Chevron U.S.A. Inc.
2410 Camino Ramon, San Ramon, California • Phone (415) 842-9500
Mail Address: P.O. Box 5004, San Ramon, CA 94583-0804

Marketing Operations

May 5, 1989

D. Moller
Manager, Operations
S. L. Patterson
Area Manager, Operations
C. G. Trimbach
Manager, Engineering

Ms. Lisa McCann
Regional Water Quality Control Board
1111 Jackson Street
Oakland, California 94607

Re: Chevron Facility #9-3356
19201 Center Street
Castro Valley, California

Dear Ms. McCann:

Enclosed is a preliminary soil vapor contaminant assessment conducted by EA Engineering at the above referenced site.

Based on the findings of this report, Chevron will install soil borings which will be completed into ground water monitoring wells. Boring locations will be determined by our consultant based on soil vapor contaminate findings and local site conditions.

I declare under penalty of perjury that the information contained in the attached report is true and correct, and that any recommended actions are appropriate under the circumstances, to the best of my knowledge. If you have any questions or comments, please contact John Randall at (415) 842-9500.

Sincerely,

D. MOLLER

By_____
C.G. Trimbach

JR/jas:V115
Enclosure

cc: Rafat Shahid
Alameda County Environmental Health
80 Swan Way, Room 200
Oakland, CA 94621

EA Engineering, Science, and Technology, Inc.

REPORT OF INVESTIGATION
SOIL VAPOR CONTAMINANT ASSESSMENT
CHEVRON SS 9-3356
19201 CENTER STREET
CASTRO VALLEY, CALIFORNIA

Prepared for

Chevron U.S.A. Inc.

Prepared by

EA Engineering, Science, and Technology, Inc.
Western Regional Operations

11 April 1989
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SOIL VAPOR CONTAMINANT ASSESSMENT
CHEVRON SS 9-3356
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Prepared for

Chevron U.S.A. Inc.
2410 Camino Ramon
San Ramon, California 94583

Prepared by

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April 1989

CONTENTS

1. INTRODUCTION

1.1 SCOPE

At the request of Chevron U.S.A. Inc., EA conducted a soil vapor contaminant assessment (SVCA) at Chevron Service Station (SS) 9-3356 in Castro Valley, California, on 2 March 1989. This report describes the investigation and presents the results.

1.2 SITE SETTING

Chevron SS 9-3356 is located on the southwest corner of the intersection of Center Street and Heyer Avenue in Castro Valley (Figure 1). The elevation of the site is about 290 feet above sea level (MSL), and the topographic gradient is approximately 400 feet per mile (0.08), down to the southwest (USGS 1947). The nearest natural drainage is an unnamed creek which flows southward and passes about 2,600 feet to the west at its closest point.

Judging from local topography (USGS 1947), the direction of groundwater flow is expected to be toward the south-southwest. The depth to groundwater beneath the site is unknown.

The site is in a predominantly residential district with the nearest residences located about 100 feet to the east (across Center Street), 150 feet to the northeast (across the intersection), 150 feet to the south, and 200 feet to the northwest. The nearest schools are about 1,200 feet to the north-northwest and 1,200 feet to the south. There is no hospital within 1,000 feet of the site. No known underground storage tanks (UST) for petroleum products are known to be located within 1,000 feet of the site.

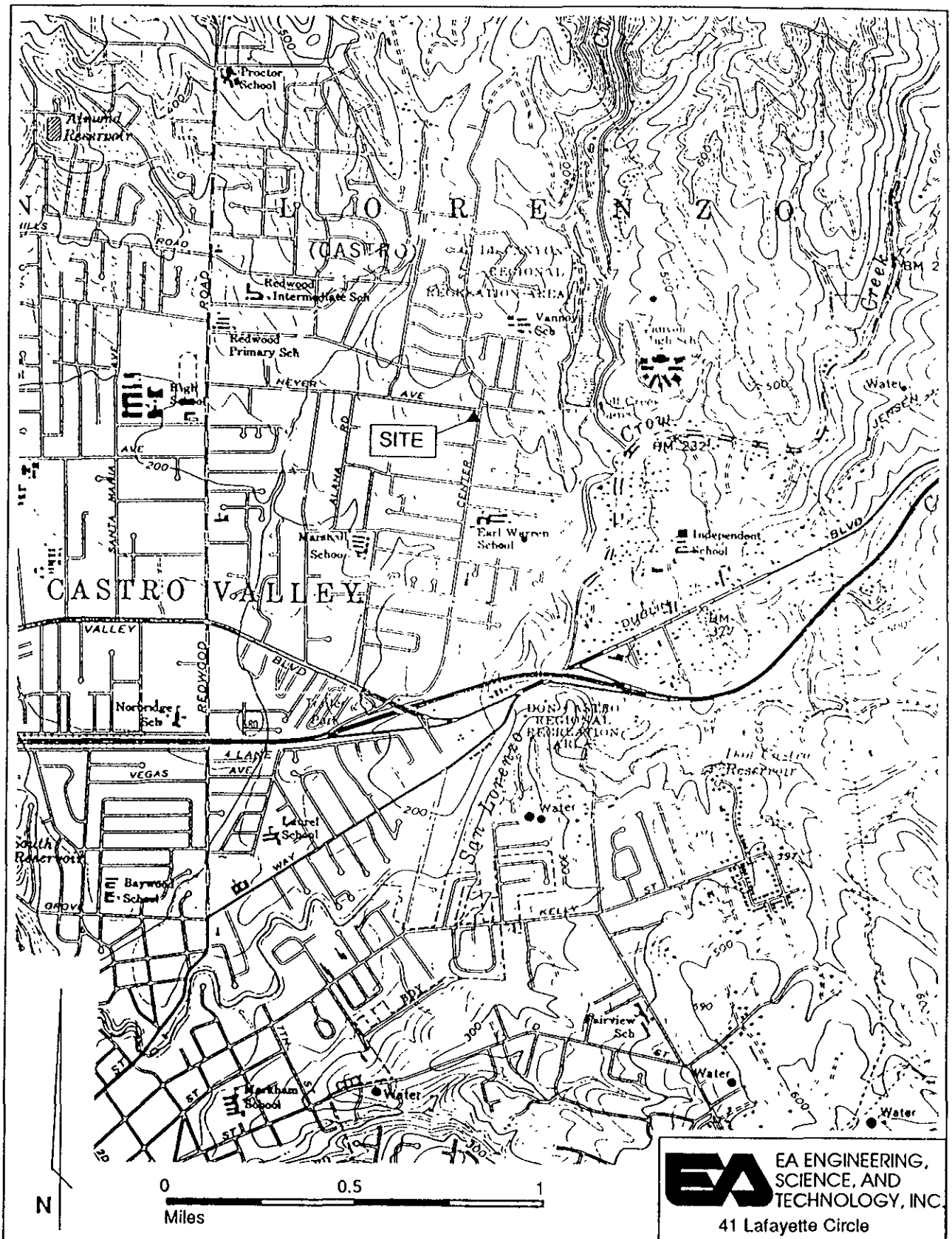

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Figure 1. Location and topography of Chevron SS 9-3356, Castro Valley, CA.

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2. SOIL VAPOR CONTAMINANT ASSESSMENT

Following a subsurface gasoline release, as free product migrates downward towards the groundwater some of the gasoline will be adsorbed to the soils, and some will vaporize. In the case of a spill of sufficient volume to exceed the soil binding capacity, free liquid will reach groundwater, at which point it will float and may begin to vaporize and solubilize. On the basis of these and other physicochemical properties and behaviors of hydrocarbon mixtures, described in Appendix A, it can be seen that associated with any groundwater, soil, or free-product contamination there is vapor phase contamination. The SVCA technique takes advantage of this, and through the collection and analysis of soil vapor permits rapid delineation of the extent of contamination.

2.1 SVCA SAMPLING

On 2 March 1989, EA conducted an SVCA at Chevron SS 9-3356 in Castro Valley. Soil gas samples were taken at 16 points (Figure 2) located as follows: V1-V4 and V14-V15 adjacent to the tank field, V5-V8 near the pump islands, V16 at the waste oil tank, V9-V12 near the south site boundary, and V13 located about 5 feet beyond the south boundary.

Vertical profiles, ranging in depth between 3 and 15 feet were made at V1-V5 and V16. Two-sample vertical profiles were made at V7 and V8. Impenetrable subsoil was encountered at sampling point V15 at a depth of 9.5 feet.

The samples were collected and analyzed according to the following protocol: First, a vacuum pump is used to purge approximately five soil probe volumes, to ensure that a representative soil gas sample is taken. This requires between 1 and 20 minutes. A vacuum gauge on the sampling apparatus (Figure 3) measures the vacuum between the tip of the probe and the pump. After the appropriate purging period, a valve is closed and the

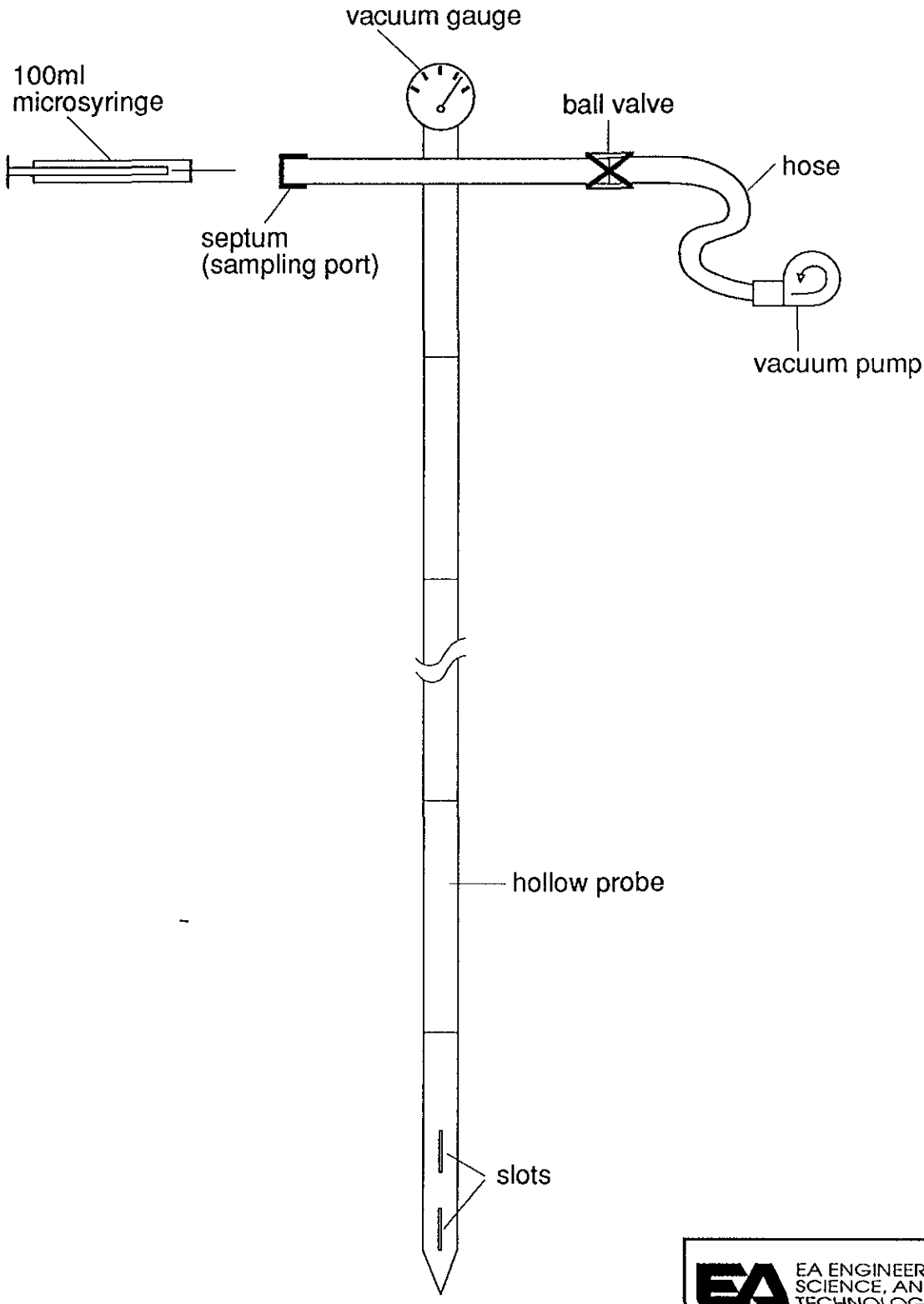

Figure 3. Schematic diagram of soil-gas sampling apparatus.

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vacuum in the probe decays. The vacuum reading during purge and the vacuum release time are recorded on the SVCA Data Sheet.

In general, the soil's gas permeability is indicated by the vacuum release time and the vacuum during purge. A short vacuum-release time suggests that there is free flow of soil gas from the vadose zone through the probe; a long vacuum release time indicates a high resistance to soil gas transport, which may result in a hydrocarbon concentration measurement that is below the actual level. In most situations, vacuum release is rapid (within three minutes), and the sample is considered representative.

The samples are collected through a septum with a microsyringe and injected into an HNU 421 chromatograph for analysis. The HNU 421 is a laboratory-size, temperature-programmable gas chromatograph equipped with a flame ionization detector (FID). The hydrogen-air flame ionizes compounds, generating an energy increase in the detector, which appears as an electrical signal. Vapor samples are injected into the gas chromatograph, separated on an analytical column, sensed by the detector, integrated, and reported as individual compounds on chromatograms. The instrument is operated isothermally at 55 C and the capillary column flow rate is 10 ml/min. These conditions ensure peak retention time stability and prevent contaminant buildup within the column. Blanks and standards are run every 6-8 samples to verify that the system is free of contamination, and to ensure system reproducibility.

The chromatograph yields a response in the form of an electrical signal, measured in volts; this is recorded and integrated across time by a Shimadzu C-R3A integrator. The peak area is expressed as volt-seconds (V-sec). The instrument is calibrated with a multicomponent standard consisting of 9.6 ppm benzene, 9.3 ppm

toluene, 9.4 ppm o-xylene, 17.7 ppm m,p-xylene, 9.5 ppm ethylbenzene, 9.2 ppm n-pentane, 9.5 ppm n-hexane, and 9.4 ppm isooctane. The integrator calculates and stores the response ratio, V-sec:ppm. The ratio for each component of the standard is used to quantify the concentrations of identifiable vapors in field samples according to their V-sec values.

The concentrations of unidentified compounds are calculated in a similar manner. In the table describing the results of the assessment, the column entitled "Peaks Prior to Benzene" represents the sum of the responses in V-sec for all peaks eluting prior to benzene, proportioned to the calibrated V-sec response for pentane. Similarly, the column entitled "Unidentified Peaks after Benzene" represents the sum of V-sec responses for unidentified components which elute after benzene, proportioned to the V-sec response for benzene. The column entitled "Total Volatile Hydrocarbons" represents the sum of all detected components (ppm).

2.2 SVCA RESULTS AND DISCUSSION

The results of the SVCA, summarized from chromatograms in Appendix B, are presented in Table 1. Soil-gas isoconcentration contours for total volatile hydrocarbons (TVH) at shallow depths (3-8 feet) and greater depths (9.5-15 feet) are presented in Figures 4 and 5. Contours for toluene at shallow depths are shown in Figure 6. Because the concentrations of benzene were too low to be measured at all but one point, isoconcentration contours for this component are not plotted.

As may be seen in Figures 4 and 5, TVH in the shallow (3-8 feet) soil gas reaches it highest concentration, exceeding 500 ppm on the south side of the pump islands; it rises to around 100 ppm at the southwest corner of the tank field. In the deeper (13 feet) soil gas, TVH reaches 500 ppm at the southwest corner of the tank field. Deeper samples were not collected at points V5-V13, in the vicinity of the pump islands and to the south.

