Air Products and Chemicals INC.

ESCAMBIA PLANT

INTEROFFICE MEMORANDUM

To: R. L. Duggan

Date: 19 October 1978

Copies:

From: L. W. Allen/R. H. Sroufe

Re: VCL Emission Test
Escambia PVC Plant

The VCL emission test was completed on the PVC Plant, and the plant is in compliance. The test was conducted on 17 October as scheduled. Mr. Bill Thomas, Florida Department of Environmental Regulation (Bureau of Air Quality Management) witnessed the test, and Dr. James Wu, EPA, who arrived after testing, reviewed all of the procedures and results. Equipment operating data was taken and is attached. Analytical data for all analyses are also attached. The attached report contains the following.

- Description of equipment.
- Conditions during tests.
- Production calculations.
- Emission test procedures.
- Emission test results.

L Wm Allen R H Sroufe

L. W. Allen/R. H. Sroufe

LWA-RHS:fls

Attachments

AP00042823

Air Products and Chemicals, INC.
ESCAMBIA PLANT

I. PVC THERMAL OXIDIZER

The purpose of the thermal oxidizer is to reduce the vinyl chloride monomer discharged to the air below 10 ppm concentration (measured by Method 106).

Process gases are purged from the vinyl chloride recovery system. The system consists of compressors and heat exchangers (cooling water, refrigerated water, and freon).

On October 17, 1978, the entire heat exchanger system was shut down. This was done to provide an adequate vinyl chloride feed for the thermal oxidizer. Shutting down the heat exchanger system is not standard procedure. This increased the vinyl chloride in the feed composition above normal operating levels.

Thermal oxidizer feed samples and flow measurements were taken hourly. The vinyl chloride concentration in the feed increased from 42.2% to 60.8%. Mass flow rate of vinyl chloride increased from 21.76 lbs. per hour to 34.63 lbs. per hour.

Method for Calculation of Vinyl Chloride Feed Flow to the Thermal Oxidizer - Example:

Basis: A Gas Chromatographic Analysis was done on feed samples.

O_2	7.1%
N_2	44.9%
CO	1.8%
CO_2	3.8%
CH_3Cl	.2%
Vinyl Chloride	42.2%

Specific Gravity of Gas 1.5; Feed Tank Pressure 30 psig; Ambient Temperature 52°F.

Principles and Practice of Flow Meter Engineering. by L. K. Spink 9th Edition, Nov. 1975.

$QN = Cg_1\ F_{tf}\ Fg\ Fpv\ Fa\ \sqrt{ha\ P_f}$

Cg_1 = Orifice Size = .250" = (17.84) pg 187

Ftf = Flowing Temperature, pg. 454 (1.008)
Fg = Specific Gravity, pg. 455 (.8165)
Fpv = Compressibility Factor, pg. 464 (1.026)
Fa = Temp. Correction on Orifice, pg. 156 (1.000)

AP00042824

I. PVC THERMAL OXIDIZER (cont'd)

$$Qn = (17.84)(1.008)(.8165)(1.026)(1.000)\left(\sqrt{\frac{(20)(44.7)}{\text{psia}}}\right) = 450 \text{ SCFH}$$

$$PPH = \frac{SCFH \times S.G.}{13.1} = \frac{450 \times 1.5}{13.1} = 51.52 \text{ \#/hr. of waste gas}$$

Vinyl Chloride Flow = 51.52 #/hr. x .422 = 21.74 #/Hr.

Thermal Oxidizer Emission Tests

The thermal oxidizer was sampled and analyzed on 17 October according to EPA Method 106. The testing began as scheduled at 7:30 a.m. Three samples were taken.

During the tests the stack air flow was constant at 202 SCFM according to a pitot manometer. The sample air flow was constant at 1.42 liters per minute to provide an 85 liter sample each hour. The rigid leakproof container and Tedlar sample bags were leak checked prior to and after testing. The equipment was found to be sealed in accordance with Method 106.

The gas samples were taken to the lab immediately after sampling. The samples were protected from sunlight and analyzed within 4 hours. Method 106 was used on all analyses. The test results are detailed below:

Thermal Oxidizer Emissions Test

	Test 1	Test 2	Test 3	Average
Sample Time	1 hour	1 hour	1 hour	
Sample Volume	85 liters	85 liters	85 liters	
% Oxygen	7.1	6.9	5.5	
PPM, VCl	None Detected	None Detected	1.52	< 1.5 ppm

The analytical results and operating data of each test run are attached in the Appendix.

AP00042825

Air Products and Chemicals, Inc.
ESCAMBIA PLANT

II. NORTH LINE STRIPPER COLUMN

The north line stripper is designed to reduce the vinyl chloride below 400 ppm concentration in the slurry from the north line reactors. (measured by Method 107). This is accomplished by 40 pound steam flowing up through stripping column and heating the slurry to flash off the vinyl chloride. The vinyl chloride gas is then cooled in the overhead condenser. Vent from the condenser is sent to the recovery system. The liquid is sent to the waste water stripping column.

During the test period the stripper operated at design rates which are greater than normal permitted rates.

Sample Calculation

Basis: Operating Conditions During EPA Testing Period - 10/17/78

$$\frac{\text{lb. PVC}}{\text{hr.}} = \text{Slurry Feed (gpm)} \times 8.33 \frac{\text{lb.}}{\text{gal.}} \times 1.11 \text{ slurry specific gravity} \times 0.32 \frac{\text{lb. PVC}}{\text{lb. slurry}} \times 60 \frac{\text{min.}}{\text{hr.}}$$

$$\frac{\text{lb. PVC}}{\text{hr.}} = 112 \text{ gpm} \times 8.33 \text{ \#/gal.} \times 1.11 \times .32 \frac{\text{\#/PVC}}{\text{\# slurry}} \times 60 \text{ min/hr.}$$

$$= 19,883.24 \text{ \#/hr., rate}$$

This translates to an equivalent annual production rate of 174.2 MM pounds of PVC. The north line rated production capacity is 120 MM pounds of PVC per year.

AP00042826

Air Products and Chemicals, Inc.
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II. NORTH LINE STRIPPER COLUMN

North Line Stripper Emission Test

The north line stripper was sampled and analyzed on 17 October according to EPA Method 107. The testing began as scheduled. Three samples were taken.

Prior to sampling, the sample line was completely purged. 60 ml. sample bottles with waxed lined screw tops were used. After sampling the bottles were taken to the lab for immediate analysis. Operating data was collected during the tests and is attached in the appendix. The test results are detailed below.

North Line Stripper Column Emissions Test

	Test 1	Test 2	Test 3	Average
Sample time	7:30 a.m.	9:10 a.m.	10:45 a.m.	
Sample volume	60 ml	60 ml	60 ml	
ppm VCL	47.9	160.2	161.2	122.9 ppm

The analytical results of each test are attached in the appendix.

AP00042827

Air Products and Chemicals, INC.
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III. SOUTH LINE STRIPPER COLUMN

The south line stripper is designed to reduce the vinyl chloride concentration in the slurry from the south line reactors below 400 ppm. (measured by Method 107). This is accomplished by 40 pound steam flowing up through the stripping column and heating the slurry to flash off the vinyl chloride. The vinyl chloride gas is then cooled in the overhead condenser. Vent from the condenser is sent to the recovery system. The liquid is sent to the waste water stripping column.

During the test period the stripper operated at design rate which is greater than normal, permitted rates.

Sample Calculation

Basis: Operating Conditions During EPA Testing Period 10/17/78

$$\frac{\text{Lb. PVC}}{\text{hr.}} = \text{Slurry Feed (gpm)} \times 8.33 \frac{\text{lb.}}{\text{gal.}} \times 1.11 \text{ Slurry Specific Gravity} \times 0.32 \frac{\text{lb. PVC}}{\text{lb. slurry}} \times 60 \frac{\text{min.}}{\text{hr.}}$$

$$\frac{\text{Lb. PVC}}{\text{hr.}} = 41 \text{ gpm} \times 8.33 \text{ \#/gal.} \times 1.11 \times \frac{.32 \text{ \#PVC}}{1\text{\# slurry}} \times 60 \frac{\text{min.}}{\text{hr.}}$$

$$= 7,278.7 \text{ \#/hr.}$$

This translates to an annual production rate of 63.8 MM pounds of PVC. The south line production capacity is 30 MM pounds of PVC per year.

South Line Stripper Emission Test

The south line stripper was sampled and analyzed on 17 October according to EPA Method 107. The test began as scheduled at 7:30 a.m. Three samples were taken.

Prior to sampling, the sample line was completely purged. 60 ml sample bottles with waxed lined screw tops were used. After sampling, the bottles were taken to the lab for immediate analysis. Operating data was collected during the tests and is attached in the appendix. The test results are detailed below:

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III. South Line Stripper Column (continued)

South Line Stripper Emissions Test

	Test 1	Test 2	Test 3	Average
Sample Time	9:25 a.m.	11.50 a.m.	12.40 p.m.	
Sample Volume	60 ml	60 ml	60 ml	
PPM, VCl	21.39	17.55	17.70	18.86 ppm

The analytical results of each test are attached in the Appendix.

AP00042829

Air Products and Chemicals, Inc.
ESCAMBIA PLANT

IV. WASTE WATER STRIPPING COLUMN

The stripping column is designed to strip vinyl monomer from water streams that contain more than 10 ppm vinyl chloride. Forty pound steam is fed into the column to flash the vinyl chloride out of the water.

During the test period the stripper operated at design rate which is greater than normal, permitted production rates.

