Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources.* AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP42 Section:	11.3
Background Chapter	4
Reference:	33
Title:	*Particulate, Fluoride, and CEM Emissions Testing on the #1 and #2 Kiln Exhausts, Boral Bricks, Inc., Smyrna, Georgia*, Analytical Testing Consultants, Inc., Roswell, GA, September 26, 1996.

Exhibits C & D

Section 4, Ref 33

Emission Factor Develop for Stack Testing of Kiln #2 at Boral Bricks, Atlanta Plant on August 27, 1996
by ATC

Schedule: 27 cars/day
6,336 brick/car
Brick Weight: 3.51 lb/fired brick (verified by quality control reports)

$$= \frac{27\ \text{car}}{\text{day}} \cdot \frac{6336\ \text{brick}}{\text{car}} \cdot \frac{3.505\ \text{lb}}{\text{brick}} \cdot \frac{\text{day}}{24\ \text{hr}} \cdot \frac{\text{ton}}{2000\ \text{lb}}$$

$$= 12.49\ \text{ton/hr}$$

Emission Factor Development:

$$\text{filterable PM} = \frac{[\text{ Average Emission Rate (lb PM / hr) }]}{[\text{ Kiln Throughput (ton / hr) }]}$$

$$= \frac{6.58\ \text{lb}}{\text{hr}} \cdot \frac{\text{hr}}{12.49\ \text{ton}}$$

filterable PM =	0.53 lb/ton

Emission Factor Summary:

Pollutant	Avg. Emission Rate	Avg. Emission Factor
PM	6.58 lb/hr	0.53 lb/ton
SO_2	20.6 lb/hr	1.65 lb/ton
NOx	2.63 lb/hr	0.21 lb/ton
CO	9.82 lb/hr	0.79 lb/ton
VOC	0.18 lb/hr	0.014 lb/ton
HF	0.46 lb/hr	0.037 lb/ton

Notes:

Emission Factor Develop for Stack Testing of Kiln #1 at Boral Bricks, Atlanta Plant on August 28, 1996
by ATC

Schedule: 27 cars/day
6,336 brick/car
Brick Weight: 3.51 lb/fired brick (verified by quality control reports)

$$= \frac{27\ \text{car}}{\text{day}} \cdot \frac{6336\ \text{brick}}{\text{car}} \cdot \frac{3.505\ \text{lb}}{\text{brick}} \cdot \frac{\text{day}}{24\ \text{hr}} \cdot \frac{\text{ton}}{2000\ \text{lb}}$$

$$= 12.49\ \text{ton/hr}$$

Emission Factor Development:

$$\text{filterable PM} = \frac{[\text{ Average Emission Rate (lb PM / hr) }]}{[\text{ Kiln Throughput (ton / hr) }]}$$

$$= \frac{5.58\ \text{lb}}{\text{hr}} \cdot \frac{\text{hr}}{12.49\ \text{ton}}$$

filterable PM = 0.45 lb/ton

Emission Factor Summary:

Pollutant	Avg. Emission Rate	Avg. Emission Factor
PM	5.58 lb/hr	0.45 lb/ton
SO_2	16.5 lb/hr	1.32 lb/ton
NOx	2.72 lb/hr	0.22 lb/ton
CO	10.17 lb/hr	0.81 lb/ton
VOC	0.01 lb/hr	0.001 lb/ton
HF	0.72 lb/hr	0.058 lb/ton

Notes:

PARTICULATE, FLUORIDE AND CEM EMISSIONS TESTING
ON THE #1 & #2 KILN EXHAUSTS

BORAL BRICKS, INC.
SMYRNA, GEORGIA

FOR
CH_2 MHILL - ATLANTA, GEORGIA

AUGUST 27 & 28, 1996
REPORT # 5811

ANALYTICAL TESTING CONSULTANTS, INC.

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INTRODUCTION

This report presents the results of particulate, floride and continuous emissions monitoring testing on the exhausts of the #1 & #2 kiln exhaust stacks located at the Boral Bricks facility in Symrna, Georgia. Testing was conducted on August 27 & 28, 1996.

The purpose of this test was to determine the emissions rate for the parameters listed above.

The test was conducted by ANALYTICAL TESTING CONSULTANTS, INC. of Kannapolis, North Carolina and Atlanta, Georgia. Members of the test team were Dan McCombs, John Welch and Richard Westbrook.

CERTIFICATION OF RESULTS

"By our signature we certify that the testing and the reporting of the test results contained herein are prepared to the best of our abilities and that, to our knowledge, the data have been calculated and reported correctly. No data or information has knowingly been omitted."

F. Larson Harsey
Test Report Preparation

Dan McCombs
Test Team Leader

SOURCE PROCESS DESCRIPTION[1]

The facility manufactures bricks from base materials of clay and shale. Clay is mined from a nearby mining site and is delivered to the plant location by truck. Shale is also mined and transported to the plant by rail car. Both raw materials are unloaded at a rail car dump station. At the dump station the raw materials are sized through a primary crusher. After being processed, the raw materials are conveyed to a covered outdoor raw material storage area called the Clay Storage Shed. Clay and shale are loaded into feed hoppers using a front end loader. Raw clay is then conveyed to the grinding plant where final sizing occurs prior to brick manufacturing. Scaffolding screens remove fine particles from the mix. The coarse material is then ground in a bottom discharge grinder. After being ground, the material is separated by a bank of six screens. The coarse material is processed by a hammermill and returned to the screening process. The ground raw materials are conveyed to one of six (6) storage silos and stored until needed at the manufacturing building.

Clay from the silos is transferred by covered conveyor to the manufacturing building. Clay enters a pug mill where water may be added depending on the moisture content requirement of the clay. "Pugged" clay is then extruded as a column. Slurries are mixed near the manufacturing line and applied to some of the product lines. Facial colorants are also added to some brick products. The colorants typically consist of sand coatings mixed with other additives. The sand coatings are prepared in the sand preparation area located next to the extrusion machine. Two tanks weigh sand into hoppers. The sand is then transferred to a cement mixer where bag colorants can be added. All air emissions from the sand coating operation, sand mixing operation and the slurry mixing operation are controlled by the manufacturing product cyclone.

After the brick is coated with a slurry mixture or sand mixed color, the extruded column is subsequently cut into green brick. Green brick are stacked on kiln cars and placed in a warming room where the moisture content is lowered slightly. In the warming room, warm air is circulated across the cars. The heat supplied to the warming room is waste heat from the cooling section of the tunnel kiln. Three stacks vent the air from the warming room to the atmosphere. The cars exit the warming room directly into one (1) of the two (2) dryers. The purpose of the dryers is to further reduce the moisture content of the bricks. The dryers are also supplied by waste heat from the cooling section of the kiln. Emissions from these sources are expected to be minimal (mostly moisture) due to the regulated air flow through the kilns. The kiln air flow is controlled such that normally all products of combustion exhaust through the kiln exhaust stacks.

Dried brick are transferred from each dryer to one of two identical tunnel kilns. Final evaporation of free water, dehydration, oxidation, vitrification, flashing and cooling of the brick product occurs in the kilns. Both kilns primary fuel is natural gas while propane is used as a back-up fuel. Kiln exhaust gases exit the respective kilns stack. Brick product exiting the kilns are packaged and moved to outside storage prior to distribution.

---

[1]Source Process Description provided by Boral Brick

PARTICULATE RESULTS SUMMARY

SYSTEM	BORAL BRICK #1 BRICK KILN
TEST DATE	8/28/96

PARAMETER	*RUN #4*	*RUN #5*	*RUN #6*	*AVERAGE*
GENERAL				
QS, FLOW, ACFM	30358	30350	31401	**30703**
Q STD DRY, FLOW SCFM	14297	14102	14712	**14371**
Vm STD (ft3)	43.08	42.20	40.55	
%I	97.92	99.74	96.12	
PARTICULATE EMISSIONS				
PMRc (lbs/hr)	5.1279	4.0762	7.5511	**5.5851**
Cs (GR/SCFD)	0.0418	0.0337	0.0599	**0.0451**

PARTICULATE RESULTS SUMMARY

SYSTEM	BORAL BRICK #2 BRICK KILN
TEST DATE	8/27/96

PARAMETER	***RUN #1***	***RUN #2***	***RUN #3***	***AVERAGE***
GENERAL				
QS, FLOW, ACFM	32861	32551	32926	**32779**
Q STD DRY, FLOW SCFM	15387	15016	15469	**15291**
Vm STD (ft3)	32.81	33.79	35.55	
%I	91.30	96.37	96.86	
PARTICULATE EMISSIONS				
PMRc (lbs/hr)	5.2486	5.0144	9.4884	**6.5838**
Cs (GR/SCFD)	0.0398	0.0389	0.0715	**0.0501**

FLUORIDE RESULTS SUMMARY

SYSTEM	BORAL BRICK #1 BRICK KILN
TEST DATE	8/28/96

PARAMETER	***RUN #4***	***RUN #5***	***RUN #6***	***AVERAGE***
GENERAL				
QS, FLOW, ACFM	30358	30350	31401	**30703**
Q STD DRY, FLOW SCFM	14297	14102	14712	**14371**
Vm STD (ft3)	43.08	42.20	40.55	
%I	97.92	99.74	96.12	
FLUORIDE EMISSIONS				
PMRc (lbs/hr)	0.6322	0.7914	0.7249	**0.7161**
Cs (GR/SCFD)	0.0052	0.0065	0.0057	**0.0058**

FLUORIDE RESULTS SUMMARY

SYSTEM	BORAL BRICK #2 BRICK KILN			
TEST DATE	8/27/96			
PARAMETER	*RUN #1*	*RUN #2*	*RUN #3*	*AVERAGE*
GENERAL				
QS, FLOW, ACFM	32861	32551	32926	**32779**
Q STD DRY, FLOW SCFM	15387	15016	15469	**15291**
Vm STD (ft3)	32.81	33.79	35.55	
%I	91.30	96.37	96.86	
FLUORIDE EMISSIONS				
PMRc (lbs/hr)	0.2711	0.5085	0.5988	**0.4595**
Cs (GR/SCFD)	0.0021	0.0039	0.0045	**0.0035**

CONTINUOUS EMISSIONS RESULTS SUMMARY

SYSTEM	BORAL BRICK #1 BRICK KILN			
TEST DATE	8/28/96			
PARAMETER	*RUN #1*	*RUN #2*	*RUN #3*	*AVERAGE*
GENERAL				
CO - Lb/Hr	10.16	9.64	10.70	**10.17**
NO_x - Lb/Hr	2.68	2.76	2.71	**2.72**
SO_2 - Lb/Hr	15.29	18.19	15.86	**16.45**
VOC - Lb/Hr	0.01	0.01	0.02	**0.01**
O_2 - %	14.4	14.1	14.6	**14.3**
CO_2 - %	3.8	4.0	3.7	**3.8**

CONTINUOUS EMISSIONS RESULTS SUMMARY

SYSTEM BORAL BRICK
#2 BRICK KILN

TEST DATE 8/27/96

PARAMETER	*RUN #4*	*RUN #5*	*RUN #6*	*AVERAGE*
GENERAL				
CO - Lb/Hr	8.91	10.62	9.94	**9.82**
NO_x - Lb/Hr	2.52	2.59	2.78	**2.63**
SO_2 - Lb/Hr	21.46	18.79	21.53	**20.60**
VOC - Lb/Hr	0.26	0.15	0.13	**0.18**
O_2 - %	14.6	14.4	14.2	**14.4**
CO_2 - %	3.7	3.8	3.8	**3.8**

METHANE EMISSIONS RESULTS SUMMARY

METHOD 18

SYSTEM BORAL BRICK
#1 & #2 BRICK KILNS

TEST DATE 8/27-28/96

RUN #s	*LAB ID*	*METHANE ppm*
KILN #2 - 1	0896036-1	ND (13.7)
KILN #2 - 2	0896036-2	ND (13.7)
KILN #2 - 3	0896036-3	ND (13.7)
KILN #1 - 4	0896036-4	ND (13.7)
KILN #1 - 5	0896036-5	ND (13.7)
KILN #1 - 6	0896036-6	ND (13.7)

ND (13.7) - Non-detect for Methane, detection limit = 13.7 ppm

NOTE: Methane was not detected for any of the test runs.

RESULTS, CONCLUSIONS AND COMMENTS

A summary of some pertinent results appear in the preceding RESULTS SUMMARY pages. For additional information, please consult the CALCULATIONS and DATA SHEETS sections of this report.

Particulate emission results averaged 5.58 pounds per hour for brick kiln #1 and 6.58 pounds per hour for brick kiln #2. Fluoride emissions averaged 0.72 pounds per hour for brick kiln #1 and 0.46 pounds per hour for brick kiln #2. The mean stack velocity was measured at 48.46 ft/sec for kiln #1 and 51.74 ft/sec for kiln #2. Both stacks had a duct diameter of 44". This yielded a mean stack volumetric flow rate for kiln #1 of 30,703 actual cubic feet per minute and 32,779 actual cubic feet per minute for kiln #2.

Complete continuous emissions results per run for both brick kilns can be found on pages 7 & 8 of this report. Average emissions for kiln #1were; CO - 10.17, NO_x - 2.72, SO_2 - 16.45, VOC - 0.01pounds per hour. Kiln #2 average emissions were; CO - 9.82, NO_x - 2.63, SO_2 - 20.60, VOC - 0.18 pounds per hour.

Bag samples were taken and sent to a laboratory for analysis by Method 18 for methane emissions. All six (6) samples were analyzed and results show non-detect for methane from the brick kiln stacks.

Two (2) VOST samples were taken per EPA Method 0031for volatile organics during the middle test run for both kiln stacks and archived for analysis as stated in the test proposal. These samples can be analyzed at a later date if directed by CH_2 MHill or Boral Brick. Standard holding times for these samples are 14 days after sampling. If results from this method are needed for permitting, it is recommended that analysis of the samples should be requested as soon as possible.

SAMPLING AND ANALYTICAL PROCEDURES

Particulate testing and analysis were performed according to procedures developed by the U. S. Environmental Protection Agency (USEPA) and referred to as Method 5. Sampling port locations and number of test points to be used were determined according to Method 1. The above federal test methods appear in the Code of Federal Regulations (Reference 1).

Fluoride testing and analysis were performed according to EPA method 13B. Continuous Emissions data for CO was performed by EPA Method 10, NO_x by Method 7E, SO_2 by Method 6C and VOC measurement was performed by Method 25A. CO_2 and O_2 values were determined by Method 3 & 3A respectively. Bag samples were analyzed by EPA Method 18 for methane. Volatile organic compounds testing were conducted according to EPA Method 0031.

REFERENCES

1. CODE OF FEDERAL REGULATIONS, Title 40, Part 60, Appendix A, July 1, 1995.

ISOKINETIC DATA AND CALCULATIONS

Particulate Emission Rate Calculation
Isokinetic Data and Calculation
Moisture Data
Isokinetic Sampling Rate Data
CO Emission Calculations
NO_x Emission Calculations
SO_2 Emission Calculations
VOC Emission Calculations
O_2 & CO_2 Emission Summaries
Nomenclature
Calculation Formulae

PARTICULATE EMISSION RATE CALCULATION

LOCATION: *BORAL*
SOURCE: *#1 BRICK KILN*

DATA	*RUN #4*	*RUN #5*	*RUN #6*	*AVERAGE*
DATE	8/28/96	8/28/96	8/28/96	
RUN TIME (min)	60.00	60.00	60.00	
Dn (in)	0.316	0.312	0.305	
An (ft2)	5.45e-04	5.31e-04	5.07e-04	
AVG DH (in H2O)	1.71	1.66	1.65	
P ATM (in Hg)	29.36	29.36	29.36	
Pm (in Hg)	29.49	29.48	29.48	
Ps (GAUGE)	-0.30	-0.30	-0.30	
Ps (IN HG)	29.34	29.34	29.34	
Tm (F)	79.13	91.58	95.71	
Tm (R)	539.13	551.58	555.71	
Vm (ft3)	44.64	44.74	43.31	
Vm STD (ft3)	43.08	42.20	40.55	
VLQ (ml)	118.90	136.50	124.80	
VV STD (ft3)	5.60	6.43	5.88	
V STD (ft3)	48.69	48.63	46.43	
%M	11.51	13.23	12.67	**12.47**
MD	0.88	0.87	0.87	
MWD	29.18	29.20	29.18	
M	27.89	27.72	27.77	
Ts (F)	517.71	511.63	509.75	**513.03**
Ts (R)	977.71	971.63	969.75	**973.03**
SUM SQRT DP	14.65	14.65	15.18	
N DP	24.00	24.00	24.00	
AVG SQRT DP	0.61	0.61	0.63	
CP	0.84	0.84	0.84	
Vs (ft/s)	47.92	47.90	49.56	**48.46**
Ds (in)	44.00	44.00	44.00	
As (ft2)	10.56	10.56	10.56	
QS, FLOW, ACFM	30358	30350	31401	**30703**
Q STD (ft3/min)	16156	16251	16846	**16418**
Q STD DRY, FLOW SCFM	14297	14102	14712	**14371**
WT (gm)	0.1168	0.0922	0.1573	
%I	97.92	99.74	96.12	
%CO2	3.78	4.00	3.74	**3.84**
%O2	14.38	14.07	14.59	**14.35**
%C0	0.00	0.00	0.00	
%N2	81.84	81.93	81.67	
PMRc (lbs/hr)	5.1279	4.0762	7.5511	**5.5851**
Cs (GR/SCFD)	0.0418	0.0337	0.0599	**0.0451**

PARTICULATE EMISSION RATE CALCULATION

LOCATION: *BORAL*
SOURCE: *#2 BRICK KILN*

DATA	*RUN #1*	*RUN #2*	*RUN #3*	*AVERAGE*
DATE	8/27/96	8/27/96	8/27/96	
RUN TIME (min)	72.00	72.00	72.00	
Dn (in)	0.251	0.251	0.253	
An (ft2)	3.44e-04	3.44e-04	3.49e-04	
AVG DH (in H2O)	0.70	0.77	0.84	
P ATM (in Hg)	29.35	29.35	29.35	
Pm (in Hg)	29.40	29.41	29.41	
Ps (GAUGE)	-0.31	-0.31	-0.31	
Ps (IN HG)	29.33	29.33	29.33	
Tm (F)	80.79	92.50	96.63	
Tm (R)	540.79	552.50	556.63	
Vm (ft3)	34.20	35.98	38.12	
Vm STD (ft3)	32.81	33.79	35.55	
VLQ (ml)	80.80	89.90	100.30	
VV STD (ft3)	3.81	4.24	4.73	
V STD (ft3)	36.62	38.03	40.27	
%M	10.40	11.14	11.74	**11.09**
MD	0.90	0.89	0.88	
MWD	29.17	29.19	29.19	
M	28.01	27.94	27.88	
Ts (F)	532.88	539.63	515.13	**529.21**
Ts (R)	992.88	999.63	975.13	**989.21**
SUM SQRT DP	15.77	15.55	15.91	
N DP	24.00	24.00	24.00	
AVG SQRT DP	0.66	0.65	0.66	
CP	0.84	0.84	0.84	
Vs (ft/s)	51.87	51.38	51.97	**51.74**
Ds (in)	44.00	44.00	44.00	
As (ft2)	10.56	10.56	10.56	
QS, FLOW, ACFM	32861	32551	32926	**32779**
Q STD (ft3/min)	17172	16898	17526	**17199**
Q STD DRY, FLOW SCFM	15387	15016	15469	**15291**
WT (gm)	0.0846	0.0853	0.1648	
%I	91.30	96.37	96.86	
%CO2	3.66	3.82	3.88	**3.79**
%O2	14.61	14.40	14.24	**14.42**
%C0	0.00	0.00	0.00	
%N2	81.73	81.78	81.88	
PMRc (lbs/hr)	5.2486	5.0144	9.4884	**6.5838**
Cs (GR/SCFD)	0.0398	0.0389	0.0715	**0.0501**

FLUORIDE EMISSION RATE CALCULATION

LOCATION: *BORAL*
SOURCE: *#1 BRICK KILN*

DATA	*RUN #4*	*RUN #5*	*RUN #6*	*AVERAGE*
DATE	8/28/96	8/28/96	8/28/96	
RUN TIME (min)	60.00	60.00	60.00	
Dn (in)	0.316	0.312	0.305	
An (ft2)	5.45e-04	5.31e-04	5.07e-04	
AVG DH (in H2O)	1.71	1.66	1.65	
P ATM (in Hg)	29.36	29.36	29.36	
Pm (in Hg)	29.49	29.48	29.48	
Ps (GAUGE)	-0.30	-0.30	-0.30	
Ps (IN HG)	29.34	29.34	29.34	
Tm (F)	79.13	91.58	95.71	
Tm (R)	539.13	551.58	555.71	
Vm (ft3)	44.64	44.74	43.31	
Vm STD (ft3)	43.08	42.20	40.55	
VLQ (ml)	118.90	136.50	124.80	
VV STD (ft3)	5.60	6.43	5.88	
V STD (ft3)	48.69	48.63	46.43	
%M	11.51	13.23	12.67	**12.47**
MD	0.88	0.87	0.87	
MWD	29.18	29.20	29.18	
M	27.89	27.72	27.77	
Ts (F)	517.71	511.63	509.75	**513.03**
Ts (R)	977.71	971.63	969.75	**973.03**
SUM SQRT DP	14.65	14.65	15.18	
N DP	24.00	24.00	24.00	
AVG SQRT DP	0.61	0.61	0.63	
CP	0.84	0.84	0.84	
Vs (ft/s)	47.92	47.90	49.56	**48.46**
Ds (in)	44.00	44.00	44.00	
As (ft2)	10.56	10.56	10.56	
QS, FLOW, ACFM	30358	30350	31401	**30703**
Q STD (ft3/min)	16156	16251	16846	**16418**
Q STD DRY, FLOW SCFM	14297	14102	14712	**14371**
WT (gm)	0.0144	0.0179	0.0151	
%I	97.92	99.74	96.12	
%CO2	3.78	4.00	3.74	**3.84**
%O2	14.38	14.07	14.59	**14.35**
%C0	0.00	0.00	0.00	
%N2	81.84	81.93	81.67	
PMRc (lbs/hr)	0.6322	0.7914	0.7249	**0.7161**
Cs (GR/SCFD)	0.0052	0.0065	0.0057	**0.0058**

FLUORIDE EMISSION RATE CALCULATION

LOCATION: BORAL
SOURCE: #2 BRICK KILN

DATA	RUN #1	RUN #2	RUN #3	AVERAGE
DATE	8/27/96	8/27/96	8/27/96	
RUN TIME (min)	72.00	72.00	72.00	
Dn (in)	0.251	0.251	0.253	
An (ft2)	3.44e-04	3.44e-04	3.49e-04	
AVG DH (in H2O)	0.70	0.77	0.84	
P ATM (in Hg)	29.35	29.35	29.35	
Pm (in Hg)	29.40	29.41	29.41	
Ps (GAUGE)	-0.31	-0.31	-0.31	
Ps (IN HG)	29.33	29.33	29.33	
Tm (F)	80.79	92.50	96.63	
Tm (R)	540.79	552.50	556.63	
Vm (ft3)	34.20	35.98	38.12	
Vm STD (ft3)	32.81	33.79	35.55	
VLQ (ml)	80.80	89.90	100.30	
VV STD (ft3)	3.81	4.24	4.73	
V STD (ft3)	36.62	38.03	40.27	
%M	10.40	11.14	11.74	**11.09**
MD	0.90	0.89	0.88	
MWD	29.17	29.19	29.19	
M	28.01	27.94	27.88	
Ts (F)	532.88	539.63	515.13	**529.21**
Ts (R)	992.88	999.63	975.13	**989.21**
SUM SQRT DP	15.77	15.55	15.91	
N DP	24.00	24.00	24.00	
AVG SQRT DP	0.66	0.65	0.66	
CP	0.84	0.84	0.84	
Vs (ft/s)	51.87	51.38	51.97	**51.74**
Ds (in)	44.00	44.00	44.00	
As (ft2)	10.56	10.56	10.56	
QS, FLOW, ACFM	32861	32551	32926	**32779**
Q STD (ft3/min)	17172	16898	17526	**17199**
Q STD DRY, FLOW SCFM	15387	15016	15469	**15291**
WT (gm)	0.0044	0.0087	0.0104	
%I	91.30	96.37	96.86	
%CO2	3.66	3.82	3.88	**3.79**
%O2	14.61	14.40	14.24	**14.42**
%C0	0.00	0.00	0.00	
%N2	81.73	81.78	81.88	
PMRc (lbs/hr)	0.2711	0.5085	0.5988	**0.4595**
Cs (GR/SCFD)	0.0021	0.0039	0.0045	**0.0035**

ISOKINETIC DATA AND CALCULATIONS

DATE	8/28/96						
SOURCE		#1 BRICK KILN					
RUN #4			***K=***	4.563			
POINT #	***Tm***	***Ts***	***dp***	***dH***	***SQRT DP***	***% O2***	***% CO2***
A1	73	526	0.44	2.01	0.663	14.38	3.78
A2	73	527	0.45	2.05	0.671		
A3	73	524	0.45	2.05	0.671		
A4	73	523	0.43	1.96	0.656		
A5	74	520	0.42	1.92	0.648		
A6	74	521	0.42	1.92	0.648		
A7	74	517	0.38	1.73	0.616		
A8	75	515	0.36	1.64	0.600		
A9	75	510	0.36	1.64	0.600		
A10	77	500	0.34	1.55	0.583		
A11	78	500	0.31	1.41	0.557		
A12	79	492	0.28	1.28	0.529		
B1	79	520	0.35	1.60	0.592		
B2	80	519	0.42	1.92	0.648		
B3	81	523	0.42	1.92	0.648		
B4	82	523	0.40	1.83	0.632		
B5	83	521	0.38	1.73	0.616		
B6	84	523	0.38	1.73	0.616		
B7	84	520	0.39	1.78	0.624		
B8	85	520	0.39	1.78	0.624		
B9	85	522	0.32	1.46	0.566		
B10	86	522	0.32	1.46	0.566		
B11	86	522	0.30	1.37	0.548		
B12	86	515	0.28	1.28	0.529		
	79.13	***517.71***		***1.71***	***14.653***	***14.38***	***3.78***
	Vm(ft3)	Initial	653.18	***% N2 (BY DIFFERENCE)***			***81.84***
		Final	697.82				
		Total	***44.64***				

ISOKINETIC DATA AND CALCULATIONS

DATE	8/28/96						
SOURCE		#1 BRICK KILN					
RUN #5			*K=*	4.425			
POINT #	*Tm*	*Ts*	*dp*	*dH*	*SQRT DP*	*% O2*	*% CO2*
A1	89	510	0.36	1.59	0.600	14.07	4
A2	89	517	0.42	1.86	0.648		
A3	90	520	0.45	1.99	0.671		
A4	90	521	0.43	1.90	0.656		
A5	90	520	0.42	1.86	0.648		
A6	89	521	0.42	1.86	0.648		
A7	89	521	0.41	1.81	0.640		
A8	90	513	0.35	1.55	0.592		
A9	90	511	0.32	1.42	0.566		
A10	90	498	0.30	1.33	0.548		
A11	91	495	0.29	1.28	0.539		
A12	91	490	0.28	1.24	0.529		
B1	92	508	0.36	1.59	0.600		
B2	93	512	0.46	2.04	0.678		
B3	93	515	0.43	1.90	0.656		
B4	93	519	0.43	1.90	0.656		
B5	93	521	0.43	1.90	0.656		
B6	93	521	0.43	1.90	0.656		
B7	93	517	0.40	1.77	0.632		
B8	94	520	0.40	1.77	0.632		
B9	94	518	0.33	1.46	0.574		
B10	94	507	0.30	1.33	0.548		
B11	94	494	0.29	1.28	0.539		
B12	94	490	0.29	1.28	0.539		
	91.58	*511.63*		*1.66*	*14.649*	*14.07*	*4.00*

Vm(ft3)	Initial	698.01	*% N2 (BY DIFFERENCE)*	*81.93*
	Final	742.75		
	Total	*44.74*		

ISOKINETIC DATA AND CALCULATIONS

DATE 8/28/96
SOURCE #1 BRICK KILN

RUN #6 *K=* 4.078

POINT #	*Tm*	*Ts*	*dp*	*dH*	*SQRT DP*	*% O2*	*% CO2*
A1	93	518	0.46	1.88	0.678	14.59	3.74
A2	94	521	0.50	2.04	0.707		
A3	94	520	0.52	2.12	0.721		
A4	94	519	0.48	1.96	0.693		
A5	94	521	0.48	1.96	0.693		
A6	94	525	0.48	1.96	0.693		
A7	94	524	0.44	1.79	0.663		
A8	94	521	0.33	1.35	0.574		
A9	94	521	0.35	1.43	0.592		
A10	95	517	0.33	1.35	0.574		
A11	95	512	0.30	1.22	0.548		
A12	95	500	0.28	1.14	0.529		
B1	95	508	0.36	1.47	0.600		
B2	96	510	0.42	1.71	0.648		
B3	96	512	0.45	1.84	0.671		
B4	97	510	0.42	1.71	0.648		
B5	97	511	0.40	1.63	0.632		
B6	98	511	0.42	1.71	0.648		
B7	98	452	0.48	1.96	0.693		
B8	98	497	0.48	1.96	0.693		
B9	98	504	0.40	1.63	0.632		
B10	98	503	0.32	1.30	0.566		
B11	98	500	0.30	1.22	0.548		
B12	98	497	0.29	1.18	0.539		
	95.71	***509.75***		***1.65***	***15.183***	***14.59***	***3.74***

Vm(ft3)	Initial	743.00	***% N2 (BY DIFFERENCE)***	***81.67***
	Final	786.31		
	Total	***43.31***		

ISOKINETIC DATA AND CALCULATIONS

DATE	8/27/96						
SOURCE		#2 BRICK KILN					
RUN #1			*K=*	1.620			
POINT #	*Tm*	*Ts*	*dp*	*dH*	*SQRT DP*	*% O2*	*% CO2*
A1	73	524	0.47	0.76	0.686	14.61	3.66
A2	73	474	0.64	1.04	0.800		
A3	73	533	0.46	0.75	0.678		
A4	74	543	0.44	0.71	0.663		
A5	74	545	0.40	0.65	0.632		
A6	75	542	0.40	0.65	0.632		
A7	76	542	0.47	0.76	0.686		
A8	76	538	0.47	0.76	0.686		
A9	76	539	0.48	0.78	0.693		
A10	77	536	0.48	0.78	0.693		
A11	78	533	0.35	0.57	0.592		
A12	80	525	0.35	0.57	0.592		
B1	81	534	0.48	0.78	0.693		
B2	82	542	0.48	0.78	0.693		
B3	83	543	0.47	0.76	0.686		
B4	84	541	0.46	0.75	0.678		
B5	87	507	0.46	0.75	0.678		
B6	87	538	0.46	0.75	0.678		
B7	88	538	0.42	0.68	0.648		
B8	88	540	0.38	0.62	0.616		
B9	88	539	0.36	0.58	0.600		
B10	88	533	0.36	0.58	0.600		
B11	89	530	0.34	0.55	0.583		
B12	89	530	0.34	0.55	0.583		
	80.79	*532.88*		*0.70*	*15.769*	*14.61*	*3.66*

Vm(ft3)	Initial	543.73	*% N2 (BY DIFFERENCE)*	*81.73*
	Final	577.93		
	Total	*34.20*		

ISOKINETIC DATA AND CALCULATIONS

DATE 8/27/96
SOURCE #2 BRICK KILN

RUN #2 K= 1.821

POINT #	Tm	Ts	dp	dH	SQRT DP	% O2	% CO2
A1	90	545	0.38	0.69	0.616	14.4	3.82
A2	91	546	0.46	0.84	0.678		
A3	91	546	0.47	0.86	0.686		
A4	91	546	0.46	0.84	0.678		
A5	91	549	0.43	0.78	0.656		
A6	90	546	0.43	0.78	0.656		
A7	90	545	0.45	0.82	0.671		
A8	90	542	0.44	0.80	0.663		
A9	90	541	0.43	0.78	0.656		
A10	91	535	0.39	0.71	0.624		
A11	92	530	0.40	0.73	0.632		
A12	92	529	0.40	0.73	0.632		
B1	92	531	0.47	0.86	0.686		
B2	93	507	0.52	0.95	0.721		
B3	94	545	0.50	0.91	0.707		
B4	94	546	0.49	0.89	0.700		
B5	94	547	0.50	0.91	0.707		
B6	94	547	0.50	0.91	0.707		
B7	94	547	0.36	0.66	0.600		
B8	94	544	0.36	0.66	0.600		
B9	95	539	0.33	0.60	0.574		
B10	95	535	0.33	0.60	0.574		
B11	96	535	0.33	0.60	0.574		
B12	96	528	0.30	0.55	0.548		
	92.50	539.63		0.77	15.548	14.40	3.82

Vm(ft3)	Initial	578.33	% N2 (BY DIFFERENCE) 81.78
	Final	614.31	
	Total	35.98	

ISOKINETIC DATA AND CALCULATIONS

DATE	8/27/96						
SOURCE		#2 BRICK KILN					
RUN #3			***K=***	1.897			
POINT #	***Tm***	***Ts***	***dp***	***dH***	***SQRT DP***	***% O2***	***% CO2***
A1	96	533	0.38	0.72	0.616	14.24	3.88
A2	96	538	0.55	1.04	0.742		
A3	96	539	0.53	1.01	0.728		
A4	95	541	0.47	0.89	0.686		
A5	95	542	0.44	0.83	0.663		
A6	95	544	0.43	0.82	0.656		
A7	95	541	0.48	0.91	0.693		
A8	96	543	0.48	0.91	0.693		
A9	96	542	0.46	0.87	0.678		
A10	96	542	0.42	0.80	0.648		
A11	96	536	0.34	0.64	0.583		
A12	97	522	0.28	0.53	0.529		
B1	97	525	0.45	0.85	0.671		
B2	97	530	0.52	0.99	0.721		
B3	97	457	0.69	1.31	0.831		
B4	97	534	0.51	0.97	0.714		
B5	97	543	0.51	0.97	0.714		
B6	97	543	0.51	0.97	0.714		
B7	98	544	0.42	0.80	0.648		
B8	98	544	0.39	0.74	0.624		
B9	98	543	0.40	0.76	0.632		
B10	98	546	0.38	0.72	0.616		
B11	98	539	0.32	0.61	0.566		
B12	98	52	0.29	0.55	0.539		
	96.63	***515.13***		***0.84***	***15.906***	***14.24***	***3.88***
	Vm(ft3)	Initial	614.77	***% N2 (BY DIFFERENCE)***			***81.88***
		Final	652.89				
		Total	***38.12***				

MOISTURE DATA

Kiln #1

RUN #4	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	197.00	109.00	2.00	310.90	
NET	97.00	9.00	2.00	10.90	**118.9**

RUN #5	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	210.00	112.00	3.00	311.50	
NET	110.00	12.00	3.00	11.50	**136.5**

RUN #6	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	198.00	113.00	3.00	310.80	
NET	98.00	13.00	3.00	10.80	**124.8**

MOISTURE DATA

Kiln #2

RUN #1	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	157.00	113.00	3.00	307.80	
NET	57.00	13.00	3.00	7.80	**80.8**

RUN #2	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	183.00	100.00	2.00	304.90	
NET	83.00	0.00	2.00	4.90	**89.9**

RUN #3	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	190.00	100.00	1.00	309.30	
NET	90.00	0.00	1.00	9.30	**100.3**

ISOKINETIC SAMPLING RATE CALCULATION

Kiln #1

dH = KdP

K = (846.72*Dn^4*dH@*Cp^2*(1-Bw)^2*Md*Tm*Ps)/(Ms*Ts*Pm)

	RUN #4	*RUN #5*	*RUN #6*
Dn	0.316	0.312	0.305
dH@	1.74	1.74	1.74
Cp	0.84	0.84	0.84
Bw(FRACTION,NOT%)	0.12	0.12	0.12
Md	29.00	29.00	29.00
Pbar	29.36	29.36	29.36
PS (GAUGE)	-0.30	-0.30	-0.30
Ps	29.34	29.34	29.34
Tm, F	85.00	85.00	90.00
Tm, R	545.00	545.00	550.00
Ms	27.68	27.68	27.68
Ts, F	540.00	520.00	520.00
Ts, R	1000.00	980.00	980.00
Pm	29.47	29.47	29.47
K	4.5628	4.4246	4.0778

TERMINOLOGY

Ms=APPARENT STACK GAS MOLECULAR WEIGHT

=Md(1-Bw)+18Bw

Md=DRY GAS MOLECULAR WEIGHT (29) OR

=(0.44*%CO2)+(0.32*%O2)+(0.28*(%N2+%CO))

Ps=ABSOLUTE STACK PRESSURE (IN. Hg)

Pm=METER ABSOLUTE PRESSURE (IN. Hg)

= Pbar + (PS gauge/13.6)

ISOKINETIC SAMPLING RATE CALCULATION

Kiln #2

dH = KdP

K = (846.72*Dn^4*dH@*Cp^2*(1-Bw)^2*Md*Tm*Ps)/(Ms*Ts*Pm)

	RUN #1	*RUN #2*	*RUN #3*
Dn	0.251	0.251	0.253
dH@	1.74	1.74	1.74
Cp	0.84	0.84	0.84
Bw(FRACTION,NOT%)	0.18	0.12	0.12
Md	29.00	29.00	29.00
Pbar	29.35	29.35	29.35
PS (GAUGE)	-0.31	-0.31	-0.31
Ps	29.33	29.33	29.33
Tm, F	85.00	85.00	90.00
Tm, R	545.00	545.00	550.00
Ms	27.02	27.68	27.68
Ts, F	540.00	540.00	540.00
Ts, R	1000.00	1000.00	1000.00
Pm	29.38	29.38	29.38
K	1.6198	1.8210	1.8970

TERMINOLOGY

Ms=APPARENT STACK GAS MOLECULAR WEIGHT
=Md(1-Bw)+18Bw

Md=DRY GAS MOLECULAR WEIGHT (29) OR
=(0.44*%CO2)+(0.32*%O2)+(0.28*(%N2+%CO))

Ps=ABSOLUTE STACK PRESSURE (IN. Hg)

Pm=METER ABSOLUTE PRESSURE (IN. Hg)
= Pbar + (PS gauge/13.6)

CO EMISSION CALCULATIONS

E-CO = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE
E-CO = CO AS CO EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM
MOLE. WT. = MOLECULAR WEIGHT OF CO, 28

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	Smyrna, Georgia
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #4	TIME	Q STD DRY SCFM	PPM	E-CO LBS/HR
	841	14297	168.00	10.424
	846	14297	163.00	10.114
	851	14297	160.00	9.928
	856	14297	159.00	9.866
	901	14297	146.00	9.059
	906	14297	165.00	10.238
	911	14297	167.00	10.362
	916	14297	166.00	10.300
	921	14297	169.00	10.486
	926	14297	169.00	10.486
	931	14297	168.00	10.424
	936	14297	165.00	10.238
AVERAGES			163.75	10.161

RUN #5	TIME	Q STD DRY SCFM	PPM	E-CO LBS/HR
	1018	14102	69.00	4.223
	1023	14102	167.00	10.221
	1028	14102	166.00	10.160
	1033	14102	163.00	9.976
	1038	14102	159.00	9.731
	1043	14102	156.00	9.548
	1048	14102	145.00	8.874
	1053	14102	168.00	10.282
	1058	14102	172.00	10.527
	1103	14102	173.00	10.588
	1108	14102	176.00	10.772
	1113	14102	177.00	10.833
AVERAGES			157.58	9.645

CO EMISSION CALCULATIONS

E-CO = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-CO = NOX AS NO2 EMISSION RATE, LB/HR
Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF CO, 28
PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	Smyrna, Georgia
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #6	TIME	Q STD DRY SCFM	PPM	E-CO LBS/HR
	1145	14712	168.00	10.727
	1150	14712	173.00	11.046
	1155	14712	175.00	11.174
	1200	14712	175.00	11.174
	1205	14712	174.00	11.110
	1210	14712	173.00	11.046
	1215	14712	169.00	10.791
	1220	14712	166.00	10.599
	1225	14712	164.00	10.471
	1230	14712	163.00	10.408
	1235	14712	147.00	9.386
	1240	14712	164.00	10.471
AVERAGES			167.58	10.700

