AP42 Section:	11.7
Reference:	14
Title:	VOC Emission Test Report For GE Ceramics Tape Casters Fume Oxidizer, Chattanooga, TN, September 13-15, 1989, IT-Air Quality Services Group, Knoxville, TN, October, 1989.

COPY

VOC EMISSION TEST REPORT
FOR
GE CERAMICS TAPE CASTERS FUME OXIDIZER

(CERTIFICATE OF OPERATION
NO. 0090-30500899-74T)

Prepared For:

G.E. Ceramics
511 Manufacturers Road
Chattanooga, TN 37405

Prepared By:

IT - Air Quality Services Group
312 Directors Drive
Knoxville, TN 37923

IT Project No. 406131

October 26, 1989

TABLE OF CONTENTS

List of Figures

List of Tables

List of Appendices

1.0 INTRODUCTION

On September 13-15, 1989, IT Corporation's Air Quality Services Group performed a source sampling test of General Electric Ceramics, Inc.'s tape casters fume oxidizer (Certificate of Operation No. 0090-30500899-74T) to demonstrate compliance with applicable provisions of the Chattanooga Air Pollution Control Ordinance. The test was conducted to determine the total volatile organic compounds (VOC) mass emission rate. The tests were conducted under maximum representative operating conditions.

The personnel involved in the GE Ceramics source sampling tests were:

Blake Shirley, IT-AQS

Larry Moore, IT-AQS

Charles Clark, GE Ceramics

Randy Reno, Chattanooga-Hamilton County Air Pollution Control Bureau

2.0 SUMMARY OF RESULTS

Five tests were conducted to determine the total VOC mass emission rate of GE Ceramics' tape casters fume oxidizer. The first test was void due to an upset condition ("flame-out"). The results of tests 2, 3, 4, and 5 are presented in Table 1.

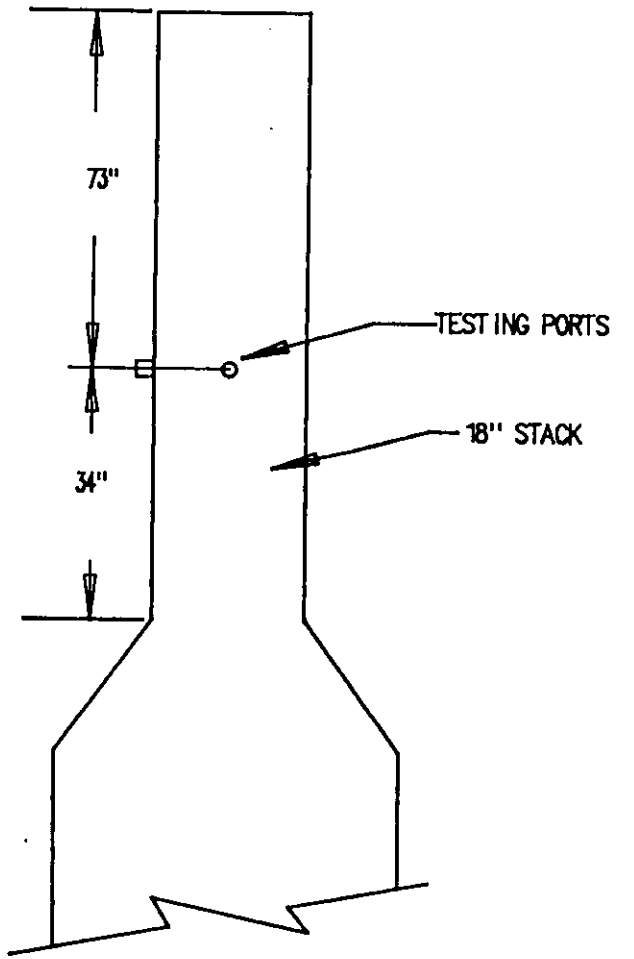
Tests 2, 3, and 4 were performed at a process weight rate of 208 lbs/hr. Test 5 was performed at a process weight rate of 78 lbs/hr. Tests 3 and 4 provide the most consistant results for maximum normal operating conditions. Analysis of the three consecutive bag samples collected during Test 2 showed a progressive increase in total VOC concentration as methane (91 ppmv CH_4, 210 ppmv CH_4, and 448 ppmv CH_4 for bags 1, 2, and 3, respectively). This indicates the process (i.e., the VOC emissions from the process entering the VOC control system) may not have reached a steady state condition during the time of this test. Test 5 results show a relatively low VOC emission rate compared to Tests 3 and 4. This is due to the reduced process weight rate during Test 5.

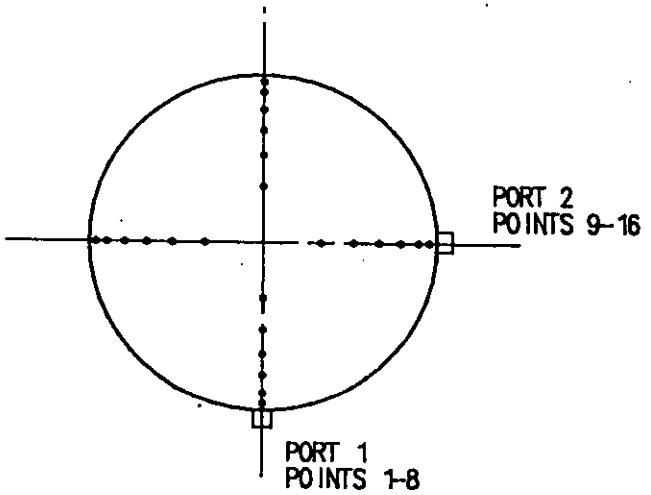
3.0 CONCLUSIONS

The results of all four EPA Method 25A tests successfully completed on GE Ceramics' tape casters fume oxidizer indicate this system is in compliance based on an allowable emission rate of 0.74 lbs VOC as carbon/hr per 80 lbs of process weight rate. The maximum measured emission rate was 0.64 lbs VOC as carbon/hr per 80 lbs process weight rate.

4.0 EMISSION SOURCE DESCRIPTION

The GE Ceramics tape casters fume oxidizer is permitted by the Chattanooga-Hamilton County Air Pollution Control Bureau as per Certificate of Operation No. 0090-30500899-74T. The fume oxidizer services two tape casters located in a secured, clean-room environment. Solvents utilized in the tape casting process consist mainly of toluene and methyl isobutyl ketone. Solvent vapors are captured by a VOC control system which consists of a series of hoods located on each tape casting unit and connecting duct work which conveys the vapors to a gas-fired fume oxidizer (incinerator). The incinerator firing is by direct gas injection using the ventilation gas stream as the source for combustion air. Exhaust from the incinerator is vented to the atmosphere via an 18 inch diameter stack. Figure 1 is a schematic diagram of the exhaust stack.





STACK DIAMETER - 18"

TRAVERSE POINT	DISTANCE FROM WALL
1/9	0.57"
2/10	1.89"
3/11	3.76"
4/12	5.81"
5/13	12.19"
6/14	14.51"
7/15	16.11"
8/16	17.42"

FIGURE 1.

SCHEMATIC OF GE INCINERATOR STACK

IT . . . CREATING A SAFER TOMORROW

STARTING DATE: 9-27-89	DATE LAST REV.:	INITIATOR: M.B.S.	DRAWING NO.: 406131
DRAWN BY: B. SHIRLEY	REV. DRAWN BY:	PROJ. MGR.: M.B.S.	PROJ. NO.: 406131

5.0 SAMPLING PROTOCOL

The source sampling test conducted at the GE facility is described in the Emissions Pre-Test Agreement approved by the Chattanooga Hamilton County Air Pollution Control Bureau. This agreement briefly summarized the proposed methods to be used during the test. All methods utilized were referenced U.S. EPA Methods. The following is a detailed description of all sampling methodologies carried out by IT Air Quality Services.

5.1 Stack Gas Velocities

The velocity of the stack gas was measured just prior to the start of each test and also during each test. The traverse point locations were determined using U.S. EPA Reference Method 1. The velocity was determined using U.S. EPA Reference Method 2. The velocity pressures were recorded at each traverse point using an S-type pitot tube and an inclined manometer.

Velocity traverses were performed on the outlet of the incinerator approximately two duct diameters downstream from the nearest disturbance and four duct diameters upstream of the exhaust. Figure 1 is a schematic diagram of the stack arrangement with the traverse point layout.

5.2 Moisture Content of the Stack Gas

The moisture content of the gas stream was determined by U.S. EPA Reference Method 4. This method requires the use of a sampling train as shown in Figure 2. This train includes a heated probe and filter preceding the impinger train which is located in an ice bath to condense any moisture present in the gas stream. The sampling train extracts the stack gas at a constant flow rate. A minimum sample volume of 21 standard cubic feet (scf) at a flow rate no greater than 0.75 cubic feet per minute (cfm) is required. To meet these requirements, a flow rate of 0.63 cfm was maintained for a sampling duration of 64 minutes to obtain a calculated sample volume of 40.32 cubic feet.

TABLE 1

TEST RESULTS
GE CERAMICS
CHATTANOOGA, TN
IT Project No. 406131

	Test 2	Test 3	Test 4	Test 5
Test Date	9-14-89	9-15-89	9-15-89	9-15-89
Test Time (min)	2:35-3:46	9:12-10:27	10:52-1:03	1:04-2:12
Stack Diameter (inches)	18	18	18	18
Net Test Time (min)	61	64	64	64
Vol. Sampled at STP (ft^3)	38.9	42.2	42.4	42.5
Stack Gas Temp (F)	564	594	605	628
Moisture Content (% Vol)	3.6	3.4	3.6	3.1
CO_2 (% Vol Dry Basis)	0	0	0	0
O_2 (% Vol Dry Basis)	20	20	19	19
CO (% Vol Dry Basis)	0	0	0	0
Stack Velocity (ft/min)	2342	2585	2553	2481
Gas Flow Rate (ACFM)+	4145	4576	4518	4391
Gas Flow Rate (DSCFM)#	2020	2224	2171	2074
Process Rate (lbs/hr)	208	208	208	78
Allowable Emission Rate (lbs/hr/80 lbs process weight rate)	0.74	0.74	0.74	0.74
Emission Rate (lbs/hr)*	0.92	1.67	1.60	0.07
Emission Rate* (lbs/hr/80 lbs process weight rate)	0.35	0.64	0.62	0.07
Emission Rate (tons/yr)*	1.2	2.2	2.1	0.09

+ ACFM - Actual cubic feet per minute
# DSCFM - Dry standard cubic feet per minute
* Total VOC Emission Rate as Carbon

Appendix A

Calibration Data

Note: OVA Calibration Data Presented in Appendix C on Strip Charts

CONTROL BOX CALIBRATION SPREADSHEET

Orifice Manometer Setting(delta H)	Calibrator Gas Volume (ft3) Desired	Actual Vw	Control Box Gas Volume (ft3) Vd	Calibrator Temp (F) Tw	Control Box Inlet (F) Tdi	Control Box Outlet (F) Tdo	Control Box Avg Temp (F) Td	Time Tenths(min)	Gamma (Y) Y	Delta H@ Delta H@	Barometric Pressure(in.Hg)
0.5	5	4.919	5.15	69	94	78	86	12.13	0.984692	1.704925	29.4
1	5	4.907	5.282	69	104	82	93	8.73	0.968690	1.762197	
2	10	9.776	10.445	69	110	88	99	12.35	0.984144	1.757317	
4	10	9.727	10.57	69	120	96	108	8.92	0.978350	1.825317	
									Avg Y	Avg Delta H@	
									0.978969	1.762439	

BOX ID NUMBER - 2
CALIBRATION STANDARD - SECONDARY
CALIBRATION STANDARD ID - DGN1
DATE CALIBRATED - 10-3-89

CALIBRATED BY - M. BLAKE SHIRLEY

SIGNATURE - 

Y - RATIO OF ACCURACY OF WET TEST METER
TOLERANCE = +/- 0.02

DELTA H@ - ORIFICE PRESSURE DIFFERENTIAL THAT YIELDS 0.75 CFM OF AIR AT 70 DEGREES F AND 29.92 INCHES OF MERCURY
TOLERANCE = +/- 0.20

R1 ROTAMETER CALIBRATION
9-8-89
M.B.S

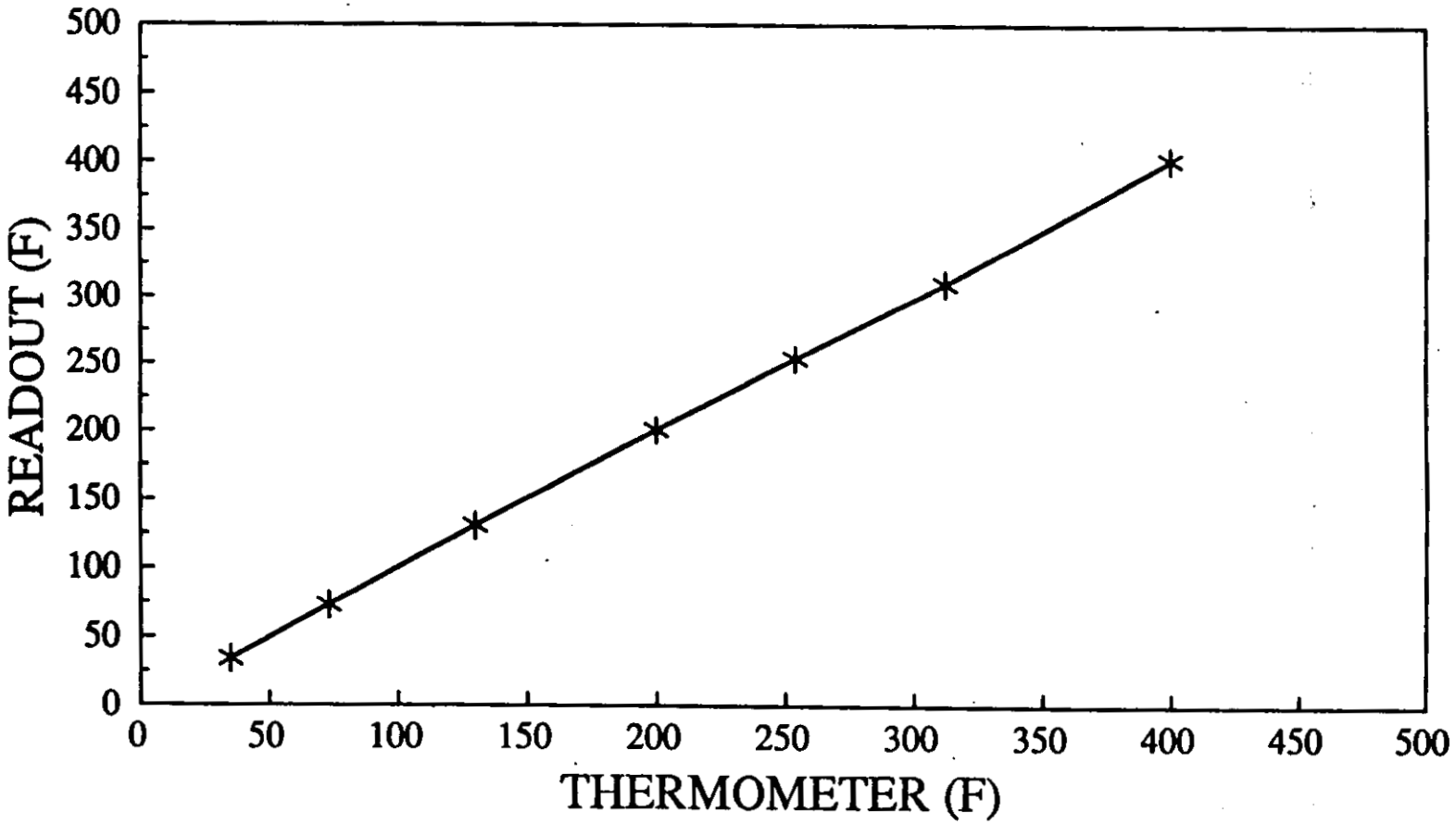
ROTAMETER SETTING	1ST TIME	2ND TIME	3RD TIME	AVERAGE TIME	FLOW RATE L/M
10	37.94	39.25	40.32	39.17	0.765892
20	13.96	14.08	13.98	14.01	2.141837
30	8.38	8.34	8.64	8.45	3.548895
40	6.02	6.02	6.08	6.04	4.966887
50	4.63	4.62	4.59	4.61	6.502890

Regression Output:

Constant	-0.70443
Std Err of Y Est	0.054205
R Squared	0.999569
No. of Observations	5
Degrees of Freedom	3
X Coefficient(s)	0.142990
Std Err of Coef.	0.001714

Y = (.14299) X - 0.70443

THERMOCOUPLE READOUT CALIBRATION



OMEGA HH-99A-K
SERIAL NO. 50

CALIBRATION DATE 6-1-89
BY: M.S.M.