Sample Calculation

Basis: Operating Conditions During EPA Testing Period - 10/17/78

$$\text{Feed } \frac{\text{lb.}}{\text{hr.}} = \text{Flow in } \frac{\text{Gal.}}{\text{min.}} \times 60 \frac{\text{min.}}{\text{hr.}} \times 8.33 \frac{\text{lb.}}{\text{hr.}} = 20 \frac{\text{gal.}}{\text{min.}} \times 60 \frac{\text{min.}}{\text{hr.}}$$

$$\times 8.33 \frac{\text{lb.}}{\text{hr.}} = 9,996 \frac{\text{lb.}}{\text{hr.}}$$

Under normal plant operating conditions the column feed is 5,998 $\frac{\text{lbs.}}{\text{hr.}}$

WASTEWATER STRIPPER EMISSION TEST

The wastewater stripper was sampled and analyzed on 17 October according to EPA Method 107. The test began as scheduled at 7:30 a.m. Three samples were taken.

The stripper was sampled using 50 ml Hypo-vials sealed with teflon faced Guf-Bond discs. The sample vials were capped with aluminum foil without the discs and muffled at 400°C for one hour prior to testing. The sample line was purged and the vials were filled bubble free. The vials were sealed and taken to the lab for immediate analysis. The samples were refrigerated until analyzed.

Operating data was collected during the tests and is attached in the Appendix. The test results are detailed below:

Waste Water Stripper Emissions Test

	Test 1	Test 2	Test 3	Average
Sample Time	7.35 a.m.	9:15 a.m.	10:40 a.m.	
Sample Volume	50 ml	50 ml	50 ml	
PPM, VCl	4.67	5.37	11.99	7.34 ppm

AP00042830

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V. EQUIPMENT AND METHOD USED TO ELIMINATE REACTOR OPENING LOSSES

Reactors are not being opened on a routine basis. Spray rinse timers have been installed on reactor sight glasses to improve visibility. This improved visibility eliminates the need for opening the reactors when coupled with the established chemical cleaning system.

A fill water system exists to fill the reactors completely (100%) with water before chemical cleaning. The vinyl chloride is purged from the reactors to the recovery system. This effectively eliminates the presence of vinyl chloride during chemical cleaning.

REACTOR OPENINGS

The emissions from reactor openings are essentially zero. The reactors are completely water filled and evacuated prior to openings. Therefore, emission testing is not required.

EPA observer, Dr. James Wu, accepted the system of abatement as a procedure. No emissions tests were required.

10/19/78

AP00042831

APPENDIX

I. Analytical Data

- Analytical Log Sheet - Test Results
- Method 107 GC Strip Chart
- Method 107 Integrator Tape
- Method 106 GC Strip Chart
- Thermal Oxidizer Feed Analysis

II. Equipment Operating Data

- North Line Stripper
- South Line Stripper
- Wastewater Stripper
- Thermal Oxidizer

AP00042832

ANALYTICAL DATA

AP00042833

ANALYTICAL LOG SHEET

TEST RESULTS

AP00042834

P.V.C. SLURRY AND VENT GAS RESULTS

SAMPLE I.D.	NORTH STRIP 1ST	NORTH STRIP 2ND	SOUTH STRIP 1ST		WASTE H_2O 1ST	WASTE H_2O 2nd	NORTH STRIP 3rd	WASTE H_2O 3rd	SOUTH STRIP 2nd	SOUTH STRIP 3rd			
DATE	10-17	10-17	10-17		10-17	10-17	10-17	10-17	10-17	10-17			
TIME							11 08 AM	11 50 PM	11 45 AM	12 45 P			
TARE	16.1937	16.2178	16.2075		16.2157	16.1531	16.0245	16.0420	16.1246	16.1070			
TOTAL WT.	17.2140	17.2465	17.2240		17.2175	17.1805	17.1021	17.0695	17.5131	17.2125			
SAMP. WT.	1.0208	1.0287	1.0165		1.0016	1.0274	1.0776	1.0275	1.3885	1.1055			
TOTAL SOLIDS	.6835	.7125	.7107		/	/	.7153	/	.6725	.6429			
SCALING FACTOR	62.43	61.92	62.62		60.90	61.43	59.32	61.42	47.15	58.08			
POSITION #	7	8	9		10	11	12	13	14	15			
TIME IN	9 50 AM	9 50 AM	9 50 AM		10 15 AM	10 15 AM	11 45	11 45	12 05 P	1 PM			
INJ. TIME	10:55	11:00	11:05		12:15	12:48	1 45 PM	2 00 PM	2 05 P				
COUNTS	23950	12829	8022		5686	6493	144213	14098	15575	14545			
PER VOL	47.93	11.22	21.39		4.67	5.37	161.2	11.99	17.55	17.70			
H_2	2.05%												
O_2	2.1												
AIR	8.3												
BUTH T° C	90.5												
OVEN T° C	50												
DETECTOR T° C	150												
INJECTOR T° C	150												
NEEDLE T° C	150												
CHART SPEED	5 mm/min												
ATT. SETTING	X5												
RANGE	X10												
CAB PRESSURE													
CAB TEMP. C°													

AP00042835

P.V.C. [redacted] VENT GAS RESULTS — Thermal Oxidizer

SAMPLE I.D.	#1	#2	#3										
DATE	10-17	10-17	10-17										
TIME													
TARE													
TOTAL WT.													
SAMP. WT.													
TOTAL SOLIDS													
SCALING FACTOR													
POSITION #													
TIME IN													
INJ. TIME	12:30	12:30	12:30										
COUNTS	0	0	4109										
PPM VCM	N.D.	N.D.	1.52										
H_2	40 cc	40 cc	40 cc										
H_2	30 cc	30 cc	30 cc										
AIR	300 cc	300 cc	300 cc										
LOOP T° C	82	82	82										
OVEN T° C	100	100	100										
DETECTOR T° C	150	150	150										
INJECTOR T° C	150	150	150										
BLEED T° C													
CHART SPEED	15 in/hr	15 in/hr	15 in/hr										
ATT. SETTING	1	1	1										
RANGE	1	1	1										
LAB PRESSURE mm Hg	761	761	761										
LAB TEMP. T° C	25	25	25										

AP00042836

METHOD 107

INTEGRATOR TAPE

Column 2 6' x 1/8 SS packed w 0.2% Carbowax 1500
on Carbopack C 800/100 mesh

Carrier flow 20 we/min.

Chart speed 5 mm/min.

Stds. 4190 ppm
1999 ppm
514 ppm
55 ppm

AP00042837

Integrator Tape for Method 107

4130 ppm std

```
#107  FILE  1
  3 XD     1016 ID

METHOD 3
                1/ 1 CAL
                 /   ANL

TIME sec        AREA of peak
 119             2162 2
 128           303743 3
 182              263
                306168

TIME   KF     CONC
 128 7350  413.00R3

TIME   KF     CONC
 126
 128 7350  413.00
 132
       KF EXP    1
       - - - -
```

Det time of VCm

Response factor from peak area

1979 ppm std

```
#108  FILE  1
  4 XD     1016 ID

METHOD 3
                1/ 1 CAL
                 /   ANL

TIME            AREA
 127           150645
 181              127
                150772

TIME   KF     CONC
 127 7540  199.90R

TIME   KF     CONC
```

AP000428 38

```
      RF EXP    1
      - - - -


      1977 ppm std
#108  FILE  1
  4 X0     1016 ID

METHOD 3
              1/ 1 CAL
               /   ANL

TIME          AREA
 127        150645
 181           127
            150772

TIME  RF     CONC
 127 7540 199.90R

TIME  RF     CONC
 126
 127 7540 199.90
 132
      RF EXP    1
      - - - -


      514 ppm std
#109  FILE  1
  5 X0     1016 ID

METHOD 3
              1/ 1 CAL
               /   ANL

TIME          AREA
 119           317 2
 128         34017 3
             34334

TIME  RF     CONC
 128 6600 514.00R3
```