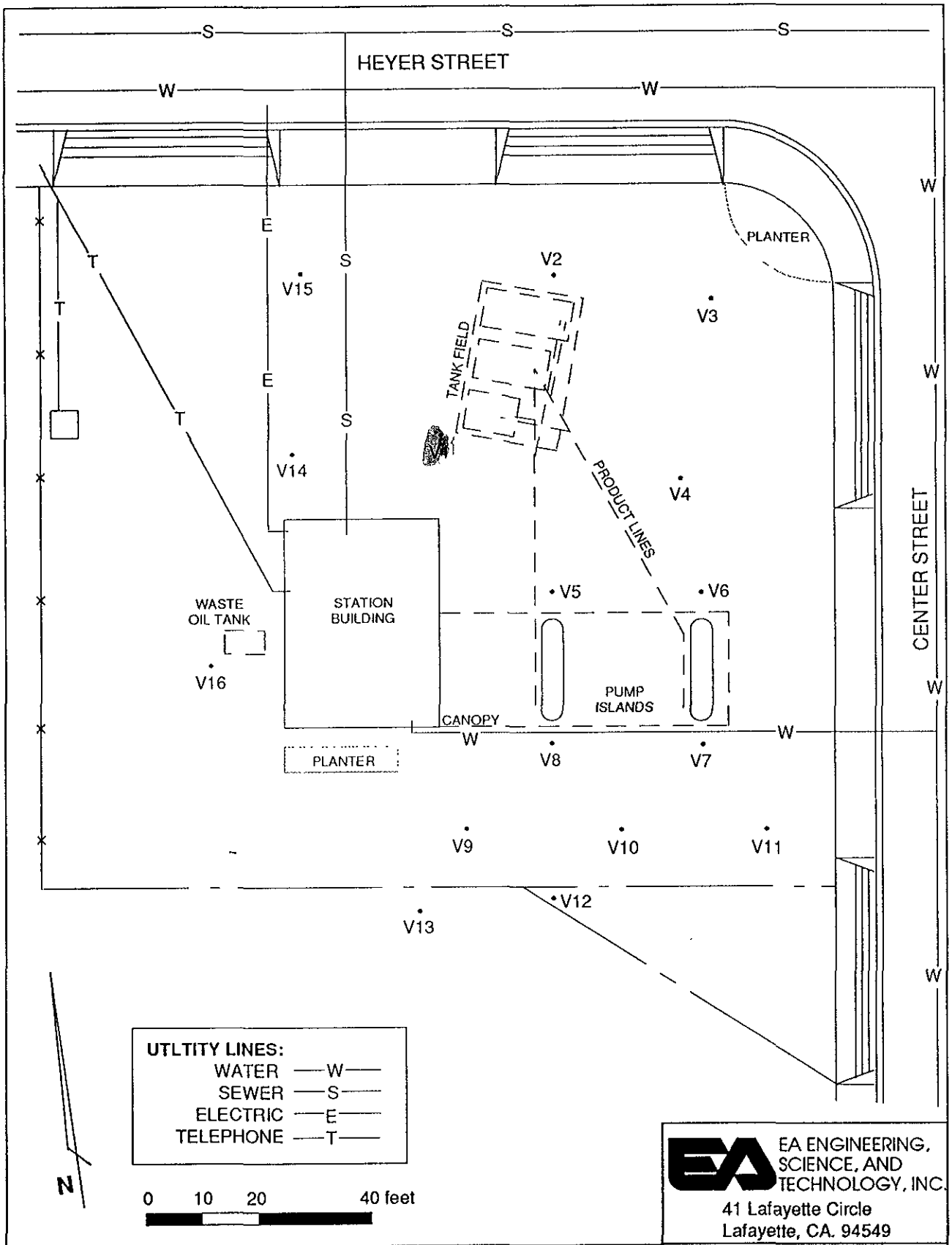

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Figure 2. Site plan, with soil vapor sampling points and underground utilities, of Chevron SS 9-3356, Castro Valley, CA. 2 March 1989.

Drawn	Date
Reviewed	Date

TABLE 1 (Cont.)

Sample Location	Depth (ft)	Vacuum (in. Hg)	Vacuum Release (min)	Peaks Prior to Benzene[a] (ppm)	Benzene (ppm)	Toluene (ppm)	Total Xylenes (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
V5/A	3	5	0	3	<1	<1	<1	<1	6	9
V5/B	8	25	1	44	<1	<1	<1	<1	1	45
V5/C	13	23	2	19	<1	<1	<1	<1	<1	19
V6	3	23	0	4	<1	<1	<1	<1	2	6
V7/A	3	18	0	280	<1	2	<1	<1	11	290
V7/B	8	20	3	230	<1	2	2	<1	12	250
V8/A	3	23	0	560	<1	13	<1	<1	100	670
V8/B	8	23	2	640	<1	19	<1	<1	170	830
V9	8	15	0	250	<1	3	<1	<1	15	270
V10	8	21	0	440	<1	2	<1	<1	41	480
V11	8	22	2	39	<1	<1	<1	<1	2	41
V12*	8	25	15	230	<1	<1	<1	<1	1	230
V13	8	22	0	25	<1	<1	<1	<1	<1	25
V14	13	25	2	26	<1	2	<1	<1	7	35
V15***	9.5	25	1.5	14	<1	<1	<1	<1	1	15
V16/A	3	9	0	14	<1	<1	<1	<1	<1	14
V16/B	8	10	0	5	<1	<1	<1	<1	<1	5
V16/C	13	21	0	16	<1	<1	<1	<1	1	17

TABLE 1 CONCENTRATIONS OF HYDROCARBON CONSTITUENTS IN SOIL VAPOR CHEVRON SERVICE STATION 9-3356
19201 CENTER STREET, CASTRO VALLEY, CALIFORNIA, 2 MARCH 1989

Sample Location	Depth (ft)	Vacuum (in. Hg)	Vacuum Release (min)	Peaks Prior to Benzene[a] (ppm)	Benzene (ppm)	Toluene (ppm)	Total Xylenes (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
V1/A	3	16	0	12	2	<1	<1	<1	7	21
V1/B	8	22	0	130	<1	2	<1	<1	9	140
V1/C	13	21	1	520	1	4	<1	<1	25	550
V1/D	5	22	5	25	<1	<1	<1	<1	2	27
V2/A	3	0	0	<1	<1	<1	<1	<1	<1	<1
V2/B	8	21	0	<1	<1	<1	<1	<1	2	2
V2/C	13	22	0	12	<1	<1	<1	<1	<1	12
V3/A	3	2	0	10	<1	<1	<1	<1	6	16
V3/B*	8	25	20	9	<1	<1	<1	<1	<1	9
V3/C	13	23	3	10	<1	<1	3**	<1	2	15
V4/A	3	23	0	<1	<1	<1	<1	<1	6	6
V4/B	8	21	0	12	<1	<1	<1	<1	<1	12
V4/C	13	20	2	7	<1	<1	<1	<1	1	8

a. Early peaks from blank data subtracted from total peaks prior to benzene. Quantification based on V-sec:ppm ratio for pentane (see text).
b. Quantification based on V-sec:ppm ratio for benzene (see text).
c. Summation of all detected constituents (see text).
* Tight soil encountered at this depth.
** Xylenes adsorbed from previous sample standard.
*** Hard subsoil encountered at this depth.

TABLE 1 (Cont.)

BLANK DATA

Test Time	Peaks Prior to Benzene (ppm)[b]	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	Unidentified Peaks After Benzene (ppm)[b]	Total Volatile Hydro-carbons (ppm)[c]
0957	<1	<0.1	<0.1	<0.3	<0.3	<0.3	<0.1	<1
1253	8	<0.1	<0.1	<0.3	<0.3	<0.3	0.2	8
1516	12	<0.1	<0.1	<0.3	<0.3	<0.3	0.1	12
1849	4	<0.1	<0.1	<0.3	<0.3	<0.3	0.3	4

PERCENTAGE OF STANDARD RECOVERED

Test Time	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	n-Pentane (ppm)	n-Hexane (ppm)	iso-Octane (ppm)
1013	100	100	100	100	100	100	100	100
1324	73	62	106	94	84	67	74	79
1526	75	69	130	111	99	65	72	77

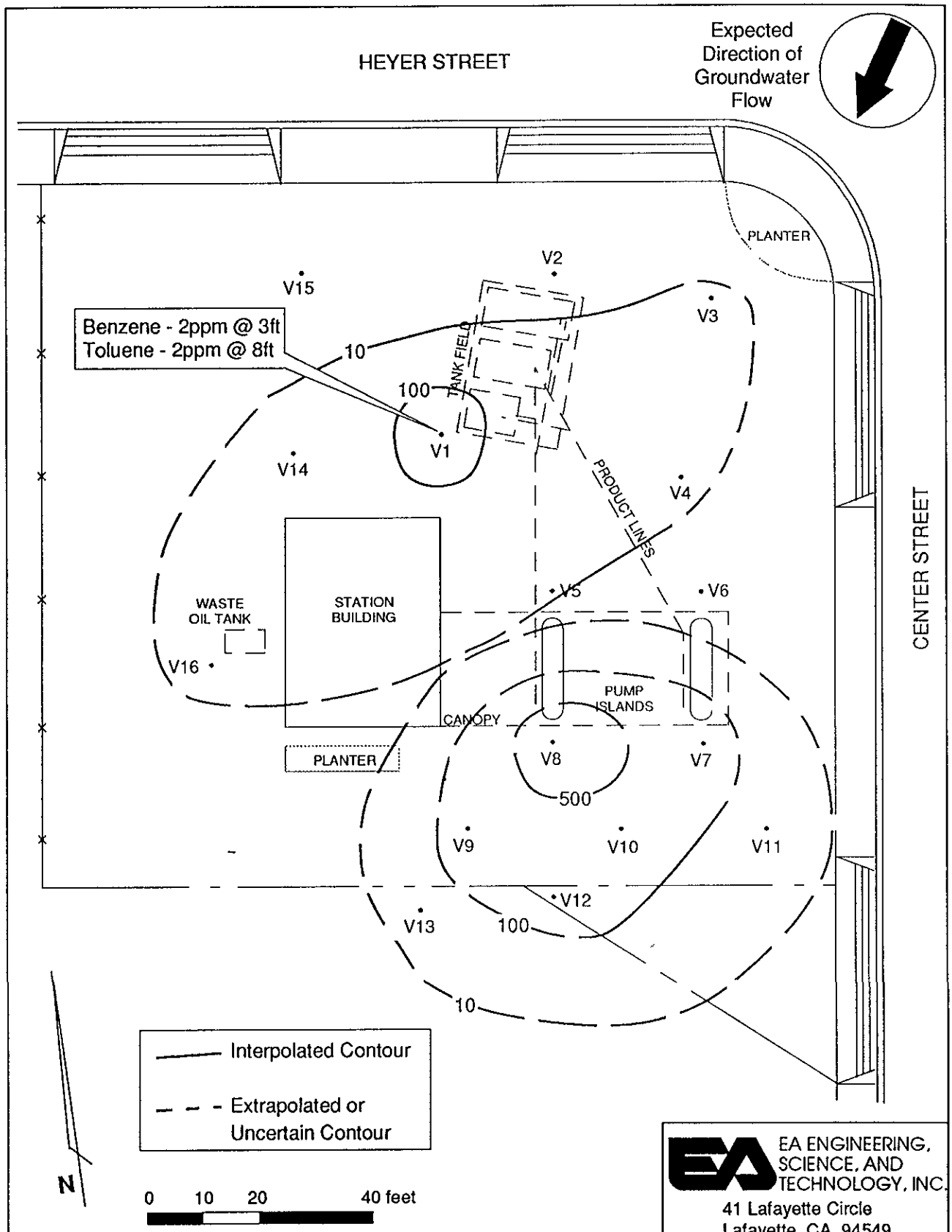

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Figure 4. Isoconcentration contours (ppm) of total volatile hydrocarbons in the shallow soil gas (3-8 feet) at Chevron SS 9-3356, Castro Valley, CA. 2 March 1989.

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Reviewed	Date

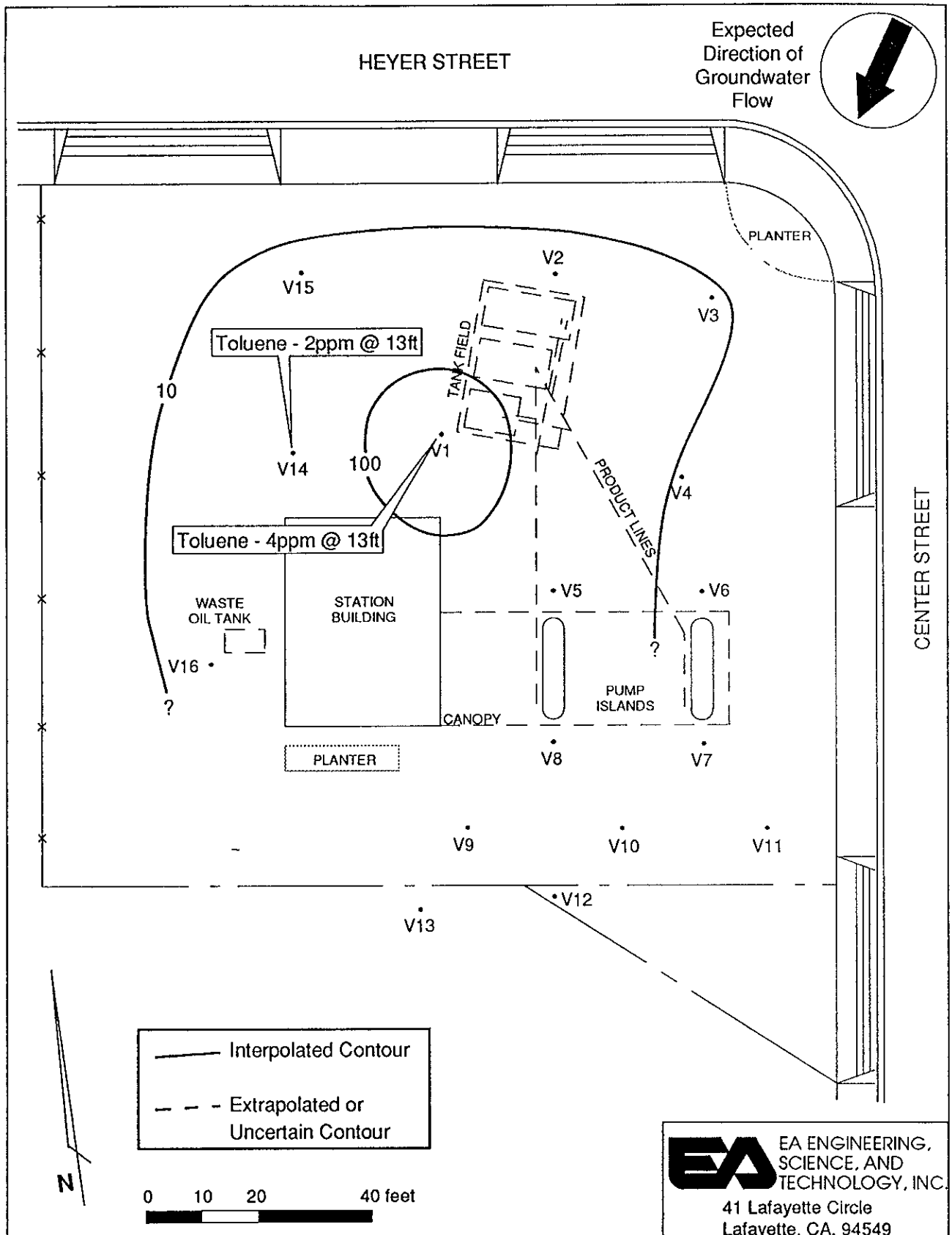

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Figure 5. Isoconcentration contours (ppm) of benzene in the shallow soil gas (3-8 feet) at Chevron SS 9-3356, Castro Valley, CA. 2 March 1989.

Drawn	Date
Reviewed	Date

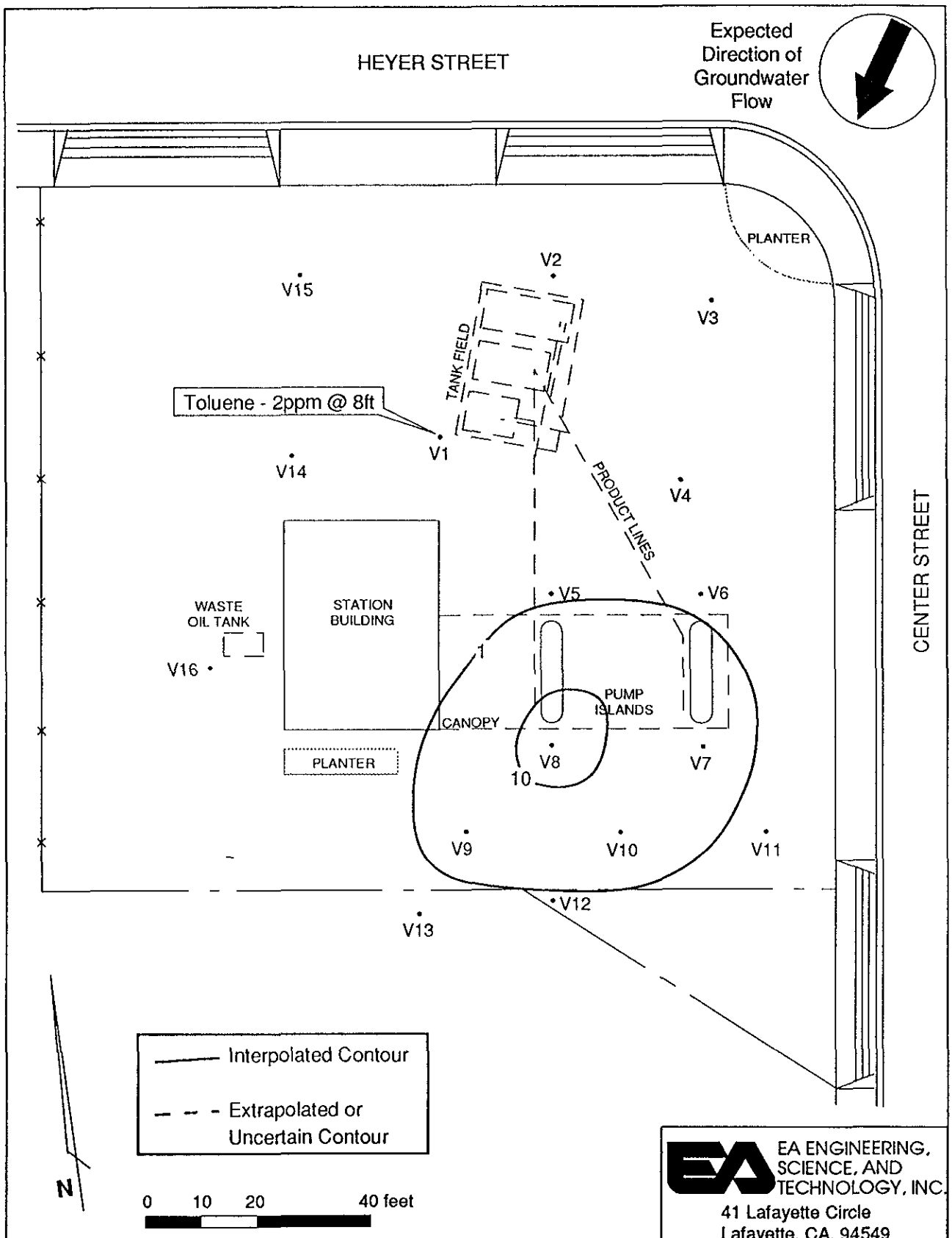

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Figure 6. Isoconcentration contours (ppm) of toluene in the shallow soil gas (3-8 feet) at Chevron SS 9-3356, Castro Valley, CA. 2 March 1989.

