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PEDCo Environmental Inc.

PEDCo Environmental Inc.

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Air

EPA

Vegetable Oil Production

Emission Test Report
Cargill, Incorporated
Sidney, Ohio

ANALYSIS OF HEXANE FOR BENZENE CONTENT

Cargill, Inc., Sidney, Ohio

The hexane sample was obtained from the working tank at the Cargill, Inc. vegetable oil plant in Sidney, Ohio during the testing done in the week of July 23, 1979. The results of the analysis show that the hexane contains 0.17 percent by volume or 0.23 percent by weight benzene.

PROCEDURE

Analysis was conducted with a gas chromatograph with a flame ionization detector (FID). A solution of benzene in carbon disulfide was used to calibrate the instrument and the hexane sample was analyzed in solution with carbon disulfide. Separation of the benzene from the other components was achieved with a six foot column packed with 1,2,3-(triscyano ethoxy) propane (TCEP). The following chromatograph conditions were used:

Injection temperature	150°C
Column temperature	Programmed to rise 5°/min from 40°C to 70°C after 6 min of run time.
FID temperature	250°C
Carrier gas	N_2 at 40 cc/min

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EMISSION TEST REPORT
CARGILL CO.
VEGETABLE OIL EXTRACTION PLANT
SIDNEY, OHIO

PRELIMINARY DRAFT

Prepared by

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Contract No. 68-02-2811
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Prepared for

U.S. Environmental Protection Agency
Emission Measurement Branch

Project Technical Manager: Nancy McLaughlin

July 1979

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1.0 INTRODUCTION

During the week of July 23, 1979 personnel from PEDCo Environmental conducted an emission test at Cargill, Inc. vegetable oil extraction plant in Sidney, Ohio. Vegetable oil is extracted from soybeans with hexane.

The purpose of this test was to determine the amount of solvent lost from the process through stack emissions, fugitive emissions from leaks in process equipment, processed meal, oil from the mineral oil scrubber, and plant wastewater. Opacity readings were taken at several sites to estimate the amount of particulate emission. A sample of hexanes used in the process was taken to be analyzed for isomer content and benzene.

Hexane emissions to the atmosphere were measured by two test methods conducted simultaneously: a carbon disulfide impinger train developed and tested by PEDCo Environmental, and proposed EPA Method 25 for the determination of total gaseous non-methane organics (TGNMO).

Carbon disulfide samples were analyzed on site using a gas chomotograph with a flame ionization detector. TGNMO samples are currently being analyzed by PEDCo Environmental laboratories and the results will be reported at a later date. These tests for hexane vapor emissions were conducted at the following sites:

1. Mineral oil scrubber inlet

2. Mineral oil scrubber outlet

3. Cooler exhaust

The dryer outlet stacks were omitted from this test because of the unsteady flow in the stacks due to natural draft venting.

Meal samples were collected on the following schedule:

After the DT - Triplicate samples once every 20 minutes for 7 hours

After the dryer - Triplicate samples every 20 minutes for 7 hours

After the cooler - Triplicate samples once an hour for 7 hours

After final milling - Triplicate samples every hour for 7 hours

These samples were analyzed for hexane content with results reported on both a wet and dry basis.

Mineral oil samples were taken at the inlet and outlet of the mineral oil scrubber during each of the emission tests on the scrubber. At the same time, a sample of vegetable oil was obtained from the product storage tank. These oil samples were analyzed for hexane by Scott Environmental Laboratories.

Wastewater samples were taken once each day of testing. Fugitive emissions were measured with a Century Model OUA-128 portable organic vapor analyzer in and around the extraction area.

2.0 SUMMARY AND DISCUSSION OF RESULTS

2.1 MEASURED GAS STREAM CONDITIONS

The results of temperature, pressure, moisture, and flow rate measurements for each of the test sites are summarized in Table 1. At the mineral oil scrubber, gas velocity was measured during each test using a velometer at the point where the gas stream enters the atmosphere. The velometer was equipped with an expansion joint so that it fit snugly inside the six-inch diameter exhaust duct and all of the gas was directed through the vanes of the velometer. Velocity readings were taken concurrently with each of the emission tests and Table 2 lists all of the values for each test. The average of each set of values was used to calculate the flow rate for that period. Moisture content of the MOS streams was determined using drierite drying tubes and a personnel sampling pump. Temperatures and pressures were read from in-line gauges installed by Cargill Co. for process monitoring.

At the cooler site, gas velocity was measured according to Federal Register* Methods 1 and 2 using a S-type pitot tube and and inclined manometer. Velocity traverses were conducted before and after each emission test. Moisture was measured with a midget impinger train consisting of three impingers with 25 ml of

* Federal Register, Volume 42, No. 16, August 18, 1977.

TABLE 1. GAS STREAM CONDITIONS

Test site	Run No.	Gas stream conditions			Flow rate		
		Temp., °F	Static press in. H_2O	Moisture, %	acfm	scfm	dscfm
MOS inlet	1	83	-6.25	3.48	246	220	212
	2	82	-5.65	3.61	230	206	199
	3	82	-5.7	3.80	236	211	203
	4	82	-5.7	3.80	258	232	223
MOS outlet	1	100	-10.0	4.24	188	168	161
	2	98	-10.5	3.54	193	172	166
	3	98	-10.5	3.49	195	174	168
	4	95	-10.5	3.49	202	181	175
Cooler outlet	1	150	-1.1	7.68	22600	18900	17440
	2	150	-1.3	7.68	22780	19000	17540
	3	150	-1.1	7.43	22950	19200	17800

Test No. / date	Time	Velometer reading ft/min.
MOS-1 / 7-23-79	16:03	2060
	16:08	2130
	16:13	2105
	16:18	1911
	16:23	2345
	16:28	1978
	16:33	2050
	16:38	2207
Average		2098
MOS-2 / 7-25-79	9:29	2225
	9:36	2115
	9:41	2106
	9:46	2058
	9:51	2020
	9:56	2230
	10:01	2166
	10:06	2149
	10:11	2212
	10:16	2213
Average		2149
MOS-3 / 7-25-79	12:26	2270
	12:31	2213
	12:36	2122
	12:41	2222
	12:46	2139
	12:51	2099
	12:56	2169
	13:01	2244
	13:06	2050
Average		2170

water in each and a drierite drying tube. Sampling was single point with a constant flow rate of ~1800 cc/min. Tests were run concurrently with the emission tests.

2.2 HEXANE EMISSION TESTS - CS_2 IMPINGER TRAIN

The results of the CS_2 impinger train tests are listed in Table 3. The average concentration at the mineral oil scrubber inlet site was 216630 parts per million equivalent to 21.7 percent by vqlume.

In the first test, there is a significant difference between the results of simultaneous tests 1A and 1B. It should be noted here that initial site setup was inadequate and sample trains were not well supported. All other inlet tests showed concentrations ranging from 19 to 28 percent by volume.

Outlet tests at the mineral oil scrubber were not successful. As shown in Table 3, concentration values varied from 12 ppm to 35196 ppm. The outlet duct was under a negative pressure of over 10 inches H_2O at the sampling site, and this was apparently too great a vacuum to sample against. PEDCo Environmental is arranging to retest the MOS, and the retest at the outlet site will be done at a point upstream from the fan where the gas is under a positive pressure.

The second test at the inlet and the outlet sites was run to determine the collection efficiency of the sampling train. In each test an extra impinger with an additional 15 ml of CS_2 was added to the train and analyzed separately for hexane. At the inlet site, 0.08 percent of the hexane collected was found in the

TABLE 3. CS_2 IMPINGER TEST RESULTS

Test site	Run No.	Date (1979)	Clock time	Hexane conc., ppm[a]	Gas flow rate		Hexane mass flow rate	
					m^3/min[b]	scfm[b]	Kg/h	lb/h
MOS inlet	1A	7/23	15:53	307658	6.2	220	412.9	908.3
	1B	7/23	15:53	90537	6.2	220	121.5	267.3
	2A	7/25	9:30	194123	5.8	206	243.9	536.6
	3A	7/25	12:23	187949	6.0	211	241.9	532.2
	3B	7/25	12:23	239460	6.0	211	308.2	678.0
	4A[c]							
	4B	7/25	15:10	280054	6.6	232	396.3	871.9
	Average			216630				
MOS outlet	1A	7/23	15:53	17	4.8	168	0.02	0.04
	1B	7/23	15:53	2091	4.8	168	2.1	4.7
	2A	7/25	9:30	35196	4.9	172	36.9	81.2
	3A	7/25	12:23	57	4.9	174	0.06	0.13
	3B	7/25	12:23	16000	4.9	174	17.0	37.4
	4A	7/25	15:10	12	5.1	181	0.01	0.03
	4B	7/25	15:10	2520	5.1	181	2.8	6.1
Cooler outlet	1A	7/26	10:00	6	537	18950	0.69	1.5/375 = 0.004
	1B	7/26	10:00	7	537	18950	0.81	1.8/375 = 0.0048
	2A	7/26	14:17	7	541	19100	0.82	1.8/375 = 0.0048
	2B	7/26	14:17	8	541	19100	0.93	2.1/375 = 0.0056
	Average			7				

[a] Parts per million by volume.

[b] scfm - Standard cubic feet per minute 29.92 in. Hg., 68°F.

[c] Sample lost.

TABLE 4. OIL SAMPLES[a]
CARGILL CO. - SIDNEY, OHIO

MINERAL OIL

Sample No.	Sample site	Time	Date	Concentration of hexanes as n-hexane mg/10^3 gram of oil[b]
1	MOS inlet	16:30	7-23-79	2163
2	MOS outlet	16:30	7-23-79	53985
3	MOS inlet	9:58	7-25-79	2362
4	MOS outlet	9:50	7-25-79	49250
5	MOS inlet	12:46	7-25-79	2097
6	MOS outlet	12:44	7-25-79	92445
7	MOS inlet	15:30	7-25-79	1928
8	MOS outlet	15:25	7-25-79	56612

VEGETABLE OIL

Sample No.	Time	Date	Concentration of hexanes as n-hexane mg/10^3 gram of oil[b]
9	10:05	7-25-79	256
10	11:00	7-26-79	334

[a] Complete analytical report from Scott Environmental Laboratories is included in Appendix A of this report and lists breakdown of concentration by isomer.

[b] mg/10^3 gram of oil is equivalent to ppm by weight.

wastewater skimmer. The sample taken on July 25 was supersaturated with hexane. The saturation point for a solution of hexane in water is 0.14 µg/µl or about 200 parts per million by volume. An organic layer was visible in the sample and due to this stratification, repeated injections of the sample produced inconsistent results with concentrations ranging from 0.08 µg/µl to 0.63 µg/µl. The average value for seven injections was 0.31 µg/µl.

The sample taken on July 26 contained considerably less hexane. The concentration of hexane in the sample was 0.004 µg/µl, about 3 percent of the saturation level.

2.5 MEAL SAMPLE ANALYSIS

Meal samples were analyzed for hexane on both a wet and dry basis. For the 62 samples taken after the desolventizer-toaster over a seven hour period, the average concentration of hexane was 326 µg/g of dry meal and 172 µg/g of wet meal. After the dryer the concentration averaged 246 µg/g of dry meal and 105 µg/g of wet meal. Samples taken after the cooler averaged 280 µg/g of dry meal and 107 µg/g of wet meal. The finished product averaged 243 µg/g of dry meal and 97 µg/g of wet meal. Complete results are in Appendix A of this report.

2.6 FUGITIVE EMISSIONS

Fugitive emissions and background organic concentration in the extraction area were measured with a Century Model-128 portable organic vapor analyzer. Background organic concentration was about 5 ppm outside the extraction building and ranged from 5 to 12 ppm inside. Inside the building a total of 262 flanges,

170 valves, 27 seams and doors, 48 sightglasses, 74 open-ended pipes, 22 pumps, 6 drains, and 5 ventilation vents were checked for organic leaks. Of these components, the following leaks were detected:

Flanges - 1 vegetable oil line dripping

Valves - 1 vegetable oil line dripping
1 steam line - small drip

Sightglasses - 1 on extractor - OVA reading - 100-200 ppm

Pumps - 1 extractor - OVA reading 220 ppm
1 extractor - OVA reading 300-500 ppm
1 DT - 2000-6000 ppm

Field data sheets and a description of the OVA analyzer are included in the appendix of this report.

2.7 OPACITY READINGS

Opacity readings were taken at the following sites according to the procedures described in Method 9 of the Federal Register:*

Cooler outlet stack

Dryer outlet stacks (north and south)

Mill grinding and screening vent duct

In all cases, the opacity was zero.

* Federal Register, Volume 42, No. 160, August 18, 1977.

3.0 PROCESS DESCRIPTION AND LOCATION OF SAMPLING POINTS

Figure 1 is a process flow diagram for the Cargill plant in Sidney, Ohio. Cargill operates a single meal flake extractor and desolventizer-toaster (DT). A single mineral oil scrubber (MOS) handles solvent emissions from the extractor and DT. Meal from the DT is then processed through a drying and cooling cycle. Exhaust streams from the dryer and cooler are vented through separate ducts to the atmosphere.

Sampling for hexane vapor was conducted at three sites, the inlet and outlet of the mineral oil scrubber and the cooler vent. These sampling sites are shown in Figures 2, 3, and 4.

Meal samples were taken from conveyor lines after the desolventizer-toaster, the dryer, cooler, and after the final milling.

Wastewater samples were taken from the equalizer tank where it is held before discharge to the wastewater skimmer.

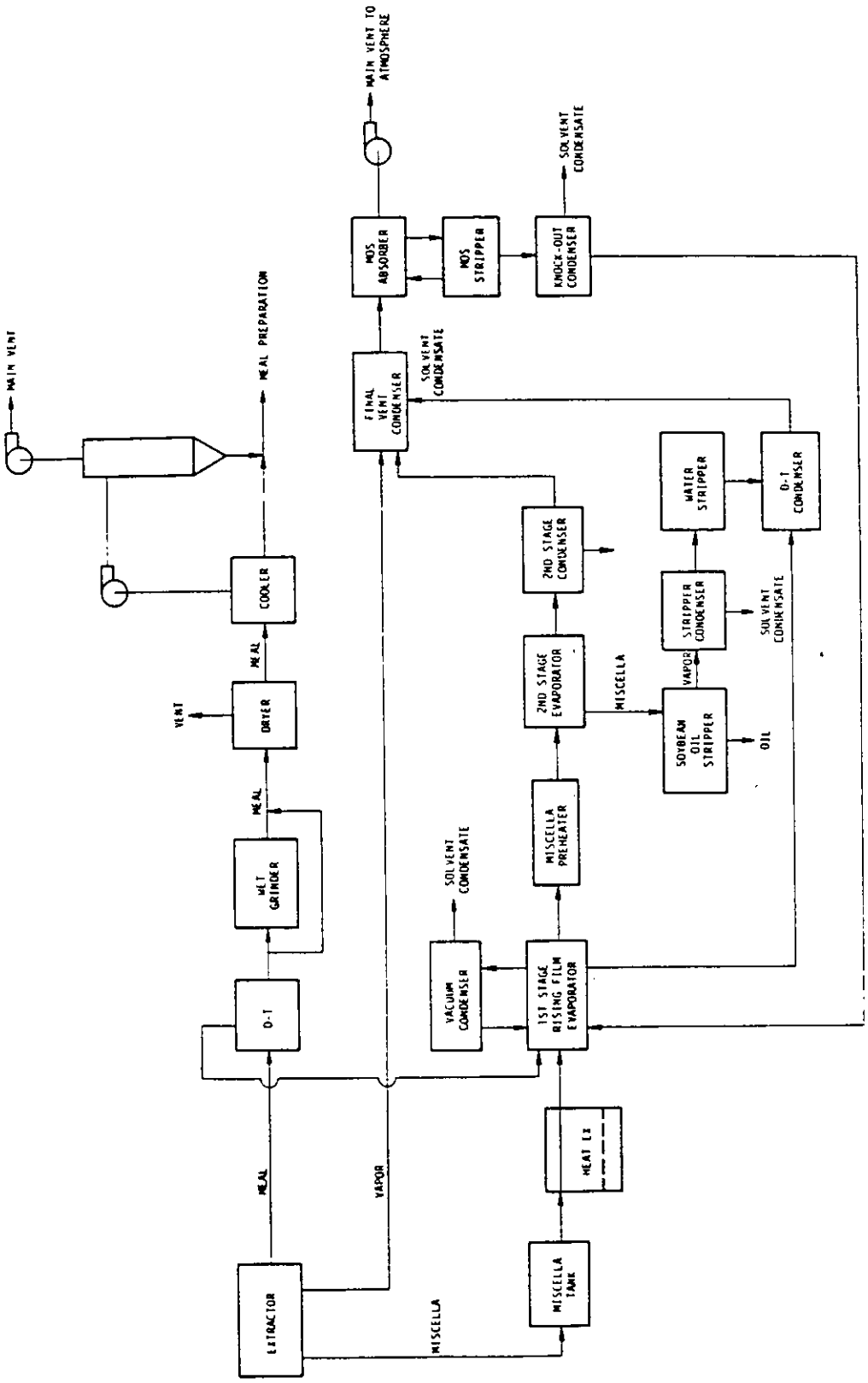

Figure 1. Flow diagram - Cargill soybean vegetable oil plant - Sidney, Ohio.

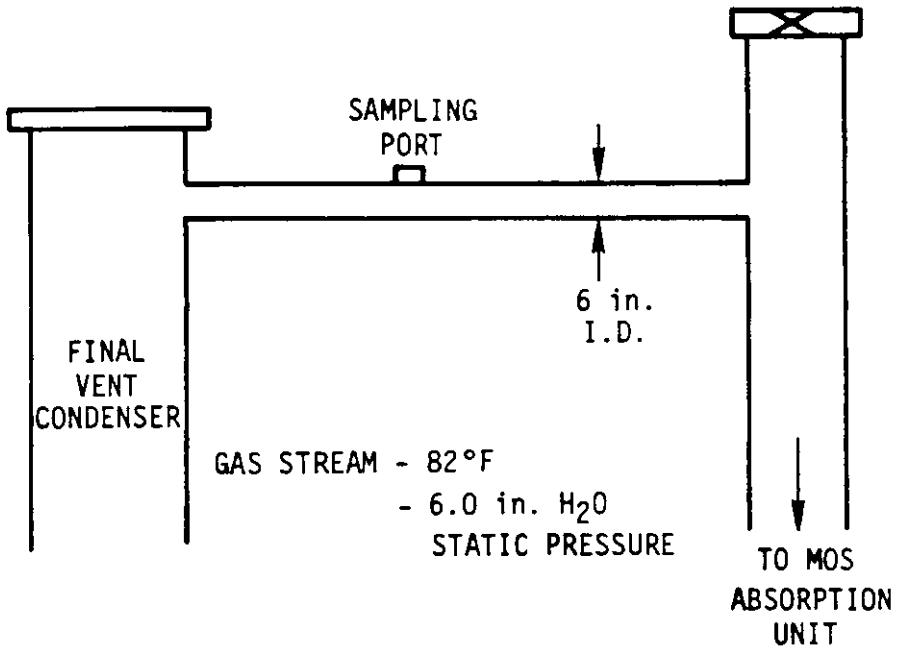

Figure 2. MOS inlet sampling site.

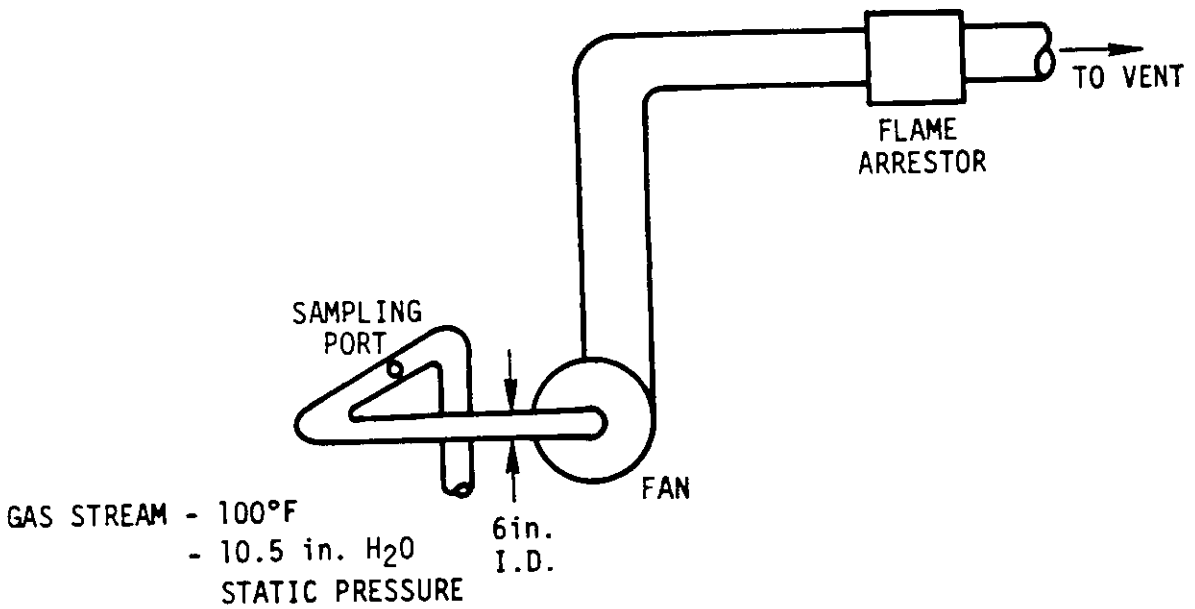

Figure 3. MOS outlet sampling site.

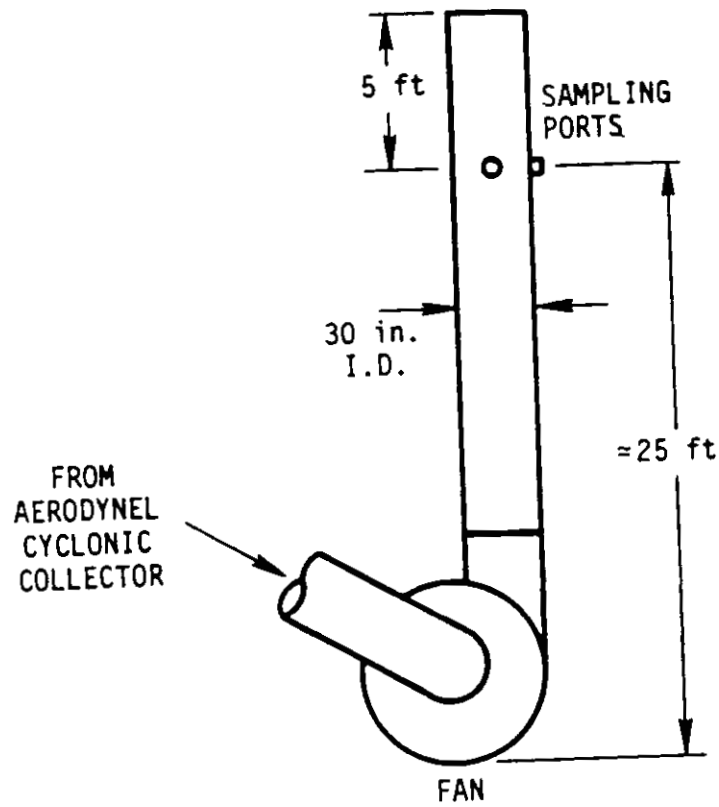

Figure 4. Cooler sampling site.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Gas Velocity, Temperature, and Moisture

At the mineral oil scrubber, gas velocity was measured with the use of a vane anometer fitted tightly inside the six-inch diameter stack. Velocity measurements were taken for a one-minute period every five minutes of each test. Temperature and pressure were measured with dial thermometers and in-line pressure gauges at each sampling site. A dial thermometer was used to measure the temperature of the gas exiting the anometer.

Moisture content of the MOS streams was determined with a drierite drying tube and a personal sampling pump. Single point sampling with a constant flow rate of about 800 cc/min was used.

At the cooler site, velocity was measured with a S-type pitot tube and an inclined manometer following the procedures of Method 2 of the Federal Register.* A total of 24 traverse points were used in the 30-inch diameter stack.

Moisture, in the cooler stack, was measured with the use of a midget impinger train consisting of three impingers with 25 ml of water in each and a drierite drying tube. Sampling was single point with a constant flow rate of ~1800 cc/min.

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* Federal Register, Volume 42, No. 160, August 18, 1977.

Hexane-Stack Emissions

Hexane emissions were measured by two methods: a carbon disulfide impinger train (shown in Figure 5), and EPA Method 25 for total gaseous non-methane organics (TGNMO).

In the impinger train, carbon disulfide absorbs the hexane as the gas bubbles through the impinger. Single point sampling was used with a constant sampling rate. The sampling period is variable depending on source concentration. A 45 minute period was used on the MOS sites and the cooler was sampled for 90 minutes. Sample is recovered by rinsing the probe with 15 ml of CS_2 and rinsing the train glassware with two separate portions of CS_2. The recovered sample is weighed to determine the amount of solution present and analyzed for hexane concentration using a gas chromatograph with a flame ionization detector (FID). The instrument used in this test was a Hewlett-Packard model 5830-A gas chromatograph. Conditions were as follows:

Column: 10 ft x 1/8 in. stainless steel with
10% SP1000 packing on 80/100 mesh suplecoport
Column temperature: 60°C
Injection temperature: 150°C
FID temperature: 300°C
Carrier gas: N_2 at 24 ml/min

Solutions of 99 mole % n-hexane in carbon disulfide were used to calibrate the instrument. All isomer peaks were conputed as n-hexane.

With the TGNMO sampling apparatus, a sample is anisokinetically drawn from the stack through a chilled condensate trap by means of an evacuated gas collection tank. In this test, sampling rate was maintained at ~80 cc/min. Total gaseous non-methane

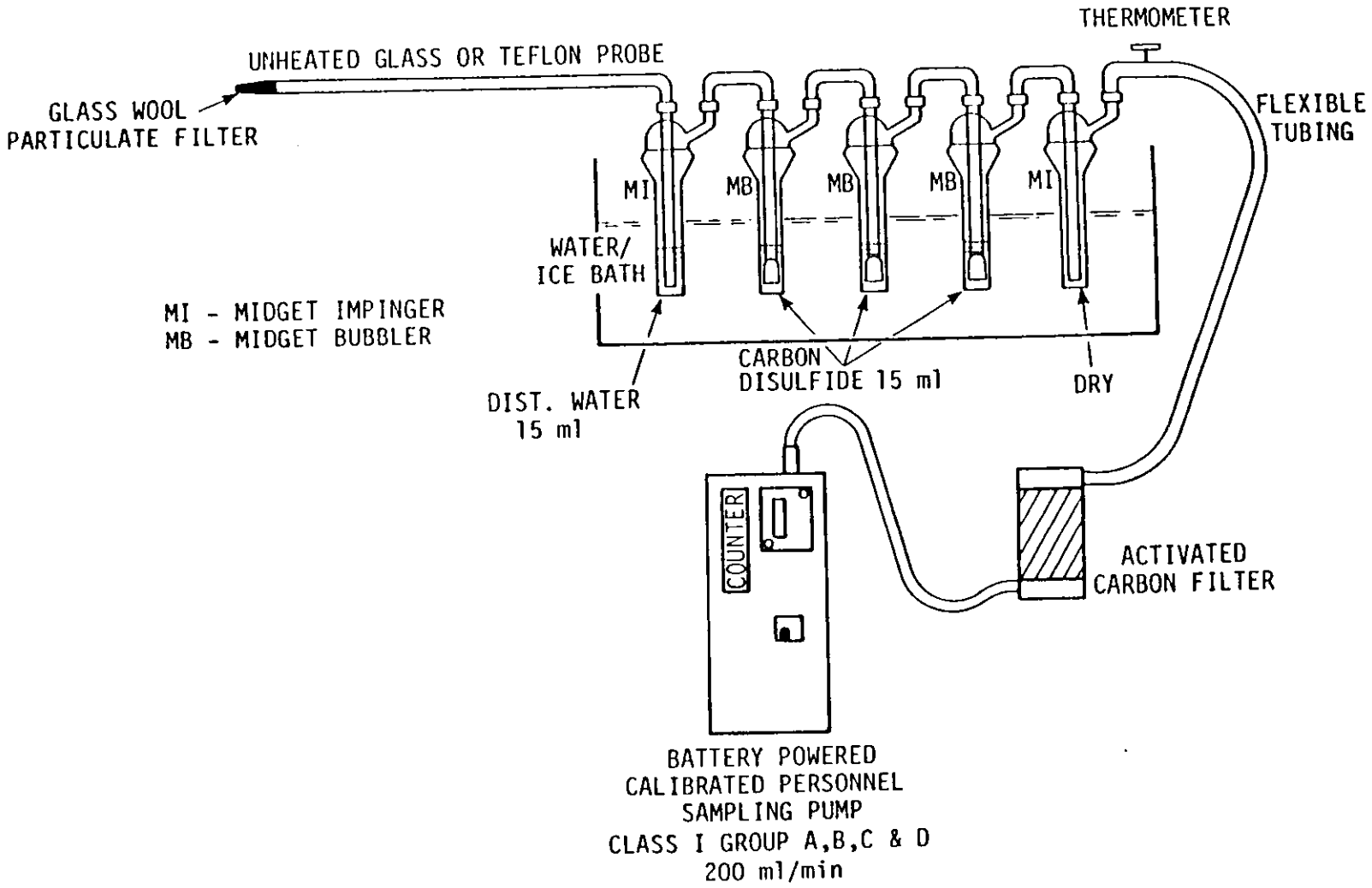

FIGURE 5. HEXANE SAMPLING APPARATUS

organics are determined by combining the analytical results obtained from independent analyses of the condensate trap and evacuated tank fractions. The condensate trap is analyzed by oxidizing the trap contents to carbon dioxide and then injecting a portion of the CO_2 into an analyzer that converts the CO_2 to methane and measures the methane concentration with an FID.

A portion of the tank contents is injected into a gas chromatograph column to separate methane, carbon monoxide, carbon dioxide, and the non-methane organics. The non-methane portion is oxidized to CO_2, reduced to methane and measured with an FID. The results of the TGNMO sample analysis will be reported at a later date.

Meal Sample Analysis

Meal samples were analyzed using a volatilization, headspace sampling technique first developed by Texas A & M University.* The sample containers were prepared just prior to sampling. Preparation involves adding two layers of filter paper to the bottom of the container, wetting the filter paper with 0.5 ml of water, and weighing the container and contents to the nearest 0.01 g.

A long handled scoop was used to take sample from the conveyor belt, then a small portion of this sample was transferred to the sample container. Triplicate samples were taken at each site. Ideally, a 2.0 gram sample should be added to each bottle.

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* Wan, P.J., M. Chittwood, and C.M. Cater. "Determination of Residual Hexane in Solvent Extracted Meal." Food Protein R & D Center, Texas A & M University.

However, sampling had to be done quickly to prevent evaporation losses, and the actual sample weight varied from 1 to 4 grams. Sample bottles were sealed with a septum cap and an aluminum cap crimped tightly over the septum. Analysis is done by placing the sample into a sand bath with a temperature of 125°C for two hours. The bottle is gradually cooled to room temperature and 1.0 ml of head space sample is injected into the gas chromatograph. Calibration standards are made up by injecting a known amount of hexane into dried, processed meal and following the same procedure used with samples.

Wastewater Analysis

Wastewater samples were analyzed for hexane by direct injection into a gas chromatograph with a flame ionization detector. These instrument conditions were used:

Column: 10 ft x 1/8 in. stainless steel with 10% SP 1000 on 80/100 mesh suplecoport
Column temperature: 70°C
Injection temperature: 100°C
Carrier gas: N_2 at 24 cc/min

A calibration standard of hexane in water was made with a concentration near but below the saturation level (0.14 µg/µl).

Fugitive Emissions

Fugitive emissions were measured with a Century Model OVA-128 portable organic vapor analyzer. This instrument has a flame ionization detector and was calibrated with gas standards of hexane in air. The OVA-128 was also equipped with a diluter assembly enabling measurements of up to 10,000 ppm hexane.

ISOMER CONTENT ANALYSIS

HEXANE FROM WORKING TANK

CARGILL, INC. - SIDNEY, OHIO

Procedure: Analysis was conducted using a gas chromatograph with flame ionization detector (FID). Isomer compounds were obtained in pure form and used in solution with carbon disulfide to calibrate the instrument. Separation of components was achieved with a 12 foot column packed with 0.2 percent carbowax 1500 on Carbopack C. Gas chromatograph conditions were as follows:

Injection temperature:	150°C
Column temperature:	Temperature programmed to rise 4°C/ min from 40°C to 175°C after 5 min of run time.
FID temperature:	250°C
Carrier gas:	Nitrogen at 47 ml/min.
Compounds used:	2,2-dimethybutane methyl cyclopentane 2,3-dimethylbutane 3-methylpentane 2-methylpentane n-hexane

TABLE 1. RESULTS OF ISOMER ANALYSIS

HEXANES FROM WORKING TANK

CARGILL, INC. - SIDNEY, OHIO

Compound	% composition by weight	% composition by volume
2,2-dimethylbutane	1.29	1.31
Methylcyclopentane	10.37	10.36
2,3-dimethylbutane	2.71	2.40
3-methylpentane	22.64	22.90
2-methylpentane	16.35	16.27
n-hexane	46.64	46.76

CALIBRATION

Standards

Compound	Density, g/ml	Molecular wt. g/g mole	Concentration in CS_2 solv. µg/µl of solv.
2,2-dimethylbutane	0.6492	86.17	0.4365
2,3-dimethylbutane	0.6616	86.17	0.4448
Methylcyclopentane	0.7489	84.16	0.5221
2-methylpentane	0.6532	86.18	0.4391
3-methylpentane	0.6643	86.18	0.4632
n-hexane	0.6594	86.18	0.4433

Standard Injections

Compound	Run 1		Run 2		Run 3		Avg. area/µl
	µl injected	Area units	µl injected	Area units	µl injected	Area units	
2,2-dimethylbutane	3.75	775600	3.70	742200	3.75	784600	205549
Methylcyclopentane		958600		917400		968600	253955
2,3-dimethylbutane		815000		777600		821400	215512
3-methylpentane		970400		933600		1004000	259610
2-methylpentane		656000		620400		637700	170887
n-hexane		788600		754000		797400	208906

Compound	Compound No.	FID response factor, µg/area unit	Retention time, min.
2,2-dimethylbutane	1	2.14×10^{-6}	20.68
Methylcyclopentane	2	2.07×10^{-6}	21.73
2,3-dimethylbutane	3	2.08×10^{-6}	22.63
3-methylpentane	4	1.83×10^{-6}	23.77
2-methylpentane	5	2.52×10^{-6}	24.02
n-hexane	6	2.14×10^{-6}	25.61

Hexanes - Cargill, Inc., Sidney, Ohio

Concentration of hexane in CS_2 = $\frac{1.6\ \mu l\ hexane}{3001.6\ \mu l\ solv.}$

Run No.	Compound No.	µl solv. injected	R.T. min.	Area response	Response factor, µl/area	Compound conc. in solv. µg/µl
1	1	3.70	20.81	7468	2.14×10^{-6}	4.319×10^{-3}
	2	3.70	21.73	59340	2.07×10^{-6}	3.320×10^{-2}
	3	3.70	22.63	14090	2.08×10^{-6}	7.921×10^{-3}
	4	3.70	23.79	138100	1.83×10^{-6}	6.830×10^{-2}
	5	3.70	24.04	82780	2.52×10^{-6}	5.638×10^{-2}
	6	3.70	25.61	257200	2.14×10^{-6}	1.488×10^{-1}
2	1	5.70	20.85	10480	2.14×10^{-6}	3.935×10^{-3}
	2	5.70	21.75	91460	2.07×10^{-6}	3.321×10^{-2}
	3	5.70	22.61	25940	2.08×10^{-6}	9.466×10^{-3}
	4	5.70	23.79	239100	1.83×10^{-6}	7.676×10^{-2}
	5	5.70	24.04	109400	2.52×10^{-6}	4.837×10^{-2}
	6	5.70	25.55	399600	2.14×10^{-6}	1.500×10^{-1}

Average Values

Compound	Compound No.	Avg. concentration µg/µl
2,2-dimethylbutane	1	4.127×10^{-3}
Methylcyclopentane	2	3.321×10^{-2}
2,3-dimethylbutane	3	8.693×10^{-3}
3-methylpentane	4	7.253×10^{-2}
2-methylpentane	5	5.237×10^{-2}
n-hexane	6	1.494×10^{-1}

```
TEMP1 4 0 0
.
 TEMP1          40     40
 TIME1           5.0
.RATE            4.00
 TEMP2         175
 TIME2           10.0
 INJ TEMP      150     150
 FID TEMP      250     250
 TCD TEMP      125     125
 AUX TEMP       40      40
 OVEN MAX      200

 CHT SPD         1.50
 ATTN 2↑        12
 FID SGNL       A
 SLP SENS        0.20
 AREA REJ        1
 FLOW  A        46
 FLOW  B        19
 OPTN            0
 15.0   RATE              13.00
 17.0   AREA REJ           1
 17.5   ZERO
 39.0   AREA REJ  -
ATTN 2↑ 0 MIN? 1 1 . 2 0
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      0.95
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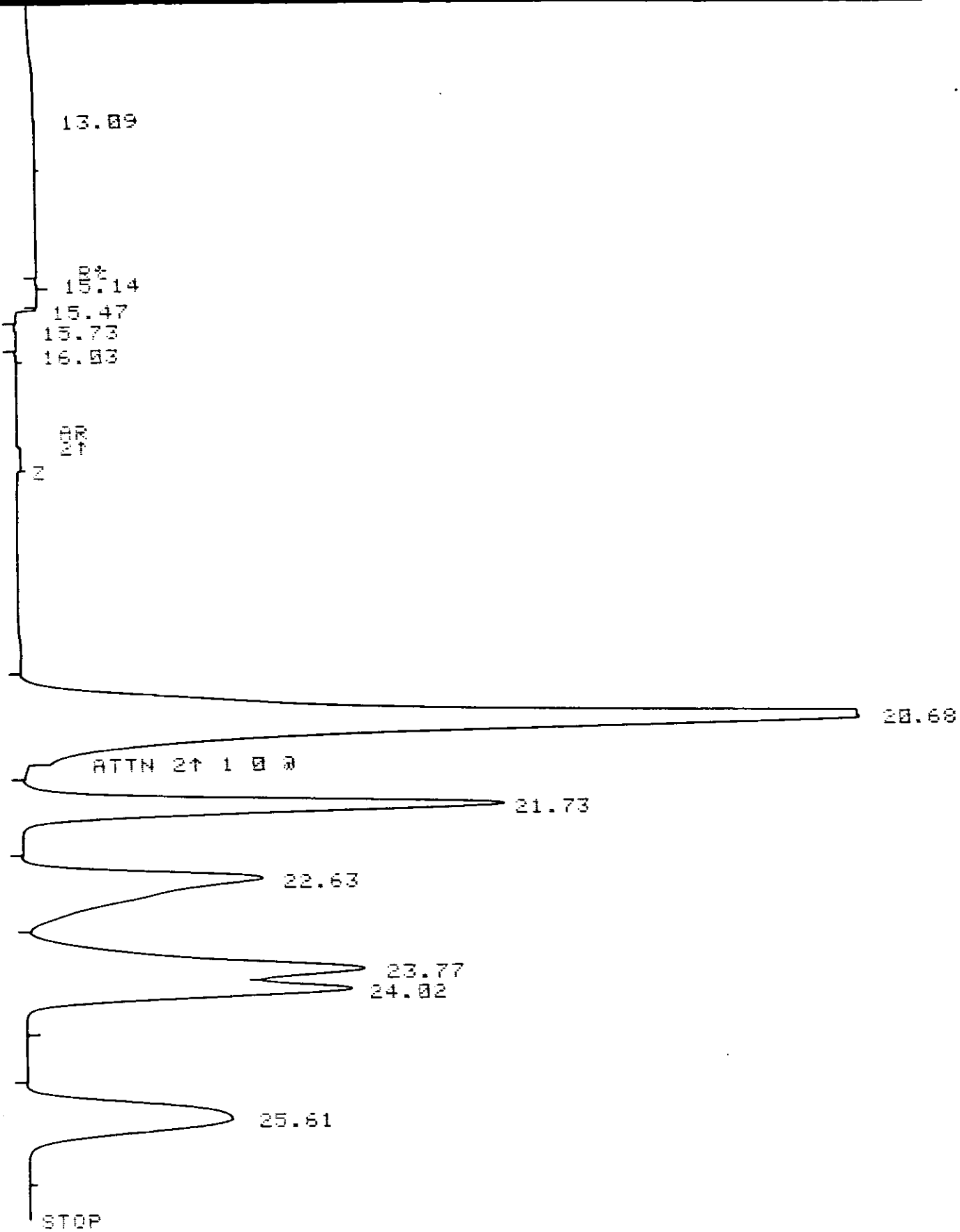


hp 5830A
AREA %

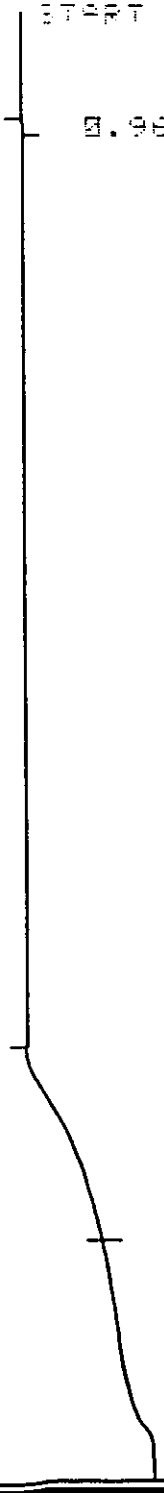
RT	AREA	AREA %
0.73	215	0.004
0.95	1192	0.022
13.09	444500	8.213
15.14	202	0.004
15.73	1952	0.036
16.03	39	0.001

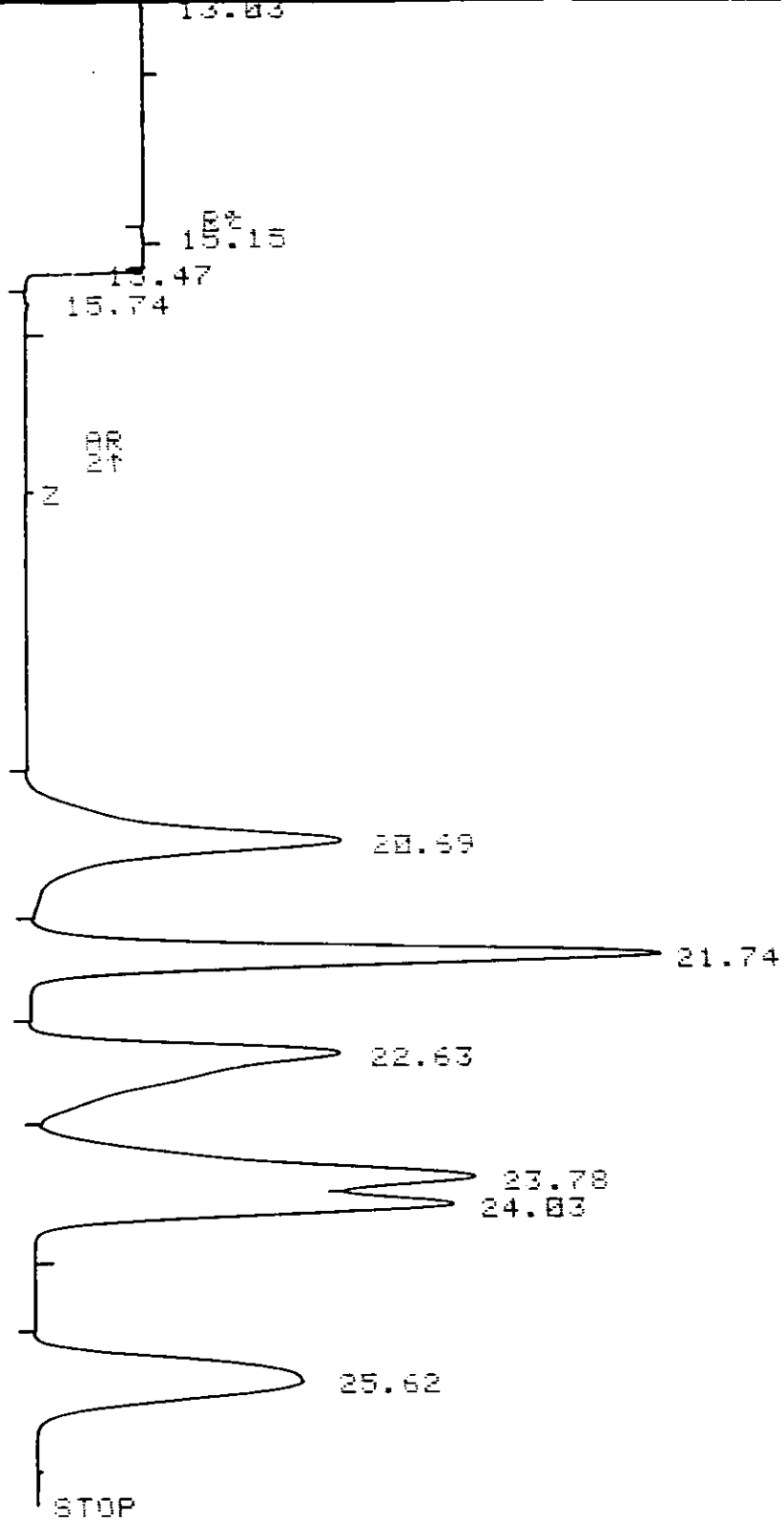
```
21.73          938000          17.712
22.63          815000          15.058
23.77          970400          17.930
24.02          656000          12.121
25.61          788600          14.571