TYPE S PITOT CALIBRATION STANDARDS

Construction Standards:

1. Dt - between 0.48 and 0.95 centimeters

2. $Pa = Pb\ 1.05\ Dt \leq P \leq 1.50\ Dt$

3. $\alpha 1, \alpha 2 < 10^{\circ}$

4. $\beta 1, \beta 2 < 5^{\circ}$

5. $Z \leq 0.32$ cm

6. $W \leq 0.08$ cm

Pitot Alignment Standards:

1. $X \geq 1.90$ cm

2. Ip must be higher than Hp

3. $W \geq 7.62$ cm

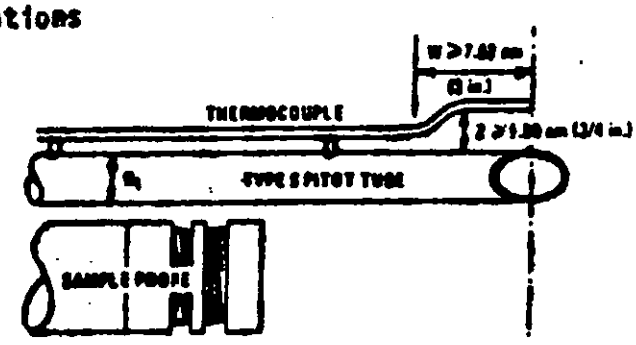
4. $Z \geq 1.90$ cm

5. $Y \geq 7.62$ cm

TYPE S PITOT TUBE CALIBRATION SHEET

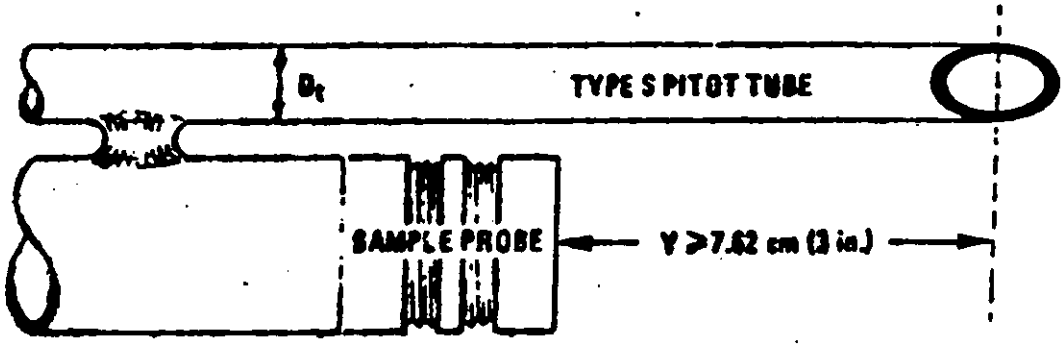
Pitot I.D. No. 6' Date 6/10/89 Performed BY MSM

Pitot Alignment Calibrations



W = 3.0

Z = 0.75



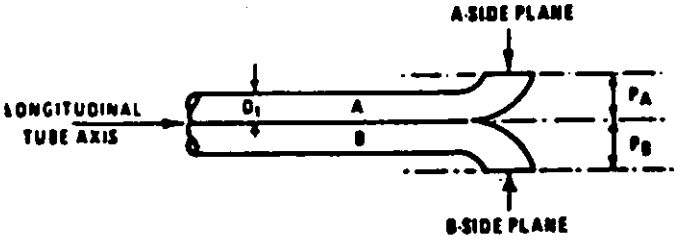
Y = 3.0

Determined Coefficient 0.84

TYPE S PITOT CALIBRATION SHEET

Pitot I.D. No. 6' Date 6/10/8 Performed By MSM

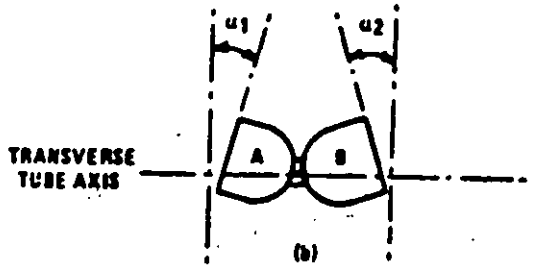
Construction Calibrations



Dt = 0.34

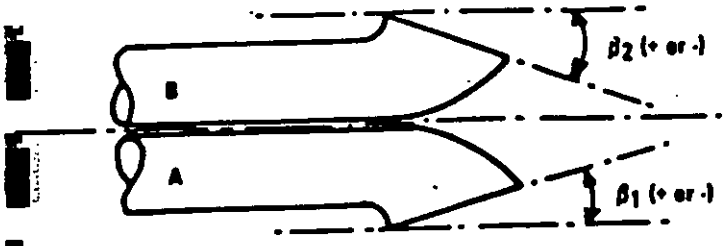
Pa = 0.53

Pb = 0.53



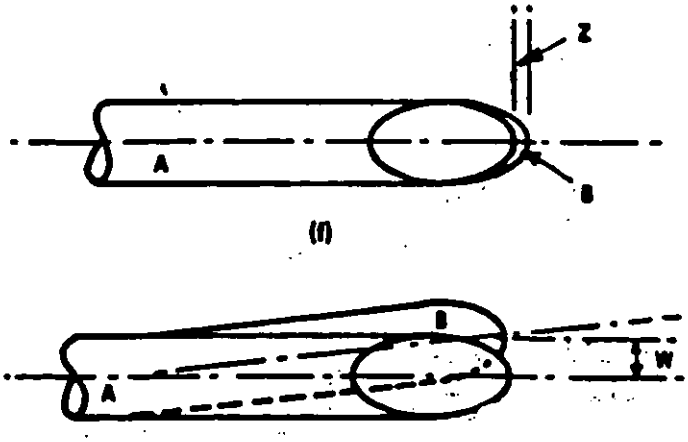
a1 = 0

a2 = 0



B1 = 0

B2 = 0



Z = 0

W = 0

Appendix B

Field Data

Test No. 2

Location GE Ceramics Pretest Traverse

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
Port 1	1	6.57	0.10	0.32	564
	2	7.89	0.16	0.40	
	3	9.76	0.20	0.45	
	4	11.81	0.23	0.48	
	5	18.19	0.25	0.50	
	6	20.51	0.24	0.49	
	7	22.11	0.22	0.47	
	8	23.92	0.15	0.39	
Port 2	9	6.57	0.12	0.35	
	10	7.89	0.16	0.40	
	11	9.76	0.18	0.42	
	12	11.81	0.21	0.46	
	13	18.19	0.23	0.48	
	14	20.51	0.22	0.47	
	15	22.11	0.22	0.47	
	16	23.92	0.20	0.45	
	Total			7.0	
	Average			0.44	564

[a] From outside of port to sampling point.

Pitot tube S Type
Manometer INCLINE
Thermometer THERMOCOUPLE

Stack Inside Dimensions 18"

Stack Area = 1.77 ft^2

Barometric Pressure, P_b = 29.19 inches Hg, stack gauge Pressure = 0.05 inches H_2O

Stack Abs. Pressure, P_s = $\frac{0.05}{13.6}$ inches H_2O + P_b = 29.20 inches Hg

Stack Gas Temp., T_s = 564 °F. + 460 = 1024 °R

Molecular Weight of Stack Gas, M_s = 28.8

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$ 174 CP x $\sqrt{\Delta p}$ x $\sqrt{T_s}$ x.....

   V_s = 2278.8 ft/min

2. Volume = 2278.8 ft/min x 1.77 ft^2 = 4033.5 ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = $4033.5 \times \frac{530}{1024} \times \frac{29.20}{29.92}$ = 2037.43 scfm

Data Recorder M. Blake Shirley

Date 9-14-89

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 3

Location GE Ceramics
Pre-test Traverse

VELOCITY TRAVERSE DATA

Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
1	6.57	0.16	0.40	594
2	7.84	0.17	0.41	
3	9.76	0.20	0.45	
4	11.81	0.21	0.46	
5	18.19	0.22	0.47	
6	20.51	0.22	0.47	
7	22.11	0.23	0.48	
8	23.42	0.22	0.47	
9	6.57	0.25	0.50	
10	7.84	0.27	0.52	
11	9.76	0.29	0.54	
12	11.81	0.32	0.57	
13	18.19	0.33	0.57	
14	20.51	0.34	0.58	
15	22.11	0.35	0.59	
16	23.42	0.34	0.58	
Total		———	8.06	
Average		———	0.50	594

Port 2

Port 1

[a] From outside of port to sampling point.

Pitot tube S-Type
Manometer INCLINE
Thermometer THERMOCOUPLE

Stack Inside Dimensions 18"
Stack Area = 1.77 ft^2
Barometric Pressure, P_b = 29.94 inches Hg, stack gauge
Pressure = 0.05 inches H_2O
Stack Abs. Pressure, P_s = 0.05 inches H_2O / 13.6 + P_b = 29.94 inches Hg
Stack Gas Temp., T_s = 594 °F. + 460 = 1054 °R
Molecular Weight of Stack Gas, M_s = 28.8

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$ $\quad 174\,CP \times \sqrt{\Delta P} \times \sqrt{T_s \times \ldots}$

   V_s = 2378.4 ft/min

2. Volume = 2378.4 ft/min x 1.77 ft^2 = 4209.7 ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92} = 4209.7 \times \frac{530}{1054} \times \frac{29.94}{29.92}$ =

   2118.2 scfm

Data Recorder M. Blake Shirley
Date 9-15-89

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 4

Location GE Ceramics Pretest Traverse

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
Port 1	1	6.57	0.15	0.39	605
	2	7.89	0.20	0.45	
	3	9.76	0.24	0.49	
	4	11.81	0.29	0.54	
	5	18.19	0.28	0.53	
	6	20.51	0.25	0.50	
	7	22.11	0.23	0.48	
	8	23.42	0.17	0.41	
Port 2	9	6.57	0.18	0.42	
	10	7.89	0.21	0.46	
	11	9.76	0.24	0.49	
	12	11.81	0.23	0.48	
	13	18.19	0.28	0.53	
	14	20.51	0.26	0.51	
	15	22.11	0.26	0.51	
	16	23.42	0.21	0.46	
	Total			7.65	
	Average			0.48	605

[a] From outside of port to sampling point.

Pitot tube S-Type
Manometer Incline
Thermometer Thermocouple

Stack Inside Dimensions 18"

Stack Area = 1.77 ft^2

Barometric Pressure, P_b = 29.94 inches Hg, stack gauge Pressure = 0.05 inches H_2O

Stack Abs. Pressure, P_s = 0.05 inches H_2O / 13.6 + P_b = 29.94 inches Hg

Stack Gas Temp., T_s = 605 °F. + 460 = 1065 °R

Molecular Weight of Stack Gas, M_s = 28.76

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$ $\quad 174\,CP \times \sqrt{\Delta p} \times \sqrt{T_s} \times \ldots$

   V_s = 2297.5 ft/min

2. Volume = 2297.5 ft/min x 1.77 ft^2 = 4066.5 ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92}$ = $4066.5 \times \frac{530}{1065} \times \frac{29.94}{29.92}$ =

   2025.1 scfm

Data Recorder M Blake Shirley

Date 9-15-89

Gas velocity and volume data.

INTERNATIONAL TECHNOLOGY CORPORATION

RESPONSIVE TO THE NEEDS OF ENVIRONMENTAL MANAGEMENT

Test No. 5

Location GE Ceramics

Pretest Traverse

VELOCITY TRAVERSE DATA

	Point	Position, inches[a]	Reading, Δp inches of H_2O	$\sqrt{\Delta p}$	T_s, °F
Port 1	1	6.57	0.15	0.39	628
	2	7.89	0.21	0.46	
	3	9.76	0.25	0.50	
	4	11.81	0.26	0.51	
	5	18.19	0.29	0.54	
	6	20.51	0.28	0.53	
	7	22.11	0.23	0.48	
	8	23.42	0.20	0.45	
Port 2	9	6.57	0.17	0.41	
	10	7.89	0.21	0.46	
	11	9.76	0.23	0.48	
	12	11.81	0.24	0.49	
	13	18.19	0.27	0.52	
	14	20.51	0.26	0.51	
	15	22.11	0.26	0.51	
	16	23.42	0.25	0.50	
	Total		—	7.74	
	Average		—	0.48	628

[a] From outside of port to sampling point.