Drawn	Date
Reviewed	Date

The concentration of toluene at shallow depths is contoured in Figure 6, and may be seen to reach over 10 ppm at V8; it falls below 1 ppm within 40 feet of that point. Toluene was also measured at points V1 and V14 at 13 feet, at concentrations of 4 and 2 ppm, respectively. Benzene could be measured only at point V1: its concentration was 2 ppm at 3 feet and 1 ppm at 13 feet. When compared with TVH levels of 21 and 550 ppm, these benzene concentrations suggest the presence of relatively unweathered product. To the south of the pump islands, however, benzene is below detection while toluene ranged from 2 to 19 ppm, and TVH ranges from 25 to 830 ppm. This suggests the presence of relatively old, weathered product.

During sampling, short vacuum release times (<4 minutes) were observed at the majority of sampling points throughout the site (Table 1). These release times indicate a relatively free flow of soil gas into the sampling probe; thus, hydrocarbon readings should be representative of actual levels. Long vacuum release times were observed at V3/B and V12, so that actual hydrocarbon concentrations at these points may be greater than reported.

3. CONCLUSIONS

On 2 March 1989, EA conducted a soil vapor contaminant assessment (SVCA) at Chevron SS 9-3356 in Castro Valley, California. The investigation measured low-to-moderate levels of total volatile hydrocarbons (TVH) and low levels of aromatic hydrocarbons (BTXE) in the soil gas at the site.

The data indicate that the highest concentration of TVH was on the south side of the pump islands, exceeding 100 ppm over an area with a diameter of 50 feet at a depth of 8 feet. Benzene was detected at only one sample point: V1 at 3 feet showed 2 ppm. Toluene exceeded 1 ppm at point V1 (8 feet), and also at points V7-V10 (all at 8 feet). Considered together, the data suggest the presence of relatively old, weathered product to the south of the pump islands, while younger product is present near the tank field. The fact that TVH reaches its maximum concentration south of the pump islands, which is also downgradient from that location, also suggests that the product has aged.

4. REFERENCES

API (American Petroleum Institute). 1985. Laboratory Study on Solubilities of Petroleum Hydrocarbons in Ground Water. Publ. 4395. API, Washington D.C.

Bruell, G.J. and G.E. Hoag. 1986. The diffusion of gasoline range hydrocarbon vapors in porous media--experimental methodologies, in Proceedings of the Joint NWWA/API Conference on Petroleum Hydrocarbons and Organic Chemicals in Ground Water, Houston, Texas.

Hinchee, R.E. and H.J. Reisinger. 1987. A practical application of multiphase transport theory to ground-water contamination problems. Ground Water Monitoring Rev. [Winter 1987]:84-92.

Lyman, W.J., W.F. Reehl, and D.H. Rosenblatt. 1982. Handbook of Chemical Property Estimation Methods--Environmental Behavior of Organic Compounds. McGraw-Hill, New York.

RWQCB (San Francisco Bay Regional Water Quality Control Board). 1985. Guidelines for Addressing Fuel Leaks. RWQCB, Oakland.

APPENDIX A

Principles of Soil Vapor Contaminant Assessment

APPENDIX A: PRINCIPLES OF SOIL VAPOR CONTAMINANT ASSESSMENT

The soil vapor survey, or SVCA, technique takes advantage of the behavior of hydrocarbon mixtures and the physicochemical properties of the individual components in the subsurface. Following a subsurface gasoline release, free product will migrate downwards towards the groundwater, some of the gasoline will volatilize, and some will adsorb to the soils. In the case of a spill of sufficient volume to exceed the soil binding capacity, free liquid will reach groundwater, at which point it will float and may begin to vaporize and solubilize.

Like most hydrocarbon liquids, gasoline is a complex mixture of many compounds, each with its own physicochemical properties. The contaminants found in groundwater located beneath a layer of floating hydrocarbon are generally less hydrophobic and are generally found in concentrations proportional to the hydrocarbon/water partition coefficient (i.e., the relative solubility of a given compound in the bulk hydrocarbon to its solubility in water) and to their percent composition in the gasoline. It may be noted that concentration of total benzene, toluene, and xylenes in product-saturated water may exceed 10-20 mg/L (API 1985a).

Hydrocarbons will also volatilize into the air- or gas-filled soil interstices. Volatilization is largely a function of vapor pressure. The natures of the contaminant mixtures, in terms of specific component mixtures, in either the aqueous or vapor phase, are distinctly different from each other and from the gasoline. That is, the more hydrophilic hydrocarbons will be more likely to move into groundwater, while the more volatile compounds are more likely to move into the vapor phase, and the compounds that are both less volatile and more hydrophobic are more likely to remain in the free product or be adsorbed to soils (Hinchee and Reisinger 1987).

Hydrocarbons not remaining in the free product will partition into either groundwater or soil vapor and migrate as the result of a variety of interacting forces. In groundwater, contaminants will migrate with the groundwater flow, interacting with the rock or soil geological medium. As the contaminants pass through a medium, organic constituents in the medium interact with the contaminants, and some are adsorbed or bound to particle surfaces (Bruell and Hoag 1986). The result is a net retardation in the velocity of movement of those compounds relative to that of the groundwater in which they are dissolved. The process is analogous to laboratory chromatography. The compound with the least affinity for the porous medium is least retarded and therefore moves most rapidly. This compound, then, is present at the leading edge of a contaminant plume.

The affinity of a compound for the soil porous medium is partly a function of the compound's hydrophobicity--that is, the more hydrophobic a compound the more likely it is to adsorb to the solid medium. Aqueous solubility is a good indicator of hydrophobicity: the more soluble a compound is, the less hydrophobic and more hydrophilic it is, and vice versa. Vapor pressure is a good indicator of volatility; compounds with higher vapor pressures are more volatile.

In determining the environmental fate of various hydrocarbon compounds in a hydrocarbon mixture such as gasoline, those which have a high vapor pressure are more likely to move into the vapor phase, or evaporate. Compounds with high solubility are more likely to move into groundwater from the free product and, once in groundwater, tend to move more rapidly. Compounds of low vapor pressure and low solubility tend to remain in the free product or be adsorbed to the solid matrix and remain relatively immobile.

Dissolved compounds will tend to volatilize from the aqueous phase. The Henry's Law constant is the equilibrium ratio of a

compound's concentration in the vapor phase to its concentration in the aqueous phase. The higher a compound's Henry's Law constant, the greater its tendency to volatilize from water into air.

Figure A-1 graphically illustrates the vapor pressure, aqueous solubility, and Henry's Law constants, and their relationships, for selected hydrocarbons typically found in gasoline. The Henry's Law constant is approximated here as the ratio of vapor pressure to solubility.

The Henry's Law constant is directly related to the tendency of compounds to volatilize, as opposed to solubilizing. Compounds with Henry's Law constants greater than 0.001 (atm· m^3/mole) volatilize from water into air very rapidly (Lyman et al. 1982); those with Henry's Law constants greater than 0.01 (atm· m^3/mole) are generally volatilized so rapidly that they are seldom found in gasoline-contaminated groundwater. It may be observed (Figure A-1) that tetraethyl lead (TEL) has an extremely low solubility and a relatively low vapor pressure. As a result, this constituent would not be expected to solubilize and migrate in groundwater, and although its low vapor pressure would indicate slow volatilization, its Henry's Law constant indicates that it may be more rapidly volatilized than solubilized. The fate of TEL would be expected to be long-term binding to the soil.

On the basis of these properties it can be seen that associated with any groundwater, soil, or free-product contamination is vapor phase contamination. The SVCA technique takes advantage of this, and through the collection and analysis of soil vapor permits a rapid, cost-effective delineation of the extent of contamination.

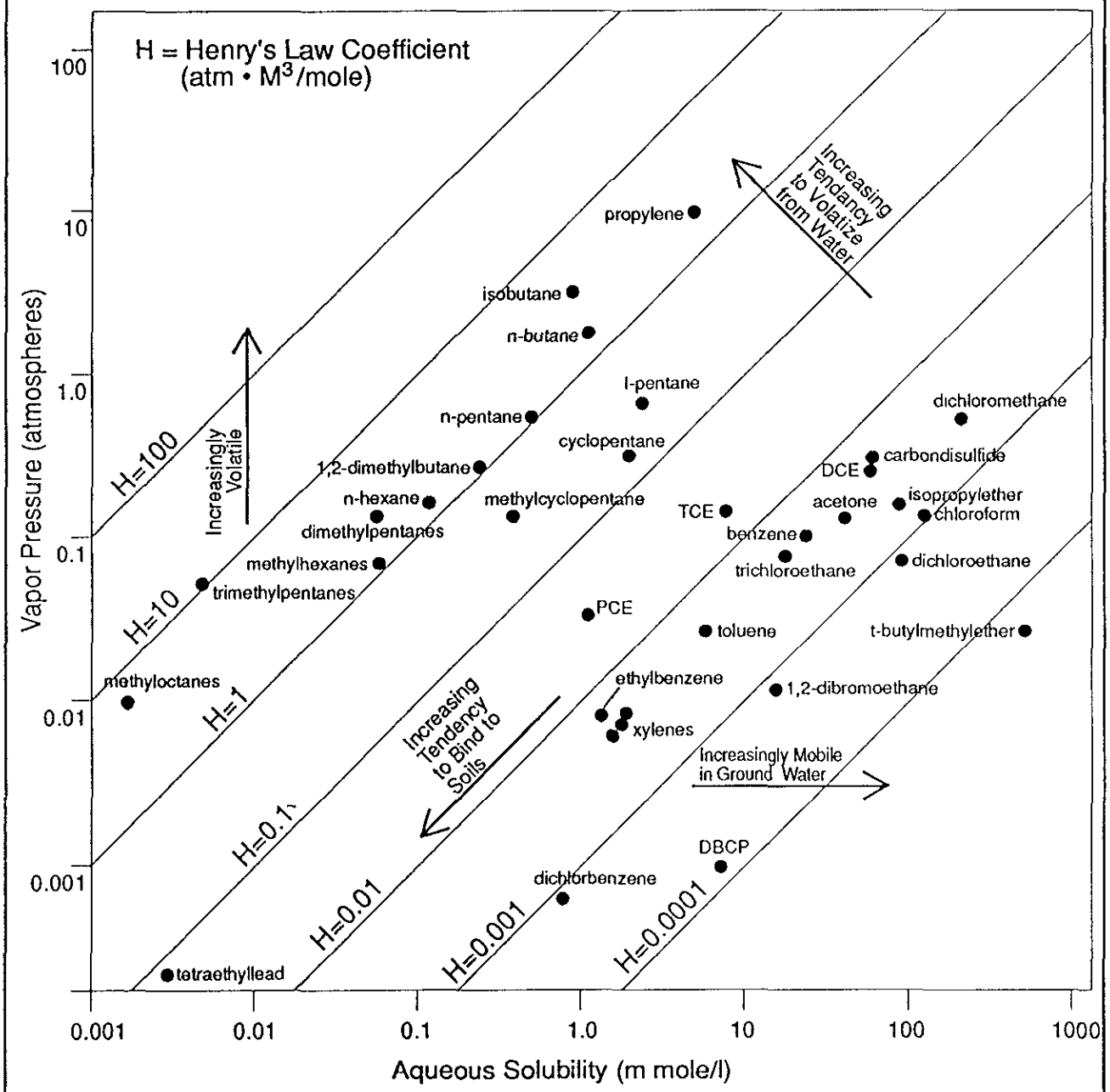

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Figure A-1. Vapor pressures, solubilities, and corresponding Henry's Law constants of selected volatile chemicals.

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APPENDIX B

SVCA Data Sheets and Chromatograms

SVCA DATA SHEET

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

Project Number 10705.49 Gas Chromatograph 421

Station Number 9-3356 Analysts MG, PP, JD Date 3/2/89

Site Location 19201 CENTER ST CASTRO VALLEY

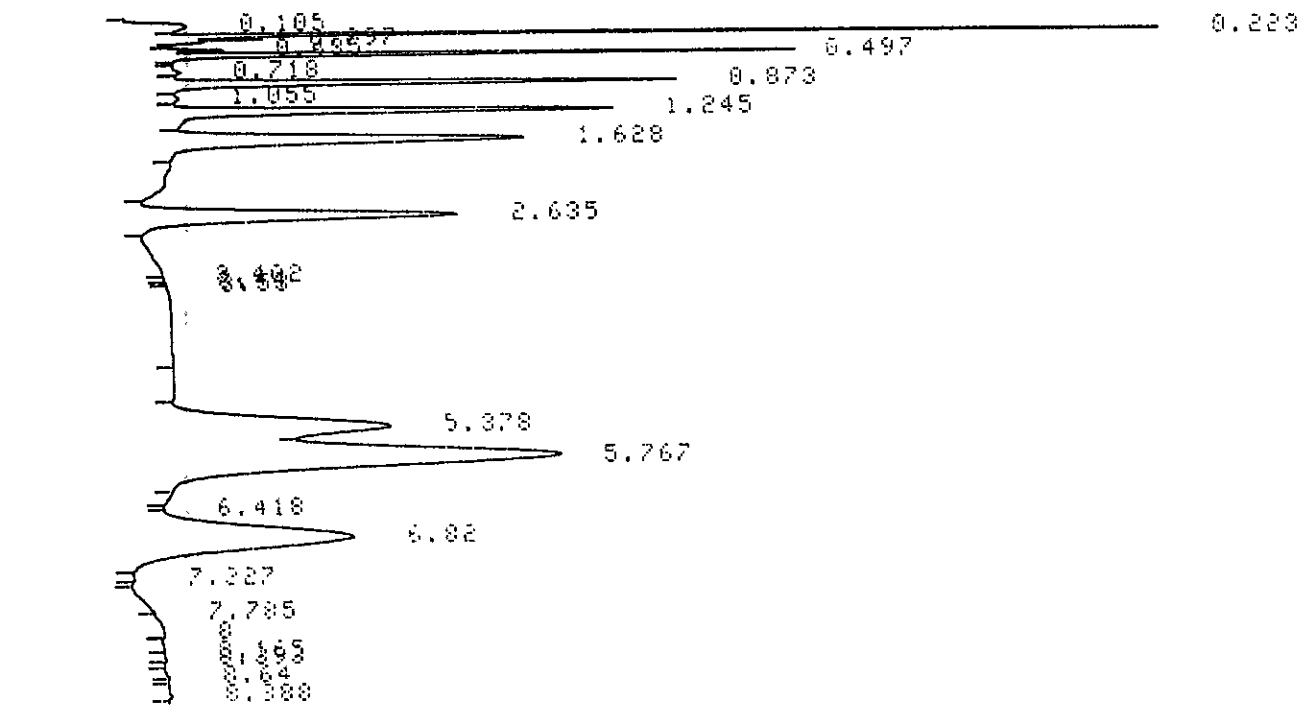
SAMPLE LOCATION	TIME	DEPTH (ft)	PURGE TIME (Min)	VACUUM (IN Hg)	VACUUM RELEASE (Min)	VOLUME INJECTED (µl)	COMMENTS
V1/A	1027	3	7	16	0	50µl	
V2/A	1041	3	2	0	0	50µl	
V3/A	1052	3	8	22	0	50µl	
V4/A	1103	3	8	23	0	50µl	
V1/B	1115	8	8	22	0	50µl	
V2/B	1125	8	7	21	0	50µl	
V3/B	1151	8	7	25	20	50µl	pumped @ 12"
V4/B	1146	8	6	21	0	50µl	
V1/C	1202	13	7	21	1	50µl	
V1/C	1212	13	--	--	--	50µl	repeat
V2/C	1233	13	10	22	0	50µl	
V3/C	1333	13	10	23	3	50µl	
V4/C	1351	13	7	20	2	50µl	
V1/D	1417	15	8	22	5	50µl	
V5/A	1430	3	5	5	0	50µl	
VC	1442	3	7	23	0	50µl	
V7/A	1454	3	7	18	0	50µl	
V8/A	1505	3	7	23	0	50µl	
V7/B	1536	8	8	20	3	50µl	
V8/B	1550	8	9	23	2	50µl	
V9	1615	8	5	15	0	50µl	
V10	1628	8	7	21	0	50µl	
V11	1635	8	7	22	2	50µl	
V5/B	1647	8	8	25	1	50µl	
V12	1736	8	10	25	15	50µl	
V13	1711	8	8	22	0	50µl	
V14	1752	13	9	25	2	50µl	
V15	1805	9.5	7	24	1.5	50µl	refusal
V16/A	1816	3	3	9	0	50µl	
V5/C	1725	13	8	23	2	50µl	
V16/B	1826	8	4	10	0	50µl	
V16/C	1840	13	6	21	0	50µl	