                    XF:   1.0000 E+ 0

 15.0   RATE              10.00
 17.0   AREA REJ           1
 17.2   ATTN 2↑            0
 17.5   ZERO
 20.0   AREA REJ   -
AREA REJ - 0
 15.0   RATE              10.00
 17.0   AREA REJ           1
 17.2   ATTN 2↑            0
 17.5   ZERO
 20.0   AREA REJ   -
ATTN 2↑ 8 MIN? 1 7 . 2 DELETE
ATTN 2↑ 1 5 MIN? 1 7 . 2 0
     START


   0.96
```



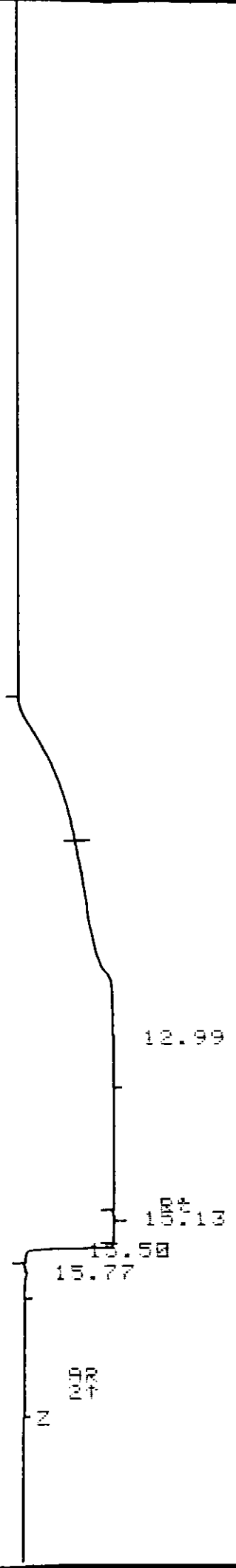


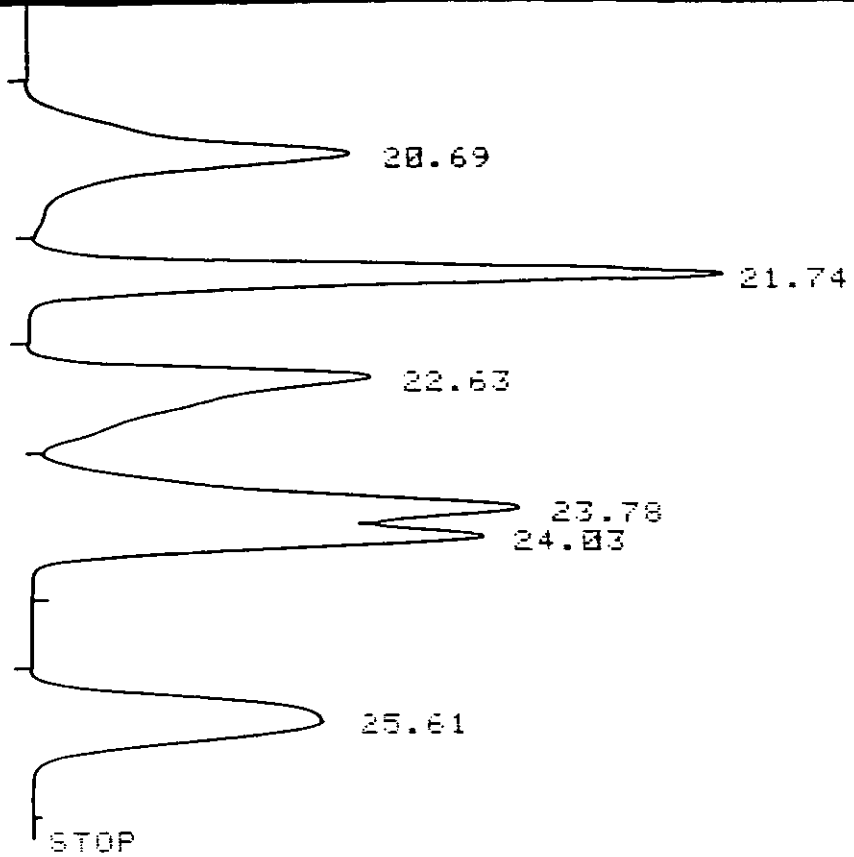
hp 5830A
AREA %

RT	AREA	AREA %
20.69	742200	15.641
21.74	917400	19.333
22.63	777600	16.387
23.78	933600	19.675
24.03	620400	13.074
25.62	754000	15.890

XF: 1.0000 E+ 0

START


12.99
15.13
15.50
15.77
Z

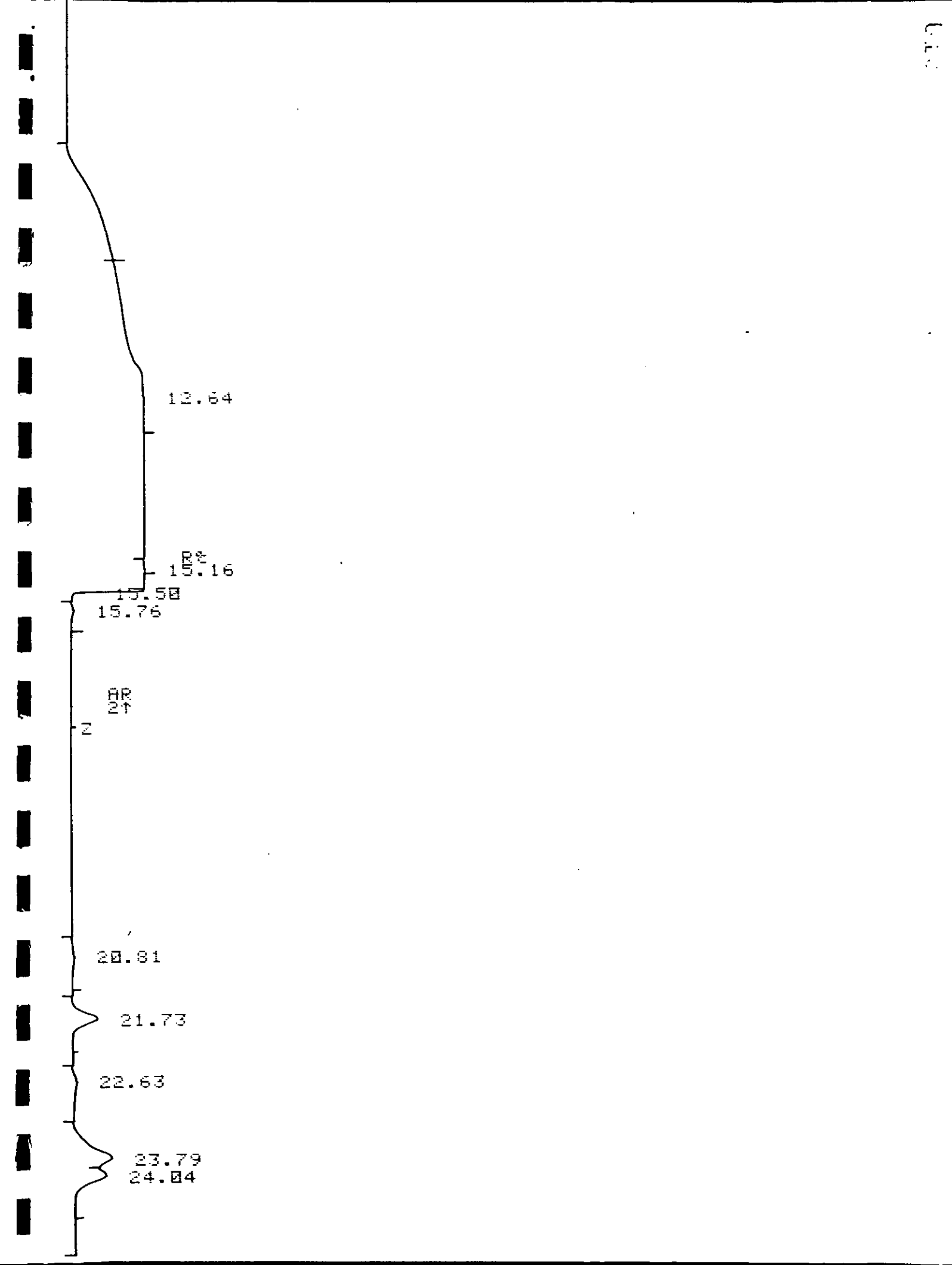


STOP
hp 5830A
AREA %

RT	AREA	AREA %
20.69	784600	15.649
21.74	968600	19.319
22.63	821400	16.383
23.78	1004000	20.025
24.03	637700	12.719
25.61	797400	15.904

XF: 1.0000 E+ 0

START


12.64
BR
15.16
15.50
15.76
AR
21
20.81
21.73
22.63
23.79
24.04

25.61

26.47

27.46

STOP

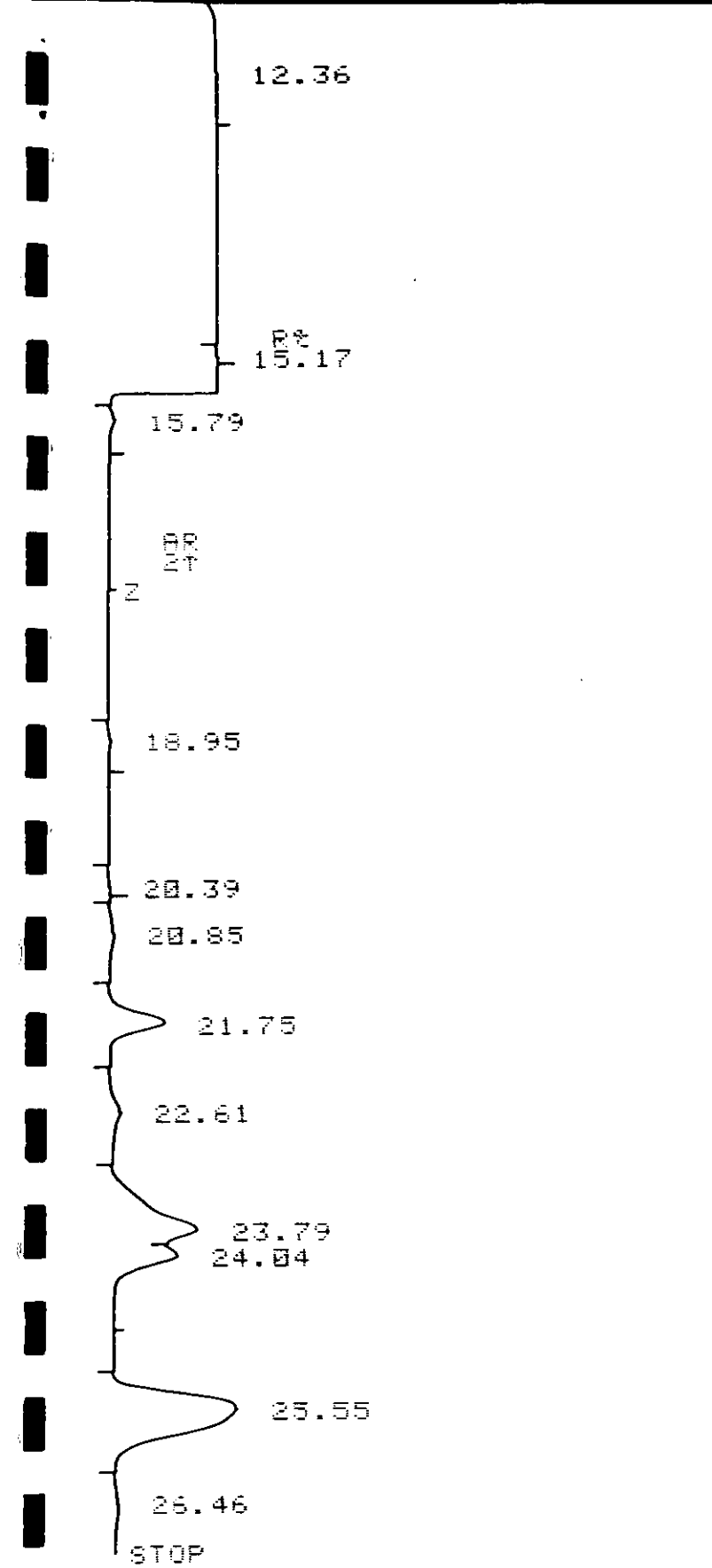
hp 5830A

AREA %

RT	AREA	AREA %
20.81	7468	1.314
21.73	59340	10.439
22.63	14090	2.479
23.79	138100	24.293
24.04	82780	14.562
25.61	257200	45.244
26.47	7166	1.261
27.46	2326	0.409

XF: 1.0000 E+ 0

START



hp 5830A
AREA %

RT	AREA	AREA %
18.95	3877	0.435
20.39	583	0.065
20.85	10480	1.177
21.75	91460	10.271
22.61	25940	2.913
23.79	239100	26.852

24.04	109400	12.286
25.55	399600	44.877
26.46	10000	1.123

XF: 1.0000 E+ 0

TEMP1 1 0 0 0 ...
RATE =

ANALYSIS OF HEXANE FOR BENZENE CONTENT

Cargill, Inc., Sidney, Ohio

The hexane sample was obtained from the working tank at the Cargill, Inc. vegetable oil plant in Sidney, Ohio during the testing done in the week of July 23, 1979. The results of the analysis show that the hexane contains 0.17 percent by volume or 0.23 percent by weight benzene.

PROCEDURE

Analysis was conducted with a gas chromatograph with a flame ionization detector (FID). A solution of benzene in carbon disulfide was used to calibrate the instrument and the hexane sample was analyzed in solution with carbon disulfide. Separation of the benzene from the other components was achieved with a six foot column packed with 1,2,3-(triscyano ethoxy) propane (TCEP). The following chromatograph conditions were used:

Injection temperature	150°C
Column temperature	Programmed to rise 5°/min from 40°C to 70°C after 6 min of run time.
FID temperature	250°C
Carrier gas	N_2 at 40 cc/min

ANALYTICAL DATA

Benzene Standard

Concentration of benzene in CS_2 - 0.281 µg/µl

Calibration:

µl solution injected	µg benzene injected	Benzene retention time, min	Area response	µg/area
3.90	1.096	5.97	583,000	1.88×10^{-6}
4.05	1.138	6.03	653,200	1.74×10^{-6}
			Average	1.81×10^{-6}

Hexanes from Cargill working tank.

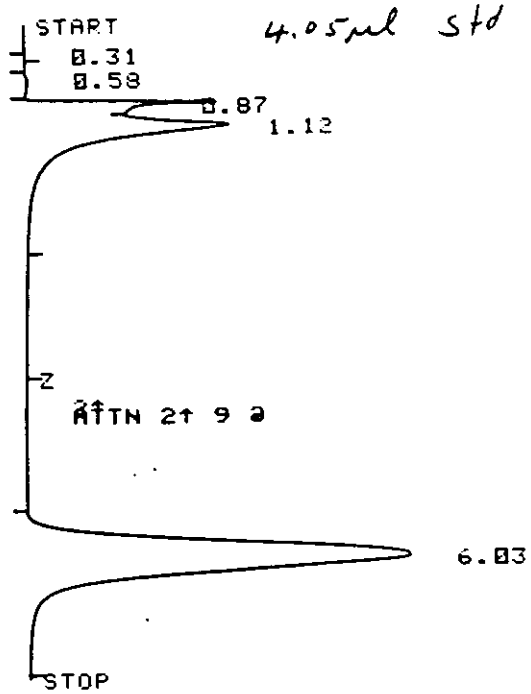
Concentration of Hexane in CS_2 - 6.270 µg/µl.

µl solution injected	µg hexane injected	Benzene retention time, min	Area response	µg benzene in sample	% benzene by weight
2.9	18.183	6.03	22,510	4.07×10^{-2}	0.224
4.3	26.960	6.05	33,680	6.10×10^{-2}	0.226
4.3	26.960	6.05	33,590	6.08×10^{-2}	0.226
				Average	0.225

$$\% \text{ by volume} = \frac{0.225 \text{ µg } C_6H_6}{100 \text{ µg } C_6H_{14}} \times \frac{659.37 \text{ µg } C_6H_{14}}{\text{µl } C_6H_{14}} \times \frac{1 \text{ µl } C_6H_6}{878.7 \text{ µg } C_6H_6} \times 100$$

= 0.169 percent by volume.

4.05 µl std C_6H_6 1.6 / 5007.1.6



hp 5830A
AREA %

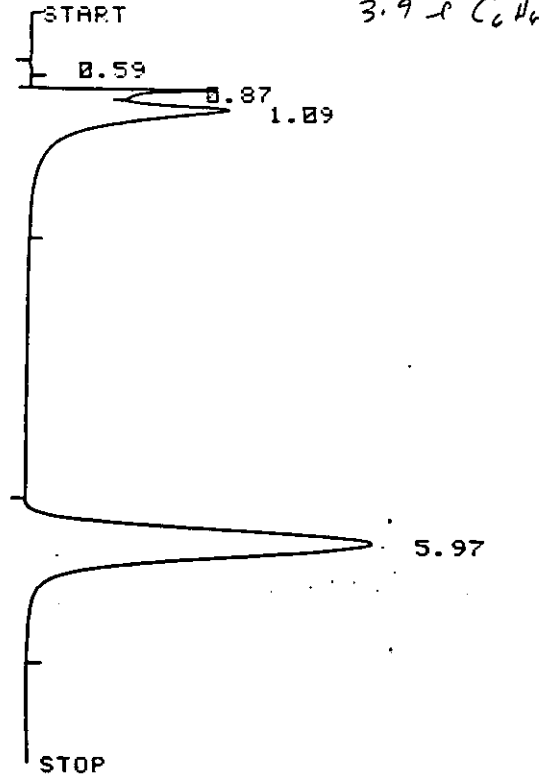
RT	AREA	AREA %
0.31	99	0.010
0.58	1757	0.178
0.87	79560	8.067
1.12	251600	25.512
6.03	653200	66.233

XF: 1.0000 E+ 0

TEMP2 7 0 ∂
TIME2 1 0 ∂

3.9 µl C_6H_6 std

$\frac{3.9\ C_6H_6 \times 1.6}{5007.1\ \text{solution}} \times 8.787 = 0.280$ 11-14-79



hp 5830A
AREA %

RT	AREA	AREA %
0.59	306	0.035
0.87	61270	6.976
1.09	233700	26.609
5.97	583000	66.380

Cargill Hexanes

2.9 µl 9

$$\text{mg/ml} = 2.9 \times \frac{48\,\mu l}{5048\,\mu l\ \text{solution}} \times \frac{659.37\,\text{mg}}{1.0\,\text{ml}}$$

ATTN 2↑ 1 2 3

START

0.33

0.85

0.99

2↑

6.03

STOP

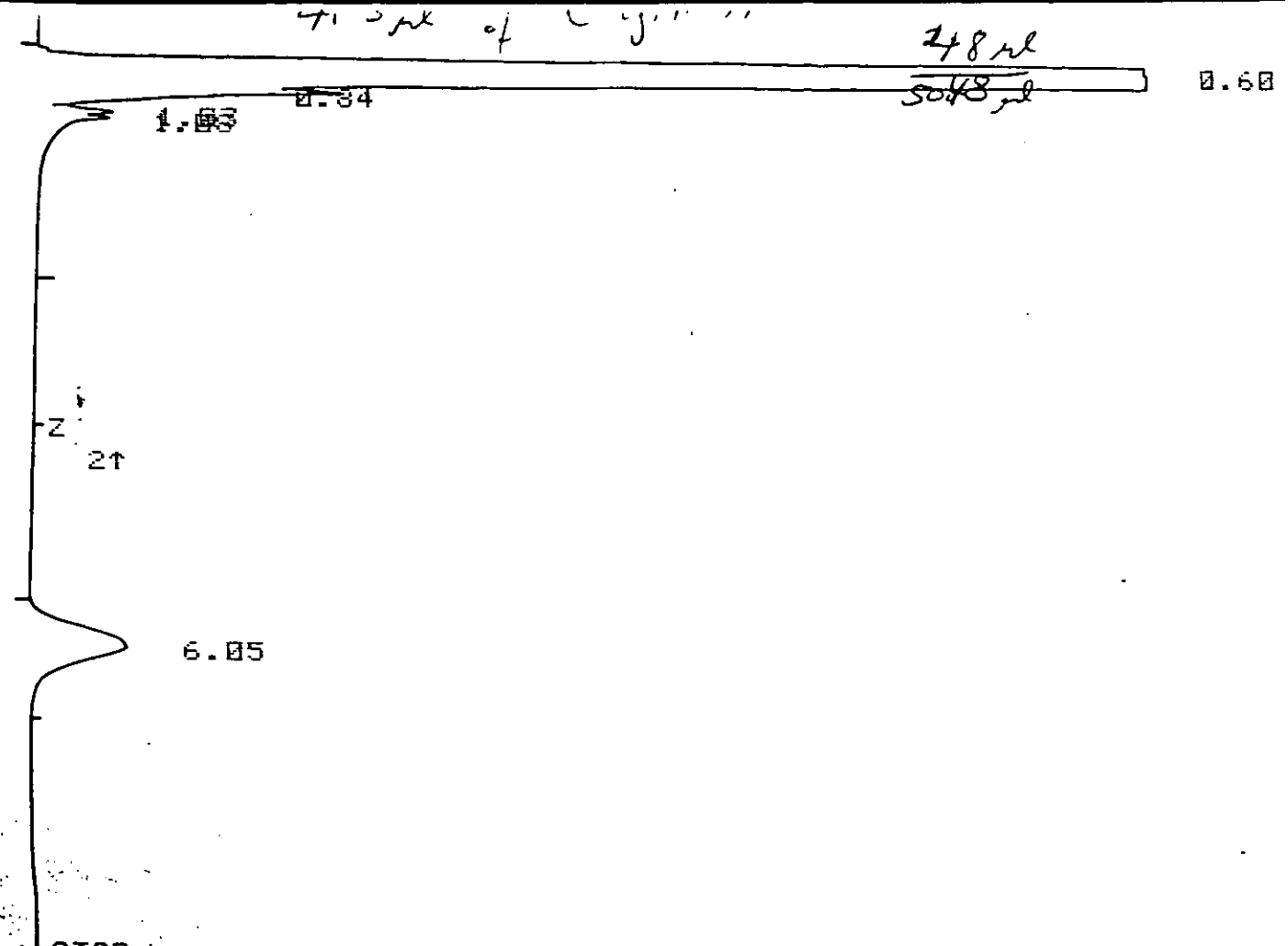
hp 5830A

AREA %

RT	AREA	AREA %
0.33	98	0.001
0.60	8458000	87.318
0.85	814800	8.412
0.99	108200	1.117
1.05	282800	2.920
6.03	22510	0.232

XF: 1.0000 E+ 0

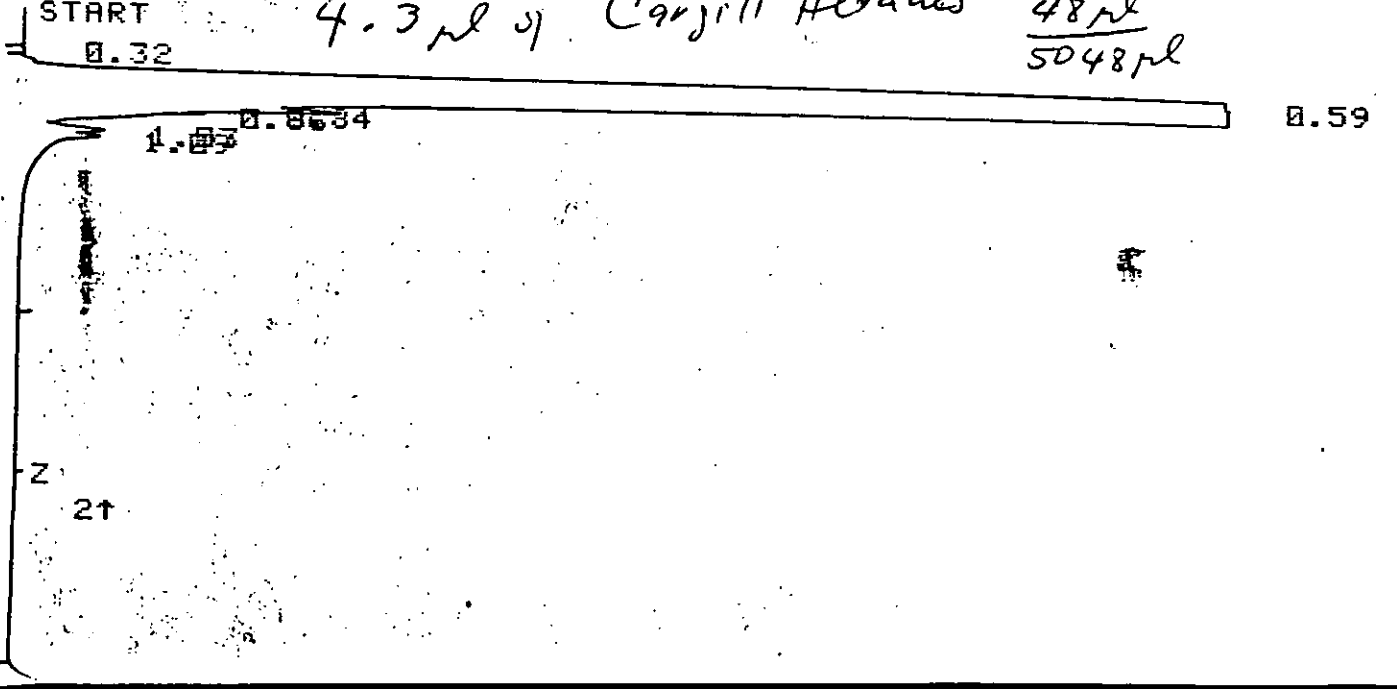
START 4:3 µl .01 Cargill Hexanes 48 µl



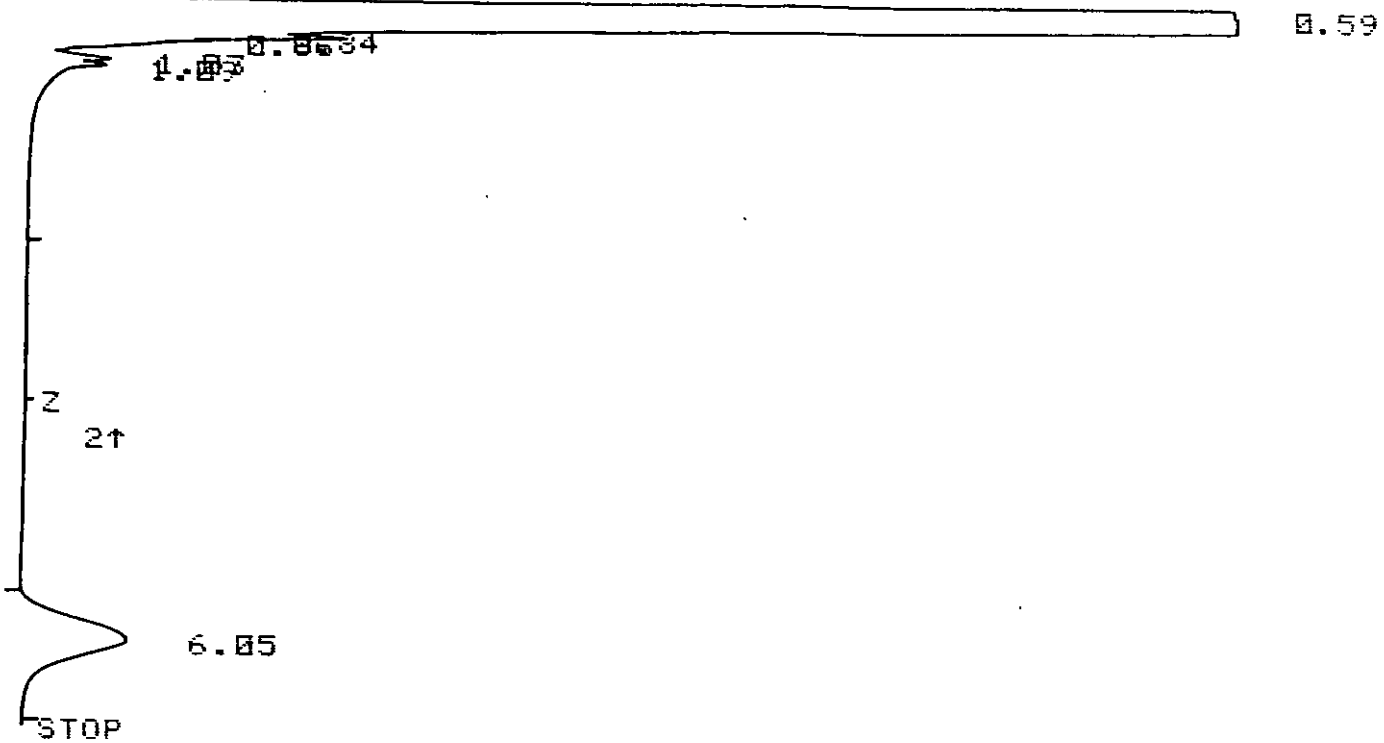
hp 5830A
AREA %

RT	AREA	AREA %
0.60	12840000	90.916
0.84	786000	5.565
1.03	142400	1.008
1.08	320800	2.271
6.05	33688	0.238

XF: 1.0000 E+ 0



4.3 µl of Cargill Heranes 48µl / 5048µl



hp 5830A
AREA %

RT	AREA	AREA %
0.32	70	0.000
0.59	12780000	91.192
0.84	449900	3.210
0.86	292000	2.084
1.03	137600	0.982
1.09	321200	2.292
6.05	33590	0.240

XF: 1.0000 E+ 0

TEMP1	40	40
TIME1	6.0	
RATE	5.00	
TEMP2	70	
TIME2	10.0	
INJ TEMP	150	150
FID TEMP	250	250
TCD TEMP	0	33
AUX TEMP	0	37
OVEN MAX	400	
CHT SPD	1.50	
ATTN 2↑	12	
FID SGNL	A	
SLP SENS	0.20	
AREA REJ	1	
FLOW A	41	
FLOW B	29	
OPTN	0	
4.0 ZERO		
4.3 ATTN 2↑	7	

Column 6ft- TCEP

APPENDIX A

ANALYTICAL DATA

1.0 CS_2 IMPINGER TRAINS

DATE: 7-24-79

CALIBRATION:
Standard hexane in CS_2 - concentration: 0.3295 $\frac{\mu g}{\mu l}$

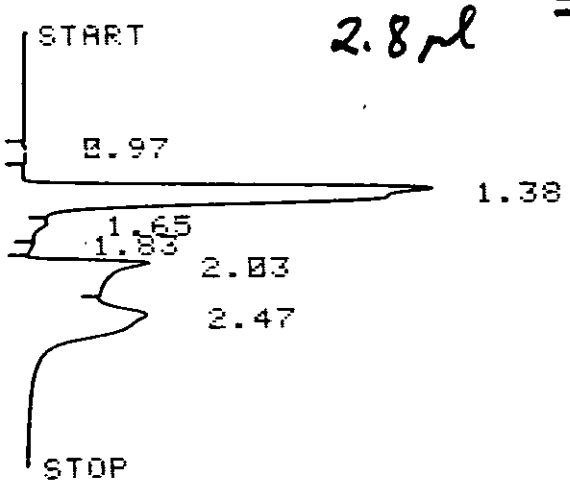
Run No.	µl injected	R.T. min	Area response	µl injected	µg/area
1	2.8	1.38	481800	0.9226	1.92×10^{-6}
2	2.8	1.39	508300	0.9226	1.82×10^{-6}
3	2.8	1.39	482000	0.9226	1.91×10^{-6}
Average					1.91×10^{-6}

Sample I.D.	Run No.	Dilution factor	µl injected	Area response	Sample conc. corrected for dilution, µg/µl
MOS-IN-1A	1	0.5/55.5	2.2	1658350	157.30
	2	0.5/55.5	1.4	1023340	152.54
MOS-IN-1B	1	0.5/75.5	1.7	214275	35.78
	2	0.5/75.5	2.85	361298	35.99
MOS-OUT-1A	1	0	2.4	5788	0.0045
	2	0	3.2	7976	.0047
	3	0	2.8	8561	.0058
MOS-OUT-1B	1	0	2.7	1656760	1.153
	2	0	2.7	1662650	1.158

TEMP1	60	60
TIME1	5.0	
INJ TEMP	150	150
FID TEMP	300	300
TCD TEMP	125	125
AUX TEMP	0	45
OVEN MAX	200	
CHT SPD	1.50	
ATTN 2↑	10	
FID SGNL	+8	
SLP SENS	0.03	
AREA REJ	1	
FLOW A	2	
FLOW B	19	
OPTN	0	
B	22	
B	23	
B	24	
B	24	
B	24	

7-24-79

2.8 µl



STD
Hexane
in
CS_2

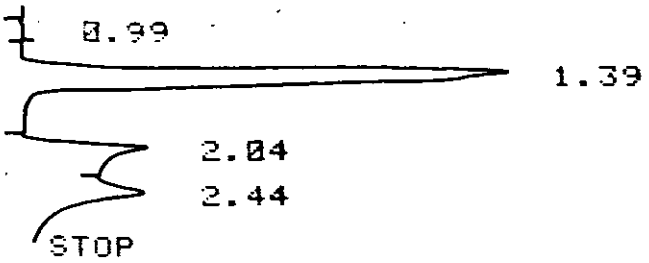
0.3295 mg/µl

hp 5830A
AREA %

RT	AREA	AREA %
0.97	82	0.008
1.38	481800	47.885
1.65	20430	2.030
1.83	5454	0.542
2.03	201600	20.037
2.47	296800	29.498

XF: 1.0000 E+ 0

2.8 µl



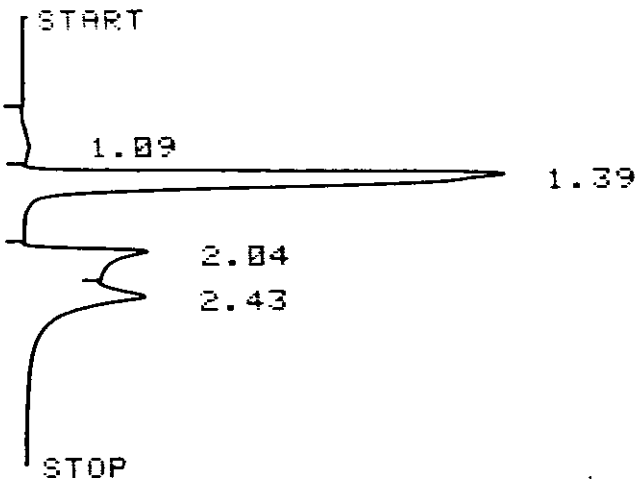
hp 5830A
AREA %

RT	AREA	AREA %
0.21	12670	1.433
0.99	66	0.007
1.39	508300	57.485
2.04	176600	19.972
2.44	186600	21.103

XF: 1.0000 E+ 0

2.8 µl

STD
Hexane in CS_2
0,3295 mg/ml

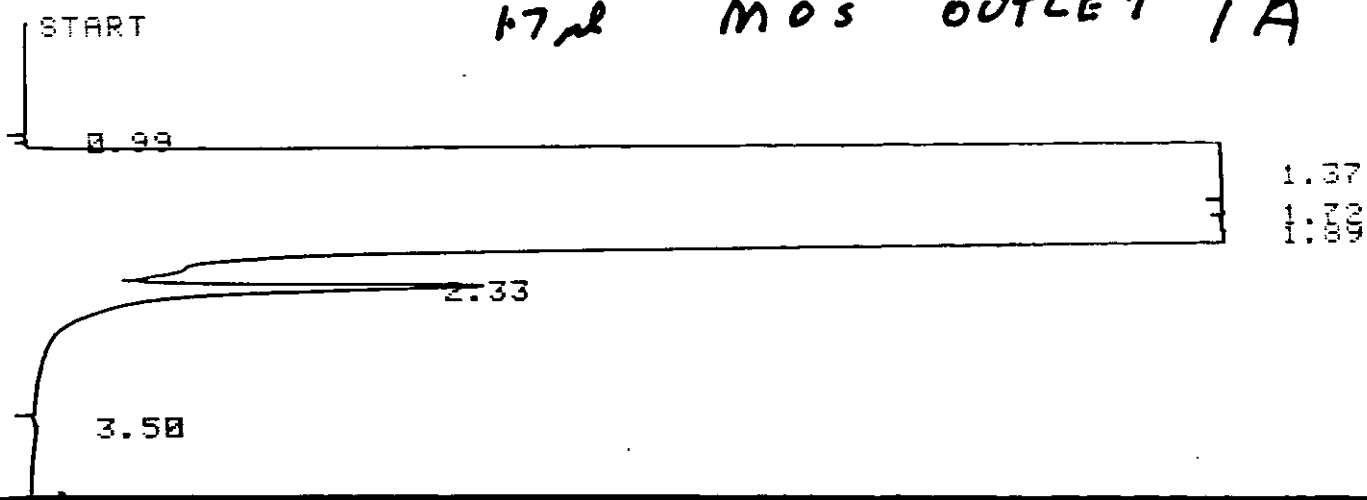


hp 5830A
AREA %

RT	AREA	AREA %
1.09	11180	1.251
1.39	482000	53.928
2.04	178500	19.971
2.43	222100	24.850

XF: 1.0000 E+ 0

1.7 µl MOS OUTLET 1A

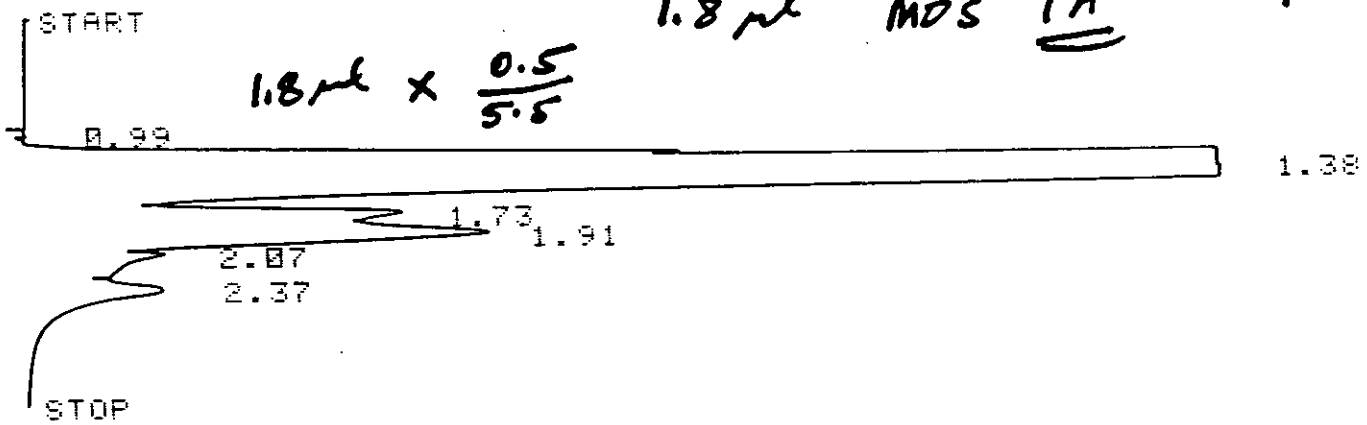


1 ST0P81
hp 5830A
AREA %

RT	AREA	AREA %
0.99	329	0.000
1.37	1527000000	93.557
1.72	2717000	1.665
1.89	7302000	4.474
2.33	478500	0.293
3.50	18860	0.012
4.81	13	0.000

XF: 1.0000 E+ 0

1.8 µl MOS 1A OUTLET

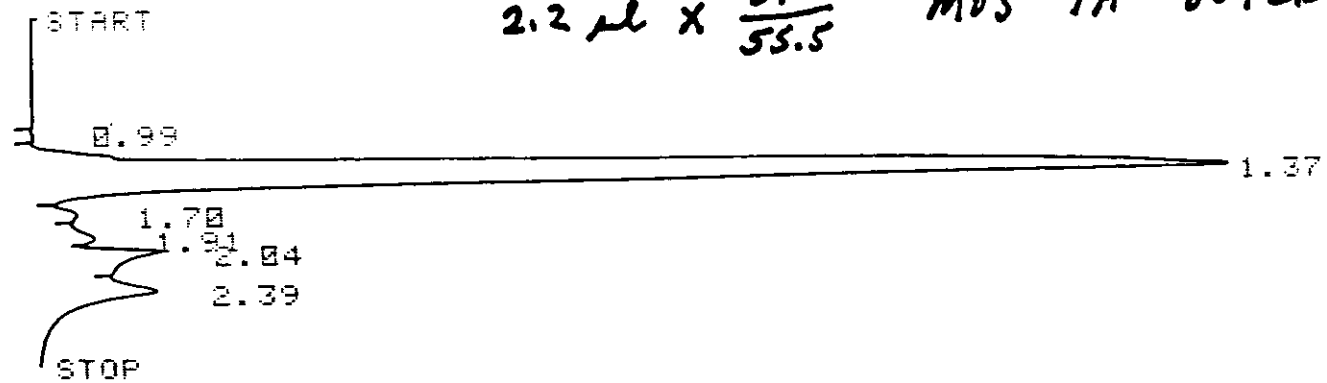


hp 5830A
AREA %

RT	AREA	AREA %
0.99	65	0.001
1.38	1136000000	89.806
1.73	324000	2.561
1.91	565400	4.470
2.07	165500	1.308
2.37	234500	1.854

XF: 1.0000 E+ 0

2.2 µl × 0.5/55.5 MOS 1A OUTLET



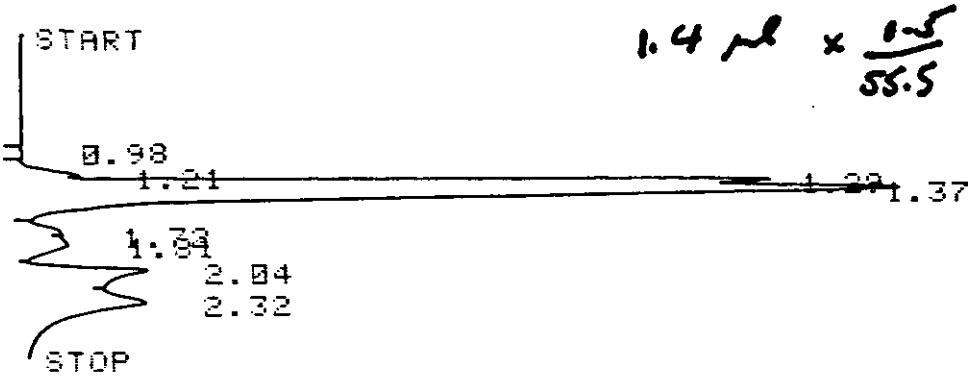
hp 5830A
AREA %

RT	AREA	AREA %
0.99	78	0.004
1.37	1552000	76.667
1.70	38890	1.921
1.91	67460	3.332
2.04	165700	8.185
2.39	200200	9.890

XF: 1.0000 E+ 0

XF: 1.0000 E+ 0

1.4 ml × 0.5/55.5 MOS 1A OUTLET



hp 5830A
AREA %

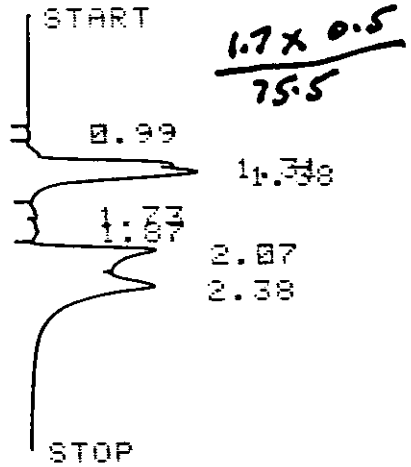
RT	AREA	AREA %
0.98	128	0.009
1.21	24650	1.821
1.29	320200	23.660
1.37	634400	46.877
1.72	22770	1.683
1.81	45970	3.397
2.04	121200	8.956
2.32	184000	13.596

XF: 1.0000 E+ 0

IN

1.7 ml MOS 1B OUT

1.7 × 0.5 / 75.5



hp 5830A
AREA %

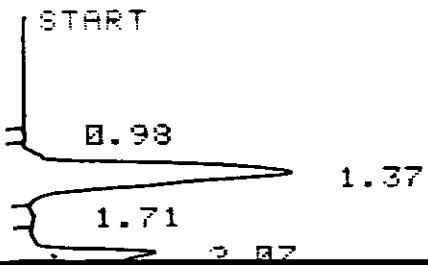
RT	AREA	AREA %
0.99	169	0.029
1.31	71500	12.333
1.38	128700	22.200
1.73	5403	0.932
1.87	8672	1.496
2.07	150200	25.908
2.38	215100	37.103

XF: 1.0000 E+ 0

IN

2.85 ml MOS 1B OUT

0.5 / 25

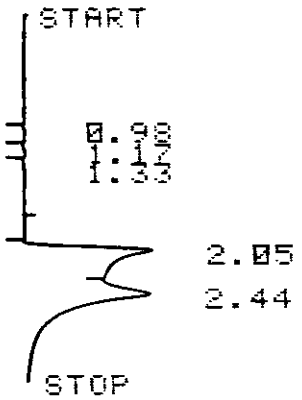


STOP

hp 5830A
AREA %

RT	AREA	AREA %
0.98	120	0.016
1.37	353600	45.951
1.71	7698	1.000
2.07	202600	26.328
2.46	205500	26.705

XF: 1.0000 E+ 0



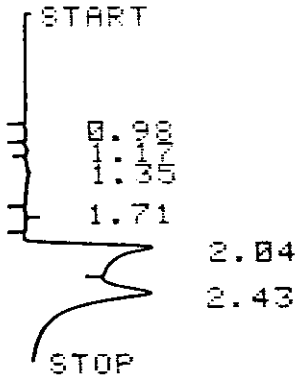
2.2 ml × $\frac{0.5}{75.5}$ MDS 1A ~~INLET~~ OUT

STOP

hp 5830A
AREA %

RT	AREA	AREA %
0.98	164	0.041
1.17	556	0.140
1.33	905	0.228
2.05	185500	46.723
2.44	209900	52.868

XF: 1.0000 E+ 0



2.4 ml MDS 1A OUT
Straight-

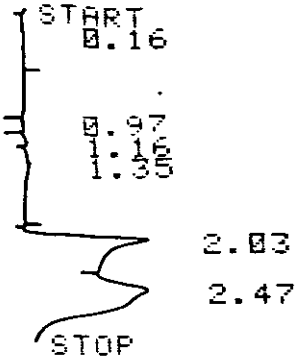
hp 5830A
AREA %

RT	AREA	AREA %
0.98	145	0.038
1.17	1157	0.301
1.35	4607	1.198
1.71	24	0.006
2.04	177200	46.094
2.43	201300	52.363

XF: 1.0000 E+ 0

3.2 ml straight

1A



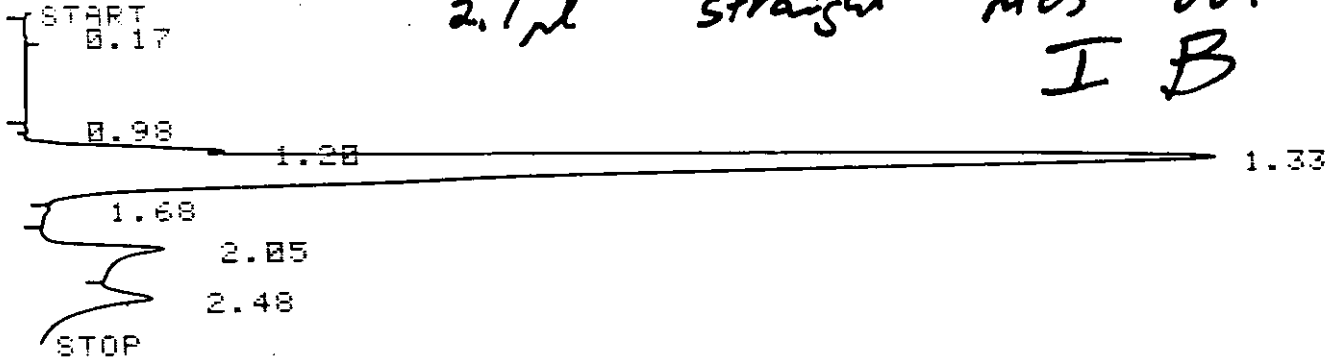
hp 5830A
AREA %

RT	AREA	AREA %
0.16	296	0.063
0.97	332	0.071
1.16	1324	0.282
1.35	6652	1.418
2.03	195200	41.611
2.47	265300	56.555

XF: 1.0000 E+ 0

2.7 ml straight MOS OUT

IB



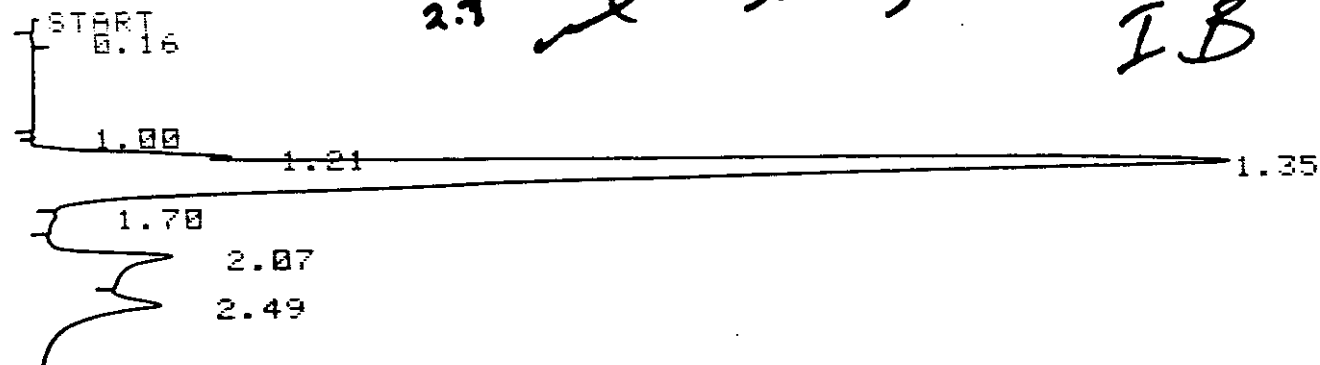
hp 5830A
AREA %

RT	AREA	AREA %
0.17	60	0.003
0.98	375	0.018
1.20	101600	4.987
1.33	1538000	75.500
1.68	17160	0.842
2.05	209500	10.284
2.48	170400	8.365

XF: 1.0000 E+ 0

2.7 ml straight MOS OUT

IB

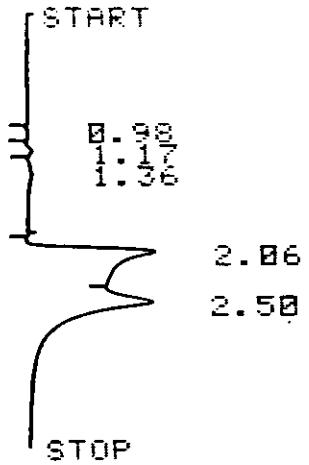


hp 5830A
AREA %

RT	AREA	AREA %
0.16	30	0.001
1.00	135	0.006
1.21	97720	4.654
1.35	1543000	73.493
1.70	21930	1.045
2.07	231700	11.036
2.49	205000	9.764

XF: 1.0000 E+ 0

2.8 mL Straight MOS OUT
1 A



hp 5830A
AREA %

RT	AREA	AREA %
0.98	110	0.024
1.17	2228	0.492
1.36	6333	1.400
2.06	217600	48.092
2.50	226200	49.992

XF: 1.0000 E+ 0

TEMP1	60	60
TIME1	5.0	
INJ TEMP	150	150
FID TEMP	300	300
TCD TEMP	125	125
AUX TEMP	0	48
OVEN MAX	200	

CHT SPD	1.50
ATTN 2↑	10
FID SGNL	+B
SLP SENS	0.03
AREA REJ	1
FLOW A	2
FLOW B	23
OPTN	0

DATE: 7-25-79

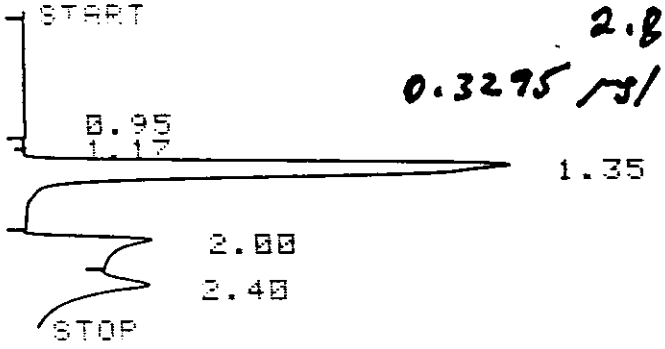
CALIBRATION;
Standard hexane in CS_2 - concentration: 0.3295 $\frac{\mu g}{\mu l}$

Run No.	µl injected	Area response	µl injected	µg/area
1	2.8	485900	0.9226	1.899×10^{-6}
2	2.8	519700	0.9226	1.78×10^{-6}
3	2.8	518400	0.9226	1.78×10^{-6}
Average				1.82×10^{-6}

Sample I.D.	Run No.	Dilution factor	µl injected	Area response	Sample conc. corrected for dilution, µg/µl
MOS-OUT-2	1	0.5/5.5	2.8	1847470	13.19
	2	0.5/5.5	1.9	1281890	13.49
OUT-2 BACKUP	1	0	3.2	485000	0.275
	2		2.7	398800	0.268
MOS-IN-2	1	0.5/50.5	2.7	1223638	83.183
	2	0.5/50.5	3.0	1355820	82.952
MOS-IN-2 BACKUP	1		1.0	70539	0.128
	2		3.05	222780	0.133
MOS-IN-3A	1	0.5/50.5	2.7	1041610	70.81
	2	0.5/50.5	3.0	1197960	73.29
MOS-IN-3B	1	0.5/50.5	3.1	1481480	87.72
	2	0.5/50.5	3.1	1470870	87.09
MOS-OUTLET-3A	1	0.5/5.5	3.0	3083	.021
	2	0.5/5.5	3.3	27906	.015
MOS-OUTLET-3B	1	0	3.1	8907600	5.22
	2	0	1.45	3868920	4.85

7-25-79

TEMP1	60	60
TIME1	5.0	
INJ TEMP	150	150
FID TEMP	300	300
TCD TEMP	125	125
AUX TEMP	0	43
OVEN MAX	200	
CHT SPD	1.50	
ATTN 2↑	10	
FID SGNL	+5	
SLP SENS	0.03	
AREA REJ	1	
FLOW A	1	
FLOW B	23	
OPTN	5	



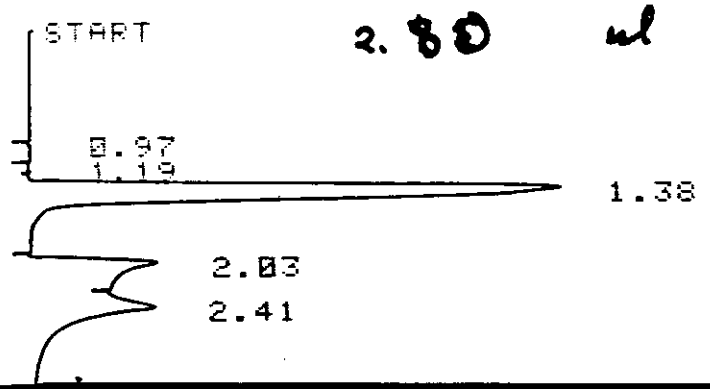
2.8 µl std Hexane in CS_2

0.3295 mg/ml

hp 5830A
AREA %

RT	AREA	AREA %
0.95	3849	0.455
1.17	131	0.015
1.35	485900	57.402
2.00	184700	21.820
2.40	171900	20.308

XF: 1.0000 E+ 0

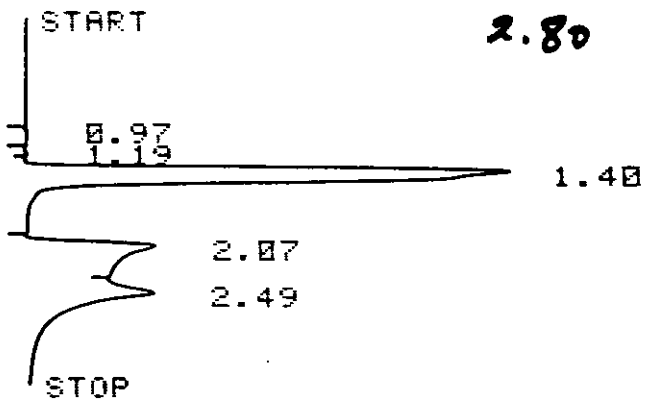


2.80 µl std of Hexane in CS_2

hp 5830A
AREA %

RT	AREA	AREA %
0.97	66	0.007
1.19	10	0.001
1.38	519700	55.698
2.03	185700	19.902
2.41	227600	24.392

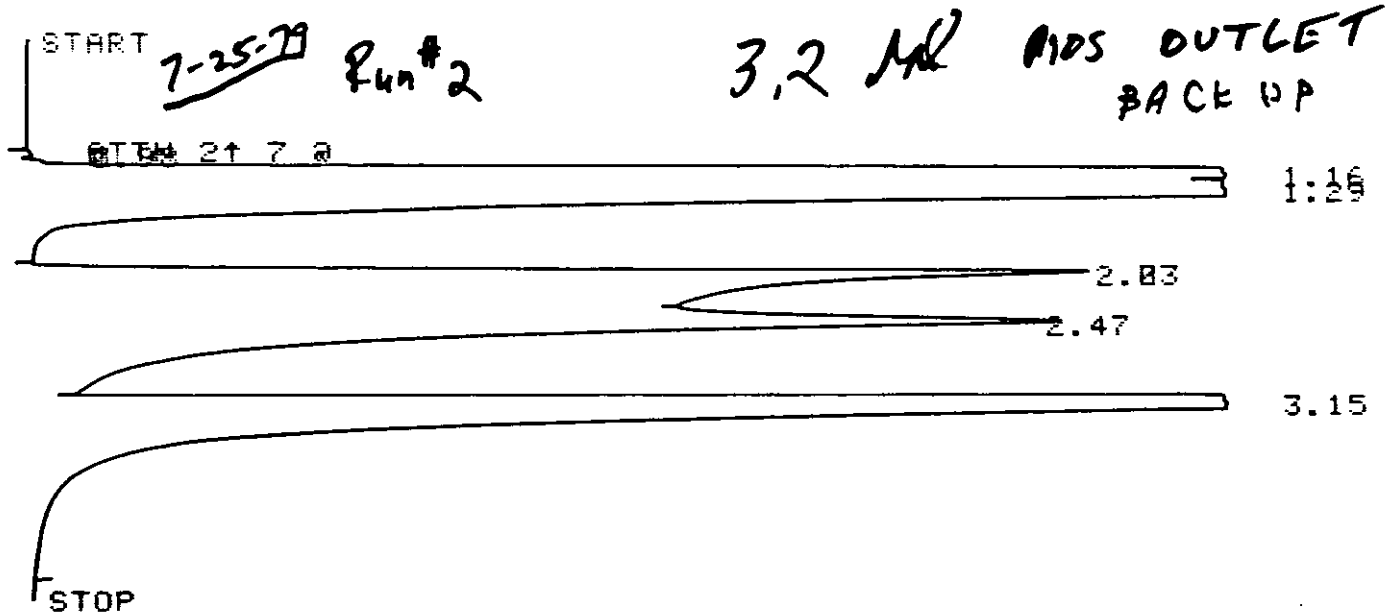
XF: 1.0000 E+ 0



hp 5830A
AREA %

RT	AREA	AREA %
0.97	82	0.009
1.19	13	0.001
1.40	518400	54.443
2.07	218100	22.905
2.49	215600	22.642

XF: 1.0000 E+ 0



hp 5830A
AREA %

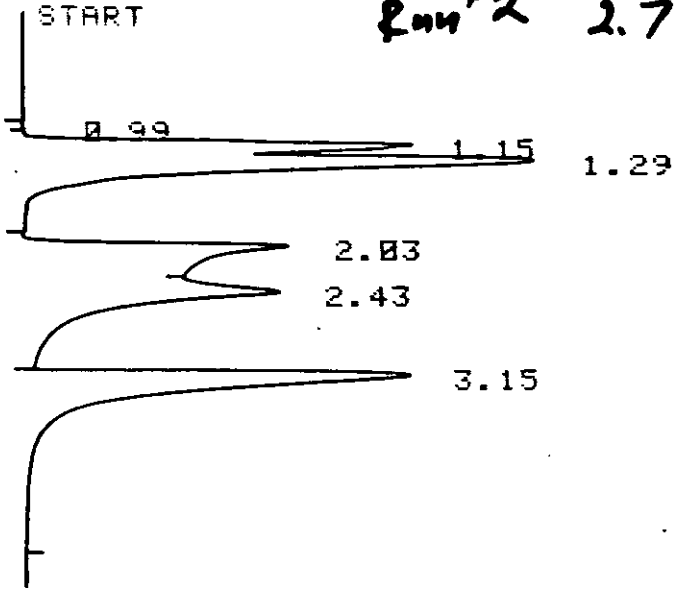
RT	AREA	AREA %

0.98	257	0.021
1.16	159800	12.778
1.29	325200	26.004
2.03	217000	17.352
