



Huber MKH
David
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PPG INDUSTRIES, INC. INDUSTRIAL CHEMICAL DIVISION P. O. BOX 1000 LAKE CHARLES, LA. 70602

December 19, 1983

Mr. Gus Von Bodungen
Department of Natural Resources
Air Quality Division
Office of Environmental Affairs
P.O. Box 44066, Capitol Station
Baton Rouge, LA 70804

Re: Incinerators No. 1, 2, & 3 Performance Test

Dear Mr. Von Bodungen:

In accordance with the Louisiana Emissions Standards for Hazardous Air Pollutants regulation Section 76.18 enclosed is the final report for the performance test of the VCM continuous monitoring system on Incinerators No. 1, 2, & 3, gathered on December 10, 1983 through December 14, 1983. Incinerator No. 4, which is temporarily out-of-service, was not tested due to problems with the in-stack analyzer. Per the verbal approval granted by your office, No. 4 Incinerator will be tested during the next period in which the Incinerator is operational.

Itemized below is a table of contents for the enclosed report on the performance test. If you should have any questions concerning this report, please call me at 318/491-4576.

Respectfully,

A handwritten signature in cursive script, reading 'Philip S. Trew'.

Philip S. Trew
Environmental Control Specialist

/bf
encl.
cc: Mr. Joe Withers

bcc: R. J. Samelson (letter only)
J. Fike (letter only)
E. J. Tullier (letter only)
B. Salter
C. Long
File #106.5.03

SL 047835

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PERFORMANCE SPECIFICATIONS AND RESULTS

<u>PARAMETER</u>	<u>SPECIFICATION</u>	<u>RESULTS</u>
1. Conditioning Period	<u>>96</u> hours	>96 hours
2. Operational Test Period	<u>>96</u> hours	96 hours
3. Calibration Error	<5% of each (midrange & high-range only) calibration gas valve	0.7% of span gas 1.5% of midrange gas
4. Response Time	<u><10</u> minutes	5½ minutes (ea)
5. Calibration Drift (2-hour)	<u><0.5</u> ppm VC	0.045ppm
6. Calibration Drift (24-hour)	<u><1.0</u> ppm VC	0.15ppm
7. Resolution:		
a. Data Recorder Chart	<u><0.05%</u> of fullscale	<0.05% of full scale
b. Data Logger Printer	<u><0.1</u> ppm VC	<0.1ppm VC
8. Relative Accuracy	<u><0.5</u> ppm VC	0.05ppm VC