TEST SUMMARY

	PPM	LBS/HR
AVERAGE	162.97	10.168

CO EMISSION CALCULATIONS

E-CO = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-CO = CO AS CO EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF CO, 28

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	Smyrna, Georgia
DATE:	August 27,1996
SOURCE:	#2 Brick Kiln

RUN #1	TIME	Q STD DRY SCFM	PPM	E-CO LBS/HR
	855	15387	130.00	8.681
	900	15387	119.00	7.947
	905	15387	129.00	8.615
	910	15387	130.00	8.681
	915	15387	132.00	8.815
	920	15387	134.00	8.948
	925	15387	138.00	9.216
	930	15387	139.00	9.282
	935	15387	142.00	9.483
	940	15387	142.00	9.483
	945	15387	133.00	8.882
	950	15387	133.00	8.882
AVERAGES			133.42	8.910

RUN #2	TIME	Q STD DRY SCFM	PPM	E-CO LBS/HR
	1051	15016	158.00	10.297
	1056	15016	167.00	10.883
	1101	15016	169.00	11.014
	1106	15016	171.00	11.144
	1111	15016	171.00	11.144
	1116	15016	169.00	11.014
	1121	15016	167.00	10.883
	1126	15016	164.00	10.688
	1131	15016	159.00	10.362
	1136	15016	144.00	9.384
	1141	15016	158.00	10.297
	1146	15016	159.00	10.362
AVERAGES			163.00	10.623

CO EMISSION CALCULATIONS

E-CO = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-CO = NOX AS NO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF CO, 28

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	Smyrna, Georgia
DATE:	August 27,1996
SOURCE:	#2 Brick Kiln

RUN #3	TIME	Q STD DRY SCFM	PPM	E-CO LBS/HR
	1235	15469	151.00	10.137
	1240	15469	151.00	10.137
	1245	15469	152.00	10.205
	1250	15469	153.00	10.272
	1255	15469	154.00	10.339
	100	15469	153.00	10.272
	105	15469	151.00	10.137
	110	15469	147.00	9.869
	115	15469	142.00	9.533
	120	15469	132.00	8.862
	125	15469	145.00	9.735
	130	15469	146.00	9.802
AVERAGES			148.08	9.942

TEST SUMMARY	PPM	LBS/HR
AVERAGE	148.17	9.825

NOX EMISSION CALCULATIONS

E-NOX = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-NOX = NOX AS NO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF NO2, 46

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #4	TIME	Q STD DRY SCFM	PPM	E-NOX LBS/HR
	841	14297	27.00	2.752
	846	14297	27.00	2.752
	851	14297	26.00	2.650
	856	14297	26.00	2.650
	901	14297	23.00	2.345
	906	14297	27.00	2.752
	911	14297	27.00	2.752
	916	14297	26.00	2.650
	921	14297	26.00	2.650
	926	14297	26.00	2.650
	931	14297	28.00	2.854
	936	14297	27.00	2.752
AVERAGES			26.33	2.684

RUN #5	TIME	Q STD DRY SCFM	PPM	E-NOX LBS/HR
	1018	14102	28.00	2.815
	1023	14102	27.00	2.715
	1028	14102	27.00	2.715
	1033	14102	28.00	2.815
	1038	14102	28.00	2.815
	1043	14102	24.00	2.413
	1048	14102	28.00	2.815
	1053	14102	27.00	2.715
	1058	14102	28.00	2.815
	1103	14102	28.00	2.815
	1108	14102	29.00	2.916
	1113	14102	28.00	2.815
AVERAGES			27.50	2.765

NOX EMISSION CALCULATIONS

E-NOX = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-NOX = NOX AS NO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF NO2, 46

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 28, 1996
SOURCE:	#1Brick Kiln

RUN #6	TIME	Q STD DRY SCFM	PPM	E-NOX LBS/HR
	1145	14712	26.00	2.727
	1150	14712	26.00	2.727
	1155	14712	26.00	2.727
	1200	14712	26.00	2.727
	1205	14712	25.00	2.622
	1210	14712	27.00	2.832
	1215	14712	26.00	2.727
	1220	14712	26.00	2.727
	1225	14712	26.00	2.727
	1230	14712	26.00	2.727
	1235	14712	23.00	2.413
	1240	14712	27.00	2.832
AVERAGES			25.83	2.710

TEST SUMMARY	PPM	LBS/HR
AVERAGE	26.56	2.720

NOX EMISSION CALCULATIONS

E-NOX = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-NOX = NOX AS NO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF NO2, 46

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 27,1996
SOURCE:	#2 Brick Kiln

RUN #1	TIME	Q STD DRY SCFM	PPM	E-NOX LBS/HR
	855	15387	24.00	2.633
	900	15387	22.00	2.414
	905	15387	24.00	2.633
	910	15387	23.00	2.523
	915	15387	23.00	2.523
	920	15387	22.00	2.414
	925	15387	24.00	2.633
	930	15387	24.00	2.633
	935	15387	24.00	2.633
	940	15387	23.00	2.523
	945	15387	20.00	2.194
	950	15387	23.00	2.523
AVERAGES			23.00	2.523

RUN #2	TIME	Q STD DRY SCFM	PPM	E-NOX LBS/HR
	1051	15016	23.00	2.462
	1056	15016	23.00	2.462
	1101	15016	25.00	2.677
	1106	15016	25.00	2.677
	1111	15016	25.00	2.677
	1116	15016	25.00	2.677
	1121	15016	24.00	2.570
	1126	15016	23.00	2.462
	1131	15016	23.00	2.462
	1136	15016	23.00	2.462
	1141	15016	26.00	2.784
	1146	15016	25.00	2.677
AVERAGES			24.17	2.587

NOX EMISSION CALCULATIONS

E-NOX = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-NOX = NOX AS NO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF NO2, 46

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 27,1996
SOURCE:	#2 Brick Kiln

RUN #3	TIME	Q STD DRY SCFM	PPM	E-NOX LBS/HR
	1235	15469	26.00	2.868
	1240	15469	26.00	2.868
	1245	15469	26.00	2.868
	1250	15469	25.00	2.757
	1255	15469	25.00	2.757
	100	15469	26.00	2.868
	105	15469	25.00	2.757
	110	15469	25.00	2.757
	115	15469	24.00	2.647
	120	15469	24.00	2.647
	125	15469	25.00	2.757
	130	15469	26.00	2.868
AVERAGES			25.25	2.785

TEST SUMMARY

	PPM	LBS/HR
AVERAGE	24.14	2.632

SO2 EMISSION CALCULATIONS

E-SO2 = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-SO2 = SO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF SO2, 64

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #4	TIME	Q STD DRY SCFM	PPM	E-SO2 LBS/HR
	841	14297	115.00	16.310
	846	14297	119.00	16.877
	851	14297	118.00	16.735
	856	14297	118.00	16.735
	901	14297	112.00	15.885
	906	14297	115.00	16.310
	911	14297	106.00	15.034
	916	14297	101.00	14.324
	921	14297	98.00	13.899
	926	14297	99.00	14.041
	931	14297	97.00	13.757
	936	14297	96.00	13.615
AVERAGES			107.83	15.294

RUN #5	TIME	Q STD DRY SCFM	PPM	E-SO2 LBS/HR
	1018	14102	128.00	17.906
	1023	14102	123.00	17.207
	1028	14102	128.00	17.906
	1033	14102	131.00	18.326
	1038	14102	129.00	18.046
	1043	14102	131.00	18.326
	1048	14102	139.00	19.445
	1053	14102	138.00	19.305
	1058	14102	135.00	18.885
	1103	14102	130.00	18.186
	1108	14102	125.00	17.486
	1113	14102	123.00	17.207
AVERAGES			130.00	18.186

SO2 EMISSION CALCULATIONS

E-SO2 = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-SO2 = SO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF SO2, 64

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #6	TIME	Q STD DRY SCFM	PPM	E-SO2 LBS/HR
	1145	14712	110.00	16.054
	1150	14712	114.00	16.638
	1155	14712	109.00	15.908
	1200	14712	108.00	15.762
	1205	14712	108.00	15.762
	1210	14712	106.00	15.470
	1215	14712	105.00	15.324
	1220	14712	105.00	15.324
	1225	14712	108.00	15.762
	1230	14712	111.00	16.200
	1235	14712	106.00	15.470
	1240	14712	114.00	16.638
AVERAGES			108.67	15.859

TEST SUMMARY

	PPM	LBS/HR
AVERAGE	115.50	16.446

SO2 EMISSION CALCULATIONS

E-SO2 = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-SO2 = SO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF SO2, 64

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 27,1996
SOURCE:	#2 Brick Kiln

		SCFM		LBS/HR
	855	15387	139.00	21.217
	900	15387	127.00	19.385
	905	15387	139.00	21.217
	910	15387	144.00	21.980
	915	15387	144.00	21.980
	920	15387	144.00	21.980
	925	15387	146.00	22.285
	930	15387	145.00	22.133
	935	15387	142.00	21.675
	940	15387	140.00	21.369
	945	15387	131.00	19.996
	950	15387	146.00	22.285
AVERAGES			140.58	21.459

RUN #2	TIME	Q STD DRY SCFM	PPM	E-SO2 LBS/HR
	1051	15016	133.00	19.812
	1056	15016	126.00	18.769
	1101	15016	128.00	19.067
	1106	15016	124.00	18.471
	1111	15016	122.00	18.173
	1116	15016	122.00	18.173
	1121	15016	133.00	19.812
	1126	15016	121.00	18.024
	1131	15016	116.00	17.279
	1136	15016	120.00	17.875
	1141	15016	133.00	19.812
	1146	15016	136.00	20.258
AVERAGES			126.17	18.794

SO2 EMISSION CALCULATIONS

E-SO2 = 1.55E-07 X Q std dry X MOLE. WT. X PPMV

WHERE

E-SO2 = SO2 EMISSION RATE, LB/HR

Q std dry = FLOW RATE DRY SCFM

MOLE. WT. = MOLECULAR WEIGHT OF SO2, 64

PPMV = PARTS PER MILLION BY VOLUME, FROM INSTRUMENTAL ANALYSIS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 27, 1996
SOURCE:	#2 Brick Kiln

RUN #3	TIME	Q STD DRY SCFM	PPM	E-SO2 LBS/HR
	1235	15469	132.00	20.256
	1240	15469	148.00	22.711
	1245	15469	139.00	21.330
	1250	15469	132.00	20.256
	1255	15469	131.00	20.102
	100	15469	132.00	20.256
	105	15469	129.00	19.795
	110	15469	135.00	20.716
	115	15469	140.00	21.483
	120	15469	149.00	22.864
	125	15469	158.00	24.245
	130	15469	159.00	24.399
AVERAGES			140.33	21.534

TEST SUMMARY	PPM	LBS/HR
AVERAGE	135.69	20.596

TOTAL VOC EMISSIONS MEASUREMENT
INSTRUMENTAL ANALYZER METHOD

LOCATION: Boral Brick - Atlanta Facility
Kiln #1

DATE 08/28/96

MOISTURE:
RUN #4 11.51
RUN #5 13.23
RUN #6 12.67

RUN #4	TIME	DATA RECORDER	PPM C WET	MG/M3 WET	FLOW ACFM	LBS/HR WET	PPM C DRY	MG/M3 DRY	FLOW SCFM	LBS/H DRY
	841	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0
	846	1	1.0	0.50	30358	0.06	1.00	0.50	14297	0
	851	1	1.0	0.50	30358	0.06	1.00	0.50	14297	0
	856	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0
	901	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0
	906	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0
	911	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0
	916	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0
	921	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0
	926	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0
	931	0	0.0	0.00	30358	0.00	0.00	0.00	14297	0.
	936	1	1.0	0.50	30358	0.06	1.00	0.50	14297	0.
	AVERAGES		0.3	0.12		0.01	0.25	0.12		0

RUN #5	TIME	DATA RECORDER	PPM C WET	MG/M3 WET	FLOW ACFM	LBS/HR WET	PPM C DRY	MG/M3 DRY	FLOW SCFM	LBS/H DRY
	1018	0	0.0	0.00	30350	0.00	0.00	0.00	14102	0.
	1023	0	0.0	0.00	30350	0.00	0.00	0.00	14102	0.
	1028	0	0.0	0.00	30350	0.00	0.00	0.00	14102	0.
	1033	0	0.0	0.00	30350	0.00	0.00	0.00	14102	0.
	1038	0	0.0	0.00	30350	0.00	0.00	0.00	14102	0.
	1043	0	0.0	0.00	30350	0.00	0.00	0.00	14102	0.
	1048	0	0.0	0.00	30350	0.00	0.00	0.00	14102	0.
	1053	0	0.0	0.00	30350	0.00	0.00	0.00	14102	0.
	1058	1	1.0	0.50	30350	0.06	1.00	0.50	14102	0.
	1103	1	1.0	0.50	30350	0.06	1.00	0.50	14102	0.
	1108	1	1.0	0.50	30350	0.06	1.00	0.50	14102	0.
	1113	1	1.0	0.50	30350	0.06	1.00	0.50	14102	0.
	AVERAGES		0.3	0.17		0.02	0.33	0.17		0.

RUN #6	TIME	DATA RECORDER	PPM C WET	MG/M3 WET	FLOW ACFM	LBS/HR WET	PPM C DRY	MG/M3 DRY	FLOW SCFM	LBS/HR DRY
	1145	0	0.0	0.00	31401	0.00	0.00	0.00	14712	0.(
	1150	0	0.0	0.00	31401	0.00	0.00	0.00	14712	0.(
	1155	0	0.0	0.00	31401	0.00	0.00	0.00	14712	0.(
	1200	0	0.0	0.00	31401	0.00	0.00	0.00	14712	0.(
	1205	1	1.0	0.50	31401	0.06	1.00	0.50	14712	0.(
	1210	1	1.0	0.50	31401	0.06	1.00	0.50	14712	0.(
	1215	1	1.0	0.50	31401	0.06	1.00	0.50	14712	0.(
	1220	1	1.0	0.50	31401	0.06	1.00	0.50	14712	0.(
	1225	1	1.0	0.50	31401	0.06	1.00	0.50	14712	0.(
	1230	2	2.0	0.99	31401	0.12	2.00	0.99	14712	0.(
	1235	1	1.0	0.50	31401	0.06	1.00	0.50	14712	0.(
	1240	1	1.0	0.50	31401	0.06	1.00	0.50	14712	0.(
	AVERAGES		0.8	0.37		0.04	0.75	0.37		0.(

TEST SUMMARY

	RUN #1	RUN #2	RUN #3	AVERAGE
AVERAGE PPMc, DRY	0.3	0.3	0.8	0.4
AVERAGE PPMc, WET	0.3	0.3	0.8	0.4
AVERAGE LBS/HR, DRY	0.0067	0.0088	0.0206	0.0120
AVERAGE LBS/HR, WET	0.0141	0.0188	0.0439	0.0256

TOTAL VOC EMISSIONS MEASUREMENT
INSTRUMENTAL ANALYZER METHOD

needs to be corrected to dry basis

LOCATION: Boral Brick - Atlanta Facility
Kiln #2

DATE 08/27/96

MOISTURE:

RUN #1	10.4
RUN #2	11.14
RUN #3	11.74

RUN #1	TIME	DATA RECORDER	PPM C WET	MG/M3 WET	FLOW ACFM	LBS/HR WET	PPM C DRY	MG/M3 DRY	FLOW SCFM	LBS/H DRY
	855	7	7 ~~8.0~~	0.00	32861	0.00	7 ~~0.00~~	0.00	15387	0.
	900	6	6.0	2.98	32861	0.37	6.00	2.98	15387	0.
	905	9	9.0	4.47	32861	0.55	9.00	4.47	15387	0.
	910	8	8.0	3.97	32861	0.49	8.00	3.97	15387	0.
	915	8	8.0	3.97	32861	0.49	8.00	3.97	15387	0.
	920	9	9.0	4.47	32861	0.55	9.00	4.47	15387	0.
	925	9	9.0	4.47	32861	0.55	9.00	4.47	15387	0.
	930	10	10.0	4.97	32861	0.61	10.00	4.97	15387	0.
	935	12	12.0	5.96	32861	0.73	12.00	5.96	15387	0.
	940	13	13.0	6.46	32861	0.80	13.00	6.46	15387	0.
	945	13	13.0	6.46	32861	0.80	13.00	6.46	15387	0.
	950	13	13.0	6.46	32861	0.80	13.00	6.46	15387	0.
	AVERAGES		9.2	4.55		0.56	9.75 ~~9.17~~	4.55		0.

RUN #2	TIME	DATA RECORDER	PPM C WET	MG/M3 WET	FLOW ACFM	LBS/HR WET	PPM C DRY	MG/M3 DRY	FLOW SCFM	LBS/HR DRY
	1051	8	8.0	3.97	32551	0.49	8.00	3.97	15016	0.
	1056	6	6.0	2.98	32551	0.36	6.00	2.98	15016	0.
	1101	5	5.0	2.48	32551	0.30	5.00	2.48	15016	0.
	1106	5	5.0	2.48	32551	0.30	5.00	2.48	15016	0.
	1111	5	5.0	2.48	32551	0.30	5.00	2.48	15016	0.
	1116	5	5.0	2.48	32551	0.30	5.00	2.48	15016	0.
	1121	5	5.0	2.48	32551	0.30	5.00	2.48	15016	0.
	1126	4	4.0	1.99	32551	0.24	4.00	1.99	15016	0.
	1131	4	4.0	1.99	32551	0.24	4.00	1.99	15016	0.
	1136	4	4.0	1.99	32551	0.24	4.00	1.99	15016	0.
	1141	10	10.0	4.97	32551	0.61	10.00	4.97	15016	0.
	1146	5	5.0	2.48	32551	0.30	5.00	2.48	15016	0.
	AVERAGES		5.5	2.73		0.33	5.50	2.73		0.

RUN #3	TIME	DATA RECORDER	PPM C WET	MG/M3 WET	FLOW ACFM	LBS/HR WET	PPM C DRY	MG/M3 DRY	FLOW SCFM	LBS/HR DRY
	1235	4	4.0	1.99	32926	0.25	4.00	1.99	15469	0.
	1240	3	3.0	1.49	32926	0.18	3.00	1.49	15469	0.
	1245	4	4.0	1.99	32926	0.25	4.00	1.99	15469	0.
	1250	3	3.0	1.49	32926	0.18	3.00	1.49	15469	0.
	1255	7	7.0	3.48	32926	0.43	7.00	3.48	15469	0.
	1300	5	5.0	2.48	32926	0.31	5.00	2.48	15469	0.
	1305	4	4.0	1.99	32926	0.25	4.00	1.99	15469	0.
	1310	4	4.0	1.99	32926	0.25	4.00	1.99	15469	0.
	1315	5	5.0	2.48	32926	0.31	5.00	2.48	15469	0.
	1320	5	5.0	2.48	32926	0.31	5.00	2.48	15469	0.
	1325	4	4.0	1.99	32926	0.25	4.00	1.99	15469	0.
	1330	6	6.0	2.98	32926	0.37	6.00	2.98	15469	0.
	AVERAGES		4.5	2.24		0.28	4.50	2.24		0.

TEST SUMMARY

	RUN #1	RUN #2	RUN #3	AVERAGE
AVERAGE PPMc, DRY	9.2	5.5	4.5	6.4
AVERAGE PPMc, WET	9.2	5.5	4.5	6.4
AVERAGE LBS/HR, DRY	0.2628	0.1539	0.1297	0.1821
AVERAGE LBS/HR, WET	0.5612	0.3335	0.2760	0.3903

OXYGEN CONCENTRATION DETERMINATIONS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #4	TIME	%O2
	841	14.30
	846	14.30
	851	14.30
	856	14.40
	901	15.00
	906	14.30
	911	14.20
	916	14.30
	921	14.40
	926	14.30
	931	14.30
	936	14.40
	AVERAGES	14.38

RUN #5	TIME	Q STD DRY SCFM	%O2
	1018		14.00
	1023		14.00
	1028		14.10
	1033		14.00
	1038		14.00
	1043		14.60
	1048		13.90
	1053		13.90
	1058		14.00
	1103		14.10
	1108		14.00
	1113		14.20
	AVERAGES		14.07

OXYGEN CONCENTRATION DETERMINATIONS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #6	TIME	Q STD DRY SCFM	%O2
	1145		14.50
	1150		14.50
	1155		14.60
	1200		14.50
	1205		14.50
	1210		14.60
	1215		14.70
	1220		14.50
	1225		14.50
	1230		14.50
	1235		15.20
	1240		14.50
	AVERAGES		14.59

TEST SUMMARY	
	%O2
AVERAGE	14.34

OXYGEN CONCENTRATION DETERMINATIONS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 27,1996
SOURCE:	#2 Brick Kiln

RUN #1	TIME	%O2
	855	14.50
	900	14.90
	905	14.40
	910	14.40
	915	14.40
	920	14.50
	925	14.50
	930	14.60
	935	14.70
	940	14.80
	945	15.20
	950	14.40
	AVERAGES	14.61

RUN #2	TIME	Q STD DRY SCFM	%O2
	1051		14.40
	1056		14.40
	1101		14.50
	1106		14.40
	1111		14.40
	1116		14.50
	1121		14.60
	1126		14.40
	1131		14.40
	1136		14.70
	1141		14.10
	1146		14.00
	AVERAGES		14.40

OXYGEN CONCENTRATION DETERMINATIONS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 27,1996
SOURCE:	#2 Brick Kiln

RUN #3	TIME	Q STD DRY SCFM	%O2
	1235		14.10
	1240		14.10
	1245		14.20
	1250		14.30
	1255		14.30
	100		14.30
	105		14.50
	110		14.40
	115		14.40
	120		14.40
	125		14.00
	130		13.90
	AVERAGES		14.24

TEST SUMMARY	
	%O2
AVERAGE	14.42

CO2 CONCENTRATION DETERMINATIONS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #4 TIME	%CO2
841	3.80
846	3.80
851	3.80
856	3.80
901	3.40
906	3.80
911	3.90
916	3.80
921	3.80
926	3.80
931	3.80
936	3.80
AVERAGES	3.78

RUN #5 TIME	Q STD DRY SCFM	%CO2
1018		4.00
1023		4.00
1028		4.00
1033		4.00
1038		4.00
1043		3.70
1048		4.10
1053		4.10
1058		4.10
1103		4.00
1108		4.00
1113		4.00
AVERAGES		4.00

CO2 CONCENTRATION DETERMINATIONS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 28,1996
SOURCE:	#1Brick Kiln

RUN #6	TIME	Q STD DRY SCFM	%CO2
	1145		3.80
	1150		3.80
	1155		3.70
	1200		3.80
	1205		3.80
	1210		3.70
	1215		3.70
	1220		3.80
	1225		3.80
	1230		3.80
	1235		3.40
	1240		3.80
	AVERAGES		3.74

TEST SUMMARY	
	%CO2
AVERAGE	3.84

CO2 CONCENTRATION DETERMINATIONS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 27, 1996
SOURCE:	#2 Brick Kiln

RUN #1	TIME	%CO2
	855	3.70
	900	3.50
	905	3.70
	910	3.80
	915	3.80
	920	3.70
	925	3.70
	930	3.70
	935	3.60
	940	3.60
	945	3.30
	950	3.80
	AVERAGES	3.66

RUN #2	TIME	Q STD DRY SCFM	%CO2
	1051		3.80
	1056		3.80
	1101		3.80
	1106		3.80
	1111		3.80
	1116		3.80
	1121		3.70
	1126		3.80
	1131		3.80
	1136		3.70
	1141		4.00
	1146		4.00
	AVERAGES		3.82

CO2 CONCENTRATION DETERMINATIONS

CLIENT:	*Boral Brick*
LOCATION:	*Smyrna, Georgia*
DATE:	August 27, 1996
SOURCE:	#2 Brick Kiln

RUN #3	TIME	Q STD DRY SCFM	%CO2
	1235		4.00
	1240		4.00
	1245		3.90
	1250		3.90
	1255		3.90
	100		3.80
	105		3.70
	110		3.80
	115		3.70
	120		3.80
	125		4.00
	130		4.00
	AVERAGES		3.88

TEST SUMMARY	
	%CO2
AVERAGE	3.78

MOISTURE DATA

KILN #1

RUN #4	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	197.00	109.00	2.00	310.90	
NET	97.00	9.00	2.00	10.90	118.9

RUN #5	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	210.00	112.00	3.00	311.50	
NET	110.00	12.00	3.00	11.50	136.5

RUN #6	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	198.00	113.00	3.00	310.80	
NET	98.00	13.00	3.00	10.80	124.8

MOISTURE DATA

KILN #2

RUN #1	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	157.00	113.00	3.00	307.80	
NET	57.00	13.00	3.00	7.80	80.8

RUN #2	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	183.00	100.00	2.00	304.90	
NET	83.00	0.00	2.00	4.90	89.9

RUN #3	1st Imp.	2nd Imp.	3rd Imp.	4th Imp.	TOTALS
BEGINNING	100.00	100.00	0.00	300.00	
ENDING	190.00	100.00	1.00	309.30	
NET	90.00	0.00	1.00	9.30	100.3

ISOKINETIC SAMPLING RATE CALCULATION

Kiln #1

dH = KdP

K = (846.72*Dn^4*dH@*Cp^2*(1-Bw)^2*Md*Tm*Ps)/(Ms*Ts*Pm)

	RUN #4	*RUN #5*	*RUN #6*
Dn	0.316	0.312	0.305
dH@	1.74	1.74	1.74
Cp	0.84	0.84	0.84
Bw(FRACTION,NOT%)	0.12	0.12	0.12
Md	29.00	29.00	29.00
Pbar	29.36	29.36	29.36
PS (GAUGE)	-0.30	-0.30	-0.30
Ps	29.34	29.34	29.34
Tm, F	85.00	85.00	90.00
Tm, R	545.00	545.00	550.00
Ms	27.68	27.68	27.68
Ts, F	540.00	520.00	520.00
Ts, R	1000.00	980.00	980.00
Pm	29.47	29.47	29.47
K	4.5628	4.4246	4.0778

TERMINOLOGY

Ms=APPARENT STACK GAS MOLECULAR WEIGHT

=Md(1-Bw)+18Bw

Md=DRY GAS MOLECULAR WEIGHT (29) OR

=(0.44*%CO2)+(0.32*%O2)+(0.28*(%N2+%CO))

Ps=ABSOLUTE STACK PRESSURE (IN. Hg)

Pm=METER ABSOLUTE PRESSURE (IN. Hg)

= Pbar + (PS gauge/13.6)

ISOKINETIC SAMPLING RATE CALCULATION

Kiln #2

dH = KdP

K = (846.72*Dn^4*dH@*Cp^2*(1-Bw)^2*Md*Tm*Ps)/(Ms*Ts*Pm)

	RUN #1	*RUN #2*	*RUN #3*
Dn	0.251	0.251	0.253
dH@	1.74	1.74	1.74
Cp	0.84	0.84	0.84
Bw(FRACTION,NOT%)	0.18	0.12	0.12
Md	29.00	29.00	29.00
Pbar	29.35	29.35	29.35
PS (GAUGE)	-0.31	-0.31	-0.31
Ps	29.33	29.33	29.33
Tm, F	85.00	85.00	90.00
Tm, R	545.00	545.00	550.00
Ms	27.02	27.68	27.68
Ts, F	540.00	540.00	540.00
Ts, R	1000.00	1000.00	1000.00
Pm	29.38	29.38	29.38
K	1.6198	1.8210	1.8970

TERMINOLOGY

Ms=APPARENT STACK GAS MOLECULAR WEIGHT

=Md(1-Bw)+18Bw

Md=DRY GAS MOLECULAR WEIGHT (29) OR

=(0.44*%CO2)+(0.32*%O2)+(0.28*(%N2+%CO))

Ps=ABSOLUTE STACK PRESSURE (IN. Hg)

Pm=METER ABSOLUTE PRESSURE (IN. Hg)

= Pbar + (PS gauge/13.6)

NOMENCLATURE

AN	(square inches), Cross sectional area of nozzle
AS	(square feet), Cross sectional area of stack
CP	Pitot tube calibration coefficient
% EA	Percent Excess Air
F	(scfd/10 6 BTU), F factor
DH	(inches of water) Average orifice meter reading
HI	(million BTU/hr), Heat Input Rate
% I	Percent Isokineticity
M	(lb/lb mole), Molecular Weight of wet gas
% M	Percent Moisture
MD	Mole fraction of dry gas
MWD	(lb/lb mole) molecular weight of dry gas
N DP	Number of sample points
P ATM	(in Hg), Local atmospheric pressure
PM	(in Hg), Absolute pressure in dry gas meter
PS	(in Hg), Absolute stack pressure
PS GAUGE	(inches of water), Measured static stack pressure gauge
P STD	(29.92 in Hg), Standard pressure
PMRC	(lb/hr), Pollutant mass rate based on concentration
PMRU	(lb/million BTU), Specific emission rate

NOMENCLATURE (CONTINUED)

DP	(inches of water), Velocity pressure
QS	(cubic feet/min.), Actual stack volume flow rate
Q STD	(cubic feet/min.), Stack volume flow rate at standard conditions
TM	(degrees R), Average dry gas meter temperature
TS	(degrees R), Average stack temperature
T STD	(528 degrees R), Standard temperature
VLQ	(ml), Liquid volume
VM	(cubic feet), Sample volume measured by dry gas meter
VM STD	(cubic feet), Sample volume at standard conditions
VS	(ft/sec), stack velocity
VV STD	(cubic feet), Volume of water vapor collected, corrected to standard conditions
WT	(gm), Total weight of particulate collected
TIME (MIN.)	Duration of test

CALCULATION FORMULAE

1. Absolute pressure in dry gas meter

$$PM = P\ ATM + DH/13.6$$

2. Absolute Stack Pressure

$$PS = P\ ATM + PS\ gauge/13.6$$

3. Sample volume at standard conditions

$$VM\ STD = (VM)\ (T\ STD/TM)\ (PM/P\ STD)$$

4. Volume of water collected, corrected to standard conditions

$$VV\ STD = (.00267)\ (VLQ)\ (T\ STD/P\ STD)$$

5. Total sample volume at standard conditions

$$V\ STD = VM\ STD + VV\ STD$$

6. Percent moisture in stack gas

$$\%M = (100)\ (VV\ STD)/V\ STD$$

7. Mole Fraction of dry gas

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

8. Molecular weight of the wet gas

$$M = (MWD)\ (MD) + 18(1-MD)$$

9. Stack velocity

$$VS = (85.48)(CP)((TS/(PS)(M))^{1/2}((Sum\ DP)^{1/2}\ N\ DP))$$

10. Stack volume flow rate

$$QS = (60)(VS)(AS)$$

CALCULATION FORMULAE (CONTINUED)

11. Stack volume flow rate, standard conditions including moisture

$$Q\ STD = (T\ STD/P\ STD)(PS/TS)(QS)$$

12. Stack volume flow rate standard conditions dry

$$Q\ STD\ DRY = (Q\ STD)(1-\%M)$$

13. Pollutant mass rate, concentration basis

$$PMRC = (.1323)(WT)(Q\ STD)/V\ STD$$

14. Pollutant mass rate ratio of areas basis

$$PMRA = (.1323)(WT)(AS)(144)/(Time)(AN)$$

15. Percent Isokineticity

$$\%I = (100)\ (PMRA)/PMRC$$

16. Average pollutant mass rate

$$PMR\ AVG = (PMRA + PMRC)/2$$

17. % Excess Air

$$\%EA = (100)\ (\%oxygen - (.5)(\%carbon\ monoxide)$$
$$(.264)(\%nitrogen) - \%oxygen + (.5)\ (\%carbon\ monoxide)$$

18. Heat input rate

$$HI = ((.6)\ (Q\ STD\ DRY)/F)((20.9 - \%oxygen)/20.9)$$

19. Specific emission rate

$$PMRU = PMR\ AVG/HI$$

DATA SHEETS

Method 5 Sampling Data Sheets
Impinger Data Sheets
Equal Area Data
Traverse Data and Cyclonic Flow Check
VOST Sampling Data Sheets
Chain of Custody Sheet
Laboratory Reports
Process Flow Diagrams
Calibration Information

KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna GA
TEST TEAM Welch, McCombs
LEAK RATES

DATE 8-28-96
SOURCE #1 Brick Kiln
RUN # 4

Pbar 29.36
Ps -.30
Method 5-13B

Module I.D. ATC#1
Filter # 5767
Pitot I.D. 51

Comments:

SETUP

Start .009 @ 14 "Hg
end .009 @ 10 "Hg

PITOT:
start
A 5.2 " B 6.0 "H_2O
end
A 6.6 " B 6.0 "H_2O

▲H@ 1.74
Tm 85
T_s 540
Md 29
Pitot I.D. 51

NOZZLE .316 (#53)
% H_2O 12
Gamma Factor 1.0
Pm 29.47
K Factor 4.563

~~Agency~~ Boral Personnel On Site Robert

Start Time 8:33 Finish Time

TIME	PT.	LINE VAC	T_m F°	T_s F°	T_p F°	T_f F°	T_i F°	▲P_s (in.)H_2O	▲H (in.)H_2O	V_m FT^3	REMARKS
8:33 0 0	A1	1.0	73	526	238	255	60	.44	2.01	653.18	Begin
3	2	2.0	73	527	239	255	60	.45	2.05	654.89	
5 6	3	2.0	73	524	239	255	60	.45	2.05	657.32	
9	4	2.0	73	523	239	255	60	.43	1.96	659.31	
10 12	5	2.0	74	520	240	256	60	.42	1.92	661.27	
15	6	2.0	74	521	240	255	61	.42	1.92	—	
15 18	7	2.0	74	517	240	255	61	.38	1.73	665.12	
20	8	2.0	75	515	240	255	61	.36	1.64	666.91	
20 24	9	2.0	75	510	240	256	61	.36	1.64	668.91	
27	10	2.0	77	500	240	256	61	.34	1.55	670.69	
25 30	11	2.0	78	500	240	256	61	.31	1.41	672.55	
33	12	2.0	79	492	240	256	61	.28	1.28	673.94	
30 34	Shut	Down								675.47	
9:06 0 0	B1	2.0	79	520	240	256	61	.35	1.60	675.47	Rescume
6	2	2.0	80	519	240	256	61	.42	1.92	677.36	
5 9	3	2.0	81	523	240	256	61	.42	1.92	679.22	

FORM 16

T_m = meter temperature T_s = stack temperature T_p = probe temperature T_f = filter temperature

ANALYTICAL TESTING CONSULTANTS, INC.
KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smryna GA
TEST TEAM DR JW

DATE 8-28-96
SOURCE #1 Brick Kiln
RUN # 4

Pbar 29.36
Ps -.30
Method 5-13B

Module I.D.
Filter #
Pitot I.D.

Comments:

LEAK RATES

Start @ "Hg
end @ "Hg
PITOT:
start
A " B "H_2O
end
A " B "H_2O

SETUP

▲H@
Tm
T_s
Md
Pitot I.D.

NOZZLE (#)
% H_2O
Gamma Factor
Pm
K Factor

Agency Personnel On Site

Start Time
Finish Time

TIME	PT.	LINE VAC	T_M °F	T_S °F	T_P °F	T_I °F	T_I °F	▲P_s (in.)H_2O	▲H (in.)H_2O	V_M FT^3	REMARKS
	64	2.0	82	523	240	255	61	.40	1.83	681.35	Continue
10	5	2.0	83	521	240	255	62	.38	1.73	—	
	6	2.0	84	523	240	256	62	.38	1.73	685.30	
15	7	2.0	84	520	240	256	62	.39	1.78	686.91	
	8	2.0	85	520	240	255	62	.39	1.78	688.87	
20	9	2.0	85	522	240	255	62	.32	1.46	690.71	
	10	2.0	86	522	240	255	62	.32	1.46	692.57	
25	11	2.0	86	522	240	255	62	.30	1.37	694.61	
	12	2.0	86	515	239	255	62	.28	1.28	696.26	
30	shut down		—							697.82	
										44.64	

FORM 16
T_M = meter temperature T_s = stack temperature T_P = probe temperature

KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna Ga.
TEST TEAM McCombs Welch

DATE 8-28-96
SOURCE #1 Brick Kiln
RUN # 5

Pbar 29.36
Ps -.30
Method 5/13B

Module I.D. ATC #1
Filter # J 768
Pitot I.D. 62

LEAK RATES

Start .009 @ 15 "Hg

end .005 @ 6 "Hg

PITOT:
start
A 7.2" B 6.0 "H_2O
end
A 8.1 " B 4.2 "H_2O

SETUP

▲H@

Tm

T_s 520 SAME

Md

Pitot I.D.

NOZZLE .312 (#56)

%H_2O #4

Gamma Factor

Pm

K Factor 4.4246

Comments:

Agency Personnel On Site

Start Time 10:15

Finish Time

TIME	PT.	LINE VAC	T_m F°	T_s F°	T_p F°	T_f F°	T_i F°	▲P (in.)H_2O	▲H (in.)H_2O	V_m FT^3	REMARKS
10:15 0	A1	1.0	89	510	240	254	58	.36	1.59	698.01	
	2	1.0	89	517	240	254	58	.42	1.86	699.89	
5	3	1.0	90	520	239	254	57	.45	1.99	—	
	4	1.0	90	521	239	255	57	.43	1.90	704.06	
10	5	1.0	90	520	239	255	58	.42	1.86	705.73	
	6	2.0	89	521	239	255	58	.42	1.86	707.91	
15	7	2.0	89	521	240	255	58	.41	1.81	709.77	
	8	2.0	90	513	240	255	58	.35	1.55	711.71	
20	9	2.0	90	511	240	255	59	.32	1.42	713.43	
	10	2.0	90	498	240	255	59	.30	1.33	715.11	
25	11	2.0	91	495	240	255	59	.29	1.28	716.91	
	12	2.0	91	490	239	255	59	.28	1.24	718.68	
30	SHUT DOWN									719.87	
10:48 0	B1	2.0	92	508	240	255	61	.36	1.59	719.87	
	2	2.0	93	512	240	255	60	.46	2.04	722.27	
5	3	2.0	93	515	240	256	60	.43	1.90	723.85	

FORM 16

T_m = meter temperature T_s = stack temperature T_p = probe temperature

AMERICAN TESTING CONSULTANTS, INC.
KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna GA
TEST TEAM DM JW

DATE 8-28-96
SOURCE #1 Brick Kiln
RUN # 5

Pbar
Ps
Method
Comments:

Module I.D.
Filter #
Pitot I.D.

LEAK RATES

Start @ "Hg
end @ "Hg
PITOT:
start
A " B "H_2O
end
A " B "H_2O

SETUP

▲H@
Tm
T_s
Md
Pitot I.D.

NOZZLE (#)
% H_2O
Gamma Factor
Pm
K Factor

Agency Personnel On Site

Start Time
Finish Time

TIME	PT.	LINE VAC	T_m °F	T_s °F	T_p °F	T_f °F	T_i °F	▲P_s (in.)H_2O	▲H (in.)H_2O	V_m FT^3	REMARKS
	B4	2.0	93	519	240	255	60	.43	1.90	225.72	
10	5	2.0	93	521	240	255	60	.43	1.90	—	
	6	2.0	93	521	240	255	61	.43	1.90	729.92	
15	7	2.0	93	517	240	255	61	.40	1.70	731.41	
	8	2.0	94	520	240	255	61	.40	1.77	—	
20	9	2.0	94	518	240	255	61	.33	1.46	736.62	
	10	2.0	94	507	240	255	61	.30	1.33	—	
25	11	2.0	94	494	240	255	61	.29	1.28	740.24	
	12	2.0	94	490	240	255	61	.29	1.28	741.57	
30	Shut Down									742.75	
										44.74	

FORM 16
T_m = meter temperature T_s = stack temperature T_p = probe temperature [redacted] fil[redacted] emp[redacted]re [redacted] exha[redacted] temp[redacted]re [redacted]
▲P[redacted] loci[redacted] ad [redacted] rent pres[redacted]

KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna GA
TEST TEAM JW, DM

DATE 8-28-96
SOURCE #1 Brick Kiln
RUN # 6

Pbar 29.36
Ps -.30
Method 5-13B

Module I.D. ATC 1
Filter # J 768
Pitot I.D.

Comments:

LEAK RATES

Start .009 @ 16" Hg
end .007 @ 10 "Hg

PITOT:
start
A 5.1 " B 5.3 "H_2O
end
A 4.2 " B 5.8 "H_2O

SETUP

▲H@ 1.74
Tm 90
T_s 520
Md 29.00
Pitot I.D.