2.47	225200	18.008
3.15	323100	25.837

XF: 1.0000 E+ 0

ATTN 2↑ 9 @

Run #2 2.7 µl MOS OUTLET BACKUP

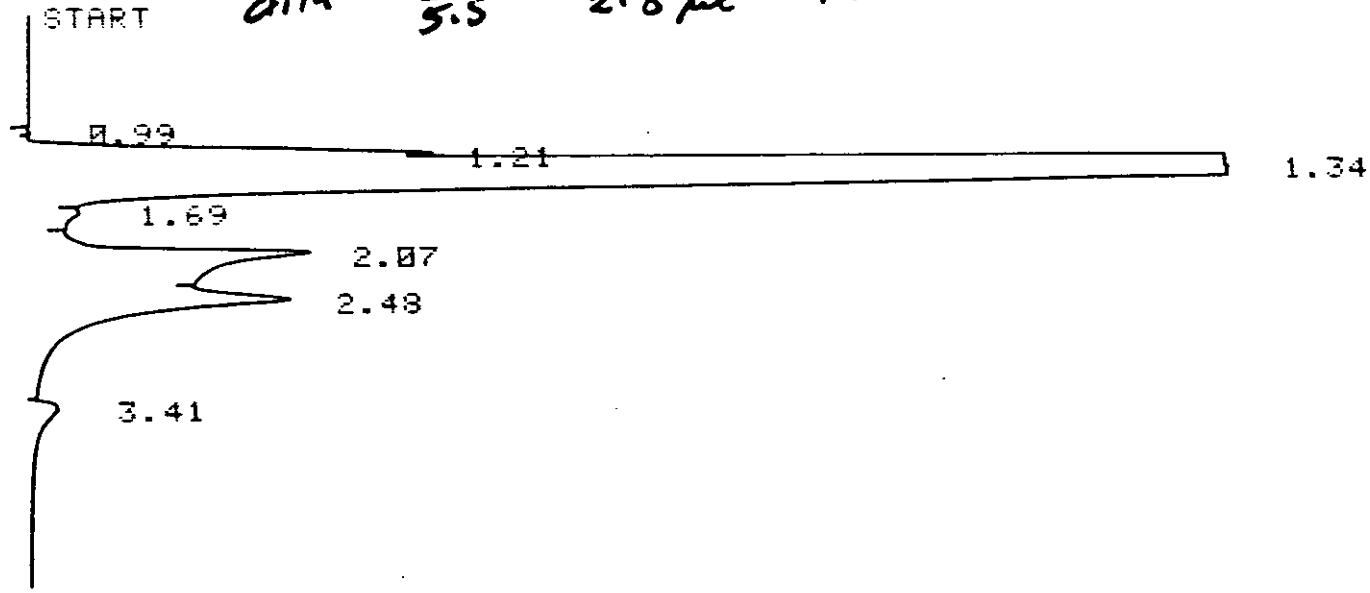


hp 5830A
AREA %

RT	AREA	AREA %
0.99	236	0.022
1.15	134700	12.455
1.29	264100	24.419
2.03	197300	18.243
2.43	220300	20.369
3.15	264900	24.493

XF: 1.0000 E+ 0

dilution $\frac{0.5}{5.5}$ 2.8 µl MOS OUTLET Run #2



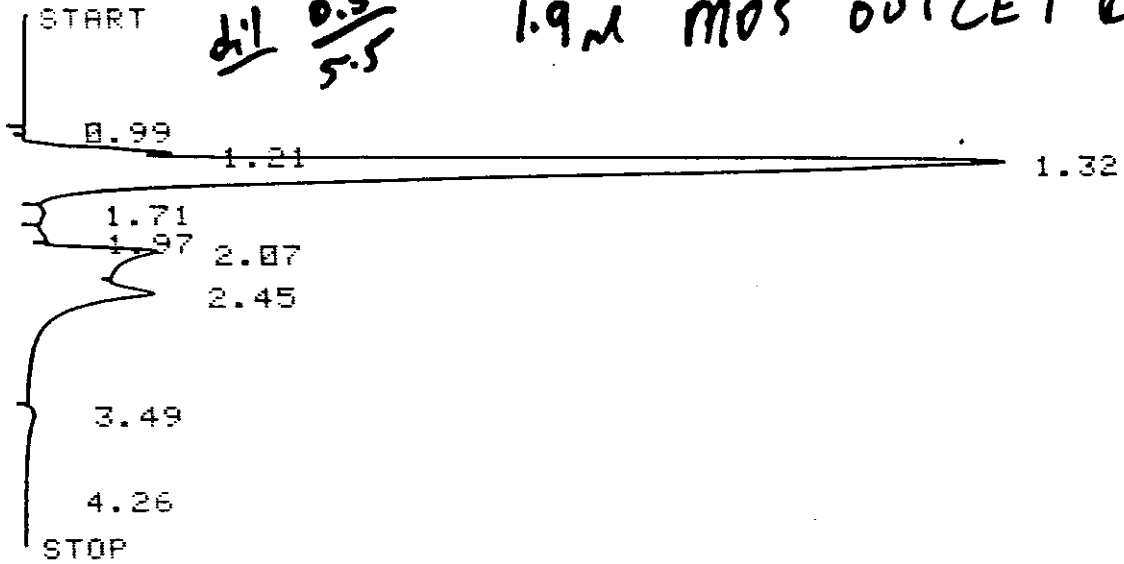
hp 5830A
AREA %

RT	AREA	AREA %
0.99	55	0.002
1.21	106600	4.525
1.34	1713000	72.716
1.69	27870	1.183
2.07	247200	10.494
2.48	231900	9.844
3.41	29110	1.236

XF: 1.0000 E+ 0

ATTN 2↑ 1 0 @

dil 0.5/5.5 1.9 mL MOS OUTLET Run #2

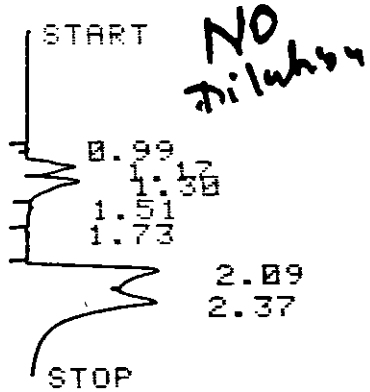


hp 5830A
AREA %

RT	AREA	AREA %
0.99	87	0.005
1.21	73760	4.208
1.32	1187000	67.714
1.71	21130	1.205
1.97	20220	1.153
2.07	204100	11.643
2.45	228200	13.018
3.49	18470	1.054

XF: 1.0000 E+ 0

1 mL MOS INLET BACKUP Run #2



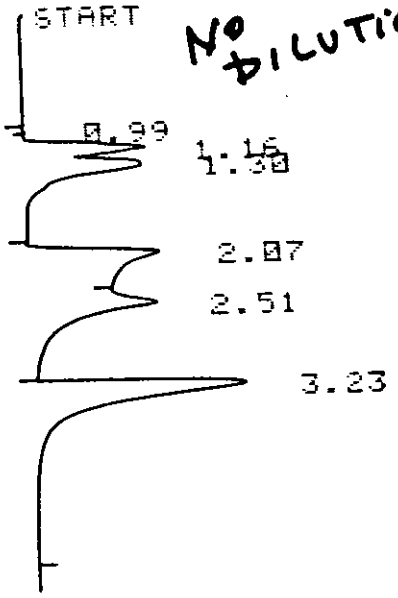
hp 5830A
AREA %

RT	AREA	AREA %
0.99	125	0.030
1.17	29530	7.042
1.30	37990	9.059

1.51	2660	0.634
1.73	359	0.086
2.09	148500	35.411
2.37	200200	47.739

XF: 1.0000 E+ 0

NO DILUTION 3.05 ml MOS INLET BACK UP RUN #2

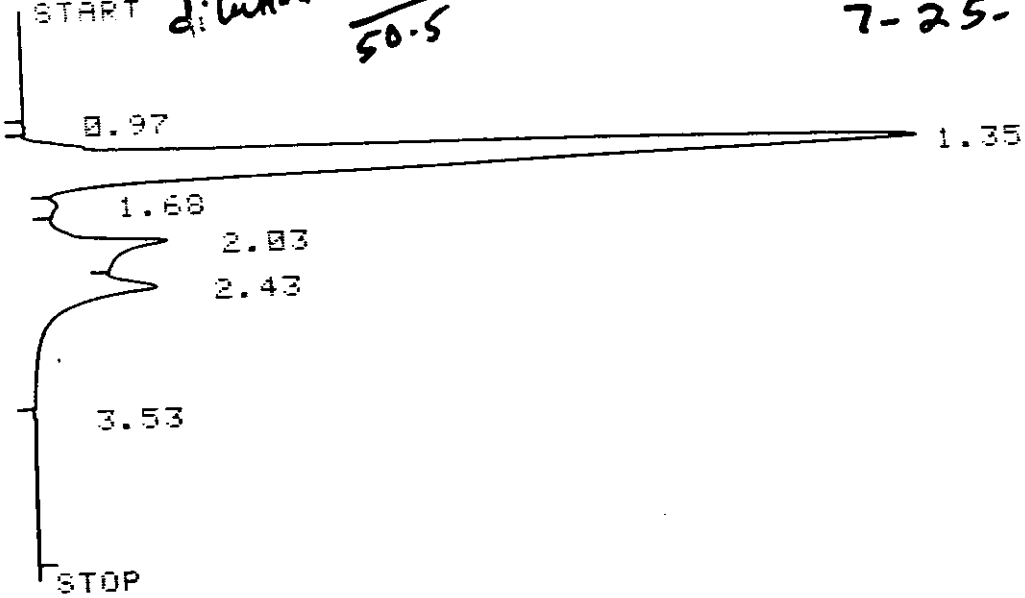


hp 5830A
AREA %

RT	AREA	AREA %
0.99	351	0.035
1.16	86180	8.680
1.30	136600	13.759
2.07	240900	24.264
2.51	227100	22.874
3.23	301700	30.388

XF: 1.0000 E+ 0

dilution 0.5/50.5 2.7 ml MOS INLET RUN #2 7-25-79



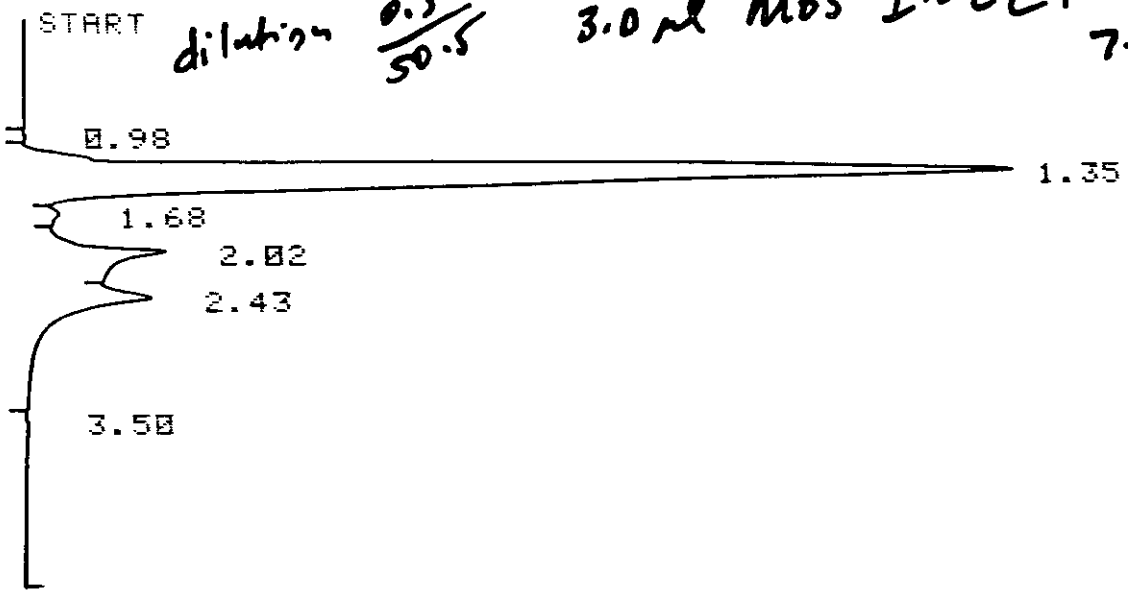
hp 5830A
AREA %

RT	AREA	AREA %
0.97	183	0.011
1.35	1190000	69.481

2.03	248200	14.492
2.43	233000	13.604
3.53	7694	0.449

XF: 1.0000 E+ 0

dilution 0.5/50.5 3.0 ml MOS INLET Run #2 7-25-79

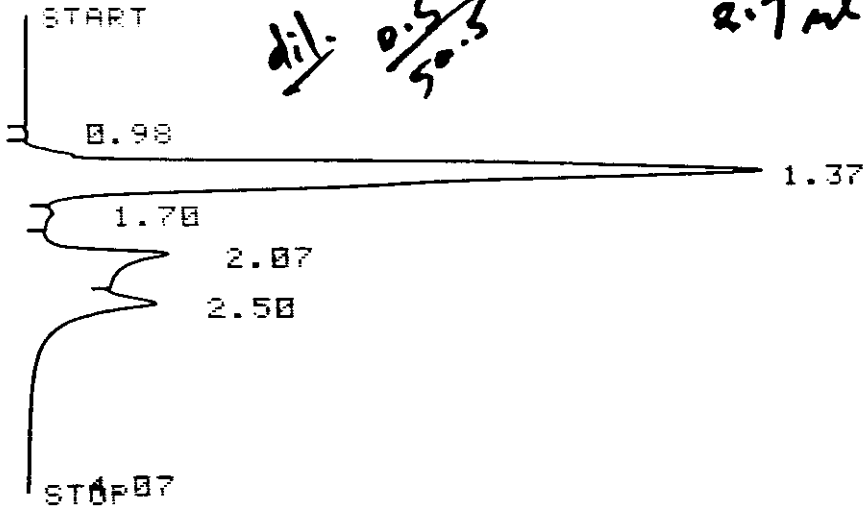


hp 5830A
AREA %

RT	AREA	AREA %
0.98	155	0.008
1.35	1318000	71.214
1.68	37820	2.044
2.02	253200	13.681
2.43	232000	12.536
3.50	9574	0.517

XF: 1.0000 E+ 0

dil. 0.5/50.5 2.7 ml MOS# 3A INLET



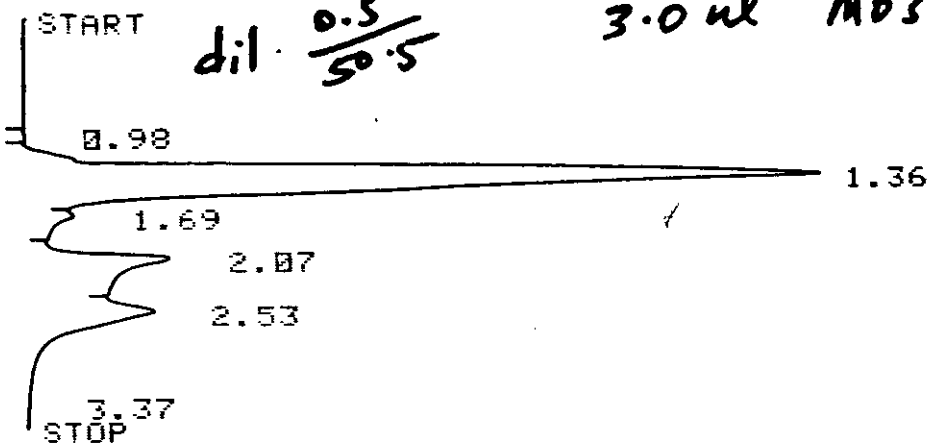
hp 5830A
AREA %

RT	AREA	AREA %
0.98	109	0.007
1.37	1011000	65.373
1.70	30610	1.979
2.07	266000	17.200
2.50	238800	15.441

XF: 1.0000 E+ 0

3.0 ml MOS #3A INCET

dil 0.5/50.5



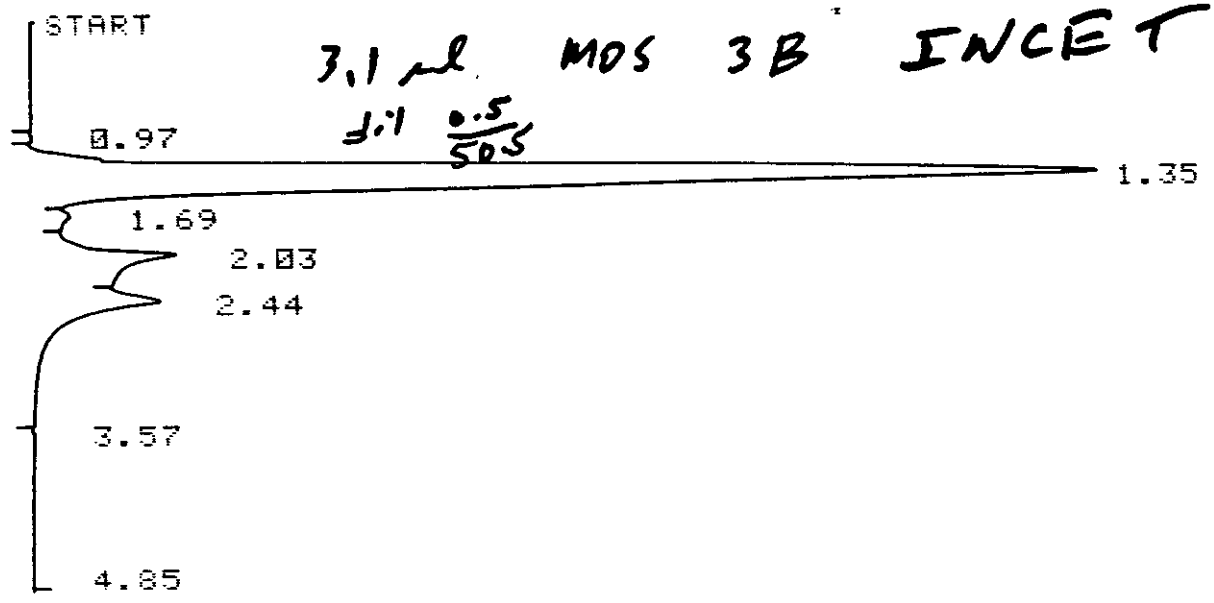
hp 5830A
AREA %

RT	AREA	AREA %
0.98	194	0.011
1.36	1133000	65.527
1.69	64960	3.757
2.07	278700	16.119
2.53	252200	14.586

XF: 1.0000 E+ 0

3.1 ml MOS 3B INCET

dil 0.5/50.5



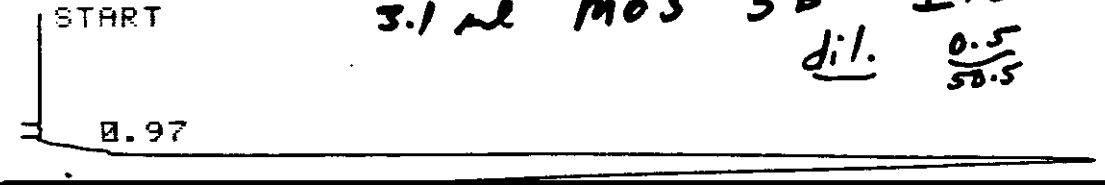
hp 5830A
AREA %

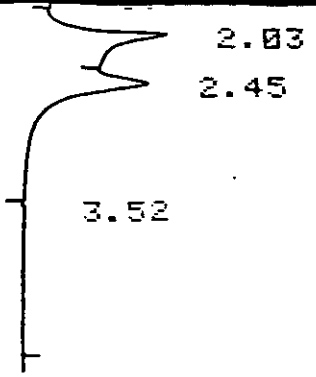
RT	AREA	AREA %
0.97	138	0.007
1.35	1436000	72.077
1.69	45480	2.283
2.03	267800	13.442
2.44	235400	11.816
3.57	7484	0.376

XF: 1.0000 E+ 0

3.1 ml MOS 3B INLET

dil. 0.5/50.5



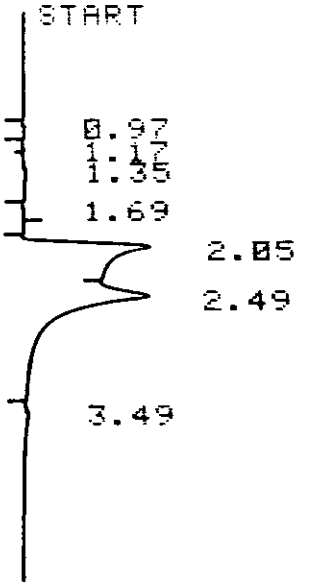


hp 5830A
AREA %

RT	AREA	AREA %
0.97	142	0.007
1.35	1425000	72.073
1.67	45870	2.320
2.03	264600	13.383
2.45	234500	11.861
3.52	7046	0.356

XF: 1.0000 E+ 0

3.0 ml MOS 3A OUTLET d.f. 0.5

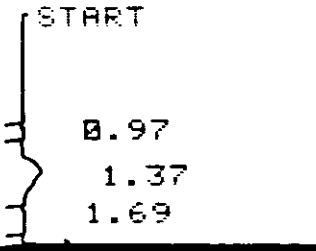


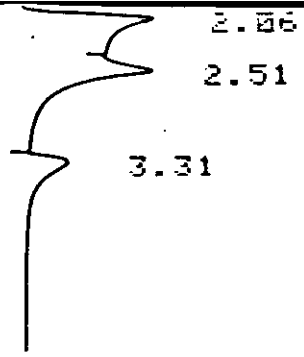
hp 5830A
AREA %

RT	AREA	AREA %
0.97	163	0.035
1.17	133	0.028
1.35	2898	0.618
1.69	52	0.011
2.05	219300	46.774
2.49	232500	49.590
3.49	13800	2.943

XF: 1.0000 E+ 0

3A OUTLET 3.3 ml straight MOS



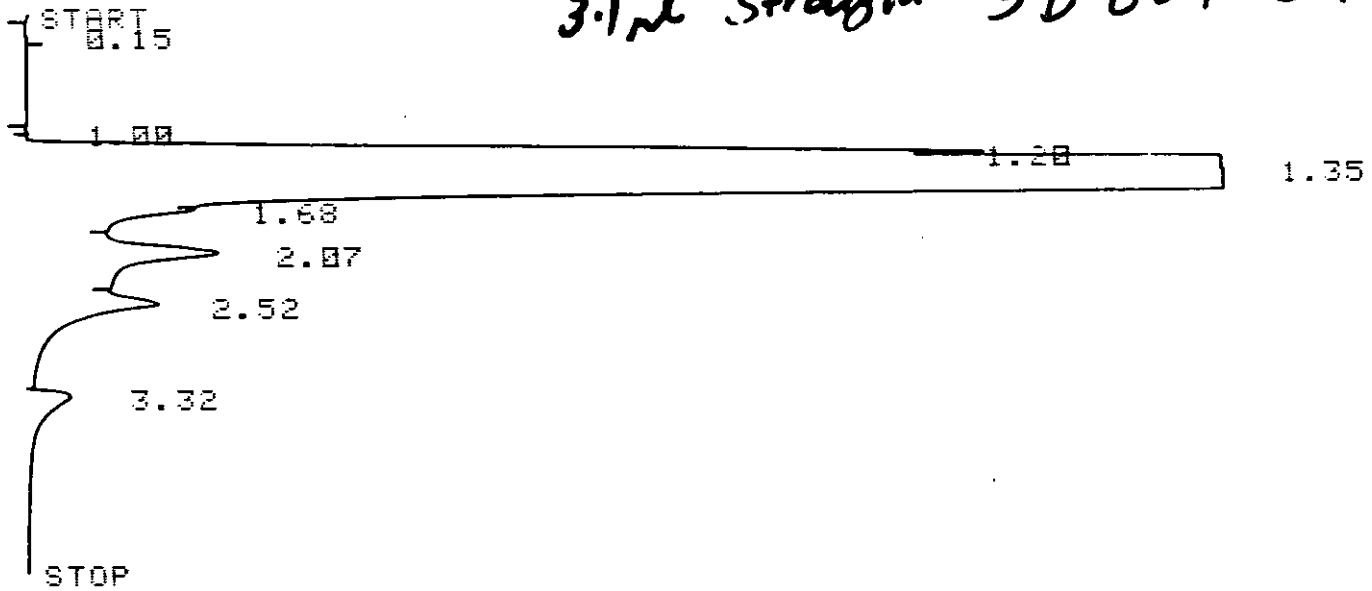


hp 5830A
AREA %

RT	AREA	AREA %
0.97	40	0.007
1.37	27250	4.793
1.69	656	0.115
2.06	235600	41.443
2.51	228700	40.230
3.31	76240	13.411

XF: 1.0000 E+ 0

3.1 mL straight MOS 3B OUTLET

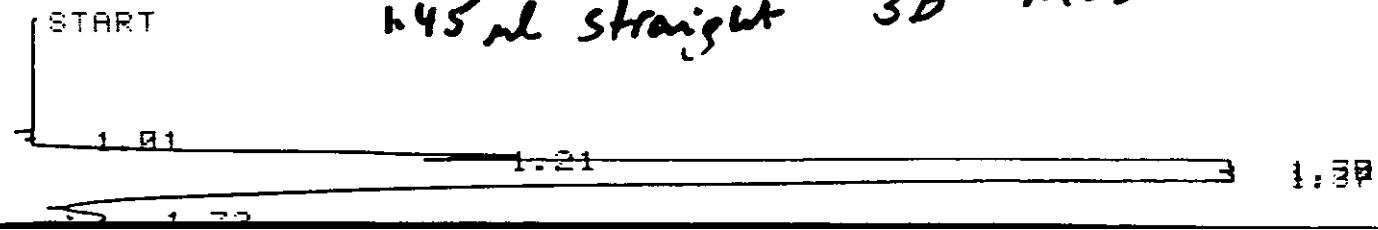


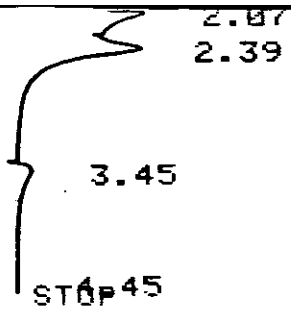
STOP
hp 5830A
AREA %

RT	AREA	AREA %
0.15	43	0.000
1.00	209	0.002
1.20	483000	5.024
1.35	8268000	86.006
1.68	156600	1.629
2.07	390500	4.062
2.52	238300	2.479
3.32	76620	0.797

XF: 1.0000 E+ 0

1.45 mL straight 3B MOS OUTLET



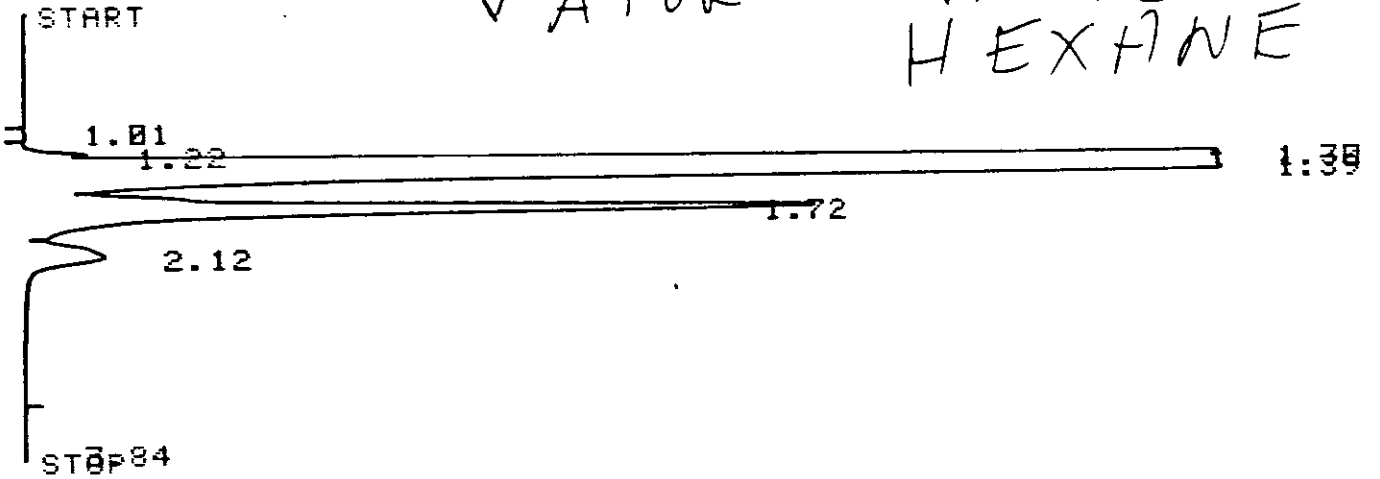


hp 5830A
AREA %

RT	AREA	AREA %
1.01	185	0.004
1.21	251000	5.848
1.30	1834000	42.731
1.37	1639000	38.188
1.72	60240	1.404
1.87	84680	1.973
2.07	170900	3.982
2.39	223100	5.198
3.45	28830	0.672

XF: 1.0000 E+ 0

VAPOR OF WORKING HEXANE

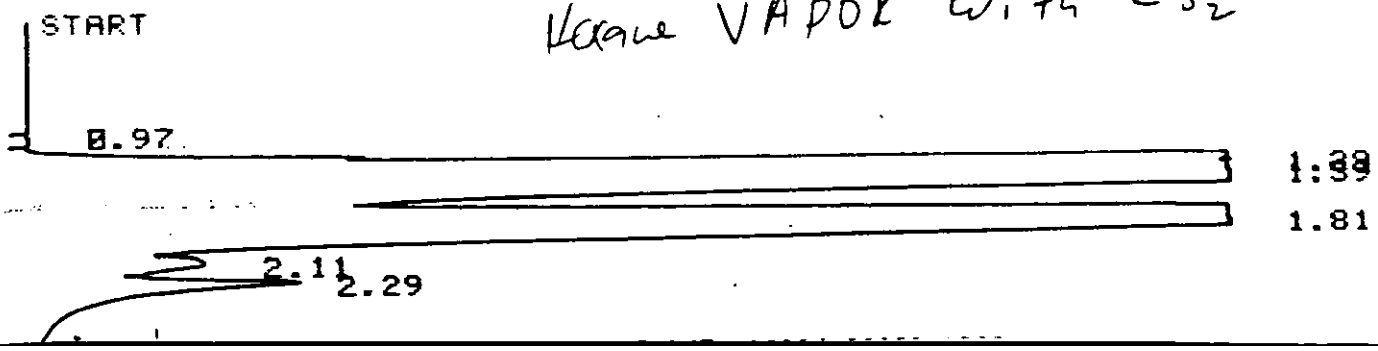


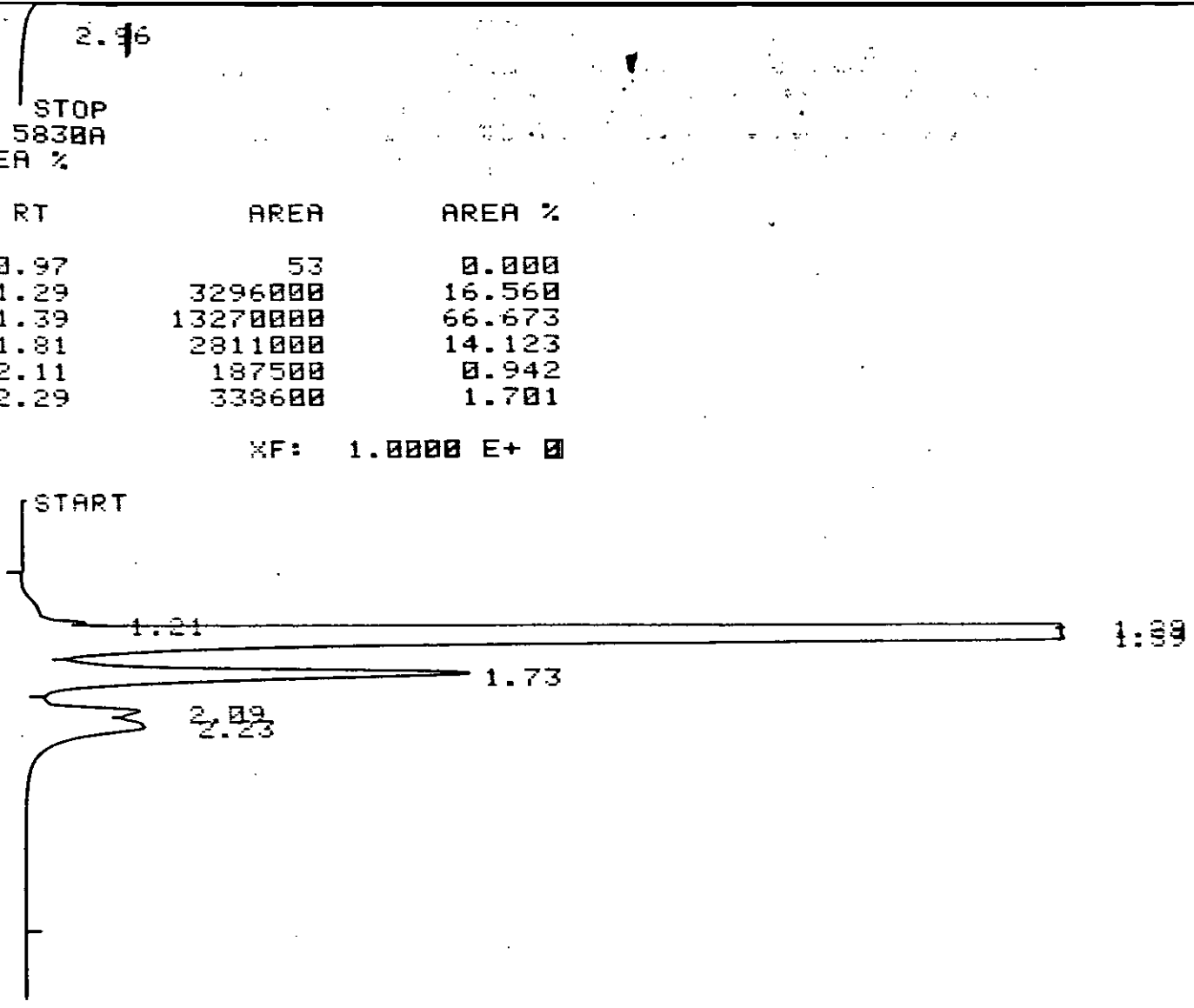
hp 5830A
AREA %

RT	AREA	AREA %
1.01	233	0.006
1.22	21250	0.526
1.30	618900	15.327
1.39	2648000	65.577
1.72	637600	15.790
2.12	112000	2.774

XF: 1.0000 E+ 0

Hexane VAPOR with CS_2





hp 5830A
AREA %

RT	AREA	AREA %
0.97	53	0.000
1.29	3296000	16.560
1.39	13270000	66.673
1.81	2811000	14.123
2.11	187500	0.942
2.29	338600	1.701

XF: 1.0000 E+ 0

hp 5830A
AREA %

RT	AREA	AREA %
1.21	56770	1.573
1.29	538200	14.910
1.39	2197000	60.864
1.73	482700	13.372
2.09	110600	3.064
2.23	224400	6.217

XF: 1.0000 E+ 0

TEMP1	60	60
TIME1	5.0	
INJ TEMP	150	150
FID TEMP	300	300
TCD TEMP	125	125
AUX TEMP	0	44
OVEN MAX	200	
CHT SPD	1.50	
ATTN 2↑	10	
FID SGNL	+B	
SLP SENS	0.03	
AREA REJ	1	
FLOW A	1	
FLOW B	23	
OPTN	0	

DATE: 7-26-79

CALIBRATION:
Standard hexane in CS_2 - concentration: 0.3295 $\frac{\mu g}{\mu l}$

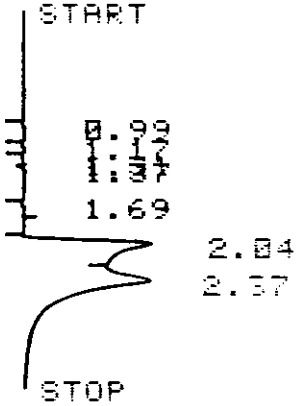
Run No.	µl injected	Area response	µl injected	µg/area
1	2.8	534500	1.01486	1.90×10^{-6}
2	2.9	572500	1.0511	1.84×10^{-6}
3	3.1	602400	1.1236	1.87×10^{-6}
Average				1.87×10^{-6}

Sample I.D.	Run No.	Dilution factor	µl injected	Area response	Sample conc. corrected for dilution, µg/µl
MOS-OUT-4A	1	0	1.7	4620	5.07×10^{-3}
	2	0	3.1	7006	4.02×10^{-3}
MOS-OUT-4B	1	0	2.8	1719190	1.146
	2	0	2.7	1708570	1.181
MOS-IN-4B	1	0.5/50.5	2.9	1704170	110.81
	2	0.5/50.5	3.4	2016130	111.82
COOLER 1A	1		3.7	6306	3.18×10^{-3}
	2		3.7	7383	3.73×10^{-3}
COOLER 1B	1		3.1	8917	5.37×10^{-3}
	2		3.2	9526	5.56×10^{-3}
COOLER 2A	1		3.10	9000	5.42×10^{-3}
	2		2.85	8552	5.60×10^{-3}
COOLER 2B	1		3.20	9229	5.38×10^{-3}
	2		3.7	10826	5.46×10^{-3}

INJ TEMP ESCAPE

TEMP1	60	60
TIME1	5.0	
INJ TEMP	150	150
FID TEMP	300	300
TCD TEMP	125	125
AUX TEMP	0	44
OVEN MAX	200	
CHT SPD	1.50	
ATTN 2↑	10	
FID SGNL	+B	
SLP SENS	0.03	
AREA REJ	1	
FLOW A	2	
FLOW B	23	
OPTN	0	

CS_2 Blank to check if Syringe is clean

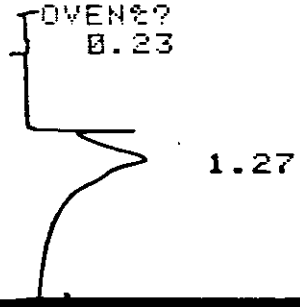


hp 5830A
AREA %

RT	AREA	AREA %
0.99	159	0.043
1.17	58	0.016
1.31	280	0.075
1.37	463	0.124
1.69	41	0.011
2.04	155400	41.662
2.37	216600	58.070

XF: 1.0000 E+ 0

TEMP1 1 5 0 0
TEMP1 150 149



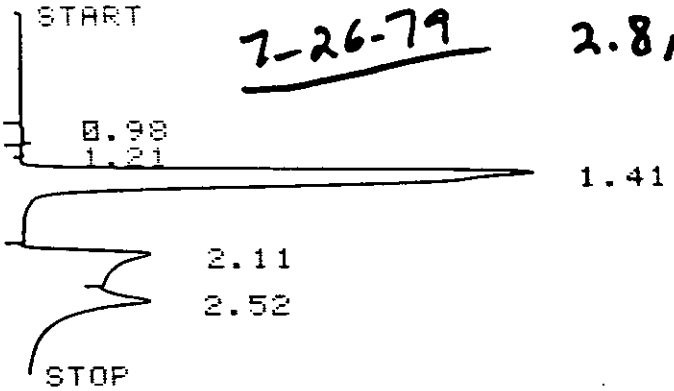
TST

hp 5830A
AREA %

RT	AREA	AREA %
0.23	2425	0.467
1.27	516800	99.533

XF: 1.0000 E+ 0

TEMP1 6 0 0
TEMP1 60 83
TEMP1 60 60



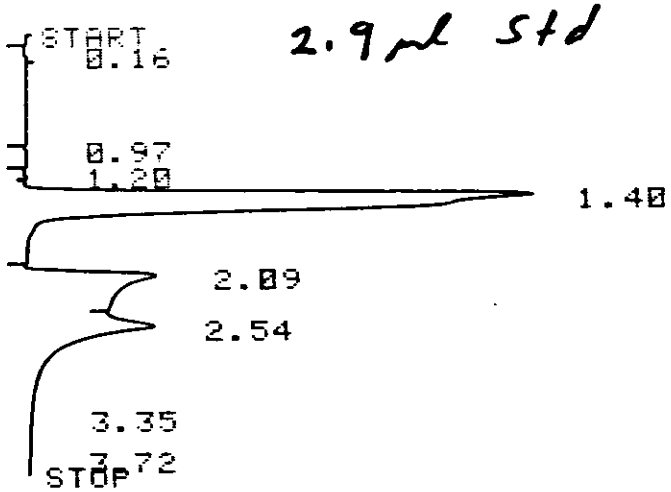
7-26-79 2.8 ml Old Hexane in CS_2 0.362454 g/ml

hp 5830A
AREA %

RT	AREA	AREA %
0.98	86	0.009
1.21	29	0.003
1.41	534500	56.674
2.11	212500	22.532
2.52	196000	20.782

XF: 1.0000 E+ 0

2.9 ml Std 7-26-79

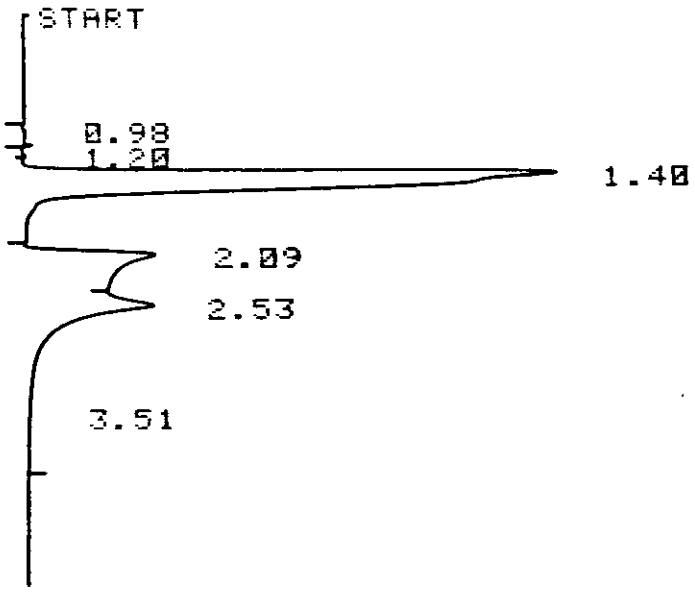


hp 5830A
AREA %

RT	AREA	AREA %
0.16	38	0.004

0.97	130	0.013
1.20	19	0.002
1.40	572500	55.368
2.09	232200	22.457
2.54	229100	22.157

XF: 1.0000 E+ 0

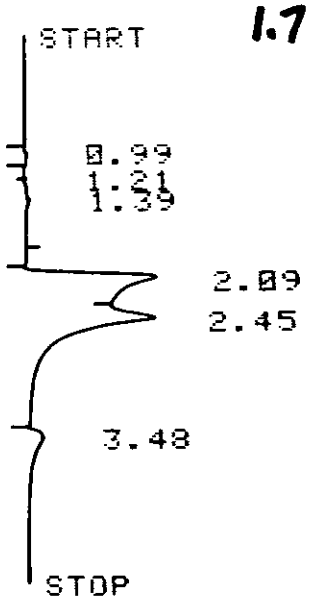


hp 5830A
AREA %

RT	AREA	AREA %
0.98	139	0.013
1.20	25	0.002
1.40	602400	56.343
2.09	239300	22.382
2.53	227300	21.260

XF: 1.0000 E+ 0

1.7ml MOS Run #4 A OUTLET NO DILUTION



8.624×10^{-3} µg I₂
5.071×10^{-3} µg/ml

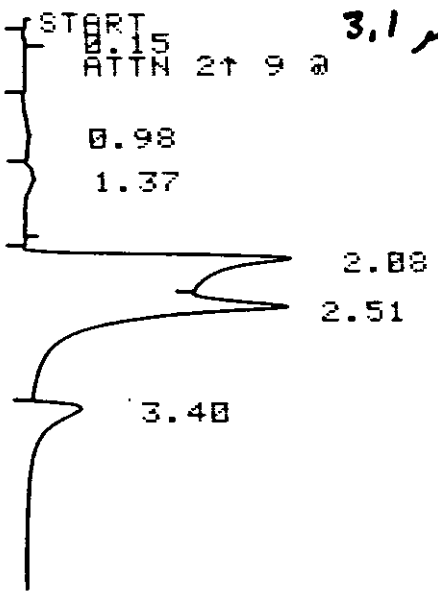
hp 5830A
AREA %

RT	AREA	AREA %
0.99	209	0.046

2.09	194500	42.799
2.45	225400	49.599
3.48	29720	6.540

XF: 1.0000 E+ 0

3.1 µl MOS Run #4A OUTLET
NO DILUTION

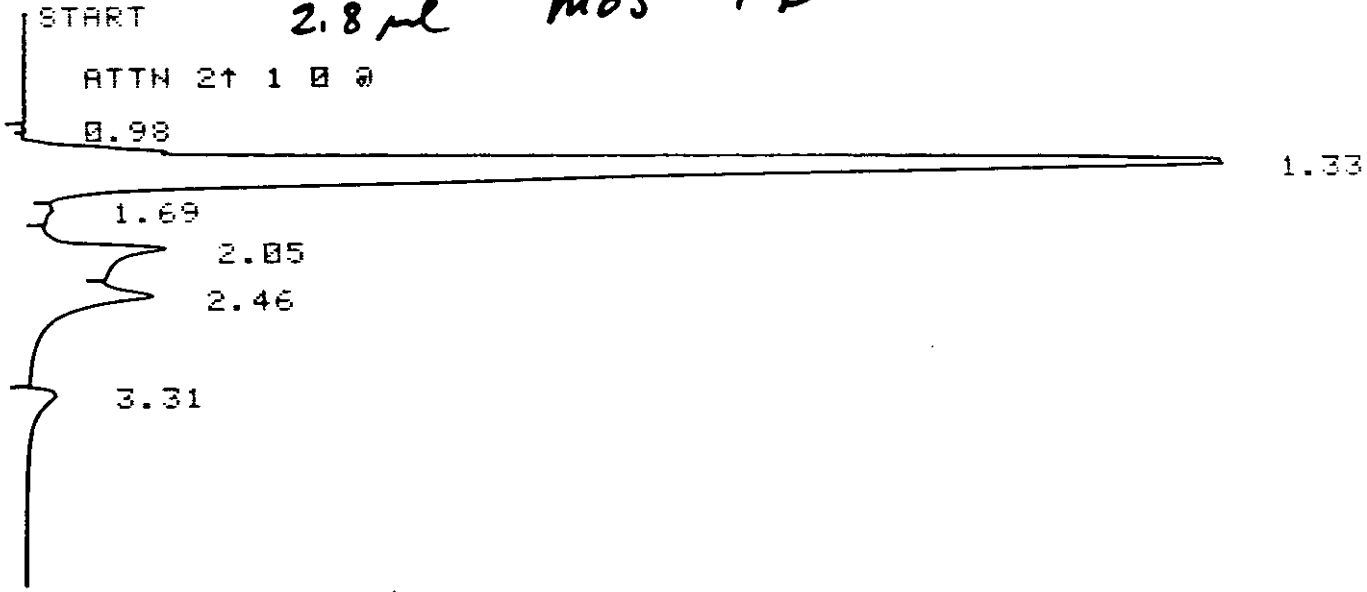


hp 5830A
AREA %

RT	AREA	AREA %
0.15	28	0.005
0.98	5515	1.056
1.37	7006	1.341
2.08	228800	43.804
2.51	228700	43.785
3.40	52280	10.009

XF: 1.0000 E+ 0

2.8 µl MOS 4B outlet No dilution



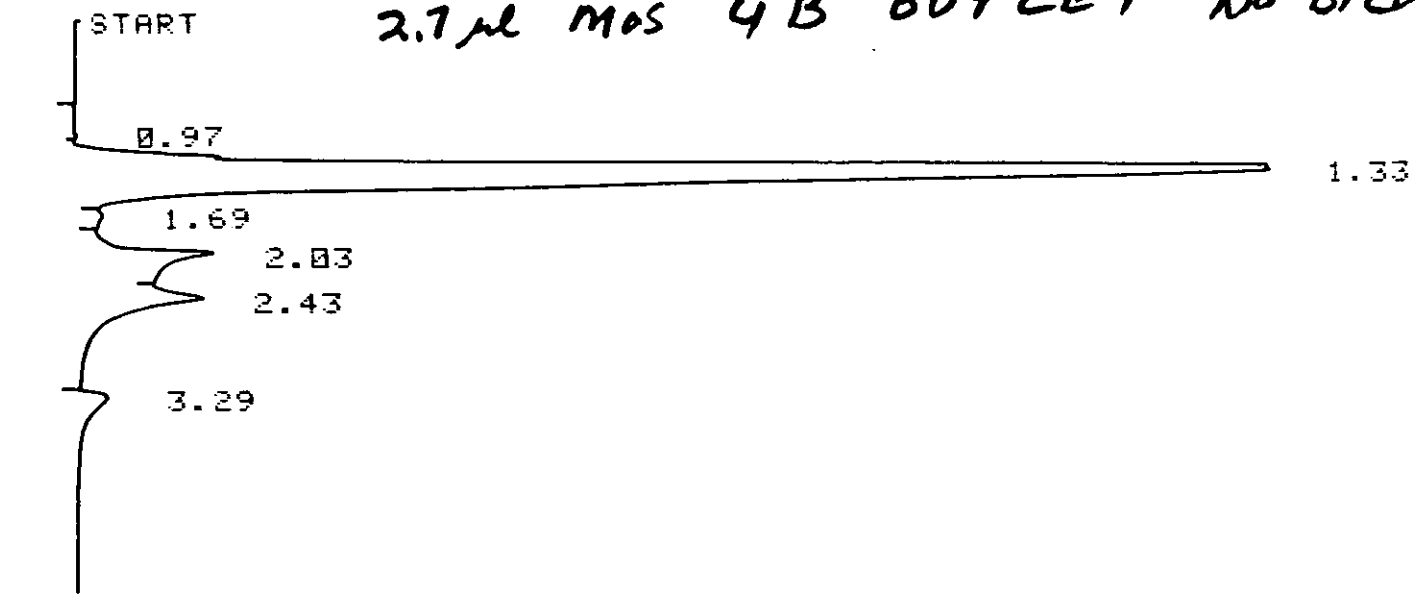
hp 5830A
AREA %

RT	AREA	AREA %
0.98	169	0.007
1.33	1687000	74.861
1.69	32190	1.428
2.05	246800	10.952

2.46	230400	10.224
3.31	56950	2.527

XF: 1.0000 E+ 0

2.7 µl MOS 4B OUTLET NO DILUTION

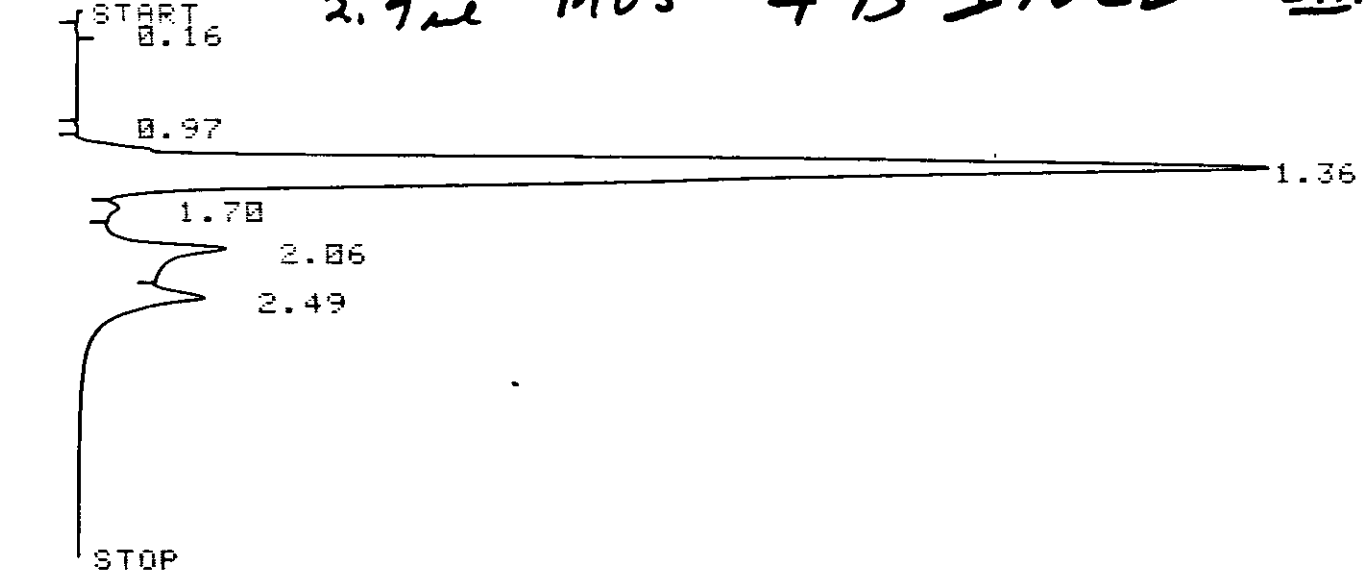


hp 5830A
AREA %

RT	AREA	AREA %
0.97	549	0.025
1.33	1679000	75.366
1.69	29570	1.327
2.03	234600	10.531
2.43	227900	10.230
3.29	56180	2.522

XF: 1.0000 E+ 0

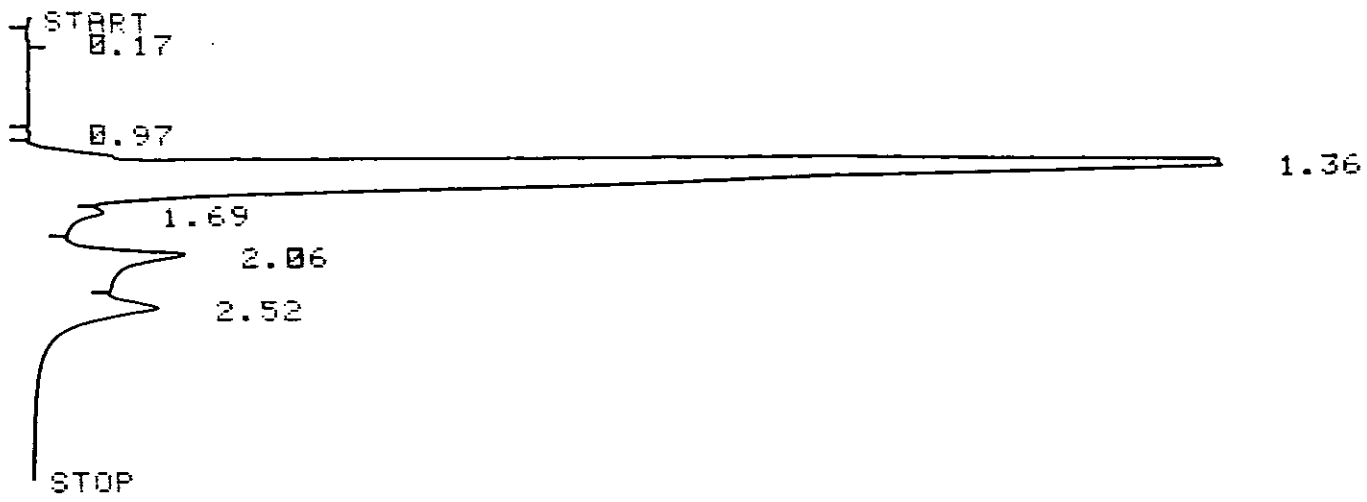
2.7 µl MOS 4B INLET dil. 0.5/50.5



hp 5830A
AREA %

RT	AREA	AREA %
0.16	20	0.001
0.97	150	0.007
1.36	1657000	74.387
1.70	47170	2.118
2.06	284600	12.776
2.49	238600	10.711

XF: 1.0000 E+ 0



hp 5830A
AREA %

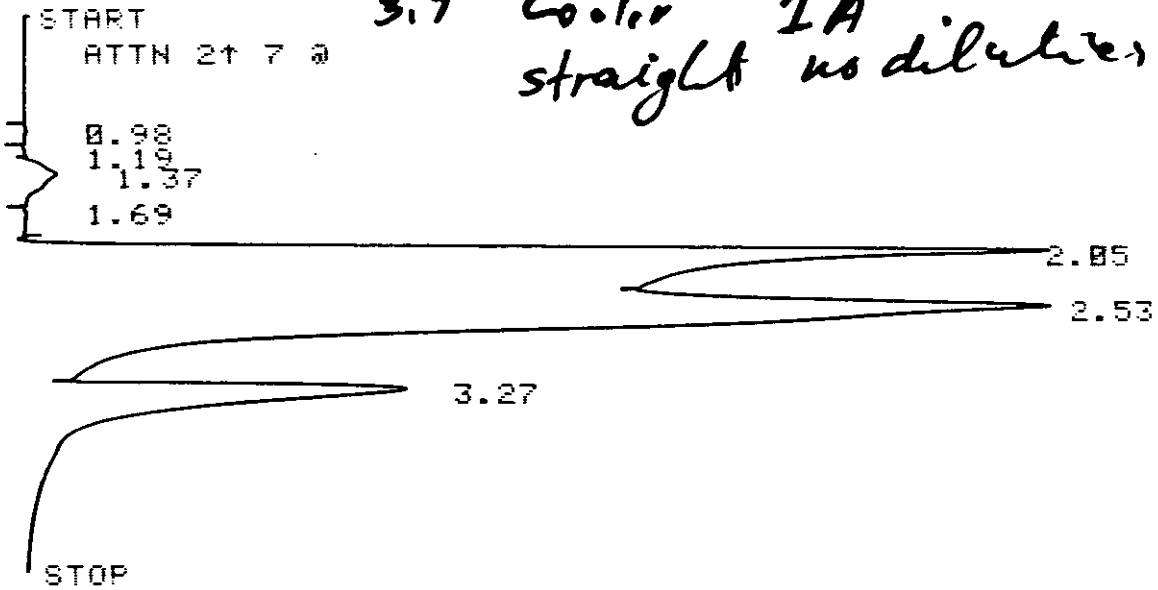
RT	AREA	AREA %
0.17	41	0.002
0.97	116	0.005
1.36	1922000	75.140
1.69	94120	3.680
2.06	296100	11.576
2.52	245500	9.598

XF: 1.0000 E+ 0

TEMP1	60	60
TIME1	5.0	
INJ TEMP	150	150
FID TEMP	300	300
TCD TEMP	125	125
AUX TEMP	0	48
OVEN MAX	200	
CHT SPD	1.50	
ATTN 2↑	10	
FID SGNL	+B	
SLP SENS	0.03	
AREA REJ	1	
FLOW A	1	
FLOW B	23	
OPTN	0	

TEMP1	60	60
TIME1	5.0	
INJ TEMP	150	150
FID TEMP	300	300
TCD TEMP	125	125
AUX TEMP	0	48
OVEN MAX	200	
CHT SPD	1.50	
ATTN 2↑	10	
FID SGNL	+B	
SLP SENS	0.03	
AREA REJ	1	
FLOW A	2	
FLOW B	24	
OPTN	0	

3.7 µl Cooler 1A straight no dilution

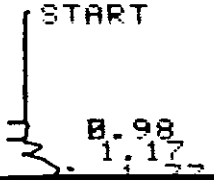


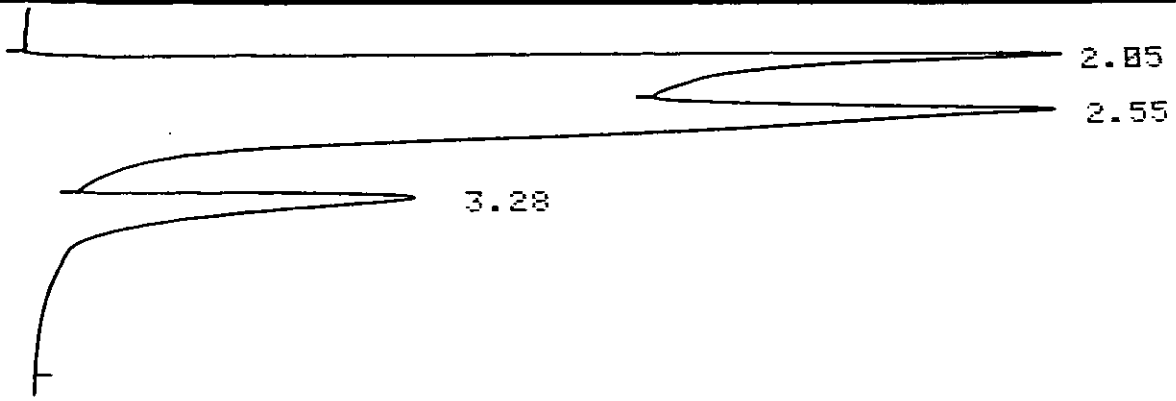
hp 5830A
AREA %

RT	AREA	AREA %
0.98	220	0.036
1.19	166	0.027
1.37	5911	0.956
1.69	229	0.037
2.05	235900	38.156
2.53	291100	47.085
3.27	84720	13.703

XF: 1.0000 E+ 0

3.7 µl Cooler 1A NO DILUTION



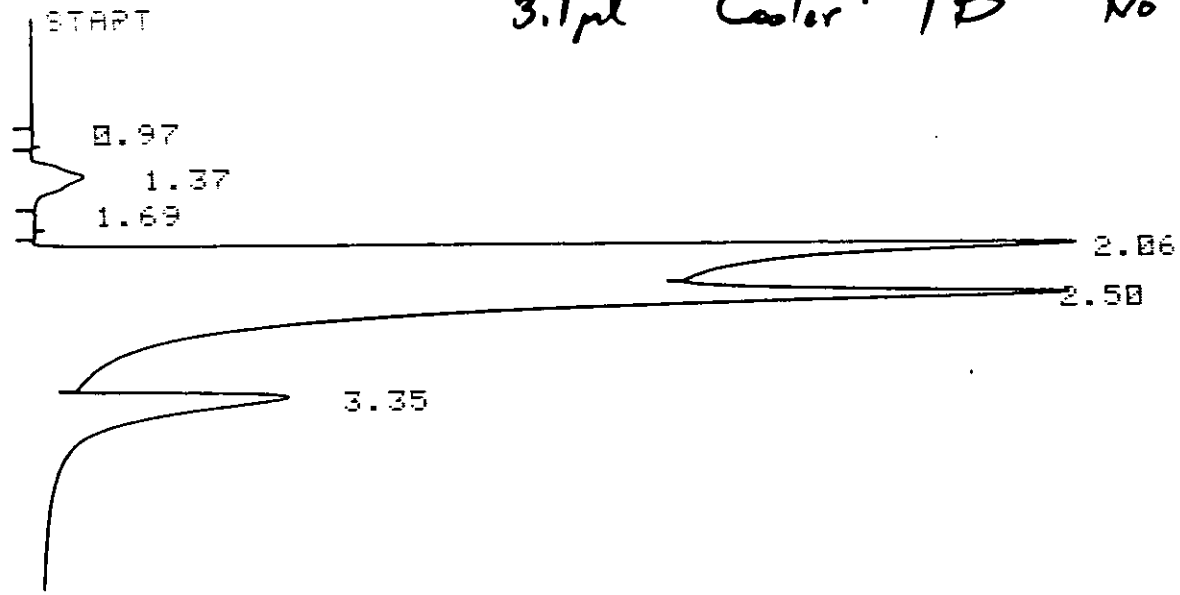


hp 5830A
AREA %

RT	AREA	AREA %
0.98	135	0.021
1.17	931	0.147
1.37	6452	1.016
2.05	245800	38.710
2.55	294800	46.427
3.28	86860	13.679

XF: 1.0000 E+ 0

3.1 µl Cooler # 1B NO DILUTION

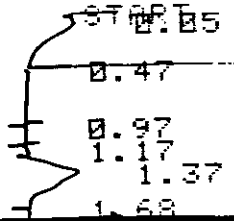


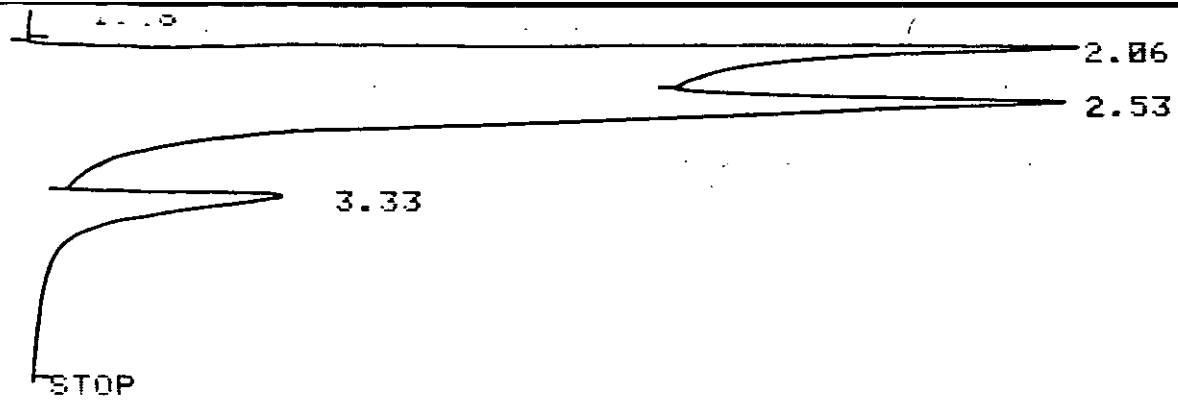
hp 5830A
AREA %

RT	AREA	AREA %
0.97	94	0.018
1.37	8800	1.662
1.69	117	0.022
2.06	225100	42.512
2.50	235800	44.533
3.35	59590	11.254

XF: 1.0000 E+ 0

3.2 µl Cooler # 1B NO Dilution





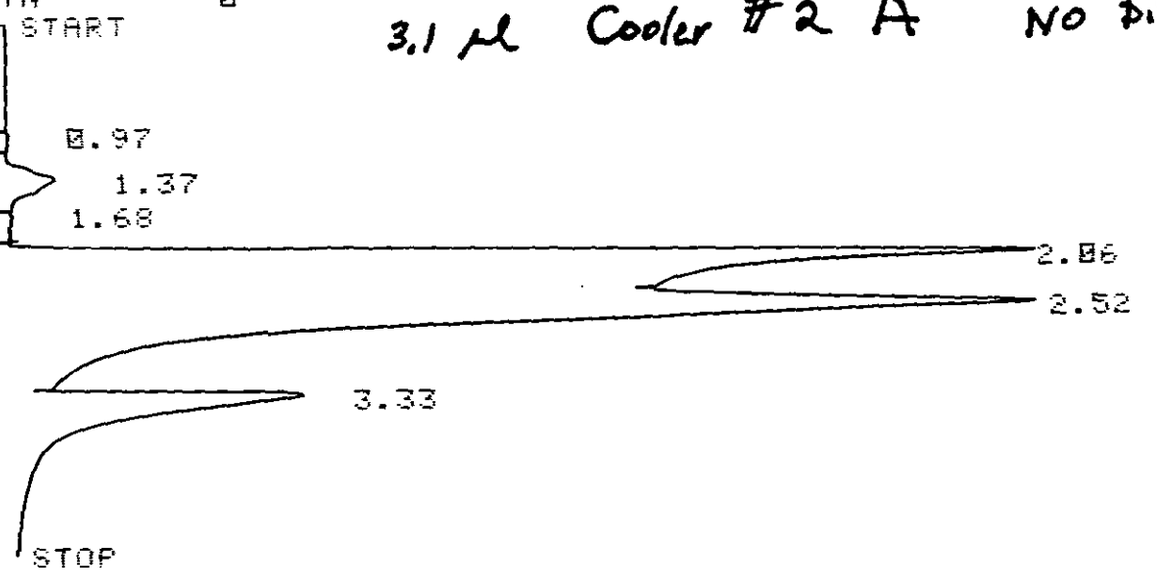
STOP
hp 5830A
AREA %

RT	AREA	AREA %
0.05	685	0.101
0.47	99720	14.759
0.97	55	0.008
1.17	184	0.027
1.37	9088	1.345
1.68	254	0.038
2.06	243800	36.084
2.53	263900	39.059
3.33	57960	8.578

XF: 1.0000 E+ 0

TEMP1	60	60
TIME1	5.0	
INJ TEMP	150	150
FID TEMP	300	300
TCD TEMP	125	125
AUX TEMP	0	47
OVEN MAX	200	
CHT SPD	1.50	
ATTN 2↑	7	
FID SGNL	+B	
SLP SENS	0.03	
AREA REJ	1	
FLOW A	2	
FLOW B	24	
OPTN	0	

3.1 µl Cooler #2 A No Dilution

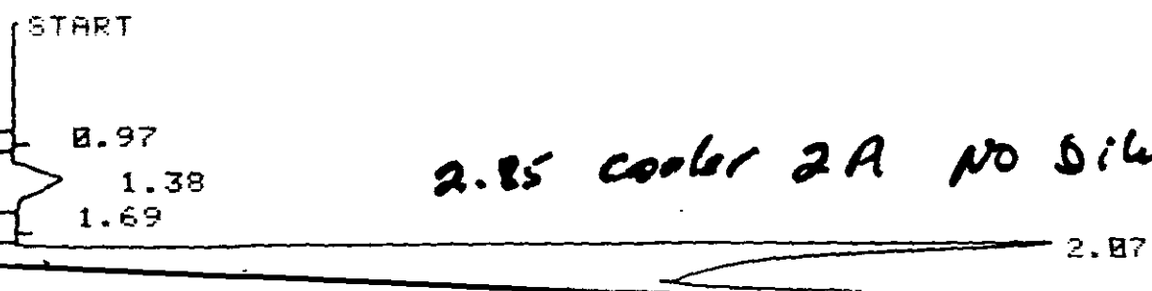


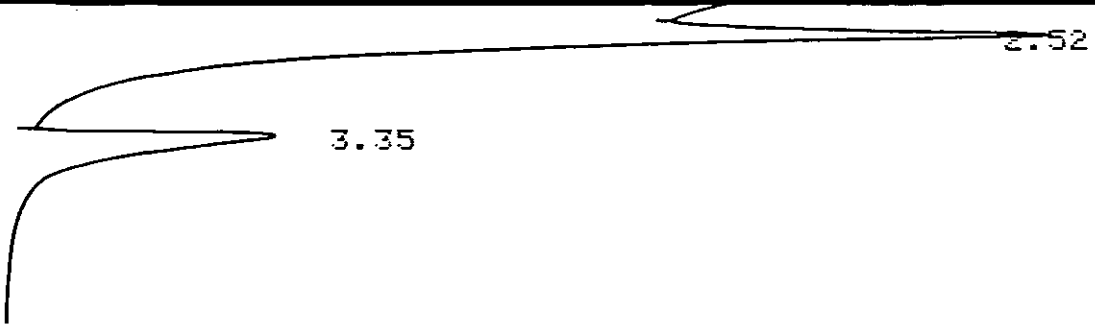
hp 5830A
AREA %

RT	AREA	AREA %
0.97	98	0.017
1.37	8734	1.485
1.68	266	0.045
2.06	238500	40.550
2.52	272800	46.382
3.33	67760	11.521

XF: 1.0000 E+ 0

2.85 cooler 2A No Dilution



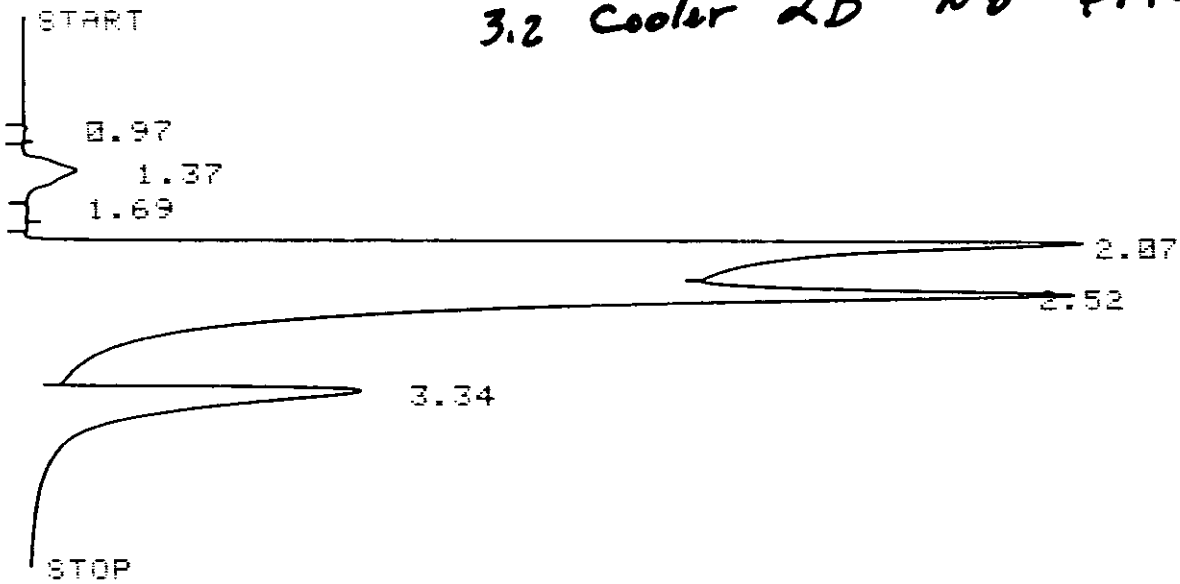


hp 5830A
AREA %

RT	AREA	AREA %
0.97	26	0.005
1.38	8374	1.541
1.69	178	0.033
2.07	240000	44.167
2.52	233100	42.897
3.35	61720	11.358

XF: 1.0000 E+ 0

3.2 Cooler 2B No dilution

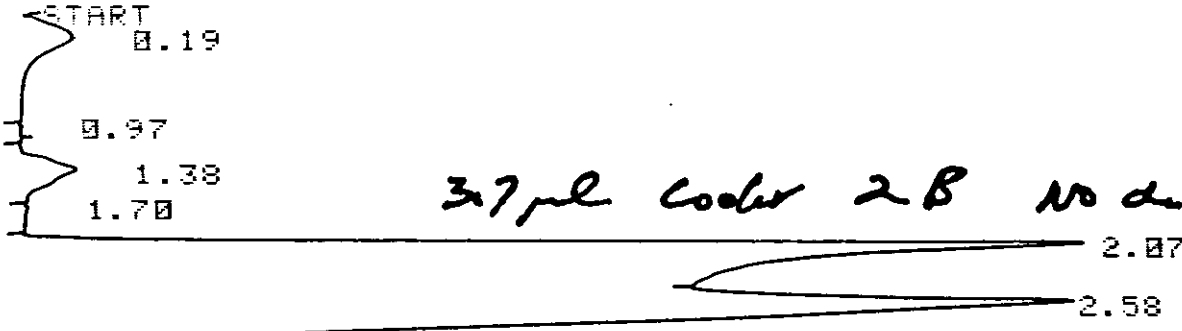


STOP
hp 5830A
AREA %

RT	AREA	AREA %
0.97	155	0.028
1.37	9110	1.637
1.69	119	0.021
2.07	240700	43.265
2.52	234500	42.150
3.34	71760	12.899

XF: 1.0000 E+ 0

3.7 µL Cooler 2B No dilution



STOP
hp 5830A
AREA %

RT	AREA	AREA %
0.19	10160	1.533
0.97	23	0.003
1.38	10330	1.559
1.70	496	0.075
2.07	270700	40.846
2.58	285600	43.095
3.31	85420	12.889

XF: 1.0000 E+ 0

2.0 AUDIT CYLINDERS AND SYRINGE SAMPLES

Audit Cylinders and Syringe Samples

Calibration

All injections 500 µl through automatic sample loop.

Hexane STD - 483 ppm

Run No.	Retention time (min)	Area	ppm/area units
1	1.67	425300	0.00114
2	1.67	419400	0.00115
3	1.67	446800	0.00108
4	1.67	406800	0.00119
5	1.67	396800	0.00122
Average			0.00116

Hexane STD - 1450 ppm

Run No.	Retention time (min)	Area	ppm/area units
1	1.67	1121000	0.00129
2	1.67	1124000	0.00129
3	1.67	1127000	0.00129
4	1.67	1141000	0.00127
5	1.67	1122000	0.00129
6	1.67	1137000	0.00127
Average			0.00128

Audit Cylinders

RTI #1040

Run No.	R.T.	Area response	Calc. ppm
1	1.67	2326000	2987
2	1.67	2335000	2998
3	1.67	2333000	2995
4	1.67	2365000	3036