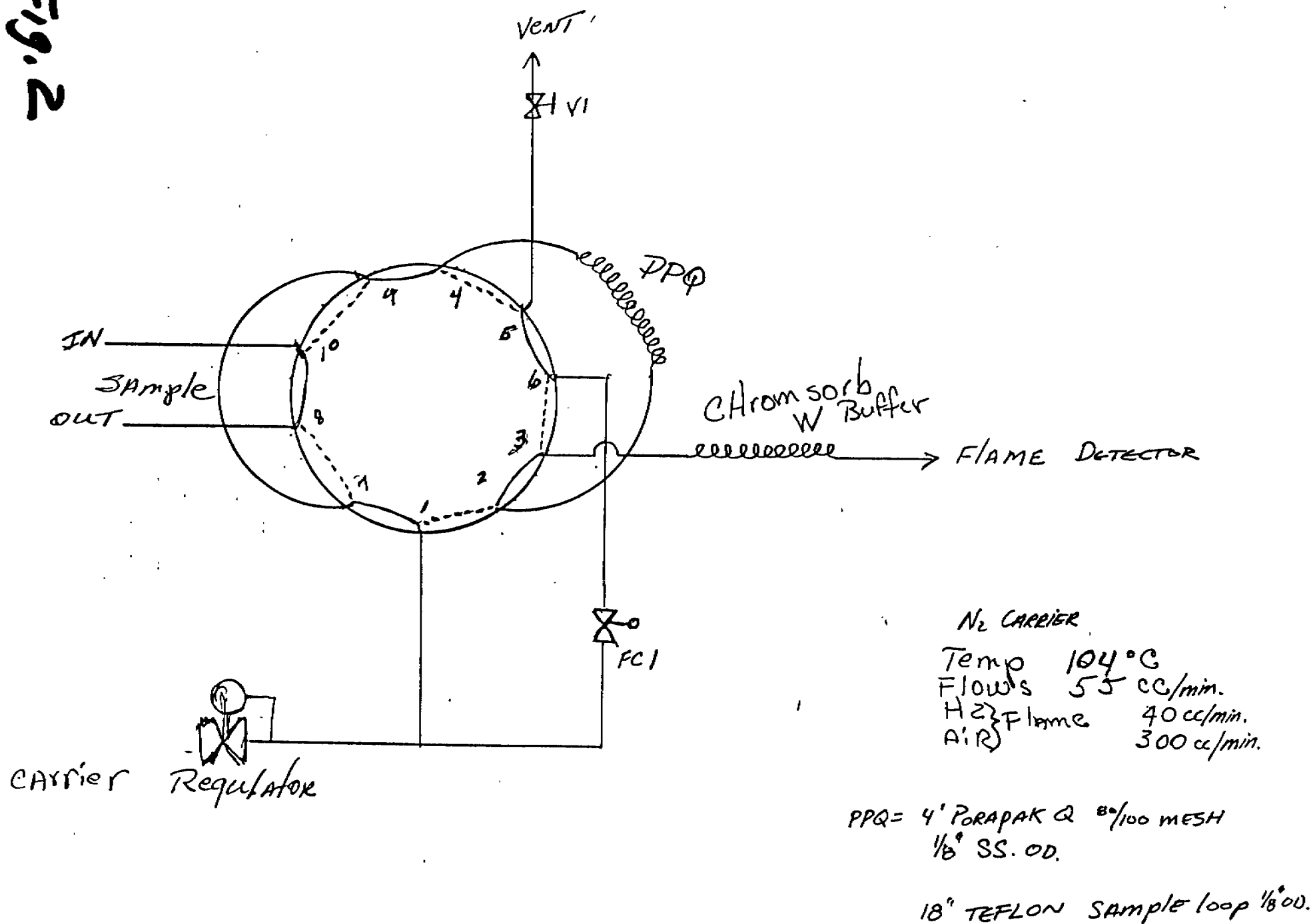
DESCRIPTION OF SYSTEM G. C.

The central portion of the monitoring system is an Arcas process gas chromatograph Model 905. The G. C. is equipt with an FID and a column system as outlined in Figure 2.

The recorder used in the system was manufactured by Linear Instruments Corporation and is a Model 142 with multiple ranges.

Fig. 2

STACK GC OLD OHe 1



Plumbing Schematic for VCM
INCINERATOR CONTINUOUS MONITORING SYSTEM
(And Performance Specification Testing)