NOZZLE .305 (#)
% H_2O 12%
Gamma Factor 1.00
Pm 29.47
K Factor 4.0778

Agency Personnel On Site

Start Time 11:48
Finish Time

TIME	PT.	LINE VAC	T_m °F	T_s °F	T_p °F	T_f °F	T_i °F	▲P_s (in.)H_2O	▲H (in.)H_2O	V_m FT^3	REMARKS
11:48 0	A1	2.0	93	518	238	255	58	.46	1.88	743.00	
	2	2.0	94	521	239	255	58	.50	2.04	745.02	
5	3	2.0	94	520	239	255	59	.52	2.12	746.87	
	4	2.0	94	519	240	255	60	.48	1.96	748.61	
10	5	2.0	94	521	240	255	60	.48	1.96	750.74	
	6	2.0	94	525	240	254	60	.48	1.96	752.77	
15	7	2.0	94	524	240	254	60	.44	1.79	754.92	
	8	2.0	94	521	240	254	60	.33	1.35	756.88	
20	9	2.0	94	521	240	254	60	.35	1.43	—	
	10	2.0	95	517	240	254	60	.33	1.35	—	
25	11	2.0	95	512	240	254	61	.30	1.22	762.31	
	12	2.0	95	500	240	254	61	.28	1.14	—	
30	Shut Down									765.25	
12:20 0	B1	2.0	95	508	240	255	62	.36	1.47	765.25	
	2	2.0	96	510	239	255	61	.42	1.71	767.00	
5	3	2.0	96	512	239	255	61	.45	1.84	768.73	

FORM 16

T_m = meter temperature T_s = stack temperature T_p = probe temperature T_f = filter temperature
▲P = Velocity head differential

ANALYTICAL TESTING CONSULTANTS, INC.
KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Broad Brick
LOCATION Smyrna GA
TEST TEAM McCombs Welch

DATE 8-28-96
SOURCE #1 Kiln
RUN # 6

Pbar
Ps
Method
Comments:

Module I.D.
Filter #
Pitot I.D.

LEAK RATES

Start @ "Hg
end @ "Hg
PITOT:
start
A " B "H_2O
end
A " B "H_2O

SETUP

▲H@
Tm
T_s
Md
Pitot I.D.

NOZZLE (#)
% H_2O
Gamma Factor
Pm
K Factor

Agency Personnel On Site
Start Time
Finish Time

TIME	PT.	LINE VAC	T_m F°	T_s F°	T_p F°	T_f F°	T_i F°	▲P_s (in.)H_2O	▲H (in.)H_2O	V_m FT^3	REMARKS
	B4	2.0	97	510	240	255	62	.42	1.71	770.42	
10	5	2.0	97	511	240	255	62	.40	1.63	—	
	6	2.0	98	~~511~~ *452	240	255	62	.42	1.71	774.08	
15	7	2.0	98	*452	240	255	62	*.48	1.96	775.87	* load
	8	3.0	98	497	240	254	63	.48	1.96	—	
20	9	3.0	98	504	240	254	63	.40	1.63	779.61	
	10	3.0	98	503	240	254	63	.32	1.30	781.41	
25	11	3.0	98	500	240	254	63	.30	1.22	783.41	
	12	3.0	98	497	240	254	63	.29	1.18	784.82	
30	SHUT DOWN									786.31	
										43.31	

FORM 16

ANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna, GA
TEST TEAM McCombs, Welch

DATE 8-27-96
SOURCE #2 Brick Kiln
RUN # 1

Pbar 29.35
Ps -.31
Method 5-13A

Module I.D. ATC#1
Filter # J 764
Pitot I.D. 51

LEAK RATES

Start .014 @ 15 "Hg
end .012 @ 12 "Hg

PITOT:
start
A 6.5 " B 4.5 "H_2O
end
A 6.0 " B 4.8 "H_2O

SETUP

▲H@ 1.74
Tm 85
T_s 540
Md 29.00
Pitot I.D. 51

NOZZLE .251 (#41)
% H_2O 18
Gamma Factor 1.0
Pm 29.38
K Factor 1.6198

Comments:
CO_2 sample taken prior to 1st Run @ Cooling
Zone Dilution Fan take Temp from 1270 → 600 °F

Agency Personnel On Site

Start Time 9:00 Finish Time

TIME	PT.	LINE VAC	T_m °F	T_s °F	T_p °F	T_f °F	T_{im} °F	▲P (in.) H_2O	▲H (in.) H_2O	V_m FT³	REMARKS
9:00 0	A1	1.0	73	524	238	254	50	.47	.76	543.73	Begin Test
3	2	1.0	73	474	238	254	50	.64	1.04	545.47	
6	3	1.0	73	533	239	254	50	.46	.75	546.92	
9	4	1.0	74	543	240	255	50	.44	.71	548.48	
12	5	1.0	74	545	240	255	50	.40	.65	549.30	
15	6	1.0	75	542	240	255	50	.40	.65	551.22	
18	7	1.0	76	542	240	255	50	.47	.76	552.51	
21	8	1.0	76	538	240	254	50	.47	.76	—	
24	9	1.0	76	539	240	254	50	.48	.79	555.61	
27	10	1.0	77	536	240	254	50	.48	.79	557.18	
30	11	1.0	78	533	240	254	50	.35	.57	558.50	
33	12	1.0	80	525	240	254	51	.35	.57	559.62	
36	SHUT DOWN									560.86	
9:38 0	B1	1.0	81	534	240	254	51	.48	.79	560.86	Resume
3	2	1.0	82	542	240	254	51	.48	.79	562.43	
6	3	1.0	83	543	240	255	51	.47	.76	563.93	

FORM 16

T_m = meter temperature T_s = stack temperature T_p = probe temperature T_f = filter temperature

ANALYTICAL TESTING CONSULTANTS, INC.
KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna Ga.
TEST TEAM McCombs

DATE 8-27-96
SOURCE #2 Brick Kiln
RUN # 1

Pbar
Ps
Method

Module I.D.
Filter #
Pitot I.D.

LEAK RATES

Start @ "Hg
end @ "Hg
PITOT:
start
A " B "H_2O
end
A " B "H_2O

SETUP

▲H@
Tm
T_s
Md
Pitot I.D.

NOZZLE (#)
% H_2O
Gamma Factor
Pm
K Factor

Comments:
Continue *Temp Drop Due to loading
Next load of Bricks into Kiln ~ 45-50 min

Agency Personnel On Site

Start Time
Finish Time

TIME	PT.	LINE VAC	T_m °F	T_s °F	T_p °F	T_p °F	T_s °F	T_s °F	▲P_s (in.)H_2O	▲H_m (in.)H_2O	V_m FT^3	REMARKS
9	B4	1.0	84	541	240	255	52		.46	.75	565.52	
12	5	1.0	87	*507	240	255	52		.46	.75	567.06	
15	6	1.0	87	538	240	255	52		.46	.75	568.40	
18	7	1.0	88	538	240	255	52		.42	.68	569.83	
21	8	1.0	88	540	240	255	52		.38	.62	571.15	
24	9	1.0	88	539	240	255	53		.36	.58	572.70	
27	10	1.0	88	533	240	255	53		.36	.58	—	
30	11	1.0	89	530	240	255	53		.34	.55	575.40	
33	12	1.0	89	530	240	255	53		.34	.55	577.18	
36	Shut	Down	End	Run							577.93	
											34.20	

FORM 16
* = meter temperature

AMERICAN TESTING CONSULTANTS INC.

KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna, GA
TEST TEAM DA, JW

DATE 8-27-96
SOURCE #2 Brick Kiln
RUN # 2

Pbar 29.35
Ps -.31
Method 5-13A

Module I.D. ATC #1
Filter # J 765
Pitot I.D. 52

LEAK RATES

Start .017 @ 16 "Hg

end .009 @ 5 "Hg

PITOT:
start
A 40 " B 5.1 "H_2O
end
A 3.5 " B 4.8 "H_2O

SETUP

ΔH@

Tm

T_s

Md

Pitot I.D.

NOZZLE .251 (#45)

% H_2O 12

Gamma Factor 1.0

Pm

K Factor 1.821

Comments:

Agency Personnel On Site

Start Time 10:51

Finish Time

TIME	PT.	LINE VAC	T_m °F	T_s °F	T_p °F	T_f °F	T_i °F	ΔP (in.) H_2O	ΔH (in.) H_2O	V_m FT³	REMARKS
10:51 0	A1	1.0	90	545	239	255	62	.38	.69	578.33	Begin
3	2	1.0	91	546	239	255	62	.46	.84	579.75	
6	3	1.0	91	546	240	255	62	.47	.86	581.51	
9	4	1.0	91	546	240	255	61	.46	.84	583.50	
12	5	1.0	91	549	240	254	60	.43	.78	584.77	
15	6	1.0	91	546	240	255	60	.43	.78	585.83	
18	7	1.0	90	545	240	255	60	.45	.82	587.52	
21	8	1.0	90	542	240	255	60	.44	.80	588.76	
24	9	1.0	90	541	240	255	60	.43	.78	590.42	
27	10	1.0	91	535	239	255	60	.39	.71	592.06	
30	11	1.0	92	530	239	255	60	.40	.73	593.52	
33	12	1.0	92	529	239	255	60	.40	.73	594.94	
36	Shut Down									596.29	
11:35 0	B1	1.0	92	531	239	255	60	.47	.86	596.29	Resume
3	2	1.0	93	*507	239	255	60	* .52	.95	598.01	*change
6	3	1.0	94	545	240	255	60	.50	.91	599.84	

FORM 16

T_m = meter temperature T_s = stack temperature T_p = probe temperature T_f = filter temper...

ANALYTICAL TESTING CONSULTANTS, INC.

KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna GA
TEST TEAM McCombs, Welch

DATE 8-27-96
SOURCE #2 Brick Kiln
RUN # #2

Pbar
Ps
Method
Comments:

Module I.D.
Filter #
Pitot I.D.

LEAK RATES

Start @ "Hg
end @ "Hg

PITOT:
start
A " B "H_2O
end
A " B "H_2O

SETUP

▲H@
Tm
T_s
Md
Pitot I.D.

NOZZLE (#)
% H_2O
Gamma Factor
Pm
K Factor

Agency Personnel On Site

Start Time
Finish Time

TIME	PT.	LINE VAC	T_m °F	T_s °F	T_p °F	T_f °F	T_i °F	▲P_s (in.) H_2O	▲H (in.) H_2O	V_m FT^3	REMARKS
9	B4	1.0	94	546	240	255	60	.49	.89	601.37	
12	5	1.0	94	547	240	255	60	.50	.91	603.10	
15	6	1.0	94	547	240	255	60	.50	.91	604.90	
18	7	1.0	94	547	240	255	60	.36	.66	606.18	
21	8	1.0	94	547	240	255	60	.36	.66	—	
24	9	1.0	95	539	240	255	61	.33	.60	609.30	
27	10	1.0	95	535	240	255	61	.33	.60	610.34	
30	11	1.0	96	535	240	255	61	.33	.60	612.32	
33	12	1.0	96	528	240	255	61	.30	.55	—	
36	Shut Down		End	Run	—	—	—	—	—	614.31	
										35.98	

FORM 16

T_m = meter temperature T_s = stack temperature [illegible]

KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna GA
TEST TEAM DM, JW

DATE 8-27-96
SOURCE #2 Brick Kiln
RUN # 3

Pbar 29.33
Ps -0.31
Method 5-13A

Module I.D. ATC #1
Filter # J 766
Pitot I.D.

Comments:

LEAK RATES

Start .009 @ 6 "Hg

end .005 @ 5 "Hg

PITOT:
start
A 4.1 " B 5.0 "H_2O
end
A 4.2 " B 5.9 "H_2O

SETUP

ΔH@ 1.71

Tm 90

T_s 540

Md 29

Pitot I.D.

NOZZLE .253 (#46)

% H_2O 12%

Gamma Factor 1.00

Pm 29.38

K Factor 1.897

Agency Personnel On Site

Start Time

Finish Time

TIME	PT.	LINE VAC	T_m °F	T_s °F	T_p °F	T_f °F	T_i °F	ΔP (in.) H_2O	ΔH (in.) H_2O	V_m FT³	REMARKS
12:35 0	A1	1.0	96	533	240	255	58	.38	.72	614.77	Begin
3	2	1.0	96	538	240	255	58	.55	1.04	616.91	
6	3	1.0	96	539	240	255	58	.53	1.01	617.85	
9	4	1.0	95	541	239	255	59	.47	.89	—	
12	5	1.0	95	542	239	255	60	.44	.83	621.68	
15	6	1.0	95	544	239	255	60	.43	.82	622.86	
18	7	1.0	95	541	239	255	61	.48	.91	624.50	
21	8	1.0	96	543	239	255	61	.48	.91	625.95	
24	9	1.0	96	542	239	255	61	.46	.87	627.88	
27	10	1.0	96	542	240	255	62	.42	.80	629.21	
30	11	1.0	96	536	240	255	62	.34	.64	631.17	
33	12	1.0	97	522	240	255	62	.28	.53	632.52	
36	Shut Down									633.35	
1:14 0	B1	1.0	97	525	240	255	63	.45	.85	633.35	
3	2	1.0	97	530	240	255	62	.52	.99	635.01	
6	3	1.0	97	457	240	255	62	.69	1.31	636.68	Change

FORM 16

T_m = meter temperature T_s = stack temperature T_p = probe temperature T_f = filter temperature

ΔP = Velocity head differential

[illegible] TESTING CONSULTANTS, INC.

KANNAPOLIS, N.C. ATLANTA, GEORGIA

MODULE SAMPLING DATA SHEET

CLIENT Boral Brick
LOCATION Smyrna GA
TEST TEAM AM JW

DATE 8-27-96
SOURCE #2 Brick Kiln
RUN # 3

Pbar 29.93
Ps -.31
Method 5 13A

Module I.D. /
Filter # /
Pitot I.D. /

LEAK RATES

Start @ "Hg
end @ "Hg
PITOT:
start
A " B "H_2O
end
A " B "H_2O

SETUP

▲H@
Tm
T_s
Md
Pitot I.D.

NOZZLE (#)
% H_2O
Gamma Factor
Pm
K Factor

Comments:

Agency Personnel On Site

Start Time

Finish Time

TIME	PT.	LINE VAC	T_m °F	T_s °F	T_p °F	T_c °F	T_i °F	▲P (in.) H_2O	▲H (in.) H_2O	V_m FT³	REMARKS
9	B4	1.0	97	534	240	255	62	.51	.97	638.39	
12	5	1.0	97	543	240	255	62	.51	.97	—	
15	6	1.0	97	543	240	255	62	.51	.97	642.00	
18	7	1.0	98	544	240	255	63	.42	.80	—	
21	8	1.0	98	544	240	255	63	.39	.74	645.61	
24	9	1.0	98	543	240	255	63	.40	.76	647.12	
27	10	1.0	98	546	240	255	64	.38	.72	648.88	
30	11	1.0	98	539	240	255	64	.32	.61	650.08	
33	12	1.0	98	532	240	255	64	.29	.55	652.51	
36	Shut Down									652.91	
										38.12	

FORM 16

T_m = meter temperature, T_s = stack temperature, T_p = probe temperature, T_c = filter temperature, T_i = exhaust temperature, ▲P = [illegible]

ANALYTICAL TESTING CONSULTANTS, INC.

KANNAPOLIS, N.C. ATLANTA, GEORGIA

IMPINGER DATA SHEET

CLIENT Boral Brick LOCATION Atlanta GA UNIT Kiln #1

RUN#		DATE	IMPINGER CONTENTS 1	2	3	4	TOTAL CONDENSATE (VLQ)	REMARKS
4	START	8/28/96	100ml H_2O	100ml H_2O	DRY	300g SiO_2		
	END	8/28/96	197ml	109ml	2ml	310.9		
	dv		+97	+9	+2	+10.9	118.9 ML	
5	START	8/28/96	100ml H_2O	100ml H_2O	DRY	300g SiO_2		
	END	8/28/96	210ml	112ml	3ml	311.5		
	dv		+110	+12	+3	+11.5	136.5 ML	
6	START	8/29/96	100ml H_2O	100ml H_2O	DRY	300g SiO_2		
	END	8/29/96	198ml	113ml	3ml	310.8		
	dv		+98	+13	+3	+10.8	124.8 ML	
	START							
	END							
	dv						ML	
	START							
	END							
	dv						ML	
	START							
	END							
	dv						ML	

DATA BY DM APPROVED BY

FORM 11

ANALYTICAL TESTING CONSULTANTS, INC.

KANNAPOLIS, N.C. ATLANTA, GEORGIA

IMPINGER DATA SHEET

CLIENT BORAL BRICK LOCATION ATLANTA, GA UNIT #2 BRICK KILN

RUN#		DATE	IMPINGER CONTENTS 1	2	3	4	TOTAL CONDENSATE (VLQ)	REMARKS
1	START	8/27/96	100ml H_2O	100ml H_2O	Dry	300g SiO_2		
	END	8/27/96	157ml	113ml	3ml	307.8		
	dv		+57	+13	+3	+7.8	80.8 ML	
2	START	8/27/96	100ml H_2O	100ml H_2O	Dry	300g SiO_2		
	END	8/27/96	183	100	2	304.9		
	dv		+83	+0	+2	+4.9	89.9 ML	
3	START	8/27/96	100ml H_2O	100ml H_2O	Dry	300g SiO_2		
	END	8/27/96	190	100	1	309.3		
	dv		+90	+0	+1	+9.3	100.3 ML	
	START							
	END							
	dv						ML	
	START							
	END							
	dv						ML	
	START							
	END							
	dv						ML	

DATA BY DM APPROVED BY

FORM 11

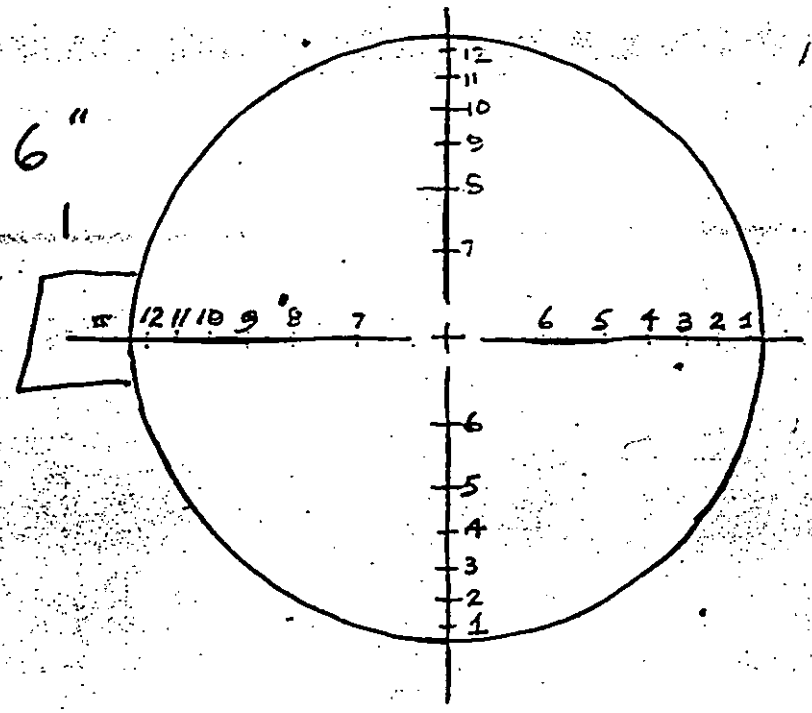
ANALYTICAL TESTING CONSULTANTS, INC.

JOB BROAD BRICK LOCATION Smyrna, Ga DATE 8-26-96

UNIT #1 + #2 KILN MADE BY DM CHECKED BY JW

Description EQUAL AREA CALCULATIONS

ROUND DUCT - TWELVE POINT TRAVERSE PER DIAMETER



STACK I.D. = 44"		
POINT NO.	% OF DIAMETER	DISTANCE (INCHES)
1	2.1	*1.0
2	6.7	2.95
3	11.8	5.19
4	17.7	7.79
5	25.0	11.00
6	35.5	15.62
7	64.5	28.3
8	75.0	33.00
9	82.3	36.2
10	88.2	38.81
11	93.3	41.0
12	97.9	*43.0

* not closer than 1"

ANALYTICAL TESTING CONSULTANTS, INC.

KANNAPOLIS, N.C. ATLANTA, GEORGIA

TRAVERSE DATA AND FLOW COMPUTATION

CLIENT Boral Brick DATE 8-27-96
LOCATION Smyrna GA SOURCE #1 Brick Kiln
TEST TEAM DM, JW RUN # Preliminary

Pbar _____ Dry Bulb (°F) _____ Wet Bulb (°F) _____
Time 2:20 pm SP ("Hg/("WG) -.30 Pitot Type _____
Pitot # _____ Fs for Pitot .84 Stack I.D. _____

TRAVERSE POINT	V_p inches	SQ. ROOT V_p	STACK TEMP., °F	dP 0° REF.	ANGLE! (0 dP)
A1	.38		503		15
2	.45		503		14
3	.45		509		13
4	.43		510		13
5	.42		513		10
6	.43		514		8
7	.40		513		8
8	.40		510		10
9	.38		508		10
10	.37		507		10
11	.36		501		15
12	.35		500		15
B1	.48		522		16
2	.46		523		15
3	.43		524		12
4	.41		524		12
5	.40		524		8
6	.40		526		7
7	.42		526		5
8	.43		526		4
9	.41		523		8
10	.40		522		10
11	.37		520		12
12	.35		518		12
SUM					1
AVERAGE					

1. t_s(Avg.)= _____ +460= _____ T_s(Rankin)
2. Duct Area=A= _____ Ft^2
3. $P_s=P_{bar}$ ±SP _____ in. Hg.
4. $Rho_s*(530/T_s)*(P_s/29.92)$= _____ lbs/ft^3
5. K=constant= $1096.5/((G.D.)^{1/2})$= _____
6. Velocity=$K*F_s*(V_p avg)^{1/2}$ _____ ft/min.
7. VOLUME(avg)= A*V= _____ ACFM
8. SCFM=Volume*$(530/T_s)*(P_s/29.92)$= _____ SCFM(wet)

Rho= specific weight of Air= 0.075 lbs/ft^3
!= angle in degrees to yield dP of 0

SKETCH

FORM 15

ANALYTICAL TESTING CONSULTANTS, INC.

KANNAPOLIS, N.C. ATLANTA, GEORGIA

TRAVERSE DATA AND FLOW COMPUTATION

CLIENT Broan Brick
LOCATION Smyrna GA
TEST TEAM McCombs Welch

DATE 8-26-96
SOURCE #2 Kiln
RUN # Preliminary

Pbar
Time
Pitot #

Dry Bulb (°F) 540
SP ("Hg/"WG) -.31
Fs for Pitot .84

Wet Bulb (°F) 160
Pitot Type Spec
Stack I.D. 44

TRAVERSE POINT	V_p inches	SQ. ROOT V_p	STACK TEMP., °F	dP 0° REF.	ANGLE! (0 dP)
A1	.40		530	.04	25
2	.39		536	.04	19
3	.36		538	.04	20
4	.37		538	.04	15
5	.46		540	.06	19
6	.44		540	.06	10
7	.48		541	.05	6
8	.50		540	.04	5
9	.50		540	.04	6
10	.49		539		11
11	.45		540		17
12	.35		534		17
B 1	.46		535		17
2	.44		544		19
3	.44		545		15
4	.45		544		12
5	.46		544		10
6	.47		545		
7	.43		545		
8	.42		548		
9	.39		547		
10	.38		547		
11	.38		540		
12	.34		538		
SUM					
AVERAGE					

1. t_s(Avg.)= _____ +460= _____ T_s(Rankin)
2. Duct Area=A= _____ Ft^2
3. $P_s=P_{bar}$ ±SP _____ in. Hg.
4. $Rho_s*(530/T_s)*(P_s/29.92)$= _____ lbs/ft^3
5. K=constant= $1096.5/((G.D.)^{1/2})$= _____
6. Velocity=$K*F_s*(V_p avg)^{1/2}$ _____ ft/min.
7. VOLUME(avg)= A*V= _____ ACFM
8. SCFM=Volume*$(530/T_s)*(P_s/29.92)$= _____ SCFM(wet)

Rho= specific weight of Air= 0.075 lbs/ft^3
!= angle in degrees to yield dP of 0

SKETCH

FORM 15

ANALYTICAL TESTING CONSULTANTS

SOURCE SURVEY AND DESCRIPTION

SYSTEM TYPE: ____ BOILER __X__ PROCESS ____ OTHER

NARRATIVE DESCRIPTION: #1 + #2 Brick Kiln's

PURPOSE OF TESTING: __X__ COMPLIANCE ____ EVALUATION

PROCESS RATE OR CAPACITY: _____ DETERMINED BY: _____

CONTROL EQUIPMENT: ____ SCRUBBER ____ ESP ____ BAGHOUSE
____ OTHER _____

CONTROL EQUIPMENT OPERATING PARAMETERS: PRESSURE DROP _____
OTHER _____

SAMPLING LOCATION DATA:

DISTANCE DOWNSTREAM FROM FLOW DISTURBANCE: 90"
NATURE OF DISTURBANCE: BEND, FAN, (EXPANSION,) BYPASS, DUCT,
OTHER _____

DISTANCE UPSTREAM FROM FLOW DISTURBANCE: 3'
NATURE OF DISTURBANCE: (STACK EXHAUST,) FAN, EXPANSION, DUCT,
OTHER _____

INDIVIDUAL STACK __✓__ COMMON STACK ____
STACK DIAMETER OR DIMENSIONS: 44
NUMBER OF PORTS: 2 POINTS PER PORT: 12
SKETCH:

ESTIMATED TEMPERATURE: _____ ESTIMATED MOISTURE: _____
GAS COMPOSITION BY: ____ OXYGEN METER, (INSTRUMENTAL)
OTHER _____

LABORATORY:

SAMPLE RECOVERY: ATC LABORATORY __✓__ CLEAN FIELD AREA __✓__
ATC VAN ____ OTHER _____

SAMPLE SHIPMENT: __✓__ ATC VAN ____ OTHER _____

SAMPLE ANALYSIS: __✓__ ATC __✓__ OTHER _____

FILTER MATERIAL: ____ GELMAN A/E __✓__ WHATMAN 934AH ____ OTHER ____

ANALYTICAL TESTING CONSULTANTS, INC.

VOST SAMPLING DATA SHEET

PLANT Boral Bricks

DATE 8/27/96

ADDRESS Atlanta GA

RUN # 2 1st SET

SOURCE ID Kiln #2

VOST TRAIN # 1

CARTRIDGE #1 ID 68 1023A (Lot #s)

CONTROL MODULE # 1

CARTRIDGE #2 ID 69 1024D (Lot #s)

OPERATOR(S) [illegible]

BAROMETRIC PRESSURE 29.35

	BEGINNING	ENDING
LEAK TEST	10" O.K	5" O.K
METER READING	0	20.02 Liters
TIME	10:52AM	11:12AM
METER INLET TEMP.	28°C	30°C
METER EXHAUST TEMP.	30°C	31°C
ROTAMETER READING	70cc	70cc
CONDENSER OUTLET TEMP.	O.K	O.K
PROBE TEMPERATURE	57°C	58°C

TEST RUN SUMMARY

AVERAGE METER TEMPERATURE

NET GAS VOLUME 20.02 liters

ELAPSED TIME 20 minutes

ANALYTICAL TESTING CONSULTANTS, INC.

VOST SAMPLING DATA SHEET

PLANT Borak Bricks

DATE 8/27/96

ADDRESS Atlanta, GA

RUN # 2 2ND SET

SOURCE ID Kiln #2

VOST TRAIN # 1

CARTRIDGE #1 ID 68 1023A (Lot #s)

CONTROL MODULE # 1

CARTRIDGE #2 ID 69* 1024A (Lot #s)

OPERATOR(S) [illegible]

BAROMETRIC PRESSURE 29.35

	BEGINNING	ENDING
LEAK TEST	10" OK	5" OK
METER READING	0 liter	20.04 liter
TIME	11:21 AM	11:41 AM
METER INLET TEMP.	31°C	32°C
METER EXHAUST TEMP.	31°C	32°C
ROTAMETER READING	70cc	70cc
CONDENSER OUTLET TEMP.	O.K	O.K
PROBE TEMPERATURE	56°C	57°C

TEST RUN SUMMARY

AVERAGE METER TEMPERATURE

NET GAS VOLUME 20.04 liter

ELAPSED TIME 20 minutes

ANALYTICAL TESTING CONSULTANTS, INC.

VOST SAMPLING DATA SHEET

PLANT Boral Bricks

DATE 8/28/96

ADDRESS Atlanta, GA

RUN # 5 1ST SET

SOURCE ID Kiln #1

VOST TRAIN # 1

CARTRIDGE #1 ID 68 1023A (Lot #s)

CONTROL MODULE # 1

CARTRIDGE #2 ID 69 1024D (Lot #s)

OPERATOR(S) [illegible]

BAROMETRIC PRESSURE 29.36

	BEGINNING	ENDING
LEAK TEST	10" O.K	5" O.K
METER READING	0 liter	20.02 liter
TIME	10:16AM	10:36AM
METER INLET TEMP.	24°C	26°C
METER EXHAUST TEMP.	24°C	26°C
ROTAMETER READING	70cc	70cc
CONDENSER OUTLET TEMP.	O.K	O.K
PROBE TEMPERATURE	55°C	59°C

TEST RUN SUMMARY

AVERAGE METER TEMPERATURE

NET GAS VOLUME 20.02 liter

ELAPSED TIME 20 minutes

ANALYTICAL TESTING CONSULTANTS, INC.

VOST SAMPLING DATA SHEET

PLANT Boral Bricks

DATE 8/28/96

ADDRESS Atlanta, GA

RUN # 5 2nd Set

SOURCE ID Kiln #1

VOST TRAIN # 1

CARTRIDGE #1 ID 68 1023A (Lot #s)

CONTROL MODULE # 1

CARTRIDGE #2 ID 69 1024D (Lot #s)

OPERATOR(S) JW

BAROMETRIC PRESSURE 29.36

	BEGINNING	ENDING
LEAK TEST	10" O.K	5" O.K
METER READING	0	20.03 liters
TIME	10:43 AM	11:03 AM
METER INLET TEMP.	26°C	29°C
METER EXHAUST TEMP.	26°C	29°C
ROTAMETER READING	70cc	70cc
CONDENSER OUTLET TEMP.	O.K	O.K
PROBE TEMPERATURE	59°C	62°C

TEST RUN SUMMARY

AVERAGE METER TEMPERATURE

NET GAS VOLUME 20.03 liters

ELAPSED TIME 20 minutes

ANALYTICAL TESTING CONSULTANTS, INC.

CHAIN OF CUSTODY RECORD

NO:

CLIENT: Boral Brick

PLANT LOCATION: Atlanta, GA

SAMPLING LOCATION: #1 & #2 Brick Kiln

REQUESTED PARAMETERS

METHOD/PARAMETER: 5 6 8 10

16 18 23 25 26 202

VOST MULTIPLE METALS OTHER

SAMPLE ID:	DATE	TIME	LOCATION	VOLUME (ML) OR FILTER #	CONTAINER CONTENTS	INITIALS
Run # 1	8/29/96		#2 Kiln	500 J764	H_2O/Rinse/Filters	Jw
2	8/29/96		#2 Kiln	J765	" " "	Jw
3	8/29/96		#2 Kiln	J766	" " "	Jw
4	8/28/96		#1 Kiln	J767	" " "	Jw
5	8/28/96		#1 Kiln	J768	" " "	Jw
6	8/28/96		#1 Kiln	J769	" " "	Jw
Field Blank Day 1	8/28/96		#2 Kiln		" " "	Jw
Field Blank Day 2	8/29/96		#1 Kiln		" " "	Jw
Reagent ~~Field~~ Blank #3	8/29/96		#1 Kiln	500	" " "	Jw

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME

FIELD REMARKS

NOTE: PLEASE MARK LIQUID LEVEL ON ALL SAMPLE BOTTLES WITH GREASE PENCIL. SEAL TIGHTLY AND RE-CHECK UPON DELIVERY TO LAB PERSONNEL.

GRAVIMETRIC ANALYSIS RESULTS

CLIENT:	BORAL BRICK
LOCATION:	ATLANTA, GA
SOURCE:	#1 KILN + #2 KILN
DATE:	8/27/96 - 8/28/96

FRACTION: DRY CATCH-FILTER FRACTION

RUN #	FILTER #	FINAL WT. #1	FINAL WT. #2	INITIAL TARE WT.	NET GAIN
BLANK					
1	J764	0.3496	0.3498	0.3290	0.0206
2	J765	0.3552	0.3550	0.3279	0.0273
3	J766	0.3503	0.3502	0.3279	0.0224
4	J767	0.3563	0.3568	0.3281	0.0282
5	J768	0.3575	0.3578	0.3293	0.0282
6	J769	0.3467	0.3470	0.3278	0.0189

FRACTION: DRY CATCH-PROBE RINSE

RUN #	BEAKER ID	FINAL WT. #1	FINAL WT. #2	INITIAL TARE WT. #1	INITIAL TARE WT. #2	NET GAIN
BLANK	141	77.0943	77.0943	77.0942	77.0943	0.0001
1	167	82.6709	82.6710	82.6069	82.6067	0.064
2	104	85.4366	85.4370	85.3786	85.3787	0.058
3	159	82.3655	82.3652	82.2231	82.2226	0.1424
4	116	82.5760	82.5762	82.4874	82.4869	0.0888
5	205	78.3768	78.3770	78.3128	78.3125	0.0643
6	108	68.8952	68.8950	68.6876	68.6875	0.1384

FRACTION: COMBINED

RUN #	NET FILTER GAINS	NET BEAKER GAINS	TOTALS (GRAMS)
1	0.0206	0.0640	0.0846
2	0.0273	0.0580	0.0853
3	0.0224	0.1424	0.1648
4	0.0282	0.0886	0.1168
5	0.0282	0.0640	0.0922
6	0.0189	0.1384	0.1573

LAB TECHNICIAN John Welch

DATE 9/6/96

RESOLUTION ANALYTICS, INC.
Specialists in High Performance Liquid Chromatography

2733 LEE AVENUE SANFORD, NC 27330 (919) 774-5557

ANALYTICAL REPORT

- TOTAL FLUORIDE
  (EPA METHOD 13B)

CLIENT: ANALYTICAL TESTING CONSULTANTS, INC

RFA#: Borat Brick

RESOLUTION ANALYTICS, INC.
Specialists in High Performance Liquid Chromatography

REPORT SUMMARY

RFA#: Boral Brick

SAMPLE ID	Total Fluoride
REAGENT BLANK	< 0.400 mgs
FIELD BLANK DAY 1	< 0.400 mgs
FIELD BLANK DAY 2	< 0.400 mgs
RUN 1	43.7 mgs
RUN 2	86.5 mgs
RUN 3	104 mgs
RUN 4	144 mgs
RUN 5	179 mgs
RUN 6	151 mgs

Analytical Narrative

RFA # Boral Brick

Client/Plant Name: Analytical Testing Consultants, Inc.

Date Rec'd in lab: 9/09/96

Analyst: JBN

Date of Analysis: 9/14/96

Analysis Method: EPA Method 13B

Analyte(s): Total Fluoride

Sample Matrix & Components:

DI H_2O reagent + DI H_2O rinses.

Summary of Sample Prep:

Samples were final volumed prior to receipt by the laboratory.

Note: A 2x dilution factor was used for all samples as a result of the equivolume addition of TISAB reagent used to buffer the sample aliquots during analysis.

Summary of Instrumentation:

Accumet™ pH/Ion Meter model 25 using Orion™ model 9609BN ISE

Manufacturer-prepared TISAB (Total Ionic Strength Adjusting Buffer) was used 1:1 sample:TISAB in adjusting sample pH and ion strength immediately prior to each aliquot analysis.

Analytical Detection Limit(s): 0.800 ppm F^-

Summary of Sample Spike Analysis:

25 mls of sample RUN 1 was spiked with 60 mls of a 167 ppm fluoride standard then analyzed in the same manner as the samples. A 109 percent recovery was obtained.

Summary of QA Audit Sample Analysis:

A 90.9 ppm fluoride standard (5:50 1000 ppm std:TISAB) was analyzed in the same manner as were the samples. A +3.85 percent deviation from the expected value was obtained.

Miscellaneous Comments Regarding Sample Analysis: (Note unusual catch weights, interferences, odd sample behavior, and steps taken to confirm unusual results. Also note any deviations from standard analytical procedures, together with justification and possible affect on results. Specify samples when applicable.)

None.

Confirmation of Data Review:

Lab QA Officer Signature J. Bruce Nestor Date 9/14/96

Method 13B Fluoride Analytical Data Sheet

Client Name: Analytical Testing Consultants, Inc. RFA# Boral Brick
Analyst: JBN Date: 09/15/96
Filename: C:\JOBS\ATC\0\M13B.WB1

Fluoride Standard Calibration Curve by Linear Regression

Fluoride Conc. (µgs/ml)	Log Conc.	Standard mVolts	Calculated Concentration (µgs/ml)	Percent Deviation from Actual
0.40	-0.40	109.7	0.40	0.15%
50.0	1.70	-14.0	49.6	-0.75%
167	2.22	-45.3	168.0	0.60%

Slope -59.1 Intercept 86.2 Efficiency 104%

Matrix H2O

Sample ID	1st Reading (µgs/ml)	2nd Reading (µgs/ml)	Average Concentration Fluoride (µgs/ml)	% Dev.	Sample Dilution Factor *	Sample Final Volume (mls)	Total Fluoride Catch (mgs)
Rgt Blank	< 0.400	< 0.400	< 0.400	0.00%	2	500	< 0.400
Field Blank Day 1	< 0.400	< 0.400	< 0.400	0.00%	2	500	< 0.400
Field Blank Day 2	< 0.400	< 0.400	< 0.400	0.00%	2	500	< 0.400
RUN 1	43.5	43.9	43.7	0.46%	2	500	43.7
RUN 2	86.4	86.6	86.5	0.12%	2	500	86.5
RUN 3	104	104	104	0.00%	2	500	104
RUN 4	144	143	144	0.35%	2	500	144
RUN 5	119	119	119	0.00%	3	500	179
RUN 6	102	100	101	1.14%	3	500	151

* A Dilution Factor of 2 is used due to a 50:50 addition of TISAB reagent required for analysis.

********* Audit Report *********

	Calc. Conc. (µgs/ml)	Expected Conc. (µgs/ml)	Percent Diff.	Percent Rec
IN-HOUSE	94.4	90.9	3.85%	3.85%

********* Spike Recovery Report *********

Conc. of Fluoride Std (ppm): 167 Sample Aliquot Volume (mls): 25.0
Vol. of Fluoride Std (mls): 60.0 Volume of TISAB (mls): 0.0

Sample Spiked	1st Reading	2nd Reading	Average Fluoride Conc. (µgs/ml)	% Dev.	Expected Recovery (µgs/ml)	Actual Recovery (µgs/ml)	% Recovery
RUN 1	141	141	141	0.00%	118	128	109%

Printing Date 15-Sep-96 Printing Time 04:20 AM

ANALYTICAL TESTING CONSULTANTS, INC.

CHAIN OF CUSTODY RECORD

NO:

CLIENT: Boral Brick

PLANT LOCATION: Atlanta, GA

SAMPLING LOCATION: #1 & #2 Brick Kiln

REQUESETED PARAMETERS

METHOD (PLEASE CIRCLE): 5 6 8 10 11 18 23 25 26 202

VOST MULTIPLE METALS OTHER

SAMPLE ID:	DATE	TIME	LOCATION	VOLUME (ML) OR FILTER #	CONTAINER CONTENTS	INITIALS
Run # 1	8/29/96		#2 Kiln	500 J764	H_2O/Rinse/Filters	JW
2	8/29/96		#2 Kiln	J765	" " "	JW
3	8/29/96		#2 Kiln	J766	" " "	JW
4	8/28/96		#1 Kiln	J767	" " "	JW
5	8/28/96		#1 Kiln	J768	" " "	JW
6	8/28/96		#1 Kiln	J769	" " "	JW
Field Blank Day 1	8/28/96		#2 Kiln		" " "	JW
Field Blank Day 2	8/29/96		#1 Kiln		" " "	JW
Reagent ~~Field~~ Blank #3	8/29/96		#1 Kiln	500	" " "	JW

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME

FIELD REMARKS

NOTE: PLEASE MARK LIQUID LEVEL ON ALL SAMPLE BOTTLES WITH GREASE PENCIL. SEAL TIGHTLY AND RE-CHECK UPON DELIVERY TO LAB PERSONNEL.

