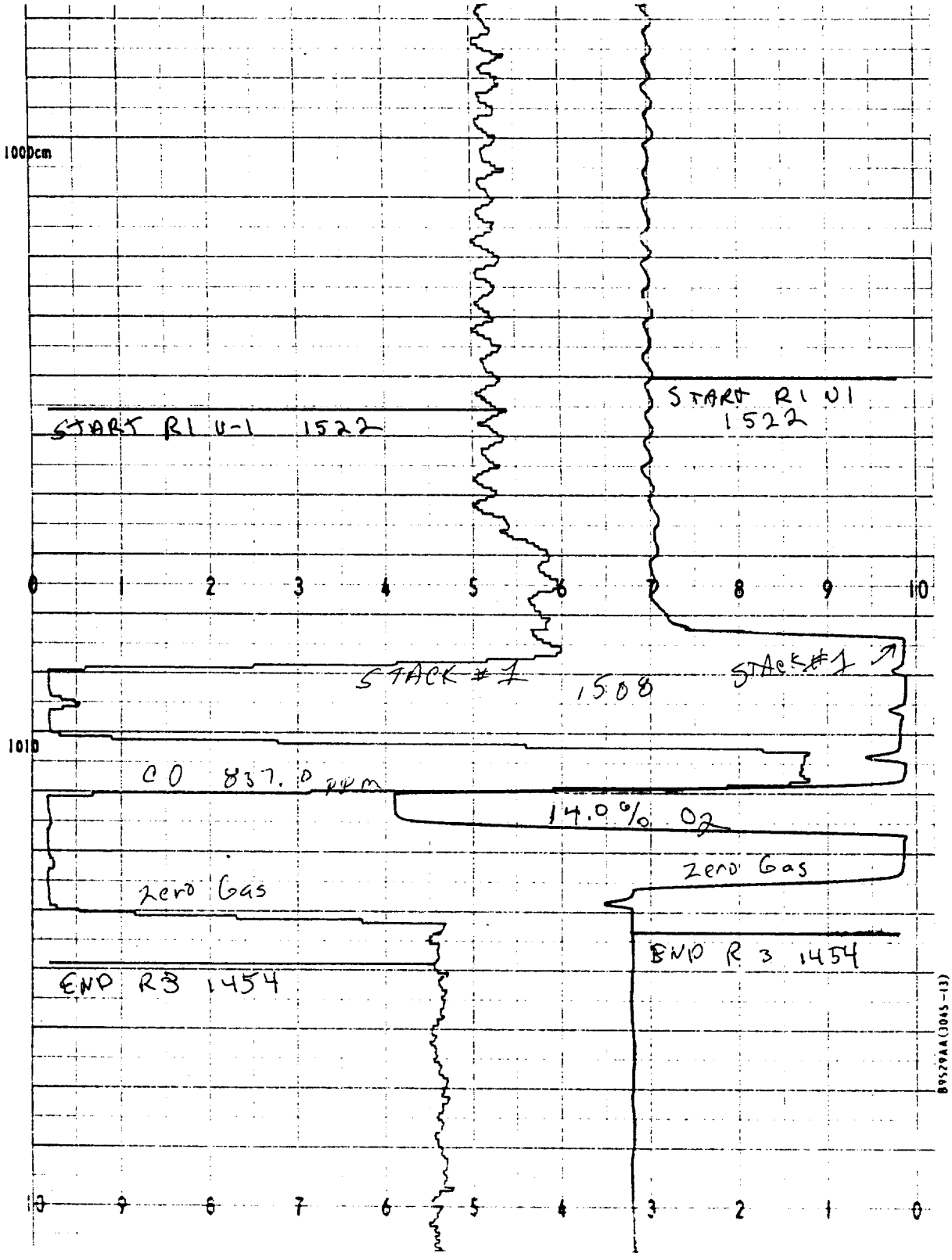
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 2 STACK
March 13, 1992



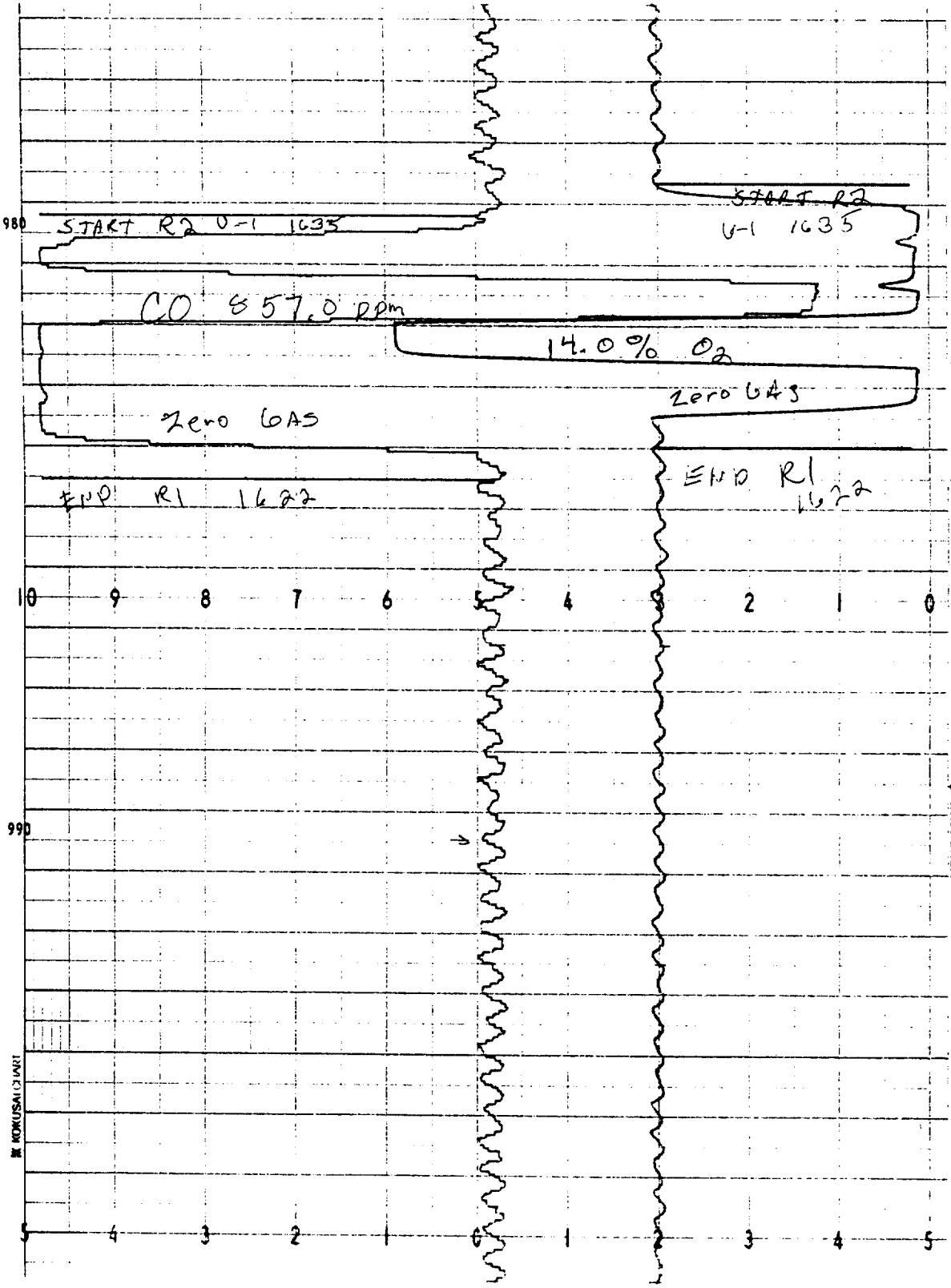
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 