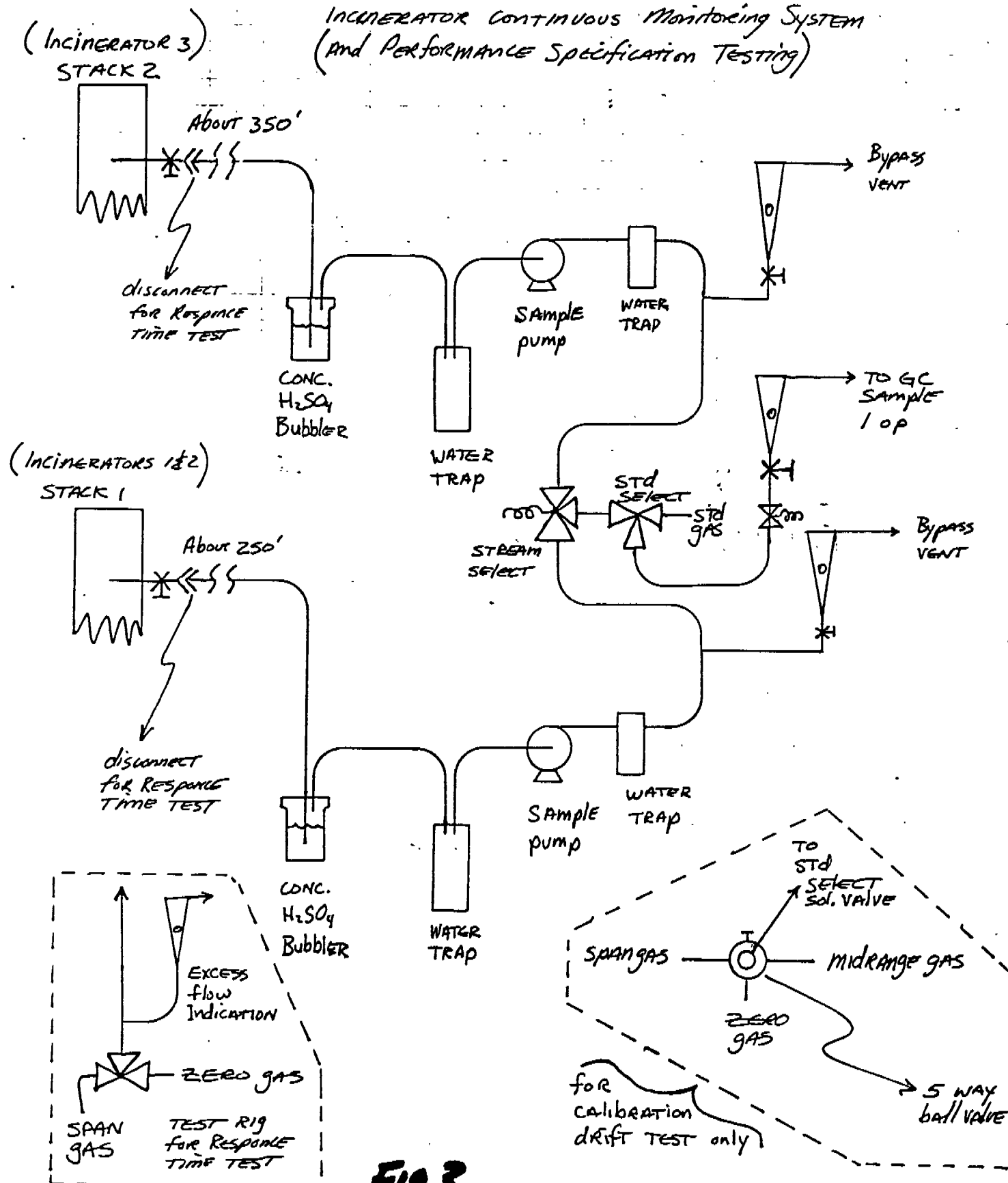


Fig 3

TABLE I

Data Set No.	Time Begin	Time End	Date	Zero Reading	Zero Drift (aZero)	Span Reading	Span Drift (aSpan)	Calibration Drift (aSpan-aZero)
1	10:00	10:06	12/10	.01	-.07	6.25	-.02	.05
2	12:06	12:12	12/10	.03	.02	6.20	-.05	-.07
3	14:02	14:14	12/10	.05	.02	6.33	-.13	.11
4	16:03	16:14	12/10	.00	-.05	6.32	-.01	.04
5	18:00	18:16	12/10	.06	.06	6.32	0	-.06
6	19:59	20:10	12/10	.05	-.01	6.29	-.03	-.02
7	08:00	08:39	12/11	.00	-.05	6.17	-.12	-.07
8	10:58	11:10	12/11	.00	0	6.10	-.07	-.07
9	13:04	13:10	12/11	.01	.01	6.11	.01	0
10	15:05	15:11	12/11	.00	-.01	6.06	-.05	-.04
11	17:01	17:06	12/11	.01	.01	6.01	-.05	-.06
12	19:07	19:13	12/11	.00	-.01	6.10	.09	.1
13	08:00	08:26	12/12	.03	.03	6.24	.14	.11
14	10:09	10:21	12/12	.00	-.03	6.24	0	.03
15	12:27	12:38	12/12	.01	.01	6.21	-.03	-.04

zero drift = [Mean Zero Drift] - 0.05 ± CI (zero) 0.189 ppm
 Calibration Drift = [Mean Span Drift] - 0.0239 ppm
 *Absolute Value. 0.004 0.041 0.045 ppm

Figure 3-1. Zero and Calibration Drift (2 Hour).