Report Prepared
for
Analytical Testing Consultants, Inc.
GC Analysis of Methane by Method 18
Project # 0896036

September 3, 1996

Report Prepared
by
DAT, Inc
6385 Shier Rings Rd.
Dublin, OH 43016

Analytical Testing Consultants, Inc.
GC Analysis of Methane by Method 18
Project # 0896036

September 3, 1996

Narrative

Six tedlar sample bags were received September 29, 1996 for GC analysis of methane by method 18. The Sample results are listed below. Methane was not detected in any of the samples.

CLIENT ID	LAB ID	Methane ppm
Kiln #2 Run #1	0896036-1	ND(13.7)
Kiln #2 Run #2	0896036-2	ND(13.7)
Kiln #2 Run #3	0896036-3	ND(13.7)
Kiln #1 Run #4	0896036-4	ND(13.7)
Kiln #1 Run #5	0896036-5	ND(13.7)
Kiln #1 Run #6	0896036-6	ND(13.7)

GC Method

Samples were injected via a two milliliter sampling loop into a GC equipped with a 10m 1/8 in SP-1500 CarboPack B packed column and a flame ionization detector (FID). The temperature was held at 40°C for 3 minutes and increased at 25°C/min to 220°C and held for 4 minutes.

Calibration

A three point curve ranging from 500 ppm to 20 ppm was used to quantify the sample results. The curve was linear and had an r^2 value greater than 0.999.

Detection limits for methane were established at 13.7 ppm.

Quality Control

Method Blank

The method blank showed no response within the retention time window methane.

Sample Duplicates

A duplicate analysis of sample Kiln # 1 Run # 6 was run concurrently with this sample set. Both the sample run and its duplicate showed no response for methane.

Report prepared by:

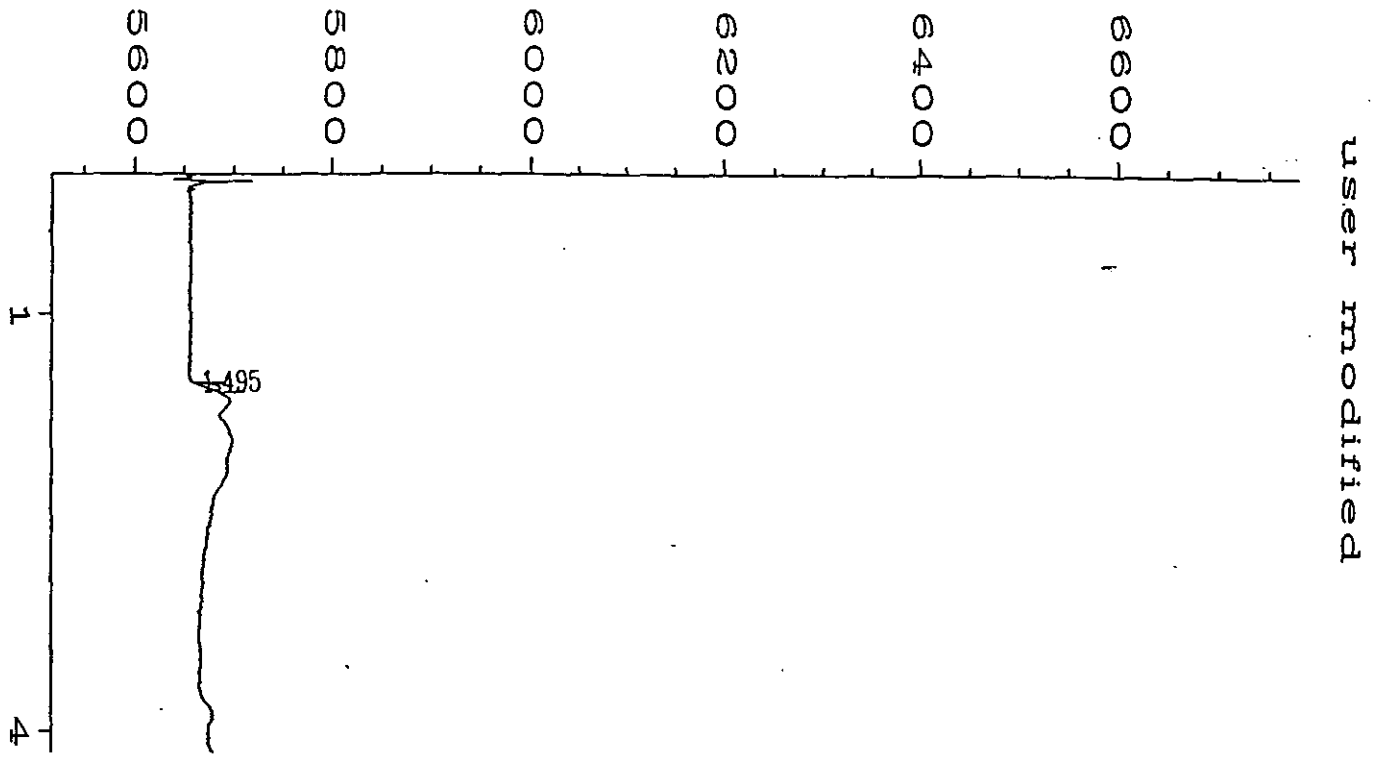
C. Scott Mitchum, Chemist I

Report approved for release by:

Aaron A. Liebrecht / yw

Ronald K. Mitchum, Ph.D.
President, **DAT**, Inc.

SAMPLE DATA



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\009F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 9
Sample Name	: 0896036-1	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 06:40 PM	Instrument Method:	0896036.MTH
Report Created on:	03 Sep 96 10:24 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\0896036\009F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.657	* not found *			1		Methane

Not all calibrated peaks were found

User Modified

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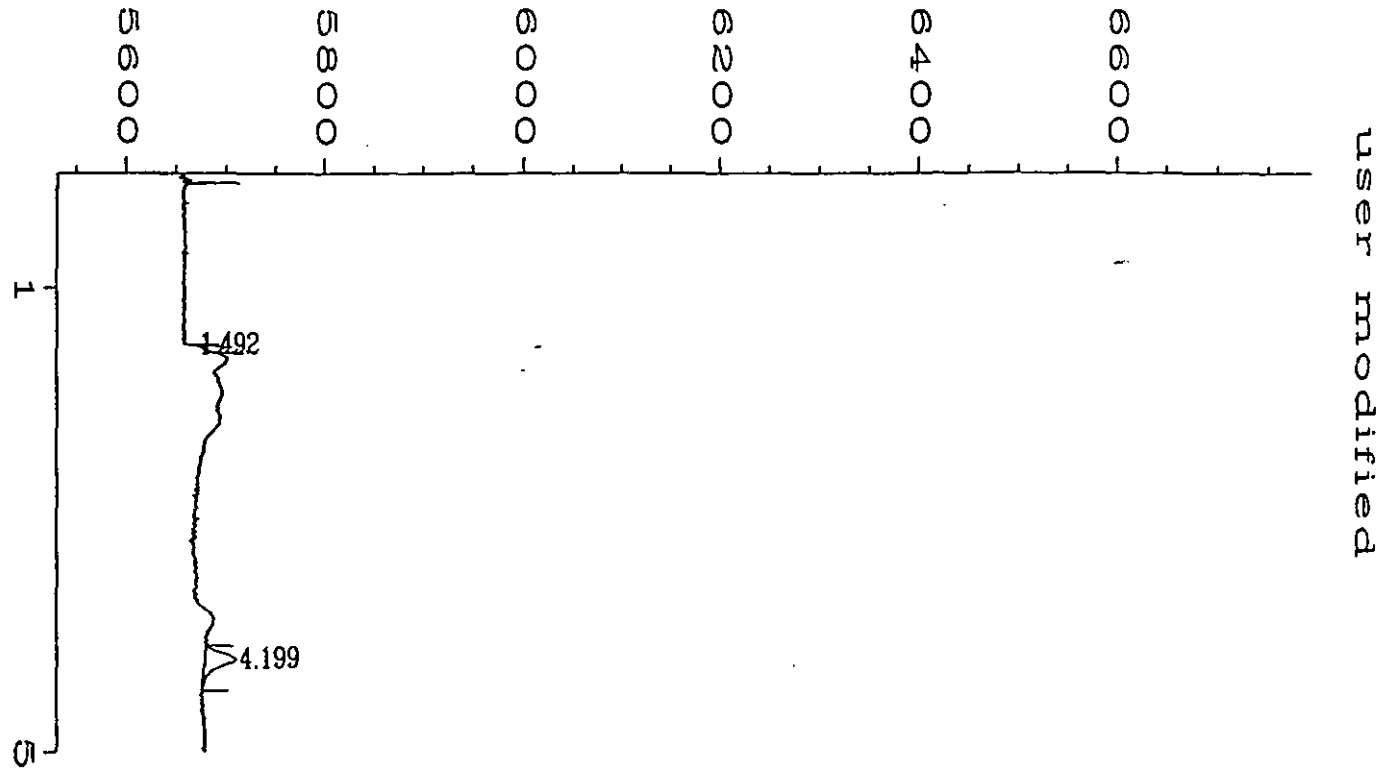


External Standard Report

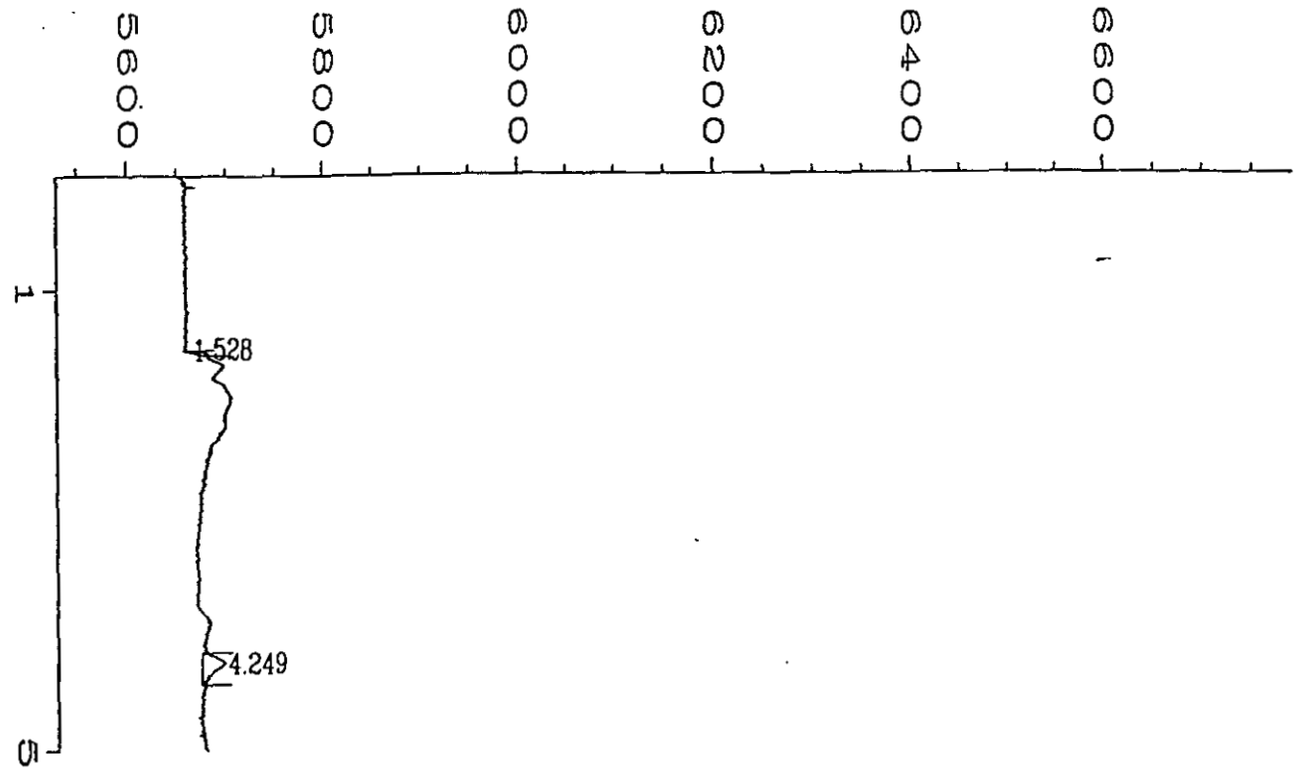
Data File Name	: C:\HPCHEM\1\DATA\0896036\010F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 10
Sample Name	: 0896036-2	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 06:58 PM	Instrument Method	: 0896036.MTH
Report Created on	: 03 Sep 96 11:39 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\0896036\010F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.657	* not found *			1		Methane

Not all calibrated peaks were found

User Modified



user modified

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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\011F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 11
Sample Name	: 0896036-3	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 07:07 PM	Instrument Method:	0896036.MTH
Report Created on:	03 Sep 96 10:25 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\0896036\011F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.657	* not found *			1		Methane

Not all calibrated peaks were found

User Modified

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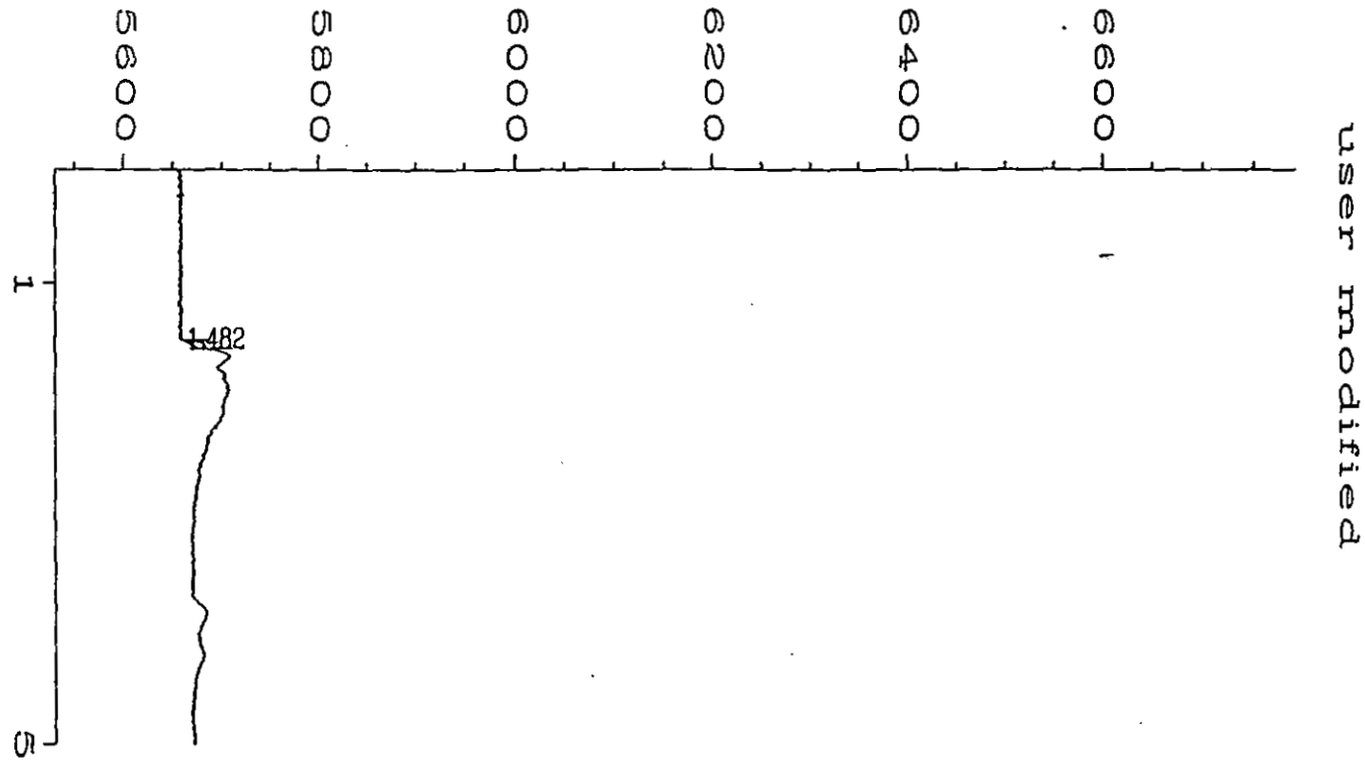

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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\012F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 12
Sample Name	: 0896036-4	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 07:18 PM	Instrument Method:	0896036.MTH
Report Created on:	03 Sep 96 10:25 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Peg. 1 in C:\HPCHEM\1\DATA\0896036\012F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.657	* not found *			1		Methane

Not all calibrated peaks were found

User Modified

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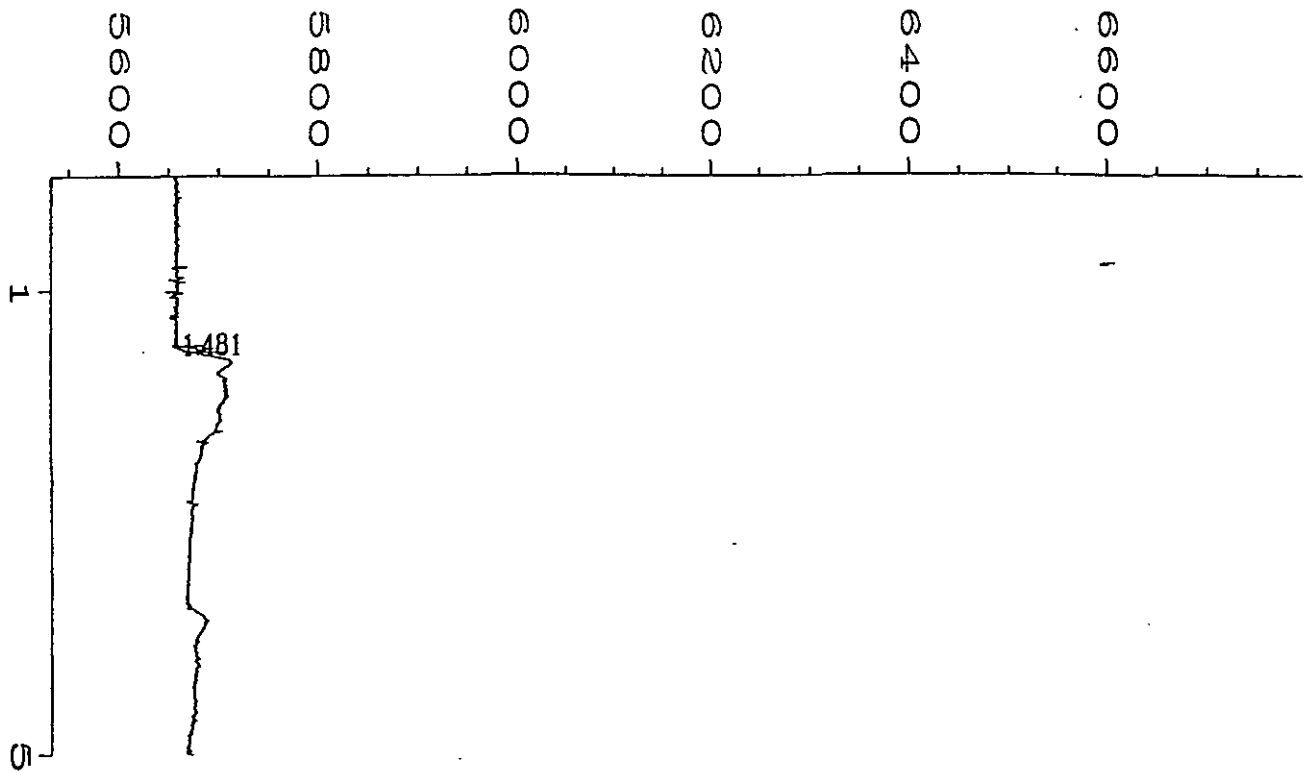

User modified

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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\013F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 13
Sample Name	: 0896036-5	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 07:27 PM	Instrument Method:	0896036.MTH
Report Created on:	03 Sep 96 10:25 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\0896036\013F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.657	* not found *			1		Methane

Not all calibrated peaks were found

User Modified

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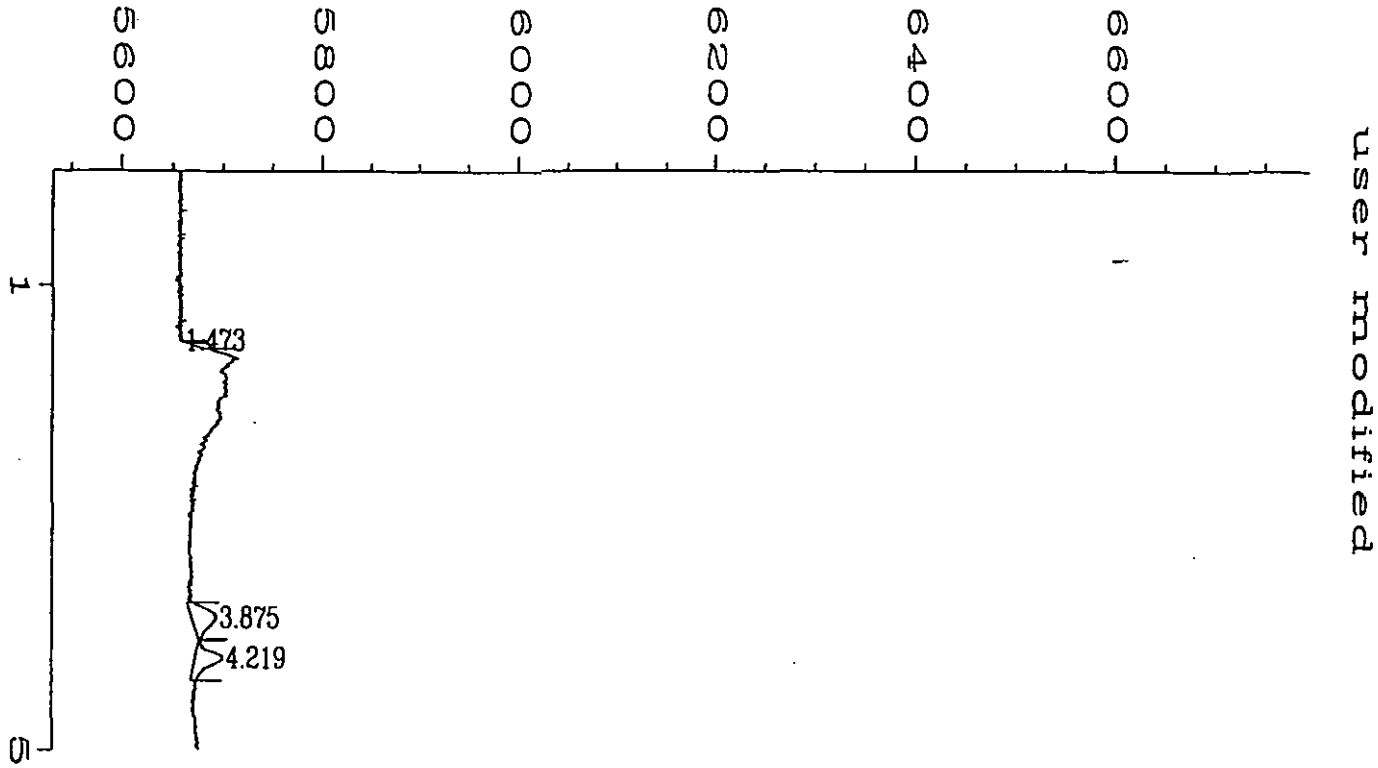

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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\014F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 14
Sample Name	: 0896036-6	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 07:45 PM	Instrument Method:	0896036.MTH
Report Created on:	03 Sep 96 10:26 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig: 1 in C:\HPCHEM\1\DATA\0896036\014F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.657	* not found *			1		Methane

Not all calibrated peaks were found

User Modified

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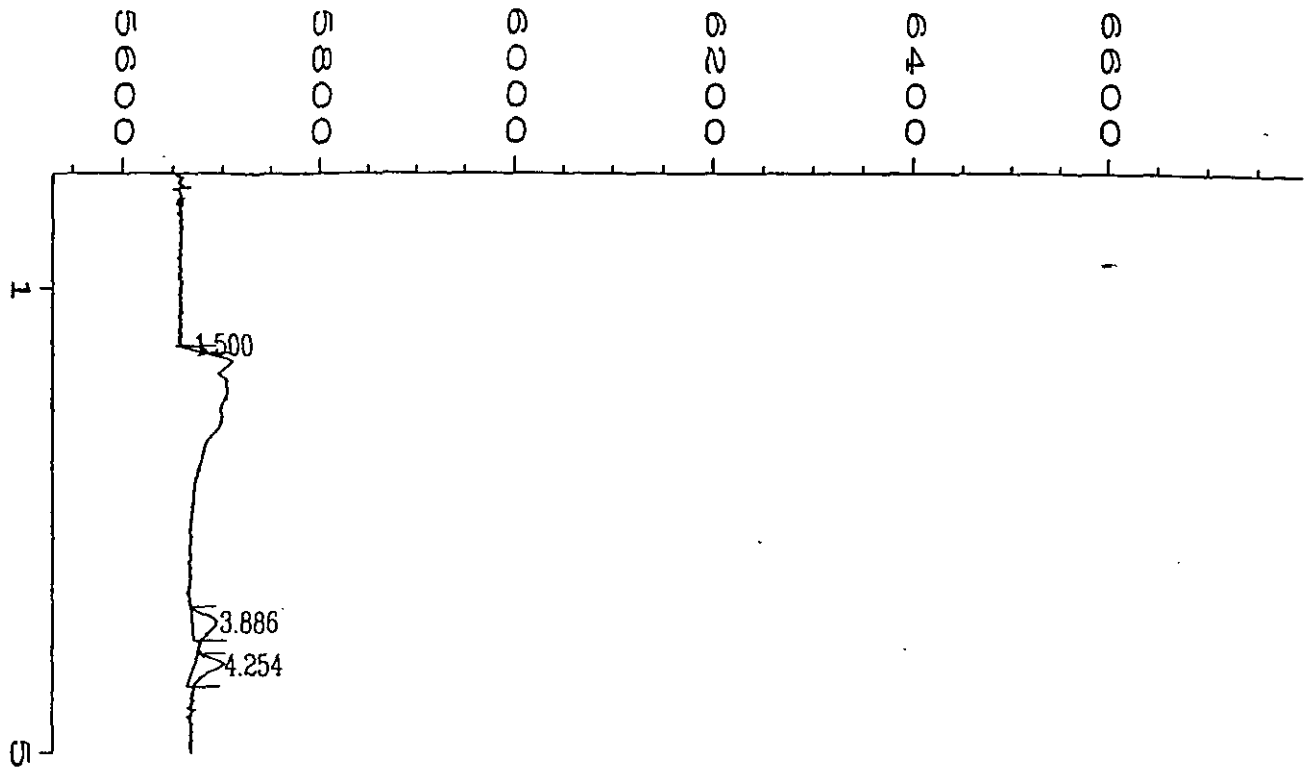

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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\015F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 15
Sample Name	: 0896036-6DUP	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 07:56 PM	Instrument Method:	0896036.MTH
Report Created on:	03 Sep 96 10:26 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\0896036\015F0101.D

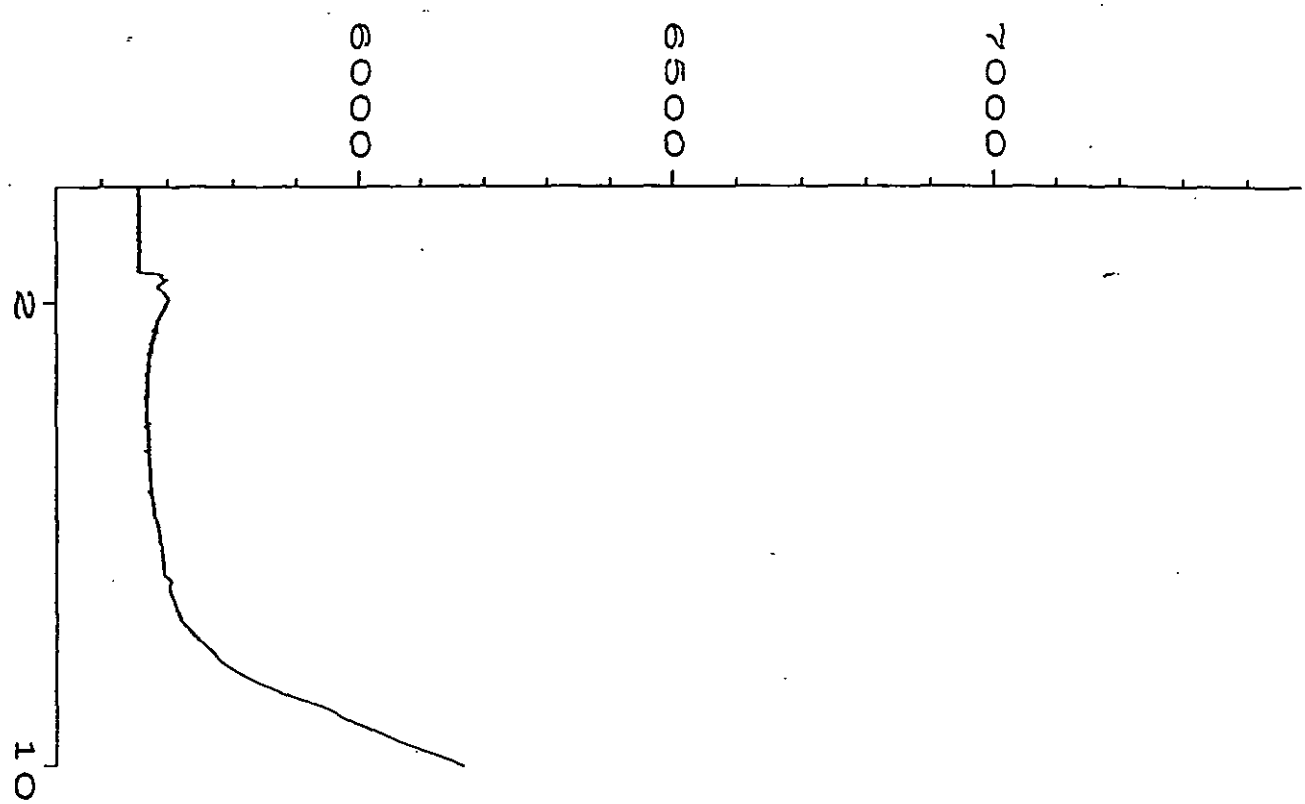
Ret Time	Height	Type	Width	Ref#	ppm	Name
1.657	* not found *			1		Methane

Not all calibrated peaks were found

User Modified

==========

BLANK DATA



External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\0896036\008F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 8
Sample Name	: INS. BLANK	Injection Number	: 1
Run Time Bar Code	:	Sequence Line	: 1
Acquired on	: 30 Aug 96 06:15 PM	Instrument Method	: 0896036.MTH
Report Created on	: 03 Sep 96 10:23 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

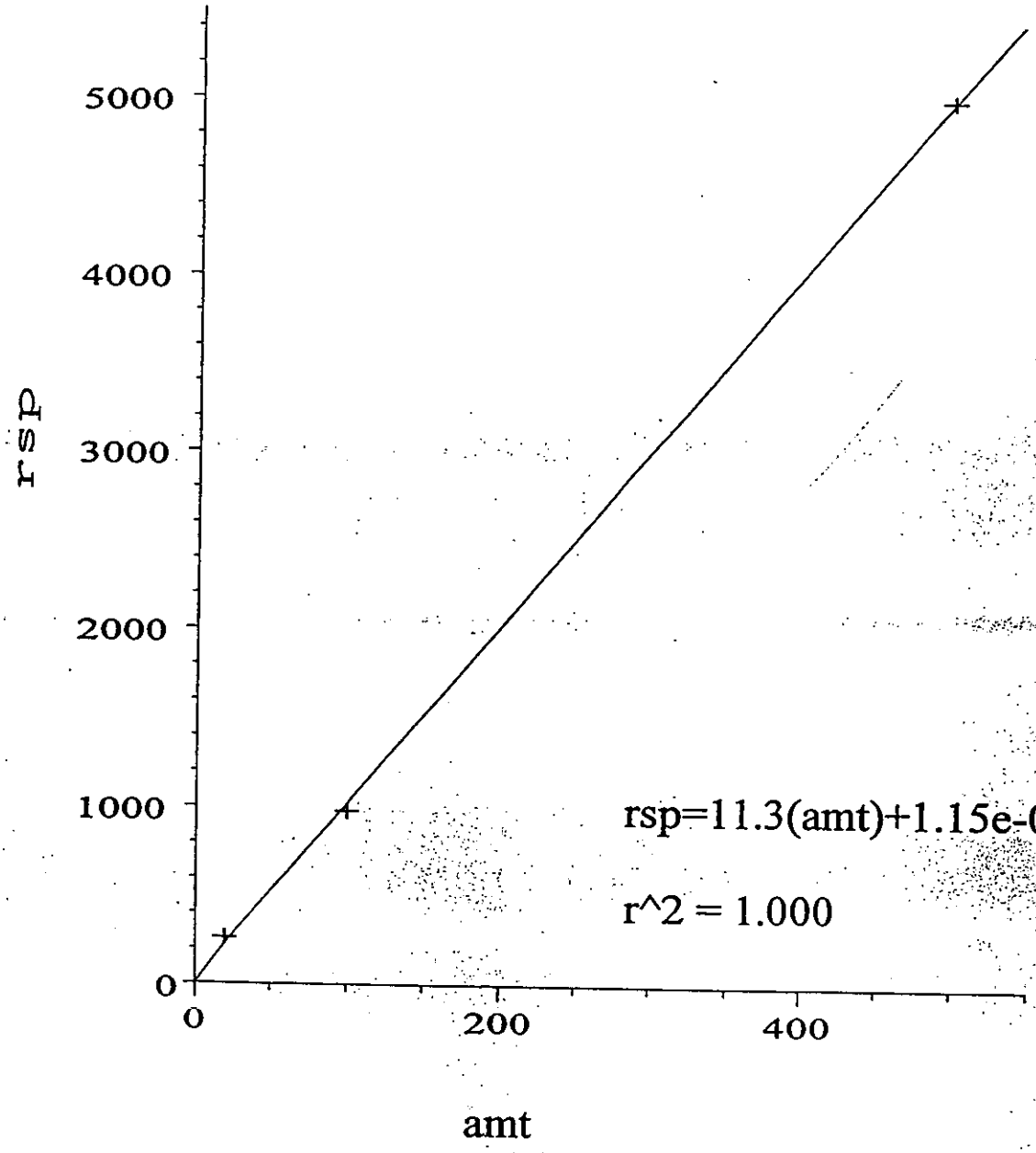
Sig. 1 in C:\HPCHEM\1\DATA\0896036\008F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.657	* not found *			1		Methane

Not all calibrated peaks were found

INITIAL CALIBRATIONS

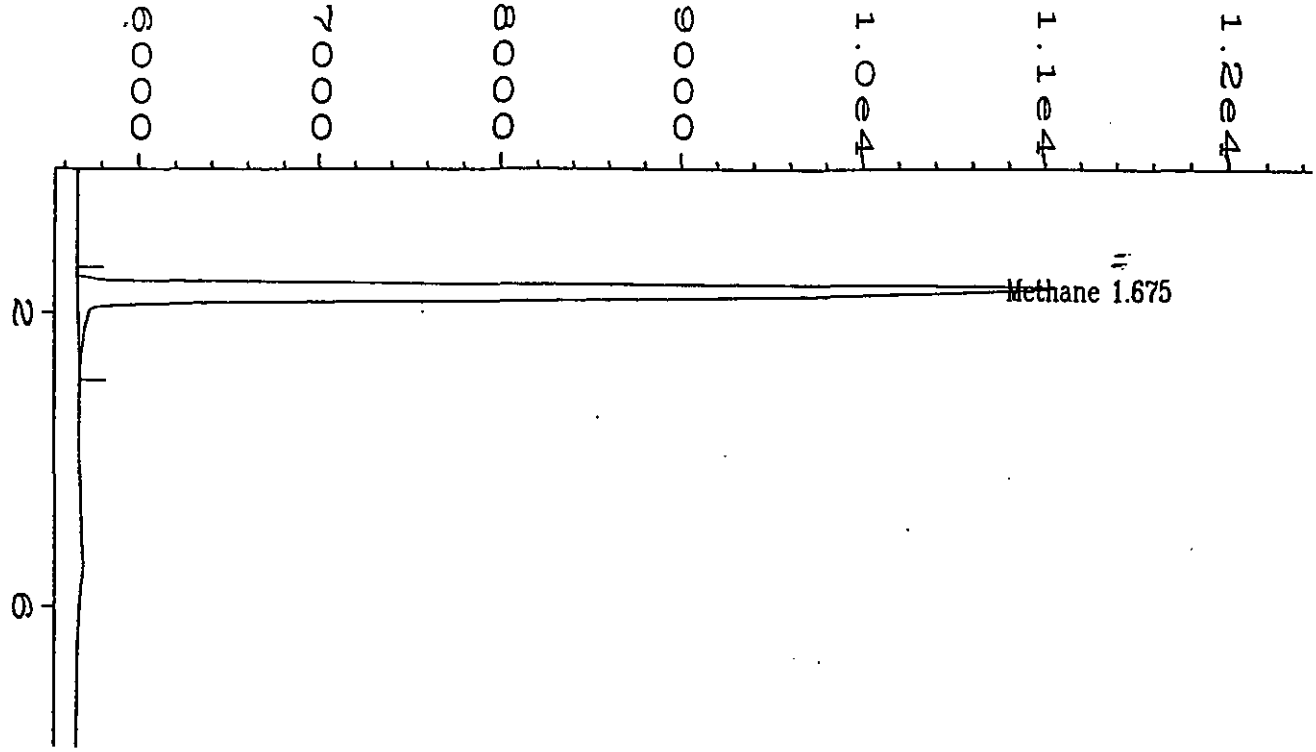
Methane


5000
4000
3000
2000
1000
0
rsp
0
200
400
amt
rsp=11.3(amt)+1.15e-014
r^2 = 1.000

Calibration Table

Pk#	RT	Lvl	ppm	Amt/Hght	Ref Istd I#	Name
1	1.657	1	500.0	0.10004	1	Methane
		2	100.0	0.10228		
		3	20.0	7.6816e-002		

RAWCOCDA PA



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External Standard Report

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ata File Name	: C:\HPCHEM\1\DATA\0896036\001F0101.D		
Operator	: CSM	Page Number	: 1
nstrument	: VARIAN 37	Vial Number	: 1
ample Name	: CALIB. 500 ppm	Injection Number	: 1
un Time Bar Code:		Sequence Line	: 1
cquired on	: 30 Aug 96 04:27 PM	Instrument Method:	0896036.MTH
Report Created on:	03 Sep 96 10:19 PM	Analysis Method	: 0896036.MTH
ast Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
ultiplier	: 1	ISTD Amount	:

g. 1 in C:\HPCHEM\1\DATA\0896036\001F0101.D

t Time	Height	Type	Width	Ref#	ppm	Name
1.675	4998	BB	0.229	1	500.705	Methane

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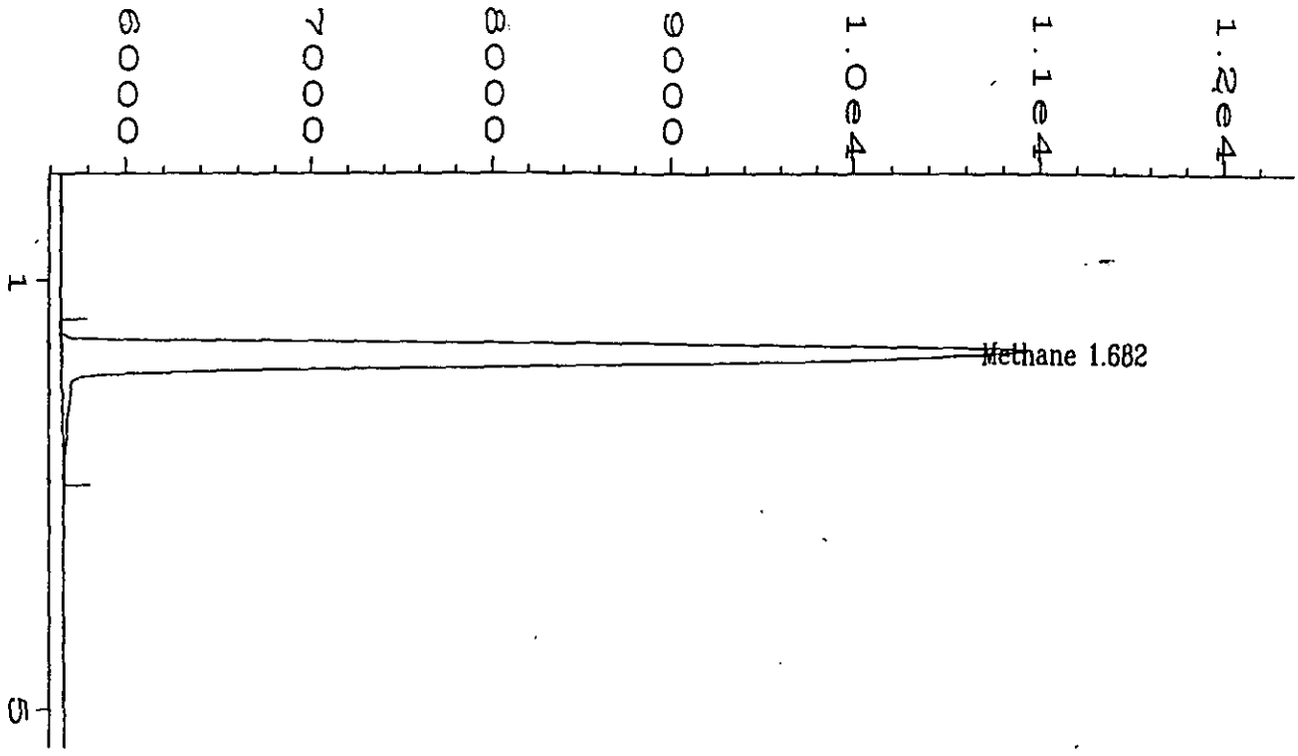