AP0042839

514 ppm std

#109 FILE 1
5 XD 1016 ID

METHOD 3
1/ 1 CAL
/ ANL

TIME	AREA	
119	317	2
128	34017	3
	34334	

TIME	KF	CONC
128	6600	514.00R3

TIME	KF	CONC
126		
128	6600	514.00
132		

55 ppm std

#110 FILE 1
6 XD 1016 ID

METHOD 3
1/ 1 CAL
/ ANL

TIME	AREA	
119	381	2
128	4508	3
	ARR9	

AP00042840

- - - -

55 ppm std

#110 FILE 1
6 XD 1016 ID

METHOD 3
1/ 1 CAL
/ ANL

TIME	AREA
119	381 2
128	4508 3
	4889

TIME	KF	CONC
128	8200	55.00R3

TIME	KF	CONC
128	8200	55.00

- - - -

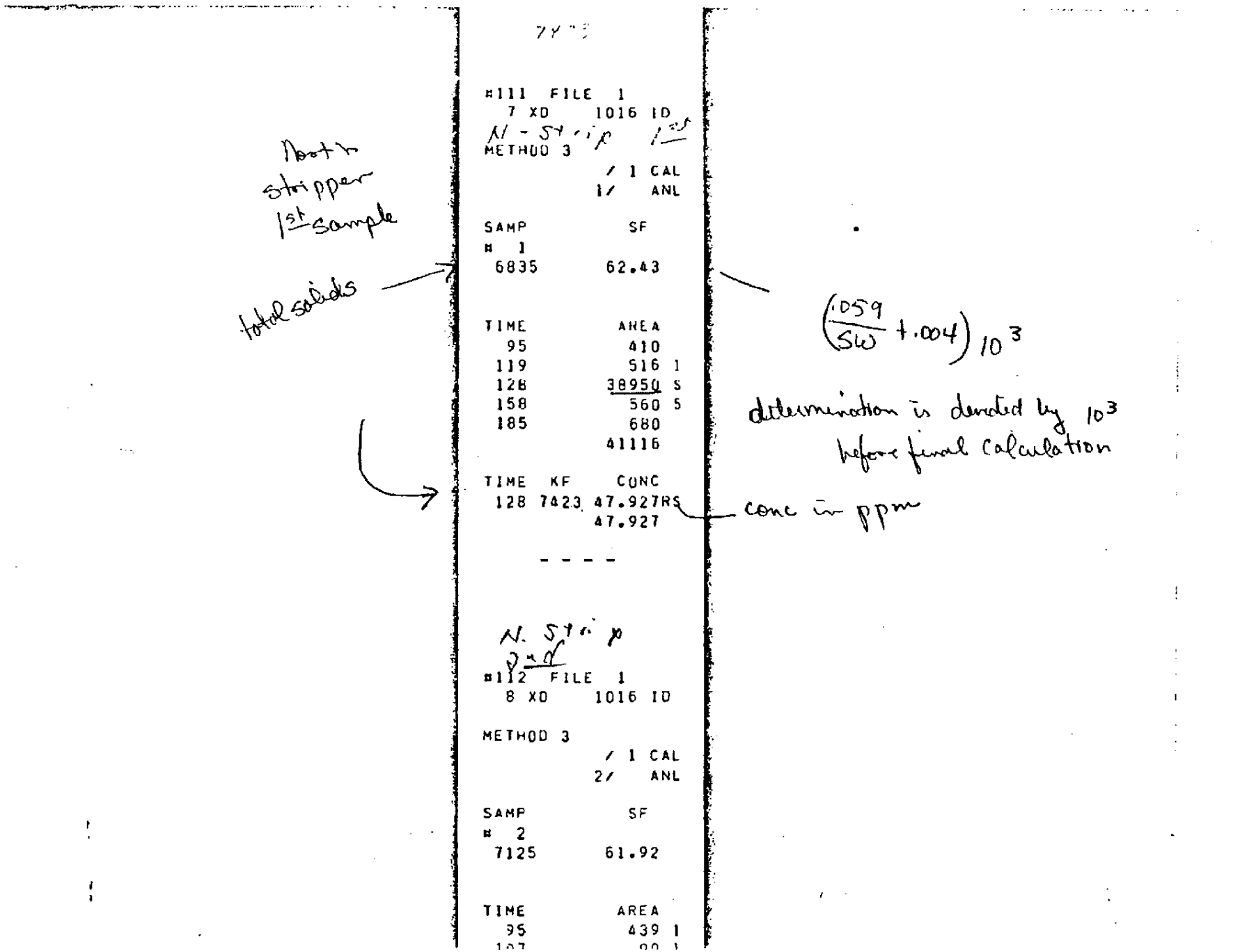
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#111 FILE 1
/ XD 1016 ID
N - Std. ppb 12
METHOD 3
/ 1 CAL
1/ ANL

SAMP #	SF
1	
6835	62.43

TIME	AREA
95	410

AP0004284


77 "3
#111 FILE 1
7 XD 1016 ID
N - Strip 1st
METHOD 3
/ 1 CAL
1/ ANL
SAMP SF
1
6835 62.43
TIME AREA
95 410
119 516 1
128 38950 S
158 560 5
185 680
41116
TIME KF CONC
128 7423 47.927RS
47.927
- - - -
N. Strip
P-A
#112 FILE 1
8 XD 1016 ID
METHOD 3
/ 1 CAL
2/ ANL
SAMP SF
2
7125 61.92
TIME AREA
95 439 1
Boat in stripper 1st sample
total solids
$\left(\frac{1059}{SW} + .004\right) 10^3$
determination is denoted by 10^3 before final calculation
conc in ppm