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-335
Sample: STANDARD
Vol. Inj: _____

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50 µl
Comments: _____



C-ROMATOPAC C-R3A ~ FILE 0
SAMPLE NO 0 METHOD 24
REPORT NO 2733 SAMPLE WT 100

PKNO	TIME	AREA	TY	IDNO	CONC	NAME
1	0.105	2.99[illegible]				
2	0.223	27694.	BV			
3	3.497	[illegible]				
4	0.435	66[illegible]				
5	0.497	5[illegible]	V	6	5.8759	PEN
6	0.873	108081		7	6.8143	HEX
7	1.245	[illegible]		[illegible]	7.1939	BEN
8	1.628	157914		8	7.2513	I-OCT
9	2.635	65[illegible]		2	6.4553	TOL
10	5.378	212432		3	9.4503	ETBEN
11	5.767	530694	V	4	19.7131	M,P XY
12	6.82	248262		5	12.2415	O XYL
13	8	33.[illegible]				
	TOTAL	.841330			74.9936	

221-25412

15 3

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48

Station Number: 9-335C

Sample: BLANC

Vol. Inj: 100µl

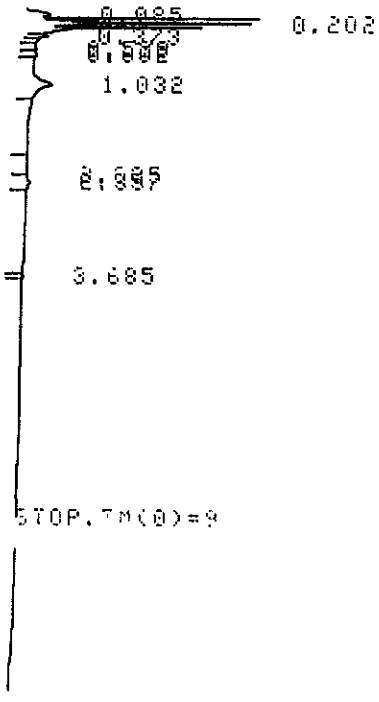
Date: 3/2/89

Analysts: MAL, PP, JD

Std. Vol. Inj: 50µl

Comments:

START
03/02/89 09:57:44



CHROMATOPAC C-R3A FILE 0
SAMPLE NO 0 METHOD 24
REPORT NO 2706 SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.085	19644				
2	0.202	53051	SV			
3	1.032	15142	V	7	1.0759	HEX
	TOTAL	88137			1.0759	