[illegible]

ZERO AND CALIBRATION DRIFT (TWO-HOUR)

<u>Δ Zero</u>		<u>Δ Span</u>	
<u>Xi</u>	<u>Xi²</u>	<u>Xi</u>	<u>Xi²</u>
-.07	.0049	-.02	.0004
.02	.0004	-.05	.0025
.02	.0004	.13	.0169
-.05	.0025	-.01	.0001
.06	.0036	.00	.0
-.01	.0001	-.03	.0009
-.05	.0025	-.12	.0144
.00	0	-.07	.0049
-.01	.0001	.01	.0001
-.01	.0001	-.05	.0025
.01	.0001	-.05	.0025
-.01	.0001	.09	.0081
.03	.0009	.14	.0196
-.03	.0009	.00	.0
<u>.01</u>	<u>.0001</u>	<u>-.03</u>	<u>.0009</u>
$\Sigma Xi = -.07 \quad \Sigma Xi^2 = .0167$		$\Sigma Xi = -.06 \quad \Sigma Xi^2 = .0783$	

$$\begin{aligned}
 \text{Zero Drift} &= | \text{Mean Zero Drift} | + C.1.(\text{Zero}) \\
 &= \left| \frac{1}{15} (-.07) \right| + \frac{2.145}{15\sqrt{14}} \sqrt{15(0.0167) - (-.07)^2} \\
 &= .005 + 0.0189 \\
 &= 0.0239
 \end{aligned}$$

$$\text{Calibration Drift} = | \text{Mean Span Drift} | + \text{C.I.}(\text{Span})$$

$$= \left| \frac{1}{15} (-0.06) \right| + \frac{2.145}{15\sqrt{14}} \sqrt{15(.0783) - (-0.06)^2}$$

$$= 0.004 + 0.041$$

$$= 0.045$$

ZERO AND CALIBRATION DRIFT (TWENTY-FOUR HOUR)

<u>Δ Zero</u>		<u>Δ Span</u>	
<u>Xi</u>	<u>Xi²</u>	<u>Xi</u>	<u>Xi²</u>
.08	.0064	.06	.0036
.03	.0009	-.13	.0169
.0	.0	.06	.0036
<u>-.01</u>	<u>.0001</u>	<u>.04</u>	<u>.0016</u>
ΣXi = -.06	ΣXi ² = 0.0074	ΣXi = 0.03	ΣXi ² = .0257

$$\text{Zero Drift} = | \text{Mean Zero Drift} | + \text{C.1.}(\text{Zero})$$

$$= \left| \frac{1}{4} (-.06) \right| + \frac{3.182}{4\sqrt{3}} \sqrt{4(0.0074) - (-.06)^2}$$

$$= 0.015 + 0.0836$$

$$= 0.0986$$

$$\text{Calibration Drift} = | \text{Mean Span Drift} | + \text{C.1.}(\text{Span})$$

$$= \left| \frac{1}{4} (0.03) \right| + \frac{3.182}{4\sqrt{3}} \sqrt{4(0.0257) - (.03)^2}$$

$$= 0.0075 + 0.1466$$

$$= 0.154$$

TABLE II

RELATIVE ACCURACY TEST

<u>Xi</u>	<u>Xi²</u>
6.27	39.31
6.25	39.06
6.20	38.44
6.33	40.07
6.32	39.94
6.32	39.94
6.29	39.56
6.17	38.07
6.10	37.21
6.11	37.33
6.06	36.72
6.01	36.12
6.10	37.21
6.24	38.94
6.24	38.94
$\Sigma Xi = \frac{6.21}{99.22} \text{ppm}$	$\Sigma Xi^2 = \frac{38.56}{615.42}$

$$\text{Relative Accuracy} = \text{Mean Reading} + \text{C.l. (Reading)}$$

$$\begin{aligned}
 &= \frac{1}{16} (99.22) + \frac{2.131}{16 \cdot 15} 16(615.42) - (99.22)^2 \\
 &= 6.2 + 0.05 \\
 &= 6.25 \text{ppm (for 6.3ppm standard)}
 \end{aligned}$$

TABLE III

CALIBRATION ERROR

$$\% \text{Calibration Error (2 hr)} = \frac{\text{Calibration Drift (2 hr)} \times 100}{\text{VC conc. in standard}}$$

$$= \frac{0.045 \times 100}{6.3} = 0.71\%$$

$$\% \text{Calibration Error (24 hr)} = \frac{\text{Calibration Drift (24 hr)} \times 100}{\text{VC conc. in standard}}$$