2 STACK
March 13, 1992



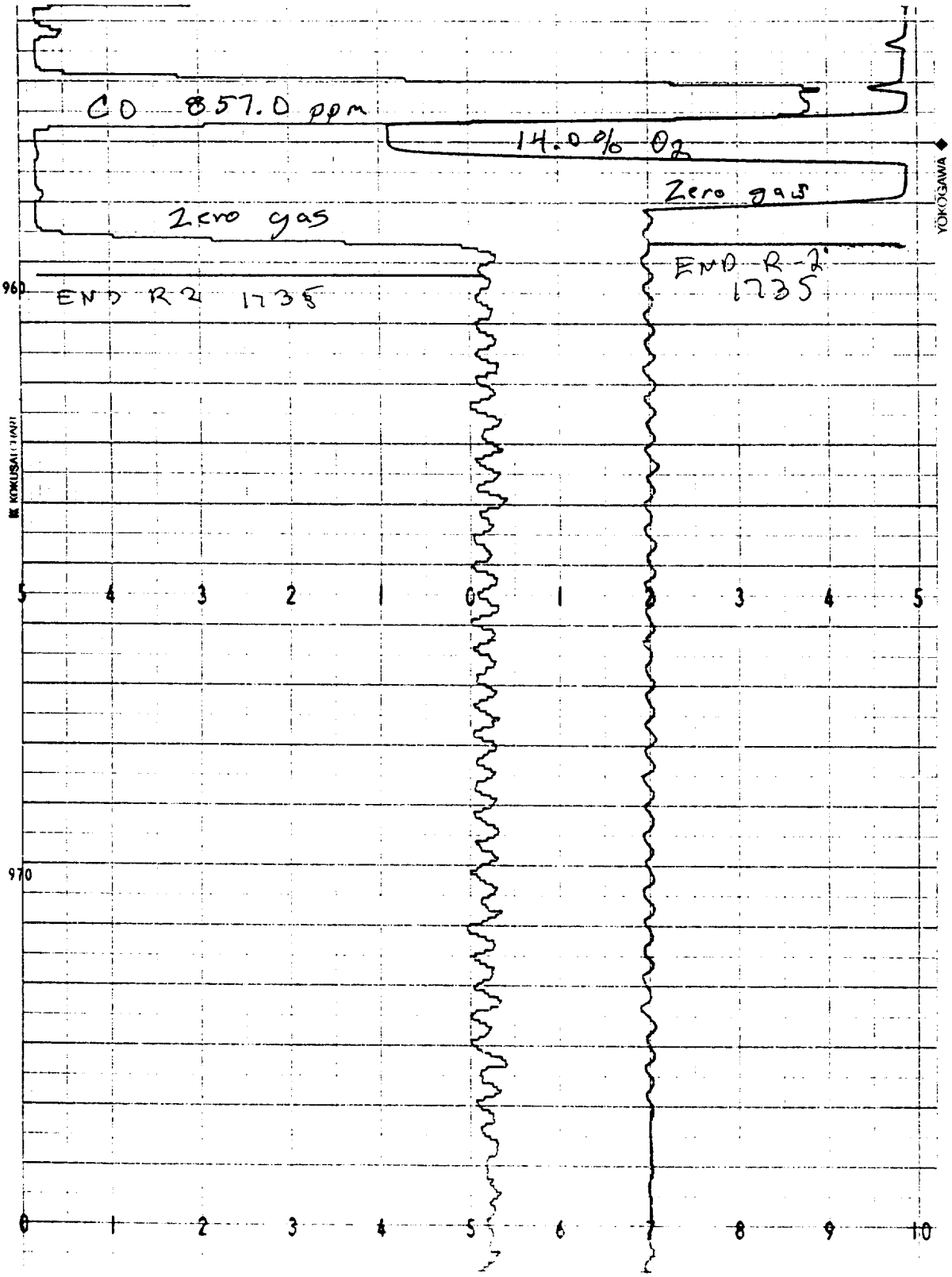
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 2 STACK
March 13, 1992