Pitot tube S-Type
Manometer INCLINE
Thermometer THERMOCOUPLE

Stack Inside Dimensions 18"

Stack Area = 1.77 ft^2

Barometric Pressure, P_b = 29.94 inches Hg, stack gauge

Pressure = 0.05 inches H_2O

Stack Abs. Pressure, P_s = $\frac{0.05}{13.6}$ inches H_2O + P_b = 29.94 inches Hg

Stack Gas Temp., T_s = 628 °F. + 460 = 1088 °R

Molecular Weight of Stack Gas, M_s = 28.76

1. $V_s = 174\ C_p \sqrt{\Delta p T_s} \times \frac{29.92}{P_s} \times \frac{28.96}{M_s}$ $\quad 174\,CP \times \sqrt{\Delta p} \times \sqrt{T_s} \times \ldots$

   V_s = 2321.4 ft/min

2. Volume = 2321.4 ft/min × 1.77 ft^2 = 4108.8 ft^3/min

   Standard Volume at 70°F and 29.92 inches Hg:

3. $ft^3/min \times \frac{530}{T_s} \times \frac{P_s}{29.92} = 4108.8 \times \frac{530}{1088} \times \frac{29.94}{29.92}$ =

   2002.9 scfm

Data Recorder M. Blake Shirley

Date 9-15-89

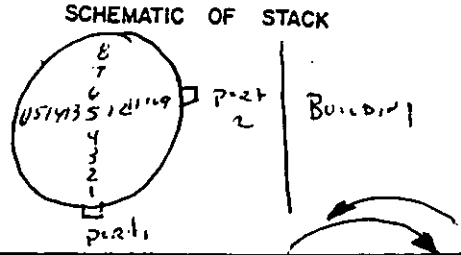
Gas velocity and volume data.

CLIENT GE Ceramics SOURCE Tape Caster Stack

RUN NO. 2
DATE 9-14-94
OPERATORS MBS, LSM
METER BOX NO. 2
SAMPLE BOX NO. 2
FILTER NO. NA
PROBE HEATER SETTING 80

BAROMETRIC PRESSURE
STATIC PRESSURE
AMBIENT TEMPERATURE 88°F
PROBE LENGTH 3' effective
PROBE LINER Stainless Steel
PORT LENGTH 4"
PORT DIAMETER 3"

SCHEMATIC OF STACK



TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm), ft.3	STACK TEMP. (Ts) °F
1	2:35	0	.12	0.35	1.5	1.5	111	106	0.0	262	567.18	46	420
2		4	.18	0.42	1.5	1.5	118	108	0.0	266	570.0	46	476
3		8	.26	0.45	1.5	1.5	122	108	0.0	269	572.8	46	548
4		12	.22	0.47	1.5	1.5	124	108	0.0	271	575.75	46	562
5		16	.27	0.52	1.5	1.5	128	110	0.0	275	578.8	46	607
6		20	.27	0.52	1.5	1.5	128	110	0.0	278	581.6	52	613
7		24	.27	0.52	1.5	1.5	129	110	0.0	275	584.5	50	602
8	3:07	28	.29	0.54	1.5	1.5	130	111	0.0	273	587.4	50	581
											590.3		
9	3:17	32	.14	0.37	1.5	1.5	113	108	0.0	255	590.3	50	525
10		36	.15	0.39	1.5	1.5	117	108	0.0	258	593.1	50	534
11		40	.25	0.50	1.5	1.5	118	108	0.0	265	596.0	50	586
12		44	.28	0.53	1.5	1.5	118	108	0.0	273	599.3	50	606
13		48	.30	0.55	1.5	1.5	116	106	0.0	278	601.9	50	620
14		52	.31	0.56	1.5	1.5	118	108	0.0	280	604.7	52	606
15		56	.32	0.57	1.5	1.5	119	108	0.0	280	607.6	52	584
16		60	.28	0.53	1.5	1.5	119	108	0.0	275	610.5	55	570
	3:46	64			1.5						611.12		
							STOPPED	RUN	3 minutes	early			
							due	to	lightening				
TOTAL				7.79			1930	1735	0.0	4327		791	9020
AVERAGE				0.49	1.5	1.5	120.625	108.44	0.0	270.44	43.94	49.44	563.75

STATIC PITOT LEAK-CHECK @ 15 sec.	O.K.
IMPACT PITOT LEAK-CHECK @ 15 sec.	O.K.
TRAIN LEAK RATE @ 60 sec.	0.0 cf @ 15 in.
TRAIN LEAK RATE @ 60 sec.	0.0 cf @ 7 in.

STACK GAS ANALYSIS

TIME	CO2	O2	CO	N2
	0	20		
	0	20		
	0	20		

NOZZLE CALIBRATION-I.D. NO.

PRETEST	POST-TEST
DIA. 1	DIA. 1
DIA. 2	DIA. 2
DIA. 3	DIA. 3
AVERAGE	AVERAGE

Thomas D. Penn

INTERNATIONAL TECHNOLOGY CORPORATION
3028 E Magnolia Avenue • Knoxville, Tennessee 37914
615-523-2911

SIGNATURE

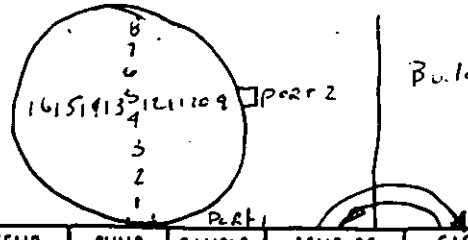
TEST TEAM LEADER

CLIENT GE Ceramics SOURCE Tape Caster Stack

RUN NO. 3
DATE 9-15-89
OPERATORS MBS, LSM
METER BOX NO. 2
SAMPLE BOX NO. 3
FILTER NO. NA
PROBE HEATER SETTING 80

BAROMETRIC PRESSURE 29.94
STATIC PRESSURE
AMBIENT TEMPERATURE 80 °F
PROBE LENGTH 3' effective
PROBE LINER Stainless steel
PORT LENGTH 6"
PORT DIAMETER 3"

SCHEMATIC OF STACK



TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (Δ Ps)	VELOCITY HEAD (√Δ Ps)	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm_in) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm_out) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm). ft.3	STACK TEMP. (Ts) °F
1	9:12	0	.11	0.42	1.5	1.5	80	76	0.0	246	611 60	40	525
2		4	.24	0.49	1.5	1.5	82	74	0.0	250	614.3	50	534
3		8	.26	0.51	1.5	1.5	88	78	0.0	265	617.1	42	573
4		12	.27	.27.52	1.5	1.5	92	79	0.0	279	620.0	42	582
5		16	.2	.33 .57	1.5	1.5	96	79	0.0	275	622.4	42	605
6		20		.35.59	1.5	1.5	99	80	0.0	270	425.6	44	631
7		24		.35.59	1.5	1.5	100	81	0.0	280	628.2	44	613
8	9:44	28	.34	.58	1.5	1.5	104	82	0.0	280	630.7	44	616
									0.0				
9	9:55	32	.18	0.42	1.5	1.5	100	81	0.0	262	633.56	44	545
10		36	.25	0.50	1.5	1.5	108	88	0.0	267	636.5	44	563
11		40	.28	0.53	1.5	1.5	110	89	0.0	256	639.2	44	609
12		44	.30	0.55	1.5	1.5	112	87	0.0	255	642.1	44	632
13		48	.33	0.57	1.5	1.5	112	92	0.0	257	645.2	44	656
14		52	.38	0.62	1.5	1.5	114	92	0.0	258	647.8	45	650
15		56	.37	0.61	1.5	1.5	116	93	0.0	263	650.6	45	609
16	10:27	60	.30	0.55	1.5	1.5	115	94	0.0	267	653.5	45	572
		64									656.35		
TOTAL				8.62			1626	1349		4234		703	9505
AVERAGE				0.54	1.5	1.5	101.63	84.31	0.0	264.63	44.75	43.94	594.06

STATIC PITOT LEAK-CHECK @ 15 sec.	OK
IMPACT PITOT LEAK-CHECK @ 15 sec.	O.K.
TRAIN LEAK RATE @ 60 sec.	0.0 cf @ 15 in.
TRAIN LEAK RATE @ 60 sec.	0.0 cf @ 5 in.

Paula D. Kerns

INTERNATIONAL TECHNOLOGY CORPORATION

3028 E Magnolia Avenue • Knoxville, Tennessee 37914
615-523-2911

STACK GAS ANALYSIS

TIME	CO2	O2	CO	N2
	0	20		
	0	20		
	0	20		

NOZZLE CALIBRATION-I.D. NO. _____

PRETEST	POST-TEST
DIA. 1	DIA. 1
DIA. 2	DIA. 2
DIA. 3	DIA. 3
AVERAGE	AVERAGE

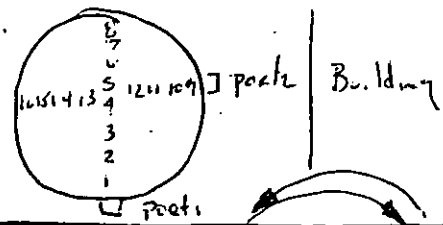
SIGNATURE _____
TEST TEAM LEADER

CLIENT GE Ceramics SOURCE Tape Caster Stack

RUN NO. 4
DATE 9-15-89
OPERATORS MGS, LSM
METER BOX NO. 2
SAMPLE BOX NO. A
FILTER NO. NA
PROBE HEATER SETTING 90

BAROMETRIC PRESSURE 29.99
STATIC PRESSURE
AMBIENT TEMPERATURE 80°F
PROBE LENGTH 3' effective
PROBE LINER Stainless Steel
PORT LENGTH 6"
PORT DIAMETER 3"

SCHEMATIC OF STACK



TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (ΔPs)	VELOCITY HEAD (√ΔPs)	ORIFICE METER (ΔH) in. H2O ACTUAL	ORIFICE METER (ΔH) in. H2O DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm) °F	GAS SAMPLE TEMP. AT DRY GAS METER OUTLET (Tm) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm), ft.3	STACK TEMP. (Ts) °F
1	10:52	0	.19	0.44	1.5	1.5	104	94	0.0	257	656 EC.	40	540
2		4	.23	0.48	1.5	1.5	106	94	0.0	249	660.0	40	569
3		8	.29	0.54	1.5	1.5	111	94	0.0	254	662.8	40	603
4		12	.29	0.54	1.5	1.5	111	94	0.0	260	665.2	45	600
5		16	.33	0.57	1.5	1.5	111	95	0.0	260	668.1	50	596
6		20	.35	0.59	1.5	1.5	112	95	0.0	261	670.9	50	610
7		24	.33	0.57	1.5	1.5	112	96	0.0	275	674.3	50	580
8	11:25	28	.31	0.56	1.5	1.5	112	96	0.0	283	676.7	55	566
9	11:32	32	.20	0.45	1.5	1.5	105	94	0.0	274	679.62	55	590
10		36	.24	0.49	1.5	1.5	111	96	0.0	273	682.4	55	600
11		40	.24	0.49	1.5	1.5	112	97	0.0	270	685.3	58	604
12		44	.24	0.49	1.5	1.5	113	98	0.0	272	688.2	58	618
13		48	.32	0.57	1.5	1.5	113	98	0.0	275	~~690.6~~ 693	58	636
14		52	.33	0.57	1.5	1.5	114	98	0.0	271	694.0	60	648
15		56	.33	0.57	1.5	1.5	114	98	0.0	271	696.9	62	648
16	1:03	60	.34	0.58	1.5	1.5	114	98	0.0	270	699.6	62	640
		64									702.635		
TOTAL				8.50			1775	1535		4275		788	9677
AVERAGE				0.53	1.5	1.5	110.94	95.94	0.0	267.19	45.815	49.25	604.81

STATIC PITOT LEAK-CHECK @ 15 sec.	OK
IMPACT PITOT LEAK-CHECK @ 15 sec.	OK
TRAIN LEAK RATE @ 60 sec.	0.0 cl @ 15 in.
TRAIN LEAK RATE @ 60 sec:	0.0 cl @ 5 in.

STACK GAS ANALYSIS

TIME	CO2	O2	CO	N2
	0	19		
	0	19		
	0	19		

NOZZLE CALIBRATION-I.D. NO. _____

PRETEST	POST-TEST
DIA. 1	DIA. 1
DIA. 2	DIA. 2
DIA. 3	DIA. 3
AVERAGE	AVERAGE

INTERNATIONAL TECHNOLOGY CORPORATION
3028 E Magnolia Avenue • Knoxville, Tennessee 37914
615-523-2911

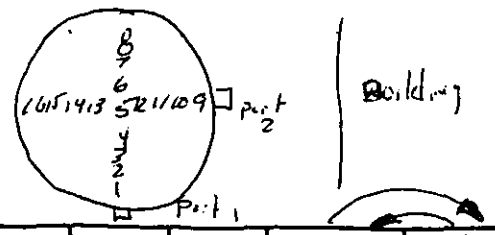
SIGNATURE _____
TEST TEAM LEADER

CLIENT GE Ceramics SOURCE Tape Caster Stack

RUN NO. 5
DATE 9-15-89
OPERATORS MBS, CJM
METER BOX NO. 7
SAMPLE BOX NO. 5
FILTER NO. NA
PROBE HEATER SETTING 80

BAROMETRIC PRESSURE 29.94
STATIC PRESSURE
AMBIENT TEMPERATURE 75°
PROBE LENGTH 3' effective
PROBE LINER Stainless Steel
PORT LENGTH 6"
PORT DIAMETER 3"

SCHEMATIC OF STACK



TRAVERSE POINT NUMBER	SAMPLING TIME CLOCK	SAMPLING TIME SAMPLE	VELOCITY HEAD (ΔPs)	(√ΔPs)	ORIFICE METER (ΔH) in. H2O ACTUAL	DESIRED	GAS SAMPLE TEMP. AT DRY GAS METER INLET (Tm_in) °F	OUTLET (Tm_out) °F	PUMP VACUUM GAUGE in. Hg	SAMPLE BOX TEMP. °F	TEMP. OF GAS LEAVING LAST IMPINGER °F	GAS SAMPLE VOLUME (Vm), ft³	STACK TEMP. (Ts) °F
1	1:04	0	0.15	0.39	1.5	1.5	101	88	0.0	230	703.56	60	528
2		4	0.22	0.47	1.5	1.5	104	90	0.0	248	706.4	60	572
3		8	0.24	0.49	1.5	1.5	108	91	0.0	276	709.5	60	619
4		12	0.25	0.50	1.5	1.5	110	92	0.0	285	712.2	60	638
5		16	0.30	0.55	1.5	1.5	111	92	0.0	276	714.9	60	658
6		20	0.31	0.56	1.5	1.5	112	93	0.0	271	717.9	60	684
7		24	0.33	0.57	1.5	1.5	113	93	0.0	271	720.9	60	662
8	1:37	28	0.31	0.56	1.5	1.5	116	96	0.0	273	724.0	60	650
9	1:41	32	0.13	0.36	1.5	1.5	110	98	0.0	268	726.7	60	560
10		36	0.22	0.47	1.5	1.5	114	100	0.0	267	729.6	60	595
11		40	0.26	0.51	1.5	1.5	116	100	0.0	265	732.6	60	629
12		44	0.30	0.55	1.5	1.5	118	100	0.0	266	735.3	62	652
13		48	0.32	0.57	1.5	1.5	118	100	0.0	267	738.1	62	684
14		52	0.33	0.57	1.5	1.5	120	100	0.0	269	741.0	62	677
15		56	0.31	0.56	1.5	1.5	120	111	0.0	268	743.9	64	656
16	2:12	60	0.27	0.52	1.5	1.5	120	110	0.0	270	746.8	64	590
		64			1.5	1.5			0.0				
											749.65		
TOTAL				8.20			1811	1554		4270		974	10049
AVERAGE				0.51	1.5	1.5	113.19	97.13	0.0	266.88	46.09	60.88	628.06

STATIC PITOT LEAK-CHECK @ 15 sec.	O.K.
IMPACT PITOT LEAK-CHECK @ 15 sec.	O.K
TRAIN LEAK RATE @ 60 sec.	0.0 cf @ 15 in.
TRAIN LEAK RATE @ 60 sec.	0.0 cf @ 7 in.