Average			3004

RTI #1037

Run No.	R.T.	Area response	Calc. ppm
1	1.67	25600	30
2	1.67	25300	29
3	1.67	25820	30
4	1.67	25970	30
5	1.67	25860	30
Average			30

Syringe Samples

MOS OUTLET

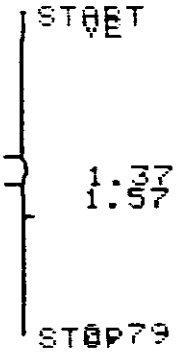
Run No.	µl injected	Area response	Calculated ppm
1	200	9157	26.6
2	1000	45685	26.6
3	1000	46075	26.8
Average			26.7

MOS INLET

Sample diluted 1:2

Run No.	µl injected	Area response	Conc. ppm	Conc. corrected for dilution, ppm
1	200	15664000	50281	100563
2	50	3325890	42704	85409
3	100	7388540	47434	94869
4	100	7293200	46822	93645
Average				93622

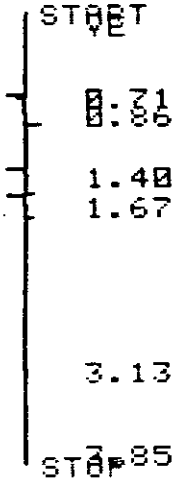
```
CHT SPD          1.50
ATTN 2↑          9
FID SGNL         +8
SLP SENS         0.03
AREA REJ         1
FLOW  A          2
FLOW  B         24
OPTN             0
 0.1  VLV/EXT    1
```



hp 5830A
AREA %

RT	AREA	AREA %
1.37	1937	87.213
1.57	284	12.787

XF: 1.0000 E+ 0



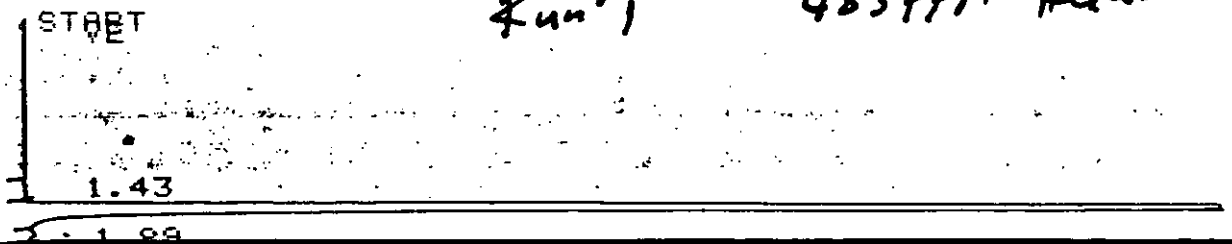
hp 5830A
AREA %

RT	AREA	AREA %
0.71	10	3.717
0.86	45	16.729
1.40	178	66.171
1.67	36	13.383

XF: 1.0000 E+ 0

Date
7-23-79

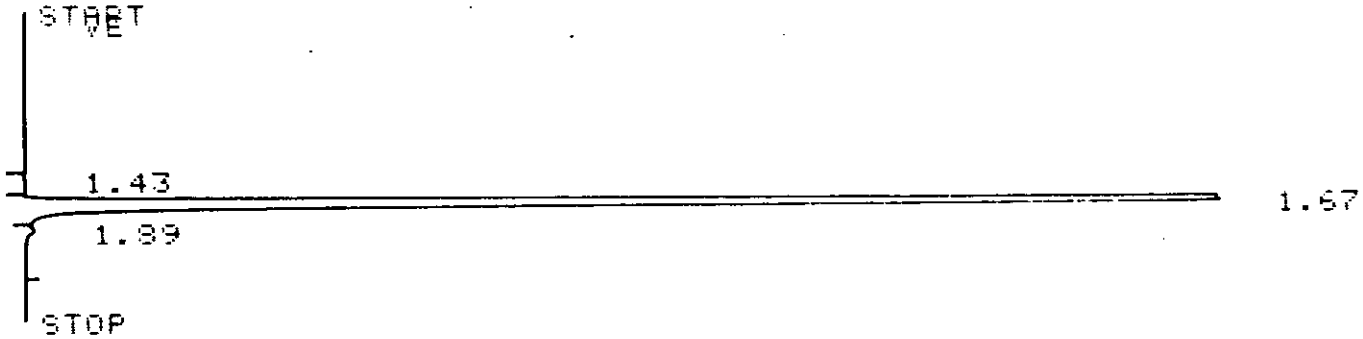
Run #1 483 PPM Helane



STOP
hp 5830A
AREA %

RT	AREA	AREA %
1.43	79	0.018
1.67	425300	99.258
1.89	3102	0.724

XF: 1.0000 E+ 0

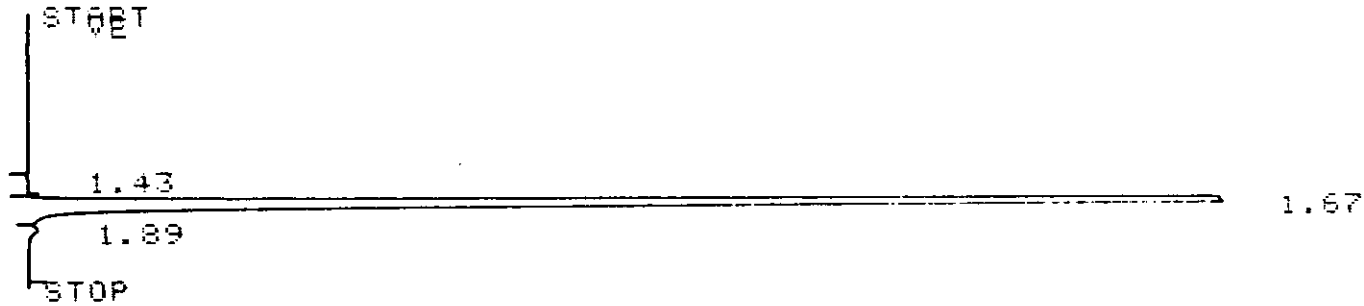


hp 5830A
AREA %

RT	AREA	AREA %
1.43	88	0.021
1.67	419400	99.251
1.89	3076	0.728

XF: 1.0000 E+ 0

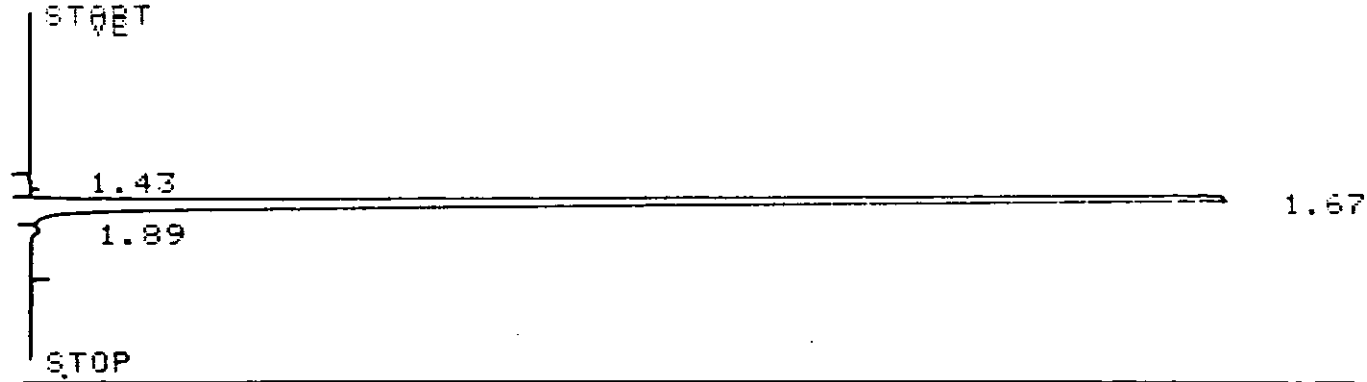
483 80m
Hexane.



hp 5830A
AREA %

RT	AREA	AREA %
1.43	68	0.015
1.67	446800	99.257
1.89	3279	0.728

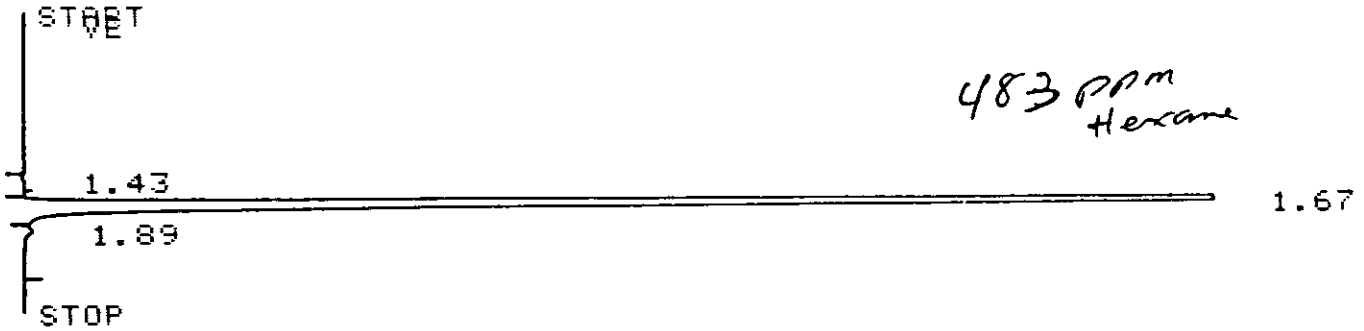
XF: 1.0000 E+ 0



AREA %

RT	AREA	AREA %
1.43	60	0.015
1.67	406800	99.267
1.89	2946	0.719

XF: 1.0000 E+ 0

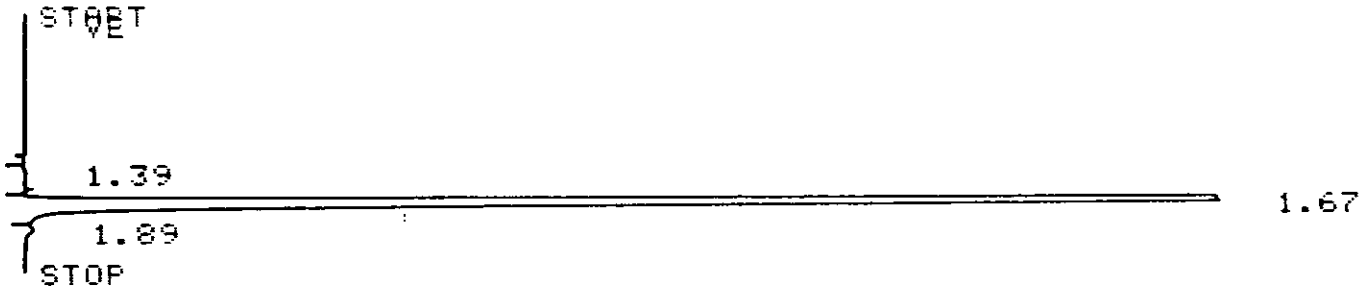


483 PPM Hexane

hp 5830A
AREA %

RT	AREA	AREA %
1.43	55	0.014
1.67	396800	99.253
1.89	2932	0.733

XF: 1.0000 E+ 0

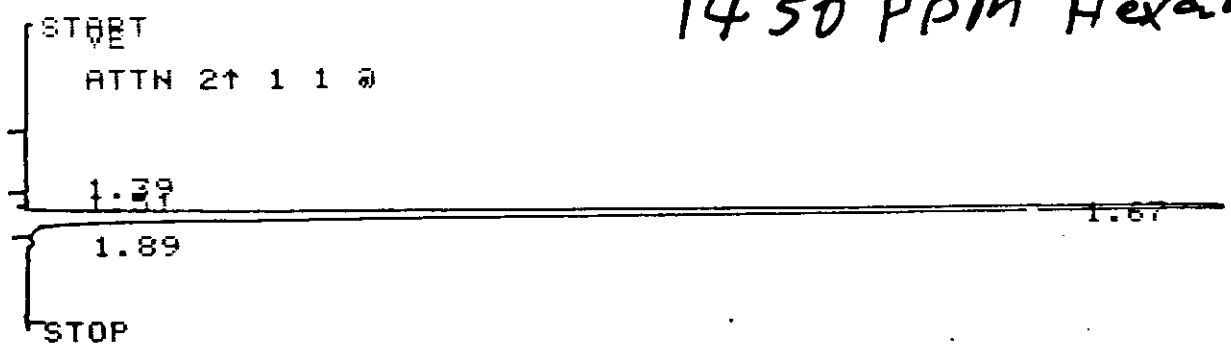


hp 5830A
AREA %

RT	AREA	AREA %
1.39	289	0.072
1.67	399000	99.225
1.89	2826	0.703

XF: 1.0000 E+ 0

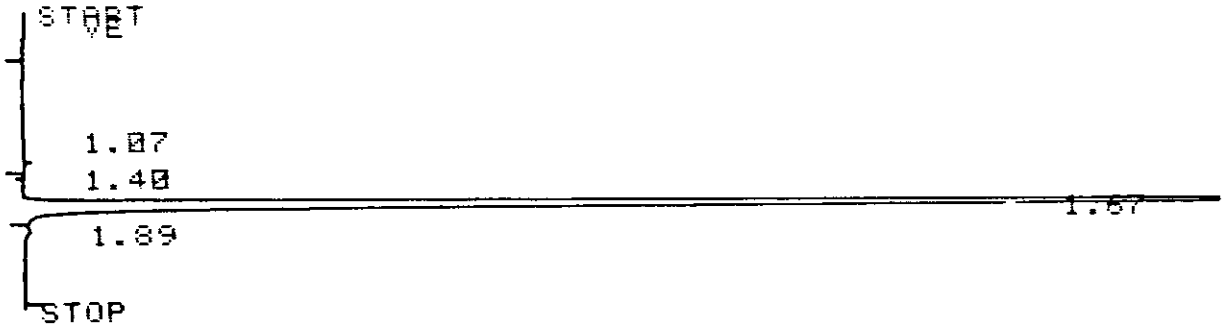
1450 PPM Hexane



hp 5830A
AREA %

RT	AREA	AREA %
1.39	1381	0.122
1.51	334	0.029
1.67	1121000	98.913
1.89	10600	0.935

XF: 1.0000 E+ 0



hp 5830A
AREA %

RT	AREA	AREA %
1.07	942	0.083
1.40	8	0.001
1.67	1124000	99.139
1.89	8808	0.777

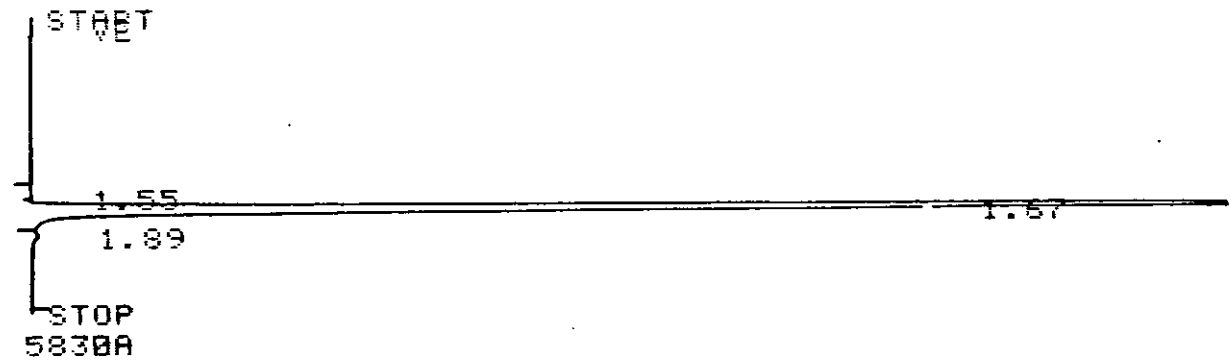
1450 ppm
Hexane

XF: 1.0000 E+ 0

hp 5830A
AREA %

RT	AREA	AREA %
1.40	6	0.001
1.67	1127000	99.221
1.89	8838	0.778

XF: 1.0000 E+ 0

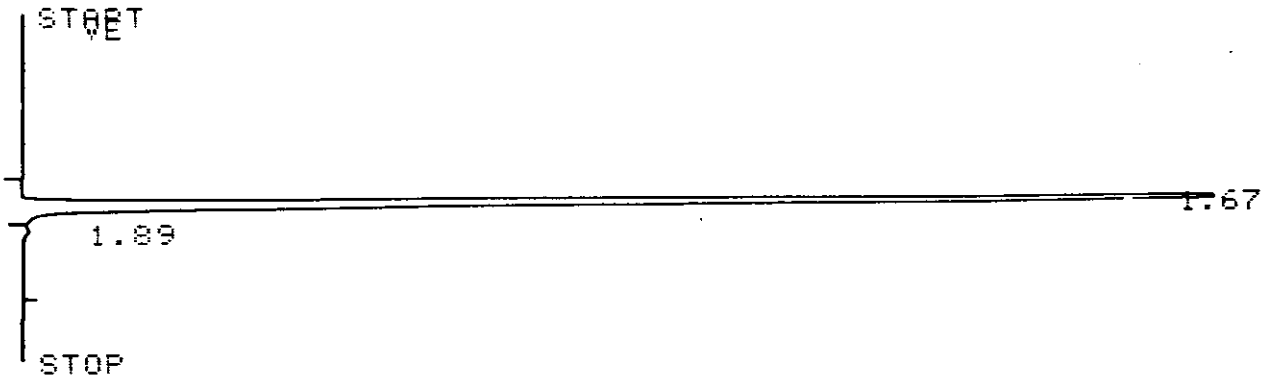


hp 5830A
AREA %

RT	AREA	AREA %

1.67	1141000	99.221
1.89	8888	0.773

XF: 1.0000 E+ 0

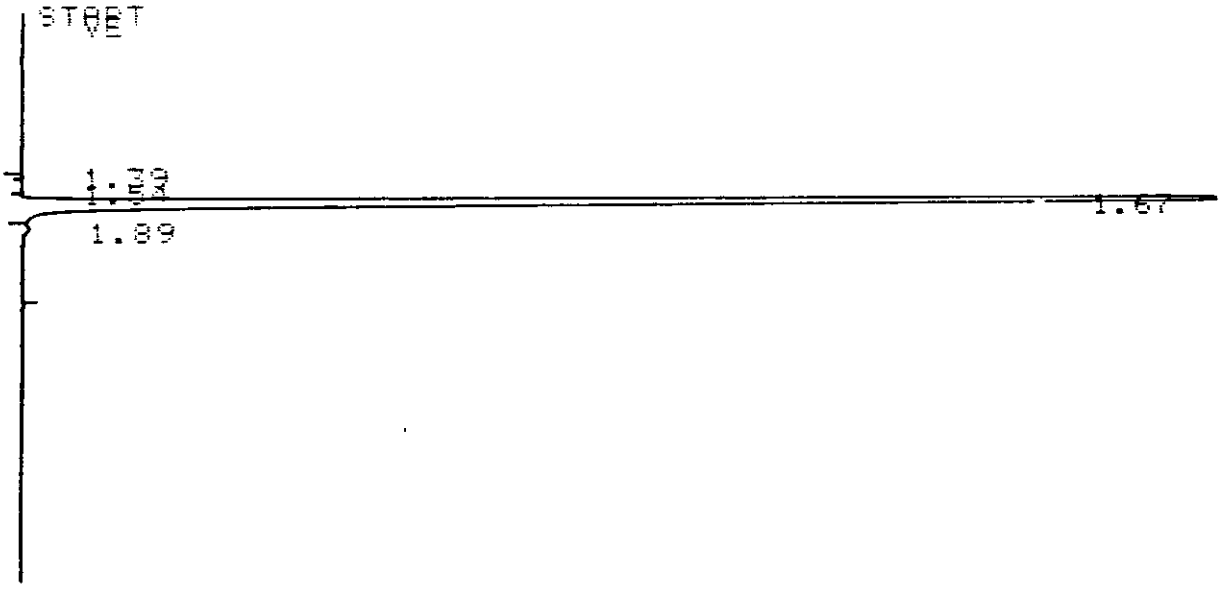


hp 5830A
AREA %

RT	AREA	AREA %
1.67	1122000	99.237
1.89	8622	0.763

XF: 1.0000 E+ 0

1450 ppm Hexane

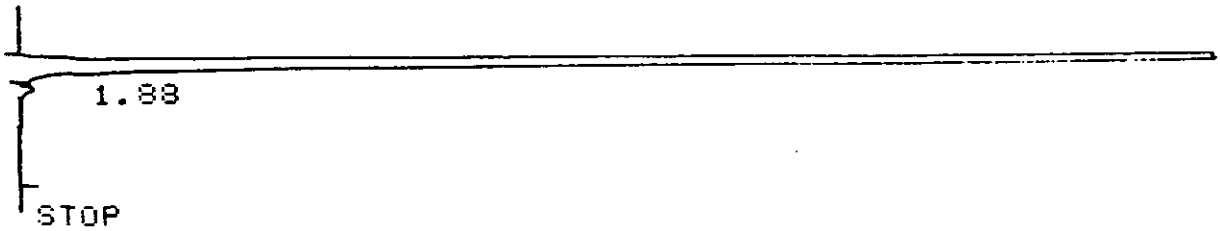


hp 5830A
AREA %

RT	AREA	AREA %
1.39	3	0.000
1.54	128	0.011
1.67	1137000	99.088
1.89	10330	0.900

XF: 1.0000 E+ 0

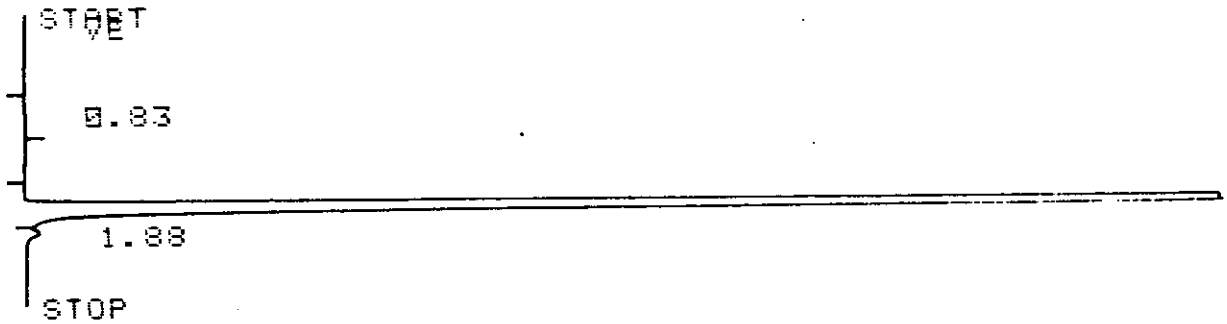
AUDIT SH RTI# 104
XL 345



hp 5830A
AREA %

RT	AREA	AREA %
1.67	2326000	99.215
1.88	18400	0.785

XF: 1.0000 E+ 0

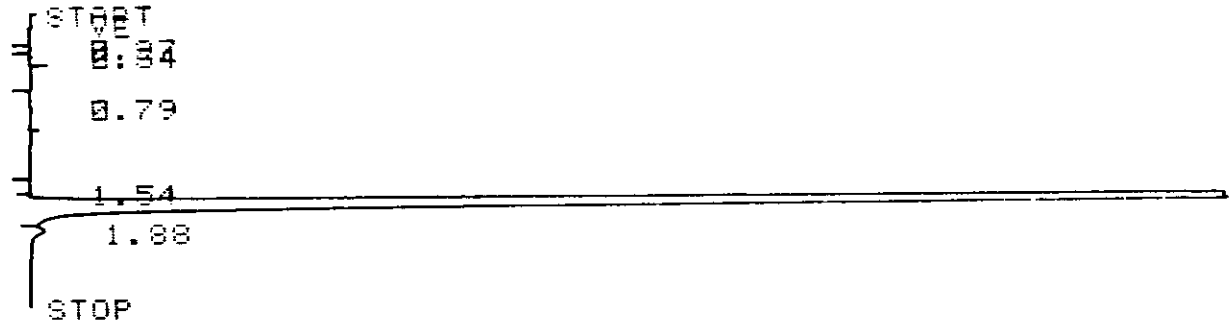


hp 5830A
AREA %

Audit
STD
RT #1040

RT	AREA	AREA %
0.83	180	0.008
1.67	2335000	99.210
1.88	18420	0.783

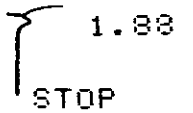
XF: 1.0000 E+ 0



hp 5830A
AREA %

RT	AREA	AREA %
0.27	117	0.005
0.34	211	0.009
0.79	545	0.023
1.54	52	0.002
1.67	2333000	99.177
1.88	18440	0.784

XF: 1.0000 E+ 0

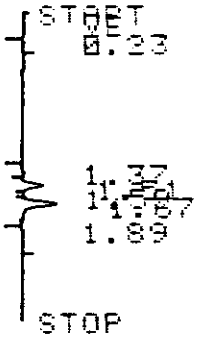


STOP
hp 5830A
AREA %

RT	AREA	AREA %
0.85	783	0.033
1.53	80	0.003
1.67	2365000	99.183
1.88	18630	0.781

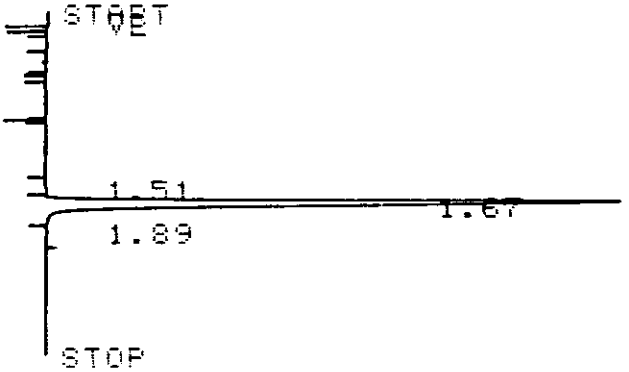
XF: 1.0000 E+ 0

BAL # 628 AUDIT Std RT1 # 1037



STOP
hp 5830A
AREA %

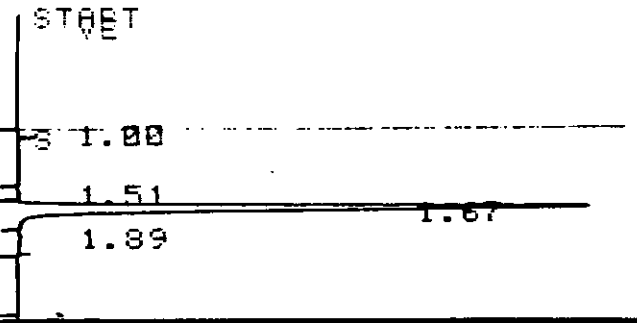
ESCAPE
ATTN 2↑ 7 @

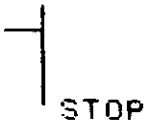


STOP
hp 5830A
AREA %

RT	AREA	AREA %
1.51	54	0.209
1.67	25600	99.179
1.89	158	0.612

XF: 1.0000 E+ 0



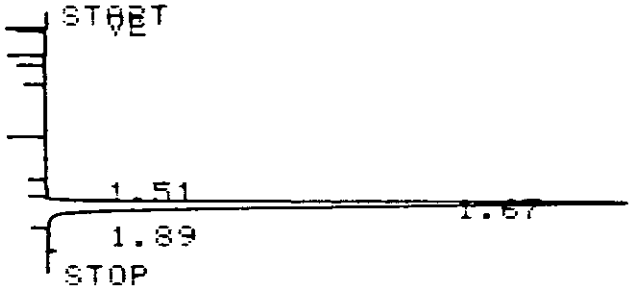


hp 5830A
AREA %

RT	AREA	AREA %
1.00	1757000	98.568
1.51	69	0.004
1.67	25300	1.419
1.89	161	0.009

XF: 1.0000 E+ 0

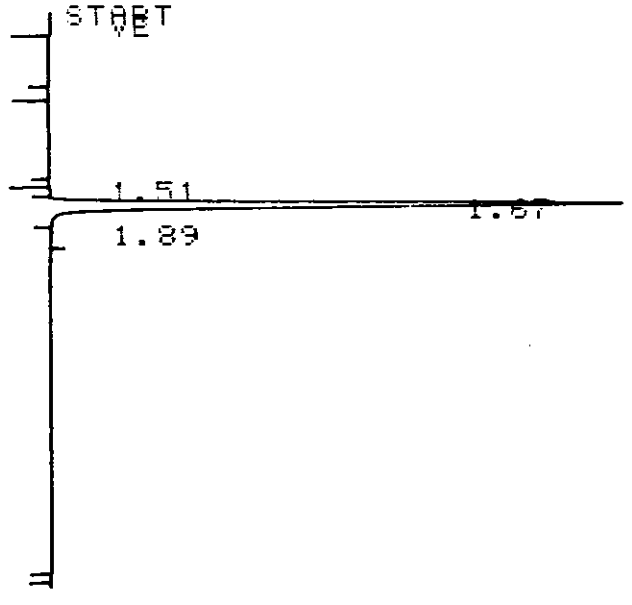
AUDIT
STD
RTI #1037



hp 5830A
AREA %

RT	AREA	AREA %
1.51	53	0.204
1.67	25820	99.189
1.89	158	0.607

XF: 1.0000 E+ 0

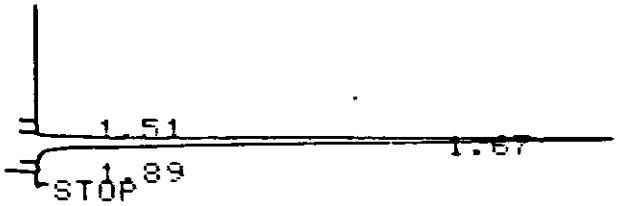


hp 5830A
AREA %

RT	AREA	AREA %
1.51	79	0.301
1.67	25970	98.798
1.89	237	0.902

XF: 1.0000 E+ 0

START



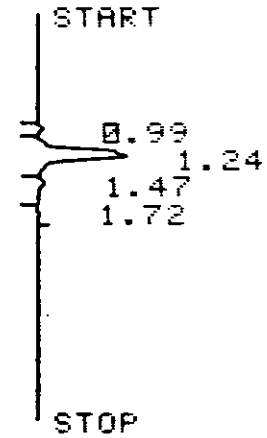
hp 5830A
AREA %

RT	AREA	AREA %
1.51	40	0.153
1.67	25860	98.967
1.89	230	0.880

XF: 1.0000 E+ 0

SYRINGE
4B MOS outlet
200 µl

VLV/EXT 1 MIN? 0 . 1 DELETE

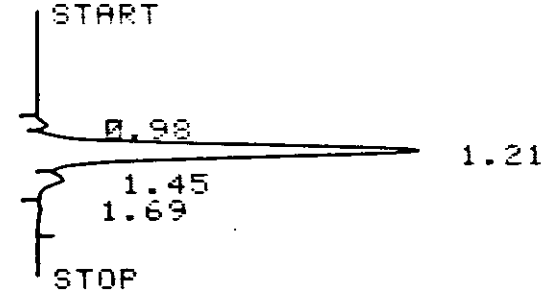


hp 5830A
AREA %

RT	AREA	AREA %
0.99	283	2.998
1.24	8600	91.102
1.47	492	5.212
1.72	65	0.689

XF: 1.0000 E+ 0

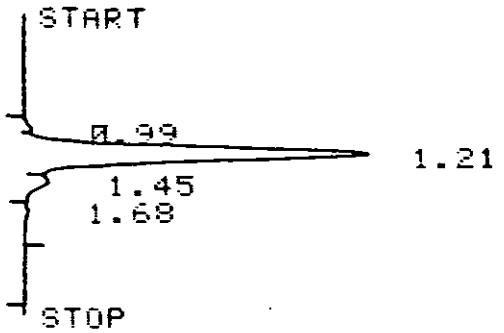
SYRINGE
4B MOS OUTLET
1000 µl



hp 5830A
AREA %

RT	AREA	AREA %
0.98	645	1.392
1.21	42540	91.820
1.45	2716	5.862
1.69	429	0.926

XF: 1.0000 E+ 0



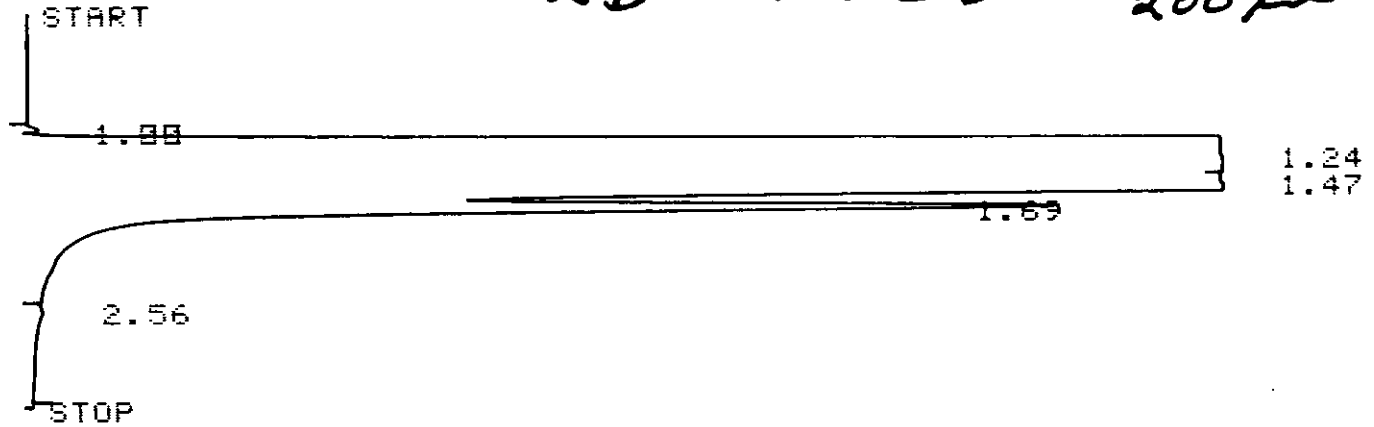
4B 1000 µl

hp 5830A
AREA %

RT	AREA	AREA %
0.99	629	1.347
1.21	42900	91.855
1.45	2711	5.805
1.68	464	0.993

XF: 1.0000 E+ 0

2B INLET SYRINGE 200 µl

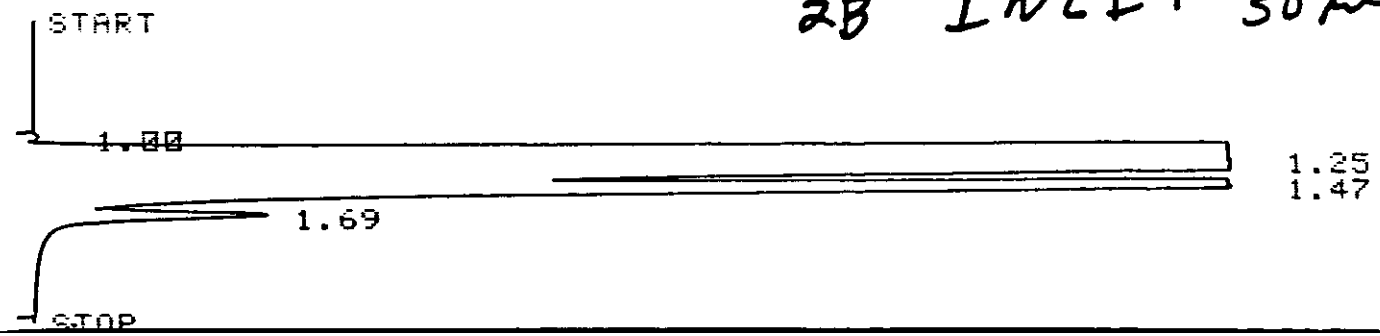


hp 5830A
AREA %

RT	AREA	AREA %
1.00	443	0.003
1.24	14450000	92.228
1.47	1109000	7.078
1.69	105000	0.670
2.56	3266	0.021

XF: 1.0000 E+ 0

2B INLET 50 µl



AREA %

RT	AREA	AREA %
1.00	244	0.007
1.25	3065000	92.149
1.47	240600	7.234
1.69	20290	0.610

XF: 1.0000 E+ 0

2B 100 µl INLET

START
1.00
1.25
1.47
1.69
2.59
STOP

hp 5830A
AREA %

SYRINGE sample

RT	AREA	AREA %
1.00	330	0.004
1.25	6806000	92.105
1.47	536800	7.265
1.69	45740	0.619
2.59	494	0.007

XF: 1.0000 E+ 0

START
1.00
1.25
1.48
1.69
2.61
3.13
3.60
STOP

100 µl 2B INLET

hp 5830A
AREA %

RT	AREA	AREA %
1.00	246	0.003
1.25	6720000	92.126
1.48	528200	7.241
1.69	45000	0.617
2.61	495	0.007
3.13	9	0.000
3.60	375	0.005

XF: 1.0000 E+ 0

3.0 MEAL SAMPLES

DATA SHEET

Plant: Sidney, Ohio Date: July 26, 1979

Date Analysis	Sample No.-Location		Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
9/11/79	360	D.T.	7/26/79	9:00	1.84	210	440
9/11/79	361	D.T.	7/26/79	9:00	2.00	220	470
9/11/79	362	D.T.	7/26/79	9:00	2.03	200	470
9/11/79	363	Dry	7/26/79	9:17	2.21	170	440
9/11/79	364	Dry	7/26/79	9:17	2.75	120	370
9/11/79	365	Dry	7/26/79	9:17	2.94	140	410
9/11/79	366	Cool	7/26/79	9:20	2.72	120	420
9/11/79	367	Cool	7/26/79	9:20	2.69	110	350
9/11/79	368	Cool	7/26/79	9:20	2.63	120	390
9/11/79	369	Finish	7/26/79	9:22	2.25	120	330
9/11/79	370	Finish	7/26/79	9:22	2.44	130	430
9/11/79	371	Finish	7/26/79	9:22	2.72	120	370
9/10/79	372	D.T.	7/26/79	9:35	2.31	220	510
9/10/79	373	D.T.	7/26/79	9:35	1.90	220	500
9/10/79	374	D.T.	7/26/79	9:35	2.58	210	530
9/10/79	375	Dry	7/26/79	9:38	2.35	130	350
9/11/79	376	Dry	7/26/79	9:38	1.95	120	290
9/11/79	377	Dry	7/26/79	9:38	1.52	140	260
9/11/79	379	D.T.	7/26/79	9:40	2.03	210	460
9/11/79	380	D.T.	7/26/79	9:40	2.41	220	510
9/11/79	381	D.T.	7/26/79	9:40	1.87	260	580
9/11/79	378	Dry	7/26/79	9:48	4.32	130	490
9/11/79	382	Dry	7/26/79	9:48	3.66	130	430
9/11/79	383	Dry	7/26/79	9:48	3.68	120	410
9/12/79	384	D.T.	7/26/79	10:00	1.48	180	310
9/12/79	385	D.T.	7/26/79	10:00	1.92	180	290
9/12/79	386	D.T.	7/26/79	10:00	1.44	190	340
9/12/79	387	Dry	7/26/79	10:05	1.59	150	420
9/12/79	388	Dry	7/26/79	10:05	1.72	100	470
9/12/79	389	Dry	7/26/79	10:05	2.04	130	290
9/13/79	390	Cool	7/26/79	10:08	2.39	87	240
9/13/79	391	Cool	7/26/79	10:08	2.19	130	420
9/13/79	392	Cool	7/26/79	10:08	2.22	100	320

DATA SHEET

Plant: Sidney, Ohio Date: July 26, 1979

Date Analysis	Sample No.	Location	Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
9/13/79	393	Finish	7/26/79	10:10	2.38	100	300
9/13/79	394	Finish	7/26/79	10:10	2.97	100	240
9/13/79	395	Finish	7/26/79	10:10	2.23	110	310
9/13/79	396	D.T.	7/26/79	10:20	1.75	170	300
9/13/79	397	D.T.	7/26/79	10:20	2.52	190	470
9/13/79	398	D.T.	7/26/79	10:20	2.28	170	400
9/13/79	399	Dry	7/26/79	10:25	1.81	120	250
9/13/79	400	Dry	7/26/79	10:25	1.39	120	220
9/13/79	401	Dry	7/26/79	10:25	2.73	92	260
9/13/79	402	D.T.	7/26/79	10:42	1.48	200	310
9/13/79	403	D.T.	7/26/79	10:42	1.27	170	270
9/13/79	404	D.T.	7/26/79	10:42	1.44	180	300
9/13/79	405	Dry	7/26/79	10:44	1.57	110	220
9/13/79	406	Dry	7/26/79	10:44	2.13	75	200
9/14/79	407	Dry	7/26/79	10:44	2.08	110	260
9/19/79	408	D.T.	7/26/79	11:00	1.56	130	230
9/19/79	409	D.T.	7/26/79	11:00	1.61	170	320
9/14/79	410	D.T.	7/26/79	11:00	1.20	190	290
9/14/79	411	Dry	7/26/79	11:05	1.57	120	280
9/14/79	412	Dry	7/26/79	11:05	1.65	100	210
9/14/79	413	Dry	7/26/79	11:05	1.52	130	220
9/14/79	414	Cool	7/26/79	11:09	2.40	110	310
9/14/79	415	Cool	7/26/79	11:09	2.49	130	380
9/14/79	416	Cool	7/26/79	11:09	2.29	110	340
9/14/79	417	Finish	7/26/79	11:10	2.19	89	230
9/14/79	418	Finish	7/26/79	11:10	1.93	93	220
9/14/79	419	Finish	7/26/79	11:10	1.90	110	220
9/14/79	420	D.T.	7/26/79	11:23	1.11	130	190
9/14/79	421	D.T.	7/26/79	11:23	1.97	120	260
9/14/79	422	D.T.	7/26/79	11:23	1.54	160	280
9/14/79	423	Dry	7/26/79	11:26	1.58	87	160
9/14/79	424	Dry	7/26/79	11:26	1.16	120	230
9/14/79	425	Dry	7/26/79	11:26	1.72	110	240

DATA SHEET

Plant: Sidney, Ohio Date: July 26, 1979

Date Analysis	Sample No.	Location	Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
9/14/79	426	D.T.	7/26/79	11:41	1.78	160	340
9/14/79	427	D.T.	7/26/79	11:41	1.43	170	290
9/14/79	428	D.T.	7/26/79	11:41	1.21	160	240
9/14/79	429	Dry	7/26/79	11:48	1.87	84	160
9/14/79	430	Dry	7/26/79	11:48	1.97	99	220
9/14/79	431	Dry	7/26/79	11:48	2.30	91	220
9/14/79	432	D.T.	7/26/79	12:00	1.52	180	360
9/14/79	433	D.T.	7/26/79	12:00	1.53	140	240
9/14/79	434	D.T.	7/26/79	12:00	1.79	170	340
9/17/79	435	Dry	7/26/79	12:05	1.56	94	200
9/17/79	436	Dry	7/26/79	12:05	1.57	100	200
9/17/79	437	Dry	7/26/79	12:05	1.38	96	160
9/17/79	438	Cool	7/26/79	12:07	2.27	100	310
9/17/79	439	Cool	7/26/79	12:07	2.07	97	250
9/17/79	440	Cool	7/26/79	12:07	1.89	95	210
9/17/79	441	Finish	7/26/79	12:09	2.23	78	210
9/17/79	442	Finish	7/26/79	12:09	1.95	78	180
9/17/79	443	Finish	7/26/79	12:09	2.36	79	220
9/17/79	444	D.T.	7/26/79	1:40	1.45	180	300
9/17/79	445	D.T.	7/26/79	1:40	1.36	200	330
9/17/79	446	D.T.	7/26/79	1:40	1.46	160	260
9/17/79	447	Dry	7/26/79	1:43	1.96	110	260
9/17/79	448	Dry	7/26/79	1:43	1.71	98	200
9/17/79	449	Dry	7/26/79	1:43	1.72	110	250
9/17/79	450	D.T.	7/26/79	2:00	1.71	160	320
9/17/79	451	D.T.	7/26/79	2:00	1.37	160	260
9/17/79	452	D.T.	7/26/79	2:00	1.74	170	330
9/17/79	453	Dry	7/26/79	2:05	1.32	73	110
9/17/79	454	Dry	7/26/79	2:05	1.74	100	200
9/17/79	455	Dry	7/26/79	2:05	1.77	91	180
9/17/79	456	Cool	7/26/79	2:08	1.90	110	290
9/17/79	457	Cool	7/26/79	2:08	1.94	100	230
9/17/79	458	Cool	7/26/79	2:08	2.12	100	260

DATA SHEET

Plant: Sidney, Ohio Date: July 26, 1979

Date Analysis	Sample No.-Location		Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
9/18/79	459	Finish	7/26/79	2:10	2.17	110	300
9/18/79	460	Finish	7/26/79	2:10	1.85	100	250
9/18/79	461	Finish	7/26/79	2:10	1.84	99	220
9/18/79	462	D.T.	7/26/79	2:21	1.37	140	250
9/18/79	463	D.T.	7/26/79	2:21	1.52	170	310
9/18/79	464	D.T.	7/26/79	2:21	1.35	150	260
9/18/79	465	Dry	7/26/79	2:24	1.56	110	220
9/18/79	466	Dry	7/26/79	2:24	1.57	83	170
9/18/79	467	Dry	7/26/79	2:24	1.97	84	210
9/18/79	468	D.T.	7/26/79	2:42	1.29	150	230
9/18/79	469	D.T.	7/26/79	2:42	1.45	200	400
9/18/79	470	D.T.	7/26/79	2:42	1.67	140	250
9/18/79	471	Dry	7/26/79	2:45	1.68	94	170
9/18/79	472	Dry	7/26/79	2:45	1.87	110	220
9/18/79	473	Dry	7/26/79	2:45	1.61	100	190
9/18/79	474	D.T.	7/26/79	3:00	2.29	190	450
9/18/79	475	D.T.	7/26/79	3:00	1.74	190	380
9/18/79	476	D.T.	7/26/79	3:00	1.78	170	- (1)
9/18/79	477	Dry	7/26/79	3:08	1.62	84	190
9/18/79	478	Dry	7/26/79	3:08	1.94	84	200