AP00042842

AV Short Prof
Proof Corrections

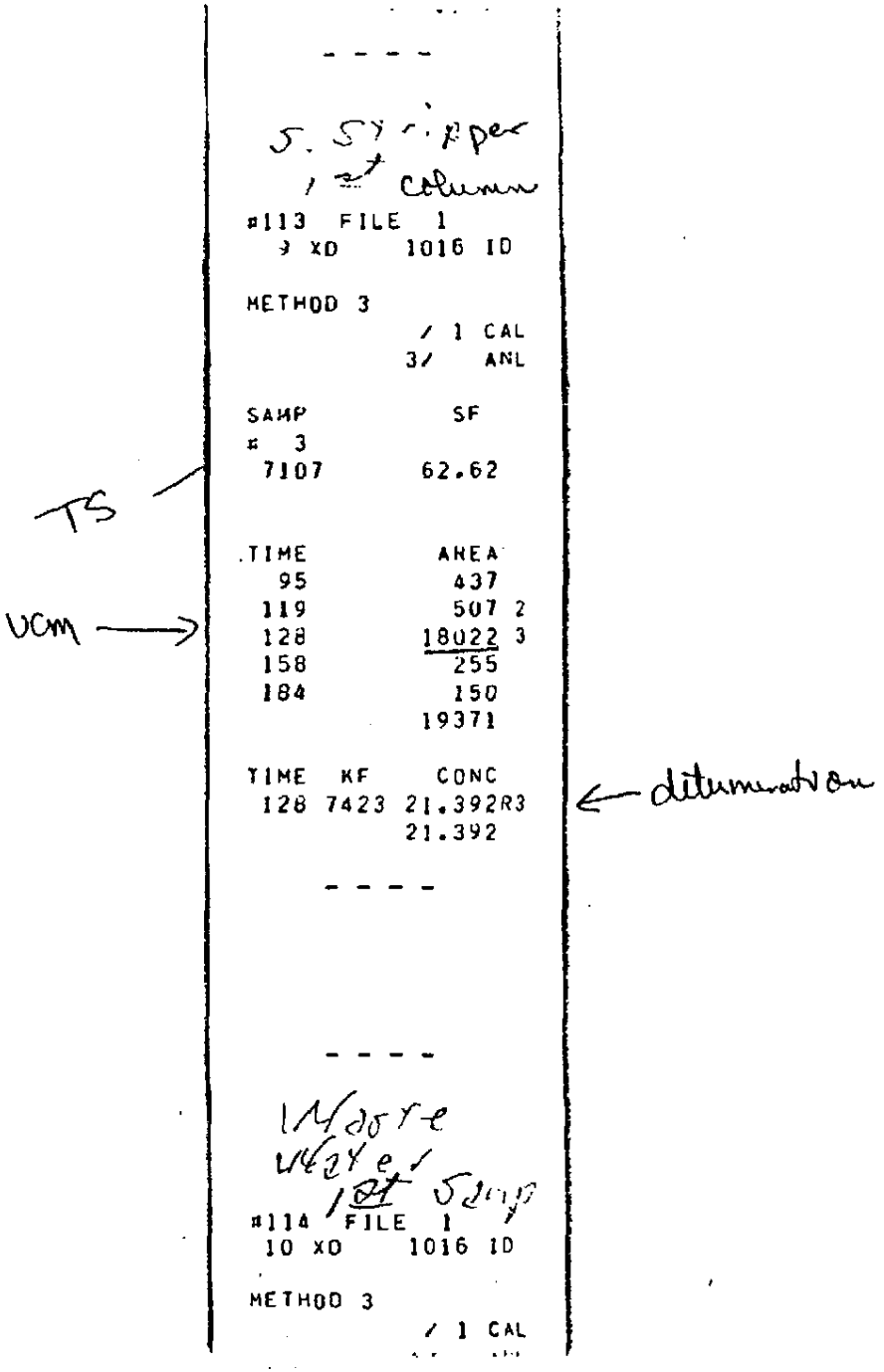
TIME OF COMC
128 7423 160.1ARS
160.194

#113 FILE 1
1016 ID

METHOD 3

AP00042843

AP00042844



- - - -

5.5 ppb per 1st column

#113 FILE 1
3 XD 1016 ID

METHOD 3
/ 1 CAL
3/ ANL

SAMP	SF
# 3	
7107	62.62

TS

TIME	AREA	
95	437	
119	507	2
128	18022	3
158	255	
184	150	
	19371	

VCM →

TIME	RF	CONC	
128	7423	21.392R3	← determination
		21.392	

- - - -

- - - -

Waste water 1st 5 pts

#114 FILE 1
10 XD 1016 ID

METHOD 3
/ 1 CAL

AP0004284S

- - - -

Waste Water Sample

#114 FILE 1
10 XD 1016 ID

METHOD 3
/ 1 CAL
4/ ANL

SAMP #	SF
1	60.90

TIME	AREA
94	538 2
107	145 2
119	831 2
128	5686 3
262	48
	7248

VCM →

TIME	KF	CONC
128	7423	4.665R3
		4.665

- - - -

Waste Water

#115 FILE 1
11 XD 1016 ID

METHOD 3
/ 1 CAL
5/ ANL

SAMP #	SF
2	61.43

AP00042846

- - - -

Waste Water sample

#115 FILE 1
11 XD 1016 ID

METHOD 3

/ 1 CAL
5/ ANL

SAMP	SF
# 2	
	61.43

TIME	AREA	
95	547	2
107	146	2
119	701	2
128	6483	3
218	145	
263	72	
	8094	

UCM →

TIME	KF	CONC
128	7423	5.365R3
		5.365

UCM →

- - - -

N. Sxr. D

#116 FILE 1
12 XD 1016 ID

METHOD 3

/ 1 CAL
6/ ANL

SAMP	SF
# 1	
7153	59.32

5.365

- - - -

N. Strip
3rd sample

#116 FILE 1
12 XD 1016 ID

METHOD 3
/ 1 CAL
6/ ANL

SAMP #	SF
1	
7153	59.32

TIME	AREA	
94	375	1
119	429	1
128	144213	S
159	1569	6
187	2619	7
	149225	

TIME	KF	CONC
128	7423	161.16RS
		161.116

- - - -

Waste water
3rd

#117 FILE 1
13 XD 1016 ID

METHOD 3
/ 1 CAL
7/ ANL

SAMP #	SF
2	
	61.42

AP00042847

Water Wipe
Lab sample

#117 FILE 1
13 XD 1016 ID

METHOD 3

/ 1 CAL
7/ ANL

SAMP	SF
# 2	61.42

TIME	AREA
95	291 2
108	320 2
119	701 2
128	1449B 3
219	174
	15984

Vom

TIME	KF	CONC
128	7423	11.996R3
		11.996

- - - -

U. Start, 10

#118 FILE 1
14 XD 1016 ID

METHOD 3

/ 1 CAL
8/ ANL

SAMP	SF
# 3	
b725	47.15

AP00042848

5.4 ppm
2 na sample

#119 FILE 1
14 XD 1016 ID

METHOD 3
/ 1 CAL
8/ ANL

SAMP	SF
# 3	
6725	47.15

TIME	AREA	
95	602	
119	554	2
128	18578	3
159	319	
137	275	
	20328	

vom →

TIME	KF	CONC
128	7423	17.547R3
		17.547

- - - -

5.54 ppm
3 na

#119 FILE 1
15 XD 1016 ID

METHOD 3
/ 1 CAL
9/ ANL

SAMP	SF
# 1	
6429	58.08

TIME	AREA	
95	447	
119	258	2
128	14545	3

AP00042849

17.547

- - - -

5, 5Tv. ppb
3 ~ 9 sample

#119 FILE 1
15 XD 1016 ID

METHOD 3

/ 1 CAL
9/ ANL

SAMP	SF
# 1	
6429	58.08

TIME	AREA
95	447
119	258 2
128	14545 3
159	228
186	249
	15727

TIME	RF	CONC
128	7423	17.702R3
		17.702

- - - -

VOA →

Second -
C2 Fib-3X, 0%
5 4.075
499

#120 FILE
18 XD 1016 ID

METHOD 3

AP000042850

AP00042851

Second Calibration shot

419 ppm std

```
#120  FILE
 18 XD     1016 ID

METHOD 3
              1/ 1 CAL
               /   ANL

TIME           AREA
 128         303142
 182            273
             303415

TIME  KF      CONC
 128 7340  413.00R

TIME  KF      CONC
 128 7340  413.00
       KF EXP    1
       - - - -
```

UCM →

Response factor

Conc. of std.

1999 ppm std

```
#121  FILE  1
 19 XD     1016 ID

METHOD 3
              1/ 1 CAL
               /   ANL

TIME           AREA
 129         151040
 182            118
             151158

TIME  KF      CONC
 129 7560  199.90H

TIME  KF      CONC
 129 7560  199.90
       KF EXP    1
       - - - -
```

TIME KF CONC
129 7500 199.90
KF EXP 1
- - - - -

5% 3M Std

#122 FILE 1
20 XD 1016 ID

METHOD 3
1/ 1 CAL
/ ANL

TIME	AREA
94	96
119	67 2
128	27297 3
	27460

TIME KF CONC
128 5300 514.0QR3

TIME KF CONC
128 5300 514.00
- - - -

5 5 PPM Std

#123 FILE 1
21 XD 1016 ID

METHOD 3
1/ 1 CAL
/ ANL

TIME	AREA
119	85 2
128	4371 3
	4456

TIME KF CONC
128 7300 55.00R3

TIME KF CONC

AP00042852

THERMAL OXIDIZER FEED ANALYSIS

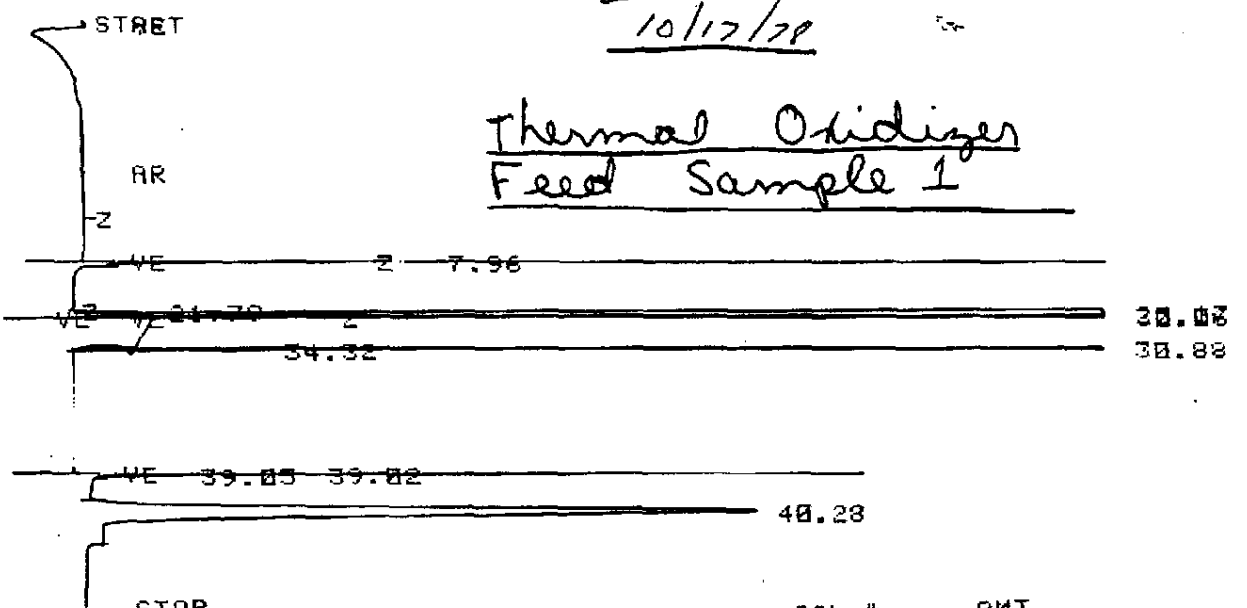
AP00042853

090

TK. press = 30#

7:30 AM
10/17/78

Thermal Oxidizer Feed Sample 1



RT	EXP RT	AREA		CAL #	AMT
30.06	30.04	306100		7	6.822 O_2
30.88	30.97	1238000	R	1	42.955 N_2
34.32	34.33	44320		9	1.670 CO
40.28	40.17	99400		10	3.625 CO_2

XF: 1.0000 E+ 0

HP 5830A
AREA %

RT	AREA	AREA %	
7.96	33460	0.967	
21.79	10680	0.309	MeCl = 0.2
25.17	1717000	49.601	VCM = 40.5
30.06	306100	8.843	
30.88	1238000	35.763	
34.32	44320	1.280	
39.02	6698	0.193	
39.05	5980	0.173	
40.28	99400	2.871	

XF: 1.0000 E+ 0 1.049

O_2 = 6.8
N_2 = 42.0
CO = 1.7
CO_2 = 3.6
MeCl = 0.2
VCM = 40.5
95.8

O_2 = 7.1	× 1.43	= 10.2
N_2 = 44.9	× 1.25	= 56.1
CO = 1.8	× 1.25	= 2.3
CO_2 = 3.8	× 1.98	= 7.5
MeCl = 0.2	× 2.31	= .5
VCM = 42.8	× 2.79	= 119.7