STACK GAS ANALYSIS

TIME	CO2	O2	CO	N2
	0	19		
	0	19		
	0	19		

NOZZLE CALIBRATION I.D. NO. _____

PRETEST	POST-TEST
DIA. 1	DIA. 1
DIA. 2	DIA. 2
DIA. 3	DIA. 3
AVERAGE	AVERAGE

INTERNATIONAL TECHNOLOGY CORPORATION
3028 E Magnolia Avenue • Knoxville, Tennessee 37914
615-523-2911

SIGNATURE _____
TEST TEAM LEADER

GE CERAMICS
Chattanooga, TN
Method 25A Sample Collection Sheet

TEST 1

	Time	Rotameter Setting
Bag 1	12:25	8
Port 2	12:30	8
	12:35	8
	12:37	8
Bag 2	1:12	8
Port 1	1:16	8
	1:20	8
	1:24	8
Bag 3	1:28	8
Port 1	1:30	8
	1:35	8
	1:40	8

TEST 2

	Time	Rotameter Setting
Bag 1	2:40	8
Port 2	2:45	8
	2:50	8
	2:52	8
Bag 2	2:59	8
Port 2	3:05	8
	3:10	8
	3:11	8
Bag 3	3:28	8
Port 1	3:30	8
	3:35	8
	3:40	8

TEST 3

	Time	Rotameter Setting
Bag 1	9:20	8
Port 1	9:25	8
	9:30	8
	9:32	8
Bag 2	9:40	8
Port 1	9:45	8
	9:50	8
	9:52	8
Bag 3	9:58	8
Port 2	10:00	8
	10:05	8
	10:10	8

Carol K Nance 10/11/89

GE CERAMICS
Chattanooga, TN
Method 25A Sample Collection Sheet (cont'd)

TEST 4

	Time	Rotameter Setting
Bag 1	10:56	8
Port 2	11:00	8
	11:05	8
	11:08	8
Bag 2	11:13	8
Port 2	11:15	8
	11:20	8
	11:25	8
Bag 3	11:35	8
Port 1	11:40	8
	11:45	8
	11:47	8

TEST 5

	Time	Rotameter Setting
Bag 1	1:12	8
	1:15	8
	1:20	8
	1:24	8
Bag 2	1:27	8
	1:30	8
	1:35	8
	1:39	8
Bag 3	1:43	8
	1:45	8
	1:50	8
	1:55	8

Carol H Nave 10/11/89

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY GE Ceramics DATE 9-14-89

SOURCE Tape Caster stack BOX NO. 2 RUN NO. 2

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml	FINAL VOL., ml	NET GAIN, ml
1.	100	116	16
2.	100	94	-6
3.	0	12.4	12.4
4.	200 ,g	208 ,g	8 ,g
TOTAL	400	430.4	30.4

PARTICULATE

COMPONENT	I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH				
ACETONE BLANK				
PROBE WASH (-Blank)				
CYCLONE				
FILTER				
IMPINGERS				

PARTICULATE COLLECTED (excluding impinger catch) =	,g
PARTICULATE COLLECTED (including impinger catch) =	,g

COMMENTS: _____

SIGNATURE OF PERSON RESPONSIBLE Carol H Nama DATE 10/10/89

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY GE Ceramics DATE 9-15-89

SOURCE Tape Caster STACK BOX NO. 2 RUN NO. 3

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml	FINAL VOL., ml	NET GAIN, ml
1.	100	110	10
2.	100	110	10
3.	0	1.4	1.4
4.	200 ,g	210.3 ,g	10.3 ,g
TOTAL	400	431.7	31.7

PARTICULATE

COMPONENT I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH			
ACETONE BLANK			
PROBE WASH (-Blank)			
CYCLONE			
FILTER			
IMPINGERS			

PARTICULATE COLLECTED (excluding impinger catch) =	,g
PARTICULATE COLLECTED (including impinger catch) =	,g

COMMENTS: _____

SIGNATURE OF PERSON RESPONSIBLE Carol K Norris DATE 10/10/89

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY GE Ceramics DATE 9-15-89

SOURCE Tape Caster stack BOX NO. 2 RUN NO. 4

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml	FINAL VOL., ml	NET GAIN, ml
1.	100	106	6
2.	100	110	10
3.	~~0~~	2.6	2.6
4.	~~300~~ ,g	314.4 ,g	14.4 ,g
TOTAL	400	433.0	33.0

PARTICULATE

COMPONENT	I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH				
ACETONE BLANK				
PROBE WASH (-Blank)				
CYCLONE				
FILTER				
IMPINGERS				

PARTICULATE COLLECTED (excluding impinger catch) =	,g
PARTICULATE COLLECTED (including impinger catch) =	,g

COMMENTS: _____

SIGNATURE OF PERSON RESPONSIBLE Carol H Hare DATE 10/10/89

SOURCE SAMPLING EPA PARTICULATE TEST LAB DATA SHEET

COMPANY GE Ceramics DATE 9-15-89

SOURCE Tape Caster Stack BOX NO. 2 RUN NO. 5

CONDENSATION

IMPINGER NO.	INITIAL VOL., ml	FINAL VOL., ml	NET GAIN, ml
1.	599.16	596.5	-2.66
2.	616.91	630.7	13.79
3.	465.93	468.82	2.89
4.	671.58 ,g	686.5 ,g	14.92 ,g
TOTAL	2,353.58	2,382.52	28.94

PARTICULATE

COMPONENT	I.D. NO.	INITIAL WT., g	FINAL WT., g	NET WT., g
PROBE WASH				
ACETONE BLANK				
PROBE WASH (-Blank)				
CYCLONE				
FILTER				
IMPINGERS				

PARTICULATE COLLECTED (excluding impinger catch) =	,g
PARTICULATE COLLECTED (including impinger catch) =	,g

COMMENTS: _____

SIGNATURE OF PERSON RESPONSIBLE Carol L Nevin DATE 10/10/89

Appendix C

Analytical Data

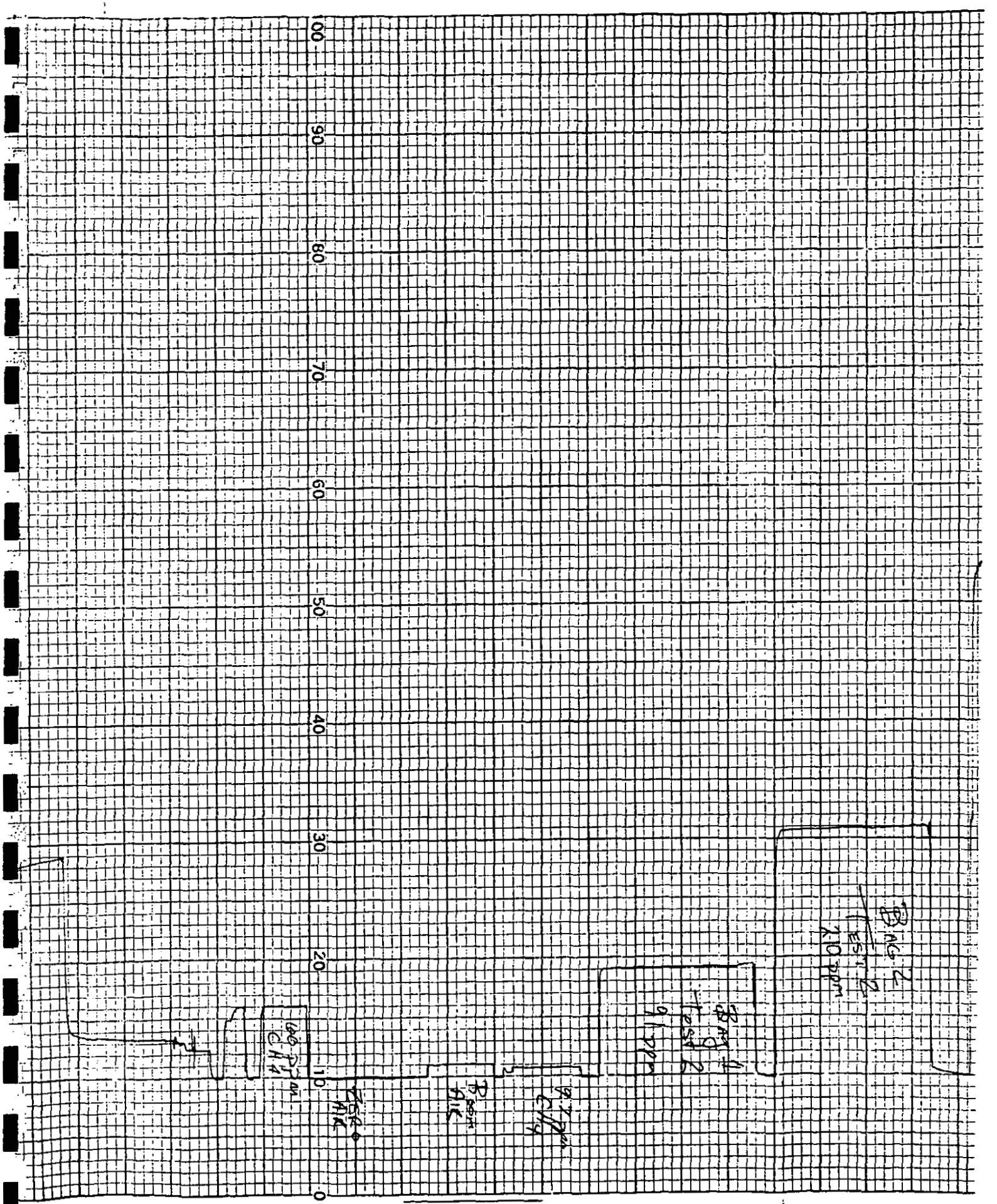
SUMMARY OF VOC ANALYSIS

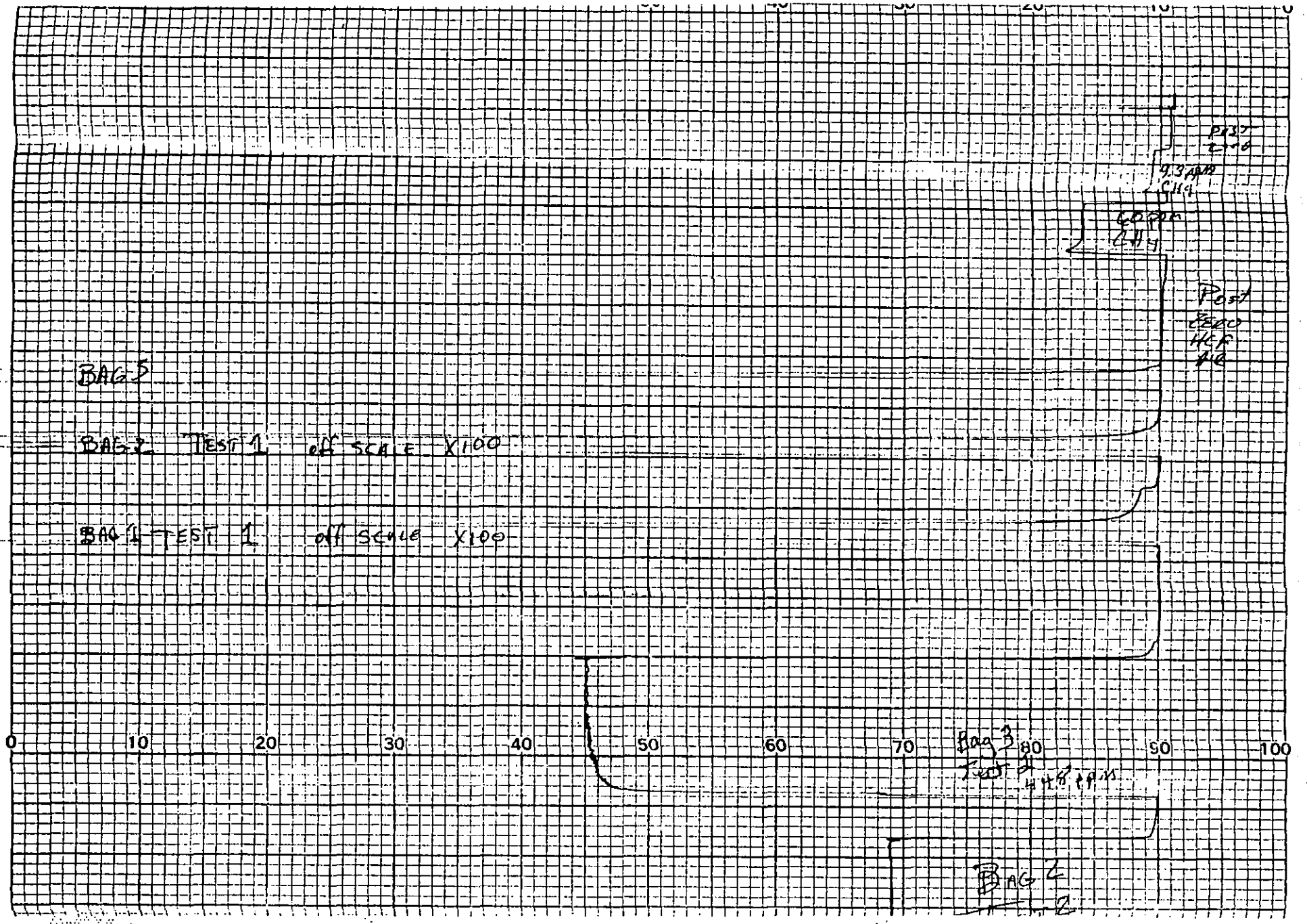
	Test 2	Test 3	Test 4	Test 5
Bag 1	91 ppm	425 ppm	357 ppm	19 ppm
Bag 2	210 ppm	380 ppm	409 ppm	19 ppm
Bag 3	448 ppm	void*	420 ppm	18 ppm
AVERAGE	250 ppm	403 ppm	395 ppm	19 ppm

* Void due to leak in bag

All concentrations are in ppm by volume as methane.