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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\005F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 5
Sample Name	: CALIB. 500 ppm 2	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 05:20 PM	Instrument Method	: 0896036.MTH
Report Created on	: 03 Sep 96 10:21 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\0896036\005F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.682	4974	BB	0.222	1	498.325	Methane

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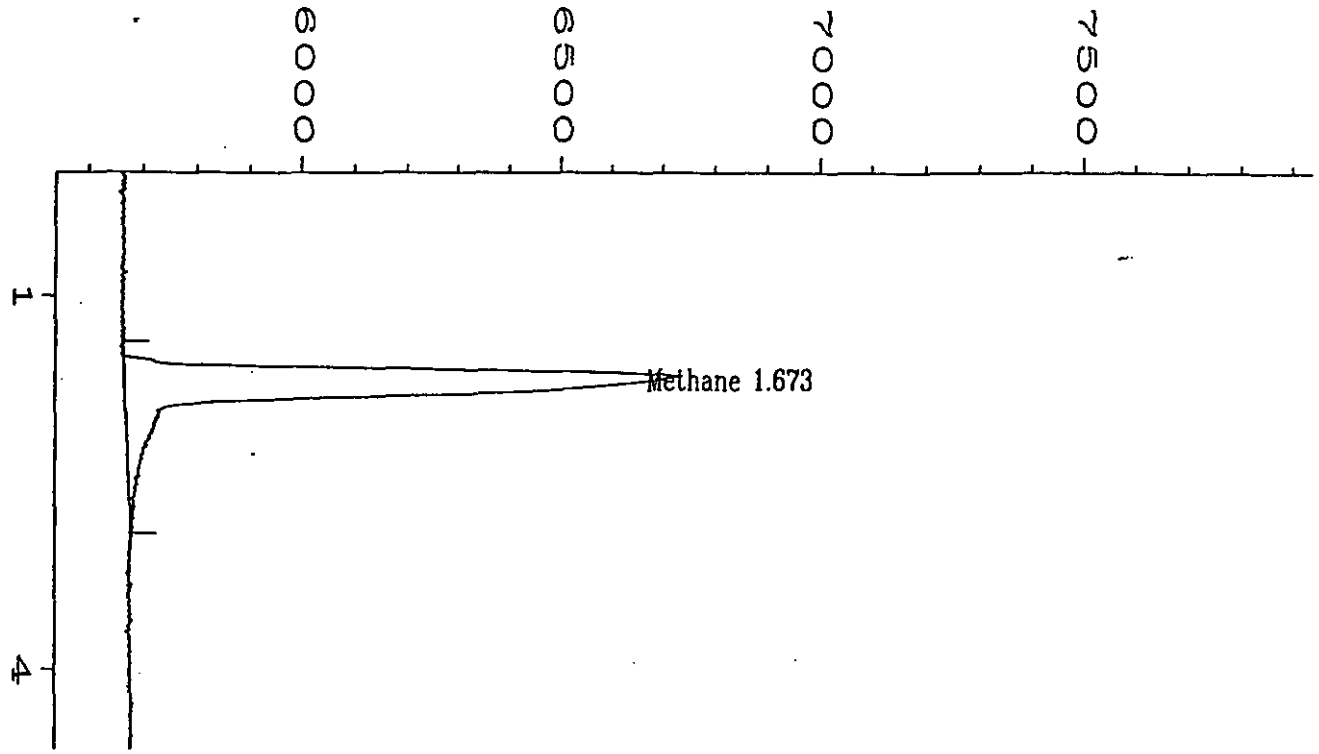

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External Standard Report

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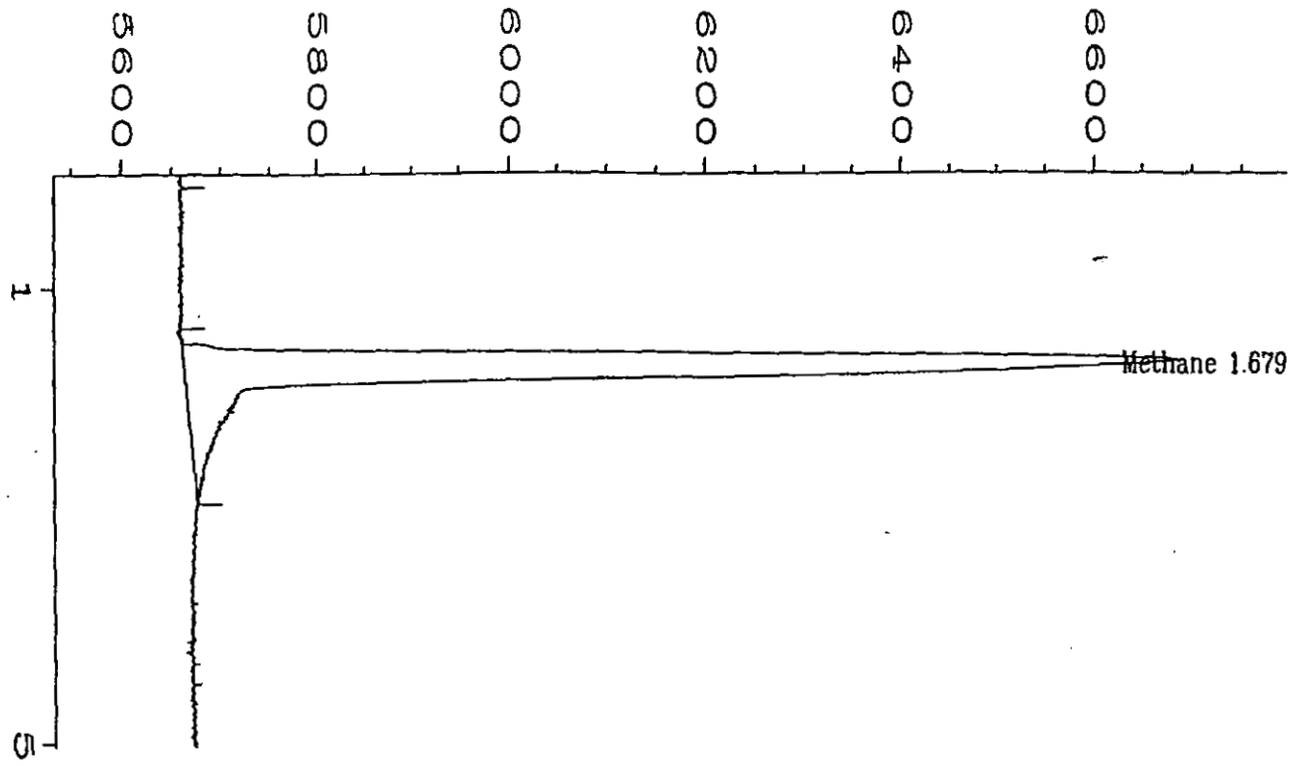
Data File Name	: C:\HPCHEM\1\DATA\0896036\002F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 2
Sample Name	: CALIB. 100 ppm	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 04:37 PM	Instrument Method	: 0896036.MTH
Report Created on	: 03 Sep 96 10:19 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Peak: 1 in C:\HPCHEM\1\DATA\0896036\002F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.673	978	BB	0.248	1	95.772	Methane

==========



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\006F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 6
Sample Name	: CALIB. 100 ppm 2	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 05:30 PM	Instrument Method	: 0896036.MTH
Report Created on	: 03 Sep 96 10:21 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\0896036\006F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.679	958	BB	0.241	1	93.775	Methane

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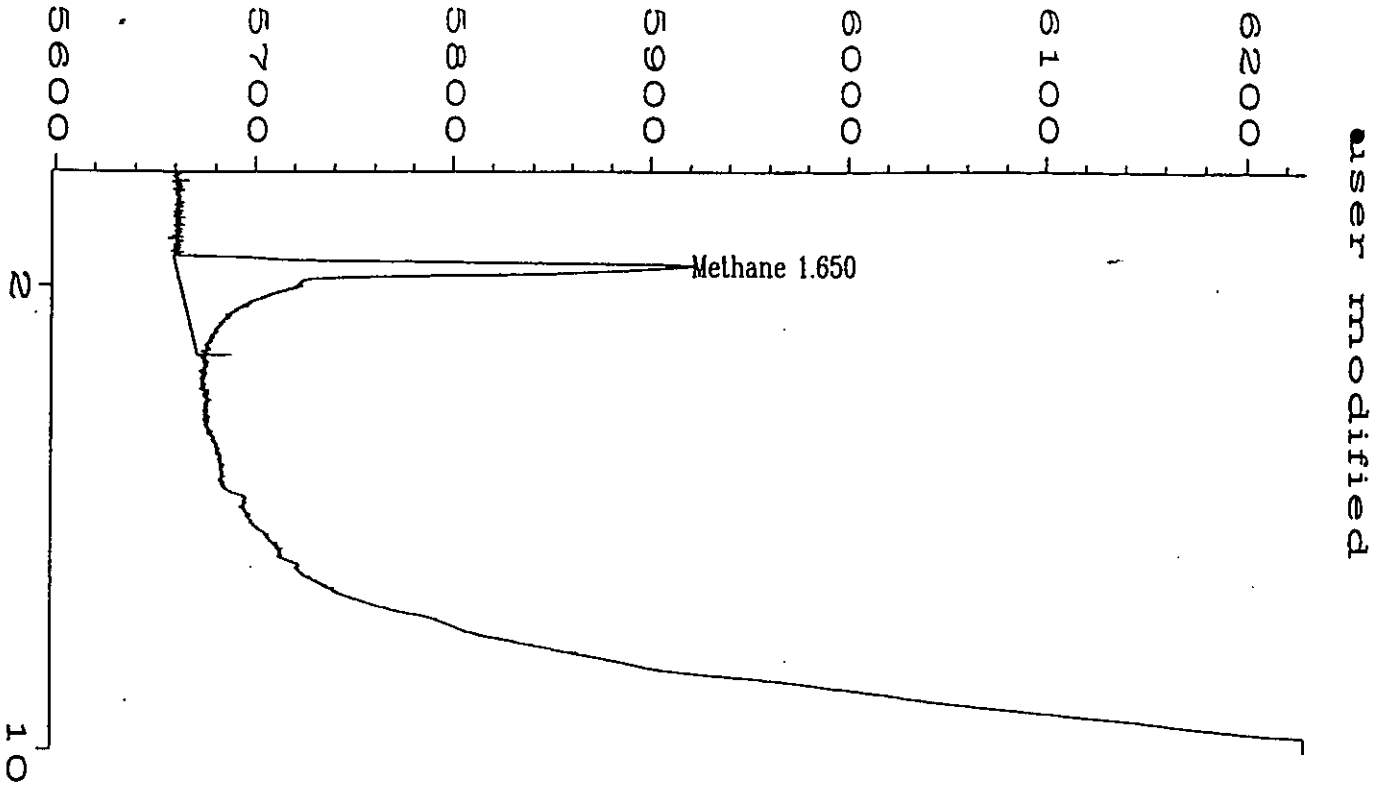


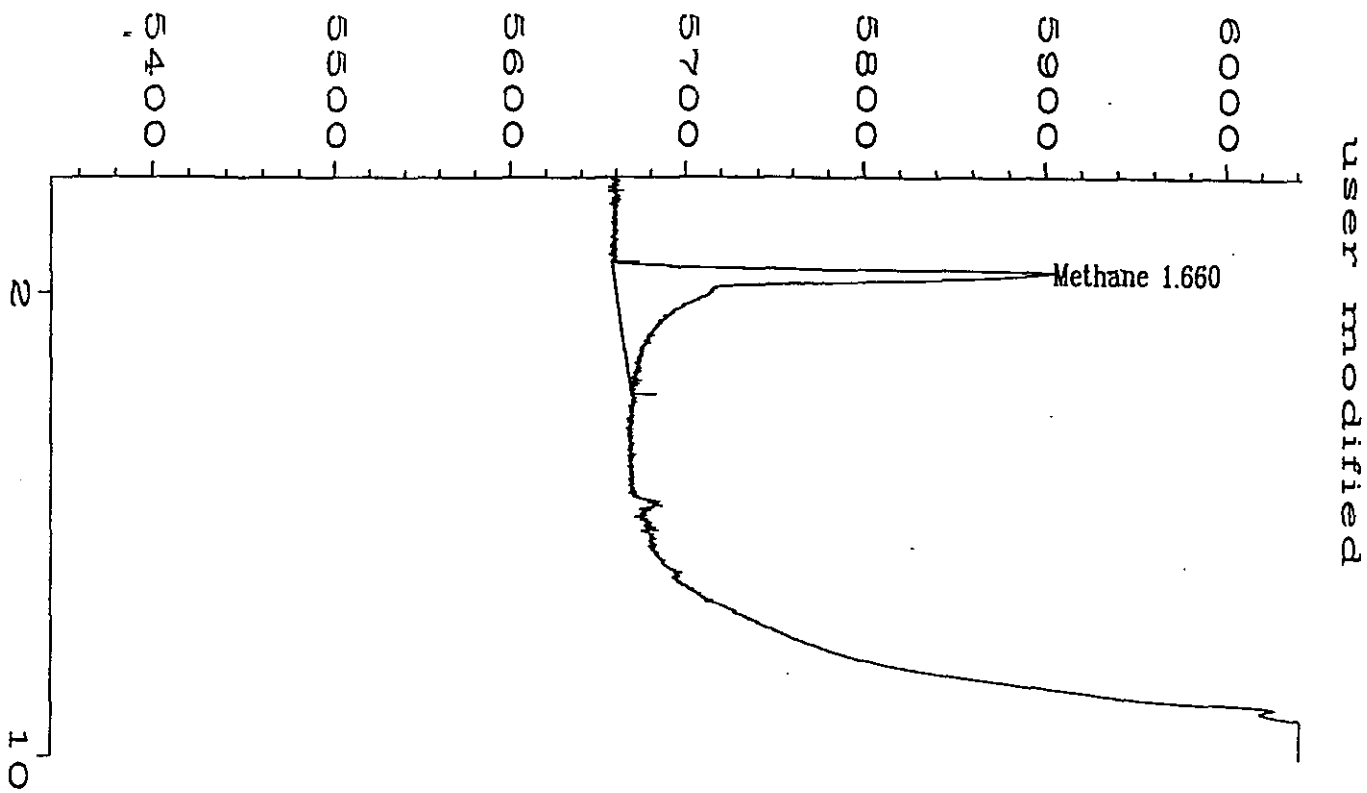
External Standard Report

Data File Name	: C:\HPCHEM\1\DATA\0896036\003F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 3
Sample Name	: CALIB. 20 PPM	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 04:47 PM	Instrument Method	: 0896036.MTH
Report Created on	: 03 Sep 96 10:20 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Fig. 1 in C:\HPCHEM\1\DATA\0896036\003F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.650	277	MM	0.346	1	25.213	Methane

User Modified



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External Standard Report

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Data File Name	: C:\HPCHEM\1\DATA\0896036\007F0101.D		
Operator	: CSM	Page Number	: 1
Instrument	: VARIAN 37	Vial Number	: 7
Sample Name	: CALIB. 20 PPM 2	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 1
Acquired on	: 30 Aug 96 05:40 PM	Instrument Method	: 0896036.MTH
Report Created on	: 03 Sep 96 10:22 PM	Analysis Method	: 0896036.MTH
Last Recalib on	: 30 AUG 96 05:02 PM	Sample Amount	: 0
Multiplier	: 1	ISTD Amount	:

Sig. 1 in C:\HPCHEM\1\DATA\0896036\007F0101.D

Ret Time	Height	Type	Width	Ref#	ppm	Name
1.660	242	MM	0.386	1	21.707	Methane

User Modified

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DOCUMENTATION

DAT

DATA / ANALYSIS TECHNOLOGIES, INC.

Submittal For Laboratory Analysis

Chain of Custody Record
6385 Shier Rings Road
Dublin, OH 43016

Ph.# 1-800-733-8644

To: DAT

From: ATC

Date: 8/29/96

Project Name: Methane in Air bags

Project #

Sample Identification	Date	Time	Contents	Volume/Size	Analysis	# of Containers
Kiln #2 Run #1	8/27/96		Air			1
Kiln #2 Run #2	↓		↓			1
Kiln #2 Run #3	↓		↓			1
Kiln #1 Run #4	8/28/96		↓			1
Kiln #1 Run #5	↓		↓			1
Kiln #1 Run #6	↓		↓			1

Relinquished by:	Date/Time	Received by: Sandra J Helvenstein	Date/Time: 8/29/96 9:45AM
Relinquished by:	Date/Time	Received by:	Date/Time:

0024

ANALYTICAL TESTING CONSULTANTS, INC.
SPECIALISTS IN FIELD DATA COLLECTION

8/28/96

please analyze these 6 samples for methane. Send Results to our Kannapolis, N.C. office.

Thanks, [illegible]

301 Brookdale Street • Kannapolis, NC 28083 • (704) 932-3193 • FAX (704) 932-0570
P.O. Box 767190 • Roswell, GA 30076 • (404) 587-5696 • FAX (404) 993-7915

591

Project #: 0896036 Client: ATC

Date Rec'd: 8/29/96

Carrier: 2-day Tracking #: 182-8X5

Analysis: methane

Condition -- Type(s) of Matrix: AIR

Temperature:

Type of Container: bag Other:

Custody seals? No

Chain of Custody? No

Client ID:	Lab ID:	Date Sampled	Matrix	Comment
Kiln #2 Run #1	0896036-1	8/27/96	AIR	
Kiln #2 Run #2	0896036-2	↓	↓	
Kiln #2 Run #3	0896036-3	↓	↓	
Kiln #1 Run #4	0896036-4	8/28/96	↓	
Kiln #1 Run #5	0896036-5	↓	↓	
Kiln #1 Run #6	0896036-6	↓	↓	

Log in Form Rev 02/LOGINFRM.XLS

Log in Initial SFH

100028

Application Sheet

Client: ATC
Project#: 0896036 8/30/96
Method/Analysis: Methane by Method 18

Gas Chromatograph ✓ Varian 3700 ____ H.P. 5890
Detectors used: FID

Columns:	Length	Diameter	Material	Packing	Mesh
1.	10 ft	1/8 in	S.S.	7% SP-1500	80/100 Carbopack B
2.					Lot # T34095
3.					

Conditioning Column(s)
1 hr @

Operating Conditions

Carrier Gas He Detector Temperature 300°C
Injection Port Temperature 40C Injection vol. 2mL

Temperature ramp

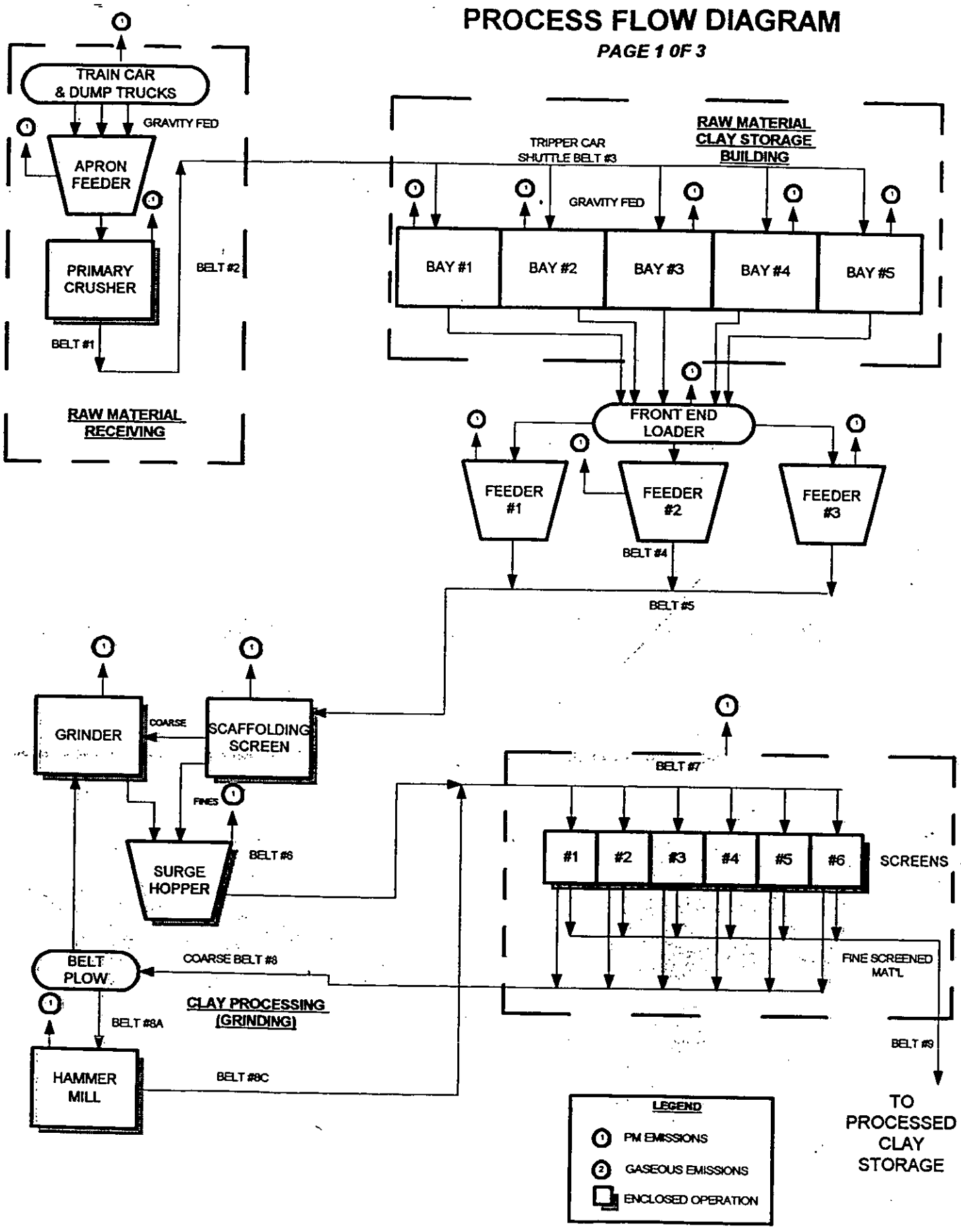
Inital	Program Rate	Final
40 °C 3 min	25 °C/min	220 °C 4 min

Gases: ____, ____, ____, ____
Pressure at Regulator: (psi): 25 psi ____, ____, ____
Notes: 15mL/min

Curve
5000ppm
↓ 1000ppm
↓
20ppm

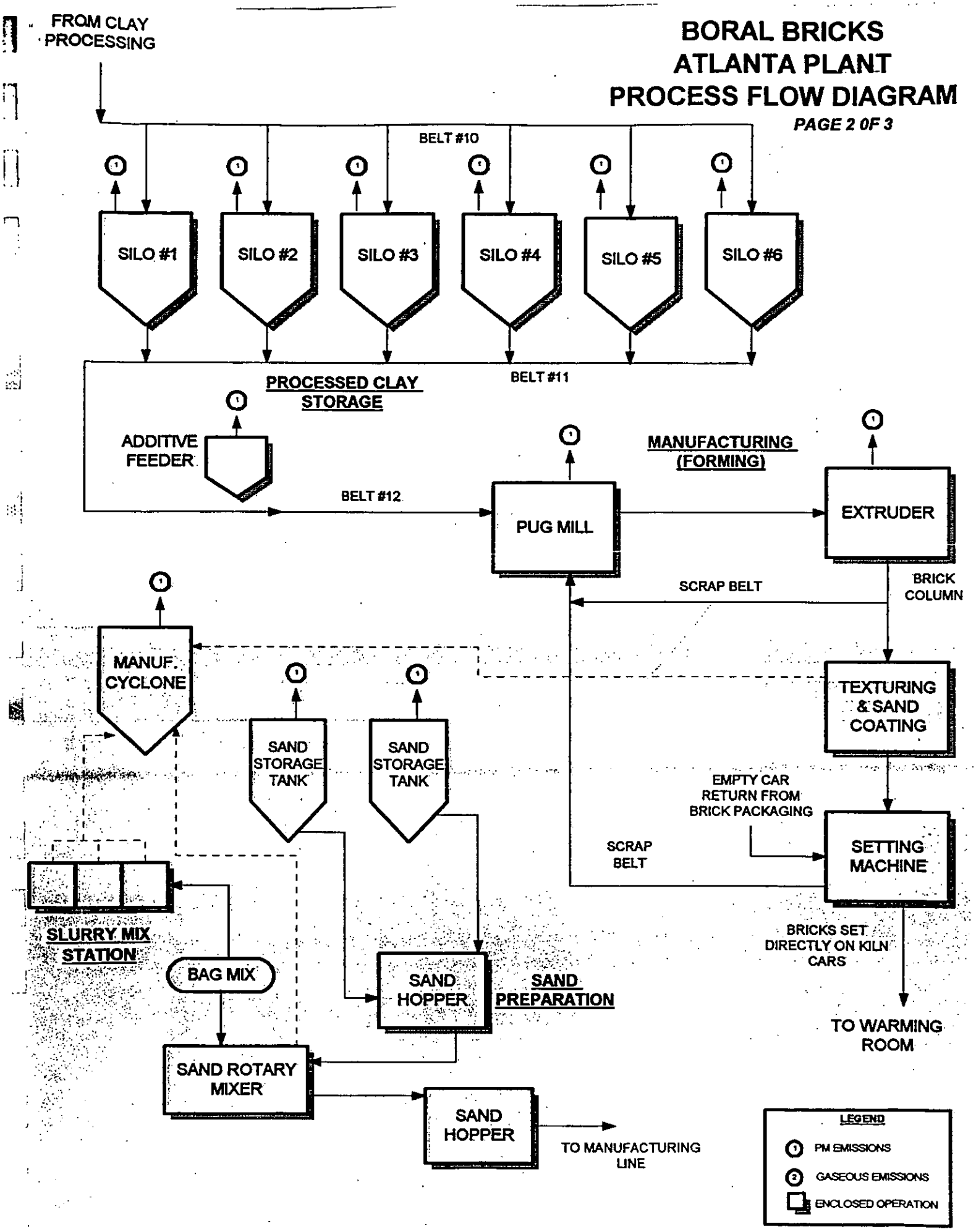
BORAL BRICKS
ATLANTA PLANT
PROCESS FLOW DIAGRAM

PAGE 1 0F 3



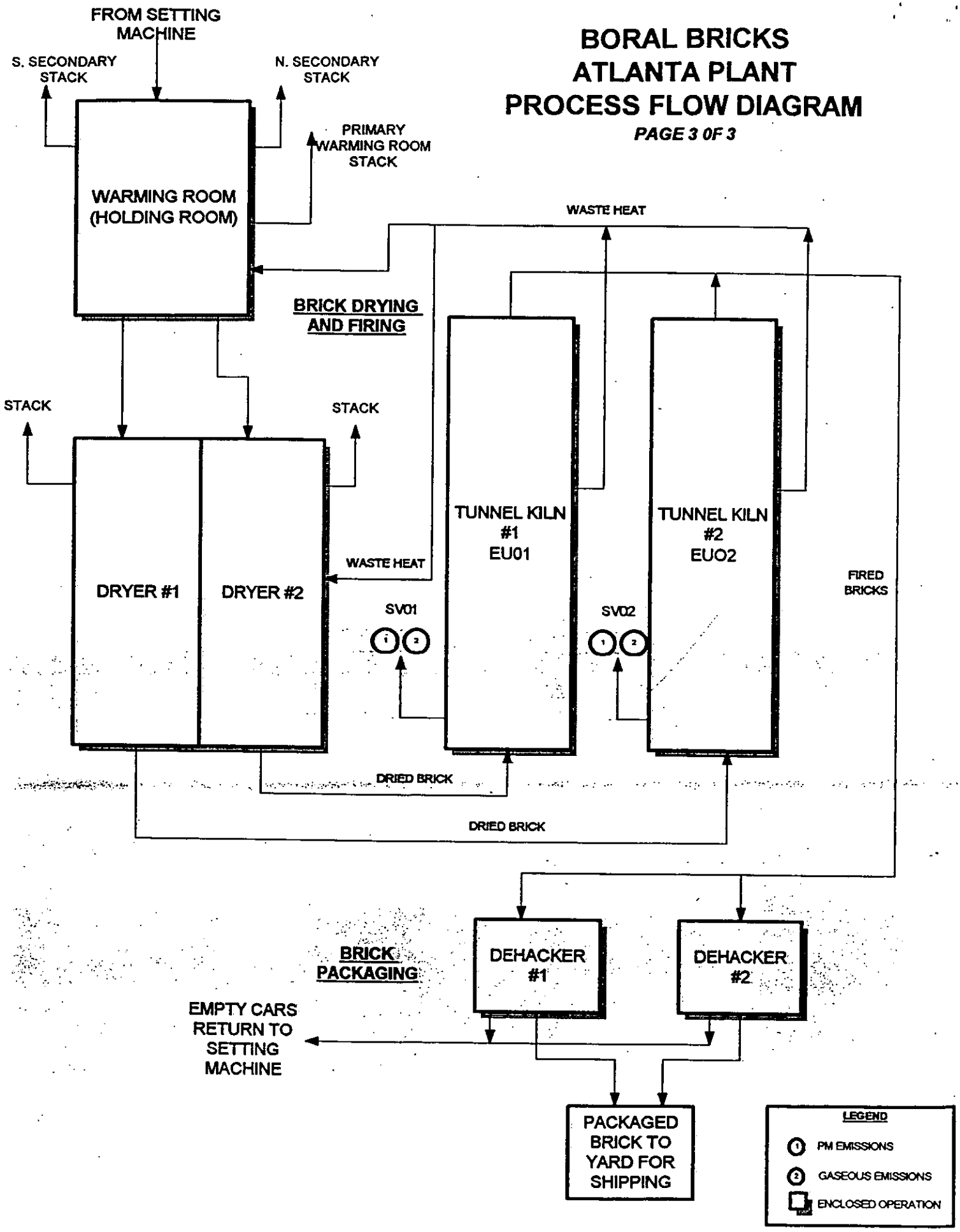
BORAL BRICKS ATLANTA PLANT PROCESS FLOW DIAGRAM

PAGE 2 0F 3



BORAL BRICKS
ATLANTA PLANT
PROCESS FLOW DIAGRAM

PAGE 3 0F 3



SYSTEM CALIBRATION ERROR DATA

CLIENT Boral Brick DATE 8/27/96
LOCATION Smyrna, Ga. CAL GAS CO in N2
SPAN VALUE 100 chart Units START TIME
METHOD ANALYZER TECO 48H

INITIAL CALIBRATION

RANGE	CONCENTRATION	PREDICTED CHART	ACTUAL CHART	% ERROR
ZERO	0	0	0	
54 LOW	100 PPM	22.9	23.0	0.44
52 MID	200 PPM	45.7	45.7	0
57 HIGH	350 PPM	80.0	80.0	—
SPAN				

K_2 = ACTUAL CHART OF SPAN/SPAN CONCENTRATION= PPM OR %/UNIT

%ERROR = (PREDICTED-ACTUAL)/PREDICTED X 100*
*PREDICTED MINUS ACTUAL SHOULD BE TAKEN AS ABSOLUTE VALUE!

HOURLY SPAN AND ZERO CHECKS

		ZERO			MID	
TIME	PREDICTED	ACTUAL	% ERROR	PREDICTED	ACTUAL	% ERROR
10:00	0	0.3	0.3	22.9	22.5	0.9
12:00	0	0	0	22.9	22.8	0.1
1:40	0	0.1	0.1	22.9	23.0	0.1
9:45	0	0	0	22.9	23.0	0.1
11:20	0	0.1	0.1	22.9	22.7	0.2
FINAL 12:50	0	0.6	0.6	22.9	22.7	0.2

ALLOWABLE INITIAL CALIBRATION ERROR = ±5%
ALLOWABLE HOURLY CALIBRATION ERROR AND DRIFT = ±3%

SYSTEM CALIBRATION ERROR DATA

CLIENT Boral Brick
LOCATION Smyrna Ga
SPAN VALUE 100 chart Volts
METHOD

DATE 8/27/96
CAL GAS NO_x in N_2
START TIME
ANALYZER TECO 10

INITIAL CALIBRATION

RANGE	CONCENTRATION	PREDICTED CHART	ACTUAL CHART	% ERROR
ZERO	0	0	0	
26 LOW	25 PPM	20.0	20.2	1.00
35 MID	50 PPM	40.0	40.4	1.00
33 HIGH	100 PPM	80.0	80.0	—
SPAN				

K_2 = ACTUAL CHART OF SPAN/SPAN CONCENTRATION= PPM OR %/UNIT

%ERROR = (PREDICTED-ACTUAL)/PREDICTED X 100*
*PREDICTED MINUS ACTUAL SHOULD BE TAKEN AS ABSOLUTE VALUE!

HOURLY SPAN AND ZERO CHECKS

		ZERO			MID	
TIME	PREDICTED	ACTUAL	% ERROR	PREDICTED	ACTUAL	% ERROR
10:00	0	0.3	0.3	20.0	19.7	0.3
12:00	0	0	0	20.0	20.1	0.1
1:40	0	0	0	20.0	19.9	0.1
9:45	0	0.4	0.4	20.0	20.7	0.7
11:20	0	0.3	0.3	20.0	19.9	0.1
FINAL 12:50	0	0.1	0.1	20.0	19.9	0.1

ALLOWABLE INITIAL CALIBRATION ERROR = ±5%
ALLOWABLE HOURLY CALIBRATION ERROR AND DRIFT = ±3%

SYSTEM CALIBRATION ERROR DATA

CLIENT Boral Brick DATE 8/27/96
LOCATION Smyrna Ga. CAL GAS SO_2 in N_2
SPAN VALUE 100 chart Units START TIME
METHOD ANALYZER Western Research 721 AT

INITIAL CALIBRATION

RANGE	CONCENTRATION	PREDICTED CHART	ACTUAL CHART	% ERROR
ZERO	0	0	0	
97 LOW	100 ppm	40.0	40.6	1.50
96 MID	150 ppm	60.0	61.0	1.67
95 HIGH	200 ppm	80.0	80.0	—
SPAN				

K_2 = ACTUAL CHART OF SPAN/SPAN CONCENTRATION= PPM OR %/UNIT

%ERROR* = (PREDICTED-ACTUAL)/PREDICTED X 100*
*PREDICTED MINUS ACTUAL SHOULD BE TAKEN AS ABSOLUTE VALUE!

HOURLY SPAN AND ZERO CHECKS

		ZERO			MID	
TIME	PREDICTED	ACTUAL	% ERROR	PREDICTED	ACTUAL	% ERROR
10:00	0	0.3	0.3	60.0	59.8	0.2
12:00	0	0.3	0.3	60.0	59.7	0.3
1:40	0	0	0	60.0	60.3	0.3
9:45	0	0	0	60.0	59.9	0.1
11:20	0	0.1	0.1	60.0	59.6	0.4
FINAL	0	0.2	0.2	60.0		

12:50

ALLOWABLE INITIAL CALIBRATION ERROR = ±5%
ALLOWABLE HOURLY CALIBRATION ERROR AND DRIFT = ±3%

SYSTEM CALIBRATION ERROR DATA

CLIENT Boral Brick
LOCATION Smyrna, Ga.
SPAN VALUE 100 chart Units
METHOD

DATE 8/27/86
CAL GAS Propane in Air
START TIME
ANALYZER Ratfisch RS 55C1

INITIAL CALIBRATION

RANGE	CONCENTRATION	PREDICTED CHART	ACTUAL CHART	% ERROR
ZERO	0	0	0	
16 LOW	50 PPM	40.0	40.1	0.25
15 MID	75 PPM	60.0	59.4	1.00
14 HIGH	100 PPM	80.0	80.0	—
SPAN				

K_2 = ACTUAL CHART OF SPAN/SPAN CONCENTRATION= PPM OR %/UNIT

%ERROR = (PREDICTED-ACTUAL)/PREDICTED X 100*
*PREDICTED MINUS ACTUAL SHOULD BE TAKEN AS ABSOLUTE VALUE!

HOURLY SPAN AND ZERO CHECKS

		ZERO			MID	
TIME	PREDICTED	ACTUAL	% ERROR	PREDICTED	ACTUAL	% ERROR
10:00	0	0	0	40.0	40.2	0.2
12:00	0	0	0	40.0	40.1	0.1
1:40	0	0.1	0.1	40.0	40.5	0.5
9/28 9:45	0	0.1	0.1	40.0	38.4	1.6
11:20	0	0.1	0.1	40.0	39.5	0.5
FINAL 12:50	0	0	0	40.0	40.5	0.5

ALLOWABLE INITIAL CALIBRATION ERROR = ±5%
ALLOWABLE HOURLY CALIBRATION ERROR AND DRIFT = ±3%

SYSTEM CALIBRATION ERROR DATA

CLIENT Boral Brick DATE 8/27/96
LOCATION Smyrna, Ga. CAL GAS O_2 in N_2
SPAN VALUE 100 chart Unit START TIME
METHOD ANALYZER Servomex 1400

INITIAL CALIBRATION

RANGE	CONCENTRATION	PREDICTED CHART	ACTUAL CHART	% ERROR
ZERO	0	0	0	
LOW	10.0	38.3	38.5	0.52
MID	15.0	57.4	57.5	0.17
HIGH	20.9	80.0	80.0	—
SPAN				

K_2 = ACTUAL CHART OF SPAN/SPAN CONCENTRATION= PPM OR %/UNIT

%ERROR* = (PREDICTED-ACTUAL)/PREDICTED X 100*
*PREDICTED MINUS ACTUAL SHOULD BE TAKEN AS ABSOLUTE VALUE!

HOURLY SPAN AND ZERO CHECKS

		ZERO			MID	
TIME	PREDICTED	ACTUAL	% ERROR	PREDICTED	ACTUAL	% ERROR
10:00	0	0	0	57.4	57.2	0.2
12:00	0	0	0	57.4	57.2	0.2
1:40	0	0	0	57.4	57.0	0.4
9:45	0	0	0	57.4	57.0	0.4
11:20	0	0	0	57.4	57.0	0.4
FINAL 12:50	0	0.1	0.1	57.4	57.3	0.1

ALLOWABLE INITIAL CALIBRATION ERROR = ±5%
ALLOWABLE HOURLY CALIBRATION ERROR AND DRIFT = ±3%

SYSTEM CALIBRATION ERROR DATA

CLIENT Boral Brick
LOCATION Smyrna, Ga.
SPAN VALUE 100 Chart Units
METHOD

DATE 8/27/96
CAL GAS CO_2 in N_2
START TIME
ANALYZER Servomex 1400

INITIAL CALIBRATION

RANGE	CONCENTRATION	PREDICTED CHART	ACTUAL CHART	% ERROR
ZERO	0	0	0	
87 LOW	2%	16.0	16.0	0
85 MID	6%	48.0	48.7	1.46
83 HIGH	10%	80.0	80.0	—
SPAN				

K_2 = ACTUAL CHART OF SPAN/SPAN CONCENTRATION= PPM OR %/UNIT

%ERROR = (PREDICTED-ACTUAL)/PREDICTED X 100*
*PREDICTED MINUS ACTUAL SHOULD BE TAKEN AS ABSOLUTE VALUE!