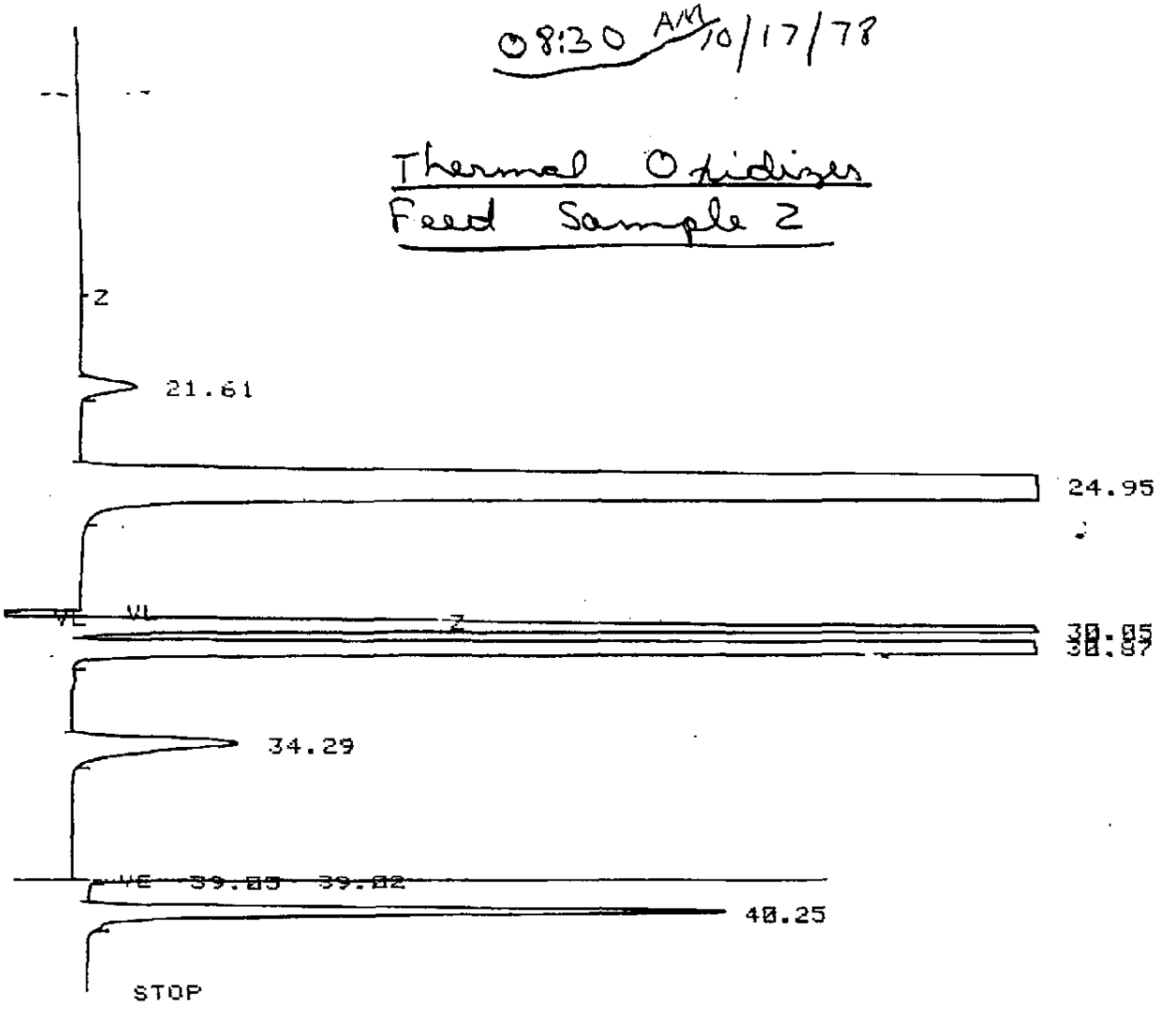
$\frac{119.7}{194.3} = 1.94$ lb

Sp. Gr. = 1.51

AP00042854

08:30 AM 10/17/78

Thermal Oxidizer
Feed Sample 2



hp 5830A
ESTD

RT	EXP RT	AREA		CAL #	AMT
30.05	30.03	301100		7	6.711-O_2
30.87	30.97	1163000	R	1	40.353-N_2
34.29	34.32	43620		9	1.644-CO
40.25	40.15	100100		10	3.650-CO_2

XF: 1.0000 E+ 0

092

hp 5830A
AREA %

RT	AREA	AREA %	
7.95	16110	0.457	- valve
21.61	11010	0.312	- MeCl
24.95	1879000	53.284	- VCl
30.05	301100	8.538	- O_2
30.87	1163000	32.980	- N_2
34.29	43620	1.237	- CO
39.02	6830	0.194	- valve

VCl = 44.3
MeCl = 0.2

96.9 Total

AP00042855

0730 AM - N. Stripper (1st Sample)

Feed 110 GPM of slurry (130 Gr

Col. Pressure 19.6 psia

TR - [redacted] 223.2°F 509 212°F 50

DPR - 1.2 psi (column press. D

NOTE: - TR505 Col. Top

TR 509 Col. Bottom

0735 AM EPA Water Stripper (1st Sample)

Feed 20 GPM

Col. Bottom Temp. 240°F

Steam 40# - 6.6 x 150 = 990 #/Hr

Col. overhead Condenser

Pressure To Gasholder - 10 psig

0740 AM Sampling Under Way - (Thermal

VCU Surge TK Pressure - 29 psig

Temperature - 2250°F @ ambient

dir 52°F, Full Flow

0830 AM ✓ Shutdown Freon Cond

✓ " " Refrigerator Cond.

✓ " " Cooling Water Condenser (

The above actions were required to increase the VCU pressure in the Thermal Oxid. Surge TK - All condensers were shutdown in Recovery System.

Continued on Page

L Wm Allen Signed 10/17/78 Date

Read and Understood By

John Diamond Signed 10/17/78 Date

[redacted]

AP00042856

PROJECT

Thermal Oxidizer 0845 AM, Full Flow 34 psig on VC surge TK, 2400°F, am air 57°F (Sampling Under Way)

0730 sample Analysis of Feed to Thermal Oxidizer by Gas Chromatograph

O_2	7.1 %
N_2	44.9 %
CO	1.8 %
CO_2	3.8 %
Methyl Chloride	.2 %
Vinyl Chloride	42.2 %
S.G.	1.5

TK Pressure 30 psig, Air Temp

Flow Calculations FOR The Thermal Oxidizer 0730 —

p426 $Q_h = C_{gi} F_{Tf} F_g F_{pv} F_a \sqrt{h_w P_f}$

from Principles and Practice of Flow Meter Engineering by L.K. Spink

C_{gi} = Orifice Size .250" = (17.84) p 151

F_{Tf} = Flowing Temperature p454 (1.000)

F_g = Specific Gravity p454 (.816 5)

F_{pv} = Compressibility factor p464 (1.022)

Continued on Pa

L Wm Allen 10/17/78

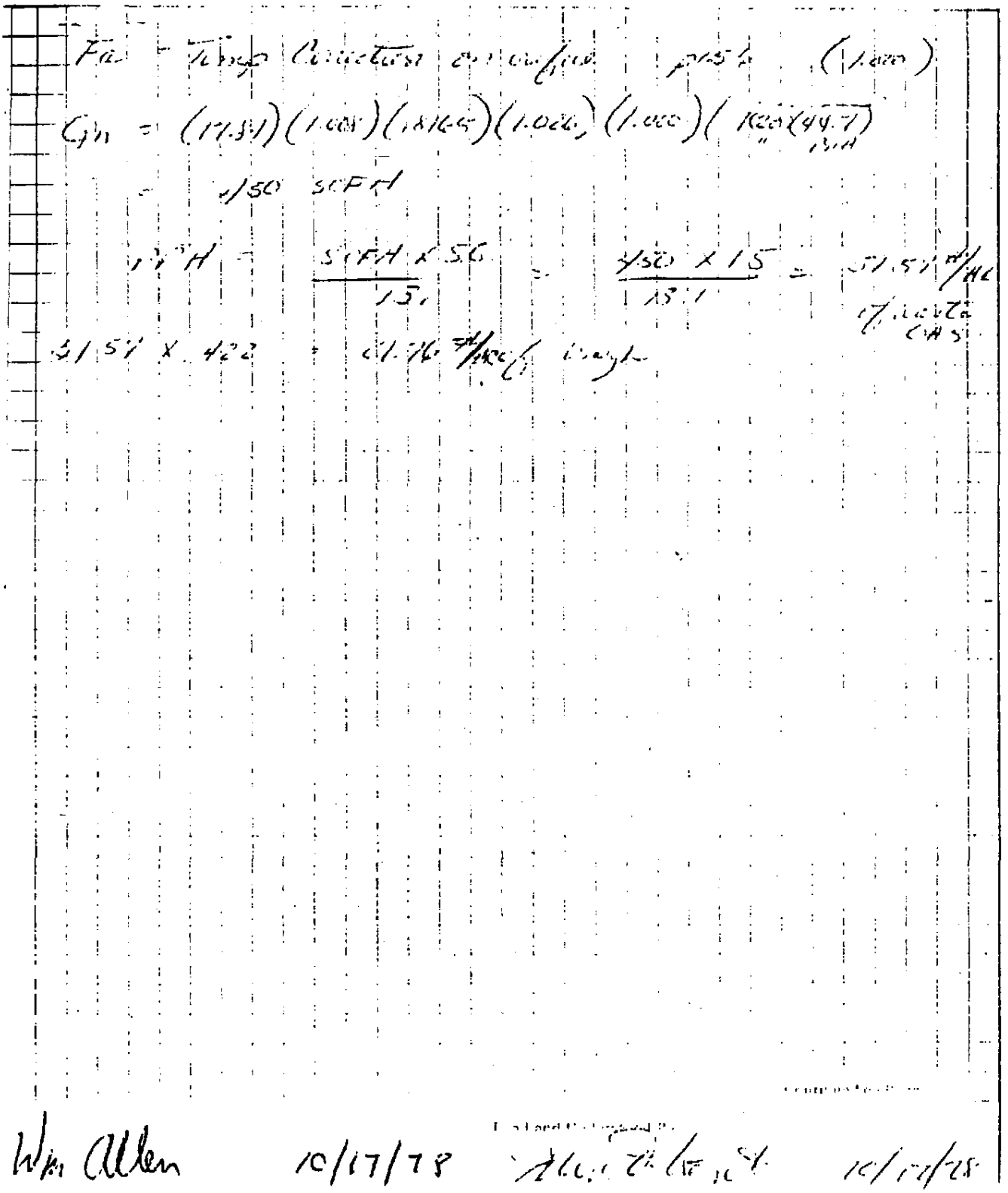
Signed Date

Read and Understood By

10/17

AP00042857

JECT



Wm Allen 10/17/78

AP00042858

1045 AM - North Line Stripping Column

Feed Flow 112 gpm (1230 grade)

[redacted] [redacted] Steam data is recorded in the original record.

Col. Temperatures

TRO 505 - 212.6 °F
TRO 509 - 222.7 °F
Stripper Col. Press. - 19.0 psia
DPR 0513 - 1.5 psig

1040 AM - Waste Water Stripper

Feed Flow - 20 GPM
Col. Bottom Temp - 241 °F
Steam 955 #/Hr @ 40 # steam
Col. Overhead Press. 10 psig

1150 - South Line Stripper

Feed slurry (1225 grade) - 41 GPM
TIC - 0517 stripper Bottom - 225 °F
stripper column Pressure - 20 psia
DPR - 0520 Col. Press Drop - 2.7 psig
[redacted] #/Hr
Col Top Temp TRO 703 - 212.6 °F
Steam data is recorded in the original record.