COLE-PARMER INSTRUMENT COMPANY
CHICAGO, ILLINOIS 60648



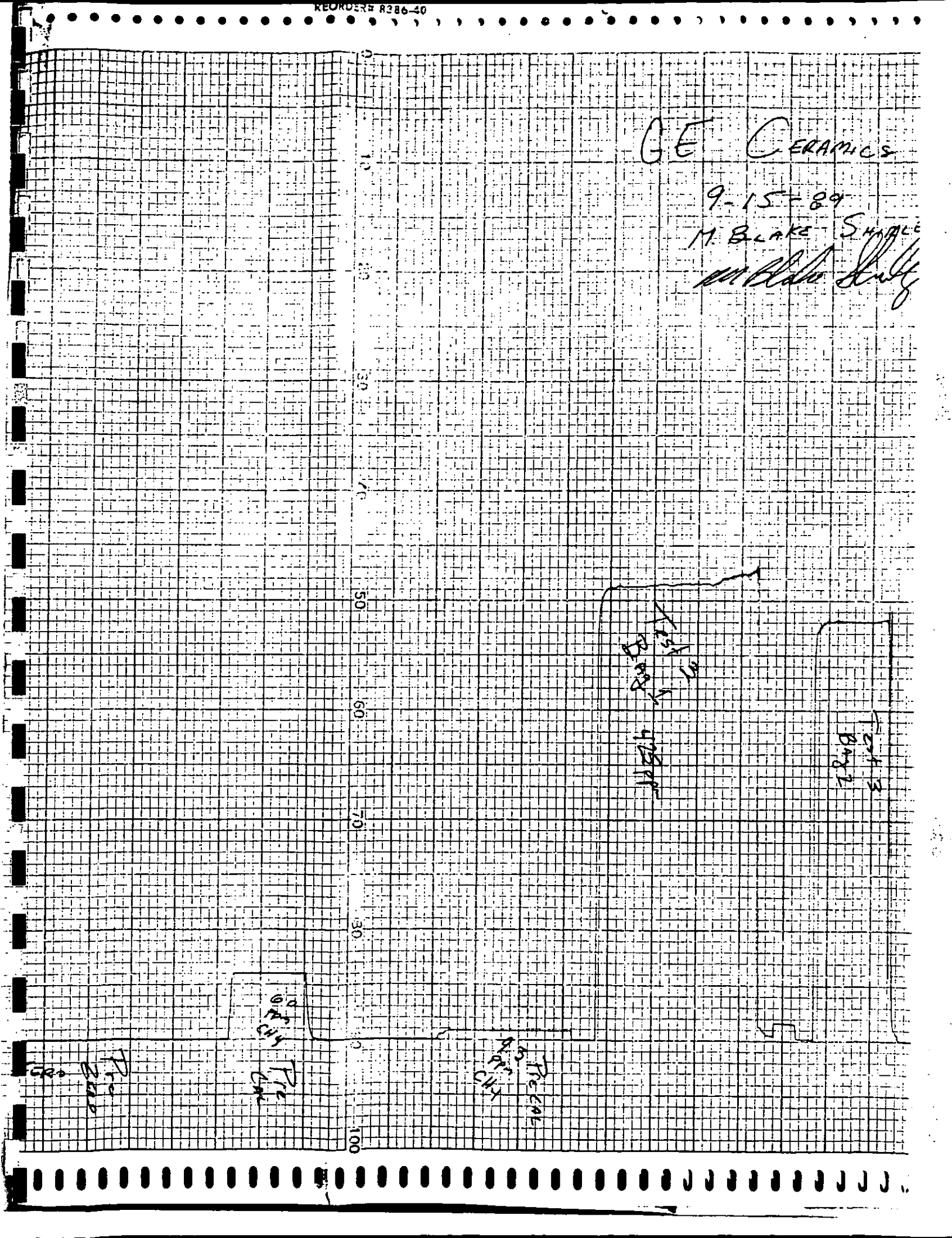

BAG 5
BAG 2 TEST 1 off SCALE X100
BAG 4 TEST 1 off SCALE X100
0
10
20
30
40
50
60
70
80
90
100
Bag 3
Test 2
BAG 2