LIST TIME.PRG
TIME PROGRAM FILE 0

```
3.01   PRINT DATE$,TIME$

LIST FORMAT$(0)
*ERROR*  4:TYPE MISMATCH
LIST WIDTH(0)
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ANALYSIS PARAMETER FILE 0

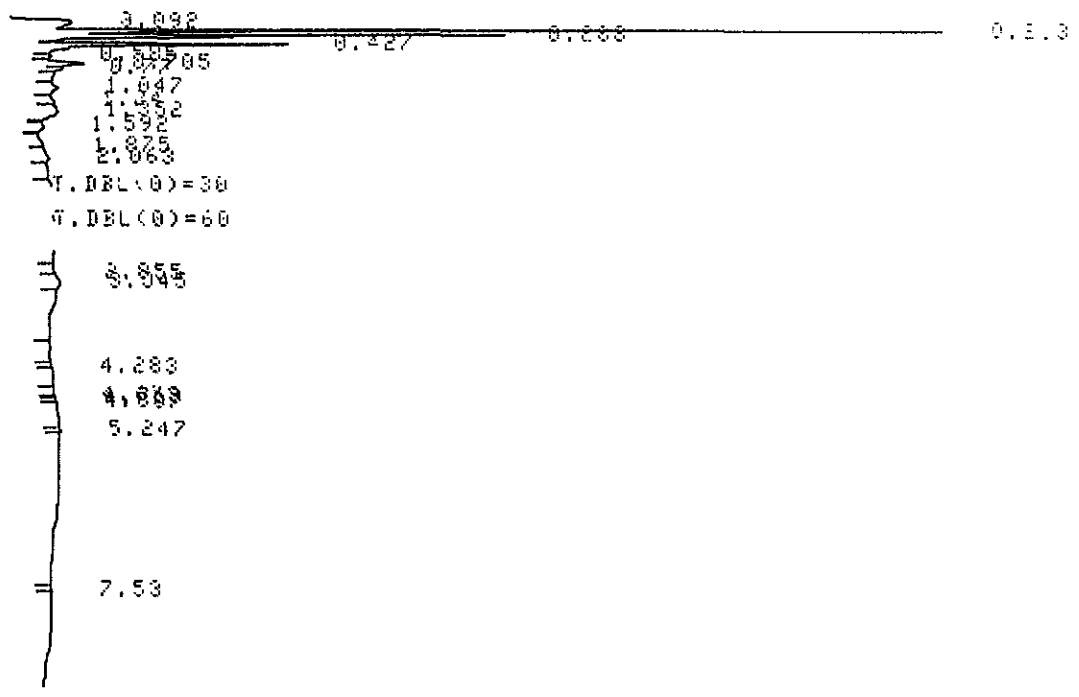
WIDTH	3	SLOPE	2000
DRIFT	100	MIN.AREA	2000
T.DBL	60	STOP.TM	9
ATTEN	6	SPEED	10
METHOD$	24	FORMAT$	0
PPL.WT	100	IS.WT	1

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-335
Sample: BLANK
Vol. Inj: 100µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2731

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.092	2390				
2	0.213	125427	V			
3	0.280	59431	V			
4	0.427	35541				
5	0.705	1750				
6	1.352	5730				
	TOTAL	257356			0	

RUN
VOLUME INJECTED (UL)
100
DILUTION
1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
TT			
4.61502	0	0	0
0	0	0.174414	0
4.78943			

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14 4

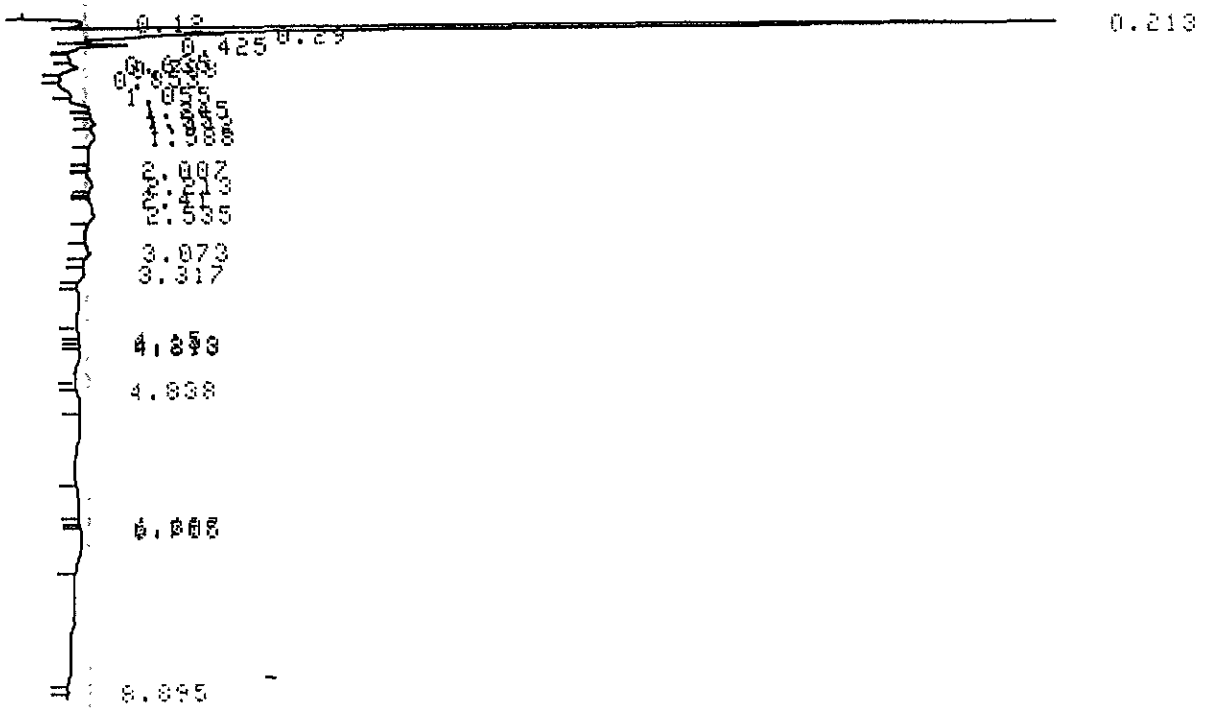
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-335L
Sample: BLANK
Vol. Inj: 10µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 15:16:24



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2732

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.12	18420				
2	0.213	322471	SV			
3	0.29	4062	V			
4	0.425	7893				
5	0.708	3110				
6	2.535	4157		2	0.1618	TOL
	TOTAL	360121			0.1618	

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EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48

Station Number: 9-335b

Sample: BLANK

Vol. Inj: 10µl

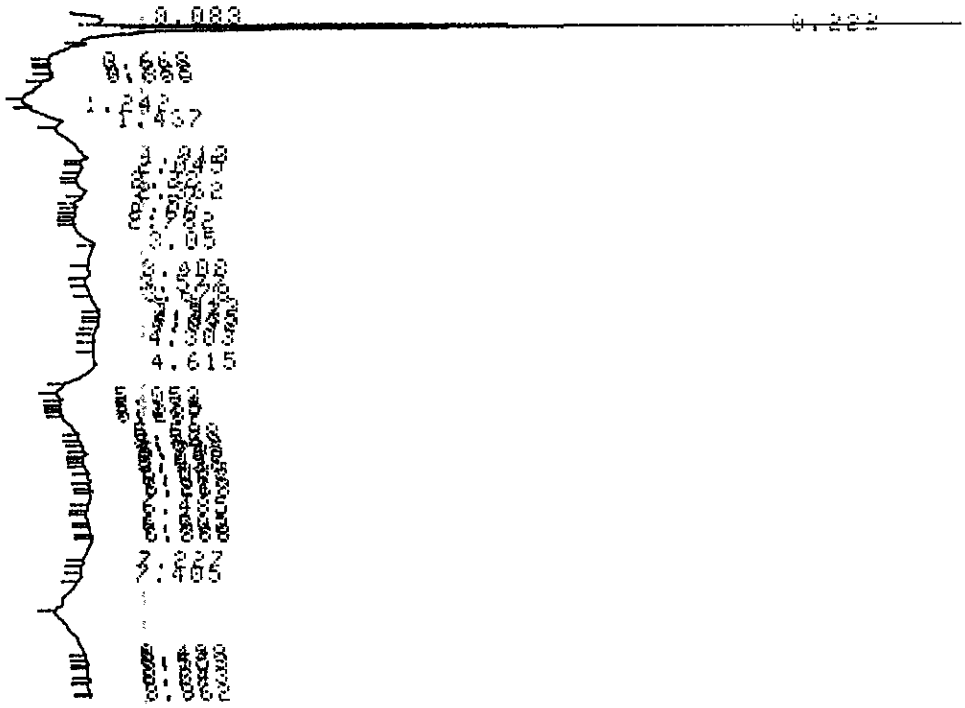
Date: 3/2/89

Analysts: MC, PP, JD

Std. Vol. Inj: 50µl

Comments:

START
03/02/89 08:49:35



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2748

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.083	[illegible]				
2	0.222	87903	V			
3	1.437	6671				
4	1.943	9326				
5	4.615	[illegible]				
6	8.438	[illegible]				
	TOTAL	129443			0	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PSB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
TT			
0.027259	0	0	0
0		0.944784	0.028043

⊕ Shimadzu 221-25412 16 5

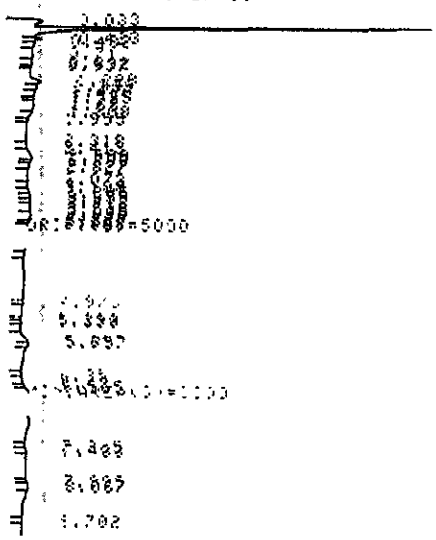
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-335L
Sample: V1/A
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 10:27:08



CHROMATOPAC C-R3A FILE 0
SAMPLE NO 0 METHOD 24
REPORT NO 2799 SAMPLE WT .00

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.085	113506				
2	0.423	13399	V			
3	0.632	126.6	V	M	0.9645	PEN
4	0.71	24238	V			
5	0.794	10207	V	7	0.8636	mEX
6	0.937	5113	V	7	0.3223	HEX
7	1.089	363.9	V	1	2.2109	BEN
8	1.233	13404-	V			
9	1.428	.3269	V			
10	1.535	5960	V	8	0.2737	I-OCT
11	1.61	1976.	V	3	0.9075	I-OCT
12	1.808	9653	V			
13	1.955	4575	V			
14	2.313	18714	V			
15	2.4..	09:.	V			
16	2.608	13053	V	2	0.5071	TOL
17	2.793	333.	V	2	0.1258	TOL
18	2.887	5946	V			
19	3.073	.0090	V			
20	3.138	4620	V			
21	3.297	4?9	.			
22	3.355	4581	V			
23	3.413	4731	\			
24	3.535	8215	V			
25	3.695	6-3(	V			
	TOTAL	380546			6.1755	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
?

?35	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
10.4756	2.21089	0.12578	0
?	0	7.30923	0
00.1215			

*ERROR# 16: UNDEF'D STATEMENT IN 390
WINDOW(0)=5

⊕ Skrivdon 221 25412

13 4

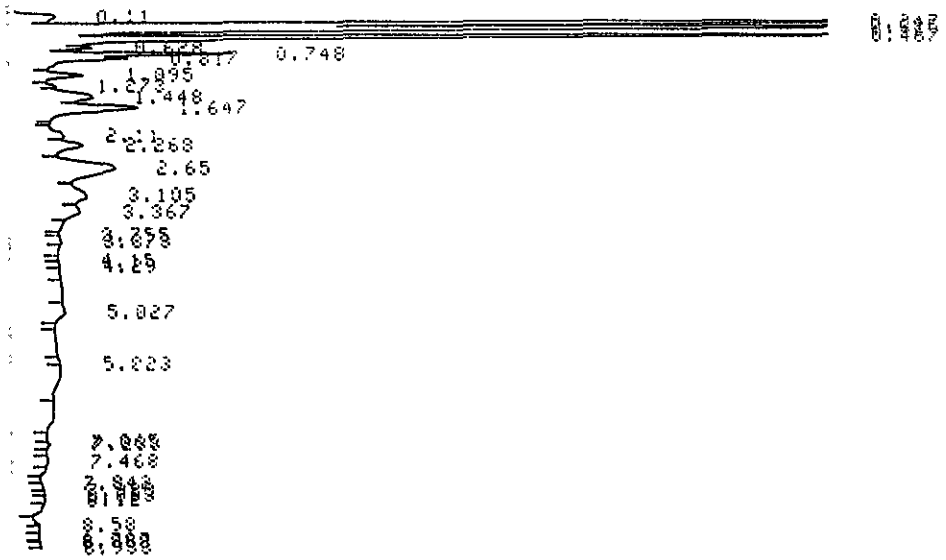
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-335E
Sample: V1 B
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 11:15:45



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2715

FILE 0
METHOD 2A
SAMPLE WT 100

PKNO	TIME	AREA	TK	IDNO	CONC	NAME
1	0.11	257[illegible]				
2	0.247	1085443	VC			
3	0.325	3[illegible]				
4	0.467	305064	SV	6	21.2975	BEN
5	0.628	3[illegible]				
6	0.748	58890	V			
7	0.817	27.0[illegible]	V			
8	1.095	13766				
9	1.273	2020		1	0.1875	BZN
10	1.448	36165	V			
11	1.647	569[illegible]	V	7	2.6143	1-OCT
12	2.11	3153				
13	2.268	3[illegible]				
14	2.65	56095		2	3.206	TOL
15	3.105	1097[illegible]				
16	3.367	61[illegible]				
17	3.627	5[illegible]				
	TOTAL	2086.2[illegible]			26.3058	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

BB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
TT			
112.23	0.187511	2.20603	0
0	0	9.32258	0
123.946			

ERROR 16:UNDEF'D STATEMENT IN 390

⊕ Shimadzu 221-25412 13 7

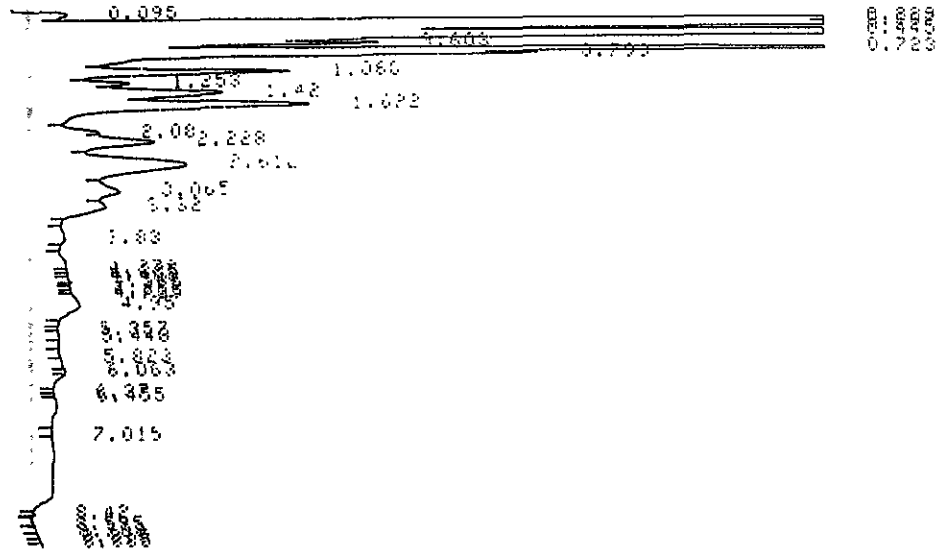
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705.48
Station Number: 9-335E
Sample: V1C
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 12:12:25



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2718
FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MM	IDNO	CONC	NAME
1	0.095	30[illegible]				
2	0.228	2842243	VE			
3	0.307	2364[illegible]	V			
4	0.445	1683942	SV			
5	0.603	23494				
6	0.723	350139	V			
7	0.793	146321	V			
8	1.068	89680	V			
9	1.253	177.1		1	1.0782 BEN	
10	1.42	100060	V			
11	1.622	156030	V	3	7.1637 1-OCT	
12	2.08	14843				