J. Wm Allen 10/17/78 B.E. George 10/17/78

AP00042859

0930 Analysis of Feed to Thermal Oxidizer Full Flow, VCM to 3rd Ambient Air - 61°F

O_2 - 5.5 %
N_2 - 29.9 %
CO - 1.1 %
CO_2 - 2.5 %
Methyl Chloride - .3 %
Vinyl Chloride - 60.8 %
S.G. 1.7

Flow Calculations -

$$Q_{in} = C_d F_t F_p F_a \sqrt{\Delta P \cdot P}$$

$$= (1754)(.9990)(.2610)(1.033)\left(1.00\right)\sqrt{(2.0)(47.7)}\ (30.51)$$

$$= 43760 \text{ SCFH}$$

$$\text{LBS/H} = \frac{43760 \times 1.7}{1.0} = 74392 \text{ LBS/HR of Chloride Gas}$$

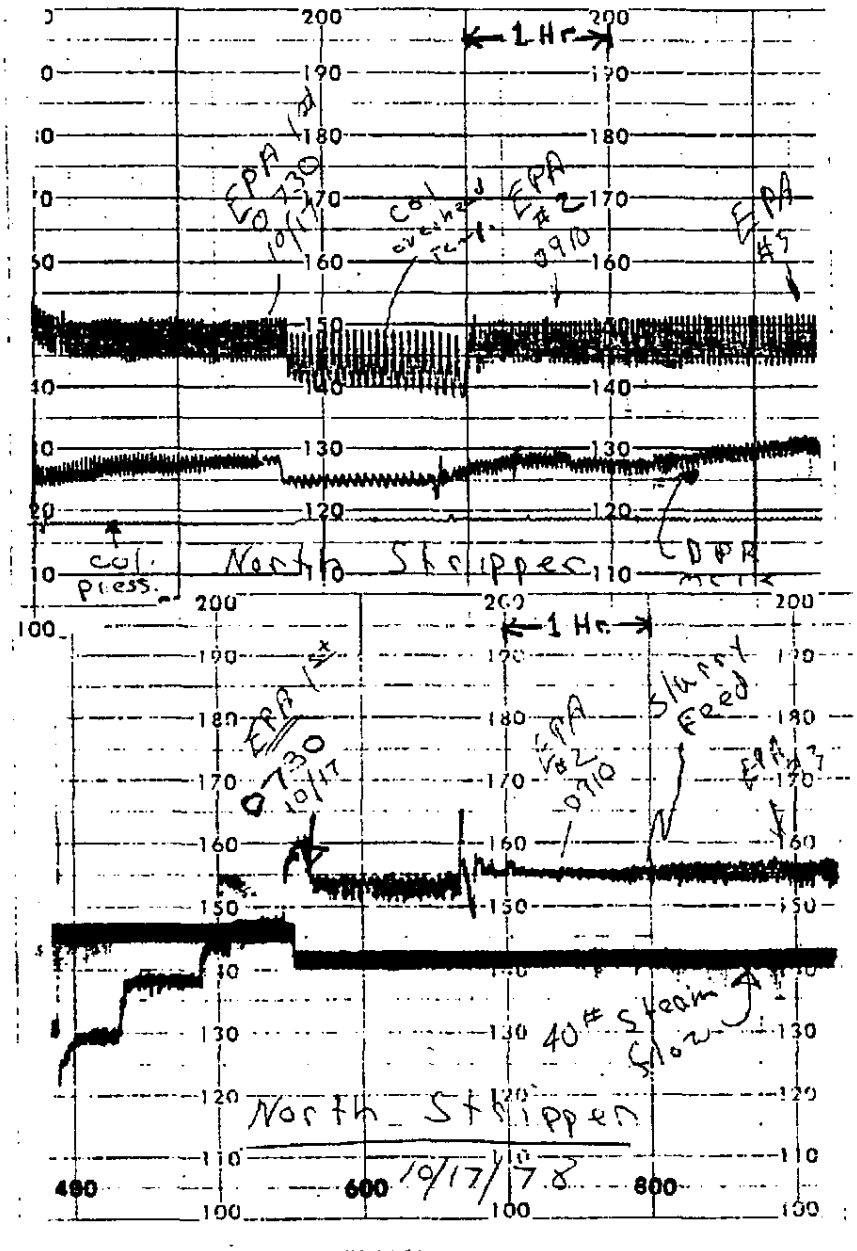
$$56.3\% \times 74392 \text{ lbs/hr} = 41868 \text{ \# of Cl in gas/HR}$$

Continued on Page

10/17/72 10/17/72 L Wm Allen 10/17/

AP00042860

North Stripper Charts - During ...ling 0750 hr, 0910 hr, 1045 hr times

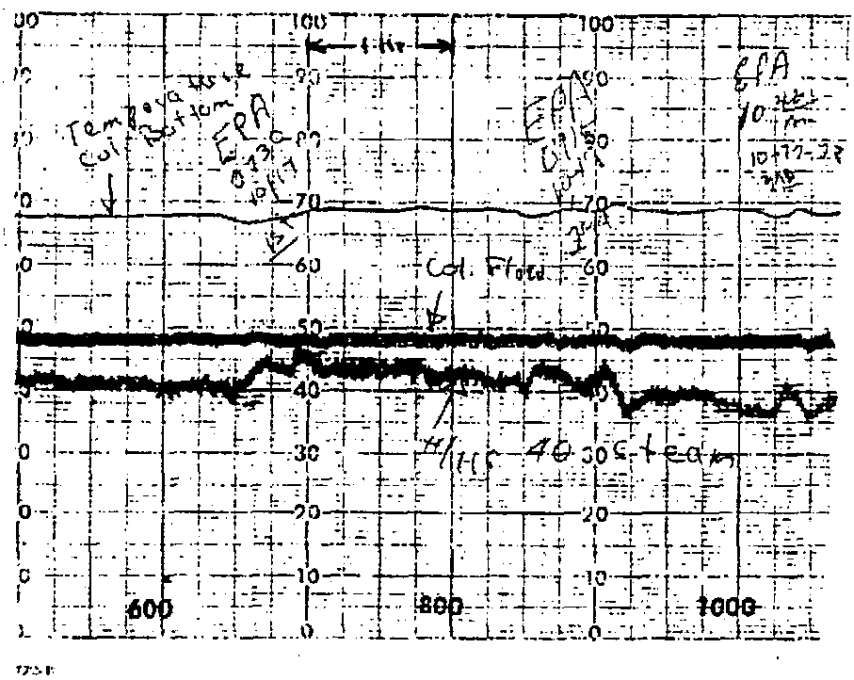


Jim Allen 10/17/78 John Diamond 10/17/78

AP00042861

EPA Waste Water Stripper Chart

Sampling Times - 0730, 0915, 1046



L Wm Allen 10/17/78 John Diamond 10/1

AP00042862

Idle

1240- South Line Stripper

Feed slurry (12.25 grade) -	41	GPM
TIC-0517 stripper Bottom -	225	°F
Stripper Col. Pressure -	20	psia
DPR-0520 Col. Press. Drop -	2.7	psig
[redacted]		#/hr
Col Top Temp TR 0703 -	212.7	°F

→ Steam data is recorded in the original record

John Allen 10/17/78 John Diamond 10/17/78

AP00042863

1240- South Line Stripper

Feed slurry (12.25 grade) -	41	GPM
TIC-0517 stripper Bottom -	225	°F
Stripper Col. Pressure -	20	psia
PPR-0520 Col. Press. Drop -	2.7	psig
[redacted]		#/Hr
Col Top Temp TR 0703 -	212.7	°F

→ Steam data is recorded in the original record

John Allen 10/17/78 John Diamond 10/11/78

AP00042864

... PVC Process Cyclone ... 10/12/18

RUN NO 1

Time	STACK Air Flow IN H_2O	Sample Flow Rate 17 MM
7:35	.05	17
7:40	.05	17
7:45	.10	17
7:50	.10	17
7:55	.10	17
8:00	.15	17
8:05	.15	17
8:10	.30	17
8:15	.10	17
8:20	.10	17
8:25	.10	17
8:30	.10	17
	.048" H_2O	

NOTE: 17 MM = 1.42 Q = 85 L/M

STACK Temp = 85° F

BAG AND BOX LEAK CHECK COMPLETE AT 08:

Flow = 1.42 L/m = 85 L/hr

RUN NO 2

	STACK Air Flow	Sample Flow Rate
8:55	.10	17
8:40	.10	17
8:45	.12	17
8:55	.10	17
1:00	.08	17
9:05	.12	17
9:10	.12	17
9:15	.10	17
9:20	.12	17
9:25	.10	17
9:30	.12	17
9:35	.12	17
	.108" H_2O	

Flow = 1.42 L/m = 85 L/hr

AP00042865

PVC OXIDIZER TEST CONTINUED

Run No 3	Stack Flow	Sample Flow
9:45	.12	17
9:50	.12	17
9:55	.13	17
10:00	.12	17
10:05	.13	17
10:10	.11	17
10:15	.12	17
10:20	.14	17
10:25	.13	17
10:30	.15	17
10:35	.12	17
10:40	.15	17
10:45	.20	
	.133" H_2O	17 = 1.42 l/m = .85