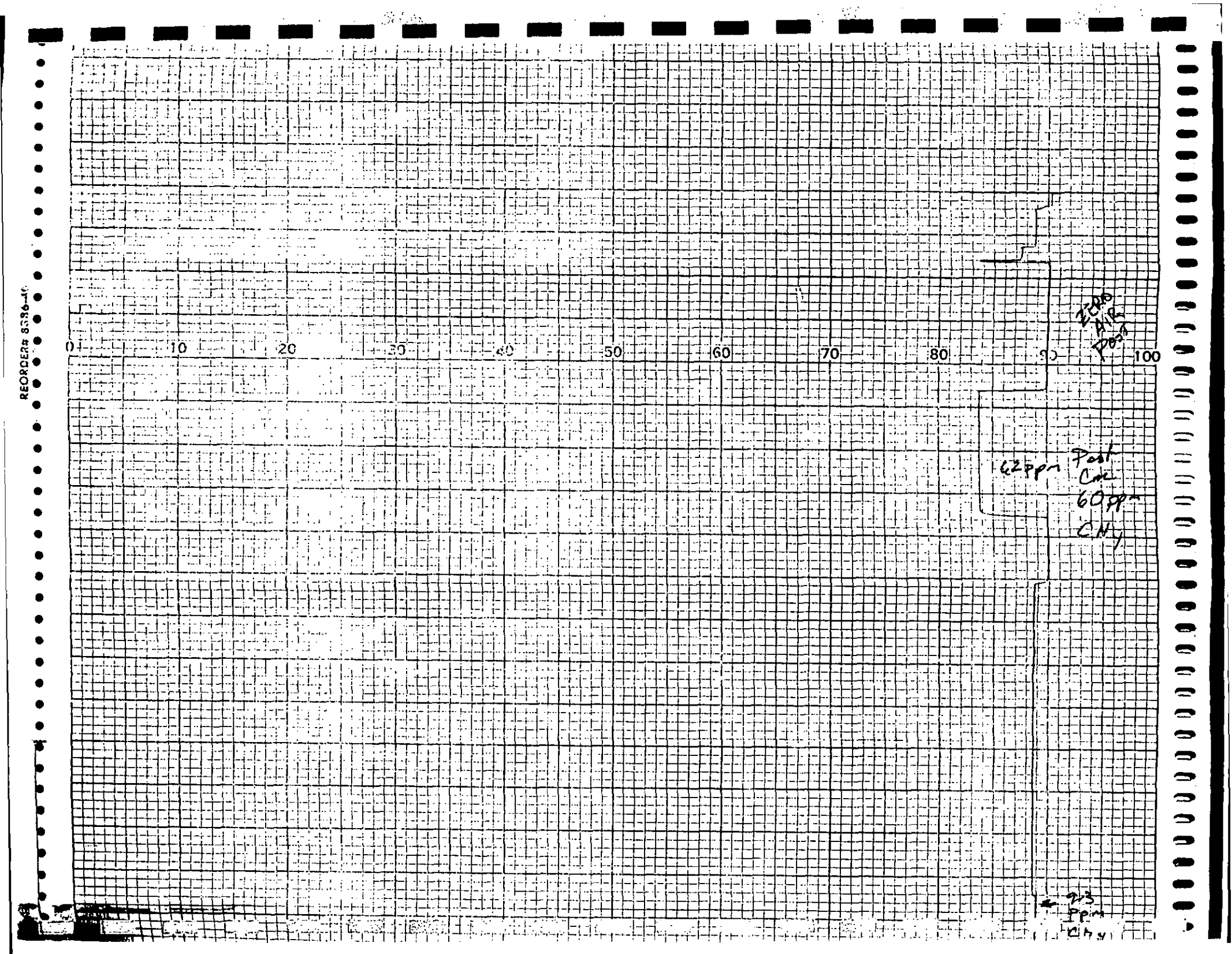
REORDER# 8386-40

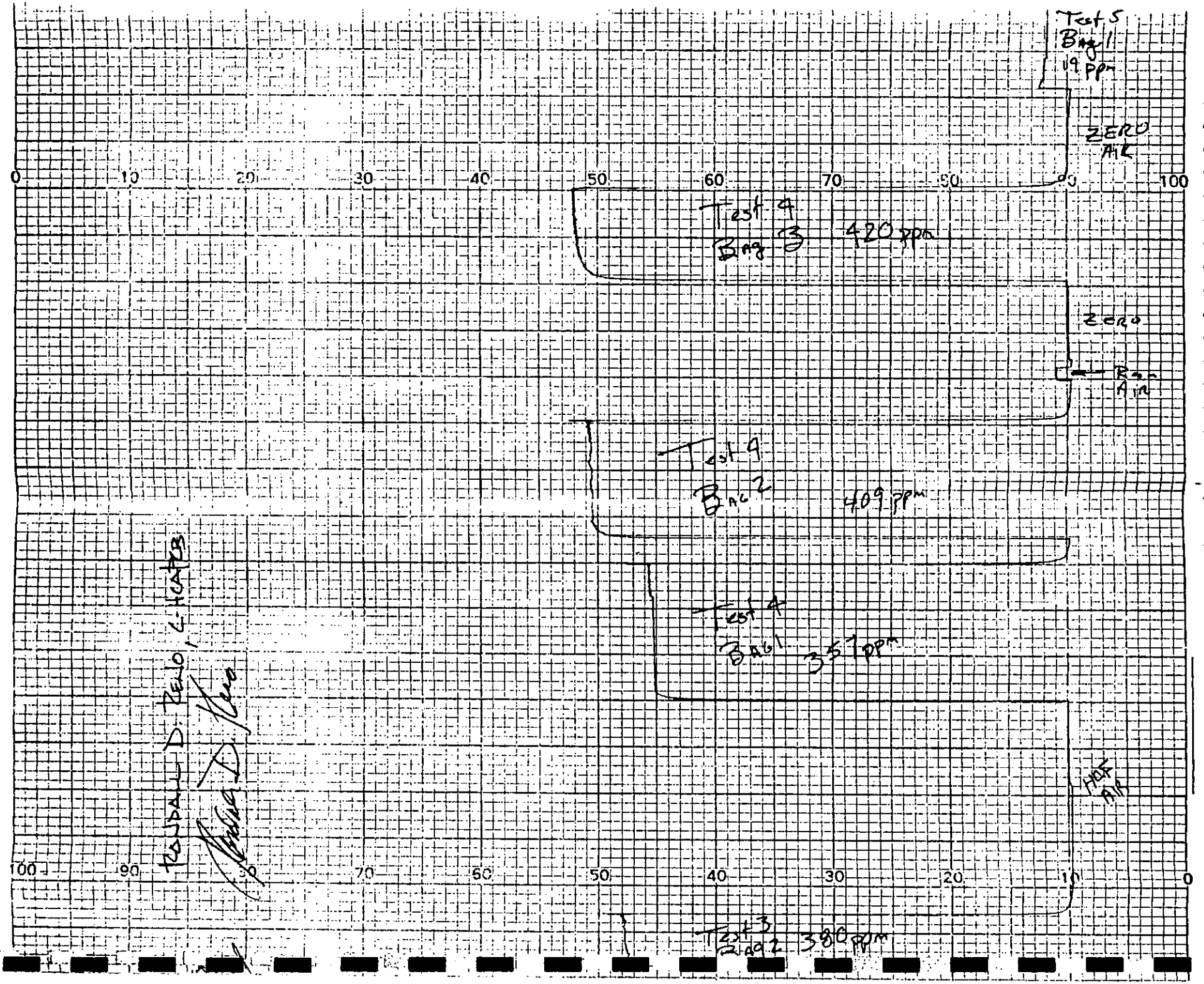
GE CERAMICS

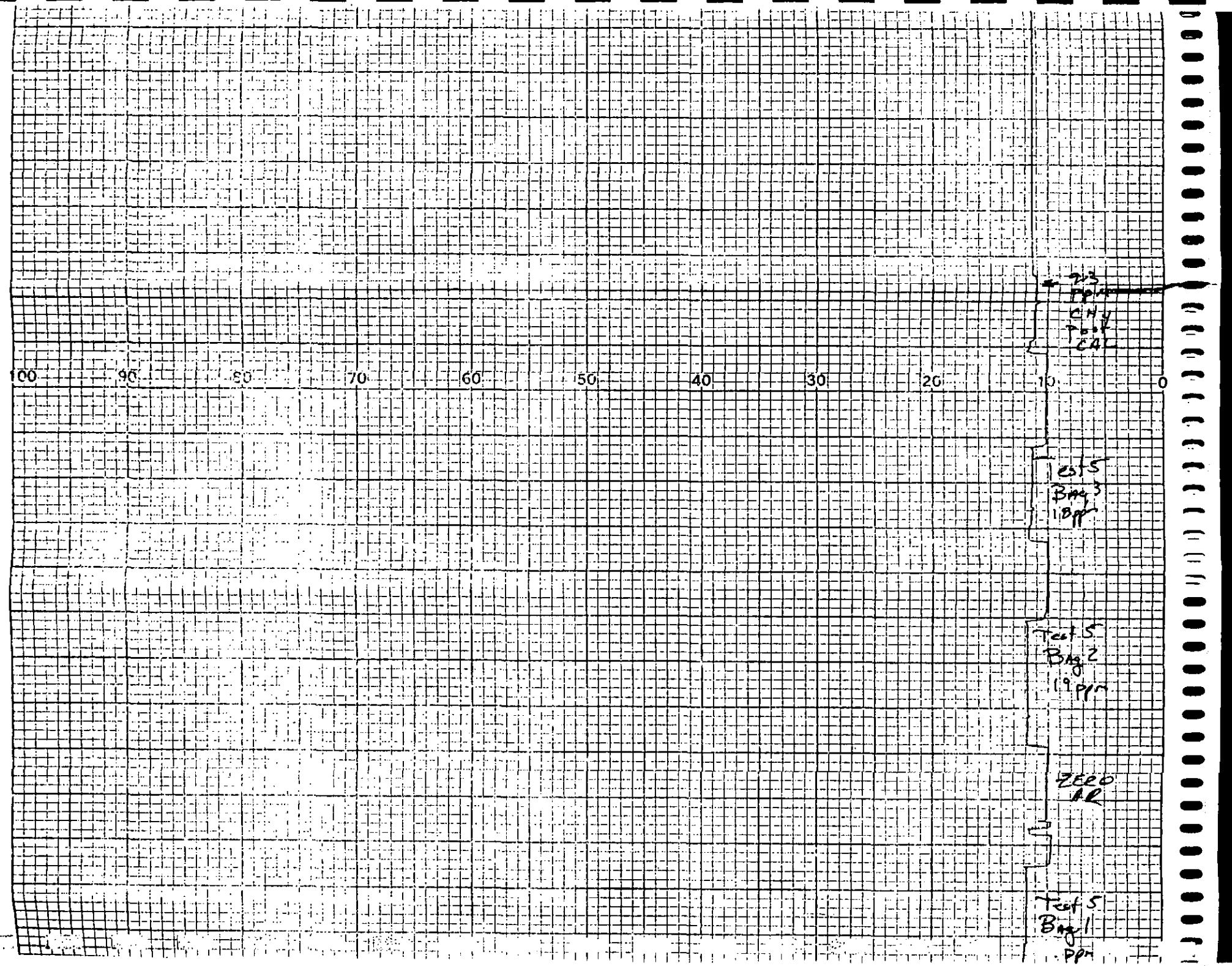
9-15-89

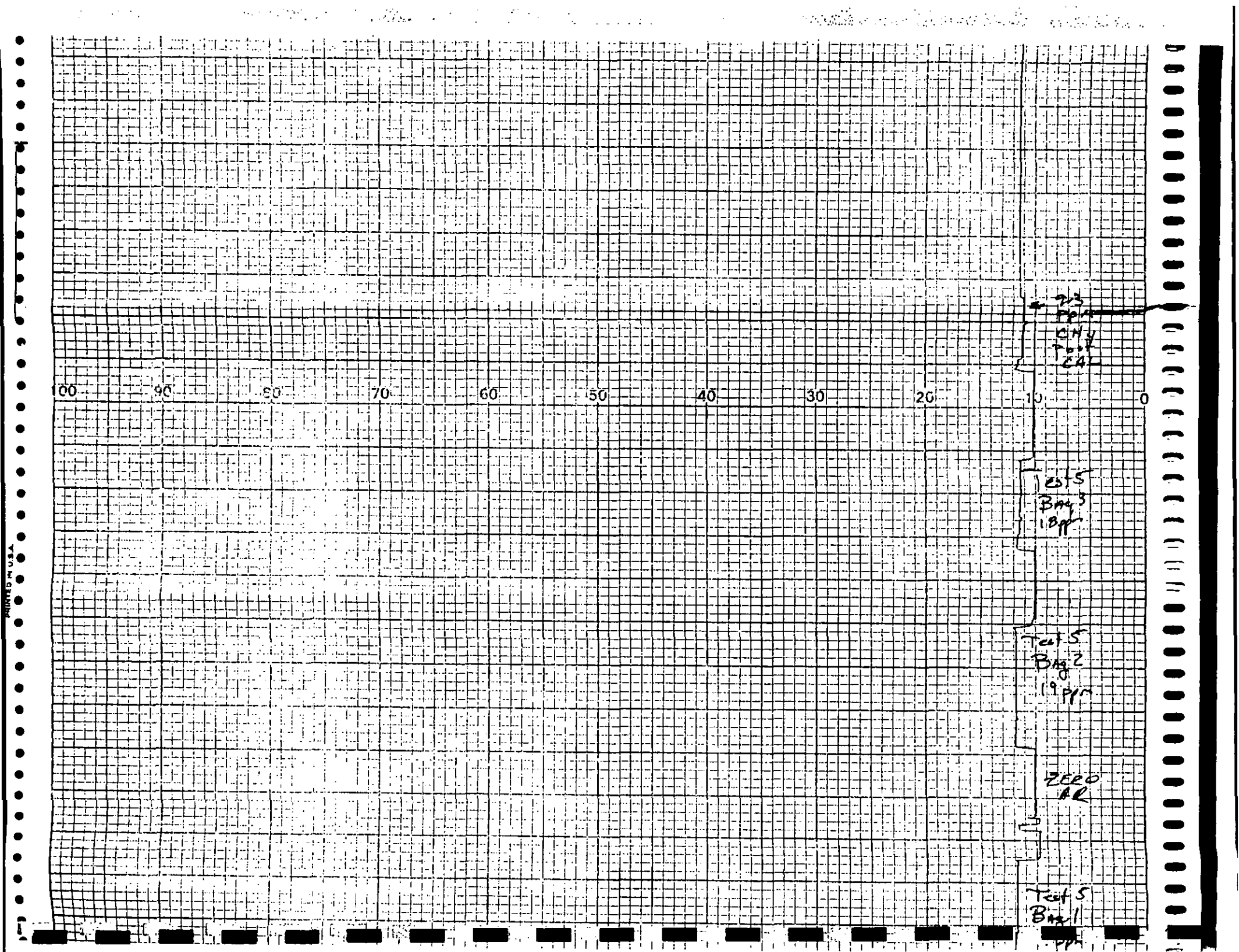
M BLAKE - SHARLE

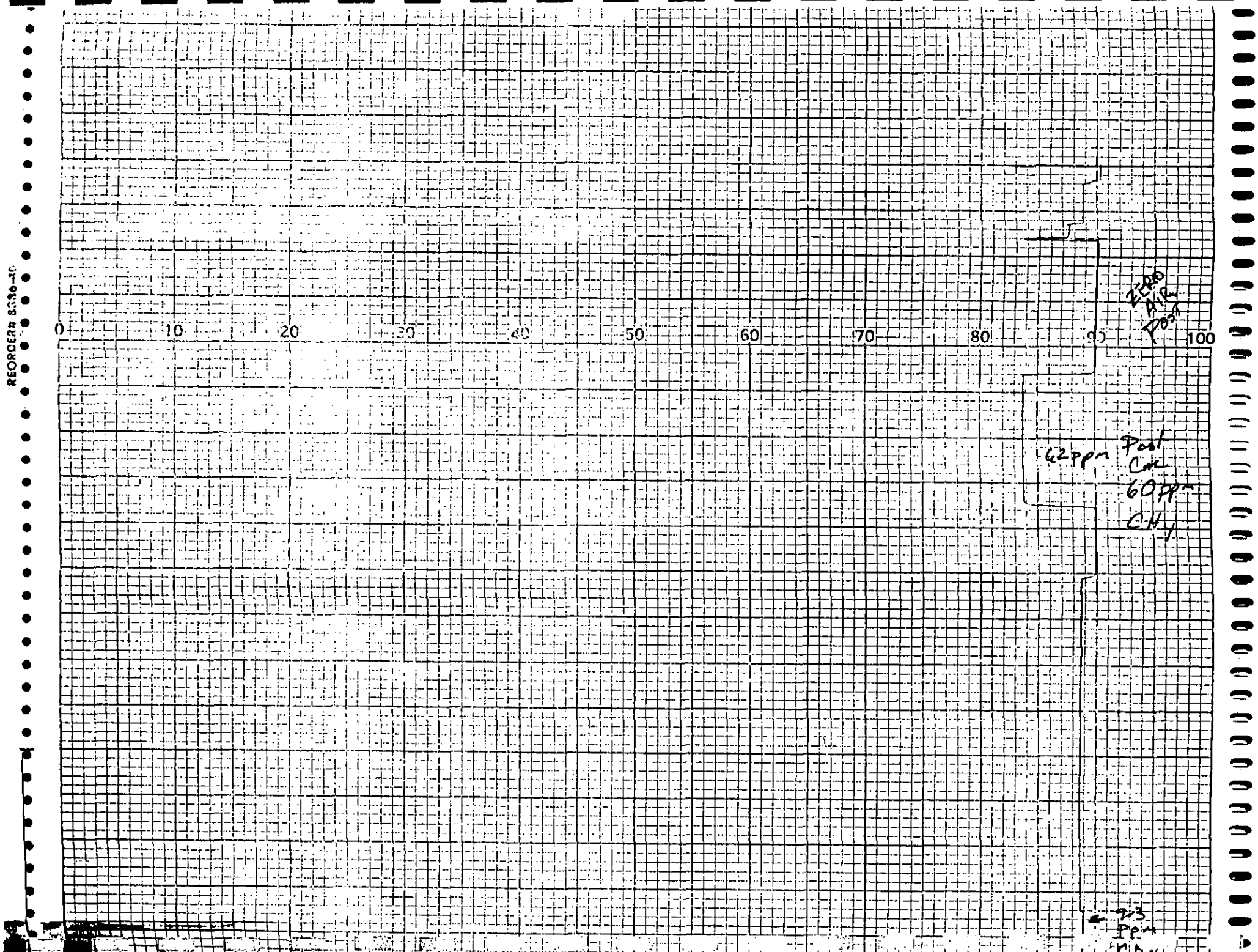



0
10
20
30
40
50
60
70
80
90
100
62ppm Post Cure 60ppm CMV
23 ppm


Test 5
Bag 1
19 PPM
ZERO AIR
0
10
20
30
40
50
60
70
80
90
100
Test 4
Bag 3
420 PPM
zero
Test 4
Bag 2
409 PPM
Test 4
Bag 1
351 PPM
Test 3
Bag 2
380 PPM
RANDALL D. REID
LICENSED


100
90
80
70
60
50
40
30
20
10
0
2.3 PPM CHV Test CAL
Test 5 Bag 3 1 PPM
Test 5 Bag 2 1.9 PPM
ZERO AIR
Test 5 Bag 1 0 PPM


100
90
80
70
60
50
40
30
20
10
0
2/3
Test 5
Bag 3
1.8 ppm
Test 5
Bag 2
1.9 ppm
Zero Air
Test 5
Bag 1


0
10
20
30
40
50
60
70
80
90
100
Zero Air Post
62ppm Post Cal 60ppm CH4
213 Ppm CH4

Appendix D

Calculations

```
_typr e geotp2
```

COMPUTER RUN DATE -9-27-89
RUN BY -LJM
PROJECT NAME -GE CERAMICS
PROJECT NUMBER -406131
FIELD DATA TEST 2

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.12	1.50	111	106	420
2	0.18	1.50	118	108	476
3	0.20	1.50	122	108	540 -540
4	0.22	1.50	124	108	562
5	0.27	1.50	128	110	607
6	0.27	1.50	128	110	613
7	0.27	1.50	129	110	602
8	0.29	1.50	130	111	581
9	0.14	1.50	113	108	525
10	0.15	1.50	117	108	534
11	0.25	1.50	118	108	566
12	0.28	1.50	118	108	606
13	0.30	1.50	118	108	620
14	0.31	1.50	118	108	606
15	0.32	1.50	119	108	584
16	0.28	1.50	119	108	570
TOTAL *	7.774	24.000	3665.000		9012.000
AVERAGE	0.486	1.500	114.531		563.250 -563.75

NET GAS SAMPLE VOLUME IS 43.94 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

```
B:\)
```

```
type geotp3
```

COMPUTER RUN DATE -9-27-89
RUN BY -LJM
PROJECT NAME -GE CERAMICS
PROJECT NUMBER -406131
FIELD DATA TEST 3

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.18	1.50	80	76	525
2	0.24	1.50	82	76	534
3	0.26	1.50	88	78	573
4	0.27	1.50	92	79	582
5	0.33	1.50	96	79	605
6	0.35	1.50	99	80	631
7	0.35	1.50	100	81	613
8	0.34	1.50	104	82	606
9	0.18	1.50	100	81	545
10	0.25	1.50	108	88	563
11	0.28	1.50	110	89	609
12	0.30	1.50	112	89	632
13	0.33	1.50	112	92	656
14	0.38	1.50	114	92	650
15	0.37	1.50	114	93	609
16	0.30	1.50	115	94	572
TOTAL *	8.632	24.000	2975.000		9505.000
AVERAGE	0.540	1.500	92.969		594.063

NET GAS SAMPLE VOLUME IS 44.75 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

B:\>

```
_type geotp4
```

COMPUTER RUN DATE -9-27-89
RUN BY -LJM
PROJECT NAME -GE CERAMICS
PROJECT NUMBER -406131
FIELD DATA TEST 4

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.19	1.50	104	94	540
2	0.23	1.50	106	94	568
3	0.29	1.50	111	94	603
4	0.29	1.50	111	94	600
5	0.33	1.50	111	95	596
6	0.35	1.50	112	95	610
7	0.33	1.50	112	96	589
8	0.31	1.50	112	96	566
9	0.20	1.50	105	94	590
10	0.24	1.50	111	96	600
11	0.24	1.50	112	97	604
12	0.24	1.50	113	98	618
13	0.32	1.50	113	98	636
14	0.33	1.50	114	98	668
15	0.33	1.50	114	98	649
16	0.34	1.50	114	98	640
TOTAL *	8.504	24.000	3310.000		9677.000
AVERAGE	0.532	1.500	103.438		604.813

NET GAS SAMPLE VOLUME IS 45.82001 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

```
B:\>
```

```
_type geotp5
```

COMPUTER RUN DATE -9-27-89
RUN BY -LJM
PROJECT NAME -GE CERAMICS
PROJECT NUMBER -406131
FIELD DATA TEST 5

TRAVERSE POINTS	VELOCITY HEAD (IN. W.C.)	ORIFICE METER (IN. W.C.)	GAS SAMPLE TEMP (DEG. F)		STACK TEMP (DEG. F)
1	0.15	1.50	101	88	528
2	0.22	1.50	104	90	572
3	0.24	1.50	108	91	619
4	0.25	1.50	110	92	638
5	0.30	1.50	111	92	658
6	0.31	1.50	112	93	684
7	0.33	1.50	113	93	662
8	0.31	1.50	116	96	650
9	0.13	1.50	110	98	560
10	0.22	1.50	114	100	595
11	0.26	1.50	116	100	629
12	0.30	1.50	118	100	652
13	0.32	1.50	118	100	684
14	0.33	1.50	120	100	672
15	0.31	1.50	120	111	656
16	0.27	1.50	120	110	590
TOTAL *	8.186	24.000	3365.000		10049.000
AVERAGE	0.512	1.500	105.156		628.063

NET GAS SAMPLE VOLUME IS 46.09003 (FT.CUBED).
* AVERAGE OF VELOCITY HEAD SQUARE ROOTS.

```
B:\>
```

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name GE Ceramics
2. Source Tape Caster Stack
3. Computer Run Date 10-3-89
4. Operators Name LJM
5. Date Test was Run 9-14-89
6. Project Number #406131
7. Analysis Type Moisture
8. Test Number 2
9. Volume of Liquid Collected (ml). 30.4
10. Volume of Meter (ft. cubed) 43.94
11. Barometric Pressure ~~29.99~~ LJM 29.20
12. Aver. Delta H (in. water - orifice meter) 1.5
13. Meter Calibration Factor 0.980044
14. Temp. of Meter, (degrees f) (Gas Sample Temp) 114.5
15. % CO2 0
16. % O2 20
17. % CO
18. Pitot Calibration Factor .84
19. Average (SQR) Delta P (Velocity Head) .49
20. Temp. of Stack, (Degrees F) 563.75
21. Gage Stack Pressure (in. water) .05
22. Stack Area (Sq. Ft.) 1.77
23. Particulate Collected (Grams)
24. Nozzle Diameter (Inches) 5/8 .625
25. Sampling Time (Min.) 64 61