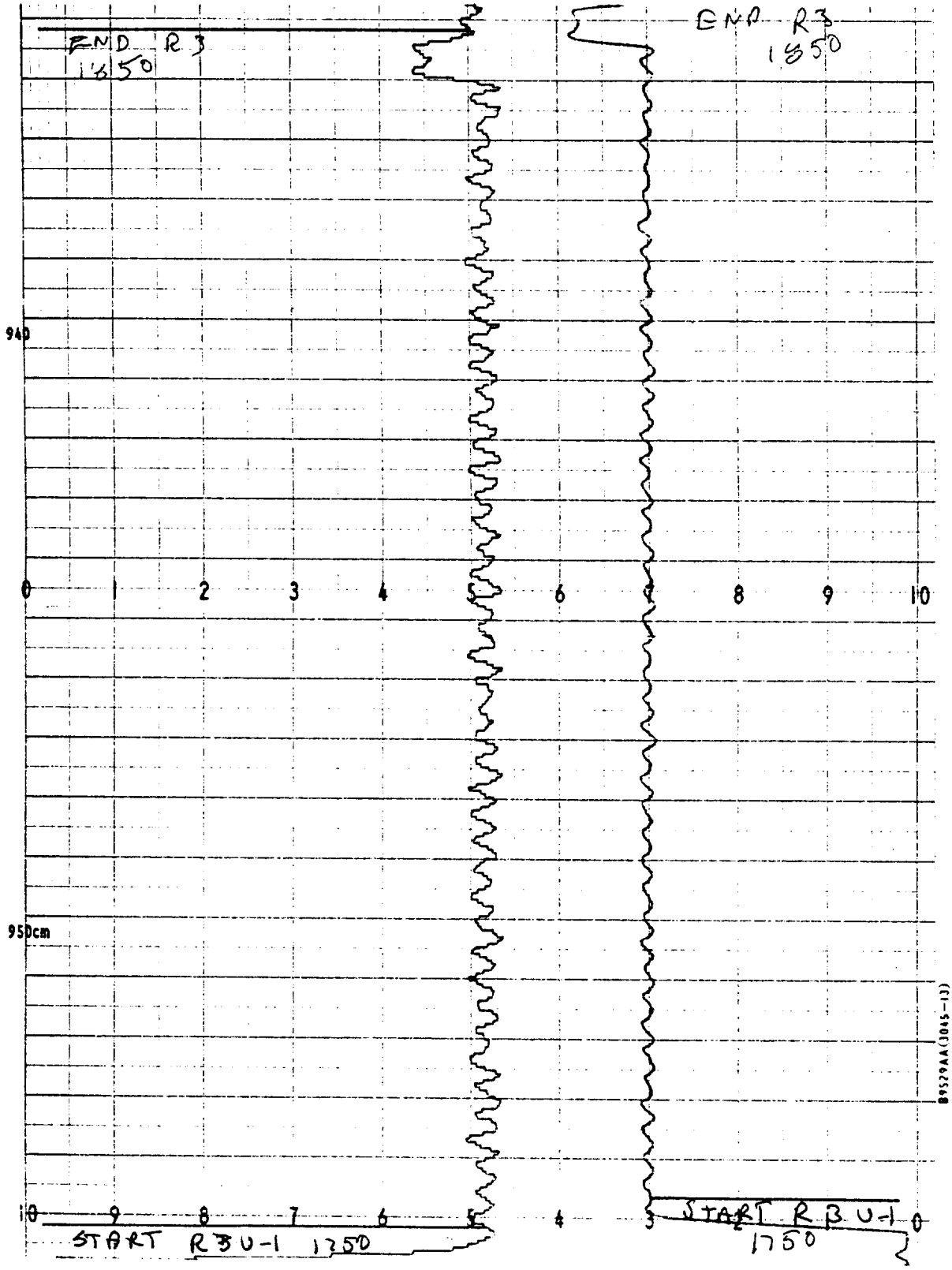
TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 1 STACK
March 13, 1992



TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 2 STACK
March 13, 1992



TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 2 STACK
March 13, 1992



TLG ENGINEERING, INC.
CARBON MONOXIDE CONCENTRATION (ppm)
OXYGEN CONCENTRATION (percent)
UNIT 2 STACK
March 13, 1992