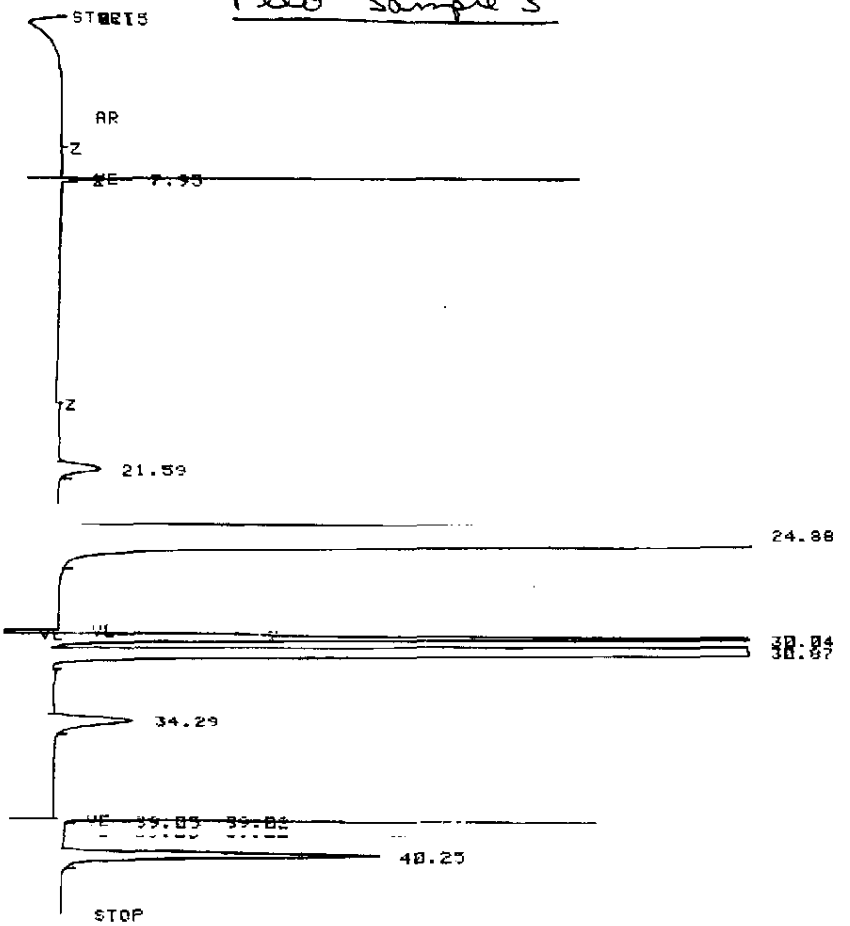
Tested Results = Air Flow = 202 SCFM -
Sample Flow = 3 SCFM

AP00042866

TK. press = 33# 10/17/88

9:30 Am

Thermal Oxidizer
Feed Sample 3



** 5830A
ESTD

RT	EXP RT	AREA		CAL #	AMT
30.04	30.02	247000		7	5.585 O_2
30.87	30.97	849400	R	1	29.472 N_2
34.29	34.32	28020		9	1.056 CO
40.25	40.15	69020		10	2.517 CO_2

XF: 1.0000 E+ 0

** 5830A
AREA %

RT	AREA	AREA %	
7.95	16090	0.424	
21.59	11640	0.307	= 0.3
24.88	2550000	67.466	= 68.3
30.04	247000	6.514	
30.87	849400	22.402	
34.29	28020	0.739	
39.02	6804	0.179	
39.05	5586	0.147	
40.25	69020	1.820	

XF: 1.0000 E+ 0

1.008

99.2

		%	
1.93 x	O_2 =	5.5	= 7.9
1.45 x	N_2 =	29.8	= 37.3
1.26 x	CO =	1.1	= 1.4
1.98 x	CO_2 =	2.5	= 5.0
2.71 x	MeCl =	0.3	= .7
2.79 x	VCM =	60.8	= 169.8
			221.9

Wayne Jeans
Dominet

AP00042867

First sample

South Line Stripper [redacted] 0925

Feed slurry ([redacted] 1225/1210 grade) – 43 GPM

TIC-0517 stripper Bottoms – 223 °F

Stripper Column Press. – 19.8 PSI[redacted]

DPR-0520 Col. Press Drop – 1.5 psig

~~Steam data is recorded in the original record.~~ [redacted] #/Hr

Col. Top Temperature TR0703 – 214.9 °F

Col. Bottom Temperature TIC-0517 – 223 °F

Second sample

North Line Stripper 0910

Feed slurry (1230 grade) – 112 GPM

~~Steam data is recorded with the original record~~ [redacted] #/Hr

Col. Temperatures

TR0505 – 212 °F

TR0509 – 223 °F

Stripper Col. Press – 19.5 psia

DPR 0513 – 1.4 psig

Continued on Page

L Wm Allen 10/17/71 John Diamond 10/17/71
Date

AP00042868

11:5 AM EPA Water Stripper

Feed 20 GPM
Col Bottom Temp 242°F
Steam 40# - 975 #/Hr
Col overhead condenser - 42a psig

930 AM Thermal Oxidizer
Full Flow, UC Tk Press 33 psig
2490°F Ambient Air - 61°F
Sampling underway

0830 sample. Analysis of Feed to Thermal Oxidizer by Gas Chromatograph

O_2	6.9%
N_2	41.7%
CO	1.7%
CO_2	3.8%
Methyl Chloride	.2%
Vinyl Chloride	45.7%

S.G. 1.6, AIR TEMPERATURE 57°F
Full Flow, TK PRESSURE 31 psig

Flow Calculations - next page

Wm Allen 10/17/78 John Diamond 10/17/78

AP00042869

$C_{HP} = C_p F_{TP} F_S F_{PP} F_{HP} F_{TH}$

C_p = Basic Design ... 17.54

F_{TP} = Temp ... 1.00

F_S = Specific Speed ... 0.7946

F_{PP} = Compressibility ... 1.031

F_{HP} = Head (Number Stages) ... 1.000

F_{TH} = $\sqrt{\text{Efficiency} \times \text{Number Stages}}$ $\sqrt{(80)(45-1)}$

$C_{HP} = (17.54)(1.00)(.7946)(1.031)(1.000)\sqrt{(80)(45-1)}$

$= 440.16$ BHP

$BHP = \frac{440.16 \times 1.0}{0.9 \cdot 1}$ = 489.5 HP/Stage

489.5 × 4 = 1958 HP

Tested by [illegible] 10/10/78 L Wm Allen 10/171

AP00042870

VCM Analysis Condition


```
TEMP1        60    60
TIME1        80.0
RATE          1.00
TEMP2        90
TIME2         0.0
INJ TEMP     60    60
TCD TEMP    100   100
OVEN MAX     90

CHT SPD       0.50
ATTN 2↑       6
TCD SGNL      A
SLP SENS      0.35
AREA REJ -
FLOW  A      25
FLOW  B     132
OPTN          0
  0.1   VLV/EXT        1
  5.0   AREA REJ      500
  6.5   ZERO
  7.9   VLV/EXT        2
  7.9   VLV/EXT        3
  7.9   ATTN 2↑        6
  8.0   ZERO
 18.5   ZERO
 29.5   VLV/EXT-       1
 29.7   VLV/EXT-       3
 29.8   ZERO
 39.0   VLV/EXT        3
 39.0   VLV/EXT-       2
 43.0   STOP
```

Columns

① 24' 16% Bis 2-methoxyethyl adipate on 80/100 P-AW + 5'30% OC200 silicone oil on 80/100 Chromosorb P-AW

② 6' Chromosorb 10L 80/100 mesh

③ 10' Molecular Sieve 45/60 mesh

```
ESTD
% RTW:   3

   CAL #          RT      AMT/AREA
REF:   1       30.97   3.4697  E-  5
       2        7.34   1.8826  E-  3
       3        9.58   2.3476  E-  5
       4       10.37   2.6813  E-  5
       5       16.07   2.2727  E-  5
       6       17.51   2.4265  E-  5
       7       30.13   2.2287  E-  5
       8       33.28   4.8254  E-  5
       9       34.44   3.7686  E-  5
      10       40.29   3.6465  E-  5
      11       40.75   3.1556  E-  5
      12       41.63   2.9689  E-  5

                 XF:   1.0000  E+  0
```