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name GE Ceramics
2. Source Tape Caster Stack
3. Computer Run Date 10-3-89
4. Operators Name LJM
5. Date Test was Run 9-15-89
6. Project Number #406131
7. Analysis Type Moisture
8. Test Number 3
9. Volume of Liquid Collected (ml). 31.7
10. Volume of Meter (ft. cubed) 44.75
11. Barometric Pressure 29.94
12. Aver. Delta H (in. water - orifice meter) ~~.05~~ LJM 1.5
13. Meter Calibration Factor 0.980044
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 92.97
15. % CO2 0
16. % O2 20
17. % CO
18. Pitot Calibration Factor .84
19. Average (SQR) Delta P (Velocity Head) .54
20. Temp. of Stack, (Degrees F) 594.06
21. Gage Stack Pressure (in. water) .05
22. Stack Area (Sq. Ft.) 1.77
23. Particulate Collected (Grams)
24. Nozzle Diameter (Inches) 5/8 .625
25. Sampling Time (Min.) 64

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name GE Ceramics
2. Source Tape Caster Stack
3. Computer Run Date 10-3-89
4. Operators Name LJM
5. Date Test was Run 9-15-89
6. Project Number # 406131
7. Analysis Type Moisture
8. Test Number 4
9. Volume of Liquid Collected (ml). 33.0
10. Volume of Meter (ft. cubed) 45.815
11. Barometric Pressure 29.94
12. Aver. Delta H (in. water - orifice meter) 1.5
13. Meter Calibration Factor 0.980044
14. Temp. of Meter, (degrees f)(Gas Sample Temp) 103.44
15. % CO2 0
16. % O2 19
17. % CO
18. Pitot Calibration Factor .84
19. Average (SQR) Delta P (Velocity Head) .53
20. Temp. of Stack, (Degrees F) 604.81
21. Gage Stack Pressure (in. water) .05
22. Stack Area (Sq. Ft.) 1.77
23. Particulate Collected (Grams)
24. Nozzle Diameter (Inches) 5/8 .625
25. Sampling Time (Min.) 64

STACK SAMPLING CALCULATIONS INPUT DATA

1. Project Name G E Ceramics
2. Source Tape Caster Stack
3. Computer Run Date 10-3-89
4. Operators Name LJM
5. Date Test was Run 9-15-89
6. Project Number # 406131
7. Analysis Type Moisture
8. Test Number 5
9. Volume of Liquid Collected (ml). 28.94
10. Volume of Meter (ft. cubed) 46.09
11. Barometric Pressure 29.94
12. Aver. Delta H (in. water - orifice meter) 1.5
13. Meter Calibration Factor 0.980044
14. Temp. of Meter, (degrees f) (Gas Sample Temp) 105.16
15. % CO2 0
16. % O2 19
17. % CO
18. Pitot Calibration Factor .84
19. Average (SQR) Delta P (Velocity Head) .51
20. Temp. of Stack, (Degrees F) 628.06
21. Gage Stack Pressure (in. water) .05
22. Stack Area (Sq. Ft.) 1.77
23. Particulate Collected (Grams)
24. Nozzle Diameter (Inches) 5/8 .625
25. Sampling Time (Min.) 64

PARAMETER SHEET

G.E. CERAMICS

PARAMETER	TEST 2	TEST 3	TEST 4
H	1.5000	1.5000	1.5000
P	0.4900	0.5400	0.5300
PB	29.2000	29.9400	29.9400
PS	29.2037	29.9437	29.9437
TM	574.5000	552.9700	563.4400
TSR	1,023.7500	1,054.0600	1,064.8100
VM	43.9400	44.7500	45.8150
VMSTD	38.9094	42.2089	42.4104
VLO	30.4000	31.7000	33.0000
VWSTD	1.4410	1.5026	1.5642
BWO	0.0357	0.0344	0.0356
MD	28.8000	28.8000	28.7600
MS	28.4143	28.4288	28.3773
VS	2,341.6080	2,585.2560	2,552.6000
QA	4,144.6470	4,575.9030	4,518.1010
QSTD	2,019.5400	2,223.5120	2,170.5700
MN	0.0000	0.0000	0.0000
CS	0.0000	0.0000	0.0000

%IS	0.2624	0.2464	0.2536
AS	1.7700	1.7700	1.7700
CP	0.8400	0.8400	0.8400
E	61.0000	64.0000	64.0000
Y	0.9800	0.9800	0.9800
AN	0.002131	0.002131	0.002131
%CO2	0.0000	0.0000	0.0000
%O2	20.0000	20.0000	19.0000
PMR	0.0000	0.0000	0.0000

NOMECLATURE

AN - CROSS SECTIONAL AREA OF NOZZLE, SQ. FT.
AS - CROSS SECTIONAL AREA OF STACK, SQ. FT.
BWO - FRACTION BY VOLUME OF WATER VAPOR IN GAS STREAM.
CP - PITOT TUBE COEFFICIENT, DIMENSIONLESS.
CS - CONCENTRATION OF PARTICULATE MATTER IN STACK GAS, GR./DSCF.
H - AVERAGE PRESSURE DROP ACROSS THE ORIFICE, INCHES H2O.
P - AVERAGE SQ. ROOT VELOCITY HEAD OF STACK GAS, INCHES H2O.
IS - PERCENT OF ISOKINETIC SAMPLING .
MD - DRY MOLECULAR WEIGHT OF STACK GAS, LB/LB. MOLE.
MN - TOTAL AMOUNT OF PARTICULATE MATTER COLLECTED, G.
MS - MOLECULAR WEIGHT OF STACK GAS (WET BASIS), LB/LB. MOLE.
PB - BAROMETRIC PRESSURE, INCHES HG.
PS - ABSOLUTE STACK GAS PRESSURE, INCHES HG.
PMR - PARTICULATE MASS RATE, LBS/HR.
QA - VOLUMETRIC FLOW RATE, ACTUAL CONDITIONS FT3/MIN.
QSTD - VOLUMETRIC FLOW RATE AT STANDARD CONDITIONS, (DRY BASIS) FT3/MIN.
TM - AVERAGE DRY GAS METER TEMPERATURE, *R.
TSR - AVERAGE STACK TEMPERAATURE, *R.
E - TOTAL SAMPLING TIME, MIN.
VLO - TOTAL VOLUME OF LIQUID COLLECTED IN IMPINGERS AND SILICA GEL, ML.
VM - VOLUME OF GAS SAMPLE THROUGH THE DRY GAS METER (METER CONDITIONS), CUBIC FT.
VMSTD - VOLUME OF GAS SAMPLE THROUGH THE DRY GAS METER AT STANDARD CONDITONS FT3.
VWSTD - VOLUME OF WATER COLLECTED AT 29.92 IN. HG. AND 70* F CUBIC FT.
VS - STACK GAS VELOCITY, ACTUAL FT. PER MINUTE.
Y - DRY METER GAS CALIBRATION FACTOR.

PARAMETER SHEET

G.E. CERAMICS

PARAMETER	TEST 3	TEST 4	TEST 5
H	1.5000	1.5000	1.5000
P	0.5400	0.5300	0.5100
PB	29.9400	29.9400	29.9400
PS	29.9437	29.9437	29.9437
TM	552.9700	563.4400	565.1601
TSR	1,054.0600	1,064.8100	1,088.0600
VM	44.7500	45.8150	46.0900
VMSTD	42.2089	42.4104	42.5352
VLO	31.7000	33.0000	28.9400
VWSTD	1.5026	1.5642	1.3718
BWO	0.0344	0.0356	0.0312
MD	28.8000	28.7600	28.7600
MS	28.4288	28.3773	28.4238
VS	2,585.2560	2,552.6000	2,480.9120
QA	4,575.9030	4,518.1010	4,391.2140
QSTD	2,223.5120	2,170.5700	2,073.7970
MN	0.0000	0.0000	0.0000
CS	0.0000	0.0000	0.0000

%IS	0.2464	0.2536	0.2662
AS	1.7700	1.7700	1.7700
CP	0.8400	0.8400	0.8400
E	64.0000	64.0000	64.0000
Y	0.9800	0.9800	0.9800
AN	0.002131	0.002131	0.002131
%CO2	0.0000	0.0000	0.0000
%O2	20.0000	19.0000	19.0000
PMR	0.0000	0.0000	0.0000

NOMECLATURE

AN - CROSS SECTIONAL AREA OF NOZZLE, SQ. FT.
AS - CROSS SECTIONAL AREA OF STACK, SQ. FT.
BWO - FRACTION BY VOLUME OF WATER VAPOR IN GAS STREAM.
CP - PITOT TUBE COEFFICIENT, DIMENSIONLESS.
CS - CONCENTRATION OF PARTICULATE MATTER IN STACK GAS, GR./DSCF.
H - AVERAGE PRESSURE DROP ACROSS THE ORIFICE, INCHES H2O.
P - AVERAGE SQ. ROOT VELOCITY HEAD OF STACK GAS, INCHES H2O.
IS - PERCENT OF ISOKINETIC SAMPLING .
MD - DRY MOLECULAR WEIGHT OF STACK GAS, LB/LB. MOLE.
MN - TOTAL AMOUNT OF PARTICULATE MATTER COLLECTED, G.
MS - MOLECULAR WEIGHT OF STACK GAS (WET BASIS), LB/LB. MOLE.
PB - BAROMETRIC PRESSURE, INCHES HG.
PS - ABSOLUTE STACK GAS PRESSURE, INCHES HG.
PMR - PARTICULATE MASS RATE, LBS/HR.
QA - VOLUMETRIC FLOW RATE, ACTUAL CONDITIONS FT3/MIN.
QSTD - VOLUMETRIC FLOW RATE AT STANDARD CONDITIONS, (DRY BASIS) FT3/MIN.
TM - AVERAGE DRY GAS METER TEMPERATURE, *R.
TSR - AVERAGE STACK TEMPERAATURE, *R.
- TOTAL SAMPLING TIME, MIN.
VLO - TOTAL VOLUME OF LIQUID COLLECTED IN IMPINGERS AND SILICA GEL, ML.
VM - VOLUME OF GAS SAMPLE THROUGH THE DRY GAS METER (METER CONDITIONS), CUBIC FT.
VMSTD - VOLUME OF GAS SAMPLE THROUGH THE DRY GAS METER AT STANDARD CONDITONS FT3.
VWSTD - VOLUME OF WATER COLLECTED AT 29.92 IN. HG. AND 70* F CUBIC FT.
VS - STACK GAS VELOCITY, ACTUAL FT. PER MINUTE.
- DRY METER GAS CALIBRATION FACTOR.

G.E. CERAMICS - CALCULATIONS-TEST 2

VOLUME OF WATER COLLECTED

VWSTD = (VLO)(0.0474)
VWSTD = 30.4 * .0474
VWSTD = 1.44096

VOLUME OF GAS METERED, STANDARD CONDITIONS

VMSTD = ((17.71)(VM)(PB + H / 13.6)(Y)) / TM
VMSTD = (17.71 * 43.94 * (29.2 + 1.5 / 13.6) * .980044) / 574.5
VMSTD = 38.90938

MOISTURE CONTENT

BWO = VWSTD / (VMSTD + VWSTD)
BWO = 1.44096 / 38.90938 + 1.44096
BWO = 3.571123E-02

MOLECULAR WEIGHT OF DRY GAS STREAM

MD = (0.44)(%CO2) + (.32)(%O2) + (0.28)(%CO + %N2)
MD = .44 * 0 + .32 * 20 + .28 *(0 + 80)
MD = 28.8

MOLECULAR WEIGHT OF STACK GAS

MS = MD(1 - BWO) + 18(BWO)
MS = 28.8 *(1 - 3.571123E-02) + 18 * 3.571123E-02
MS = 28.41432

VELOCITY OF STACK GAS

VS = 174 * CP * P * SQR (TS * (29.92 / PS) * (28.96 / MS))
VS = 174 * .84 * .49 *SQR(1023.75 *(29.92 / 29.20368)*(28.96 / 28.41432))
VS = 2341.608

TOTAL FLOW OF STACK GAS

QA = AS * VS
QA = 1.77 * 2341.608
QA = 4144.647
QS = QA * (530 / TSR) * (PS / 29.92)
QS = 4144.647 * (530 / 1023.75)*(29.20368 / 29.92)
QS = 2094.332
QSTD = QS(1 - BWO)
QSTD = 2094.332 (1 - 3.571123E-02)
QSTD = 2019.54

PARTICULATE CONCENTRATION

CS = (15.43)(MN) / VMSTD
CS = (15.43 * 0) / 38.90938
CS = 0

PARTICULATE MASS RATE

PMR = (MN)(QSTD)(60) / (VMSTD)(453.6)
PMR = (0 * 2019.54 * 60) / (38.90938 * 453.6)
PMR = 0

PERCENT ISOKINETIC OF TEST

IS = VMSTD / (AN * E * VSSTD)
IS = 38.90938 / (2.130534E-03 * 61 * 1140.983)
IS = .2623958

G.E. CERAMICS - CALCULATIONS-TEST 3

VOLUME OF WATER COLLECTED

VWSTD = (VLC)(0.0474)
VWSTD = 31.7 * .0474
VWSTD = 1.50258

VOLUME OF GAS METERED, STANDARD CONDITIONS

VMSTD = ((17.71)(VM)(PB + H / 13.6)(Y)) / TM
VMSTD = (17.71 * 44.75 * (29.94 + 1.5 / 13.6) * .980044) / 552.97
VMSTD = 42.20893

MOISTURE CONTENT

BWO = VWSTD / (VMSTD + VWSTD)
BWO = 1.50258 / 42.20893 + 1.50258
BWO = 3.437493E-02

MOLECULAR WEIGHT OF DRY GAS STREAM

MD = (0.44)(%CO2) + (.32)(%O2) + (0.28)(%CO + %N2)
MD = .44 * 0 + .32 * 20 + .28 *(0 + 80)
MD = 28.8

MOLECULAR WEIGHT OF STACK GAS

MS = MD(1 - BWO) + 18(BWO)
MS = 28.8 *(1 - 3.437493E-02) + 18 * 3.437493E-02
MS = 28.42875

VELOCITY OF STACK GAS

VS = 174 * CP * P * SQR (TS * (29.92 / PS) * (28.96 / MS))
VS = 174 * .84 * .54 *SQR(1054.06 *(29.92 / 29.94368)*(28.96 / 28.42875))
VS = 2585.256