9/18/79	479	Dry	7/26/79	3:08	1.27	60	96
9/18/79	480	Cool	7/26/79	3:12	1.49	100	210
9/18/79	481	Cool	7/26/79	3:12	1.71	110	250
9/18/79	482	Cool	7/26/79	3:12	1.48	110	210
9/18/79	483	Finish	7/26/79	3:14	1.50	94	180
9/18/79	484	Finish	7/26/79	3:14	1.14	96	160
9/18/79	485	Finish	7/26/79	3:14	1.28	100	170
9/18/79	486	D.T.	7/26/79	3:20	1.49	180	330
9/18/79	487	D.T.	7/26/79	3:20	1.56	170	310
9/18/79	488	D.T.	7/26/79	3:20	1.53	170	310
9/19/79	489	Dry	7/26/79	3:22	1.47	62	110
9/19/79	490	Dry	7/26/79	3:22	1.51	75	140
9/19/79	491	Dry	7/26/79	3:22	1.64	100	210

(1) Dry weight not recorded.

DATA SHEET

Plant: Sidney, Ohio Date: July 26, 1979

Date Analysis	Sample No.-Location		Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
9/19/79	492	D.T.	7/26/79	3:40	1.51	140	210
9/19/79	493	D.T.	7/26/79	3:40	1.30	180	290
9/19/79	494	D.T.	7/26/79	3:40	1.34	140	250
9/19/79	495	Dry	7/26/79	3:42	1.90	160	450
9/19/79	496	Dry	7/26/79	3:42	1.69	100	200
9/19/79	497	Dry	7/26/79	3:42	1.64	120	270
9/19/79	498	D.T.	7/26/79	4:03	1.45	180	320
9/19/79	499	D.T.	7/26/79	4:03	1.43	180	330
9/19/79	500	D.T.	7/26/79	4:03	1.97	180	370
9/19/79	501	Dry	7/26/79	4:05	2.19	85	220
9/19/79	502	Dry	7/26/79	4:05	2.08	98	230
9/19/79	503	Dry	7/26/79	4:05	1.92	130	320
9/19/79	504	Cool	7/26/79	4:08	1.66	140	271
9/19/79	505	Cool	7/26/79	4:08	1.76	99	200
9/19/79	506	Cool	7/26/79	4:08	1.59	110	240
9/19/79	507	Finish	7/26/79	4:10	1.90	80	200
9/19/79	508	Finish	7/26/79	4:10	1.99	80	180
9/19/79	509	Finish	7/26/79	4:10	1.93	100	240
9/19/79	510	D.T.	7/26/79	4:21	1.44	140	240
9/19/79	511	D.T.	7/26/79	4:21	1.86	170	340
9/19/79	512	D.T.	7/26/79	4:21	1.46	150	270
9/19/79	513②	Dry	7/26/79	4:24	2.20	47	120
9/19/79	514②	Dry	7/26/79	4:24	2.02	200	460
9/19/79	515	Dry	7/26/79	4:24	2.29	100	280
9/19/79	516	D.T.	7/26/79	4:40	1.21	160	280
9/19/79	517[2]	D.T.	7/26/79	4:40	2.45	84	110
9/19/79	518	D.T.	7/26/79	4:40	1.34	150	250
9/19/79	519	Dry	7/26/79	4:42	1.70	100	230
9/19/79	520	Dry	7/26/79	4:42	1.54	46	93
9/19/79	521	Dry	7/26/79	4:42	2.45	78	120
9/19/79	522	D.T.	7/26/79	4:55	1.30	160	270
9/19/79	523	D.T.	7/26/79	4:55	1.22	170	270
9/19/79	524	D.T.	7/26/79	4:55	1.49	140	270

② Reanalysis of sample yielded same results.

DATA SHEET

Plant: Sidney, Ohio Date: July 26, 1979

Date Analysis	Sample No.-Location		Sample Date	Time	Wet Wt. (g)	Wet (µg/g)	Dry (µg/g)
9/19/79	525	Dry	7/26/79	4:57	2.11	90	240
9/19/79	526	Dry	7/26/79	4:57	1.61	72	140
9/19/79	527	Cool	7/26/79	4:59	1.98	91	200
9/19/79	528	Cool	7/26/79	4:59	1.52	71	150
9/19/79	529	Finish	7/26/79	5:01	1.88	68	210
9/19/79	530	Finish	7/26/79	5:01	1.79	95	220

4.0 WASTEWATER ANALYSIS

Wastewater Analysis
Cargill Co., Sidney, Ohio

Calibration

Standard: Hexane in water
Concentration: 0.1187 µg/µl

Run No.	µl injected	µg injected	Response area units	µg/area unit
1	2.9	0.344	123500	2.79×10^{-6}
2	2.9	0.344	126500	2.72×10^{-6}
3	2.9	0.344	161300	2.13×10^{-6}
4	2.9	0.344	128300	2.68×10^{-6}
Average				2.58×10^{-6}

Wastewater Sample #1
Sample Date: 7-23-79

Run No.	µl injected	Response area units	Response factor µg/area	Sample conc. - hexane µg/µl
1	4.85	1189000	2.58×10^{-6}	0.632
2	4.80	155900		0.084
3	4.80	554700		0.298
4	4.25	133400		0.081
5	2.05	254500		0.320
6	2.30	555300		0.623
7	2.45	129800		0.137
Average				0.311

Saturation point of hexane in water is 0.14 µg/µl. Sample 1 (7-25-79) is supersaturated with hexane and the inconsistency of the analysis can be attributed to stratification of the organic and non-organic portions within the sample.

Wastewater Sample #2
Sample Date: 7-26-79

Run No.	µl injected	Response area units	Response factor µg/area	Sample conc. - hexane µg/µl
1	2.9	4918	2.58×10^{-6}	0.004
2	2.85	4905		0.004
3	2.80	4504		0.004
Average				0.004

Sample concentration: 0.004 µg/µl.

hp 5830A
AREA %

RT	AREA	AREA %
0.19	11380	3.993
0.77	613	0.215
0.82	209900	73.656
3.49	3557	1.248
4.08	182	0.064
4.81	12080	4.239
7.48	47260	16.584

XF: 1.0000 E+ 0

TEMP1 7 0 @
RATE 0 @

2.5 ml H_2O.

START

0.93

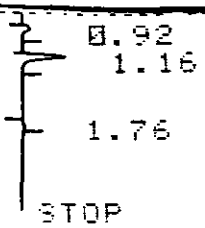
8.28

STOP

hp 5830A
AREA %

RT	AREA	AREA %
0.93	275	100.000

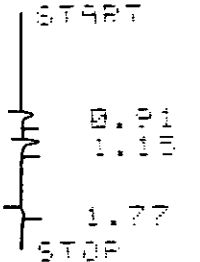
XF: 1.0000 E+ 0



hp 5830A
AREA %

RT	AREA	AREA %
0.92	202	17.908
1.16	870	77.128
1.76	56	4.965

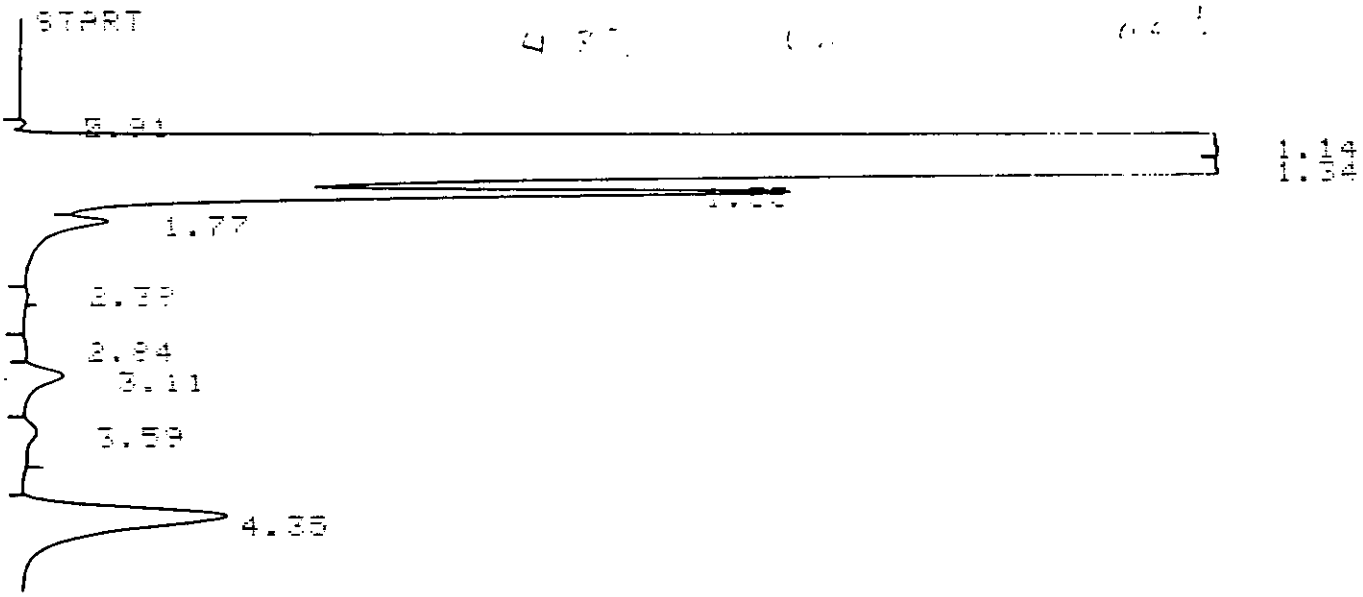
XF: 1.0000 E+ 0



hp 5830A
AREA %

RT	AREA	AREA %
0.91	263	39.137
1.15	353	52.530
1.77	56	8.333

XF: 1.0000 E+ 0



hp 5830A
AREA %

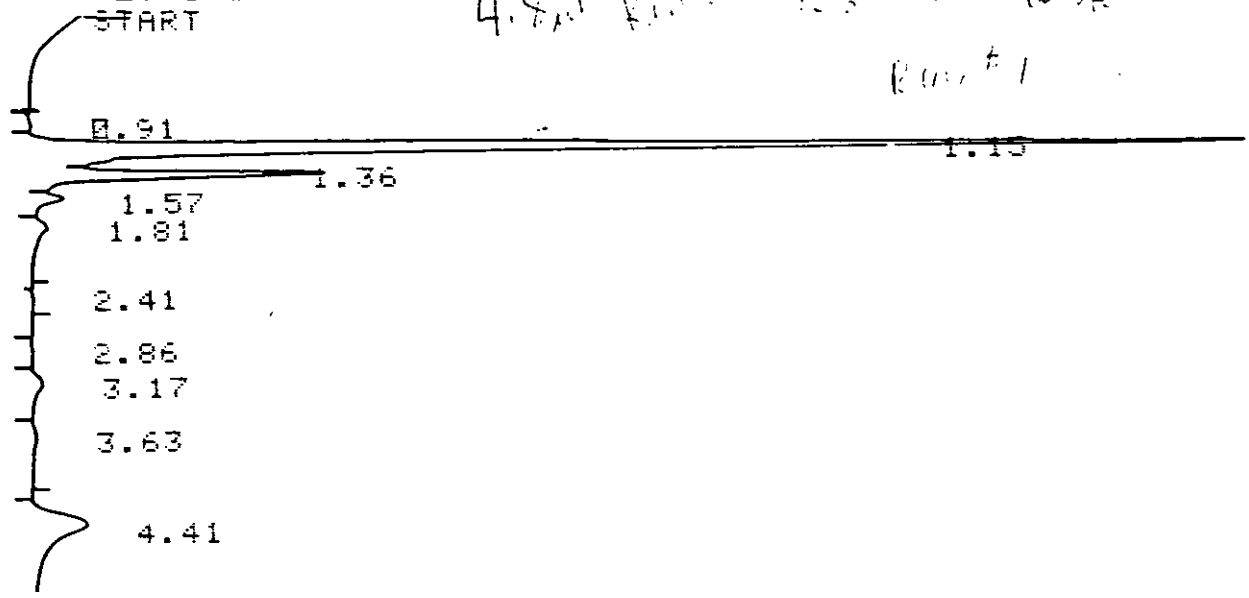
RT	AREA	AREA %
0.91	140	0.009
1.14	1189000	79.346
1.34	247700	16.530
1.55	30960	2.066
1.77	6048	0.404
2.38	133	0.009
2.84	251	0.017

3.59	959	0.064
4.35	20340	1.357

XF: 1.0000 E+ 0

ATTN 2↑ 8 @

START

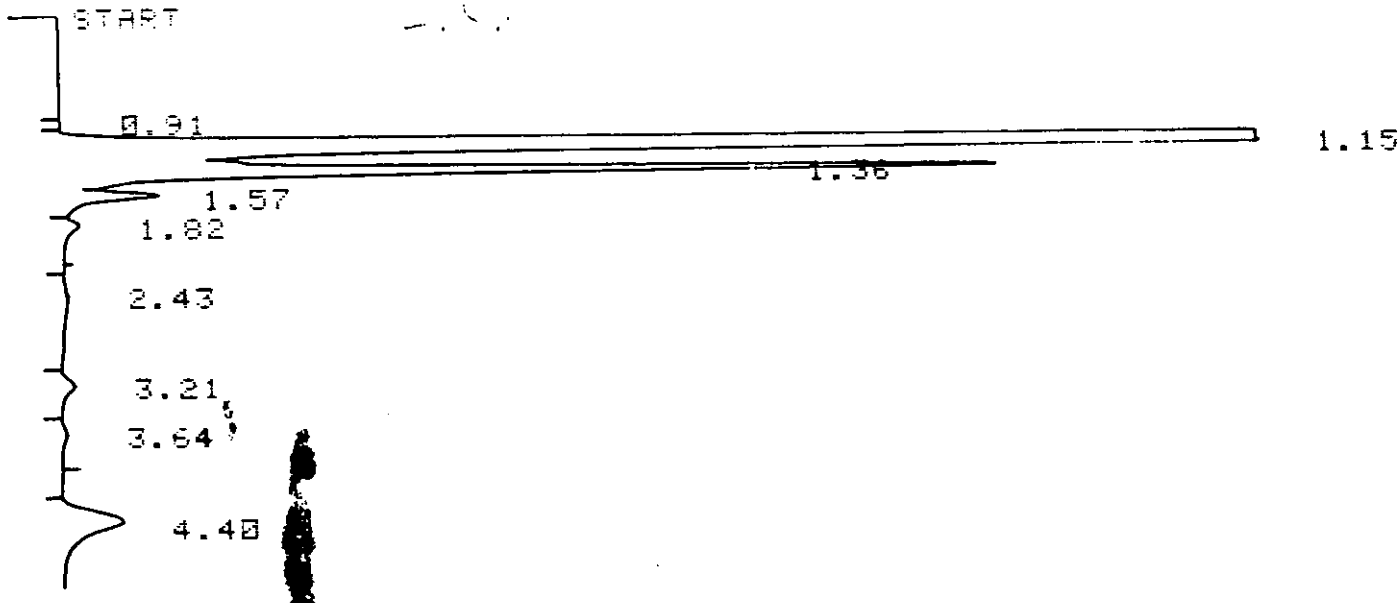


hp 5830A
AREA %

RT	AREA	AREA %
0.91	97	0.041
1.15	155900	66.185
1.36	38250	16.238
1.57	5870	2.492
1.81	5581	2.369
2.41	240	0.102
2.86	248	0.105
3.17	3441	1.461
3.63	1776	0.754
4.41	24150	10.253

XF: 1.0000 E+ 0

START

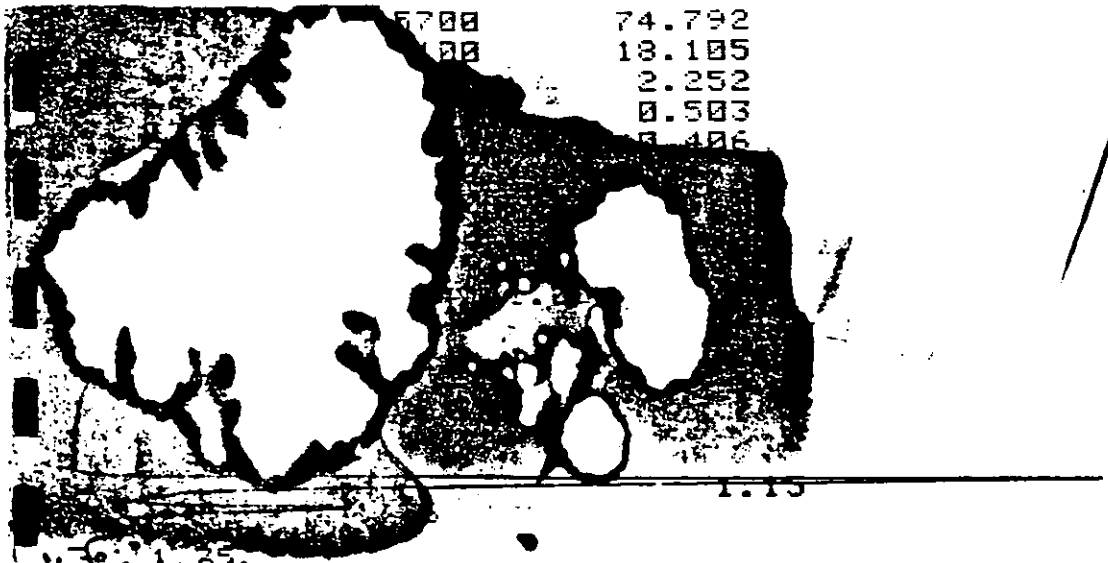


hp 5830A
AREA %

RT	AREA	AREA %

071

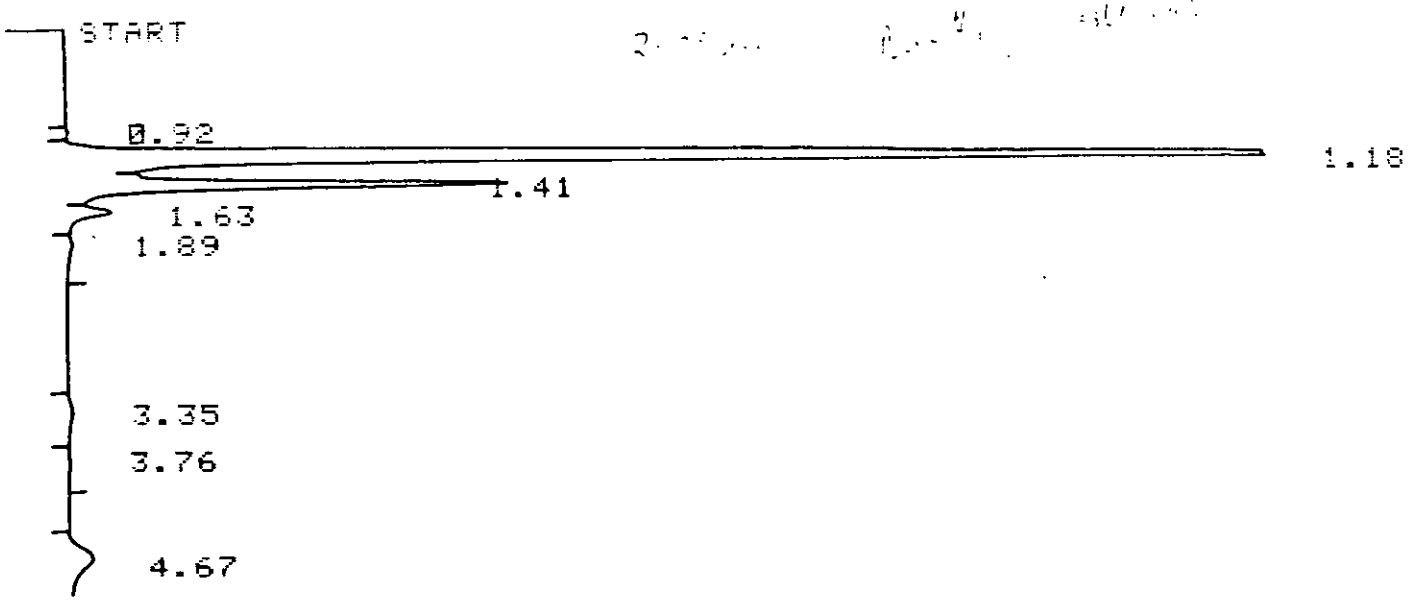
PERKIN-ELMER PART No. 332-1910



hp 5830A
AREA %

RT	AREA	AREA %
0.91	101	0.045
1.15	133400	59.375
1.36	39330	17.506
1.57	9248	4.116
1.75	1561	0.695
1.84	6668	2.968
2.44	307	0.137
2.90	241	0.107
3.30	3384	1.506
3.67	1992	0.887
4.42	28440	12.659

XF: 1.0000 E+ 0



AREA %

RT	AREA	AREA %
0.92	134	0.040

639000

7794 2.298

1763 0.520

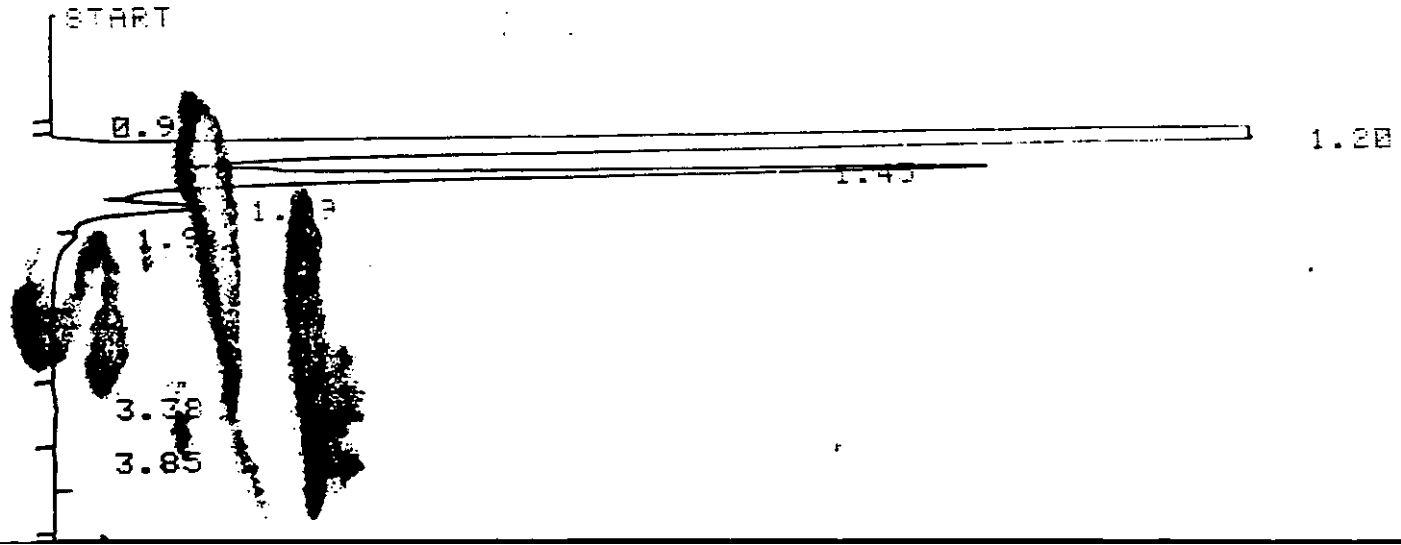
9140 2.694

XF: 1.0000 E+ 0

hp 5830A
AREA %

RT	AREA	AREA %
0.92	134	0.040
1.18	254500	75.024
1.41	63900	18.837
1.63	7794	2.298
1.89	1763	0.520
3.35	1503	0.443
3.76	489	0.144
4.67	9140	2.694

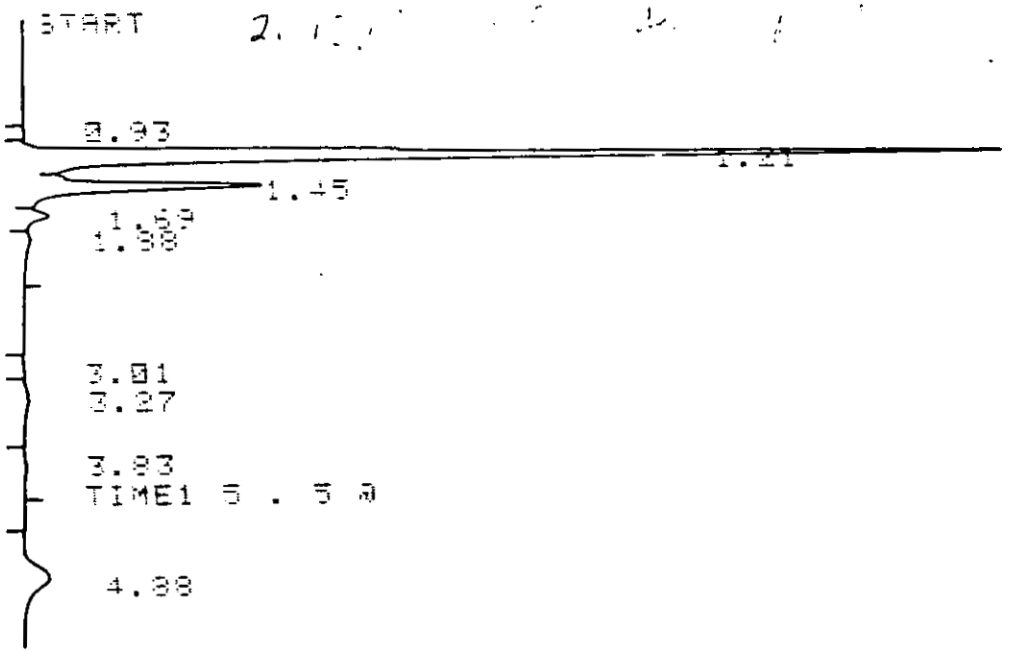
XF: 1.0000 E+ 0



hp 5830A
AREA %

RT	AREA	AREA %
0.93	133	0.017
1.20	555300	72.774
1.45	159300	20.877
1.69	33960	4.451
1.91	8138	1.067
3.78	1616	0.212
4.00	452	0.059
4.85	4145	0.543

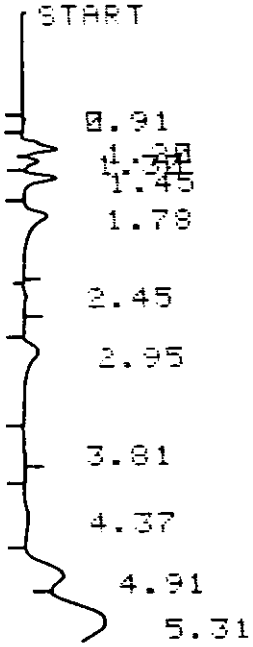
XF: 1.0000 E+ 0



hp 5830A
AREA %

RT	AREA	AREA %
0.93	99	0.053
1.21	129800	69.306
1.45	36830	19.665
1.69	4400	2.354
1.80	2230	1.191
3.01	127	0.068
3.27	1930	1.035
3.83	664	0.355
4.88	11190	5.975

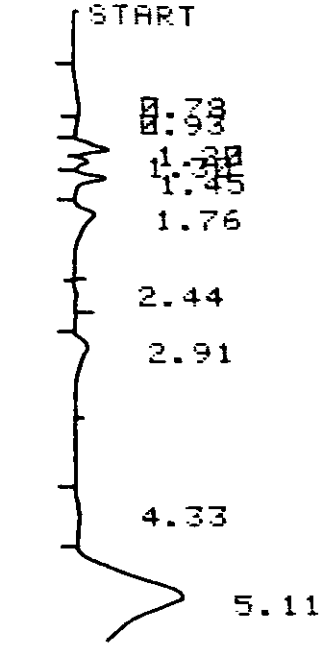
XF: 1.0000 E+ 0



hp 5830A
AREA %

RT	AREA	AREA %
0.91	179	0.382
1.20	4918	10.506
1.30	1807	3.860
1.45	4526	9.669
1.78	7036	15.031
2.45	619	1.322
2.95	5114	10.925
3.81	297	0.634
4.37	1242	2.653
4.91	5542	11.839
5.31	15530	33.177

2.85 µl waste water Cargill 7-26-79

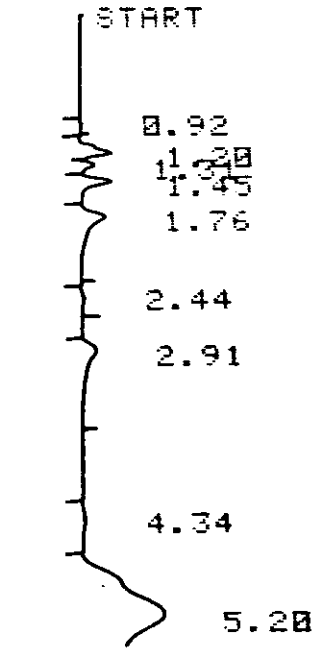


hp 5830A
AREA %

RT	AREA	AREA %
0.78	2811	3.400
0.93	1059	1.281
1.20	4905	5.933
1.30	1609	1.946
1.45	4180	5.056
1.76	6780	8.201
2.44	442	0.535
2.91	4962	6.002
4.33	1130	1.367
5.11	54790	66.277

XF: 1.0000 E+ 0

2.8 µl waste water Cargill 7-26-79



hp 5830A
AREA %

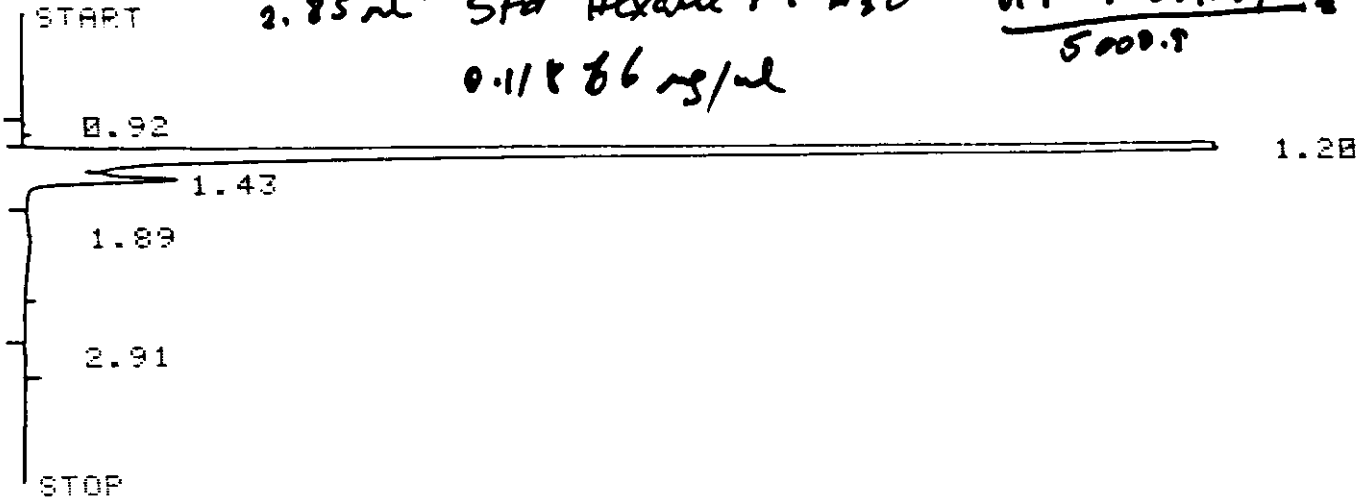
RT	AREA	AREA %
0.92	123	0.210
1.20	4504	7.708
1.76	1639	2.805

1.76	6808	11.650
2.44	496	0.849
2.91	5123	8.767
4.34	1001	1.713
5.20	34580	59.176

XF: 1.0000 E+ 0

2.85 mL Std Hexane in H_2O $\frac{0.90 \times 659.37}{5000.9} =$

0.11866 mg/mL



hp 5830A
AREA %

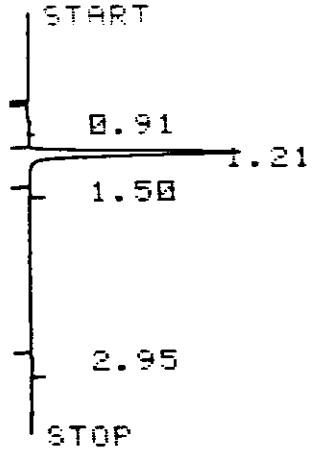
RT	AREA	AREA %
0.92	115	0.022
1.20	491700	94.526
1.43	22940	4.410
1.89	5208	1.001
2.91	211	0.041

XF: 1.0000 E+ 0

B 9
B 21
B 23
B 24
B 24

2.75 mL Std Hexane in water

0.11866 mg/mL

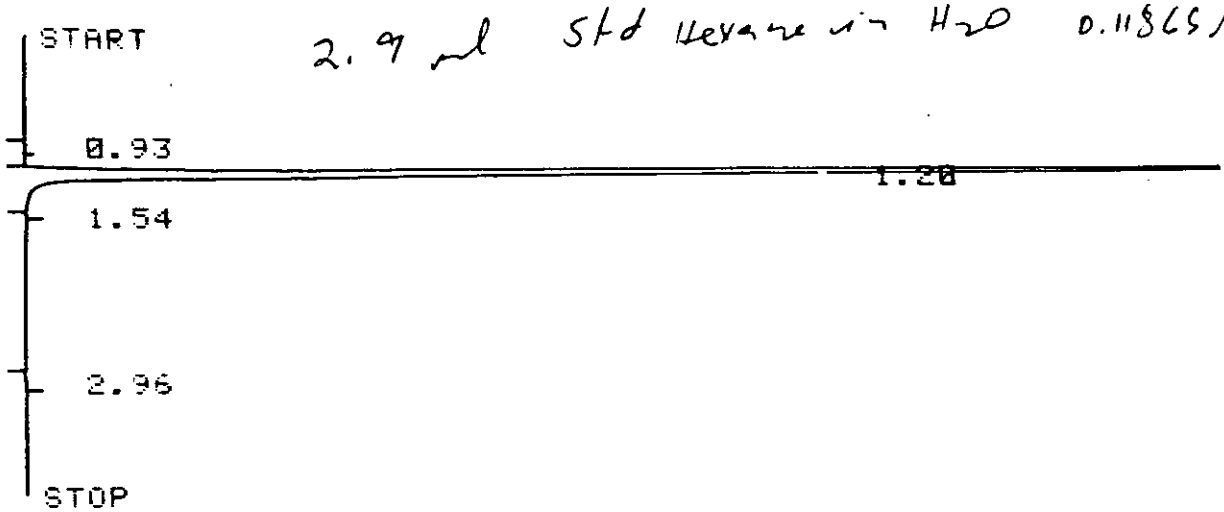


hp 5830A
AREA %

RT	AREA	AREA %
0.91	266	1.466
1.21	17710	97.587
1.50	89	0.490
2.95	83	0.457

XF: 1.0000 E+ 0

2.9 ml Std Hexane in H_2O 0.11865 µg/ml

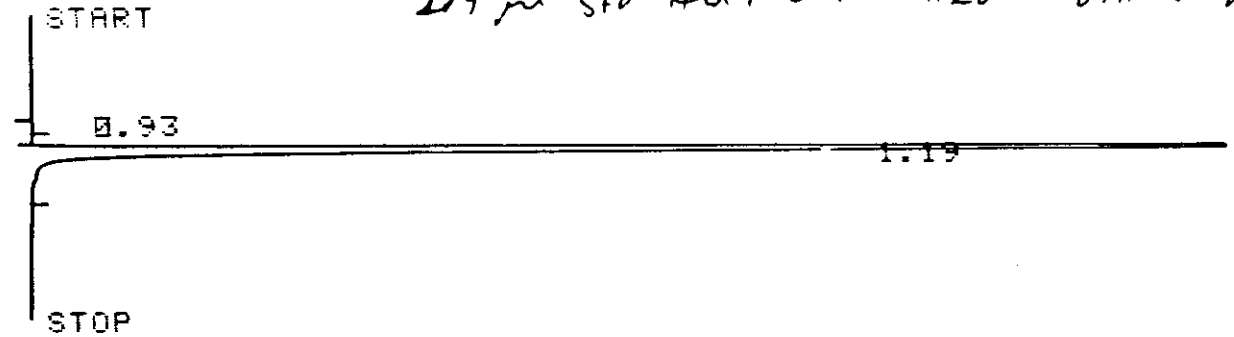


hp 5830A
AREA %

RT	AREA	AREA %
0.93	99	0.080
1.20	123500	99.818
1.54	48	0.039
2.96	78	0.063

XF: 1.0000 E+ 0

2.9 ml Std Hexane in H_2O 0.11866 µg/ml

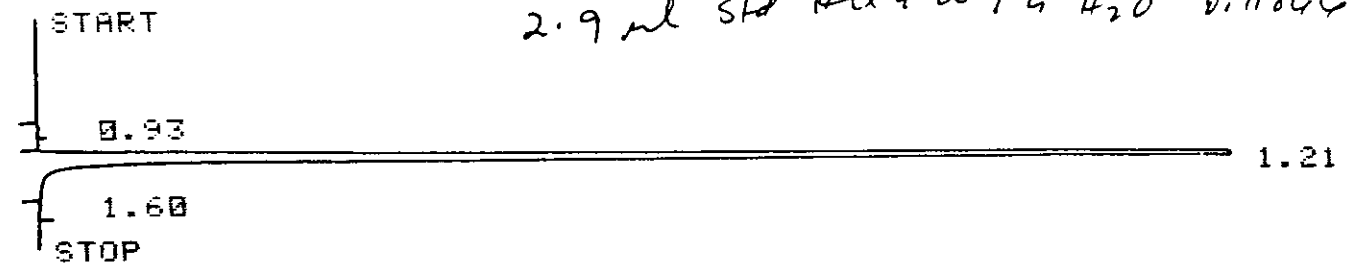


hp 5830A
AREA %

RT	AREA	AREA %
0.93	68	0.054
1.19	126500	99.946

XF: 1.0000 E+ 0

2.9 ml Std Hexane in H_2O 0.11866 µg/ml

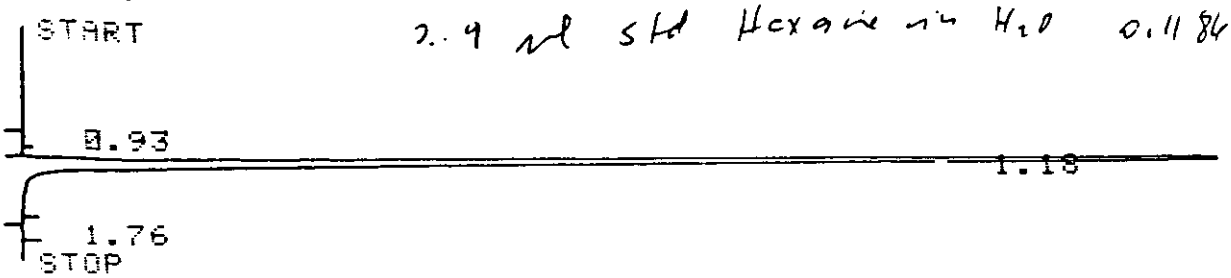


hp 5830A
AREA %

RT	AREA	AREA %
0.93	109	0.067
1.21	161300	99.732
1.60	324	0.200

XF: 1.0000 E+ 0

2.9 ml std Hexane in H_2O 0.1186 µg/ml

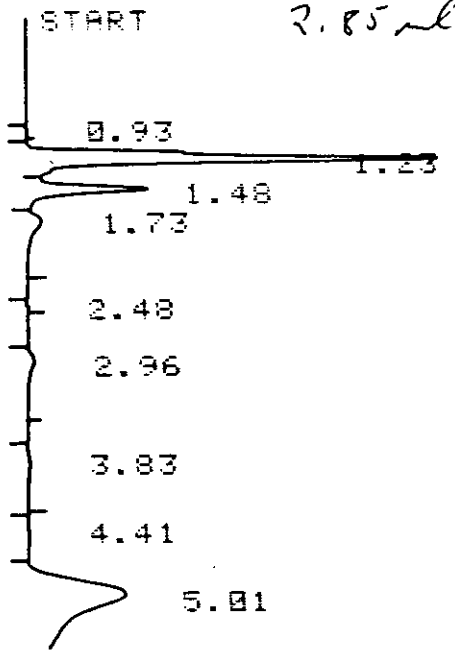


hp 5830A
AREA %

RT	AREA	AREA %
0.93	160	0.124
1.18	128300	99.817
1.76	75	0.058

XF: 1.0000 E+ 0

2.85 ml wastewater 7-25-79



hp 5830A
AREA %

RT	AREA	AREA %
0.93	51	0.039
1.23	56860	43.687
1.48	18280	14.045
1.73	4873	3.744
2.48	62	0.048
2.96	2272	1.746
3.83	848	0.652
4.41	287	0.221
5.01	46620	35.819

XF: 1.0000 E+ 0

5.0 OIL SAMPLES

TABLE 1

Title: Analysis of hexane in oil
EMB: Project No: 79-VEG-7
Method: GC using FID
Instrument: Perkin Elmer GC Model# 900

Sample NO.	Concentrations of individual components as n-Hexane. Concentrations are expressed as mg/10^3 grams of oil.					Total Concentration as n-Hexane (mg/10^3 grams) of oil
	2-Methyl Pentane	3-Methyl Pentane	n-Hexane	Methyl Cyclo-pentane	Cyclo-hexane	
1	490	480	834	297	62	2163
2	16126	12955	19663	4867	374	53985
3	557	518	910	314	63	2362
4	14727	11771	18112	4239	401	49250
5	478	458	801	307	53	2097
6	27175	21657	34431	8265	917	92445
7	402	406	761	298	61	1928
8	16896	13173	21681	4486	376	56612
9	28	38	85	67	38	256
10	33	48	110	89	54	334

Note: Concentration expressed as (mg/10^3 grams of oil) is equivalent to concentration expressed as (ppm by weight).

TABLE 2

OIL SAMPLES
SIDNEY OHIO - CARGILL COMPANY

Mineral Oil

Sample No.	Test Site	Time/Date	Hexane Run No.
1	MOS Inlet	4:30/7-23-79	MI-1
2	MOS Outlet	4:30/7-23-79	MO-1
3	MOS Inlet	9:58/7-25-79	MI-2
4	MOS Outlet	9:50/7-25-79	MO-2
5	MOS Inlet	12:46/7-25-79	MI-3
6	MOS Outlet	12:44/7-25-79	MO-3
7	MOS Inlet	3:30/7-25-79	MI-4
8	MOS Outlet	3:25/7-25-79	MO-4

Vegetable Oil

9		10:05/7-25-79	
10		7-26-79	

APPENDIX B

FIELD DATA SHEETS

1.0 CS_2 IMPINGER TRAIN

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL INC. SIDNEY, OH

Date: 7/23/79 Ambient Temp.: 82° F Ambient Press.: 29.15 mm Hg

Sampling Location: MOS INLET Run Number: MI - 1

Sample Train Description: _____

Pump Type/No.: _____ Calibration Factor: _____

A-1043 - 231 ~~std~~ ml/min

B 1046 - 222 ~~std~~ ml/min

Test Data

Clock Time Start: _____ Pump Count Initial: _____

Finish: _____ Final: _____

Sampling Time: _____ Net: _____

Volume of Gas Sampled: _____

Stack Temp °F	Static Pressure in H_2O	Impinger Train Temperature °F	Time Clock	Time Sample
	-6.0		3:53	0
	-6.5		4:03	10
	-6.0		4:13	20
83	-6.0		4:23	30
83	-6.5		4:33	40

Moisture Determination

Silica Tube Number: 47.36 g

Pump Type/No.: # 00201 Calibration Factor: 888.3 ml/min

Clock Time Start: 4:42 Pump Count Initial: _____

Finish: * Final: _____

Net: _____ Net: _____

Volume of Gas Sampled: _____

Grams H_2O Collected: _____

* Momentary disconnect of tube to pump 4:44
AT 4:53 Noticed tube disconnected again, time unknown

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL Inc, Sidney, Ohio

Date: 07/25/79 Ambient Temp.: _____ Ambient Press.: _____

Sampling Location: MOS Inlet Run Number: MI-2

Sample Train Description: CS_2 (collection eff)

Pump Type/No.: MSA, 1046 Calibration Factor: Rec-3 100cc

B 187.50

Test Data

Clock Time Start: 9:30 AM Pump Count Initial: _____
Finish: 10:15 AM Final: _____

Sampling Time: _____ Net: _____

Volume of Gas Sampled: _____

Stack Temp °F	Static Pressure in H_2O	P_s	Impinger Train Temperature °F
82°F	-6" H_2O	9:30 AM	
82°F	-6" "	9:37 AM	
82°F	-5.5" "	9:44 AM	
82°F	-5.7" H_2O	9:51 AM	
82°F	-5.5" "	9:58 AM	
82°F	-5.5" H_2O	10:05 AM	
82°F	-5.5" H_2O	10:12 AM	
82°F	-5.5" "	10:15 AM	

Moisture Determination

Silica Tube Number: _____

Pump Type/No.: _____ Calibration Factor: _____

Clock Time Start: _____ Pump Count Initial: _____
Finish: _____ Final: _____

Net: _____ Net: _____

Volume of Gas Sampled: _____