AP00042871

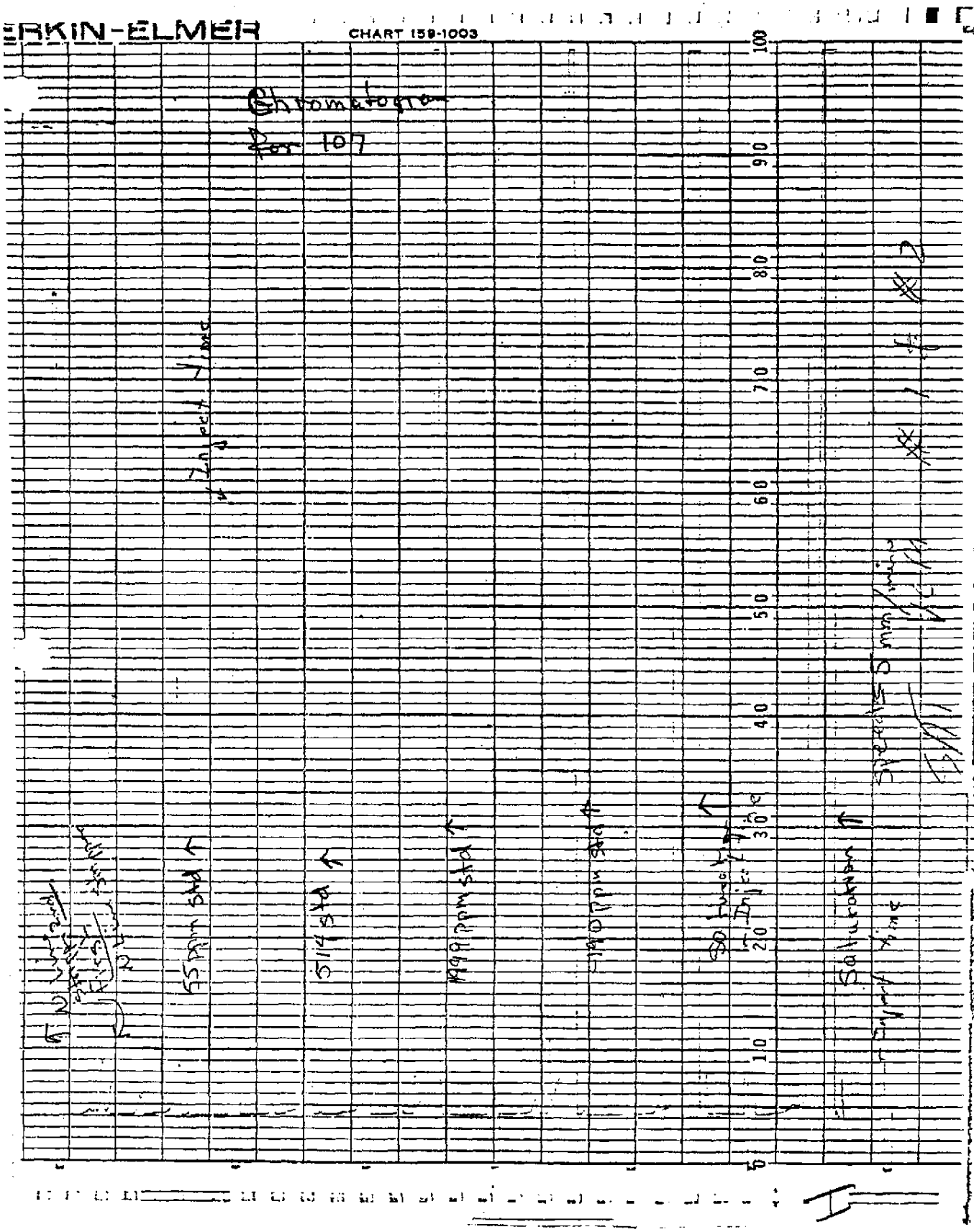
METHOD 107

GC STRIP CHART

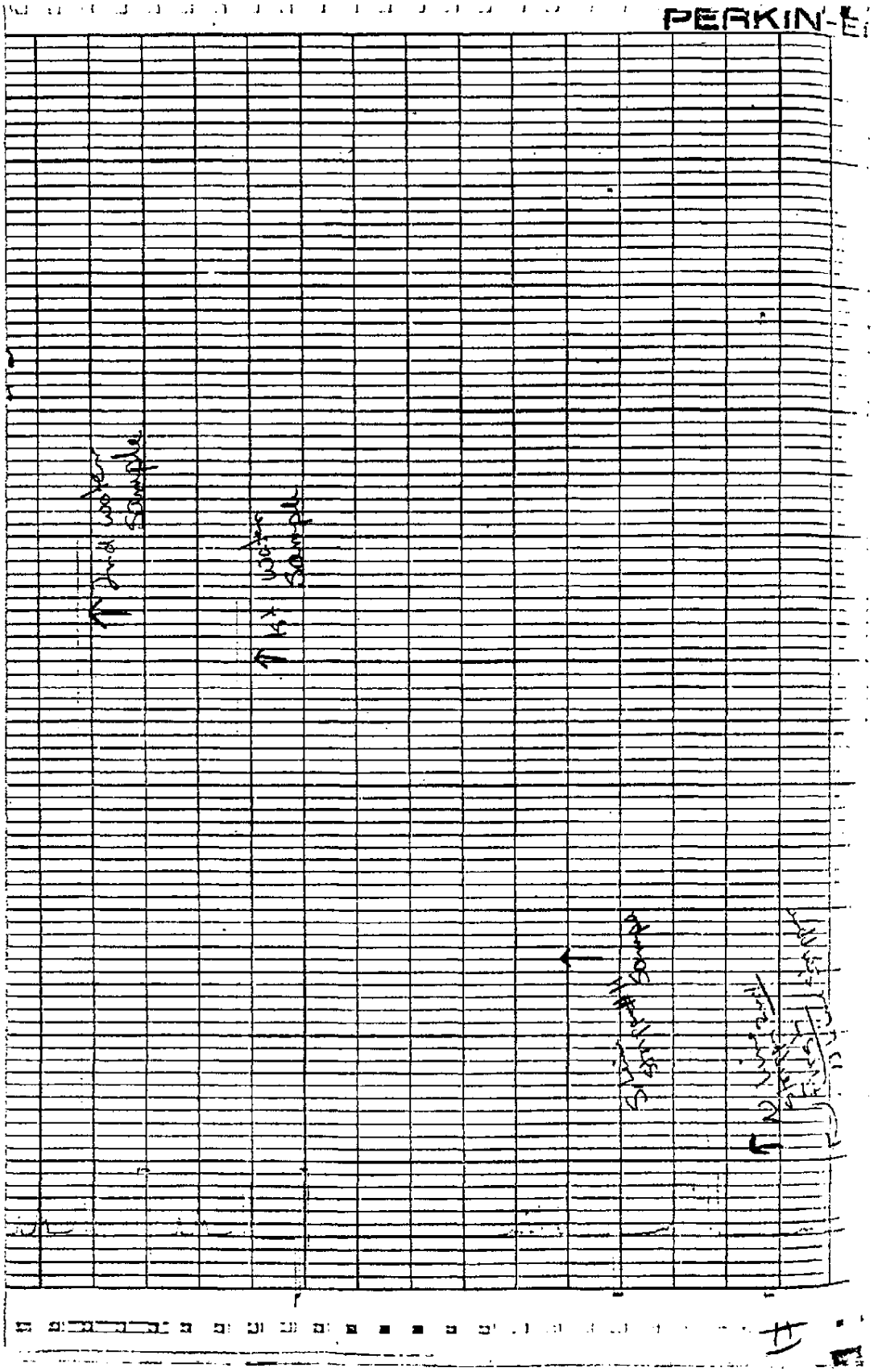
Chart speed 5 mm/min.

Retention time by integrator is 128-129 sec.

AP00042872


ERKIN-ELMER
CHART 159-1003
Chromatogram
Run 107
100
90
80
70
60
50
40
30
20
10

AP00042873



AP00042874

PERKIN-ELMER CHART 159-1003

AP00042875

AP00042876

METHOD 106

GC STRIP CHART

Chart speed 15 inches/hour

Retention time is 3.7 minutes

AP00042877

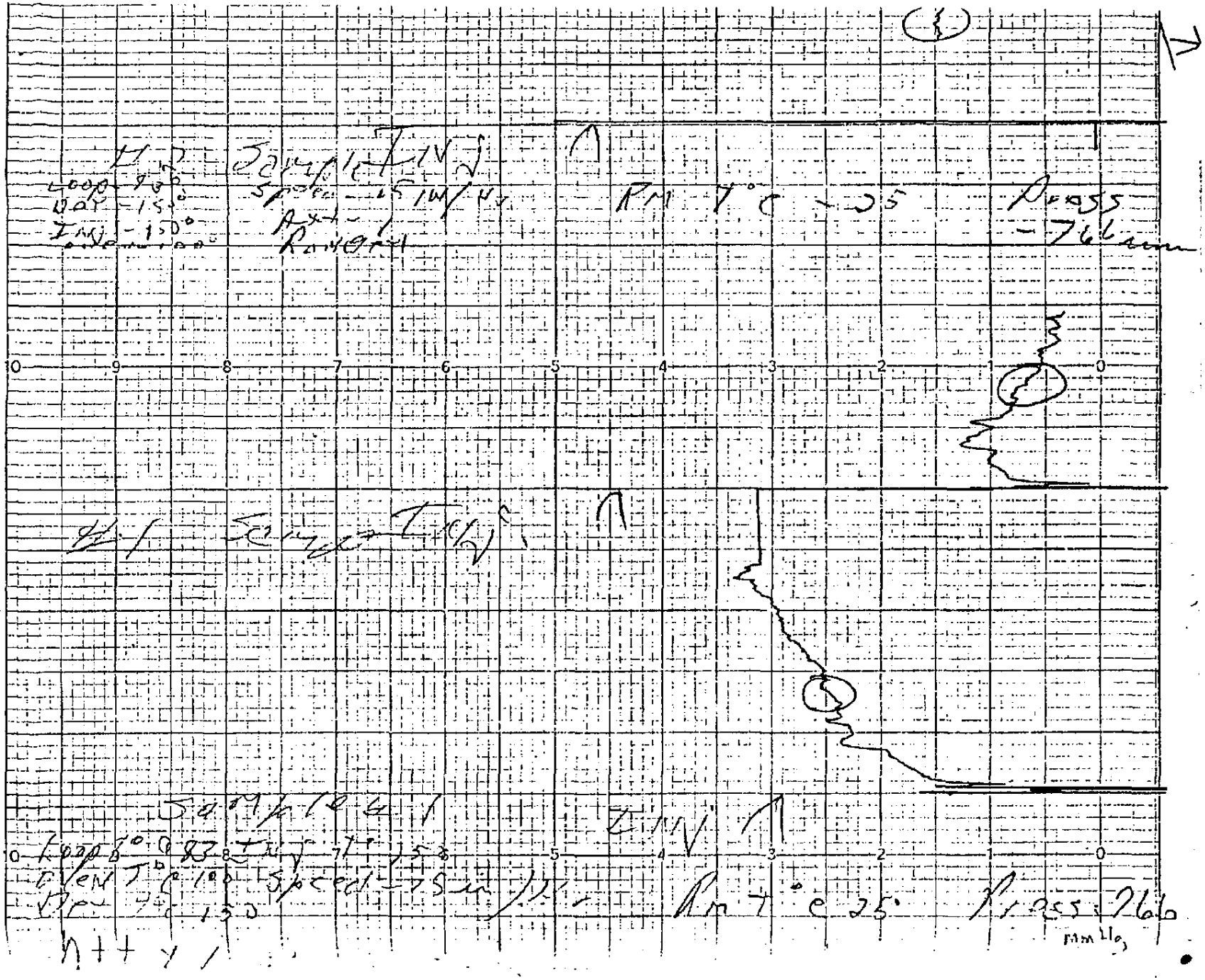
Chromatogram for 106

AP00042878

AP00042879

AP00042880

AP00042881



AP00042882