HOURLY SPAN AND ZERO CHECKS

		ZERO			MID	
TIME	PREDICTED	ACTUAL	% ERROR	PREDICTED	ACTUAL	% ERROR
10:00	0	0.2	0.2	48.0	48.0	0
12:00	0	0.2	0.2	48.0	48.2	0.2
1:40	0	0.1	0.1	48.0	48.0	0
1/28 9:45	0	0	0	48.0	48.3	0.3
11:20	0	0.1	0.1	48.0	48.2	0.2
FINAL 12:50	0			48.0	48.4	0.4

ALLOWABLE INITIAL CALIBRATION ERROR = ±5%
ALLOWABLE HOURLY CALIBRATION ERROR AND DRIFT = ±3%

creen Print: 11:01:59 Tuesday 27 August 96

11:01:59

PORT MAINTENANCE

Port#	Cylinder Gas Conc.	K-factor	Gas Name	
1	100.0 %	0.994	NITROGEN	N2
2	100.0 %	1.0	AIR	
3	24.6 %	0.992	OXYGEN	O2
4	48711. PPM	0.994	CARBON MONOXIDE	CO
5	21.9 %	0.925	CARBON DIOXIDE	CO2
6	8847.2 PPM	0.994	NITRIC OXIDE	NO
7	13700. PPM	0.978	PROPANE	C3H8
8	4810.0 PPM	0.992	SULFUR DIOXIDE	SO2

PPM OR % CLEAR ENTER GAS SELECT GAS PRT SCRN EXIT

Screen Print: 11:02:34 Tuesday 27 August 96

11:02:34

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type
1	2	BAL MFC		AIR	
2	3	0.0	%	OXYGEN	O2
3	3	0.0	PPM	OXYGEN	O2
4	3	0.0	PPM	OXYGEN	O2
5	3	0.0	PPM	OXYGEN	O2

Total Flow 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:03:01 Tuesday 27 August 96

11:03:01

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type
1	1 ^	BAL MFC		NITROGEN	N2
2	3 ^	0.0	%	OXYGEN	O2
3	3 ^	0.0	PPM	OXYGEN	O2
4	3 ^	0.0	PPM	OXYGEN	O2
5	3 ^	0.0	PPM	OXYGEN	O2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:03:27 Tuesday 27 August 96

11:03:27

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	2 ^	BAL MFC	AIR	
2	7 ^	0.0 PPM	PROPANE	C3H8
3	7 ^	0.0 PPM	PROPANE	C3H8
4	7 ^	100.0 PPM	PROPANE	C3H8
5	7 ^	0.0 PPM	PROPANE	C3H8

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:03:54 Tuesday 27 August 96

11:03:53

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	2 ^	BAL MFC	AIR	
2	7 ^	0.0 PPM	PROPANE	C3H8
3	7 ^	0.0 PPM	PROPANE	C3H8
4	7 ^	75.0 PPM	PROPANE	C3H8
5	7 ^	0.0 PPM	PROPANE	C3H8

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:04:20 Tuesday 27 August 96

11:04:20

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	2 ^	BAL MFC	AIR	
2	7 ^	0.0 PPM	PROPANE	C3H8
3	7 ^	0.0 PPM	PROPANE	C3H8
4	7 ^	50.0 PPM	PROPANE	C3H8
5	7 ^	0.0 PPM	PROPANE	C3H8

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:04:47 Tuesday 27 August 96

11:04:47

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	1 ^	BAL MFC	NITROGEN	N2
2	5 ^	10.0 %	CARBON DIOXIDE	CO2
3	5 ^	0.0 %	CARBON DIOXIDE	CO2
4	5 ^	0.0 %	CARBON DIOXIDE	CO2
5	5 ^	0.0 %	CARBON DIOXIDE	CO2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:37:04 Tuesday 27 August 96

%

11:37:04

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	1 ^	BAL MFC	NITROGEN	N2
2	5 ^	6.0 %	CARBON DIOXIDE	CO2
3	5 ^	0.0 %	CARBON DIOXIDE	CO2
4	5 ^	0.0 %	CARBON DIOXIDE	CO2
5	5 ^	0.0 %	CARBON DIOXIDE	CO2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:37:24 Tuesday 27 August 96

11:37:24

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	1 ^	BAL MFC	NITROGEN	N2
2	5 ^	0.0 %	CARBON DIOXIDE	CO2
3	5 ^	2.0 %	CARBON DIOXIDE	CO2
4	5 ^	0.0 %	CARBON DIOXIDE	CO2
5	5 ^	0.0 %	CARBON DIOXIDE	CO2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:37:50 Tuesday 27 August 96

11:37:50

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type
1	1 ^	BAL MFC		NITROGEN	N2
2	6 ^	0.0	%	NITRIC OXIDE	NO
3	6 ^	100.0	PPM	NITRIC OXIDE	NO
4	6 ^	0.0	PPM	NITRIC OXIDE	NO
5	6 ^	0.0	PPM	NITRIC OXIDE	NO

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

creen Print: 11:38:16 Tuesday 27 August 96

11:38:16

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type
1	1 ^	BAL MFC		NITROGEN	N2
2	6 ^	0.0	%	NITRIC OXIDE	NO
3	6 ^	0.0	PPM	NITRIC OXIDE	NO
4	6 ^	50.0	PPM	NITRIC OXIDE	NO
5	6 ^	0.0	PPM	NITRIC OXIDE	NO

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:38:43 Tuesday 27 August 96

11:38:42

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type
1	1 ^	BAL MFC		NITROGEN	N2
2	6 ^	0.0	%	NITRIC OXIDE	NO
3	6 ^	0.0	PPM	NITRIC OXIDE	NO
4	6 ^	25.0	PPM	NITRIC OXIDE	NO
5	6 ^	0.0	PPM	NITRIC OXIDE	NO

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:39:09 Tuesday 27 August 96

11:39:09

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type
1	1 ^	BAL MFC		NITROGEN	N2
2	3 ^	15.0	%	OXYGEN	O2
3	3 ^	0.0	PPM	OXYGEN	O2
4	3 ^	0.0	PPM	OXYGEN	O2
5	3 ^	0.0	PPM	OXYGEN	O2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:39:36 Tuesday 27 August 96

11:39:35

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	1 ^	BAL MFC	NITROGEN	N2
2	3 ^	100000 PPM	OXYGEN	O2
3	3 ^	0.0 PPM	OXYGEN	O2
4	3 ^	0.0 PPM	OXYGEN	O2
5	3 ^	0.0 PPM	OXYGEN	O2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:40:01 Tuesday 27 August 96

11:40:01

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type
1	1 ^	BAL MFC		NITROGEN	N2
2	4 ^	0.0	%	CARBON MONOXIDE	CO
3	4 ^	0.0	PPM	CARBON MONOXIDE	CO
4	4 ^	350.0	PPM	CARBON MONOXIDE	CO
5	4 ^	0.0	PPM	CARBON MONOXIDE	CO

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:40:30 Tuesday 27 August 96

11:40:30

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type	
1	1 ^	BAL MFC			NITROGEN	N2
2	4 ^	0.0	%		CARBON MONOXIDE	CO
3	4 ^	0.0	PPM		CARBON MONOXIDE	CO
4	4 ^	200.0	PPM		CARBON MONOXIDE	CO
5	4 ^	0.0	PPM		CARBON MONOXIDE	CO

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

creen Print: 11:40:56 Tuesday 27 August 96

11:40:55

CONCENTRATION MODE

MFC	Port	Target OGC		Actual OGC	Gas Type
1	1 ^	BAL MFC		NITROGEN	N2
2	4 ^	0.0	%	CARBON MONOXIDE	CO
3	4 ^	0.0	PPM	CARBON MONOXIDE	CO
4	4 ^	100.0	PPM	CARBON MONOXIDE	CO
5	4 ^	0.0	PPM	CARBON MONOXIDE	CO

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:41:29 Tuesday 27 August 96

11:41:29

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type	
1	2 ^	BAL MFC		AIR	
2	8 ^	0.0 PPM		SULFUR DIOXIDE	SO2
3	8 ^	200.0 PPM		SULFUR DIOXIDE	SO2
4	8 ^	0.0 PPM		SULFUR DIOXIDE	SO2
5	8 ^	0.0 PPM		SULFUR DIOXIDE	SO2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

creen Print: 11:41:55 Tuesday 27 August 96

11:41:55

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	2 ^	BAL MFC	AIR	
2	8 ^	0.0 PPM	SULFUR DIOXIDE	SO2
3	8 ^	150.0 PPM	SULFUR DIOXIDE	SO2
4	8 ^	0.0 PPM	SULFUR DIOXIDE	SO2
5	8 ^	0.0 PPM	SULFUR DIOXIDE	SO2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

Screen Print: 11:42:25 Tuesday 27 August 96

11:42:25

CONCENTRATION MODE

MFC	Port	Target OGC	Actual OGC	Gas Type
1	2 ^	BAL MFC	AIR	
2	8 ^	0.0 PPM	SULFUR DIOXIDE	SO2
3	8 ^	100.0 PPM	SULFUR DIOXIDE	SO2
4	8 ^	0.0 PPM	SULFUR DIOXIDE	SO2
5	8 ^	0.0 PPM	SULFUR DIOXIDE	SO2

Total Flow^ 9000.0 CCM

START SAVE RECALL PPM OR % BAL MFC PRT SCRN EXIT

DILUTION SYSTEM VERIFICATION
METHOD 205

SERVOMEX 1900

SITE [redacted]			INSTRUMENT USED [redacted]			
LOCATION [redacted]			HIGH EVENT GAS PROTOCOL OXYGEN [redacted]			
DATE [redacted]			HIGH GAS CONCENTRATION [redacted]			
GAS CONC. %	EXPECTED CHART READING		ACTUAL CHART READINGS			AVERAGE CHART READING
			RUN #1	RUN #2	RUN #3	
5.0	19.1		19.0	19.0	19.0	
10.0	38.3		38.3	38.4	38.4	
15.0	57.4		57.5	57.3	57.3	
20.0	76.6		76.6	76.4	76.6	

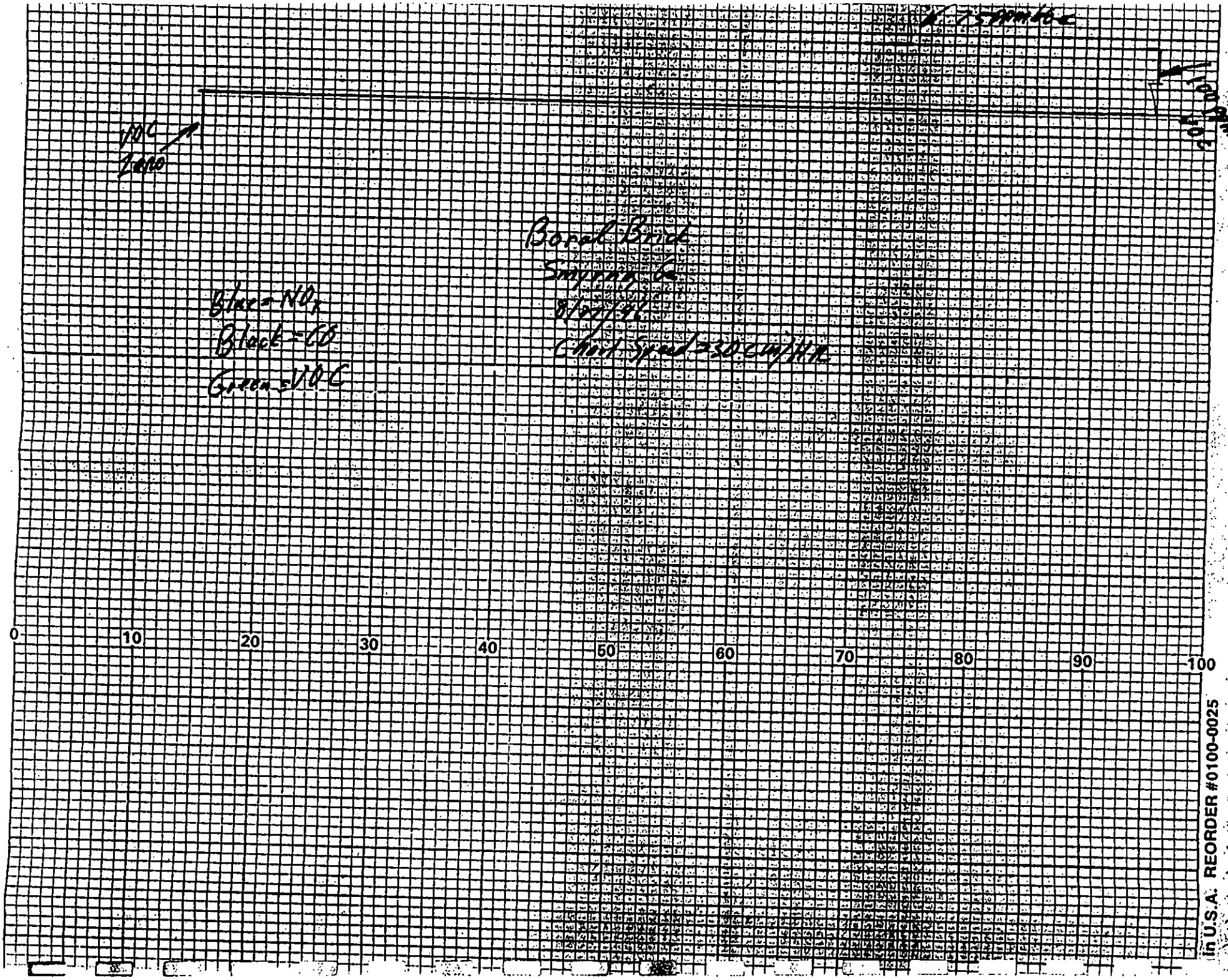
PERCENT ERROR FROM EXPECTED			PROTOCOL GAS CONCENTRATION (% OXYGEN)	EXPECTED CHART READING	ACTUAL CHART READING	PERCENT ERROR
RUN #1	RUN #2	RUN #3				
			5.02	19.1	19.3	
					19.2	
					19.3	

CALIBRATION DATA REQUIRED

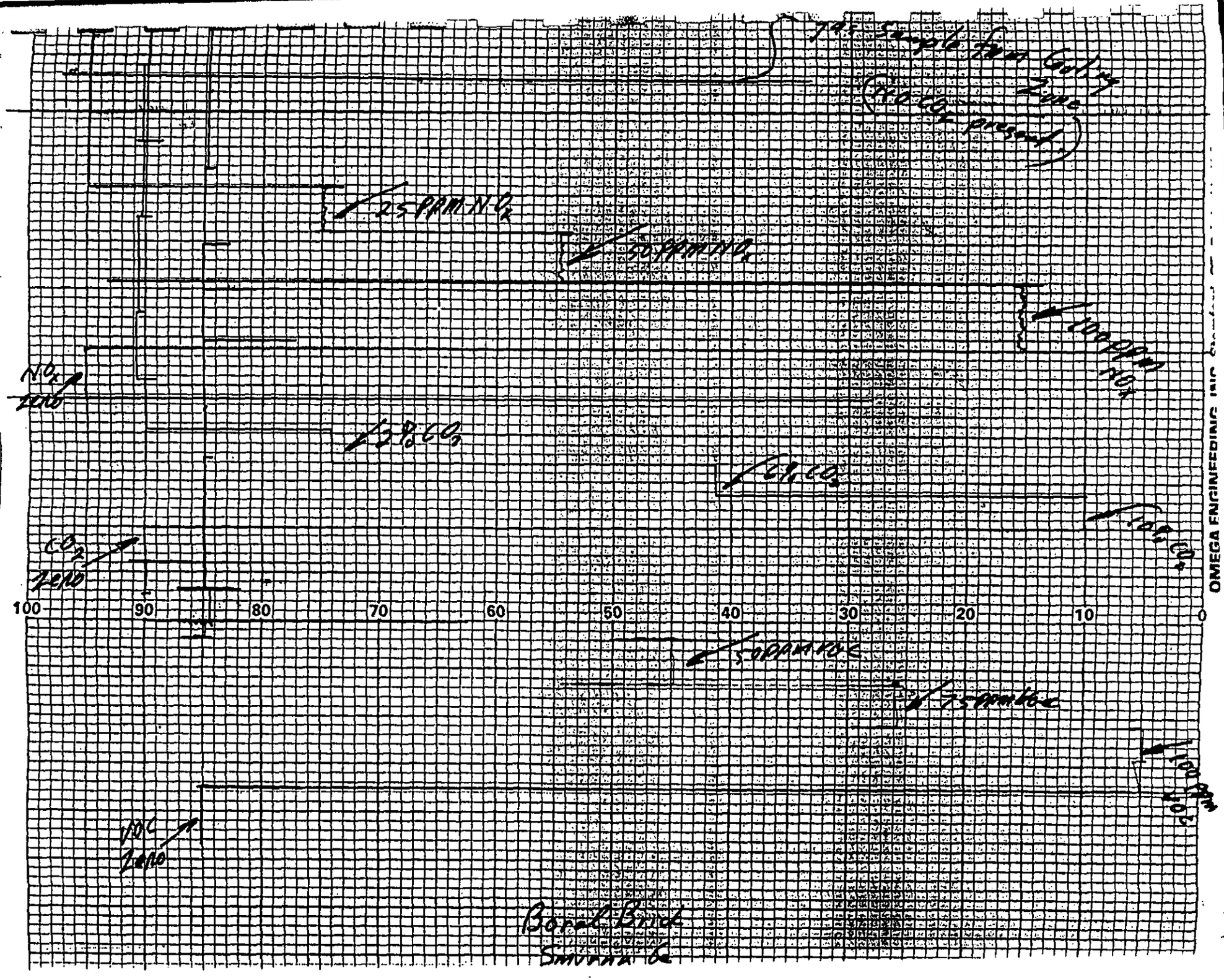
EQUIPMENT*	RUN #1	RUN #2	RUN #3	RUN #4	RUN #5	RUN #6
BAROMETER	✓	✓	✓	✓	✓	✓
MODULE DATA	A.T.C #1	A.T.C #1	A.T.C #1	A.T.C #1	A.T.C #1	A.T.C #1
PRE-	✓	✓	✓	✓	✓	✓
POST-	✓	✓	✓	✓	✓	✓
O2 INTERFERENCE CK						
PITOT TUBES	50	52	53	50	52	53
THERMOCOUPLES	50	52	53	51	52	53
NOZZLES	41	45	46	53	56	51
CALIBRATION GASES						
O2	✓	✓	✓			
CO	✓	✓				
CO2	✓	✓				
PROPANE/AIR	✓	✓				
PROPANE/NITROGEN						
NOX	✓	✓	✓	✓	✓	✓
SO2	✓	✓	✓	✓	✓	✓
OTHER						
ENVIRONICS DATA	✓	✓	✓	✓	✓	✓
VE CERTIFICATIONS						
OTHER						

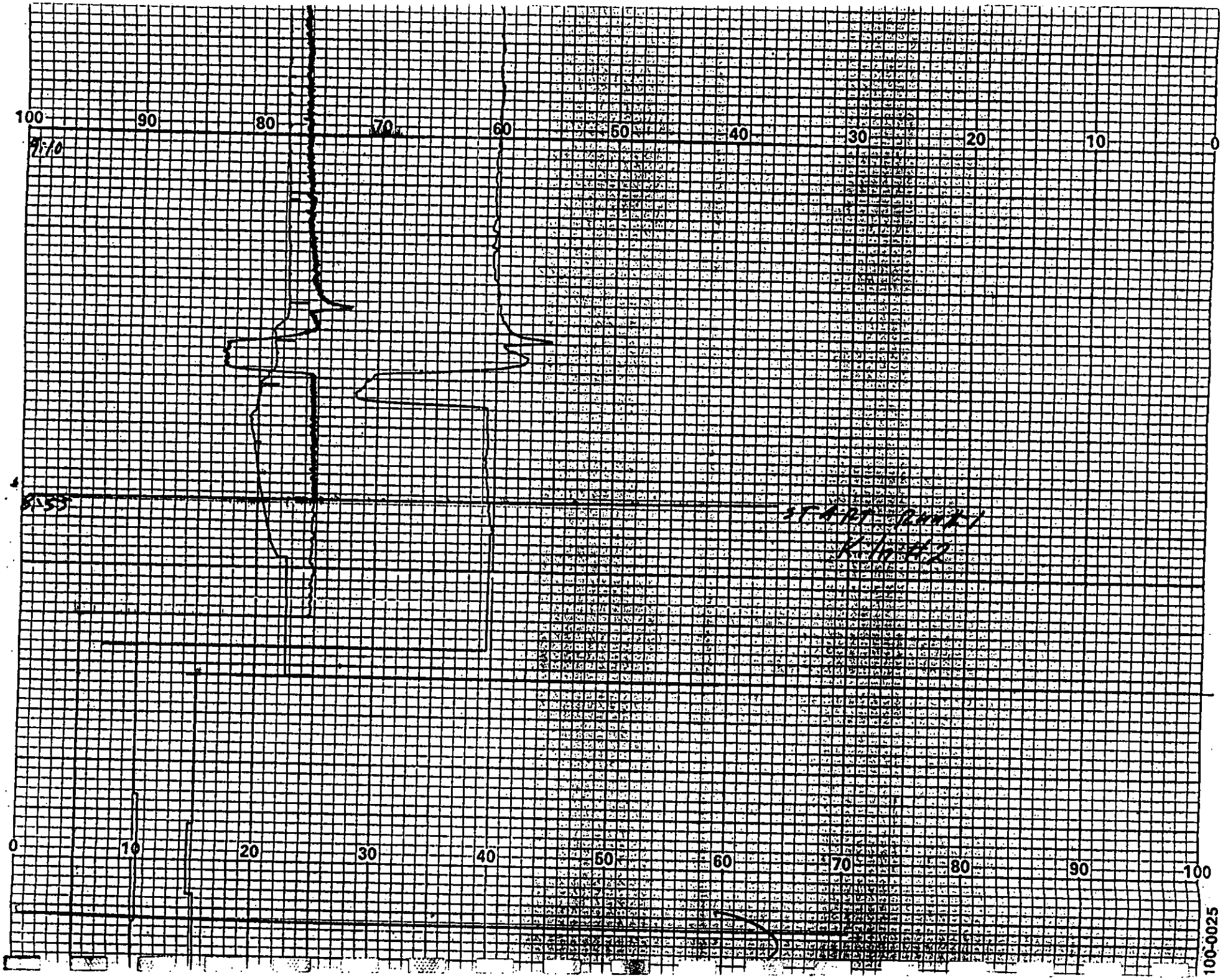
*PLEASE FILL OUT APPROPRIATELY AND INCLUDE WITH DATA SHEETS.
e.g. FOR NOZZLES, PITOTS, MODULES, AND TC, FILL IN #
FOR CAL GASES, WRITE IN CONCENTRATIONS.
FOR VE, ENVIRONICS DATA, BAROMETER, et al., JUST CHECK BOX

WHILE IT MAKES SENSE FOR CALIBRATION DATA TO BE ON THE COMPUTER, IT HAS BECOME TOO TEDIOUS TO LINK FILES WITH REPORTS. THE VISUAL CONSISTENCY OF THE FINISHED PRODUCT HAS NOT BEEN ACCEPTABLE.
THEREFORE, COLLEEN WILL HAVE AN UP TO DATE CALIBRATION PACKET AND WILL INSERT THIS DATA WHEN THE FINISHED REPORT IS SUBMITTED TO HER.
PLEASE HELP MAKE THIS CHANGE BENEFICIAL FOR EVERYONE.



In U.S.A. REORDER #0100-0025


100
90
80
70
60
50
40
30
20
10
0
NOx zero
CO2 zero
VOC zero
25 PPM NOx
50 PPM NOx
100 PPM NOx
3% CO2
6% CO2
10% CO2
50 PPM VOC
75 PPM VOC
100 PPM VOC
Bond Brick
Smokehouse
OMEGA ENGINEERING INC


100
90
80
70
60
50
40
30
20
10
0
9:10
4
8:55
0
10
20
30
40
50
60
70
80
90
100
100-0025

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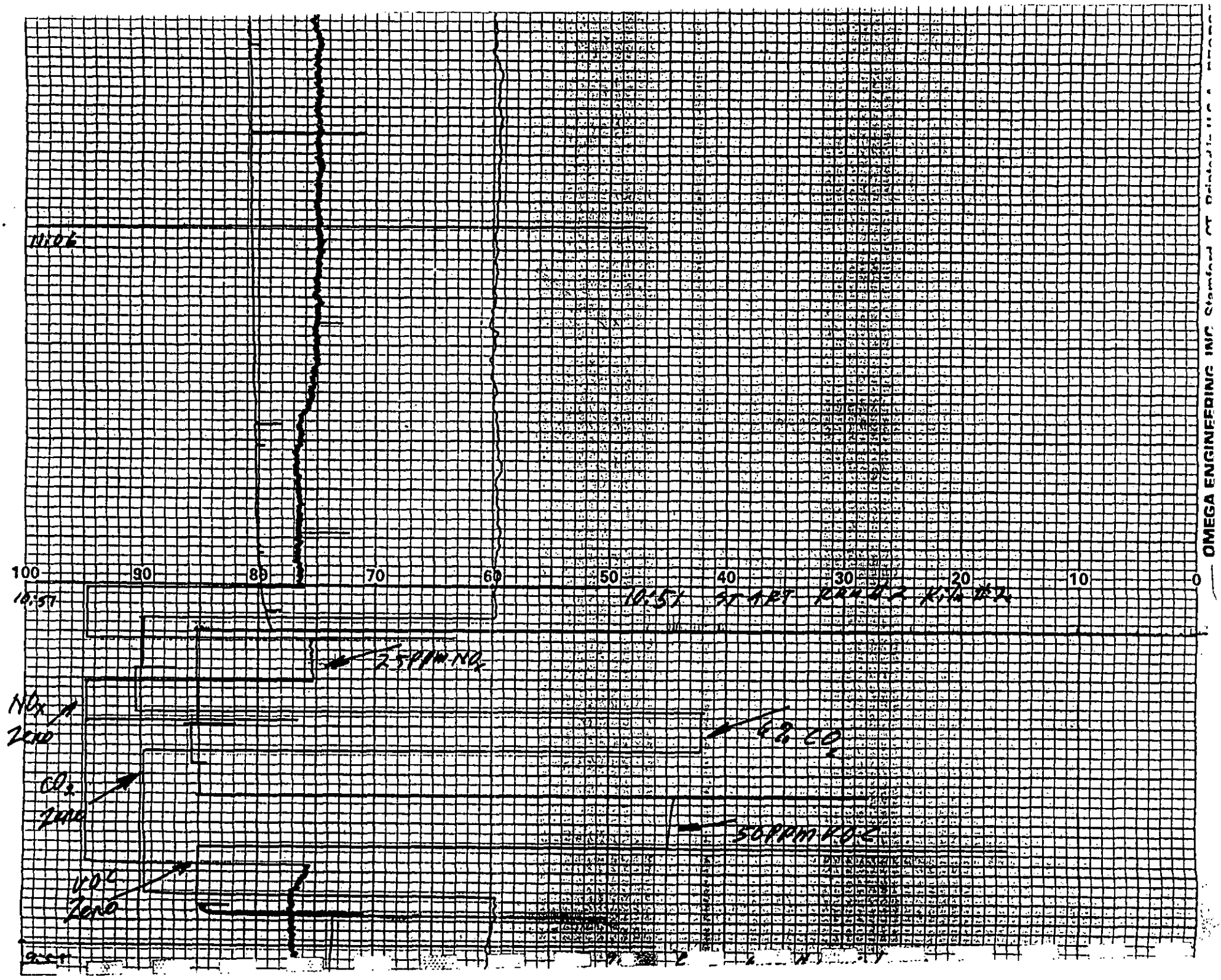
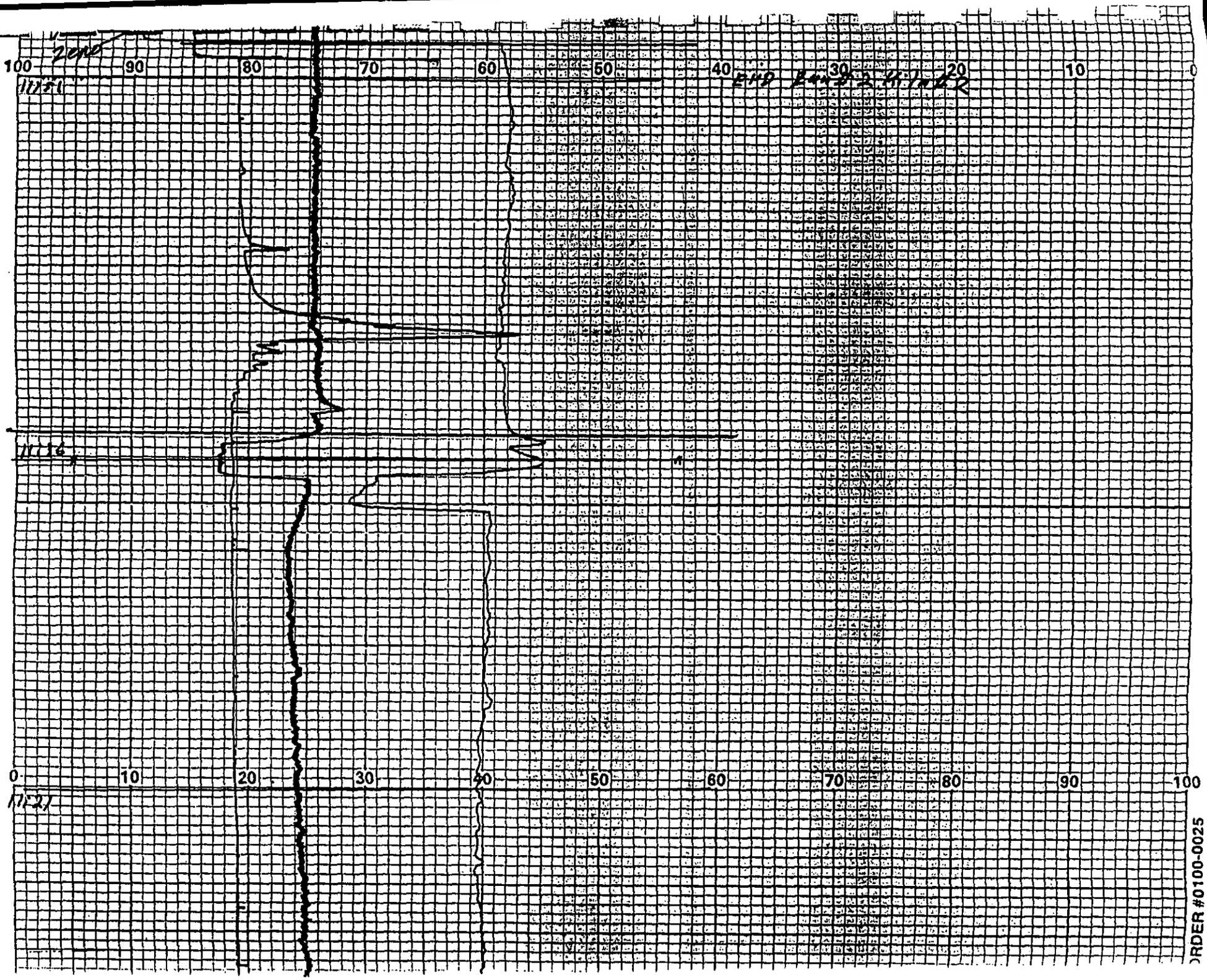
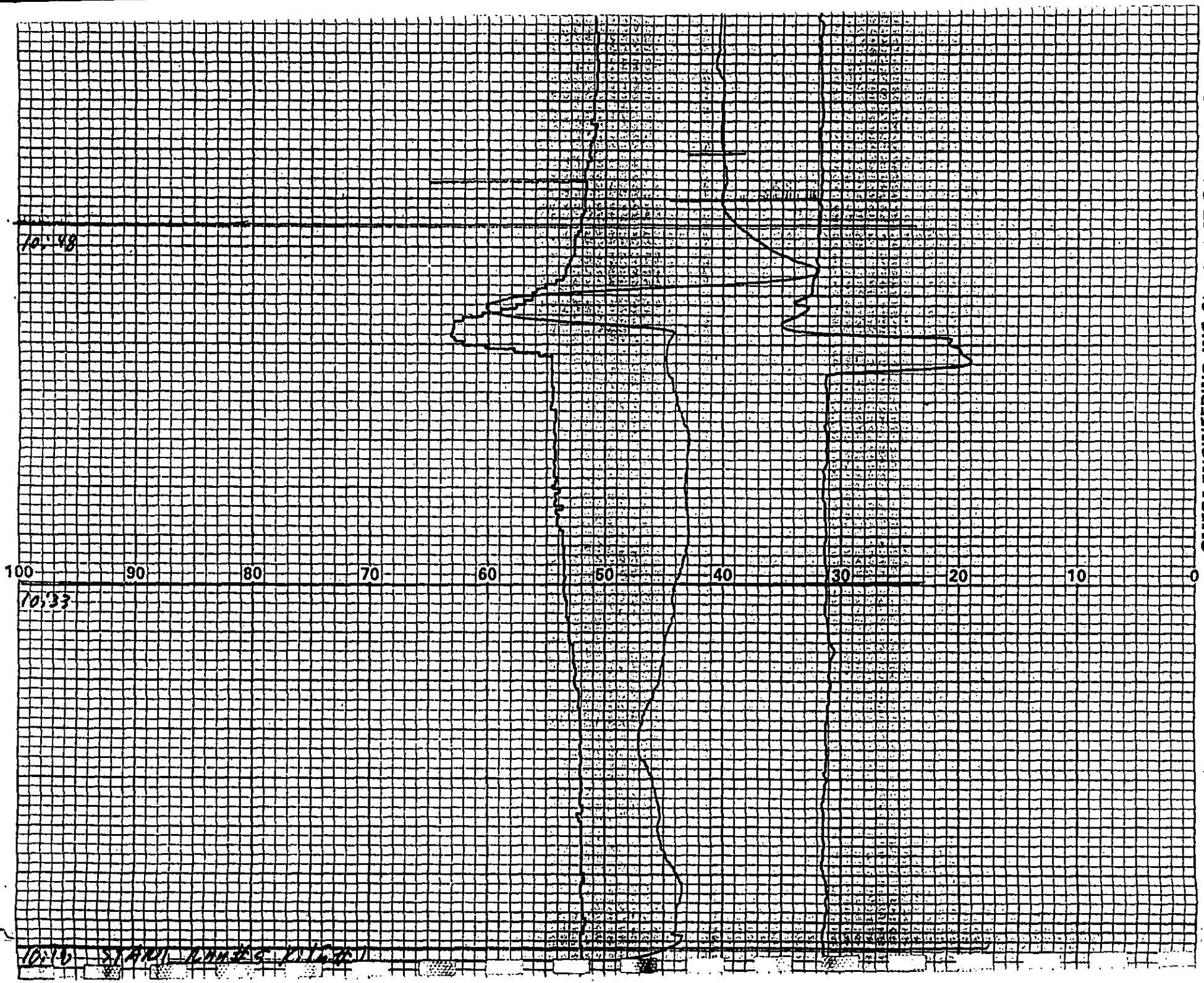

100
90
80
70
60
50
40
30
20
10
0
10.06
10.57
10.57
25 ppm NO2
NOx
zero
CO2
zero
VOC
zero
50 ppm CO2
50 ppm CO2
OMEGA ENGINEERING INC Stamford CT Printed in U.S.A.