$$= \frac{0.154 \times 100}{10.5}$$

$$= 1.47\%$$

TABLE IV

Auto zero test

12-11-83

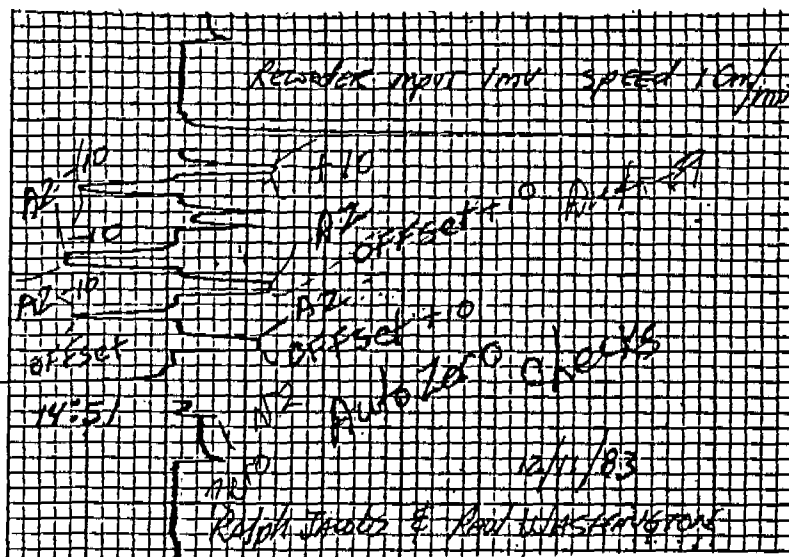


TABLE V

FIGURE 3-3 RESPONSE

Incinerators No. 1 & 2 (Stack No. 1)

Date of Test: 12/12/83

Span Gas Concentration: 10.5 ppm

Response:

A. Upscale

1. 1 cycles 10.5ppm

2. 1 cycles 10.57ppm

3. 1 cycles 10.53ppm

Average 1 cycles X cycle time: 330 sec/cycle

= Average upscale response time: 330 sec.

B. Downscale

1. 1 cycles 0.1ppm

2. 1 cycles 0.06ppm

3. 1 cycles 0.19ppm

Average 1 cycles X cycle time: 330 sec/cycle

= Average Downscale response time: 330 sec.

A Change gases at the same time the GC injects the sample.

TABLE V

FIGURE 3-3 RESPONSE

Incinerator No. 3 (Stack No. 2)

Date of Test: 12/13/83

Span Gas Concentration: 10.5 ppm

Response:

A. Upscale

1. 1 cycles 10.43ppm

2. 1 cycles 10.44ppm

3. 1 cycles 10.41ppm

Average 1 cycles X cycle time: 330 sec/cycle

= Average upscale response time: 330 sec.