13	2.228	9509.	V			
14	2.612	103570		2	4.0299 TOL	
15	3.065	14899				
16	3.32	15981				
17	3.83	3850				
18	4.95	15336				
	TOTAL	8029408			12.2737	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOL	PAO
TY			
455.409	1.07815	4.02989	0
0	0	25.2187	0
485.736			

ERROR# 16:UNDEF'D STATEMENT IN 390

Shimadzu 221 25412 14 4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

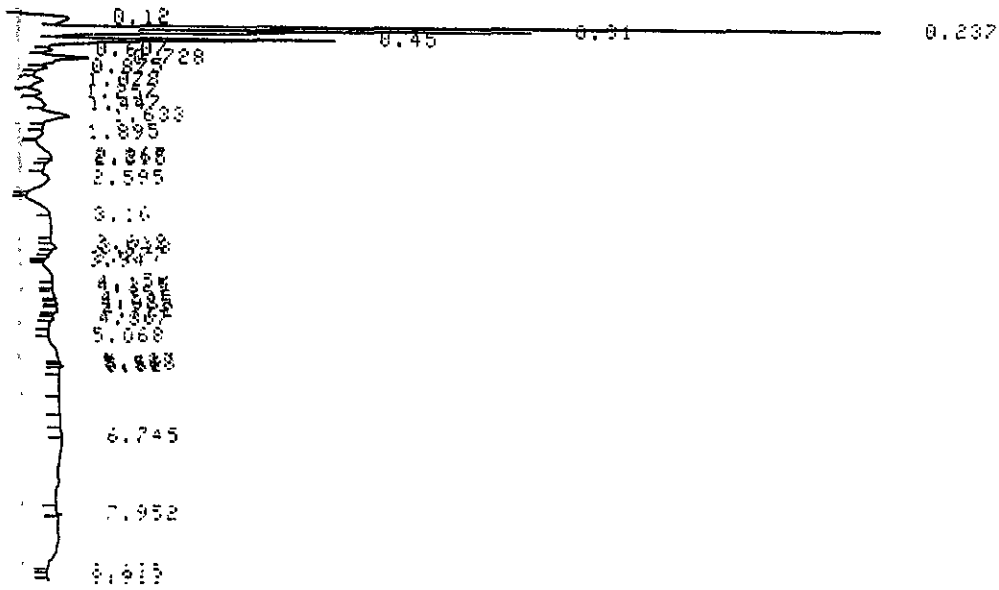
Project Number: 10705.48
Station Number: 9-3356
Sample: V1/D
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl

221-25412

14 8

START
03/02/89 14:17:54



NO	TIME	AREA	TY	MTHD	CONC	WHIC
1	0.12	29.57				
2	1.217	229.48	V			
3	1.633	1374				
4	3.45	13207				
5	4.91	451				
6	5.078	4716				
7	6.757	1.2%			0.899	BEN
8	7.447	3414				
9	7.931	1.6%		B	0.5921	I-OCT
10	8.595	11626		2	0.4524	TOL
11	9.15	4564				
12	9.437	35c5		3	0.1568	ETBEN
	TOTAL	440633			1.3912	

RUN
VOLUME INJECTED (UL)
50
DILUTION
1

MB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
21.5818	0.189932	0.452358	0
0	0.156816	1.58101	0
23.9619			

ERROR 16:UNDEF'D STATEMENT IN 390

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V2/A
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 10:41:47

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2710

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.088	10666				
2	0.232	48705	V			
3	0.305	7813	V			
4	0.443	3428				
	TOTAL	70613			0	

⊕ Shimadzu 221-25412

13 5

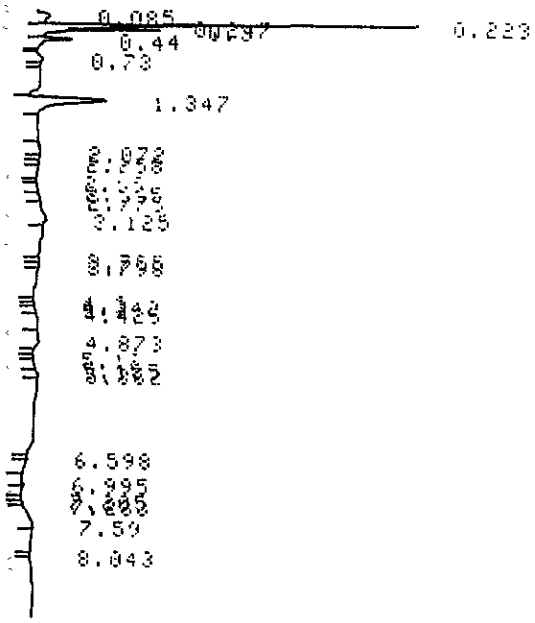
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705.48
Station Number: 9-335
Sample: V2/B
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 11:25:58



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2714

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.085	3754				
2	0.223	20081				
3	0.247	15525	V			
4	0.3	13394	V			
5	0.44	5072				
6	1.347	31406				
7	3.125	4265				
	TOTAL	93492			0	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
0.476065	0	0	0
0	0	2.17143	0
2.64745			

ERROR 16:UNDEF'D STATEMENT IN 390

⊕ Shinder 221.25412 13 8

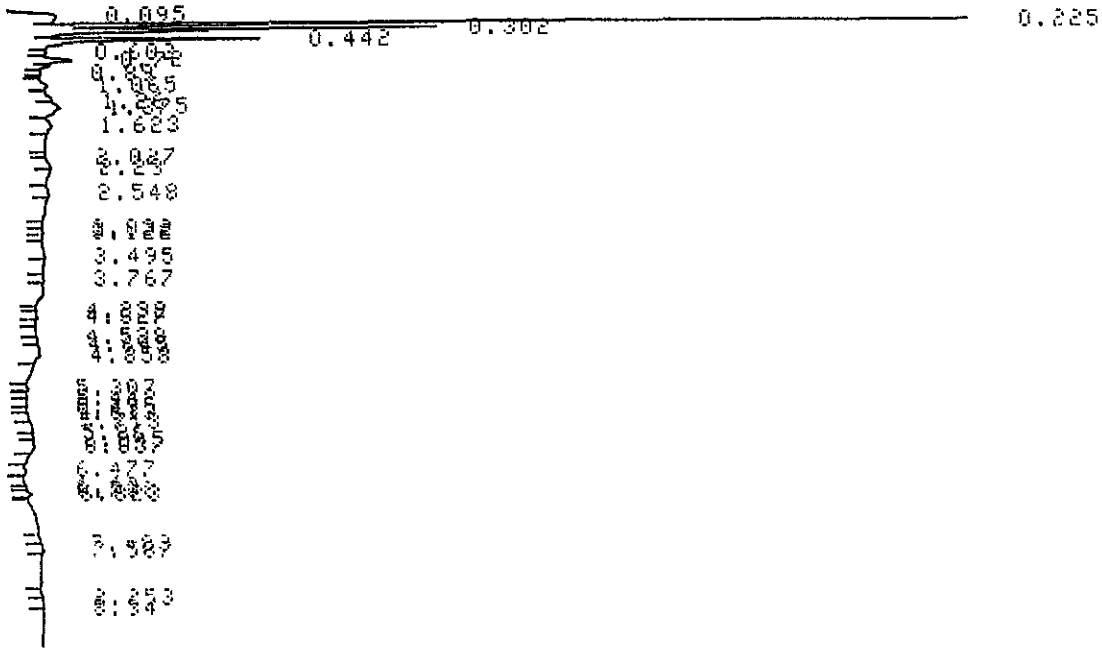
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V2/C
Vol. Inj: 5 µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50 µl
Comments:

START
03/02/89 12:33:14



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2719

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.095	24250				
2	0.225	123987	V			
3	0.302	58009	V			
4	0.442	35839	V			
5	0.72	5235				
6	1.375	4857				
	TOTAL	252178			0	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBR	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
TT			
12.0116	0	0	0
0	0	0.295674	0
12.0073			

#ERROR* 16:UNDEF'D STATEMENT IN 390

Shimadzu 221-7412 2 of 4

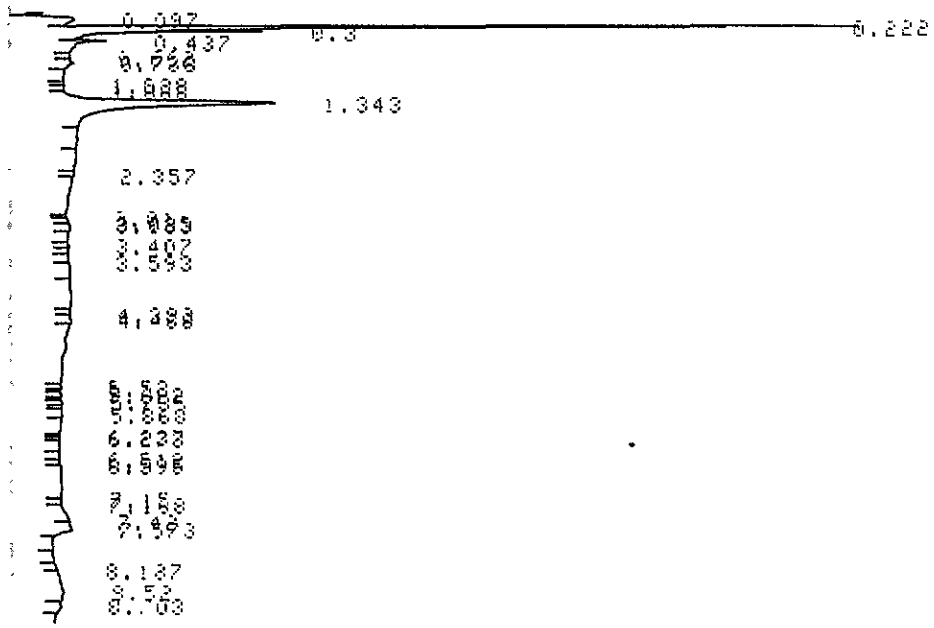
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705.48
Station Number: 9-335L
Sample: V3/A
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 10:52:34



CHROMATOPAC C-R3A FILE 0
SAMPLE NO 1 METHOD 24
REPORT NO 2711 SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.097	25165				
2	0.223	116756	V			
3	0.3	46860	V			
4	0.437	24988	V			
5	0.662	6377	V			
6	0.726	5857	V			
7	1.34	9171				
8	2.573	5039				
9	3.11	6963				
	TOTAL	323638			0	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
TT			
10.2547	0	0	0
0	0	5.67773	0.676195
16.6086			

ERROR 16:UNDEF'D STATEMENT IN 390

⊕ Shimadzu

221-25412

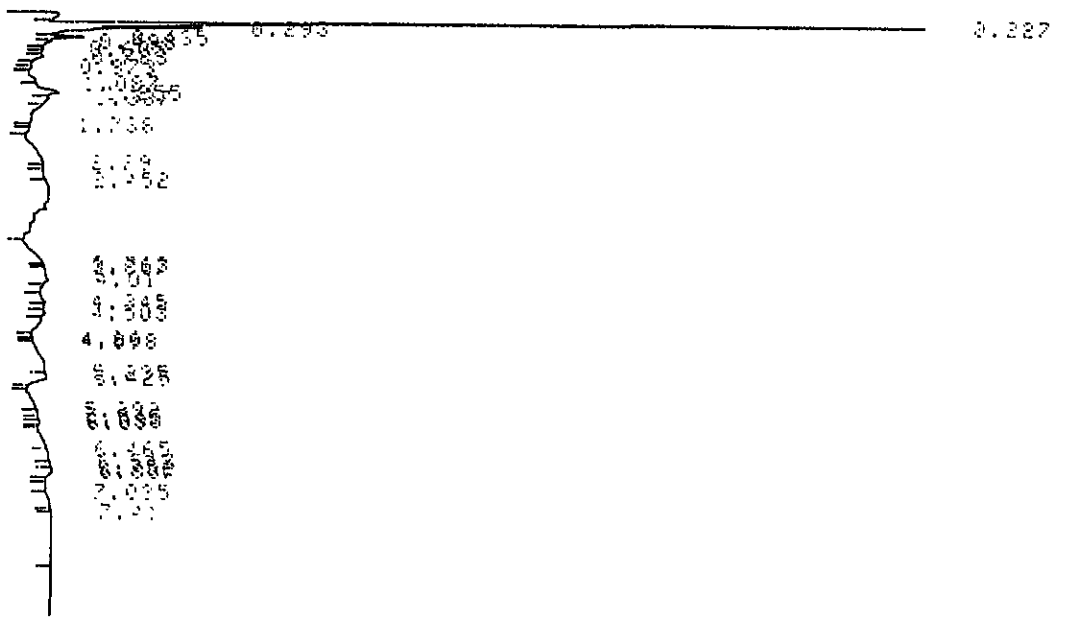
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705, 48
Station Number: 9-335
Sample: V3/B
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 11:51:02



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2716

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.0[illegible]	[illegible]				
2	0.227	14[illegible]50	V			
3	0.29[illegible]	32[illegible]6	V			
4	0.435	10717	V			
5	0.493	3851	V	6	0.2269	PEN
6	1.255	4206		1	0.256	BEN
7	2.29	4196				
8	5.2[illegible]	3431		3	0.1526	ETBEN
9	5.425	3274		3	0.1457	ETBEN
	TOTAL	228137			0.7812	

PUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
TT			
9.92421	0.256011	0	0
0	0.145652	0.517942	0
10.8423			

⊕ Stimadex 221-25412

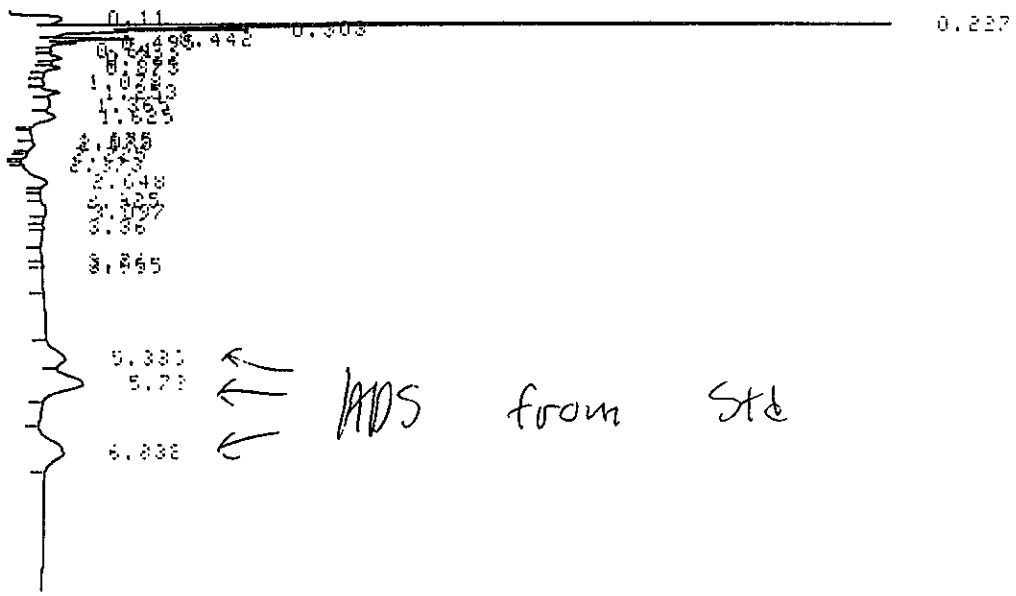
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V3/C
Vol. Inj: 50 µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50 µl
Comments:

START
03/02/89 13:33:36



MDS from Std

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2725

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.11	20304				
2	0.227	149693	V			
3	0.303	30627	V			
4	0.442	11922				
5	0.495	3760	V	6	0.2625	PEN
6	1.253	4174		1	0.2541	BEN
7	1.625	6502		6	0.3904	1-OCT
8	2.648	8205		2	0.3193	TOL
9	5.303	11339		3	0.5044	ETBEN
10	5.78	35800		4	1.6386	M,P XY
11	6.832	329.5		5	1.623	O XYL
	TOTAL	317240			4.9922	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
T-			
10.1237	0.254066	0.319271	1.62382