Grams H_2O Collected: _____

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL Inc, Sidney, OHIO

Date: 07/25/79 Ambient Temp.: 85°F Ambient Press.: 29.02

Sampling Location: mos Inlet Run Number: MI-3

Sample Train Description:

Pump Type/No.: A 1054 Calibration Factor: 212
B 1044 184

Test Data

Clock Time Start: Pump Count Initial:
Finish: Final:

Sampling Time: Net:

Volume of Gas Sampled:

Stack Temp °F	Static Pressure in H_2O		Impinger Train Temperature °F
82°F	-5.7" H_2O	12:23 PM	Start Run Time
82°F	-5.5" H_2O	12:31	
82°F	-5.7" "	12:39	
82°F	-5.7" H_2O	12:47	
82°F	-5.7" H_2O	12:55	
82°F	-5.7" H_2O	13:03	
82°F	-5.7" H_2O	13:08	End Run Time

Moisture Determination

Silica Tube Number: INITIAL WGT. 51.12g FINAL WGT. 51.83 g

Pump Type/No.: MSA #00201 Calibration Factor: 800.2 cc/min.

Clock Time Start: 13:12 Pump Count Initial:
Finish: 13:42 Final:

PRESSURE = -5.5" H_2O
TEMP. = 84°F Net: Net:

Volume of Gas Sampled:

Grams H_2O Collected:

CS_2 IMPINGER TRAIN DATA

Plant and City: Cargill Inc, Sidney Ohio

Date: 07/25/79 Ambient Temp.: 85°F Ambient Press.: 29.02" Hg

Sampling Location: Mixer/Oil Inlet Run Number: M-IN-4

Sample Train Description: _____

Pump Type/No.: _____ Calibration Factor: _____

G- #1054 2.12

I - 1044 1.84

Test Data

Clock Time Start: 15:10 pm Pump Count Initial: _____

Finish: _____ Final: _____

Sampling Time: _____ Net: _____

Volume of Gas Sampled: _____

Stack Temp °F		Static Pressure in H_2O	Impinger Train Temperature °F
82°F	15:10	-5.4" H_2O	
82°F	15:18	-5.5" "	
82°F	15:26	-5.5 "	
82°F	15:34	-6.0" H_2O	
82°F	15:42	-5.7" "	
82°F	15:50	-5.5"	
82°F	15:55 pm	-5.5"	

End Test Run (Int)

Moisture Determination

Silica Tube Number: _____

Pump Type/No.: _____ Calibration Factor: _____

Clock Time Start: _____ Pump Count Initial: _____

Finish: _____ Final: _____

Net: _____ Net: _____

Volume of Gas Sampled: _____

Grams H_2O Collected: _____

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL

Date: 7/23/79 Ambient Temp.: 90 Ambient Press.: 29.15

Sampling Location: OUTLET Run Number: M-O-1-A+B

Sample Train Description: CS_2 imp. -

Pump Type/No.: MSA - Calibration Factor: ~~7~~

M-O-1 A (1054) 164.9 ml/min

Test Data M-O-1-B (1044) 215.4 STD ml/min

Clock Time Start: 15:55 Pump Count Initial:

Finish: 16:40 Final:

Sampling Time: Net:

Volume of Gas Sampled:

Stack Temp °F	Static Pressure in H_2O	Impinger Train Temperature °F
~100°F	-10 in H_2O	
16:35 100°F	-10" H_2O	
16:40 100°F	-10" H_2O	

Moisture Determination

Silica Tube Number:

Pump Type/No.: Calibration Factor:

Clock Time Start: Pump Count Initial:

Finish: Final:

Net: Net:

Volume of Gas Sampled:

Grams H_2O Collected:

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL Sidney OH

Date: 7/25/79 Ambient Temp.: 88°F Ambient Press.: 29.02

Sampling Location: MOS Outlet Run Number: 2

Sample Train Description: Midget Impinger

Pump Type/No.: 00261 Calibration Factor: #103A - ~~231.64~~ 222.3 ~~std~~ ml/min

Test Data

Clock Time Start: 0930 Pump Count Initial: 07:30

Finish: 1015 Final:

Sampling Time: 45 min. Net:

Volume of Gas Sampled:

	Stack Temp °F	Static Pressure in H_2O	~~Impinger Train Temperature~~ °F	Velometer ft/min
9:30	98			2225
9:35	98	-10.5		2115
9:40	98	-10.5		2106
9:45	98	-10.5		2058
9:50	98	-10.5		2020
9:55	98	-10.5		2230

Thomas R. Clark

Moisture Determination

Silica Tube Number: INITIAL WGT. 51.77g. → FINAL WGT. 52.43

Pump Type/No.: MSA #00201 Calibration Factor: 800.2 cc/min.

Clock Time Start: 10:20 Pump Count Initial:

PRESSURE -10.5" H_2O Finish: 10:50 Final:

TEMP. 95°F Net: Net:

Volume of Gas Sampled:

Grams H_2O Collected:

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL Inc.

Date: 07/25/79 Ambient Temp.: 85°F Ambient Press.: 29.02

Sampling Location: MOS Outlet Run Number: MO-3

Sample Train Description: Midget Impinger

Pump Type/No.: 1043 A train Calibration Factor: 208
1046 B train 208

Test Data

Clock Time Start: 12:25 Pump Count Initial:
Finish: 13:10 Final:

Sampling Time: Net:

Volume of Gas Sampled:

	Stack Temp °F	Static Pressure in H_2O	~~Impinger Train Temperature °F~~ velocity
12:25	98	-10.5	2270
12:30	98	-10.5	2213
12:35	98	-10.5	2122
12:40	98	-10.5	2222
12:45	98	-10.5	2139
12:50	98	-10.5	2099

Moisture Determination

Silica Tube Number: INITIAL WGT. 39.90g. FINAL WGT. 40.55g.

Pump Type/No.: MSA #00201 Calibration Factor: 800.2 cc/min.

Clock Time Start: 13:46 Pump Count Initial:
PRESSURE = -10.5" H_2O Finish: 14:16 Final:
TEMP. = 100°F Net: Net:

Volume of Gas Sampled:

Grams H_2O Collected:

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGIL Sidney, OHIO

Date: 7/25/79 Ambient Temp.: 85°F Ambient Press.: 29.02 IN Hg

Sampling Location: Mineral Oil scrubber outlet Run Number: MO4

Sample Train Description: Midget Impinger

Pump Type/No.: 1046 B / 1043 A Calibration Factor: 208 / 208

Test Data

Clock Time Start: 15:10 Pump Count Initial:
Finish: 15:55 Final:

Sampling Time: Net:

Volume of Gas Sampled:

	Stack Temp °F	Static Pressure in H_2O	~~Impinger Train Temperature °F~~ Velocity
1510	95	-10.5	2240
1515	95	-10.5	2332
1520	95	-10.5	2222
1525	95	-10.5	2237
1530	95	-10.5	2225
1535	95	-10.5	2227

Moisture Determination

Silica Tube Number:

Pump Type/No.: Calibration Factor:

Clock Time Start: Pump Count Initial:
Finish: Final:

Net: Net:

Volume of Gas Sampled:

Grams H_2O Collected:

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL INC.

Date: 07/26/79 Ambient Temp.: 75°F Ambient Press.: 28.98" Hg

Sampling Location: Cooler Outlet Run Number: C01

Sample Train Description: CS_2 impinger Train duplicate

Pump Type/No.: MSA Calibration Factor: B- #1054 212 cc/min
A #1044 184 "

Test Data

Clock Time Start: Pump Count Initial:
10:00 AM - 11:38 AM Finish: Final:
1 min down
Sampling Time: 97 Minutes 10:00 AM — 11:38 AM 1 min down Net:
Tank Change (2 min)

Volume of Gas Sampled:

Stack Temp °F	Static Pressure in H_2O	Impinger Train Temperature °F
150		
150		
150		
150		
150		
150		

Moisture Determination

Silica Tube Number:

Pump Type/No.: Calibration Factor:

Clock Time Start: Pump Count Initial:
Finish: Final:

Net: Net:

Volume of Gas Sampled:

Grams H_2O Collected:

CS_2 IMPINGER TRAIN DATA

Plant and City: Cargill Inc. Sidney

Date: 7/26/79 Ambient Temp.: 29C Ambient Press.: 28.98

Sampling Location: Cooler outlet Run Number: C-2 A+B

Sample Train Description: + CS_2

Pump Type/No.: MSA Calibration Factor:

Post test 1044: 189.5 ml/min Pretest A 1044 291.4 ml/min

Test Data 1054 89. ml/min B 1054 242.6 ml/min

Clock Time Start: 14:17 PM Pump Count Initial:

Finish: 15:45 Final:

Sampling Time: Net:

Volume of Gas Sampled:

Stack Temp °F	Static Pressure in H_2O	Impinger Train Temperature °F
150°F		
150°F		
150°F		
150°F		
150°F		
150°F		

Moisture Determination

Silica Tube Number:

Pump Type/No.: Calibration Factor:

Clock Time Start: Pump Count Initial:

Finish: Final:

Net: Net:

Volume of Gas Sampled:

Grams H_2O Collected:

+ Test down 3 minutes while TCA Tanks were changed on Collaborative test Duration of test = 90 minutes

2.0 VELOCITY AND MOISTURE

TRAVERSE POINT LOCATION FOR CIRCULAR DUCTS

PLANT CARGILL
DATE 2/26/79
SAMPLING LOCATION COKER UNIT
INSIDE OF FAR WALL TO
OUTSIDE OF NIPPLE. (DISTANCE A) _____
INSIDE OF NEAR WALL TO
OUTSIDE OF NIPPLE. (DISTANCE B) _____
STACK I.D., (DISTANCE A - DISTANCE B) 30.0
NEAREST UPSTREAM DISTURBANCE 20
NEAREST DOWNSTREAM DISTURBANCE 60
CALCULATOR _____

SCHEMATIC OF SAMPLING LOCATION

TRAVERSE POINT NUMBER	FRACTION OF STACK I.D.	STACK I.D.	PRODUCT OF COLUMNS 2 AND 3 (TO NEAREST 1 8 INCH)	DISTANCE B	TRAVERSE POINT LOCATION FROM OUTSIDE OF NIPPLE (SUM OF COLUMNS 4 & 5)
1	.021	30.0	.63 (1.0)	—	1.0
2	.067		2.01		2.01
3	.118		3.54		3.54
4	.177		5.31		5.31
5	.250		7.50		7.50
6	.356		10.68		10.68
7	.644		19.32		19.32
8	.750		22.50		22.50
9	.823		24.69		24.69
10	.882		26.46		26.46
11	.933		27.99		27.99
12	.979		29.37 (29.0)		29.37 (29.0)

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. CARGILL Inc.	07 / 26 / 79

SAMPLING LOCATION	CLOCK TIME
Cooler Outlet	9:45 am

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. Pet	Jerry Lewis	75°	28.98	− 1.1

Before Run

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	STACK INSIDE DIMENSION (in.) SIDE 2	PITOT TUBE Cp
28.00	30 Round		.84

moisture 7.68 %

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
1	0.63 (10)	.20	150
2	2.01	.35	150
3	3.59	.60	150
4	5.31	.80	150
5	7.5	.70	150
6	10.68	.70	150
7	19.32	.65	150
8	22.5	.65	150
9	24.69	.65	150
10	26.96	.60	150
11	27.99	.45	150
12	29.37 (24)	.30	150
1		0.90	150
2		1.20	150
3		1.37	150
4		1.45	150
5		.47	150 *
6		.50	150
7		.70	150
8		.75	150
9		.90	150
10		.80	150
11		.60	150
12		.30	150

1 & 2 East Port A

Port B North

ρ_s − 1.1

$\overline{\sqrt{\Delta p}}$ − 1.23

ρ_s − 28.90

76.47 f/s

22528 acfm

18835 scfm

* ρ_s taken

Ave of three = 18892 scfm

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. CARGILL Inc, Sidney, Ohio	07 / 26 / 79

SAMPLING LOCATION	CLOCK TIME
Cooler Outlet	11:45 am

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. 2	Jerry Lewis	75	28.98	−1.3

After CO / Run

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	SIDE 2	PITOT TUBE Cp
28.00	30" Ø Round duct	—	0.84

moisture 7.68%

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in. H_2O	STACK TEMP, °F
Port A EAST			
1	(100)	1.15	150
2		1.80	
3		1.65	|
4		1.75	
5		1.75	
6		1.75 *	
7		1.65	
8		1.65	
9		1.70	
10		1.65	
11		1.95	
12		1.35	
Port B North			
1		0.95	
2		1.25	
3		1.35	|
4		1.50	
5		1.50	
6		1.55	
7		1.75	
8		1.75	
9		1.80	
10		1.75	
11		1.60	
12		1.45	

$P_s = -1.3$" H_2O

$\overline{\sqrt{\Delta p}} = 1.24$

* P_s taken

4560 ft/min

4.91 $ft^2 = A$

22383 acfm

18700 scfm

529509 l/min

529.5 m^3/min

10 ppm ≡ 25 lb/hr

~ 60 lb/day

GAS VELOCITY AND VOLUME DATA

PLANT AND CITY	RUN DATE
1. CARGILL Inc. Sidney, Ohio	07/26/79

SAMPLING LOCATION	CLOCK TIME
Cooler Outlet	

RUN NUMBER	OPERATOR	AMB. TEMP. (°F)	BAR. PRESS (in. Hg)	STATIC PRESS (in. H_2O)
2. 3	Jerry/Lewis	78	28.98	-1.1

~~Before~~ After Run #2

MOLECULAR WT.	STACK INSIDE DIMENSION (in.) DIAM OR SIDE 1	STACK INSIDE DIMENSION (in.) SIDE 2	PITOT TUBE Cp
28.03	30"	—	0.84

Raind duct

FIELD DATA

TRAVERSE POINT NUMBER	POSITION (in.)	VELOCITY HEAD (Δp_s), in.H_2O	STACK TEMP. °F
7,8,9,10	11,12,13,14	25,26,27,28,29	38,39,40,41
1		1.15	150
2		1.35	
3		1.65	
4		1.70	
5		1.75	
6		1.70	
7		1.55	
8		1.50	
9		1.55	
10		1.55	
11		1.45	
12		1.35	
1		1.0	
2		1.25	
3		1.35	
4		1.30	
5		1.60	
6		1.80 *	
7		1.85	
8		1.85	
9		1.90	
10		1.95	
11		1.85	
12		1.60	

Port A East

Port B North

Moisture 7.68% 7.43

* Static Pressure $P_s = -1.1$ "H_2O

$\overline{\sqrt{\Delta P}} = 1.25$

P_s 28.90

M_w = 28.16

77.71 f/o

22895 acfm

19142 scfm

PITOT TUBE CALIBRATION

The pitot tubes used in sampling were constructed by PEDCo Environmental and met all requirements of Method 2, section 4.1 of the Federal Register*. Therefore, a baseline coefficient of 0.84 was assigned to each pitot tube. See Figures E-4 and E-5 for alignment requirements of Method 2.

* Federal Register, Vol. 42, No. 160, August 18, 1977.

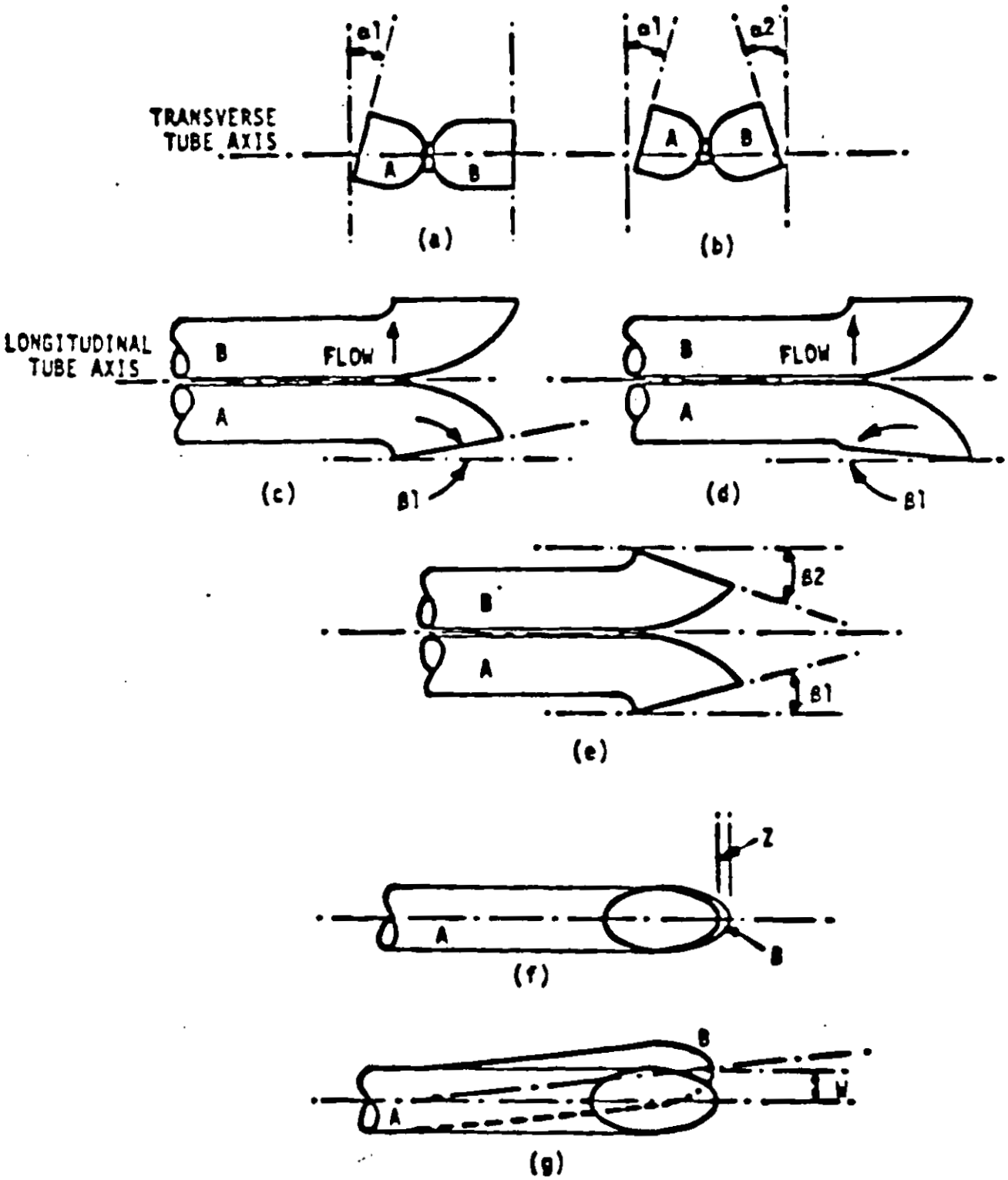


Figure E-5 Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect Cp so long as α_1 and α_2 <10°, β_1 and β_2 <5°, z <0.32 cm (1/8 in.) and w<0.08 cm (1/32 in.).

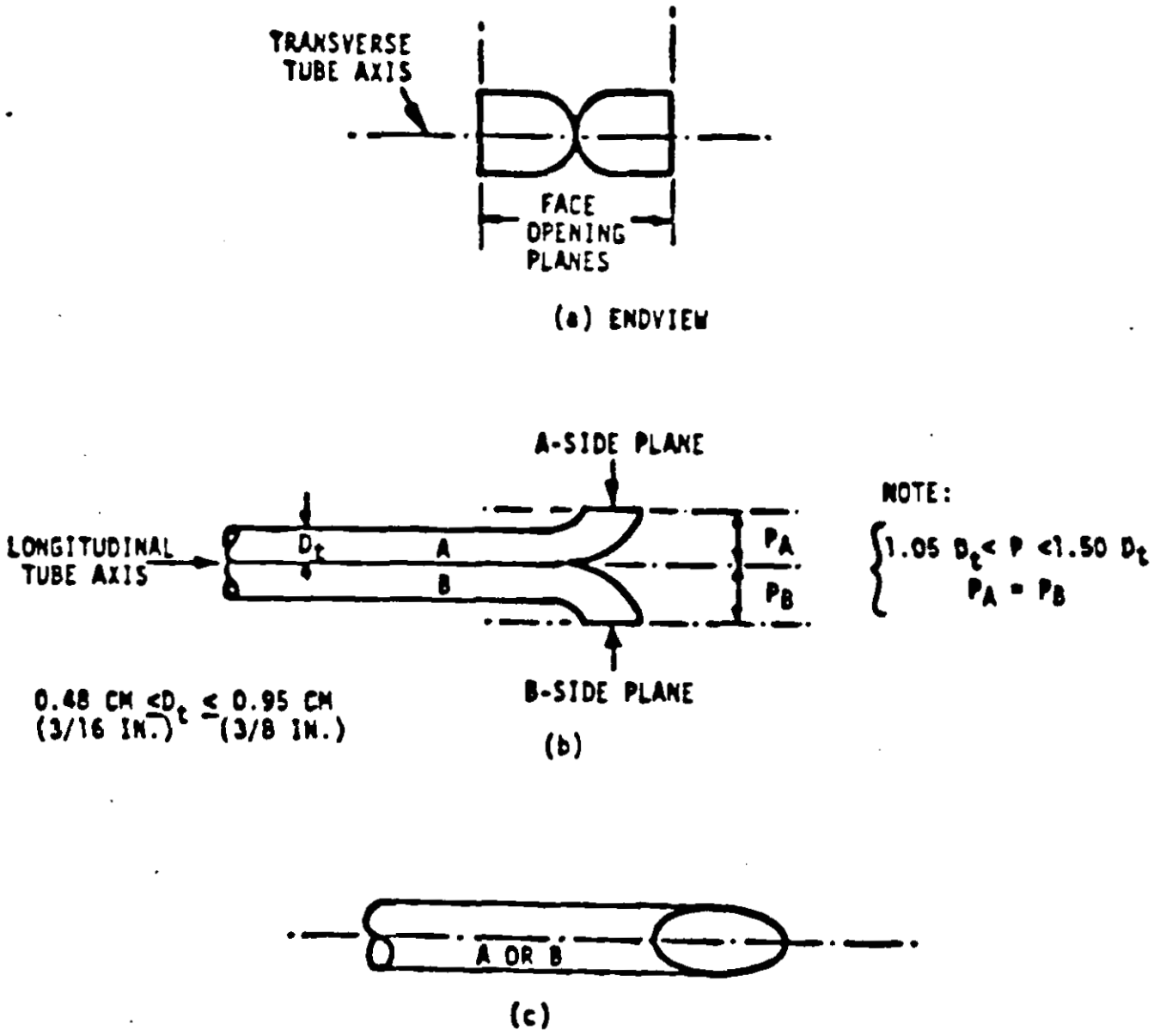


Figure E-4 Properly constructed Type S pitot tube, shown in: (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening planes parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way.