B. Downscale

1. 1 cycles .00ppm

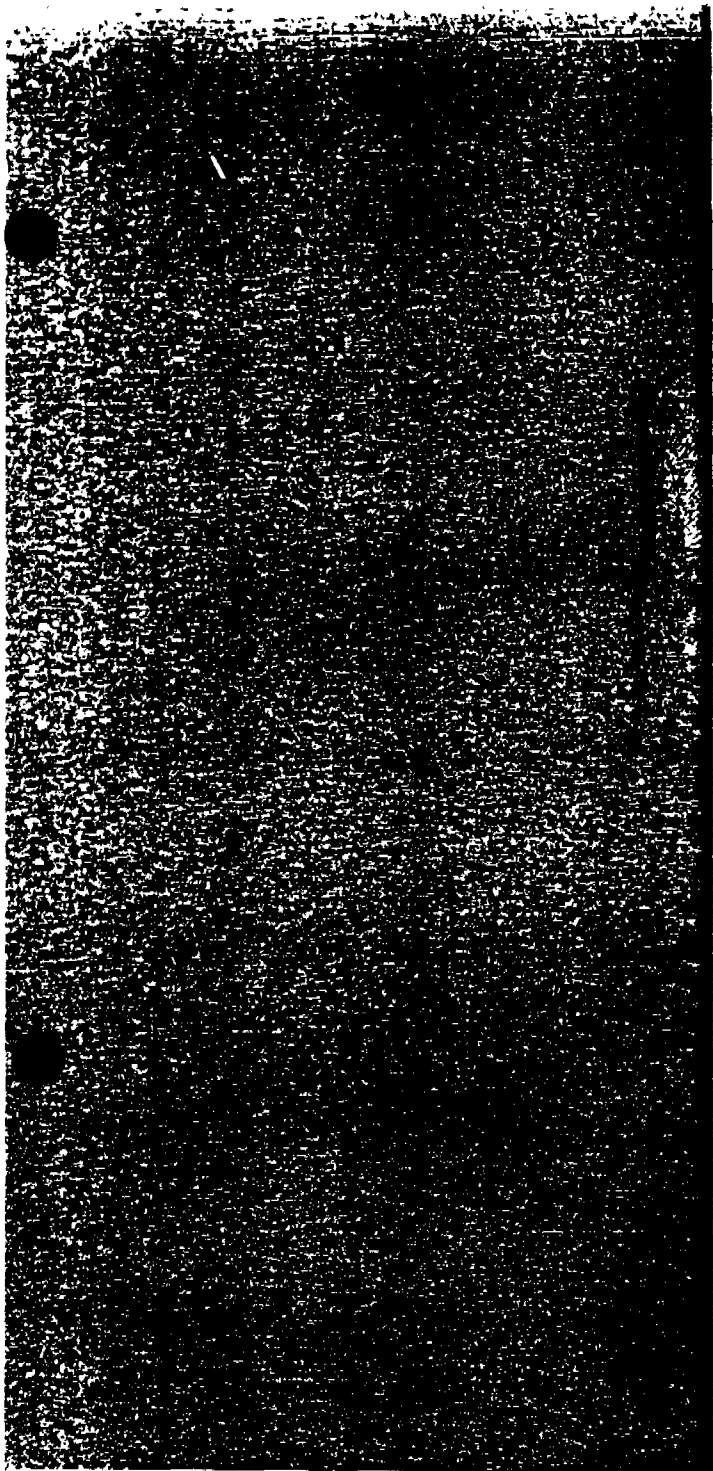
2. 1 cycles .05ppm

3. 1 cycles .51ppm

Average 1 cycles X cycle time: 330 sec/cycle

= Average Downscale response time: 330 sec.

A Change gases at the same time the GC injects the sample.



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CHART NO. 0100-0011

0 10 20 30 40 50 60 70 80 90 100

INJECT STD GAS 10.5

INJECT ZERO N₂

INJECT STD GAS 10.5

INJECT ZERO N₂

TABLE VI

LIQUID AIR INC. GAS MIXTURES

Cylinder No.	<u>SPAN GAS</u> T-125687	<u>MIDRANGE GAS</u> 20094
Composition:		
Vinyl Chloride	10.5ppm	6.3ppm
Nitrogen	Balance	Balance
NBS Std. No.	CC-36469	CC-36469
	CC-36452	CC-36452
	CC-36416	CC-36416
Cylinder Exp. Date	12/8/85	12/8/85



AIR LAB
A division of
LIQUID AIR INC.

P. O. Box 1020 • Lake Charles, Louisiana 70602

ANALYSIS CERTIFICATION

CYLINDER NO. 20094

VALVE 350

DATE Dec. 8, 1983

Customer PPG

P. O. No. _____

Order Date 12/8/83 Shipped 12/8/83

I.D. No. _____

COMPONENT

REQUESTED

ANALYSIS

VINYL CHLORIDE

5 PPM

6.3 PPM

NITROGEN

BALANCE

NBS STD #CC-36469

CC-36452

CC-36416

Make Date 12/8/83 Exp. Date 12/8/85 Cylinder Pressure 2000#

In general, the accuracy of Analysis
is $\pm 1\%$ of Component Value.

* Analysis is Percent by Volume
Unless Otherwise Specified.

John Arnold
ANALYST



AIR LAB
A division of
LIQUID AIR INC.

P. O. Box 1020 • Lake Charles, Louisiana 70602

ANALYSIS CERTIFICATION

CYLINDER NO. T-125687

VALVE 350

DATE Dec. 8, 1983

Customer PPG

P. O. No. _____

Order Date 12/8/83 Shipped 12/8/83

I.D. No. _____

COMPONENT

REQUESTED

ANALYSIS*

VINYL CHLORIDE

10 PPM

10.5 PPM

NITROGEN

BALANCE

NBS STD #CC-36469

CC-36452

CC-36416

Make Date 12/8/83 Exp. Date 12/8/85 Cylinder Pressure 2000#

In general, the accuracy of Analysis
is $\pm$ 1% of Component Value:

* Analysis is Percent by Volume
Unless Otherwise Specified.

John Arnold
ANALYST