TOTAL FLOW OF STACK GAS

QA = AS * VS
QA = 1.77 * 2585.256
QA = 4575.903
QS = QA * (530 / TSR) * (PS / 29.92)
QS = 4575.903 * (530 / 1054.06)*(29.94368 / 29.92)
QS = 2302.666
QSTD = QS(1 - BWO)
QSTD = 2302.666 (1 - 3.437493E-02)
QSTD = 2223.512

PARTICULATE CONCENTRATION

CS = (15.43)(MN) / VMSTD
CS = (15.43 * 0) / 42.20893
CS = 0

PARTICULATE MASS RATE

PMR = (MN)(QSTD)(60) / (VMSTD)(453.6)
PMR = (0 * 2223.512 * 60) / (42.20893 * 453.6)
PMR = 0

PERCENT ISOKINETIC OF TEST

IS = VMSTD / (AN * E * VSSTD)
IS = 42.20893 / (2.130534E-03 * 64 * 1256.221)
IS = .2464165

G.E. CERAMICS - CALCULATIONS-TEST 4

VOLUME OF WATER COLLECTED

VWSTD = (VLO)(0.0474)
VWSTD = 33 * .0474
VWSTD = 1.5642

VOLUME OF GAS METERED, STANDARD CONDITIONS

VMSTD = ((17.71)(VM)(PB + H / 13.6)(Y)) / TM
VMSTD = (17.71 * 45.815 * (29.94 + 1.5 / 13.6) * .980044) / 563.44
VMSTD = 42.41045

MOISTURE CONTENT

BWO = VWSTD / (VMSTD + VWSTD)
BWO = 1.5642 / 42.41045 + 1.5642
BWO = .0355705

MOLECULAR WEIGHT OF DRY GAS STREAM

MD = (0.44)(%CO2) + (.32)(%O2) + (0.28)(%CO + %N2)
MD = .44 * 0 + .32 * 19 + .28 *(0 + 81)
MD = 28.76

MOLECULAR WEIGHT OF STACK GAS

MS = MD(1 - BWO) + 18(BWO)
MS = 28.76 *(1 - .0355705) + 18 * .0355705
MS = 28.37726

VELOCITY OF STACK GAS

VS = 174 * CP * P * SQR (TS * (29.92 / PS) * (28.96 / MS))
VS = 174 * .84 * .53 *SQR(1064.81 *(29.92 / 29.94368)*(28.96 / 28.37726))
VS = 2552.6

TOTAL FLOW OF STACK GAS

QA = AS * VS
QA = 1.77 * 2552.6
QA = 4518.101
QS = QA * (530 / TSR) * (PS / 29.92)
QS = 4518.101 * (530 / 1064.81)*(29.94368 / 29.92)
QS = 2250.626
QSTD = QS(1 - BWO)
QSTD = 2250.626 (1 - .0355705)
QSTD = 2170.57

PARTICULATE CONCENTRATION

CS = (15.43)(MN) / VMSTD
CS = (15.43 * 0) / 42.41045
CS = 0

PARTICULATE MASS RATE

PMR = (MN)(QSTD)(60) / (VMSTD)(453.6)
PMR = (0 * 2170.57 * 60) / (42.41045 * 453.6)
PMR = 0

PERCENT ISOKINETIC OF TEST

IS = VMSTD / (AN * E * VSSTD)
IS = 42.41045 / (2.130534E-03 * 64 * 1226.311)
IS = .253632

G.E. CERAMICS - CALCULATIONS-TEST 5

VOLUME OF WATER COLLECTED

/WSTD = (VLC)(0.0474)
VWSTD = 28.94 * .0474
VWSTD = 1.371756

VOLUME OF GAS METERED, STANDARD CONDITIONS

/MSTD = ((17.71)(VM)(PB + H / 13.6)(Y)) / TM
VMSTD = (17.71 * 46.09 * (29.94 + 1.5 / 13.6) * .980044) / 565.1601
/MSTD = 42.53517

MOISTURE CONTENT

BWO = VWSTD / (VMSTD + VWSTD)
BWO = 1.371756 / 42.53517 + 1.371756
BWO = 3.124237E-02

MOLECULAR WEIGHT OF DRY GAS STREAM

MD = (0.44)(%CO2) + (.32)(%O2) + (0.28)(%CO + %N2)
MD = .44 * 0 + .32 * 19 + .28 *(0 + 81)
MD = 28.76

MOLECULAR WEIGHT OF STACK GAS

MS = MD(1 - BWO) + 18(BWO)
MS = 28.76 *(1 - 3.124237E-02) + 18 * 3.124237E-02
MS = 28.42383

VELOCITY OF STACK GAS

VS = 174 * CP * P * SQR (TS * (29.92 / PS) * (28.96 / MS))
VS = 174 * .84 * .51 *SQR(1088.06 *(29.92 / 29.94368)*(28.96 / 28.42383))
VS = 2480.912

TOTAL FLOW OF STACK GAS

QA = AS * VS
QA = 1.77 * 2480.912
QA = 4391.214
QS = QA * (530 / TSR) * (PS / 29.92)
QS = 4391.214 * (530 / 1088.06)*(29.94368 / 29.92)
QS = 2140.677
QSTD = QS(1 - BWO)
QSTD = 2140.677 (1 - 3.124237E-02)
QSTD = 2073.797

PARTICULATE CONCENTRATION

CS = (15.43)(MN) / VMSTD
CS = (15.43 * 0) / 42.53517
CS = 0

PARTICULATE MASS RATE

PMR = (MN)(QSTD)(60) / (VMSTD)(453.6)
PMR = (0 * 2073.797 * 60) / (42.53517 * 453.6)
PMR = 0

PERCENT ISOKINETIC OF TEST

IS = VMSTD / (AN * E * VSSTD)
IS = 42.53517 / (2.130534E-03 * 64 * 1171.637)
IS = .2662483

INTERNATIONAL TECHNOLOGY CORPORATION

By T. Cobb Date 10/6/89 Subject GE Ceramics VOC emission Sheet No. 1 of ____

Chkd. By ____ Date ____ Calculation Proj. No. 406131

Purpose: The purpose of these calculations is to convert Stack Gas Concentrations measured using an OVA as per EPA Method 25 to total VOC emission rates as organic carbon.

Given: The OVA was calibrated with methane CH_4 (M.W. = 16) during testing. Strip chart results are in ppmv as methane.

Test # 1 was voided due to an incinerator shut down during the test.

Test # 2 OVA Results from Strip Chart

Sample Bag # 1	91 ppmv as CH_4
Sample Bag # 2	210 ppmv as CH_4
Sample Bag # 3	448 ppmv as CH_4
Average	250 ppmv as CH_4

$$ppmv\ CH_4 \times \frac{M.W.}{24.04} = mg\ as\ CH_4 / m^3$$

$$250 \times 16/24.04 = 166.4\ mg/m^3$$

Conversion from concentration to emission rate based on measured stack gas flow rate

$$166.4\ mg\ as\ CH_4/m^3 \times 1g/1000\ mg \times 1lb/454g \times 2020\ ft^3/min \times 1m^3/35.31\ ft^3 \times 60\ min/hr = 1.26\ lbs\ as\ CH_4/hr$$

Conversion to lbs as C/hr:

$$1.26\ lbs\ as\ CH_4/hr \times \frac{12\ (\text{weight in } CH_4 \text{ due to carbon})}{16\ (\text{weight of } CH_4)} = 0.94\ lbs\ C/hr$$

INTERNATIONAL TECHNOLOGY CORPORATION

By T. Babb Date _____ Subject GE Ceramics VOC emission Sheet No. 2 of _____

Chkd. By _____ Date _____ Calculations Proj. No. 406131

Test # 3 OVA Results from Strip Chart

Sample Bag # 1	425 ppmv as CH_4
Sample Bag # 2	380 ppmv as CH_4
Sample Bag # 3	VOID DUE TO LEAK
Average	403 ppmv as CH_4

$403 \text{ ppmv} \times 16/24.04 = 268 \text{ mg}/m^3$

$268 \text{ mg } CH_4/m^3 \times \frac{1g}{1000mg} \times \frac{1lb}{454g} \times 2224 \frac{ft^3}{min} \times \frac{1 m^3}{35.31 ft^3} \times 60 \frac{min}{hr}$

$= 2.23 \text{ lbs as } CH_4/hr$

$2.23 \text{ lbs as } CH_4 \times \frac{12}{16} = 1.67 \text{ lbs as } C/hr.$

Test # 4 OVA Results from Strip Chart

Sample Bag # 1	354 ppmv as CH_4
Sample Bag # 2	409 ppmv as CH_4
Sample Bag # 3	420 ppmv as CH_4
Average	394 ppmv as CH_4

$394 \times 16/24.04 = 262.4 \text{ mg}/m^3$ as CH_4

$262.4 \text{ mg } CH_4/m^3 \times \frac{1g}{1000mg} \times \frac{1lb}{454g} \times 3171 \frac{ft^3}{min} \times \frac{1 m^3}{35.31 ft} \times 60 \frac{min}{hr}$

$= 2.13 \text{ lbs as } CH_4/hr$

$2.13 \times \frac{12}{16} = 1.6 \text{ lbs as } C/hr$

INTERNATIONAL TECHNOLOGY CORPORATION

By T. Babb Date 10/3/89 Subject G.E. Ceramics VOC emission Sheet No. 3 of ____

Chkd. By ____ Date ____ Calculation Proj. No. 906131

Test # 5 OVA Results from strip chart

Sample Bag # 1 19 ppmv as CH_4
Sample Bag # 2 19 ppmv as CH_4
Sample Bag # 3 18 ppmv as CH_4

Average 19 ppmv as CH_4

$19 \times 16/24.04 = 12.4$ mg/m³ as CH_4

$$12.4 \text{ mg } CH_4/m^3 \times \frac{1 g}{1000 mg} \times \frac{1 lb}{454 gr} \times 2074 \frac{ft^3}{min} \times \frac{1 m^3}{35.31 ft^3} \times 60 \frac{min}{hr}$$

$= 0.096$ lbs as CH_4/hr

$0.096 \times 12/16 = 0.072$ lbs C/hr

Appendix E

Emissions Pretest Agreement

TELECOPIER COVER LETTER

DATE: 9/12/89

TIME: 4:20 PM

PLEASE DELIVER THE FOLLOWING PAGES TO:

NAME CAROL NORMAN / BLAKE SHIRLEY

COMPANY/FIRM IT CORPORATION

CITY & STATE KNOXVILLE, TN

TELECOPIER NUMBER (615) 690-3626

FROM:

NAME RANDY RENO

CHATTANOOGA-HAMILTON COUNTY AIR POLLUTION CONTROL BUREAU
3511 ROSSVILLE BOULEVARD
CHATTANOOGA, TENNESSEE 37407-2466

TELECOPIER NUMBER: (615) 867-4348

WE ARE TRANSMITTING 6 PAGES (INCLUDING THIS COVER LETTER).

IF TRANSMISSION IS NOT COMPLETE, CALL:

OPERATOR'S NAME RANDY RENO

TELEPHONE NUMBER: (615) 867-4321 (DAYS) OR
867-4326 (AFTER 4:30 P.M.)

EMISSIONS PRE-TEST AGREEMENT

Preamble

A source sampling test of General Electric Ceramics, Inc.'s tape casters fume oxidizer (Certificate of Operation No. 0090-30500899-74T) will be conducted to demonstrate compliance with all applicable provisions of the Chattanooga Air Pollution Control Ordinance and will be conducted by IT Corporation. The test will be conducted for total volatile organic compounds. The test shall be observed by representatives of the Chattanooga-Hamilton County Air Pollution Control Bureau (Bureau) and shall be conducted under maximum representative operating conditions. Failure to meet the test conditions specified herein or include all necessary information in the final report shall constitute sufficient basis for the Bureau's rejection of the test results and/or the final report.

Minimum Test Requirements

A. Process Requirements:

1. Normal process weight (permitted process weight): ~~80~~ 41.6 Solvent pounds per hour, SOLVENT INCINERATION RATE; 104 LB/HR/CASTER (2) PRODUCTION RATE

2. Process material requirements:

   a. The process weight for each run and method of determination shall be: ~~80~~ 41.6 lbs/hr INCINERATION RATE; 104 LB/HR/CASTER (2) PRODUCTION RATE

   b. Allowable deviations: ~~±5%~~ ±10%

Testing shall conform to EPA Reference Method 25A with Tedlar bag capture for flame ionization detector analysis, and Methods 1, 2, 3, and 4 for moisture determination and velocity profile.

B. Compliance Test Requirements:

1. The source sampling test shall be conducted with a Method 25A sampling train with flame ionization detector.
2. Copies of all notes, tables, field documents, ~~tare weights of filters,~~ and calculations shall be exchanged between the representatives of the company and the control agencies prior to test completion.
3. Any and all test reports shall be submitted to the Bureau regardless of the results of the test.

C. Test Report

The test report shall consist of the following sections, as a minimum:

1. Introduction
2. Summary of results
   a. Stack Diameter
   b. Stack Gas Velocity
   c. Stack Gas Flow Rate (scfm)
   d. Emission listed in pounds per hour (lbs/hr)
   e. Allowable emission rate in lbs/hr
   f. Yearly emissions for all pollutants sampled, listed in tons/year

g. Process weight during test

h. Other pertinent results

3. Conclusions

4. Emission Source Description

   a. APCB permit number

   b. Process description and equipment

   c. Control equipment

   d. Exhaust description

5. Sampling Protocol

   a. Methodology

   b. Analytical Procedures

6. Appendices

   a. Velocity Profile Diagram

   b. Sample Calculations

   c. Description of sampling procedure and laboratory procedure (signed)

   d. Copy of field data sheets (signed by tester)

   e. Schematic diagram of sampling site showing distance to upstream and downstream disturbances

   f. Identification of regulations applicable to source

   g. Calibration data to include the most recent data and results of calibration for all equipment used in the test. (i.e. dry gas meter before and after each test and orifice before each test.)

This document is not a contractual agreement but constitutes the source test conditions which were negotiated on September 12, 1989, between representatives of the Bureau and IT Corporation.

This information is set forth in written form to insure that all appropriate parties understand the minimum test conditions. The signature of each representative party signifies that he has read the document and will, to the best of his knowledge and ability, comply with the terms of the pre-test agreement.

(company representative)	9/14/89 (date)
(consultant)	(date)
(test consultant)	9/14/89 (date)
(Bureau)	9/14/89 (date)