```
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
```

```
#J499; #02318  *  RPT, P3333U,PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U,PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U,PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
```

```
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
```

```
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
```

```
:JOB RPT,P3333U.PEI,PUB
PRIORITY = ES; INPRI = 8; TIME = UNLIMITED SECONDS
JOB NUMBER = #J499
TUE, SEP 25, 1979,  4:24 PM
HP3000 / MPE III B.00.02
:RUN STKVELPG
```

STACK VELOCITY DATA

PLANT	CARGILL INC
DATE	07/26/79
SAMPLING LOCATION	COOLER OUTLET
RUN NUMBER	1
CLOCK TIME	945
OPERATOR	JERRY LEWIS
AMBIENT TEMP. (DEG.F)	75.
BAR.PRESS.(IN HG)	28.98
STATIC PRESS.(IN H2O)	-1.10
MOLECULAR WEIGHT	28.00
STACK INSIDE DIM(IN)	30.000
PITOT TUBE COEFF.	.84
MOISTURE CONTENT(%)	.00

TRANSVERSE POINT NO.	POSITION INCHES	VELOCITY HEAD (IN H2O)	STACK TEMP (DEG.F)
A-01	.6	1.200	150.
A-02	2.0	1.350	150.
A-03	3.5	1.600	150.
A-04	5.3	1.800	150.
A-05	7.5	1.700	150.
A-06	10.6	1.700	150.
A-07	19.3	1.650	150.
A-08	22.5	1.650	150.
A-09	24.6	1.650	150.
A-10	26.4	1.600	150.
A-11	27.9	1.450	150.
A-12	29.3	1.300	150.
B-01	.0	.900	150.
B-02	.0	1.200	150.
B-03	.0	1.370	150.
B-04	.0	1.450	150.
B-05	.0	1.470	150.
B-06	.0	1.500	150.
B-07	.0	1.700	150.
B-08	.0	1.750	150.
B-09	.0	1.900	150.
B-10	.0	1.800	150.
B-11	.0	1.600	150.
B-12	.0	1.300	150.
AVERAGE		1.525	150.

PLANT	CARGILL INC
DATE	07/26/79
SAMPLING LOCATION	COOLER OUTLET
RUN NUMBER	1

STACK AREA, SQ. FT.	4.909
STACK ABS. PRES., IN HG.	28.90
STACK GAS TEMPERATURE, DEG.F	150.
SQRT(VEL HD X STACK TEMP ABS)	30.4
STACK GAS VELOCITY, ACT. FPS	76.7
STACK GAS VOLUME (WET), ACT. CFM.	22604.3
STACK GAS VOLUME (DRY), ACT. CFM.	22604.3
STACK GAS VOLUME @ 29.92 IN. HG AND 68 DG. F :	
(DRY)	18898.1
(WET)	18898.1

SAMPLE CALCULATIONS

SYMBOLS:

AREA	CROSS-SECTIONAL STACK AREA, SQ FT	PTC	PITOT TUBE COEFFICENT
BPRES	BAROMETRIC PRESSURE, IN HG	SPRES	STATIC PRESSURE, IN H2O
DELP	DELTA P	STEMP	STACK TEMPERATURE, DEG F
DIA	DIAMETER OF CIRCULAR STACK, IN	STPRES	STACK PRESSURE, IN HG
DIM1	LENGTH OF RECTANGULAR STACK, IN	STVEL	STACK VELOCITY, AFPM
DIM2	WIDTH OF RECTANGULAR STACK, IN	TEMP	TEMPERATURE, DEG F
MOIST	MOISTURE CONTENT	VH	VELOCITY HEAD, IN H2O
MW	MOLECULAR WEIGHT	SVOLFLW	STANDARD VOLUMETRIC FLOW (WET), ACFM
NP	NUMBER OF TRANSVERSE POINTS	VOLFLW	VOLUMETRIC FLOW (WET), ACFM

FORMULAS AND SAMPLE CALCULATIONS:

$$DELP = \frac{SUM[SQRT[VH * TEMP]]}{NP} = \frac{729.6}{24} = 30.4$$

$$STPRES = BPRES + (SPRES/13.6) = 28.98 + (-1.10/13.6) = 28.9 \text{ IN HG}$$

$$STEMP = \frac{SUM[STEMP]}{NP} = \frac{3600.}{24} = 150. \text{ DEG F}$$

$$AREA(CIRCULAR\ STACK) = \frac{3.1416 * (DIA/2)**2}{144} = \frac{3.1416 * (30.000/2)**2}{144} = 4.909 \text{ SQ FT}$$

$$STVEL = \frac{85.49 * PTC * DELP}{SQRT[MW * STPRES]} = \frac{85.49 * .84 * 30.4}{SQRT[28.00 * 28.9]} = 76.7 \text{ AFPM}$$

$$VOLFLW = 60. * STVEL * AREA = 60. * 76.7 * 4.909 = 22604.3 \text{ ACFM}$$

$$SVOLFLW = \frac{VOLFLW * STPRES * (460. + 68.)}{29.92 * (STEMP + 460.)} = \frac{22604.3 * 28.9 * (460. + 68.)}{29.92 * (150.0 + 460.)} = 18898.1 \text{ ACFM}$$

STACK VELOCITY DATA

PLANT	CARGILL, INC, SIDNEY, OHIO
DATE	07/26/79
SAMPLING LOCATION	COOLER OUTLET
RUN NUMBER	2
CLOCK TIME	1145
OPERATOR	JERRY LEWIS
AMBIENT TEMP. (DEG.F)	75.
BAR.PRESS.(IN HG)	28.98
STATIC PRESS.(IN H20)	-1.30
MOLECULAR WEIGHT	28.00
STACK INSIDE DIM(IN)	30.000
PITOT TUBE COEFF.	.84
MOISTURE CONTENT(%)	.00

TRANSVERSE POINT NO.	POSITION INCHES	VELOCITY HEAD (IN H20)	STACK TEMP (DEG.F)
A-01	.0	1.150	150.
A-02	.0	1.400	150.
A-03	.0	1.650	150.
A-04	.0	1.750	150.
A-05	.0	1.750	150.
A-06	.0	1.750	150.
A-07	.0	1.650	150.
A-08	.0	1.650	150.
A-09	.0	1.700	150.
A-10	.0	1.650	150.
A-11	.0	1.450	150.
A-12	.0	1.350	150.
B-01	.0	.950	150.
B-02	.0	1.250	150.
B-03	.0	1.350	150.
B-04	.0	1.500	150.
B-05	.0	1.500	150.
B-06	.0	1.550	150.
B-07	.0	1.750	150.
B-08	.0	1.750	150.
B-09	.0	1.800	150.
B-10	.0	1.750	150.
B-11	.0	1.600	150.
B-12	.0	1.450	150.
AVERAGE		1.546	150.

PLANT	CARGILL, INC, SIDNEY, OHIO
DATE	07/26/79
SAMPLING LOCATION	COOLER OUTLET
RUN NUMBER	2

STACK AREA, SQ. FT.	4.909
STACK ABS. PRES., IN HG.	28.88
STACK GAS TEMPERATURE, DEG.F	150.
SQRT(VEL HD X STACK TEMP ABS)	30.6
STACK GAS VELOCITY, ACT. FPS	77.3
STACK GAS VOLUME (WET), ACT. CFM.	22777.2
STACK GAS VOLUME (DRY), ACT. CFM.	22777.2
STACK GAS VOLUME @ 29.92 IN. HG AND 68 DG. F :	
(DRY)	19033.0
(WET)	19033.0

SAMPLE CALCULATIONS

SYMBOLS:

AREA	CROSS-SECTIONAL STACK AREA, SQ FT
BPRES	BAROMETRIC PRESSURE, IN HG
DELP	DELTA P
DIA	DIAMETER OF CIRCULAR STACK, IN
DIM1	LENGTH OF RECTANGULAR STACK, IN
DIM2	WIDTH OF RECTANGULAR STACK, IN
MOIST	MOISTURE CONTENT
MW	MOLECULAR WEIGHT
NP	NUMBER OF TRANSVERSE POINTS
PTC	PITOT TUBE COEFFICENT
SPRES	STATIC PRESSURE, IN H20
STEMP	STACK TEMPERATURE, DEG F
STPRES	STACK PRESSURE, IN HG
STVEL	STACK VELOCITY, AFPM
TEMP	TEMPERATURE, DEG F
VH	VELOCITY HEAD, IN H20
SVOLFLW	STANDARD VOLUMETRIC FLOW (WET), ACFM
VOLFLW	VOLUMETRIC FLOW (WET), ACFM

FORMULAS AND SAMPLE CALCULATIONS:

$$DELP = \frac{SUM[SQRT(VH * TEMP)]}{NP} = \frac{735.0}{24} = 30.6$$

$$STPRES = BPRES + (SPRES/13.6) = 28.98 + (-1.30/13.6) = 28.9 \text{ IN HG}$$

$$STEMP = \frac{SUM[STEMP]}{NP} = \frac{3600.}{24} = 150. \text{ DEG F}$$

$$AREA(CIRCULAR\ STACK) = \frac{3.1416 * (DIA/2)^{**}2}{144} = \frac{3.1416 * (30.000/2)^{**}2}{144} = 4.909 \text{ SQ FT}$$

$$STVEL = \frac{85.49 * PTC * DELP}{SQRT[MW * STPRES]} = \frac{85.49 * .84 * 30.6}{SQRT[28.00 * 28.9]} = 77.3 \text{ AFPM}$$

$$VOLFLW = 60. * STVEL * AREA = 60. * 77.3 * 4.909 = 22777.2 \text{ ACFM}$$

$$SVOLFLW = \frac{VOLFLW * STPRES * (460. + 68.)}{29.92 * (STEMP + 460.)} = \frac{22777.2 * 28.9 * (460. + 68.)}{29.92 * (150.0 + 460.)} = 19033.0 \text{ ACFM}$$

STACK VELOCITY DATA

PLANT	CARGILL INC SIDNEY, OHIO
DATE	07/26/79
SAMPLING LOCATION	COOLER OUTLET
RUN NUMBER	3
CLOCK TIME	0
OPERATOR	JERRY LEWIS
AMBIENT TEMP. (DEG.F)	78.
BAR.PRESS.(IN HG)	28.98
STATIC PRESS.(IN H2O)	-1.10
MOLECULAR WEIGHT	28.03
STACK INSIDE DIM(IN)	30.000
PITOT TUBE COEFF.	.84
MOISTURE CONTENT(%)	.00

TRANSVERSE POINT NO.	POSITION INCHES	VELOCITY HEAD (IN H2O)	STACK TEMP (DEG.F)
A-01	.0	1.150	150.
A-02	.0	1.350	150.
A-03	.0	1.650	150.
A-04	.0	1.700	150.
A-05	.0	1.750	150.
A-06	.0	1.700	150.
A-07	.0	1.550	150.
A-08	.0	1.500	150.
A-09	.0	1.550	150.
A-10	.0	1.550	150.
A-11	.0	1.450	150.
A-12	.0	1.350	150.
B-01	.0	1.000	150.
B-02	.0	1.250	150.
B-03	.0	1.350	150.
B-04	.0	1.500	150.
B-05	.0	1.600	150.
B-06	.0	1.800	150.
B-07	.0	1.850	150.
B-08	.0	1.850	150.
B-09	.0	1.900	150.
B-10	.0	1.950	150.
B-11	.0	1.850	150.
B-12	.0	1.600	150.
AVERAGE		1.573	150.

PLANT	CARGILL INC SIDNEY, OHIO
DATE	07/26/79
SAMPLING LOCATION	COOLER OUTLET
RUN NUMBER	3

STACK AREA, SQ. FT.	4.909
STACK ABS. PRES., IN HG.	28.90
STACK GAS TEMPERATURE, DEG.F	150.
SQRT(VEL HD X STACK TEMP ABS)	30.9
STACK GAS VELOCITY, ACT. FPS	77.9
STACK GAS VOLUME (WET), ACT. CFM.	22947.3
STACK GAS VOLUME (DRY), ACT. CFM.	22947.3
STACK GAS VOLUME @ 29.92 IN. HG AND 68 DG. F :	
(DRY)	19184.9
(WET)	19184.9

SAMPLE CALCULATIONS

SYMBOLS:

AREA	CROSS-SECTIONAL STACK AREA, SQ FT	PTC	PITOT TUBE COEFFICENT
BPRES	BAROMETRIC PRESSURE, IN HG	SPRES	STATIC PRESSURE, IN H2O
DELP	DELTA P	STEMP	STACK TEMPERATURE, DEG F
DIA	DIAMETER OF CIRCULAR STACK, IN	STPRES	STACK PRESSURE, IN HG
DIM1	LENGTH OF RECTANGULAR STACK, IN	STVEL	STACK VELOCITY, AFPM
DIM2	WIDTH OF RECTANGULAR STACK, IN	TEMP	TEMPERATURE, DEG F
MOIST	MOISTURE CONTENT	VH	VELOCITY HEAD, IN H2O
MW	MOLECULAR WEIGHT	SVOLFLW	STANDARD VOLUMETRIC FLOW (WET), ACFM
NP	NUMBER OF TRANSVERSE POINTS	VOLFLW	VOLUMETRIC FLOW (WET), ACFM

FORMULAS AND SAMPLE CALCULATIONS:

$$DELP = \frac{SUM[SQRT[VH * TEMP]]}{NP} = \frac{741.1}{24} = 30.9$$

$$STPRES = BPRES + (SPRES/13.6) = 28.98 + (-1.10/13.6) = 28.9 \text{ IN HG}$$

$$STEMP = \frac{SUM[STEMP]}{NP} = \frac{3600.}{24} = 150. \text{ DEG F}$$

$$AREA[CIRCULAR\ STACK) = \frac{3.1416 * (DIA/2)^{**}2}{144} = \frac{3.1416 * (30.000/2)^{**}2}{144} = 4.909 \text{ SQ FT}$$

$$STVEL = \frac{85.49 * PTC * DELP}{SQRT[MW * STPRES]} = \frac{85.49 * .84 * 30.9}{SQRT[28.03 * 28.9]} = 77.9 \text{ AFPM}$$

$$VOLFLW = 60. * STVEL * AREA = 60. * 77.9 * 4.909 = 22947.3 \text{ ACFM}$$

$$SVOLFLW = \frac{VOLFLW * STPRES * (460. + 68.)}{29.92 * (STEMP + 460.)} = \frac{22947.3 * 28.9 * (460. + 68.)}{29.92 * (150.0 + 460.)} = 19184.9 \text{ ACFM}$$