ORDER #0100-0025



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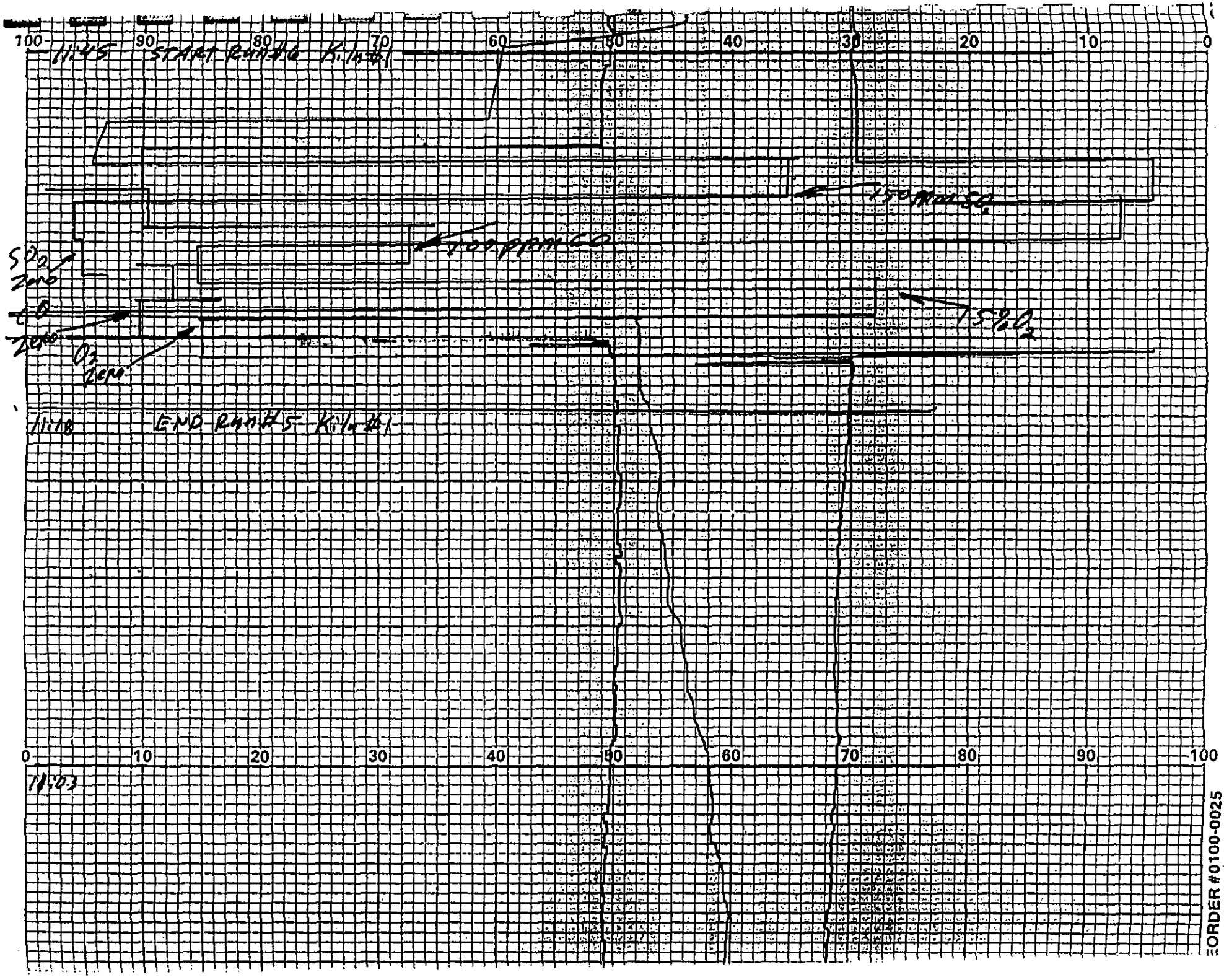

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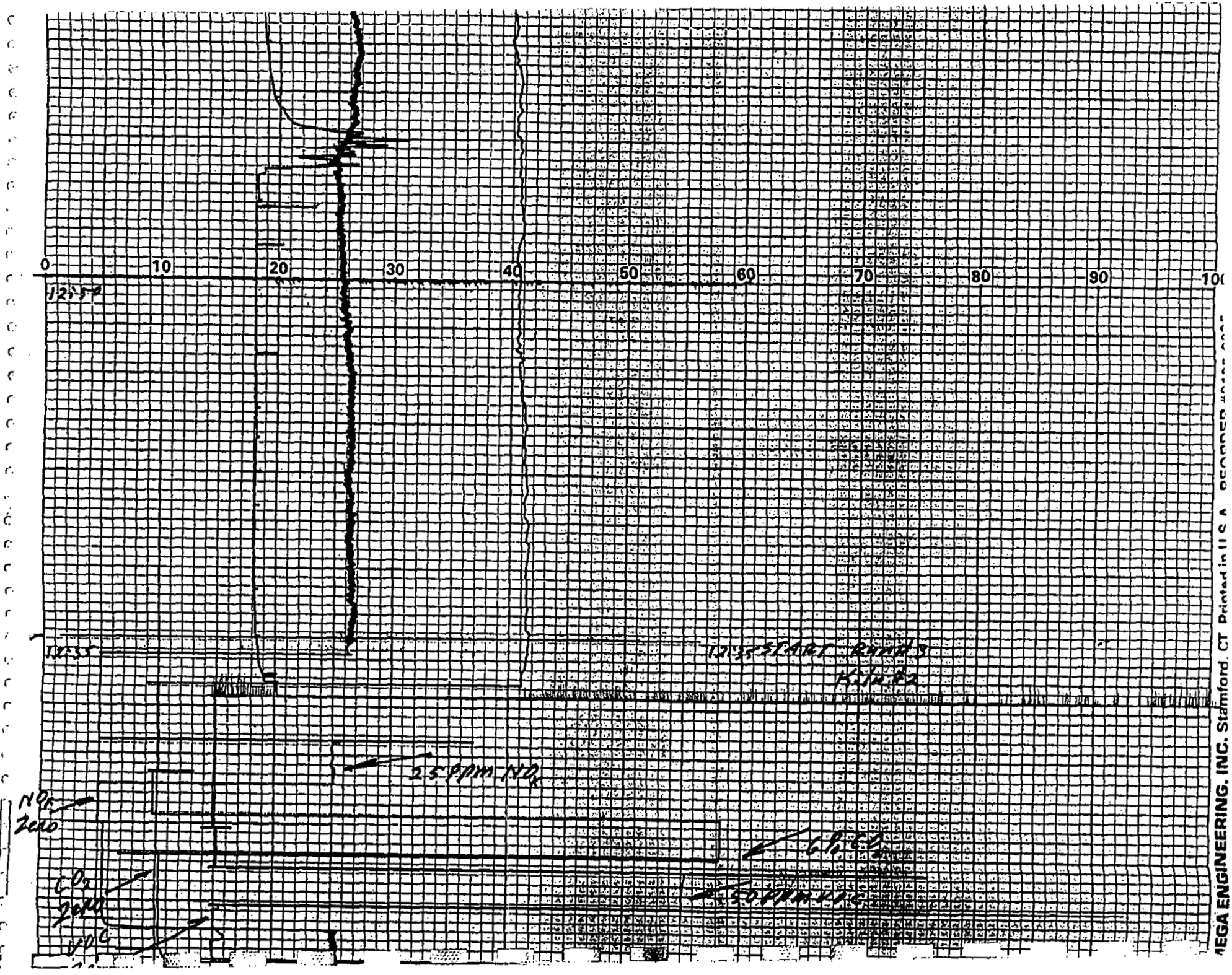

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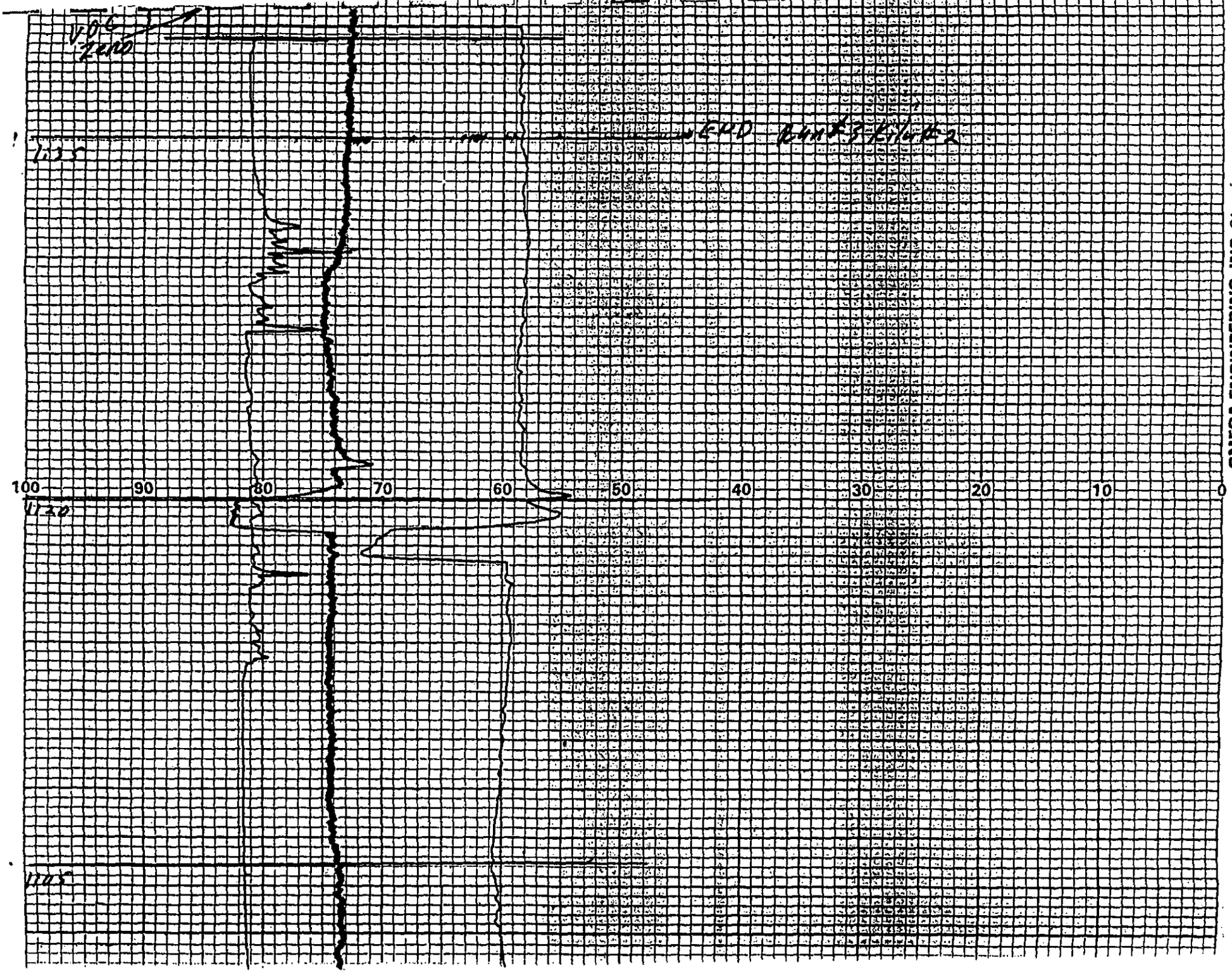
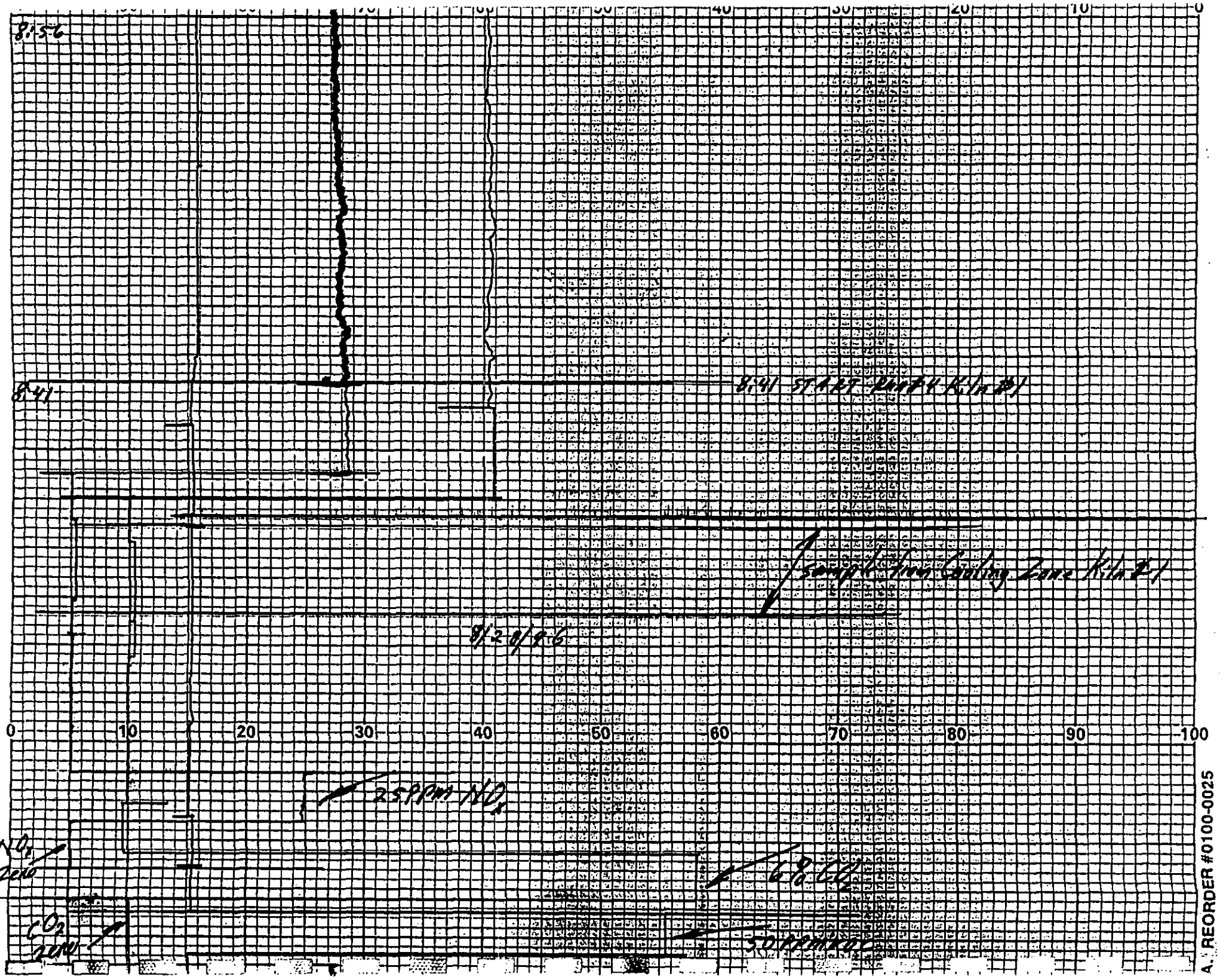
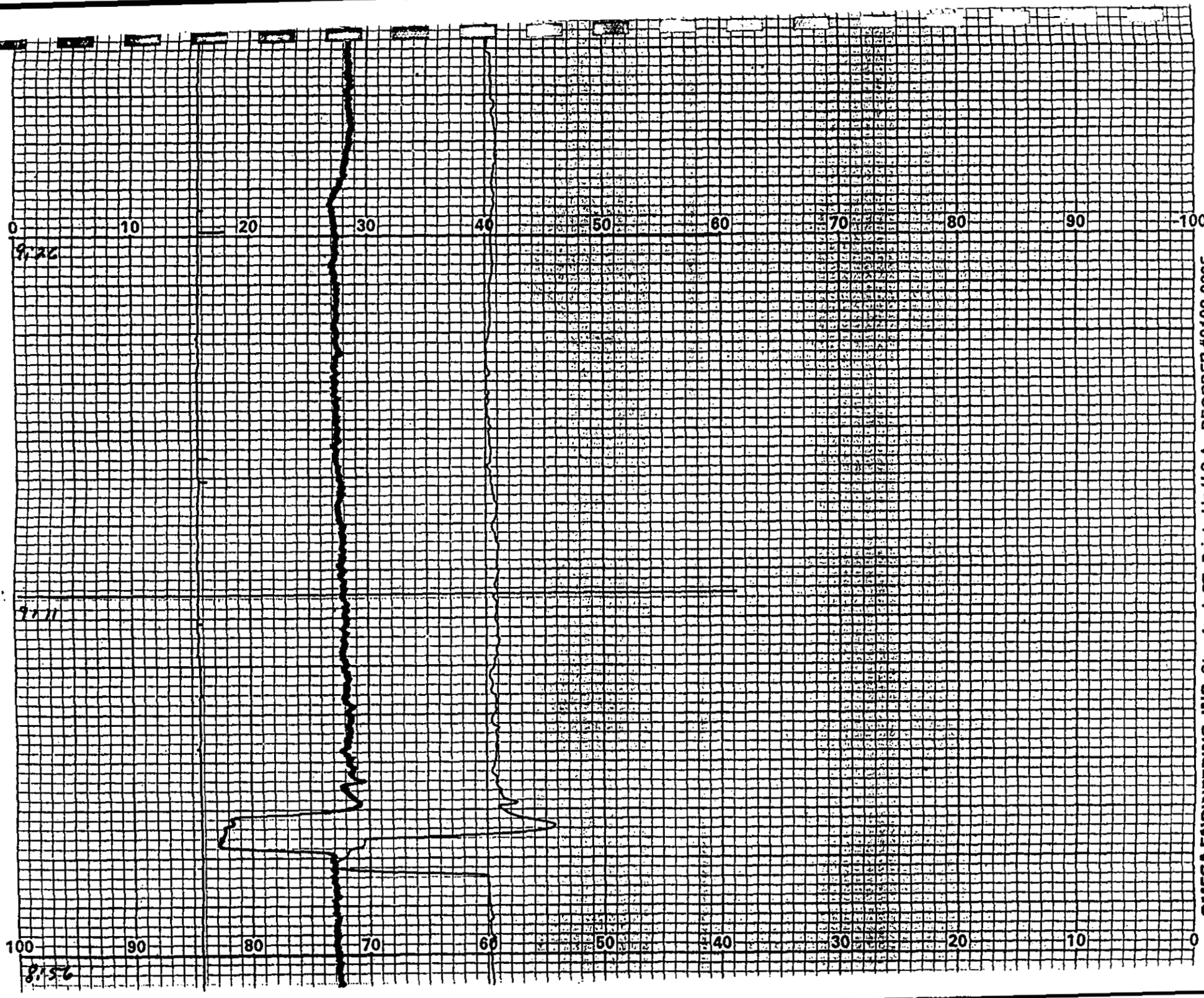


OMEGA ENGINEERING INC.



A. REORDER #0100-0025



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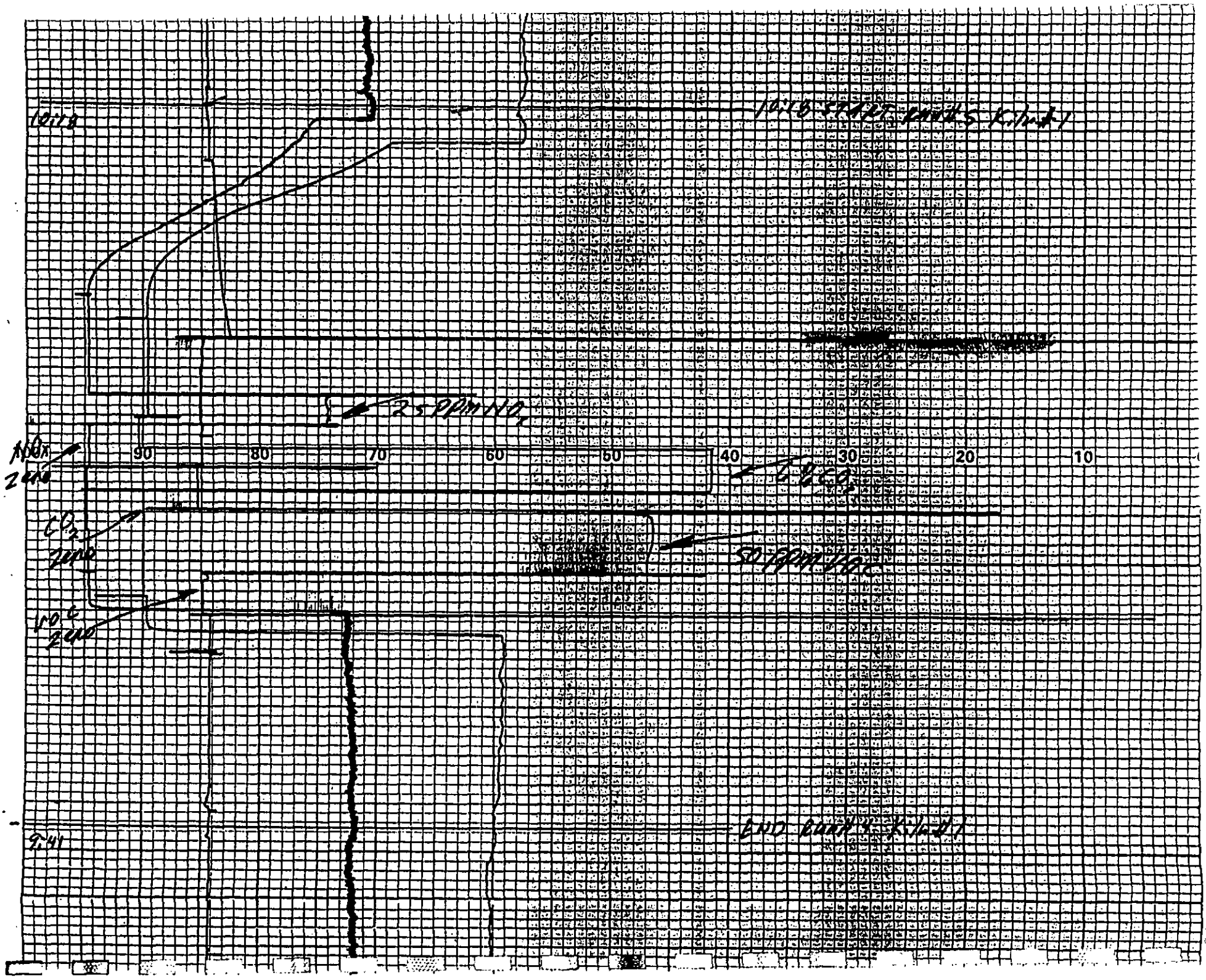
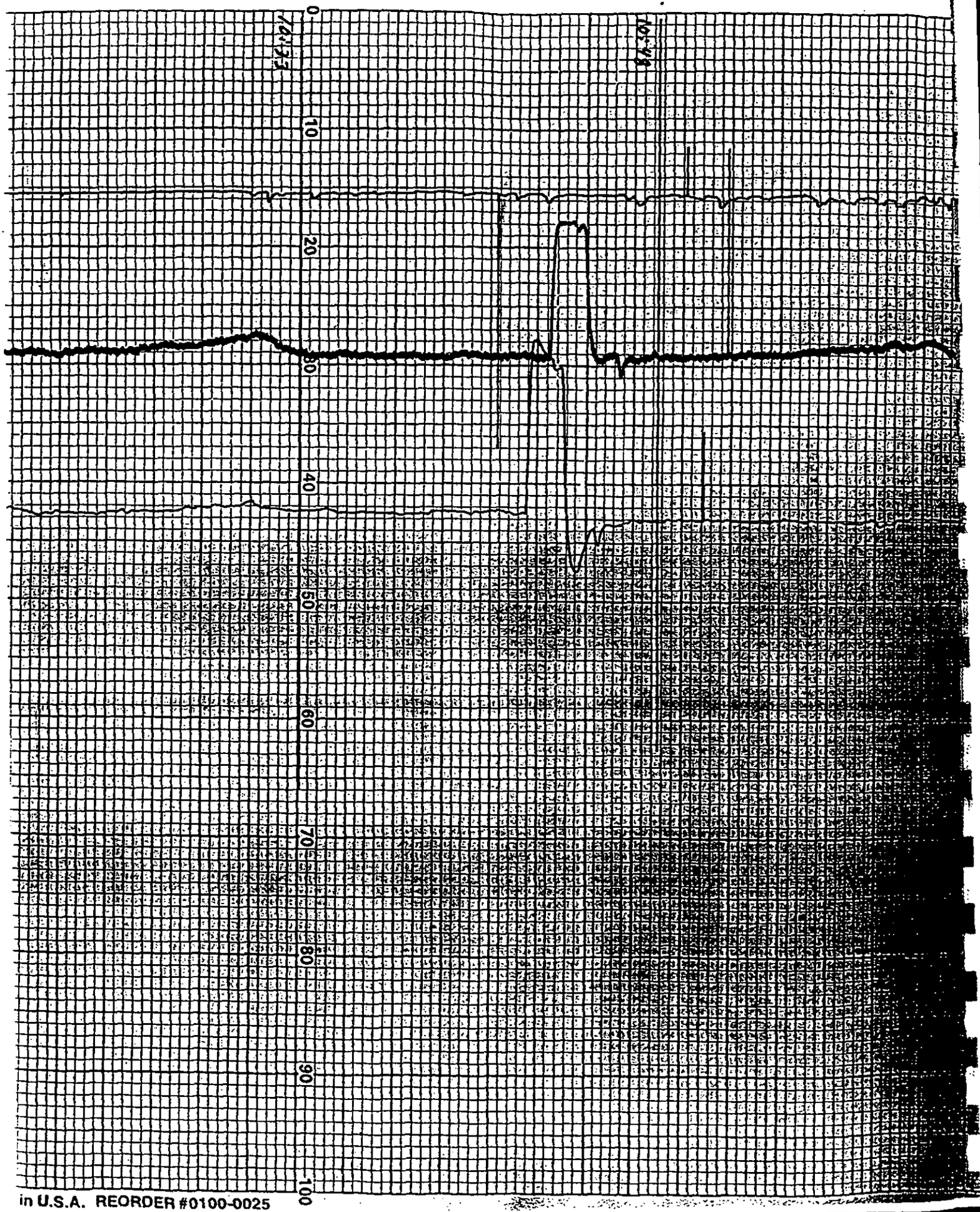

90
80
70
60
50
40
30
20
10



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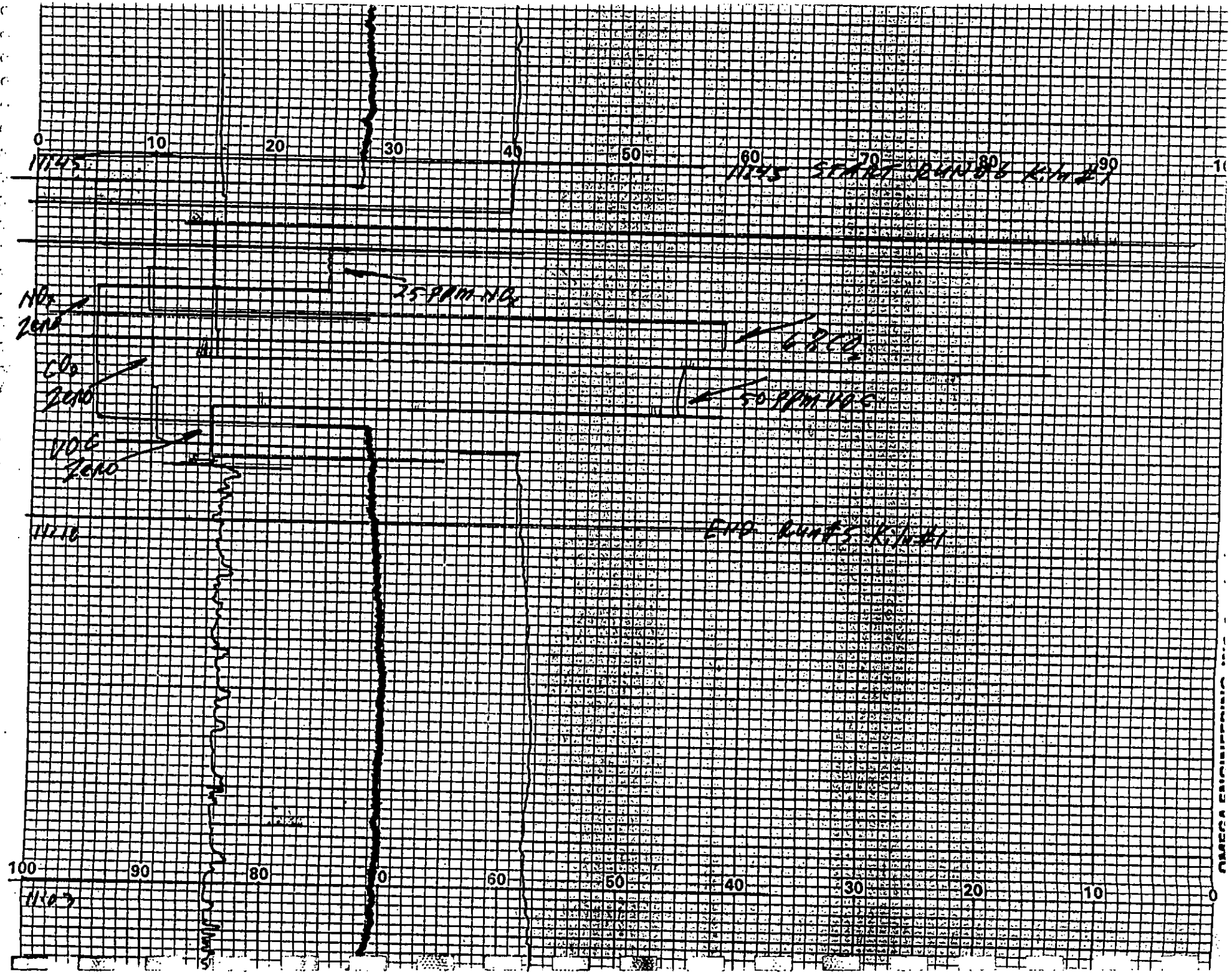
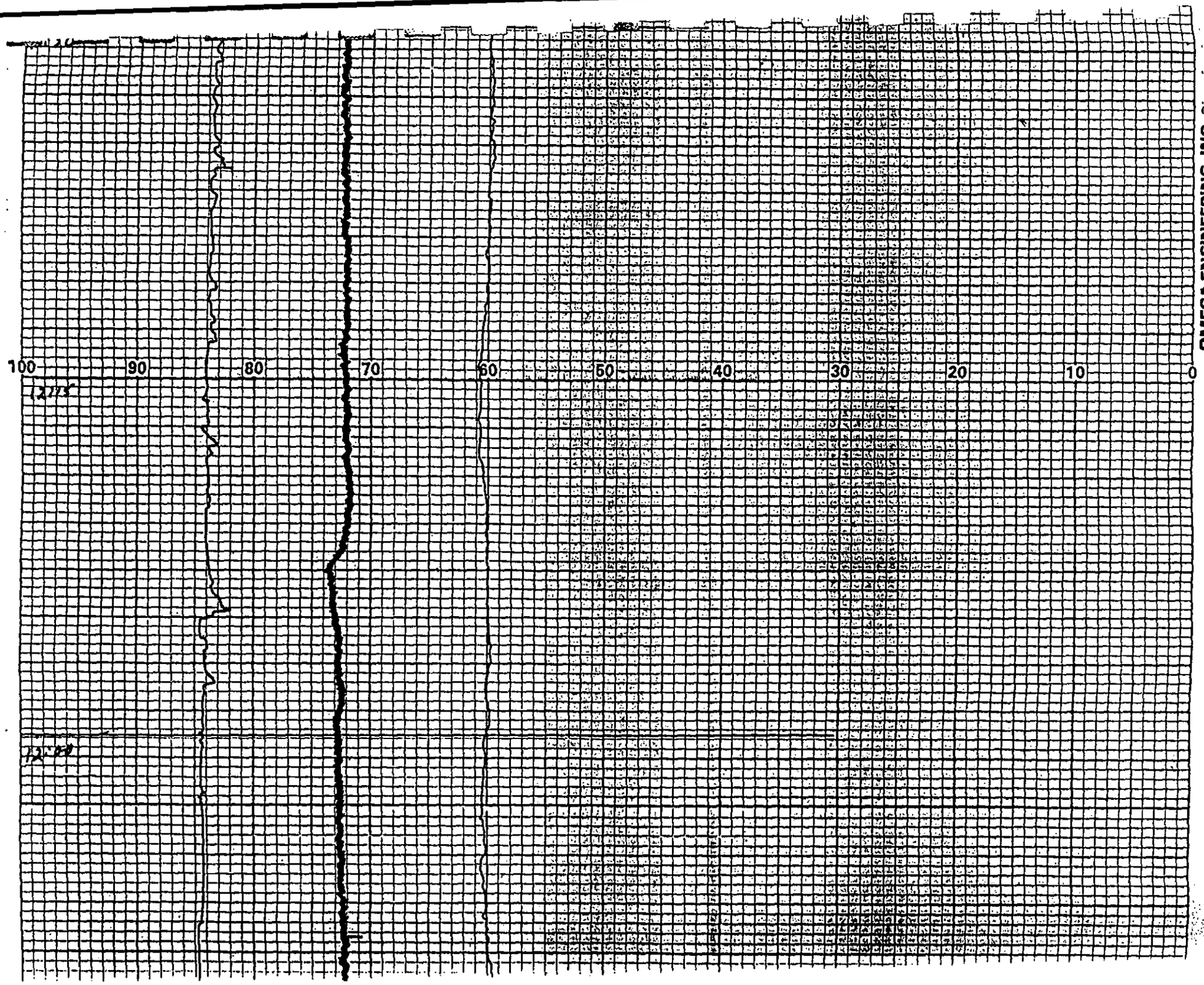
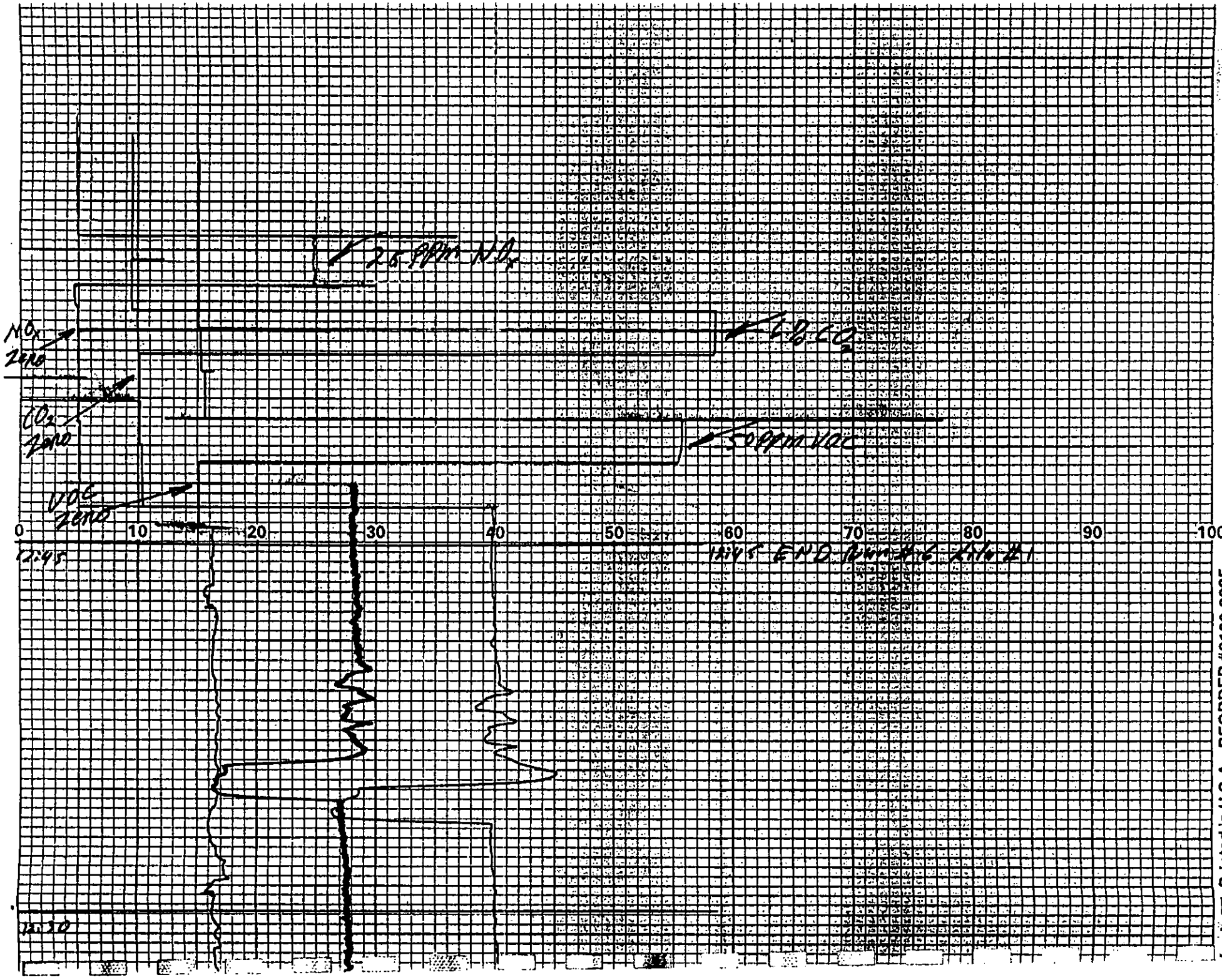
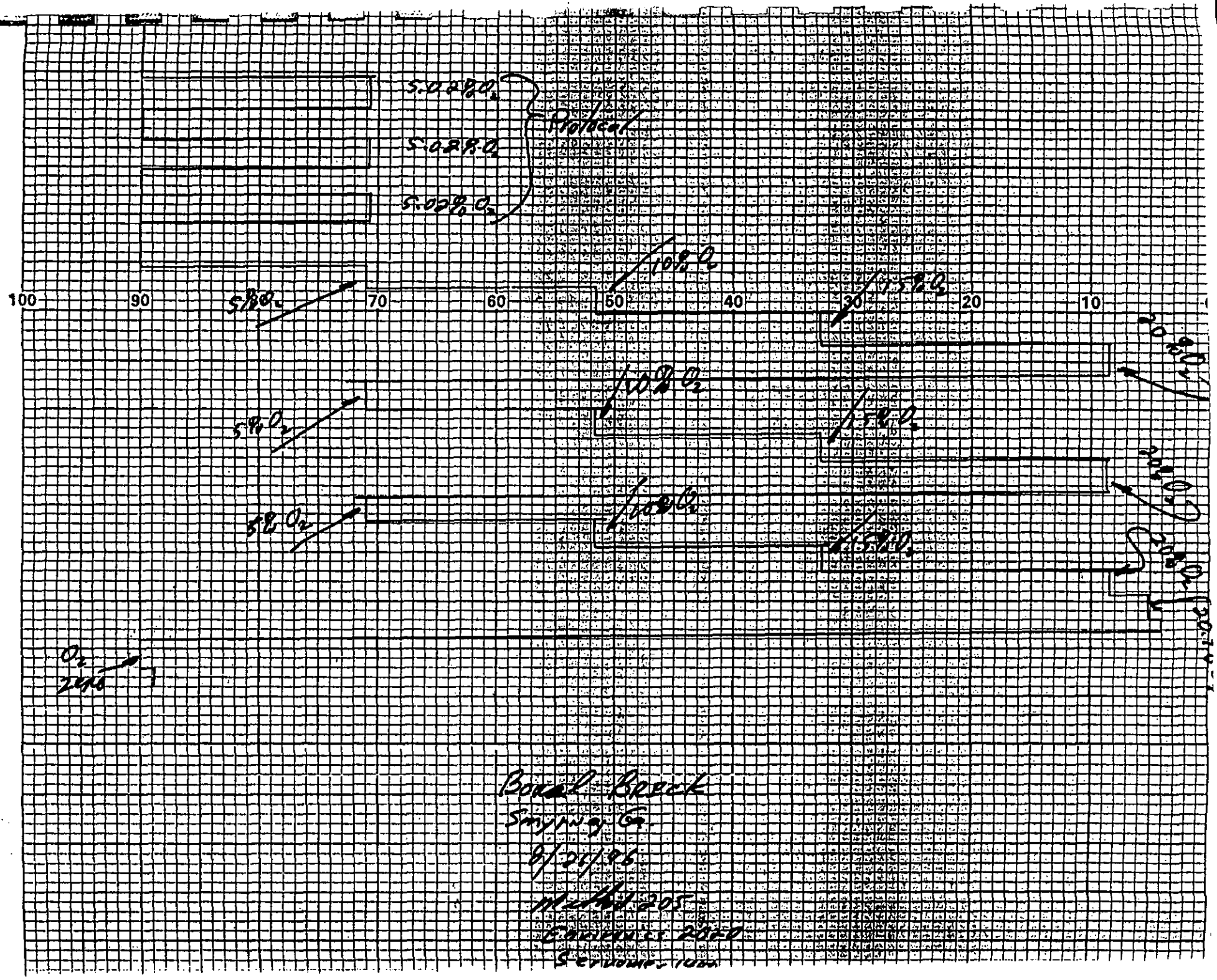
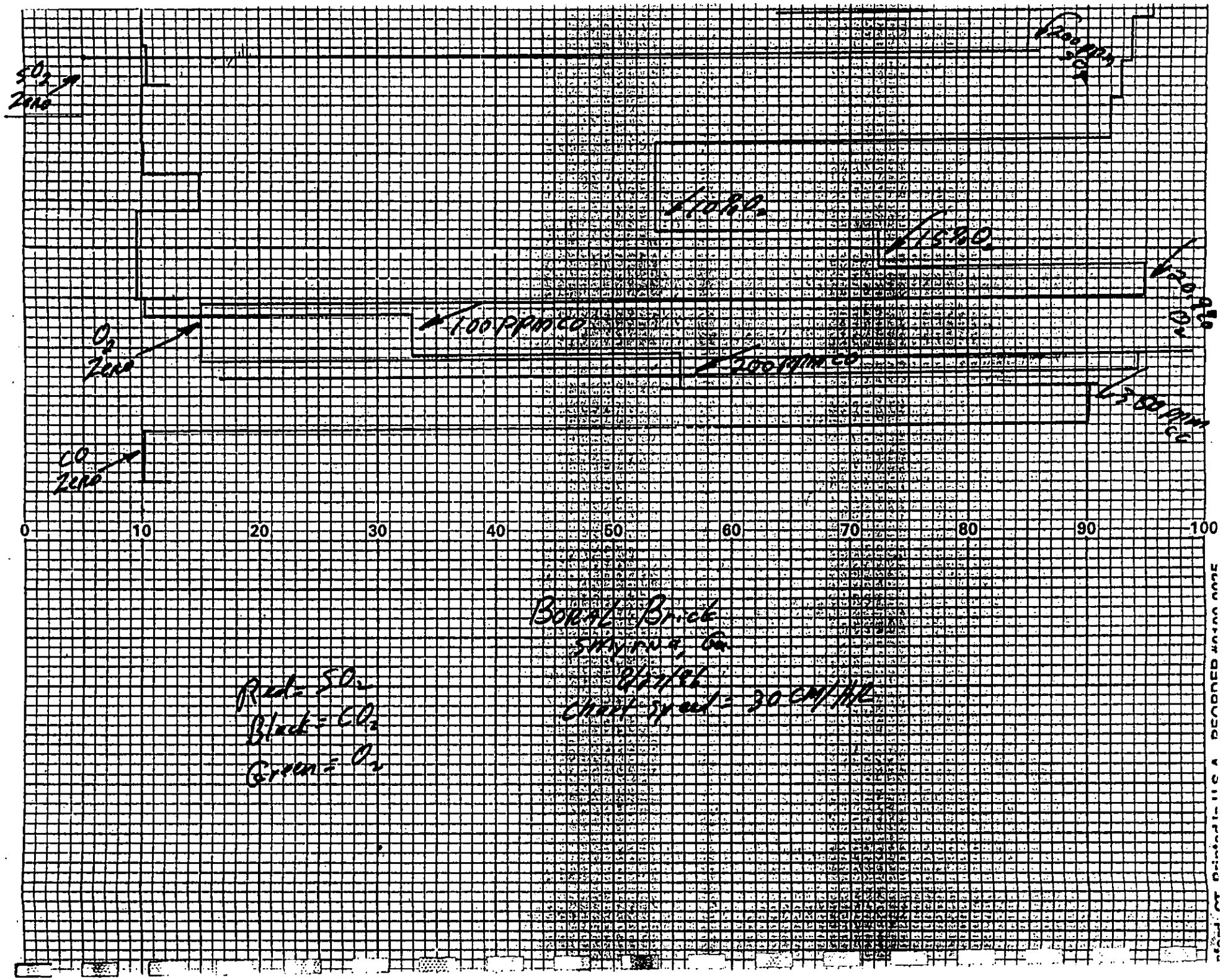

0
10
20
30
40
50
60
70
80
90
100
90
80
70
60
50
40
30
20
10
0
11:45
11:45 START BURNING KILN #1
NOx
ZERO
25 PPM NOx
CO
ZERO
CO
ZERO
50 PPM VOC
VOC
ZERO
END BURNING KILN #1
11:10
11:05

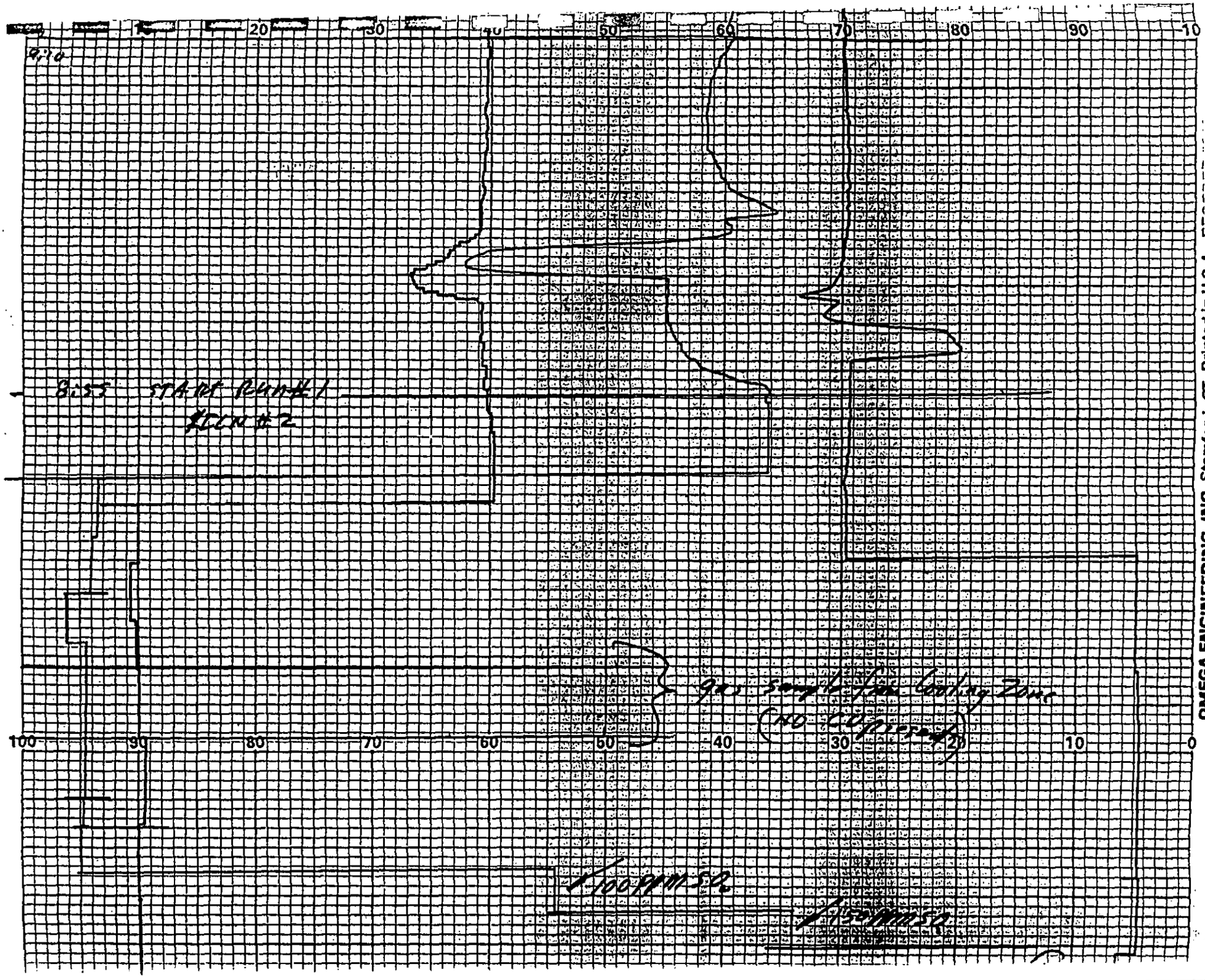

100
90
80
70
60
50
40
30
20
10
0
OMEGA ENGINEERING INC.