1.63856	0.504415	-0.198753	2.00367
6.6679			

Shimadzu

221-25412

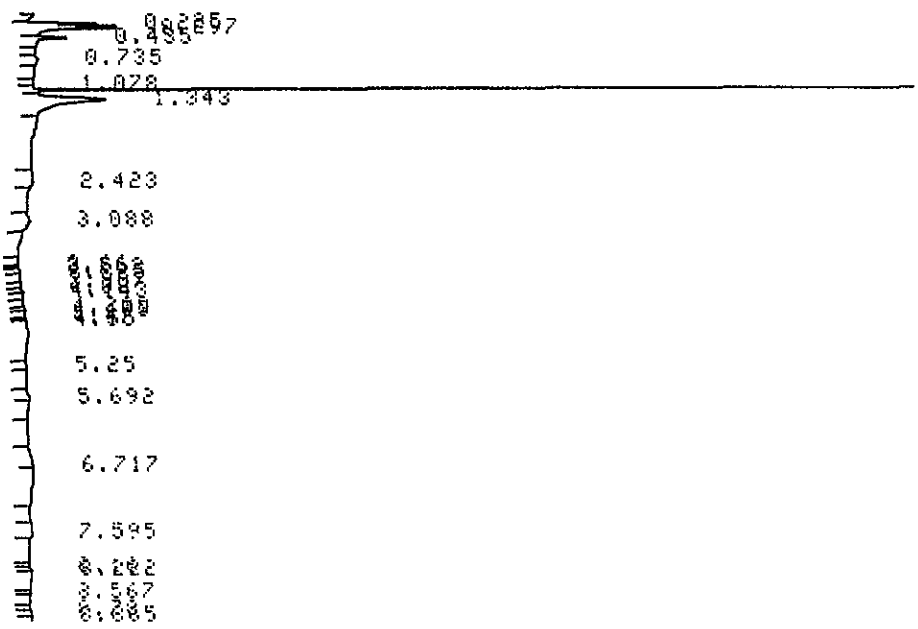
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V4/A
Vol. Inj: 60µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments: _____

START
03/02/89 11:03:29



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2712

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.00	19537				
2	0.225	23973	V			
3	0.297	21056	V			
4	0.405	9876	V			
5	1.168	76534			4.6589	BEN
6	1.343	28688				
	TOTAL	179662			4.6589	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
TT			
6.14671	4.65892	0	0
9	0	-2.9126	0
7.89302			

ERROR 16:UNDEF'D STATEMENT IN 390

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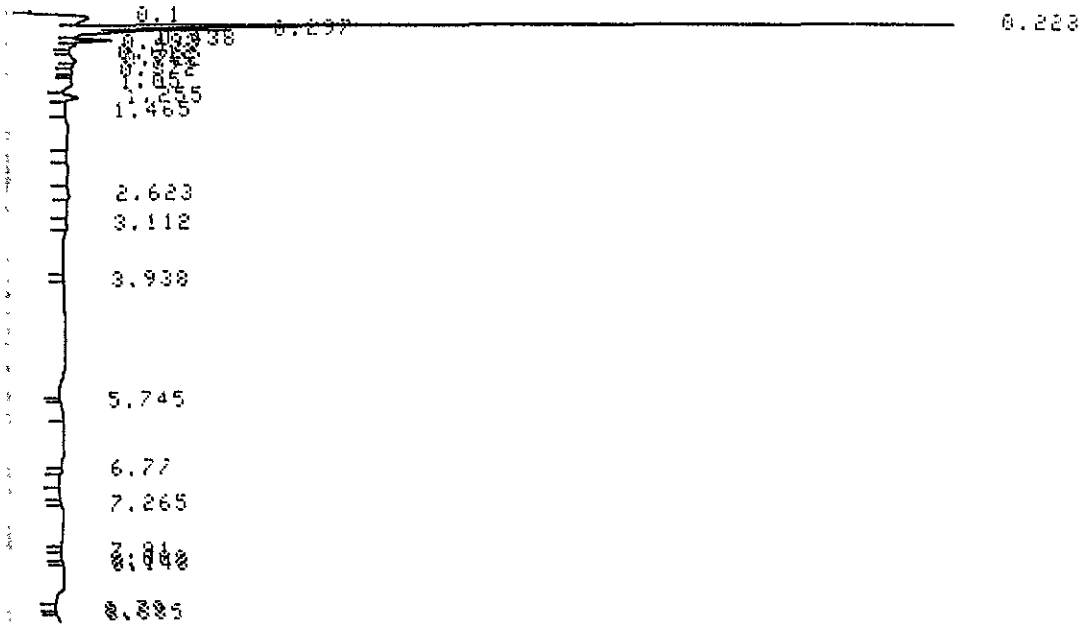
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V4B
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 11:40:52



CHROMATOPAC C-R3A FILE 0
SAMPLE NO 0 METHOD 24
REPORT NO 2715_ SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.1	31469				
2	0.228	173587	V			
3	0.297	30039	V			
4	0.438	13085	V			
5	0.493	5887	V		0.411	BEN
6	0.722	3405	V			
7	1.255	3742			0.2278	BEN
	TOTAL	262010			0.6387	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PHOI	PAO
??			
12.678	0.227783	0	0
0	0	-2.02656E-6	0
12.9058			

ERROR 16:UNDEF'D STATEMENT IN 390

⊕ Shimadzu 221-25412 13 9

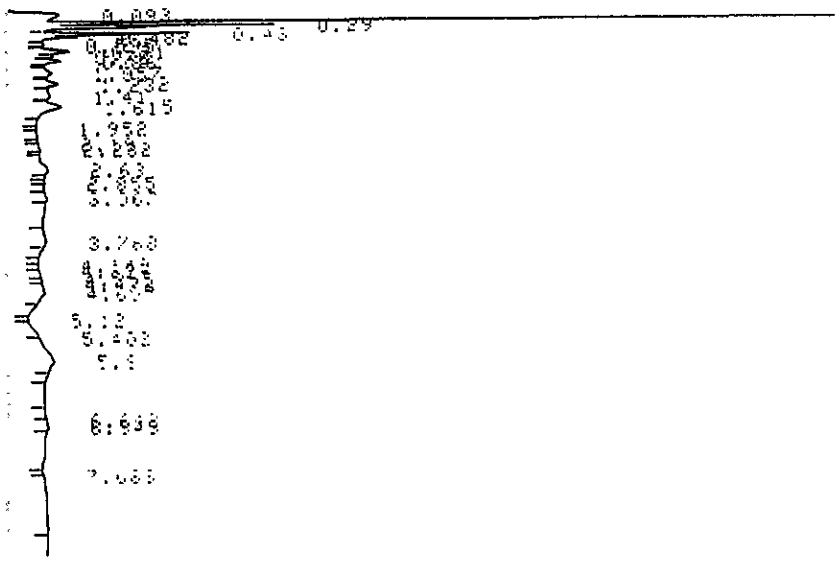
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-335L
Sample: V4|C
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 13:51:.4



CHROMATOPAC I-<IA FILE 0
SAMPLE NO 0 METHOD 24
REPORT NO 2726 SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.611	96[illegible]				
2	0.29	39227	V			
3	0.43	24[illegible]				
4	0.482	5628	V	6	0.3929	BEN
5	0.7[illegible]	92[illegible]				
6	0.86	3196		7	0.2015	HEX
7	1.2[illegible]	3556		1	0.2169	BZN
8	1.615	10171		8	0.467	I-OCT
9	2.6[illegible]	30[illegible]		2	0.1[illegible]	TOL
10	4.60[illegible]	3224				
11	5.8	11934		4	0.5462	M,P XY
	TOTAL	2[illegible]2			1.9542	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	CT BEN	PNOI	PAO
7.81326	0.216485	0.129996	0
0.546241	0	0.852539	0
0.55652			

ERROR 16:UNDEF'D STATEMENT IN 390

14 7

⊕ Standards

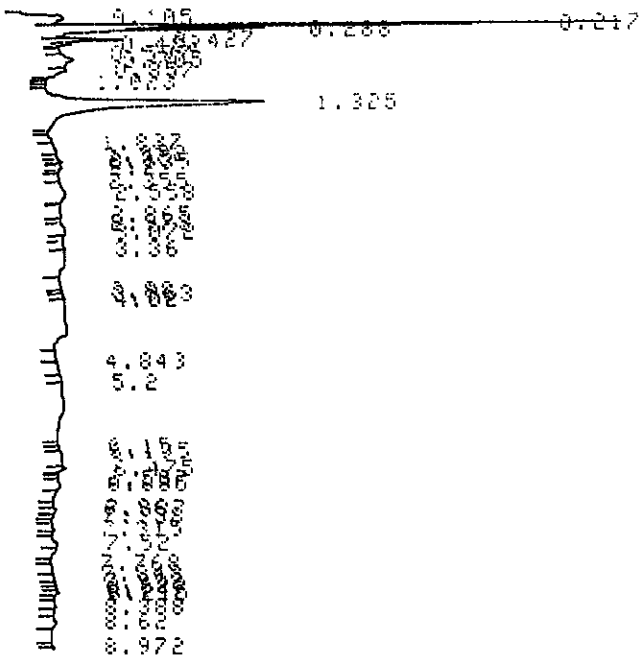
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-335
Sample: V5/A
Vol. Inj: 50 µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50 µl
Comments:

START
03/02/89 14:30:14



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2788

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.113	.3461				
2	0.217	07242	V			
3	0.288	05617	V			
4	0.427	0067				
5	0.703	3561				
6	1.325	09297				
7	8.558	4541		2	0.138	TOL
TOTAL		26270			0.138	

RUN 1
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
?			
4.25654	0	0.137951	0
0	0	6.12247	0
10.517			

⊕ Shinadow 221-25412 149

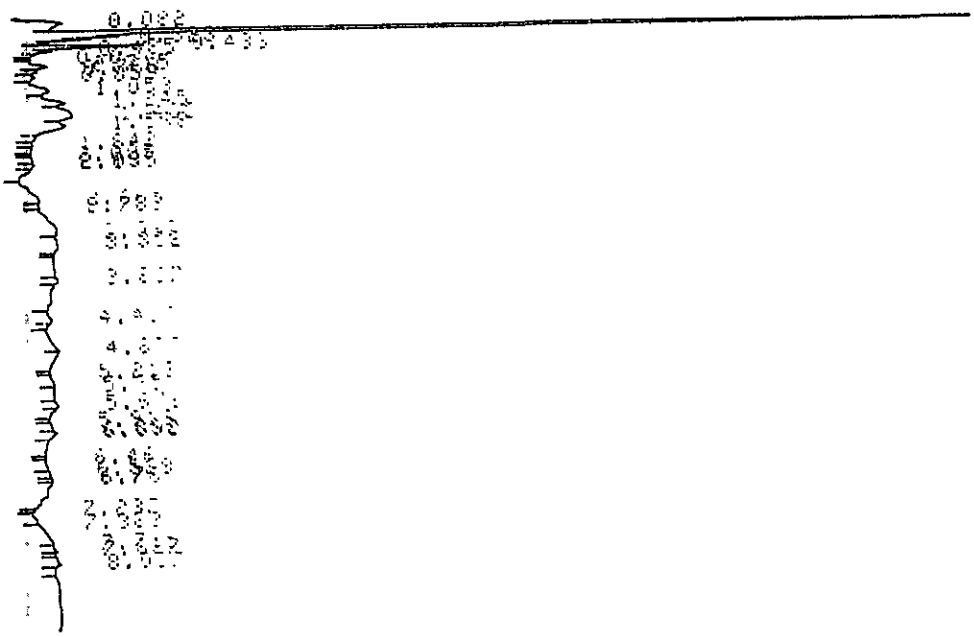
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V5/B
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 16:47:32



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 0110

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.000	42083				
2	0.218	667099	SV			
3	0.431	3177				
4	1.053	4110				
5	1.244	2426			0.2083	BEN
6	1.403	9834				
7	1.561	5771		C	0.2628	T-OCT
8	2.665	5219		2	0.2027	TOL
9	3.027	6497				
	TOTAL	730259			0.6738	

RUN
VOLUME INJECTED (UL)
50
DILUTION
1

PBD	BEN	TOL	P-XY-
M,P-XYL	ET BEN	PROI	PRO
T:			
40.3225	0.208297	0.202732	9
0	9	1.16328	0
-1.83963			

ERROR# 16:UNDEF'D STATEMENT IN 390

⊕ Stimadyne 221-25412 15 8

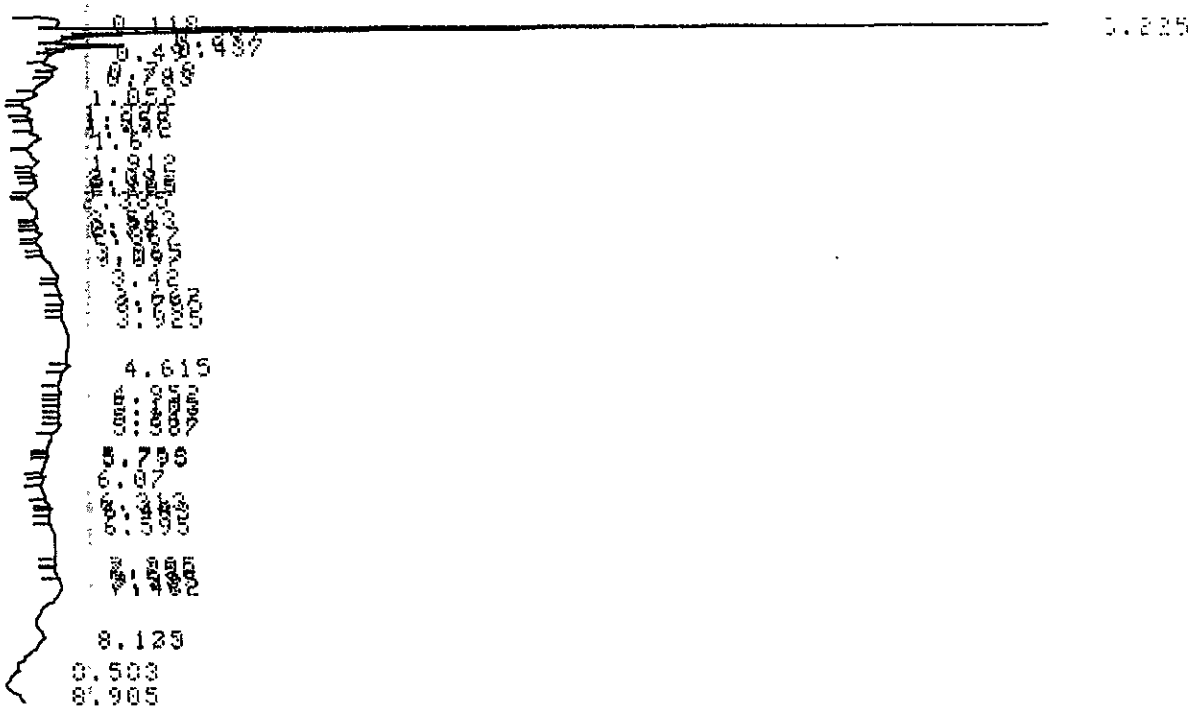
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705, 48
Station Number: 9-335
Sample: V5/C
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 17:25:08



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2741

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0....	.5/19				
2	0.225	330974	SV			
3	0....	.7...				
4	1.6	4398		9	0.202	1-OCT
TOTAL		357634			0.202	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
?			
18.459	0	0	0
0	0	9.267744	0
18.7268			

Shimadzu

221-25412

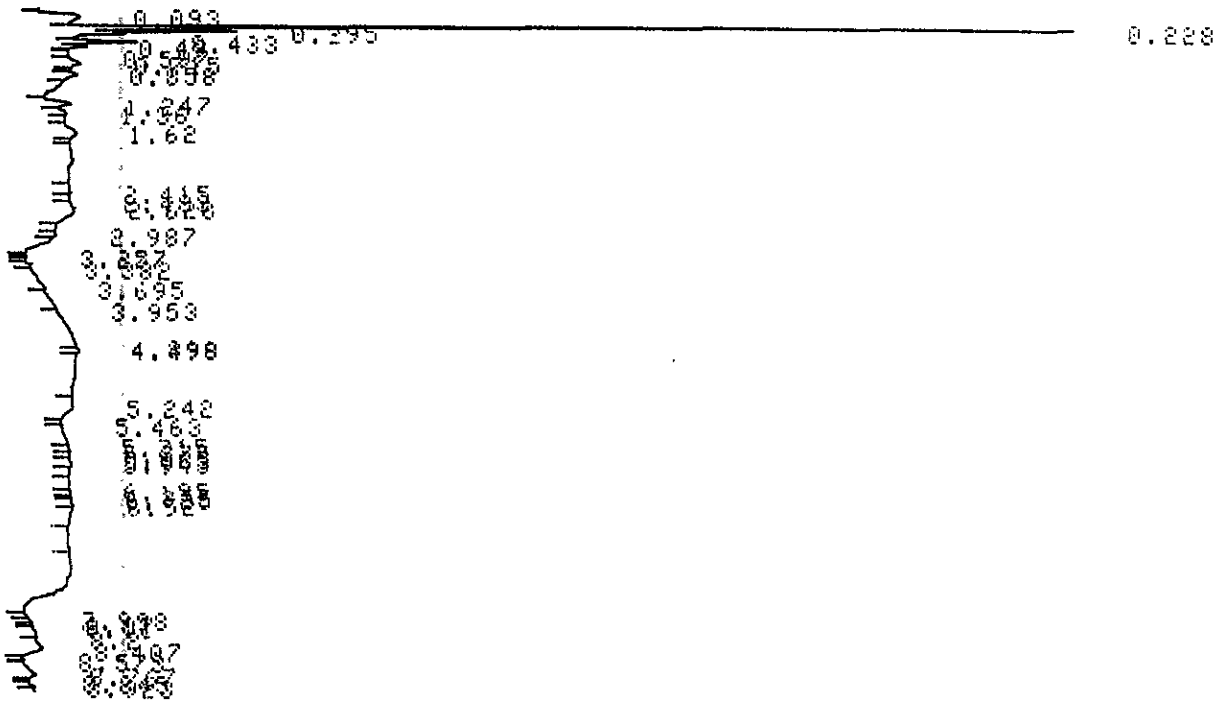
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V6
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 14:42:56



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2729

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.093	10320				
2	0.228	104761				
3	0.295	1674	V			
4	0.433	7244				
5	1.247	4438		1	0.2701	BEN
6	1.62	3317		8	0.1523	1-OCT
7	2.628	5684		2	0.2212	TOL
8	4.398	3062				
9	5.242	3436		3	0.1526	ETBEN
10	8.407	7408				
11	8.767	3636				
	TOTAL	172137			0.7962	

RUN
VOLUME INJECTED (UL)
? 0
DILUTION
? 1

⊕ Shimadzu 221-25412 15 0

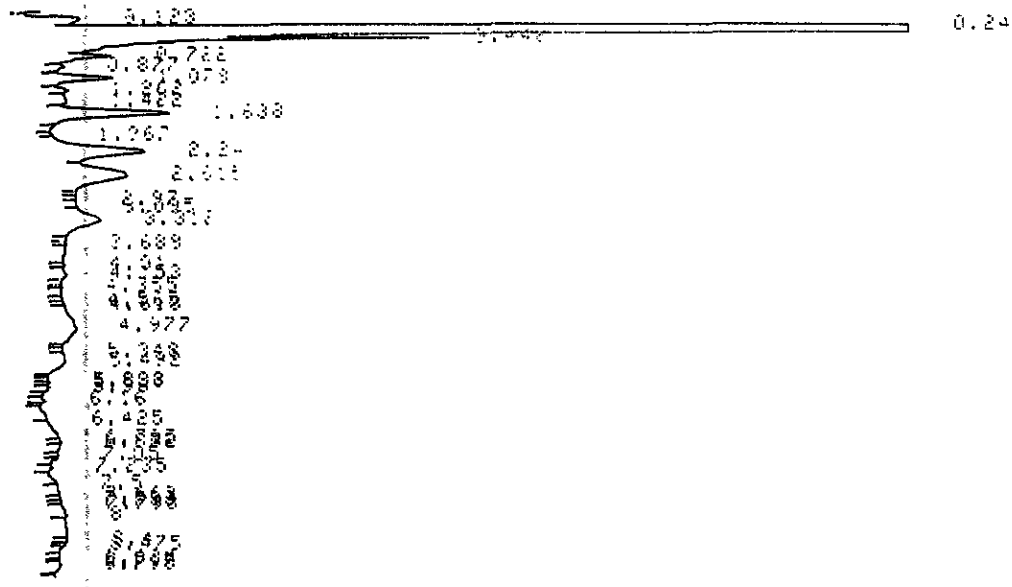
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-3356
Sample: V7/A
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