```
END OF PROGRAM
;EOJ
CPU SEC. = 8.  ELAPSED MIN. = 3.  TUE, SEP 25, 1979,  4:26 PM
```

```
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM

#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM

#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM

#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
#J499; #02318  *  RPT, P3333U.PEI; $STDLIST  *  TUE, SEP 25, 1979,  4:27 PM
```

CARGILL INC. SYDNEY, OHIO 7-26-79

COOLER OUTLET MOISTURE DETERMINATION TIME: 10:00 → 11:38

DRIERITE TUBE INTIAL WGT. 49.65g.
FINIAL WGT. 50.79g.
WGT. GAINED 1.14g.

IMPINGER CONTENTS INTIAL VOLUME 75ml
FINAL VOLUME 85ml.
VOLUME GAINED 10ml.

TOTAL MOISTURE 11.14

Pump - MSA
1821 ml/min.

% MOISTURE = 7.68%

MOISTURE DETERMINATION 7-26-79

COOLER STACK RUN #2

DRIERITE INITIAL WGT. 48.73g

FINAL WGT. 49.07g

WGT. GAINED .34g

IMPINGER VOLUME INITIAL 75 ml.

FINAL 81 ml.

GAINED 06 ml.

MSA pump 1133 ml/min.

TOTAL MOISTURE 6.34

% MOISTURE = [redacted]%

7.43%

ASME TRAIN PARTICULATE SAMPLE RECOVERY AND INTEGRITY SHEET

Plant: Cargill Sample date: 7/23

Sample location: MOS INLET Run no.: 1

Sample recovery person: _____ Recovery date: _____

Filter(s) no.: MOISTURE ONLY

Sample VOL
888 ml/min
<20 min
= 17.760 L

MOISTURE

Impingers			~~Silica gel~~ DRIERITE		
Final volume (wt)	_____ ml (gm)	Final wt.	48.94 g	_____	g
Initial volume (wt)	_____ ml (gm)	Initial wt.	48.46 g	_____	g
Net volume (wt)	_____ ml (gm)	Net wt.	0.48 g	_____	g

Total moisture _____ g

Color of ~~silica~~ DRIERITE gel PINK & BLUE 30% spent.

Description of impinger water _____

RECOVERED SAMPLE

Thimble container no. _____ sealed _____

Description of particulate on filter _____

Acetone rinse container no. _____ Liquid level marked _____

Acetone blank container no. _____ Liquid level marked _____

Samples stored and locked _____

Remarks: _____

Date of laboratory custody _____

Laboratory personnel taking custody _____

Remarks: _____

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL INC. SYDNEY, OHIO

Date: 7-25-79 Ambient Temp.: 88°F Ambient Press.: 29.02

Sampling Location: MINERAL OIL SCRUBBER INLET Run Number: MOISTURE INLET #2

Sample Train Description: DRIERITE TUBE FOR MOISTURE DETERMINATION
INITIAL WGT. 53.37g. ⟶ FINAL WGT. 54.14g.

Pump Type/No.: _____ Calibration Factor: _____

Test Data

Clock Time Start: _____ Pump Count Initial: _____
Finish: _____ Final: _____

Sampling Time: _____ Net: _____

Volume of Gas Sampled: _____

Stack Temp °F	Static Pressure in H_2O	Impinger Train Temperature °F

Moisture Determination

Silica Tube Number: _____

Pump Type/No.: MSA #00201 Calibration Factor: 800.2cc/min.

Clock Time Start: 0827 Pump Count Initial: _____
PRESSURE = -5.5" H_2O Finish: 0947 Final: _____
TEMP. 80°F Net: _____ Net: _____

Volume of Gas Sampled: _____

Grams H_2O Collected: _____

CS_2 IMPINGER TRAIN DATA

Plant and City: Scrubber Sidney Ohio

Date: 7/25/79 Ambient Temp.: 85 Ambient Press.: 29.02 in Hg

Sampling Location: Mineral oil scrubber Inlet Run Number: M-I-4 (MOISTURE)

Sample Train Description: Dricrite Tube for moisture

Initial wt: 51.129 Final wt 51.83 g

Pump Type/No.: MSA / 201 Calibration Factor: 800.2 sto ml/min

Test Data

Clock Time Start: 16:10 Pump Count Initial:
Finish: 16:40 Final:

Sampling Time: 30 min Net:

Volume of Gas Sampled: 24006 ml

Stack Temp °F	Static Pressure in H_2O	Impinger Train Temperature °F

Moisture Determination

Silica Tube Number:

Pump Type/No.: Calibration Factor:

Clock Time Start: Pump Count Initial:
Finish: Final:

Net: Net:

Volume of Gas Sampled:

Grams H_2O Collected:

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL INC. SYDNEY, OHIO

Date: 7-25-79 Ambient Temp.: 88°F Ambient Press.: 29.02

Sampling Location: MINERAL OIL SCRUBBER OUTLET Run Number: MOISTURE OUTLET #1

Sample Train Description: DRIERITE TUBE TO ABSORB MOISTURE.
INITIAL WGT. 55.27g. → FINAL WGT. 55.89g.

Pump Type/No.: _____ Calibration Factor: _____

Test Data

Clock Time Start: _____ Pump Count Initial: _____
Finish: _____ Final: _____

Sampling Time: _____ Net: _____

Volume of Gas Sampled: _____

Stack Temp °F	Static Pressure in H_2O	Impinger Train Temperature °F

Moisture Determination

Silica Tube Number: _____

Pump Type/No.: MSA #00201 Calibration Factor: 800.2 cc/MIN.

Clock Time Start: 0854 Pump Count Initial: _____
Finish: 0914 Final: _____

PRESSURE = $-10"H_2O$

TEMP. 90°F

Net: _____ Net: _____

Volume of Gas Sampled: _____

Grams H_2O Collected: _____

CS_2 IMPINGER TRAIN DATA

Plant and City: CARGILL SIDNEY OHIO

Date: 7/25/79 Ambient Temp.: 85 Ambient Press.: 29.02 in Hg

Sampling Location: MOS - OUTLET Run Number: 4

Sample Train Description: DRIERITE FOR MOISTURE

INITIAL WT. 51.77 g FINAL WT. 52.42 g

Pump Type/No.: MSA - 201 Calibration Factor: 800.2 ml/min

Test Data

Clock Time Start: 16:50 Pump Count Initial: _____
Finish: 17:20 Final: _____

Sampling Time: 30 min Net: _____

Volume of Gas Sampled: 24006 ml

Stack Temp °F	Static Pressure in H_2O	Impinger Train Temperature °F

Moisture Determination

Silica Tube Number: _____

Pump Type/No.: _____ Calibration Factor: _____

Clock Time Start: _____ Pump Count Initial: _____
Finish: _____ Final: _____

Net: _____ Net: _____

Volume of Gas Sampled: _____

Grams H_2O Collected: _____

3.0 OPACITY READINGS

METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1 OF 1

COMPANY CARGILL
LOCATION SIDNEY, OH
TEST NO. 4-1
DATE 7/26/79
TYPE FACILITY Cooler
CONTROL DEVICE

HOURS OF OBSERVATION 1860
OBSERVER DAVID SOLOMON
OBSERVER CERTIFICATION DATE 7/2/79
OBSERVER AFFILIATION Pedco Environmental
POINT OF EMISSIONS Cooler outlet
HEIGHT OF DISCHARGE POINT

	Initial			Final
CLOCK TIME	10:50			11:37
OBSERVER LOCATION Distance to Discharge	75 feet			
Direction from Discharge	South East			
Height of Observation Point	Ground Level			
BACKGROUND DESCRIPTION	Blue sky			
WEATHER CONDITIONS Wind Direction	west			
Wind Speed	8-10 MPH			
Ambient Temperature	75°F			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Clear			
PLUME DESCRIPTION Color	N/A			
Distance Visible	N/A			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	1050-1055	0	0
2	11:18-1118	0	0
3	11:32-11:37	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2 OF 2

COMPANY Cargill
LOCATION Sidney, Ohio
TEST NO. 4-1
DATE 7/26/79

OBSERVER David Solomon
TYPE FACILITY Cooler
POINT OF EMISSIONS Cooler outlet

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
10	50	0	0	0	0	N/A	N/A	
	51	0	0	0	0	"	"	
	52	0	0	0	0	"	"	
	53	0	0	0	0	"	"	
	54	0	0	0	0	"	"	
	55	0	0	0	0	"	"	
11	13	0	0	0	0	"	"	
	14	0	0	0	0	"	"	
	15	0	0	0	0	"	"	
	16	0	0	0	0	"	"	
	17	0	0	0	0	"	"	
	18	0	0	0	0	"	"	
11	32	0	0	0	0	"	"	
	33	0	0	0	0	"	"	
	34	0	0	0	0	"	"	
	35	0	0	0	0	"	"	
	36	0	0	0	0	"	"	
	37	0	0	0	0	"	"	

Form 1403 Date 6/78

METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1A OF 2

COMPANY Cargill
LOCATION Sidney Ohio
TEST NO. 3A-1
DATE 7/26/79
TYPE FACILITY Dryer
CONTROL DEVICE

HOURS OF OBSERVATION 1810
OBSERVER T. Clark
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION Pedco Environmental
POINT OF EMISSIONS Stack A (North)
HEIGHT OF DISCHARGE POINT ≈55'

	Initial			Final
CLOCK TIME	10:14			10:55
OBSERVER LOCATION Distance to Discharge	100'			
Direction from Discharge	South East			
Height of Observation Point	≈ 55 feet			
BACKGROUND DESCRIPTION	SKY.			
WEATHER CONDITIONS Wind Direction	West			
Wind Speed	7-9 mph			
Ambient Temperature	75			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Clear			
PLUME DESCRIPTION Color	White			
Distance Visible	50 Feet			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	10:14-10:20	0	0
2	10:29-10:35	0	0
3	10:50-10:55	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 1A OF 2

COMPANY Cargill
LOCATION Sidney, OHIO
TEST NO. 3A-1
DATE 7/26/79

OBSERVER T. Clark
TYPE FACILITY Dryer
POINT OF EMISSIONS Stack A (North)

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
10	14	0	0	0	0	✓		
	15	0	0	0	0	✓		
	16	0	0	0	0	✓		
	17	0	0	0	0	✓		
	18	0	0	0	0	✓		
	19	0	0	0	0	✓		
	20	0	0	0	0	✓		
10	29	0	0	0	0	✓		
	30	0	0	0	0	✓		
	31	0	0	0	0	✓		
	32	0	0	0	0	✓		
	33	0	0	0	0	✓		
	34	0	0	0	0	✓		
	35	0	0	0	0	✓		
10	50	0	0	0	0	✓		
	51	0	0	0	0	✓		
	52	0	0	0	0	✓		
	53	0	0	0	0	✓		
	54	0	0	0	0	✓		
	55	0	0	0	0	✓		

Form 1403 Date 6/78

METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 1-18 OF 2

COMPANY Cargill
LOCATION Sidney, Ohio
TEST NO. 1-19
DATE 7/26/79
TYPE FACILITY Mill Grinding & Screening
CONTROL DEVICE

HOURS OF OBSERVATION 18/60
OBSERVER Thomas R. Clark
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION PEDCO Environmental Inc.
POINT OF EMISSIONS Mill Grinding & Screening Vent Duct
HEIGHT OF DISCHARGE POINT 30 Feet

	Initial			Final
CLOCK TIME	14:13			14:53
OBSERVER LOCATION Distance to Discharge	70 feet			
Direction from Discharge	South west			
Height of Observation Point	Ground			
BACKGROUND DESCRIPTION	TAN Bldg			
WEATHER CONDITIONS Wind Direction	West			
Wind Speed	7-10 MPH			
Ambient Temperature	85°F			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Clear			
PLUME DESCRIPTION Color	Non observed			
Distance Visible	N/A			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	1413-1418	0	0
2	1429-1434	0	0
3	1448-1453	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2-18 OF 2

COMPANY Cargill
LOCATION Sidney, Ohio
TEST NO. 1 - 19
DATE 7/26/79

OBSERVER T. Clark
TYPE FACILITY Mill Grind & Screen
POINT OF EMISSIONS Vent Duct (19)

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
2	13	0	0	0	0	N/A	N/A	
	14	0	0	0	0	"	"	
	15	0	0	0	0	"	"	
	16	0	0	0	0	"	"	
	17	0	0	0	0	"	"	
	18	0	0	0	0	"	"	
2	29	0	0	0	0	"	"	
	30	0	0	0	0	"	"	
	31	0	0	0	0	"	"	
	32	0	0	0	0	"	"	
	33	0	0	0	0	"	"	
	34	0	0	0	0	"	"	
2	48	0	0	0	0	"	"	
	49	0	0	0	0	"	"	
	50	0	0	0	0	"	"	
	51	0	0	0	0	"	"	
	52	0	0	0	0	"	"	
	53	0	0	0	0	"	"	

Form 1403 Date 6/78

METHOD 9 RECORD OF VISUAL DETERMINATION OF OPACITY PAGE 18 OF 2

COMPANY Cargill
LOCATION Sidney, Ohio
TEST NO. 1-B
DATE 7/26/79
TYPE FACILITY meal Dryer
CONTROL DEVICE

HOURS OF OBSERVATION
OBSERVER Thomas R. Clark
OBSERVER CERTIFICATION DATE 7/12/79
OBSERVER AFFILIATION PEDCo Environmental
POINT OF EMISSIONS Dryer Stack (South)
HEIGHT OF DISCHARGE POINT

	Initial			Final
CLOCK TIME	11:51			13:50
OBSERVER LOCATION Distance to Discharge	50 Feet			
Direction from Discharge	South East			
Height of Observation Point	~~[illegible]~~ Ground			
BACKGROUND DESCRIPTION	Blue Sky			
WEATHER CONDITIONS Wind Direction	West			
Wind Speed	7-10			
Ambient Temperature	78°F			
SKY CONDITIONS (clear, overcast, % clouds, etc.)	Clear			
PLUME DESCRIPTION Color	None			
Distance Visible	N/A			
OTHER INFORMATION				

SUMMARY OF AVERAGE OPACITY

Set Number	Time Start-End	Opactity Sum	Opactity Average
1	11:51-11:56	0	0
2	12:11-12:16	0	0
3	13:45-13:50	0	0

Readings ranged from 0 to 0 % opacity

The source was/was not in compliance with _____ at the time evaluation was made.

Form 1403 Date 6/78

METHOD 9 OBSERVATION RECORD PAGE 2B OF 2

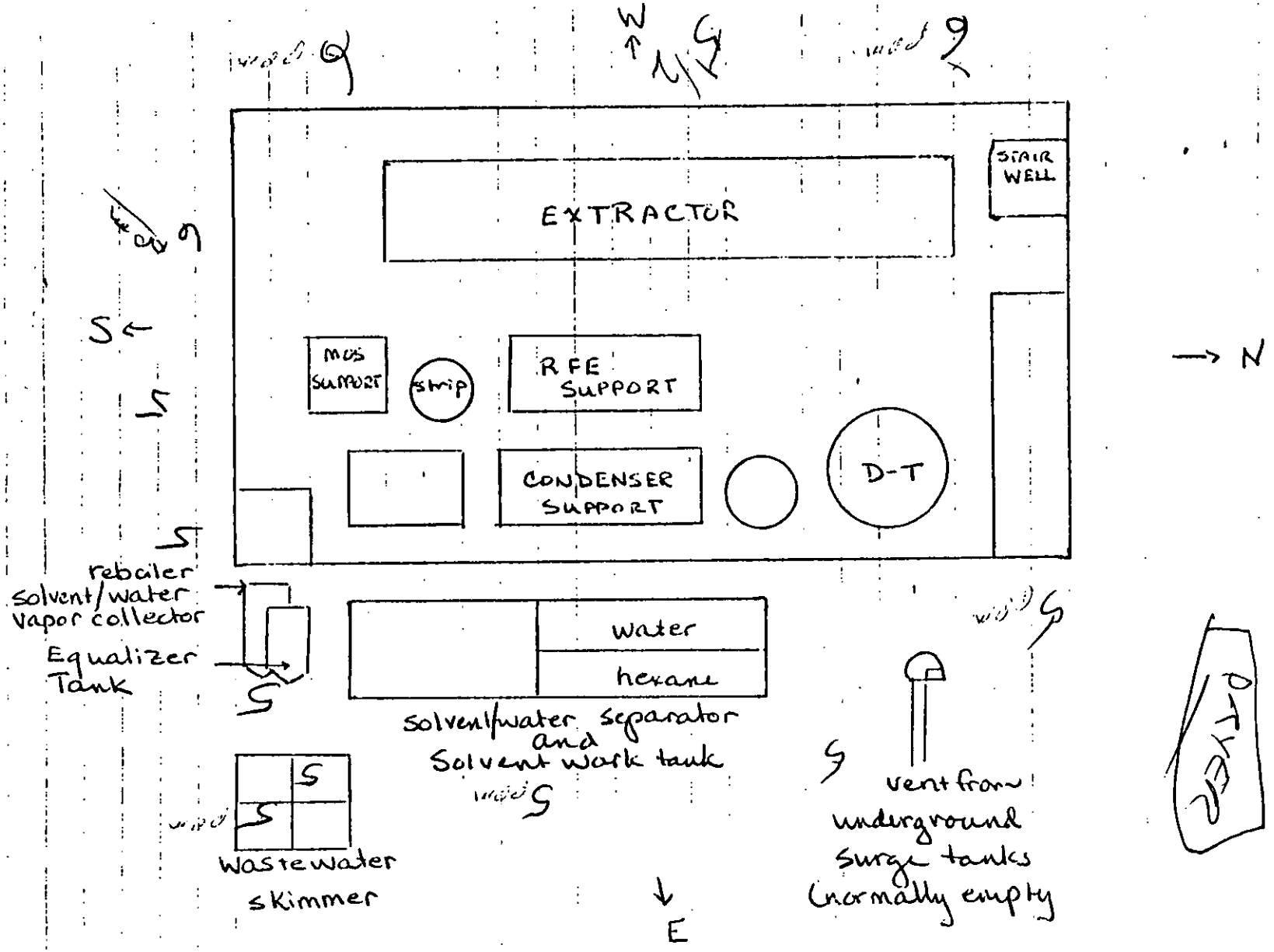
COMPANY Cargill
LOCATION Sidney, Ohio
TEST NO. 1-B
DATE 7/26/79

OBSERVER T. Clark
TYPE FACILITY Dryer
POINT OF EMISSIONS Stack (South)

Hr.	Min.	Seconds 0	15	30	45	STEAM PLUME (check if applicable) Attached	Detached	COMMENTS
11	51	0	0	0	0	N/A	N/A	
	52	0	0	0	0	"	✓	
	53	0	0	0	0	"	✓	
	54	0	0	0	0	"	✓	
	55	0	0	0	0	"	✓	
	56	0	0	0	0	"	✓	
12	11	0	0	0	0	N/A	N/A	
	12	0	0	0	0	"	"	
	13	0	0	0	0	N/A	N/A	
	14	0	0	0	0	"	"	
	15	0	0	0	0	"	"	
	16	0	0	0	0	"	"	
1	45	0	0	0	0	"	"	
	46	0	0	0	0	"	"	
	47	0	0	0	0	"	"	
	48	0	0	0	0	"	"	
	49	0	0	0	0	"	"	
	50	0	0	0	0	"	"	

Form 1403 Date 6/78

4.0 FUGITIVE EMISSIONS

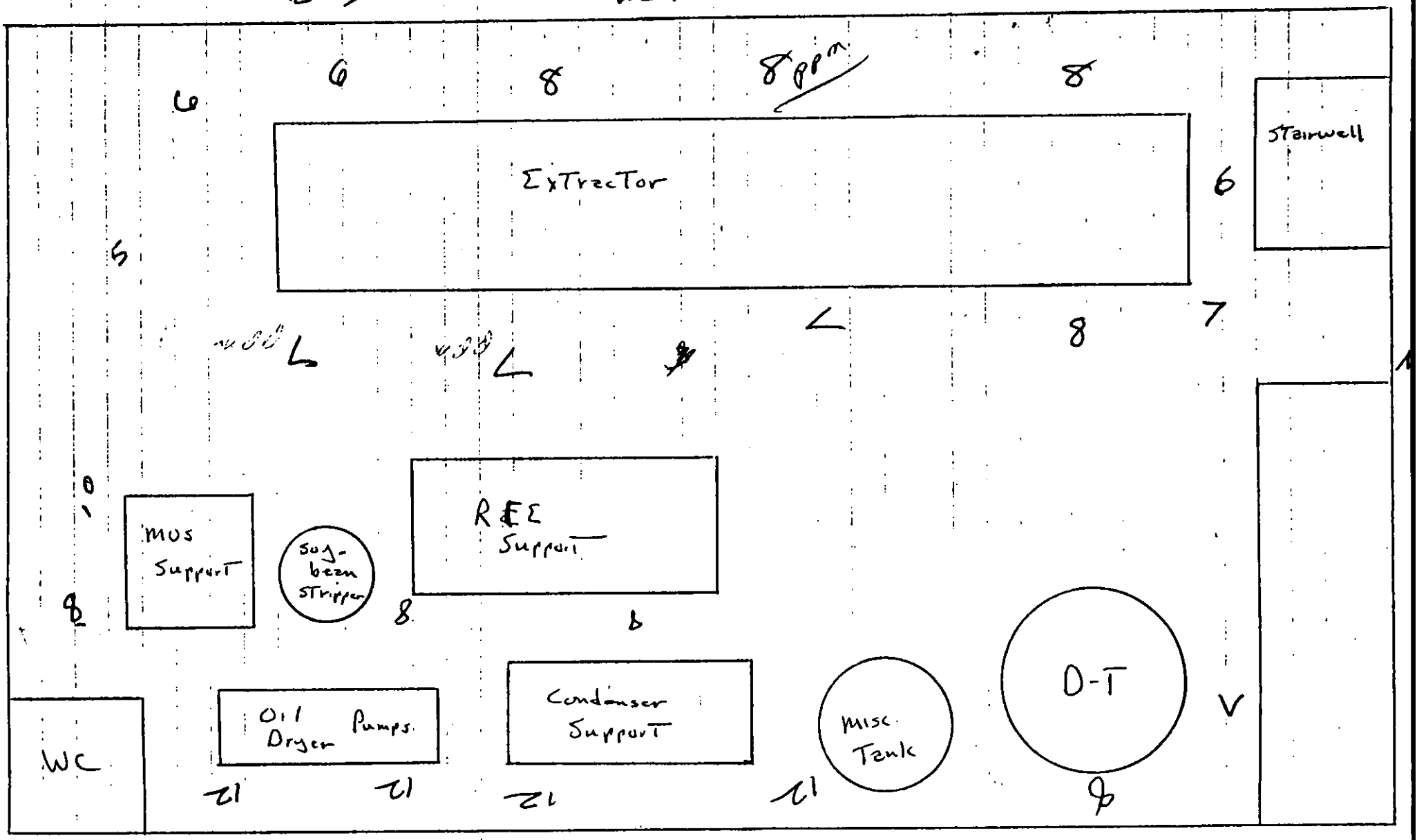

EXTRACTOR
STAIR WELL
MCS SUPPORT
SWIP
RFE SUPPORT
CONDENSER SUPPORT
D-T
N
rebaler
solvent/water vapor collector
Equalizer Tank
water
hexane
solvent/water separator and Solvent work tank
vent from underground surge tanks normally empty
Wastewater skimmer
E

Extraction Plant 1st level

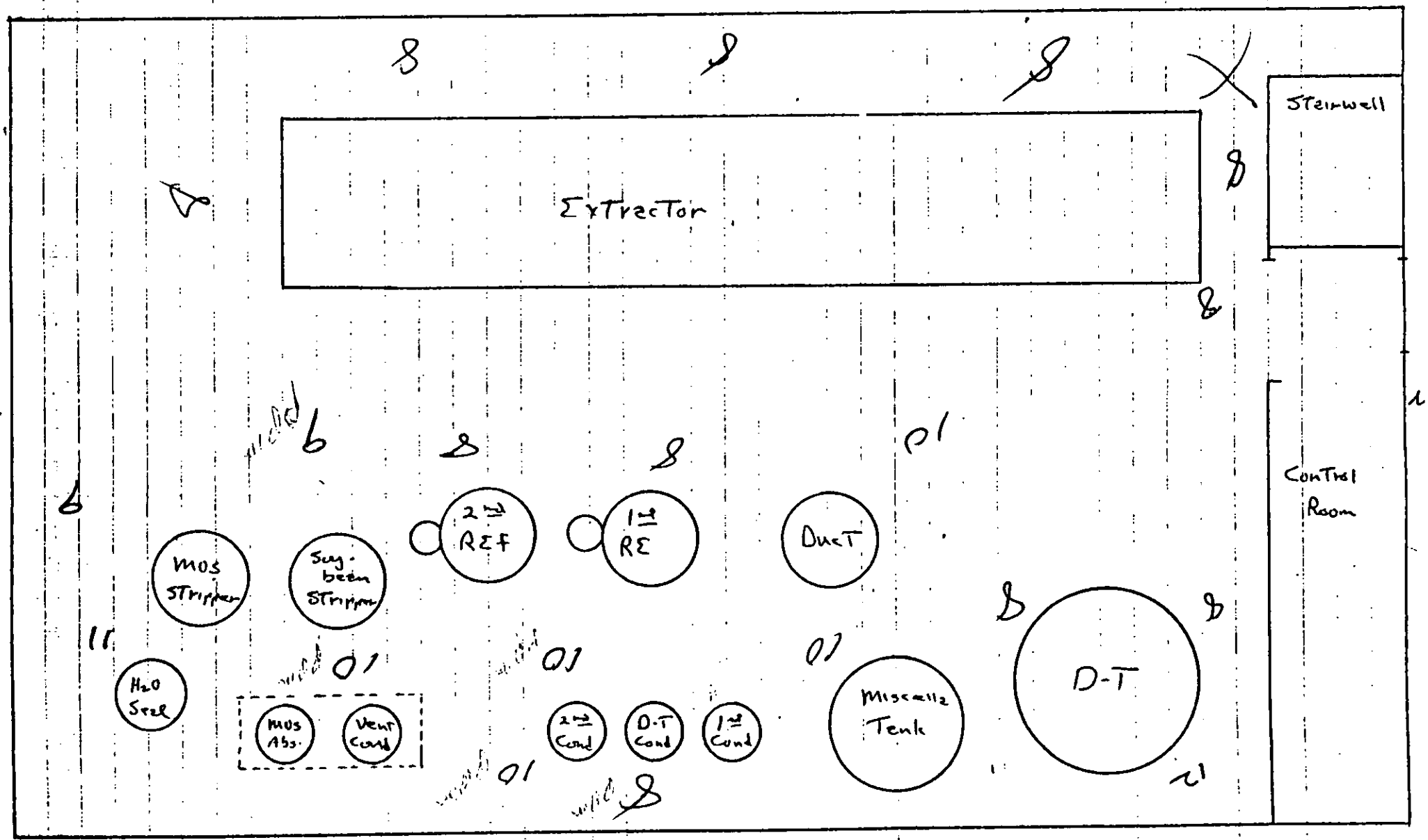
N

WEST

ZERO = 4

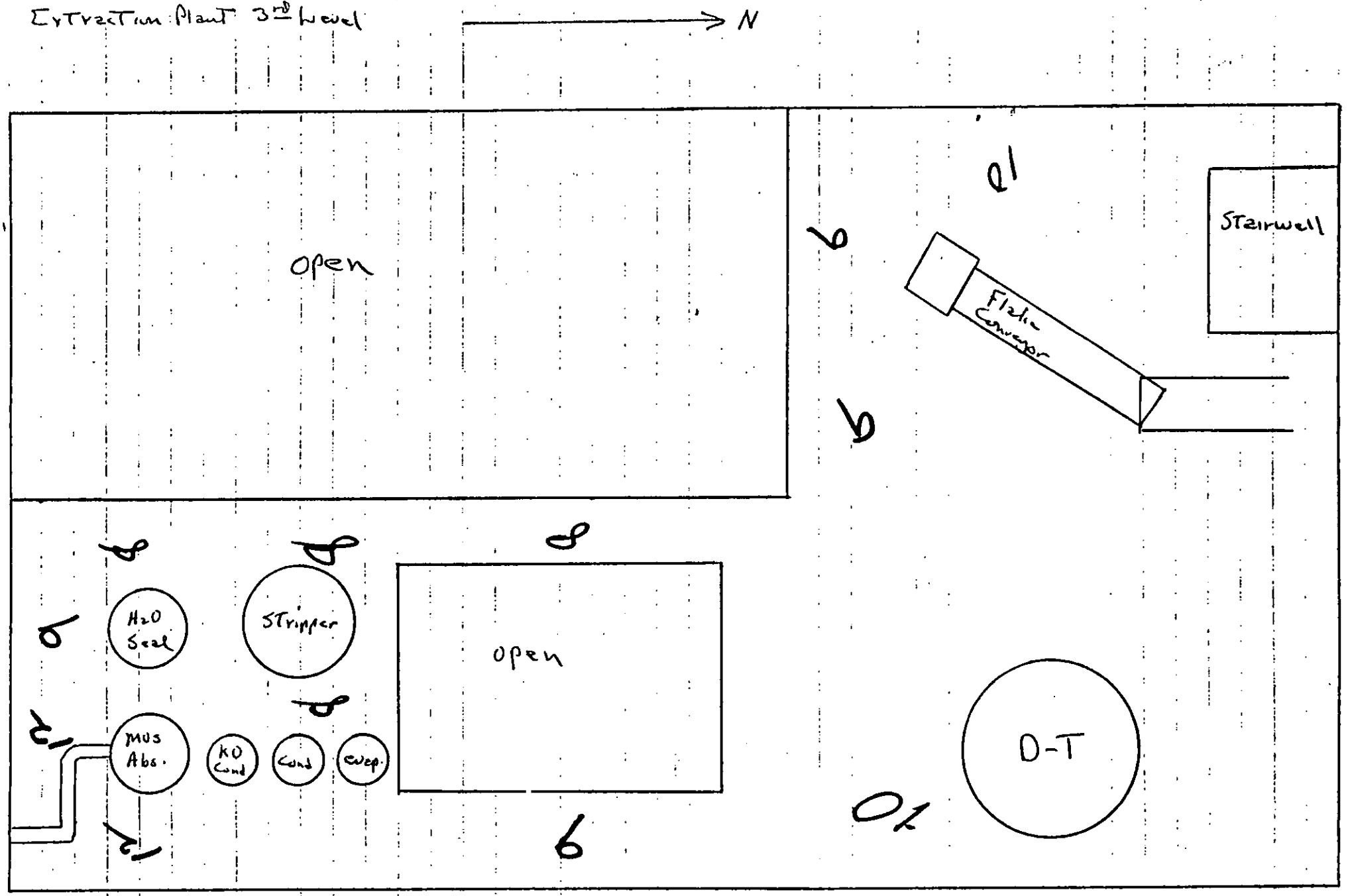


Sidney, OH
Extraction Plant 2nd level



Cargill's Sidney Oil — 11/21/14

Extraction Plant 3rd level



ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANAS
LOCATION: EXT Blds TIME: 1:30 INSTRUMENT: OVA

COMPONENT: FLANGES
NUMBER TESTED: 262
30 + 46 + 18 + 7 + 8 + 20 + 2 + 85 + 21 + 19 + 2
+ 7 + 31 + 9 + 33 + 2 + 3 + 2 + 9 + 1 + 14 + 10

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING
1	SE	flange (drippy)	Very oil	

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: Manna

LOCATION: _____ TIME: _____ INSTRUMENT: OVA

COMPONENT: VALVES

NUMBER TESTED: 170

2 +12 +5 +5 +20 +6 +9 +8 +1 4 +5 +4

11 +3 +11 +8 +2 +20 +14 +4 +3 +3 +1 +3 +3 +3 +3

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING
1	SE	drip leak - ~~steam~~ GAS valve	Veg oil	
2	ME	DRIP (SMALL	STEAM	0

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANNA

LOCATION: _____ TIME: _____ INSTRUMENT: OVA

COMPONENT: MISCELLANEOUS (SEALS, DOORS,

NUMBER TESTED: 27

2+2+2+3+2+1 3+2+2+3+1+1+1

+2

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANNA
LOCATION: EXT Bldg TIME: 1-3:20 INSTRUMENT: OVA

COMPONENT: OPEN-ENDED PIPES
NUMBER TESTED: 74
8+4+5+5+1+6+4 1+2 +9+1+4+2+3
+5+2+2+5+2+1+3+1 43

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24/79 TESTER: MANNA Henday
LOCATION: ~~S+B~~ EXT AUX TIME: 12:30 INSTRUMENT: OVA

COMPONENT: PUMPS
NUMBER TESTED: 22
5+1+1 3+1+1+1
+1+3+1
+1+2+1

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING
1	SW	EXTRACTOR	miscella	220
1	~~SW~~ MW	"	"	300-500
2	NE	DT-		2-6000

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANNA
LOCATION: EXT Bldg TIME: 1:30 INSTRUMENT: OVA

COMPONENT: DRAINS
NUMBER TESTED: 6
1 x 3 x 2 = 6

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING

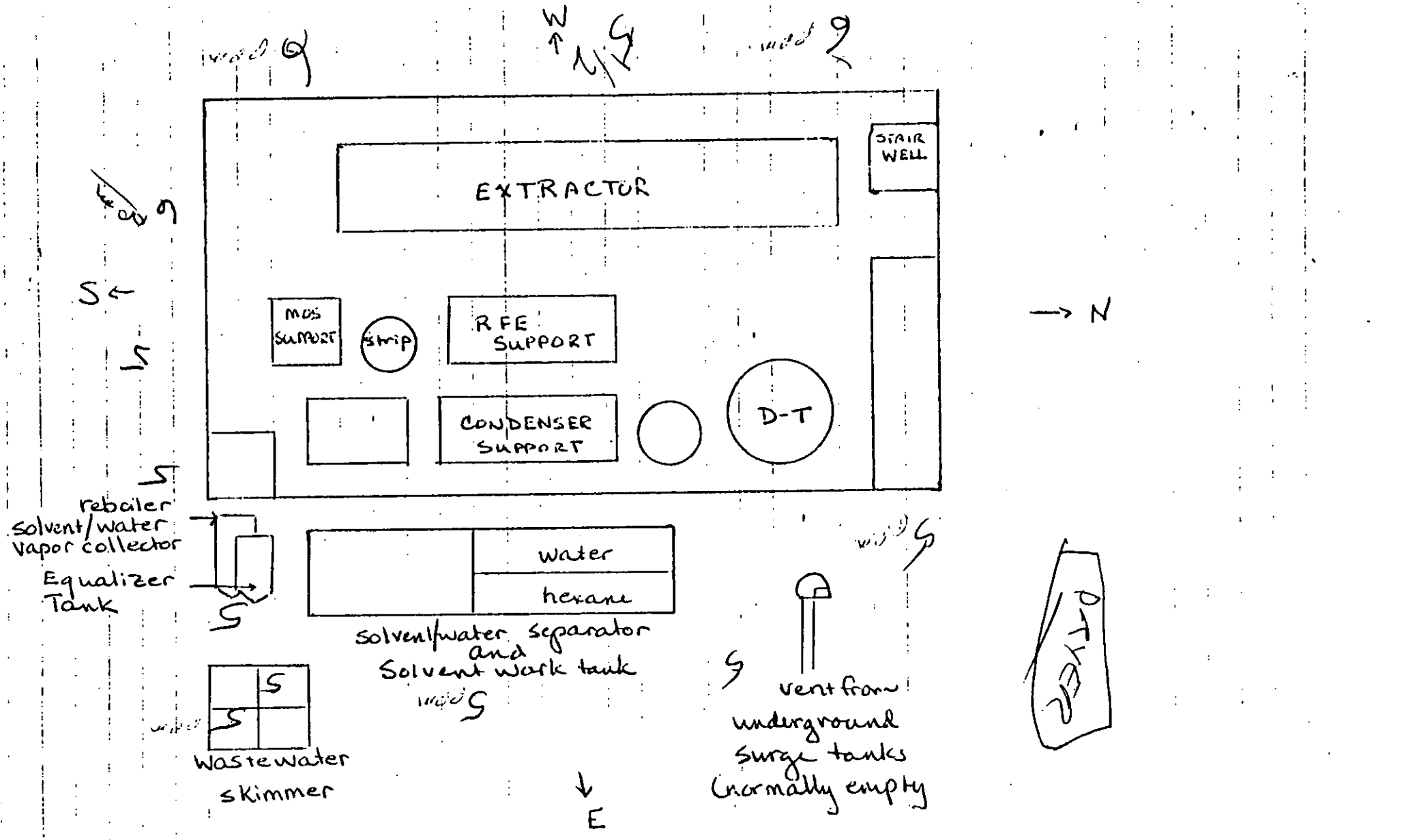
ORGANIC FUGITIVE LEAK DETECTION

PLANT: Cargill DATE: 7/24 TESTER: MANNA
LOCATION: 3 EXT. Bldgs TIME: 1:00 INSTRUMENT: OVA

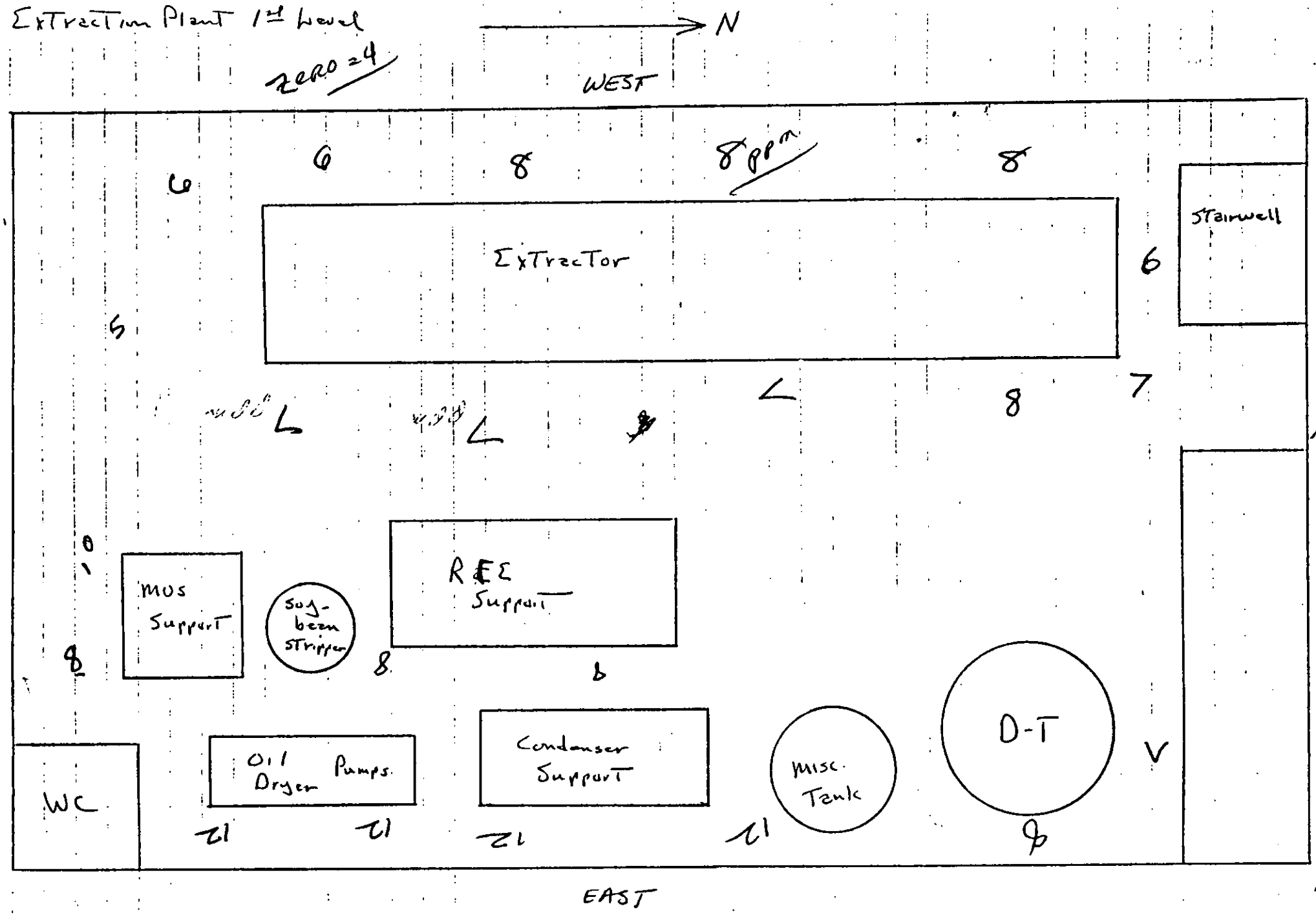
COMPONENT: VENTILATION VENTS
NUMBER TESTED: 5
1+1+1+2

DETAILS ON LEAKING COMPONENTS

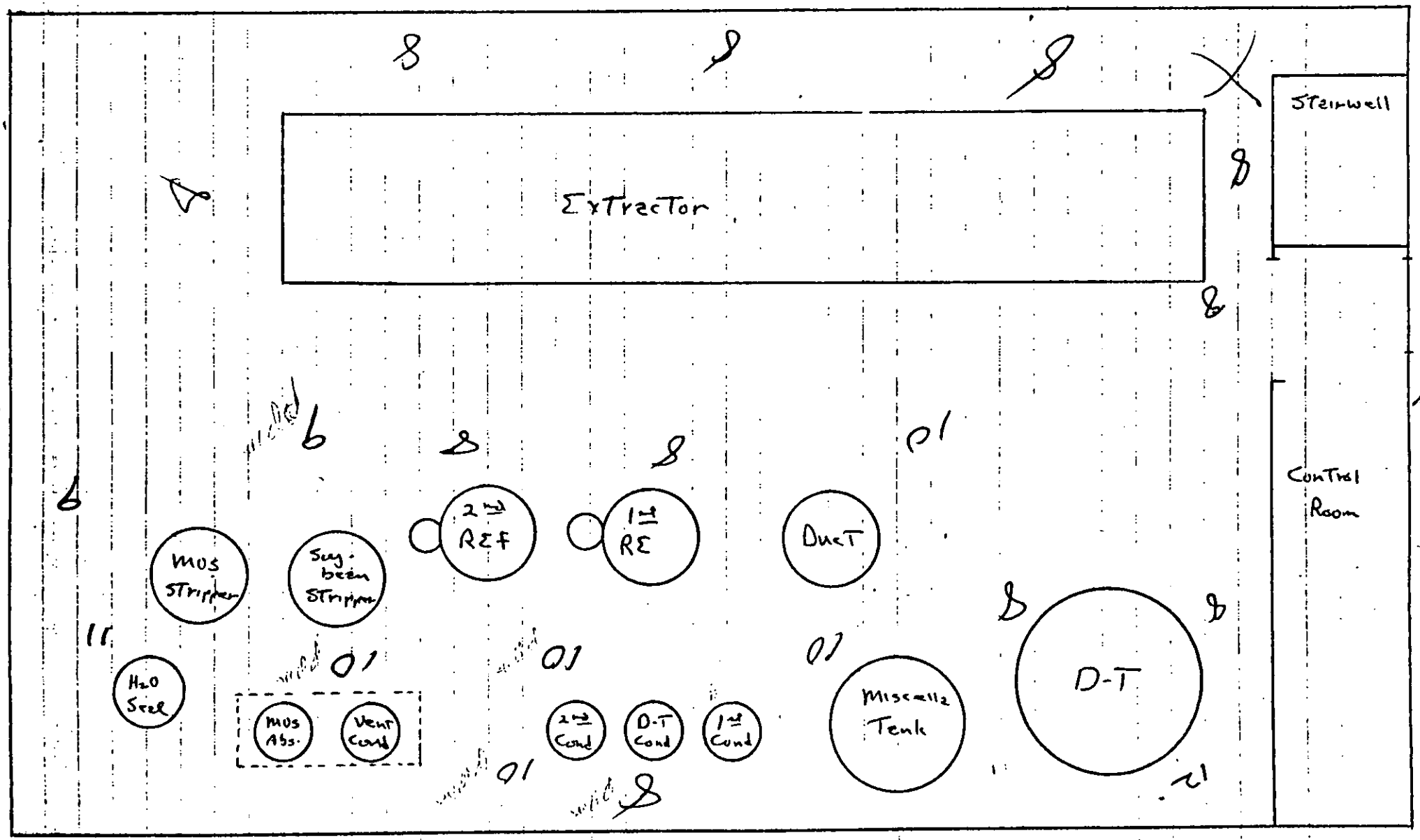
FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING


EXTRACTOR
STAIR WELL
MOS SUPPORT
STRIP
RFE SUPPORT
CONDENSER SUPPORT
D-T
N
rebaler
solvent/water
Vapor collector
Equalizer Tank
water
hexane
solvent/water separator and Solvent work tank
vent from underground surge tanks Cnormally empty
Wastewater skimmer
E

Extraction Plant 1st Level

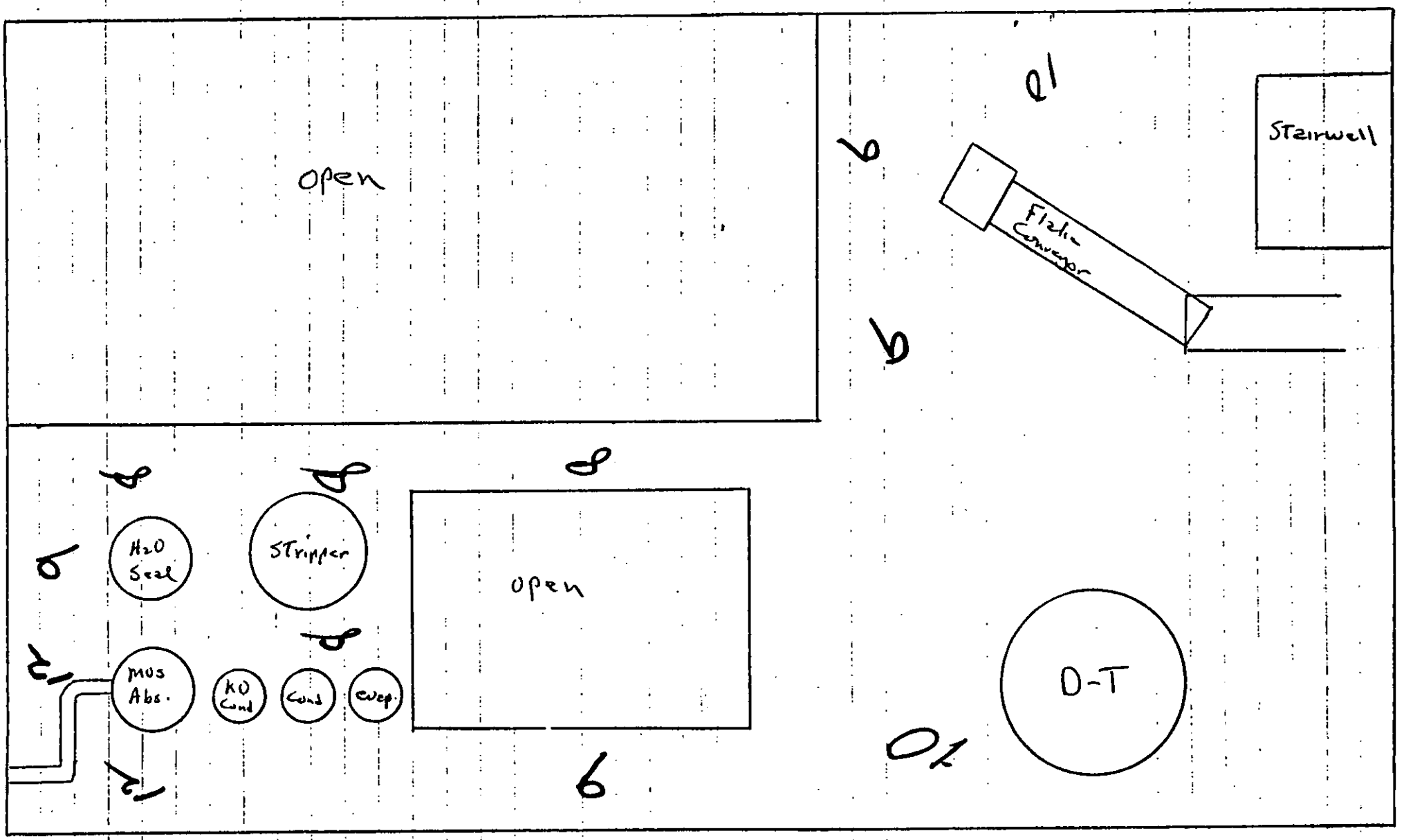


Sidney, OH
Extraction Plant 2nd level



Cargill's Sidney Oil — 11/4/19

Extraction Plant 3rd Level → N



ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANNS
LOCATION: EXT Bldg TIME: 1:30 INSTRUMENT: OVA

COMPONENT: FLANGES
NUMBER TESTED: 262
30 + 46 + 18 + 7 + 8 + 20 + 2 + 6 + 5 + 21 + 19 + 2
+ 7 + 31 + 9 + 33 + 2 + 3 + 2 + 9 + 1 + 14 + 10

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING
1	SE	flange (drippy)	Very oil	

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: Manna
LOCATION: _____ TIME: _____ INSTRUMENT: OVA

COMPONENT: VALVES
NUMBER TESTED: 170

2 + 12 + 5 + 5 + 20 + 6 + 9 + 8 + 1 + 4 + 5 + 4
11 + 13 + 11 + 8 + 2 + 20 + 1 + 4 + 3 + 3 + 1 + 1 + 3 + 3 + 3 + 3

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING
1	SE	drip leak - gate valve	Veg oil	
2	ME	DRIP (SMALL	STEAM	0

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANNA
LOCATION: _____ TIME: _____ INSTRUMENT: OVA

COMPONENT: MISCELLANEOUS (SEALS, DOORS
NUMBER TESTED: 27

2+2+2+3+2+1 3+2+2+3+1+1+1
+2

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANN

LOCATION: _____ TIME: 1-3:00 pm INSTRUMENT: OVA

COMPONENT: SIGHTGLASSES

NUMBER TESTED: 48

9 + 13 + 12 + 2 + 9 + 1 + 2

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING
2	SW	EXTRACTOR	Meal, miscella & H Soma	100-200

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANNA
LOCATION: EXT Bldg TIME: 1-3:00 INSTRUMENT: OVA

COMPONENT: OPEN-ENDED PIPES
NUMBER TESTED: 74

8+1+1+5+5+1+6+4+1+2+9+1+1+2+3
+5+2+2+5+2+1+3+1
43

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24/79 TESTER: MANN-A Hershey
LOCATION: ~~SID~~ EXT BLDG TIME: 12:30 INSTRUMENT: OVA

COMPONENT: PUMPS
NUMBER TESTED: 22
5+1+1 3+1+1+1
+1+3+1
+1+2+1

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING
1 ~~S~~	SW	EXTRACTOR	miscella	220
1	~~SW~~ MW	"	"	300-500
2	NE	DT-		2-6000

ORGANIC FUGITIVE LEAK DETECTION

PLANT: CARGILL DATE: 7/24 TESTER: MANNA
LOCATION: EXT Bldg TIME: 1:30 INSTRUMENT: OVA

COMPONENT: DRAINS
NUMBER TESTED: 6
(x) x 2 x 3

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING

ORGANIC FUGITIVE LEAK DETECTION

PLANT: Cargill DATE: 7/24 TESTER: MANNA
LOCATION: 3 EXT. Bldgs TIME: 1:00 INSTRUMENT: OVA

COMPONENT: VENTILATION VENTS
NUMBER TESTED: 5
1+1+1+2

DETAILS ON LEAKING COMPONENTS

FLOOR	SECTOR	DESCRIPTION	STREAM COMPOSITION	METER READING

APPENDIX C

PROJECT PARTICIPANTS AND SAMPLING LOG

PROJECT PARTICIPANTS

Name	Affiliation	Function
Nancy McLaughlin	US EPA, EMB	Project technical manager
Dale Hershey	PEI	Test team leader
Jerry Lewis	PEI	Test engineer
Tom Clark	PEI	Test technician and opacity readings
David Solomon	PEI	Meal sampling and opacity readings
Paul Manna	PEI	Fugitive emission testing

PEI - PEDCo Environmental, Inc.

SAMPLING LOG

Date	Time	Activity
7-23-79	8:30-14:00	Site set up, equipment checks, pump calibration
	15:30-16:50	First test at MOS inlet and outlet (45 min. run)
	17:00	Test team leaves plant
7-24-79	8:00	Test team arrives at plant - informed that plant is down for better part of day
	12:00	Test crew sent home except personnel needed for fugitive emission check
	12:30-14:30	Fugitive emission check
7-25-79	8:00-9:30	Test team arrives and sets up for second MOS test
	9:30-10:45	2nd test at MOS
	10:45-12:20	Cleanup and recovery set up for 3rd test
	12:23-13:08	3rd test at MOS
	13:10-13:30	Cleanup and recovery
	13:30-14:30	Lunch break
	14:30-15:10	Set up for 4th test at MOS
	15:10-15:55	4th test at MOS
	16:00-17:00	Cleanup and recovery, test team leaves site for day
7-26-79	8:00-10:00	Set up for cooler vent test 5. First velocity traverse at cooler site
	10:00-12:00	Test 1 at cooler site, 2 CS_2 trains, 1 TGNMO test
	13:00-14:00	Set up for test 2 at cooler. Opacity readings
	14:17-16:17	Test 2 at cooler site
	16:17-17:00	Cleanup and recovery of samples. 3rd velocity traverse
7-27-79	8:00	Steady rain forces cancellation of outdoor work on cooler scaffolding. Since test team was not permitted to work in plant on weekends and since plant was shutting down on following Monday, 3rd test on cooler was cancelled