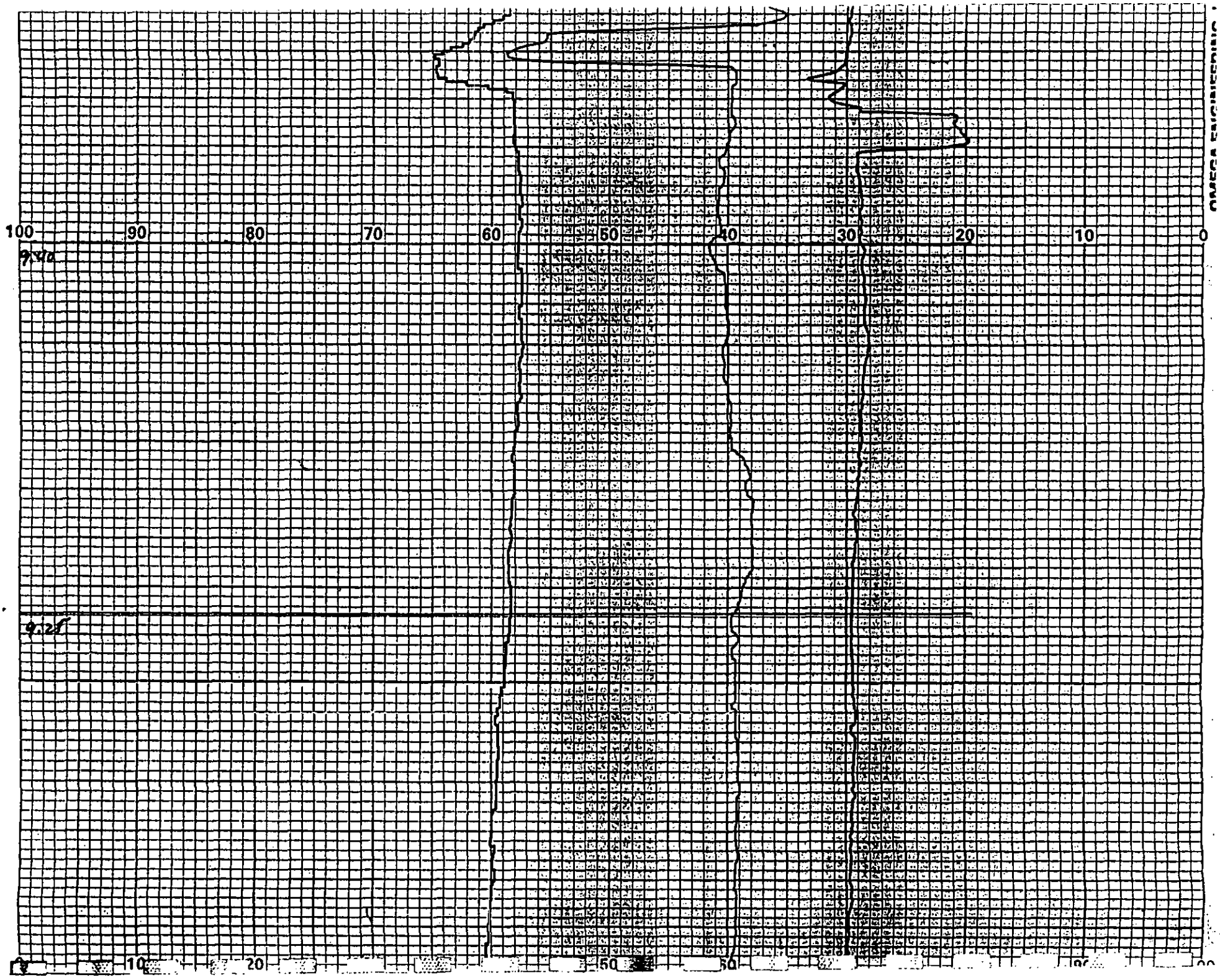


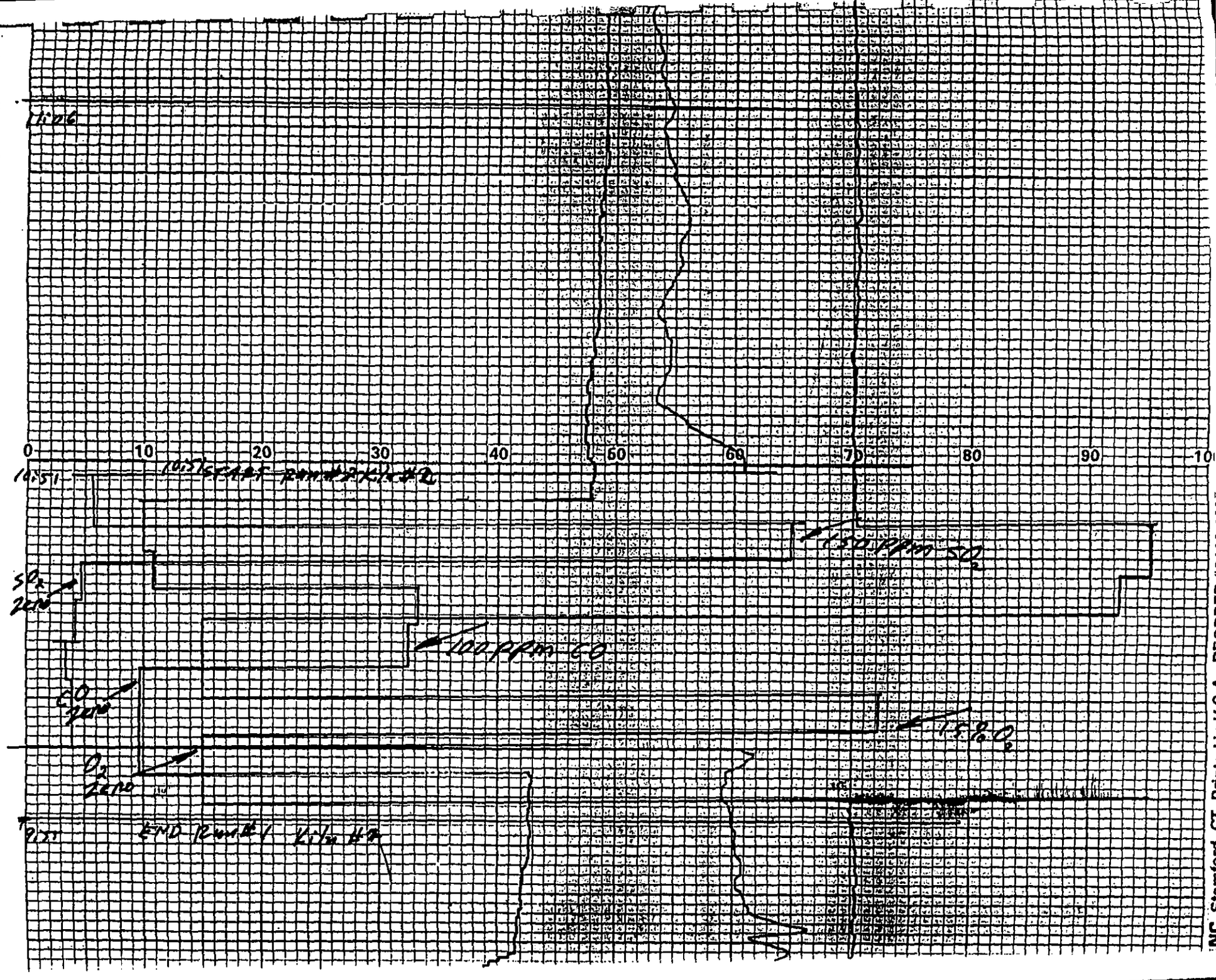
ford, CT Printed in U.S.A. REORDER #0100-0025


5.02% O2
5.02% O2
5.02% O2
Protocol
100
90
70
60
50
40
30
20
10
5% O2
10% O2
10% O2
5% O2
5% O2
10% O2
5% O2
10% O2
5% O2
O2 zero
Bonal Breck
Smyrna Ga
8/26/96
205
2020
Sev volume - 1000

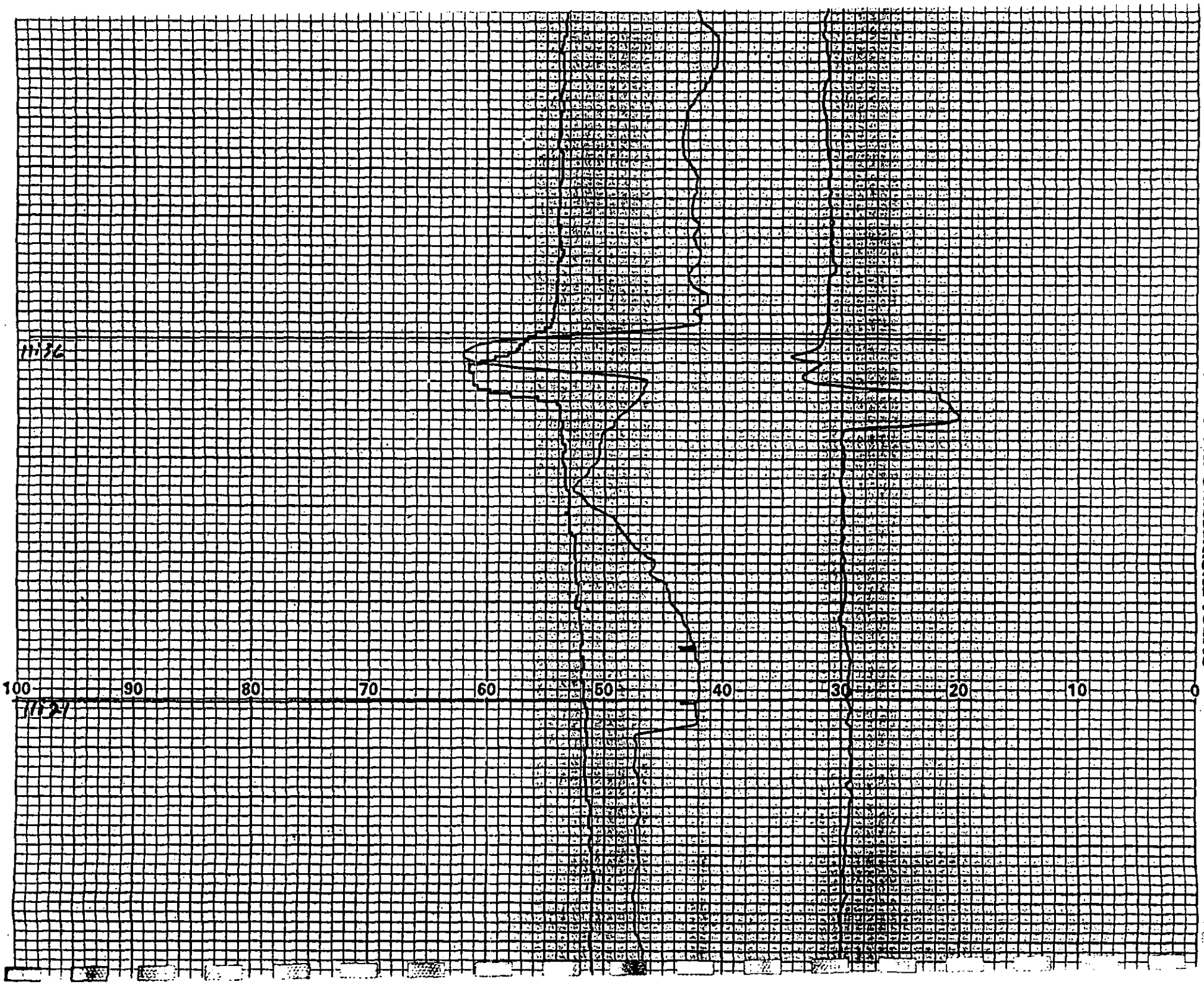

SO_2 zero
O_2 zero
CO zero
100 ppm CO
200 ppm CO
500 ppm CO
1000 ppm CO
1500 ppm CO
2000 ppm CO
2500 ppm CO
0
10
20
30
40
50
60
70
80
90
100
Red = SO_2
Black = CO_2
Green = O_2
Boral Brick
Smyrna, Ga.
Chart speed = 30 cm/hr

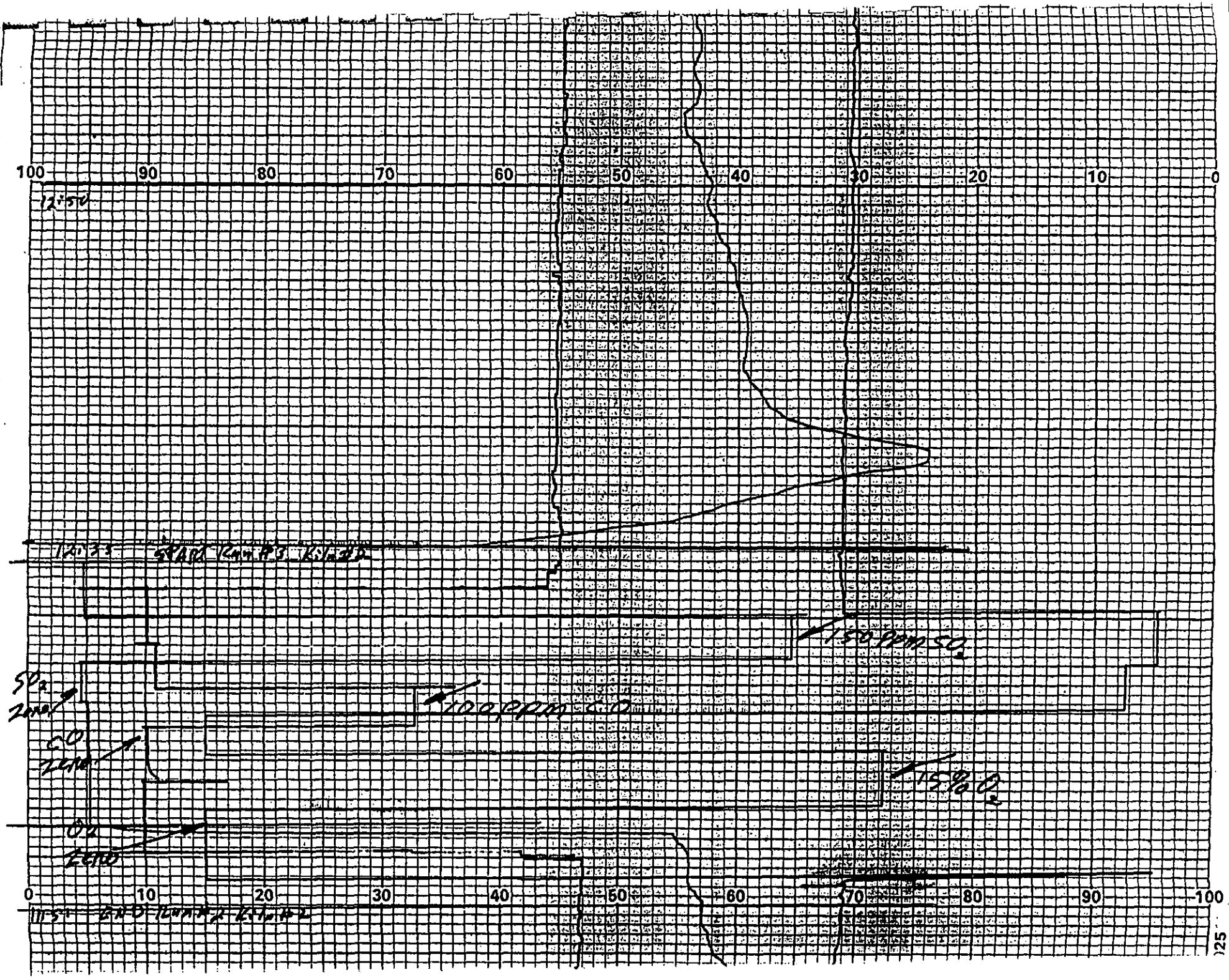

8:55 START RUN #1
RUN #2
gas sample from cooling zone
(no compressor)
1/100 mm SO2
1/50 mm SO2
OMEGA ENGINEERING, INC. Stamford, CT


100
90
80
70
60
50
40
30
20
10
0
9.4a
9.2f
10
20
50
50

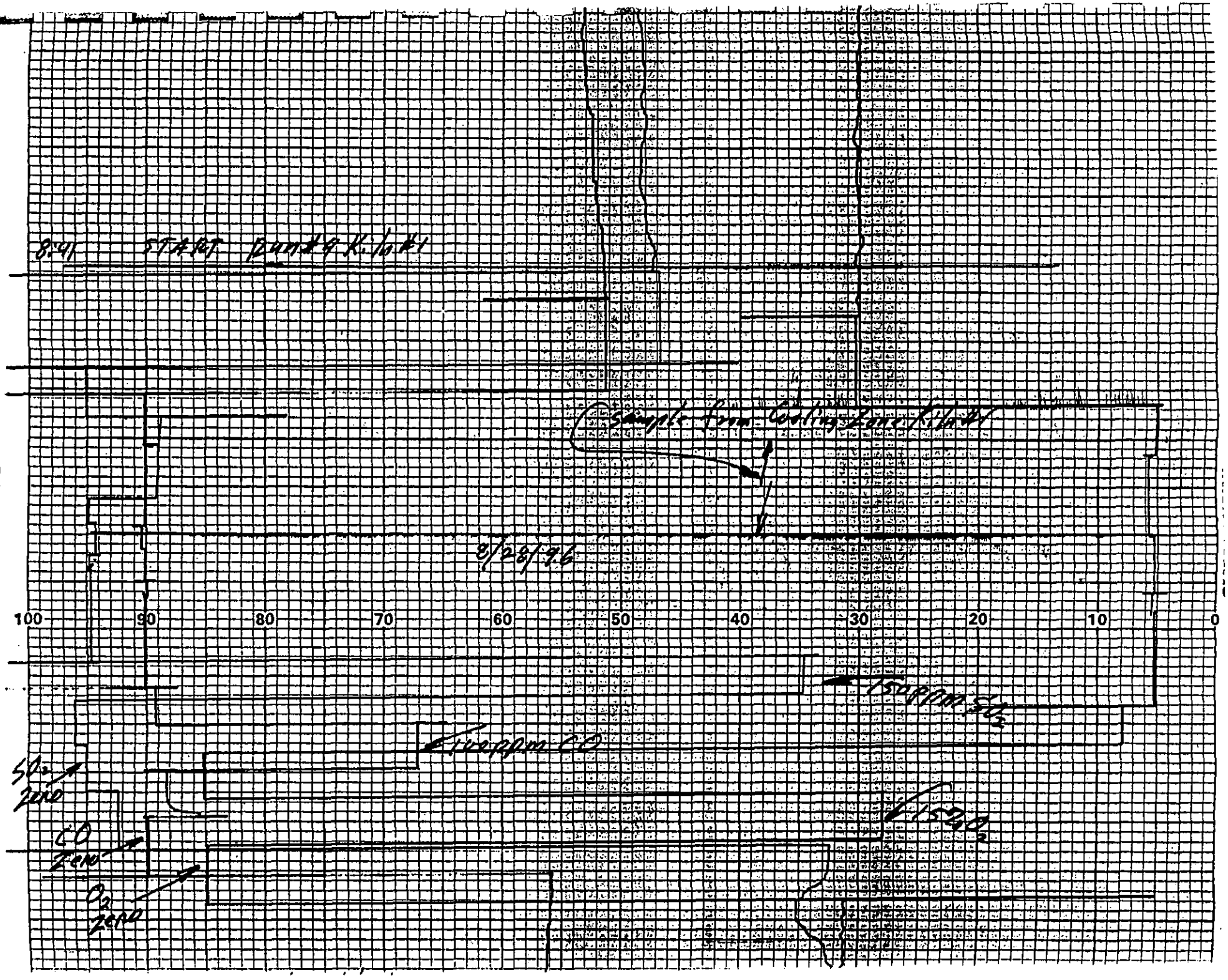


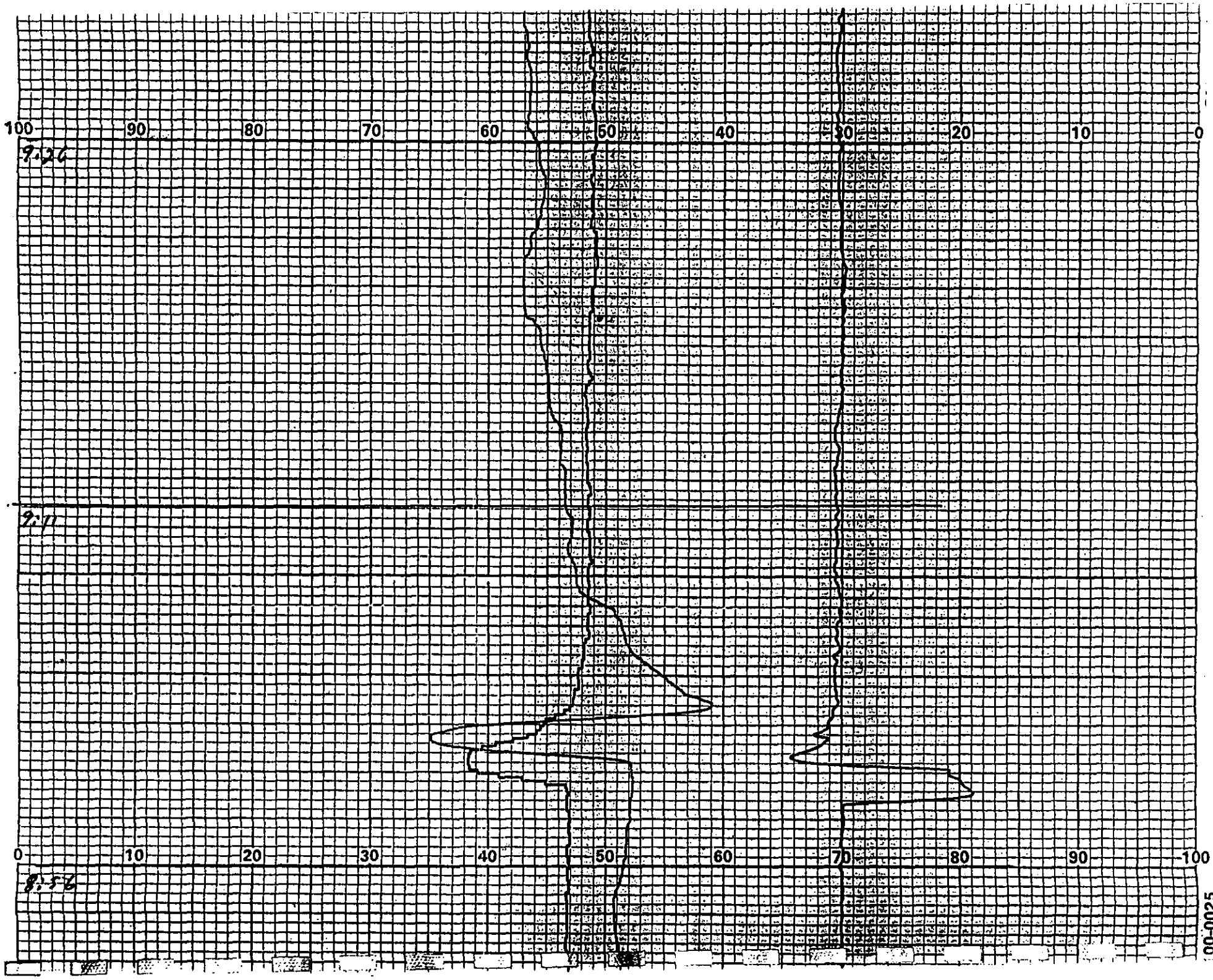
NC. Stamford, CT Printed in U.S.A.


11:36
11:21
100
90
80
70
60
50
40
30
20
10
0
OMEGA ENGINEERING, INC. Stamford, CT Printed in U.S.A. RECORDER #9100-000

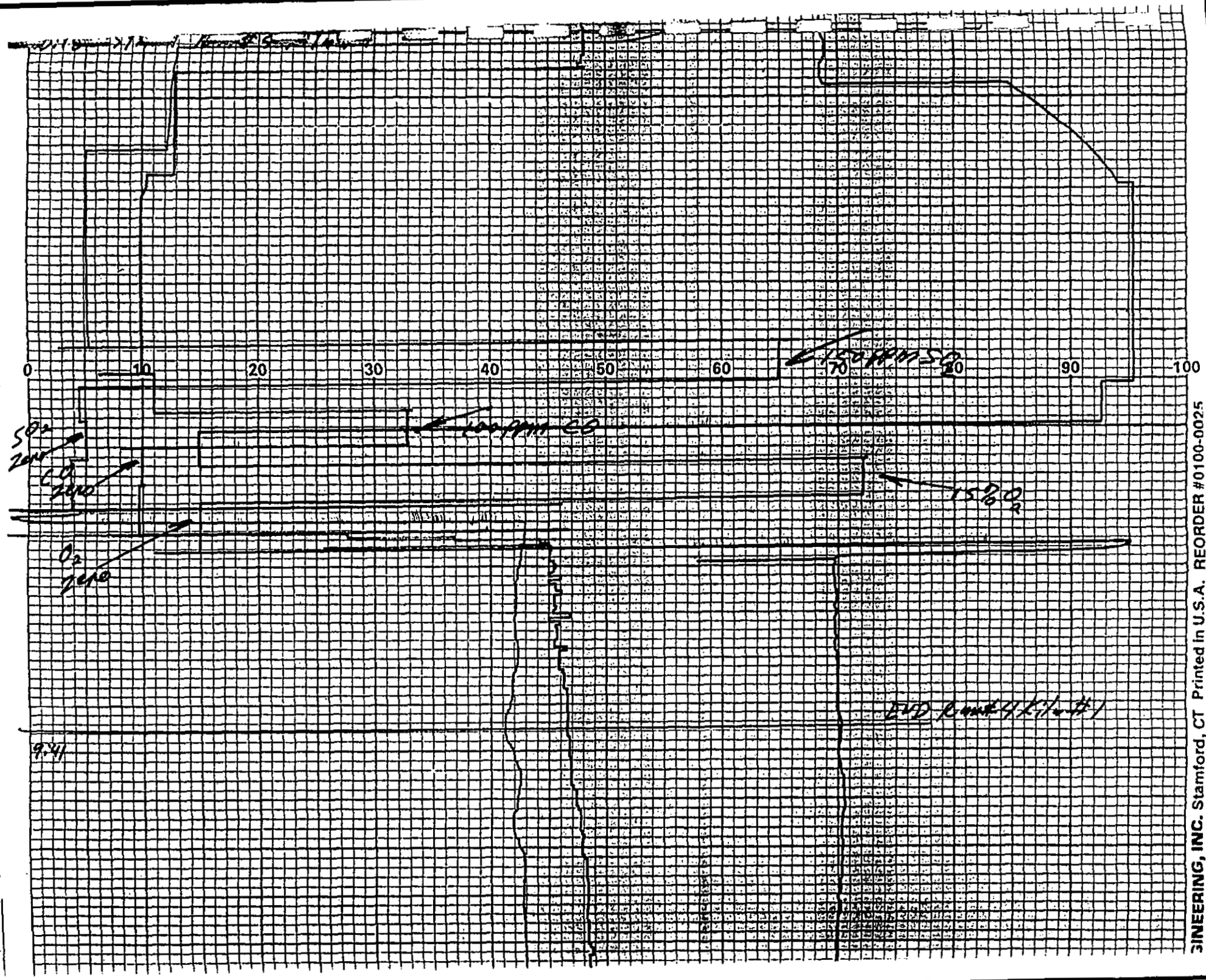

100
90
80
70
60
50
40
30
20
10
0
12:50
12:33
150 ppm SO2
100 ppm CO
15% O2
SO2 zero
CO zero
O2 zero
0
10
20
30
40
50
60
70
80
90
100
11:51

0
10
20
30
40
50
60
70
80
90

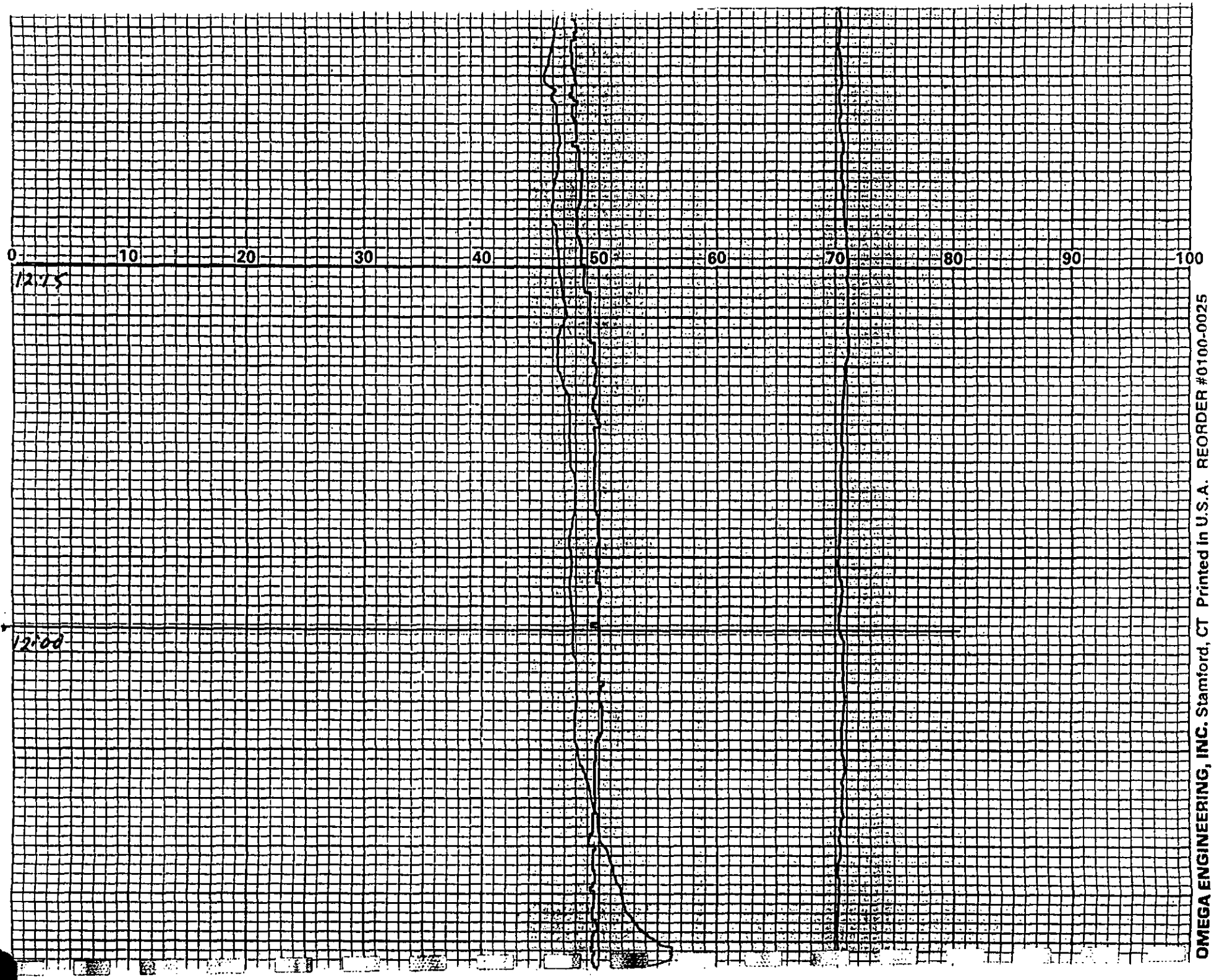

8:41 START Burn #9 K.Ln #1
Sample from Cooling Zone Kiln #1
8/28/96
100
90
80
70
60
50
40
30
20
10
0
150ppm SO2
1000ppm CO
SO2 ZERO
CO ZERO
O2 ZERO
150 O2


100
90
80
70
60
50
40
30
20
10
0
9:26
9:11
0
10
20
30
40
50
60
70
80
90
100
8:56

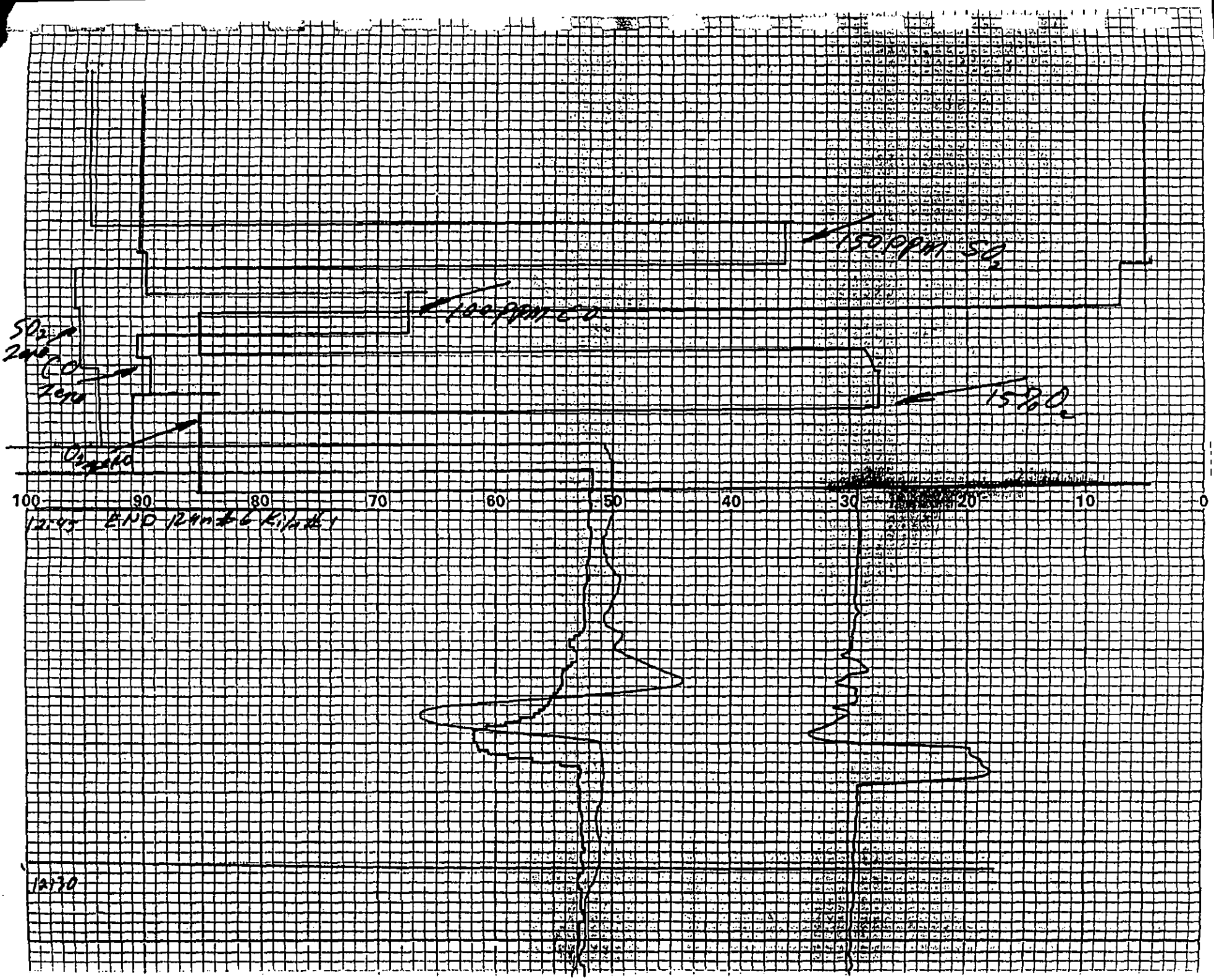
00-0025



GINEERING, INC. Stamford, CT Printed in U.S.A. REORDER #0100-0025



OMEGA ENGINEERING, INC. Stamford, CT Printed in U.S.A. REORDER #0100-0025


150ppm SO2
100ppm CO
SO2 zero
CO zero
O2 zero
15% O2
100
90
80
70
60
50
40
30
20
10
0
12:45 END 12mm #6 Kiln #1
12:30