```
#ERROR# 6:DIVISION BY 0 IN    270
START
03/02/89          14:54:04
```




```
CHROMATOPAC   C-R1A                    FILE          0
SAMPLE NO     3                        METHOD          24
REPORT NO     3710                     SAMPLE WT     100
```

PKNO	TIME	AREA	TY	IDNO	CONC	NAME
1	0.23	3829				
2	0.24	3975982	BVE			
3	0.446	29550	V			
4	0.722	10491				
5	1.076	8360				
6	1.422	3270				
7	1.636	5[illegible]		3	1.7e44	I-OCT
8	2.24	53012				
9	2.63	1[illegible]85		1	1.8367	TOL
10	3.113	34224				
11	4.977	1[illegible]				
12	5.498	6241		2	0.3712	E-BEN
	TOTAL	4e1e100			4.9723	

```
RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PSB                  BEN                  TOL                  O-XYL
M,P-XYL              E-BEN                PNOI                 PAO
?
 244.439             2                    1.83672              0
 0                   0.371165             10.9799              0
 257.627
#ERROR# 16:UNDEF'D STATEMENT IN    390
```

⊕ Shimadzu 221-25412 15 1

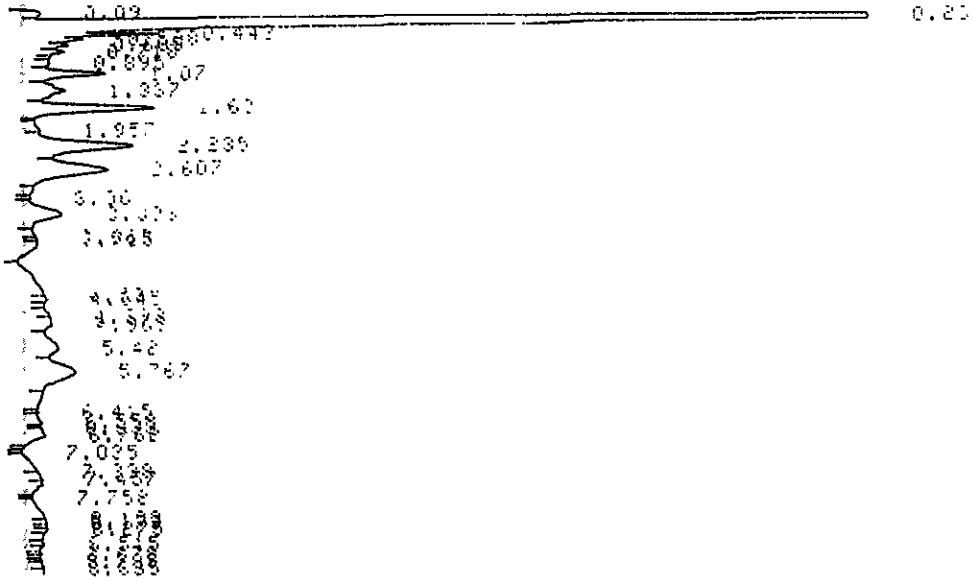
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-335
Sample: V7B
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 5:36:25



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2704

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.09	21131				
2	0.23	1282676	SVE			
3	0.443	7.1				
4	1.07	24370				
5	1.357	15439				
6	1.63	60808		8	2.7923	I-OCT
7	2.236	43134				
8	2.607	54264		2	2.1113	TOL
9	2.808	27144				
10	4.53	7434				
11	5.42	10855		1	0.4967	ETBEN
12	5.767	34102		4	1.5609	M/P XY
13	6.762	7721		5	0.3607	O XYL
	TOTAL	3643077			7.3418	

RUN
VOLUME INJECTED (UL)
50
DILUTION
1

PBB	BEN	TOL	O-XYL
M,P-XYL	ETBEN	NAP	PRO
PT			
201.937	0	2.1126	0.360722
1.56087	0.496707	1.8636	0.470016
218.846			

ERROR 16:UNDEF'D STATEMENT IN 390

⊕ Shrader 221-25412

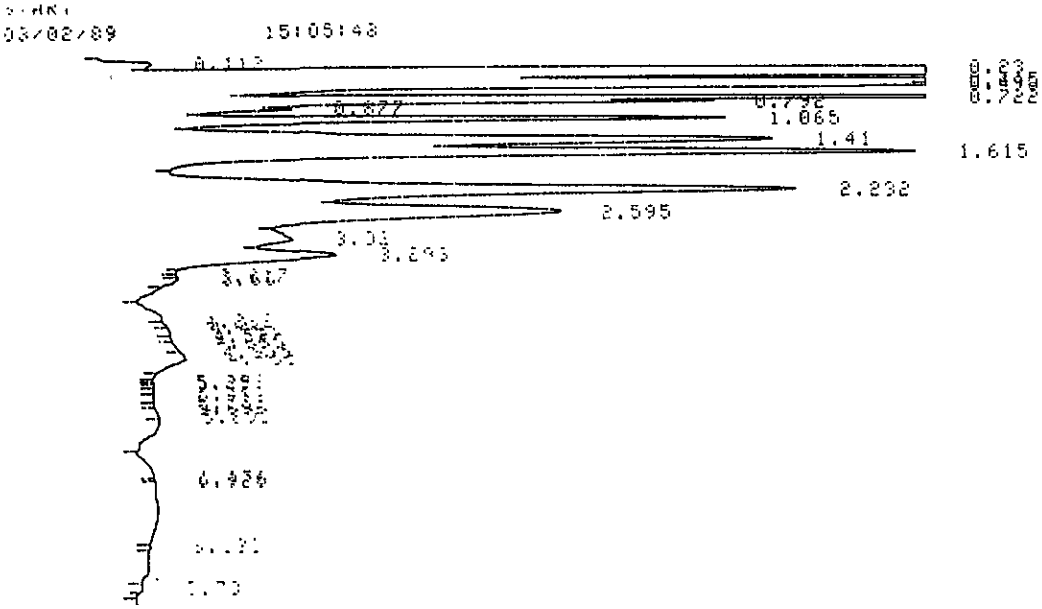
15 4

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705.48
Station Number: 9-335E
Sample: V8/A
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:



[ ]RDINATING	C-PEN		FILE	0		
AMPLE BY	3		METHOD	24		
EPORT NO	8751		SAMPLE WT	100		

RNO	TIME	AREA	PK	IDNO	CONC	NAME
1	0.113	22761				
2	0.27	5136836	VE			
3	0.445	156673	V			
4	0.498	447348	V	6	31.2307	PEN
5	0.724	33660	V			
6	0.792	130954	V			
7	0.877	26616	V	7	1.6781	HEX
8	1.065	209638				
9	1.41	45667				
10	1.615	45800	V	8	21.0314	I-OCT
11	1.232	52782				
12	2.595	388678	V	2	13.1857	TOL
13	3.01	27721				
14	3.293	89418				
15	3.284	9106				
16	4.955	10265				
17	6.879	4311		5	0.2126	O XYL
	TOTAL	9969.82			67.3384	

RUN
VOLUME INJECTED (UL)
50
DILUTION
1

PPD	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
488.318	0	13.1857	0.212557
0	0	103.056	0.26239
805.03			

ERROR 16:UNDEF'D STATEMENT IN 390

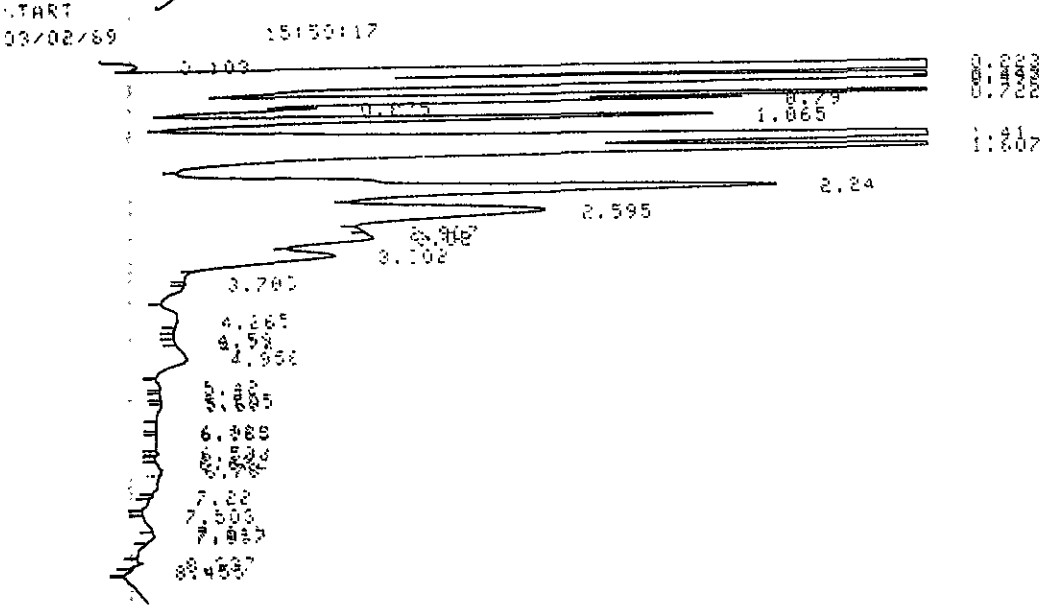
⊕ Shinadow 221-25412 15 2

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-335
Sample: V8/B
Vol. Inj: 40µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:



CHROMATOGRAM 1-PEN
SAMPLE NO 0
REPORT NO 2215

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	TY	BASE	CONC	NAME
4	1.457	1951	V	0	27.5885	PEN
6	2.27	1964	V			
7	2.595	2111	V		2.549	??
8	3.105	3.5+ 3				
10	4.267	5+11		1	24.8909	1-OCT
12	5.885	1.+1+2	V	2	15.0734	TOL
14	8.00	1197	V			
16	4.265	1035				
TOTAL	10.69765				70.0908	

RUN
VOLUME INJECTED (UL)
? 40
DILUTION
? 1

PBB	PEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
579.631	0	18.8417	0
0	0	169.079	0
767.75			

ERROR 16:UNDEFD STATEMENT IN 390

Skinadex 221-25412 15 5

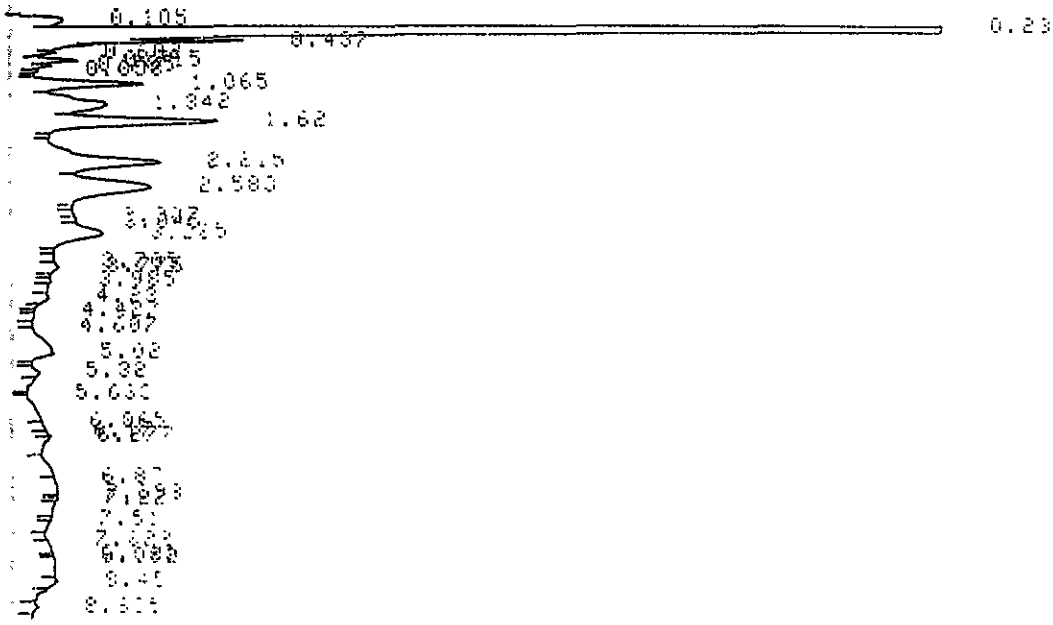
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V9
Vol. Inj: 50 µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50 µl
Comments:

START
03/02/89 16:15:30



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2716
FILE 0
METHOD 24
SAMPLE WT 100

PEAK	TIME	AREA	MK	IDNO	CONC	NAME
1	0.105	44960				
2	0.23	3628955	SVE			
3	0.437	14445				
4	0.715	6880				
5	1.065	39436				
6	1.342	34307				
7	1.62	74441		0	3.4102	I-OCT
8	2.215	63180				
9	2.583	65799		2	2.5602	TOL
10	3.285	26911				
11	5.02	24664				
	TOTAL	4099851			5.9704	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

O-XYL	M-P-XYL	BEN	TOL	O-XYL
	RET		RET	
222.817		0	0.56022	0
3		0	15.0522	0
240.43				

ERROR 16:UNDEF'D STATEMENT IN 390

⊕ Shimadzu 221-25412

15 6

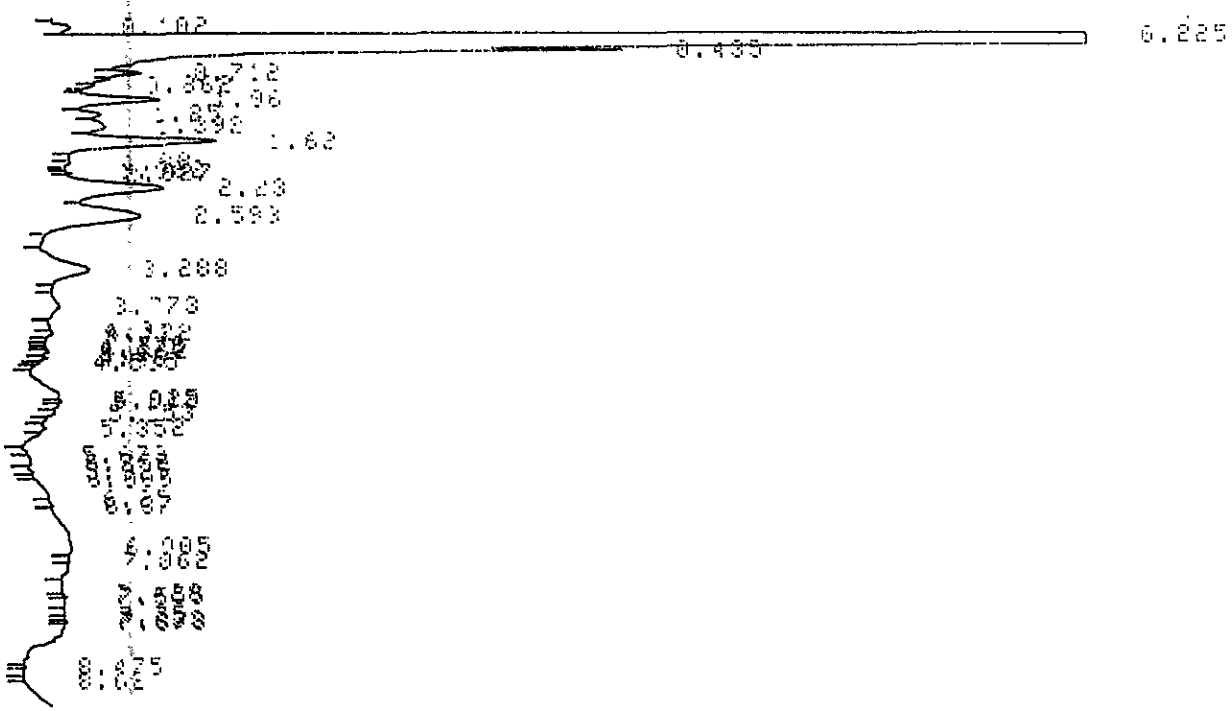
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V10
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 10:25:31



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2737

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.102	4492				
2	0.225	6367635	B	E		
3	0.435	13875		F		
4	0.712	5320				
5	1.00	20884				
6	1.25	3718		1	0.2264	BEN
7	1.500	6503				
8	1.662	58608		8	2.6913	I-OCT
9	2.293	54661				
10	2.593	53397		2	2.2722	T[illegible]
11	3.288	33523				
12	3.773	7269				
13	8.805	12961		5	0.6391	O XYL
	TOTAL	6657249			5.8239	

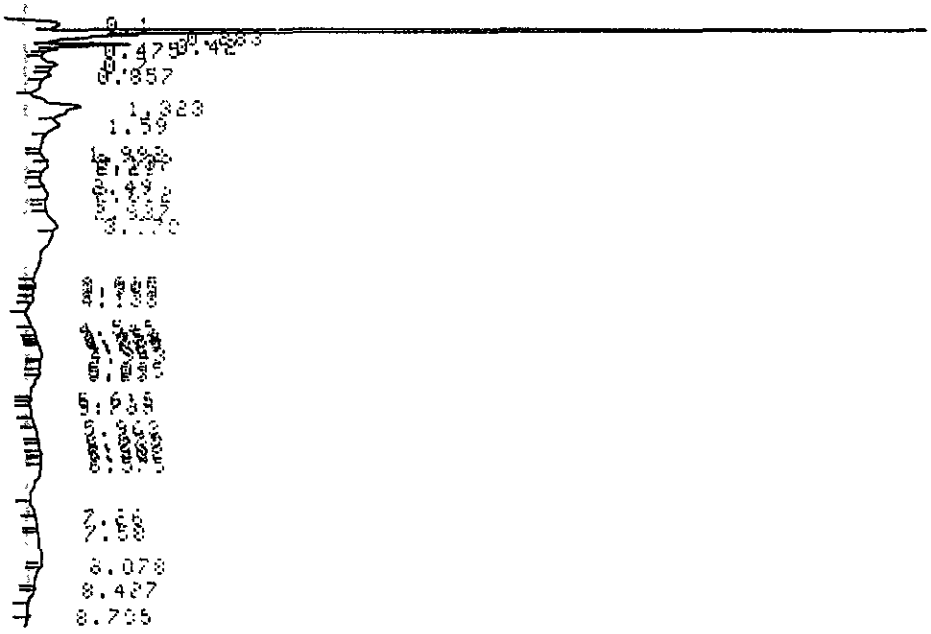
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-335L
Sample: V11
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MC, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 16:35:33



CHROMATOPAC C-R3A FILE 0
SAMPLE NO 0 METHOD 24
REPORT NO 2738 SAMPLE WT 100

PKNO	TIME	AREA	MF	IDNO	CONC	NAME
1	0.1	21961				
2	0.207	588901	V			
3	0.285	18379	V			
4	0.42	10293				
5	1.323	22093				
6	1.59	4553		0	0.2093	1-OCT
7	3.070	4442				
	TOTAL	670232			0.2093	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PSB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	2-01	PAO
35.8595	0	0	0
0	0	1.89573	0
37.7552			

ERROR 16:UNDEF'D STATEMENT IN 390

221-25412

15.7

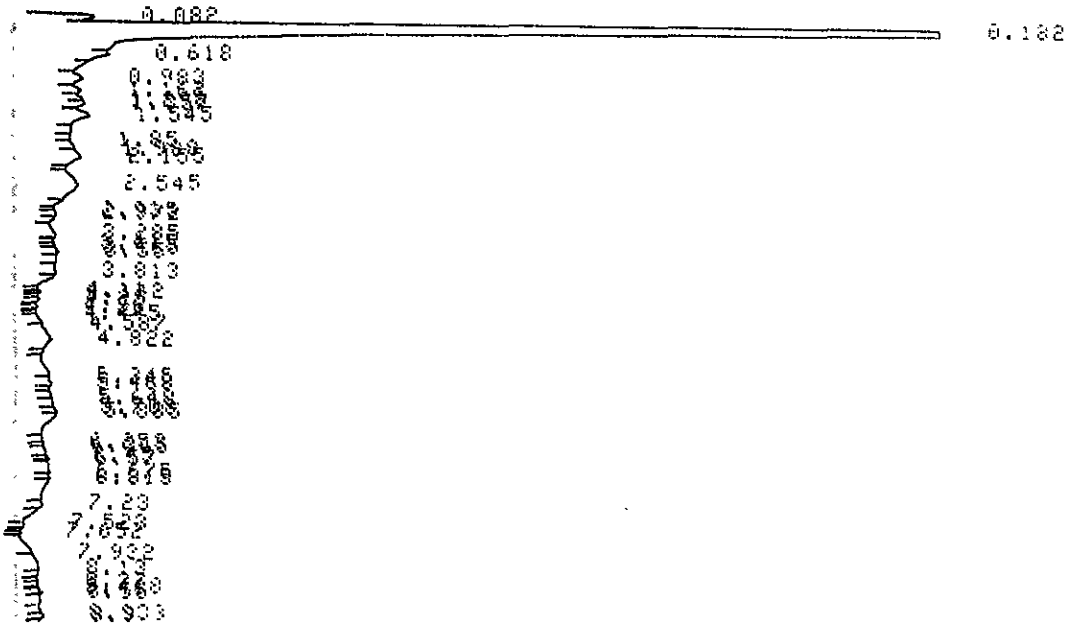
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705, 48
Station Number: 9-335L
Sample: V12
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 17:36:05



CHROMATOGRAM 0--2A
SAMPLE NO V
REPORT NO 2[illegible]

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	%	IDNO	CONC	NAME
1	0.082	[illegible]				
2	0.182	3807300	SVE			
3	[illegible]	[illegible]				
4	2.545	7[illegible]		8	0.8507	1-OCT
5	[illegible]	[illegible]				
6	3.813	13[illegible]		2	0.5181	TOL
7	[illegible]	[illegible]				
	TOTAL	3369487			0.8628	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

BB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
200.099	0	0.512108	0
9	0	1.45675	0
202.068			

ERROR 16:UNDEF'D STATEMENT IN 390

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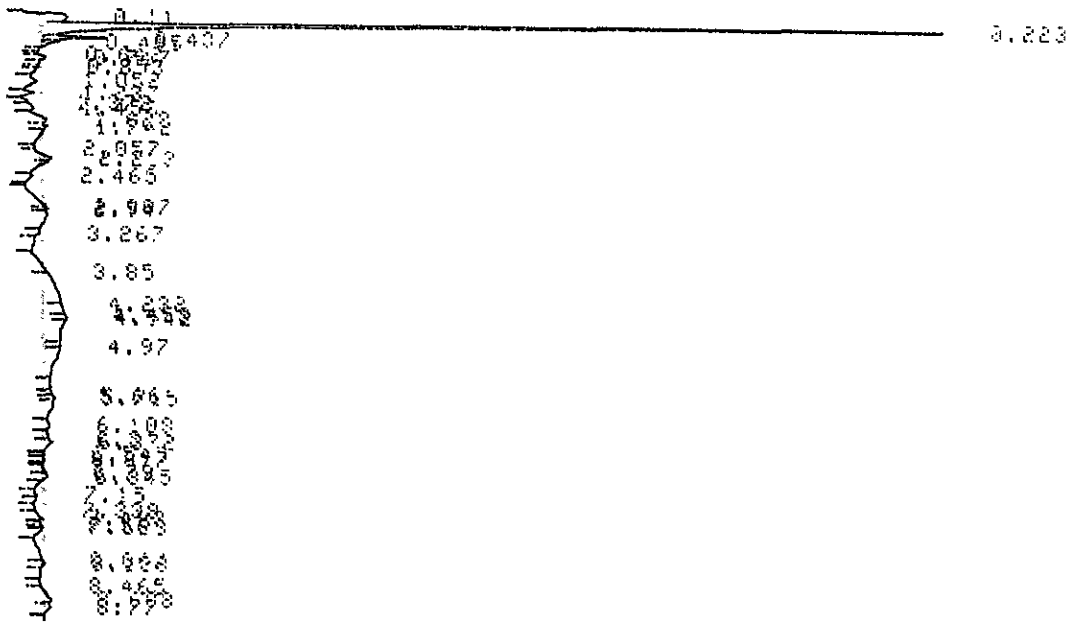
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-3356
Sample: V13
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 17:11:27



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2743

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	[illegible]	[illegible]	TYPE	CONC	NAME
2	3.223	[illegible]	V			
3	[illegible]	[illegible]				
4	[illegible]	[illegible]				
5	[illegible]	[illegible]		V	0.1398	I-OCT
6	4.232	[illegible]				
	TOTAL	[illegible]			0.1398	

SUM
VOLUME INJECTED [illegible]
0 SC
DILUTION
1

M/P-XYL	BEN	TOL	O-XYL
23.2654	0	0	0
0	0	0.375031	0
23.6407			

ERROR 16:UNDEFINED STATEMENT IN 390

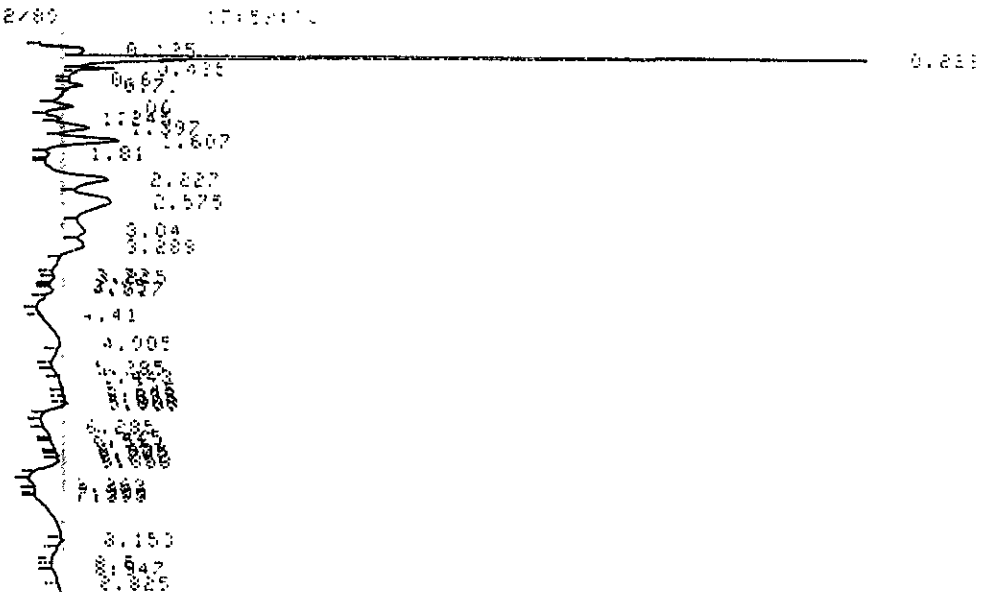
⊕ Shaudex 221-25412 15 9

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705.48
Station Number: 9-335Z
Sample: V14
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MC, PP, JD
Std. Vol. Inj: 50µl
Comments:



⊕ Stimsonite 221-25412 16 1/2

CHROMATOGRAM C-M3A
SAMPLE NO 0
REPORT NO 274

FILE 0
METHOD 24
SAMPLE WT 100

CMD	TIME	AREA	CMD	TIME	NAME
1	1.120	1.1			
2	1.328	0.257			
3	1.432	0.1			
4	1.6	1661			
5	1.16	1.1			
6	1.397	.5594			
7	1.1	1.1	1	1.19.7 1-0	
8	1.827	1333			
9	1.3	1.1	1	1.36.8 TOL	
10	1.84	1.1			
11	1.0	1.1			
12	1.212	1.1			
13	1.61	1.1	1	0.1.6.0 0 1	
		1.1		1.3.9	

UNK
VOLUME INJECTED (UL)
50
DILUTION
1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
24.6602	0	1.50179	0.261565
0	0	7.06397	0.322914
34.1104			

ERROR 16:UNDEF'D STATEMENT IN 390

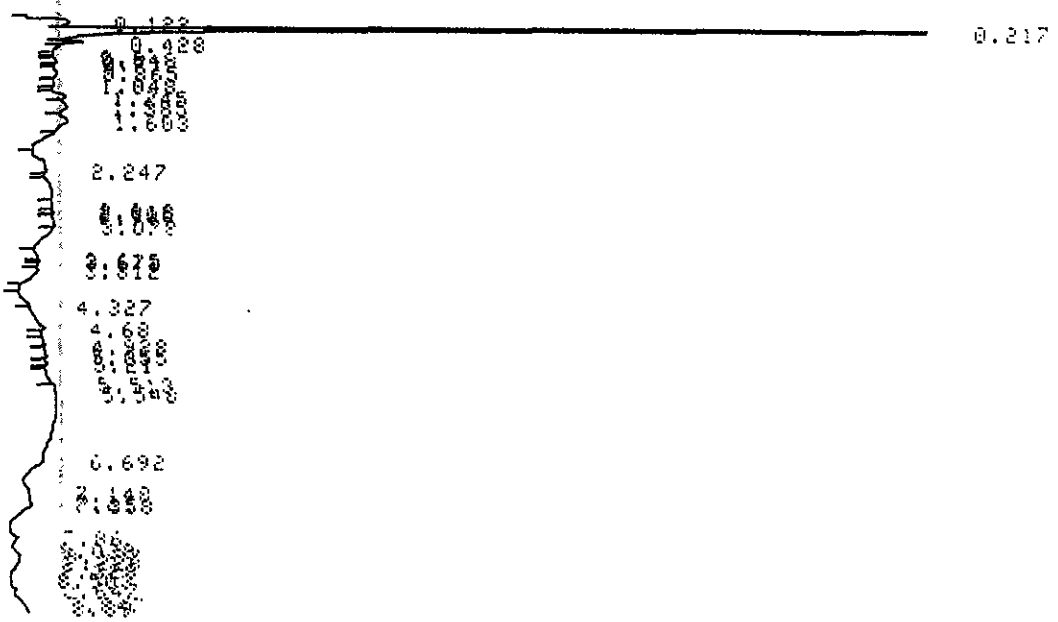
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-335
Sample: V15
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 18:05:32



CHROMATOPAC C-R3A FILE 3
SAMPLE NO: 0 METHOD 24
REPORT NO: 1744 SAMPLE WT 100

PKNO	TIME	AREA	M	TONO	CONC	NAME
1	0.122	3561				
2	0.217	104299	V			
3	1.385	2014				
4	1.603	5375		8	0.2466	I-OCT
5	2.247	451				
6	5.812	3186				
	TOTAL	296409			0.2468	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
?			
13.9961	0	0	0
0	0	1.0037	0
14.9993			

ERROR 16:UNDEF'D STATEMENT IN 390

⊕ Shimadzu

221-25412

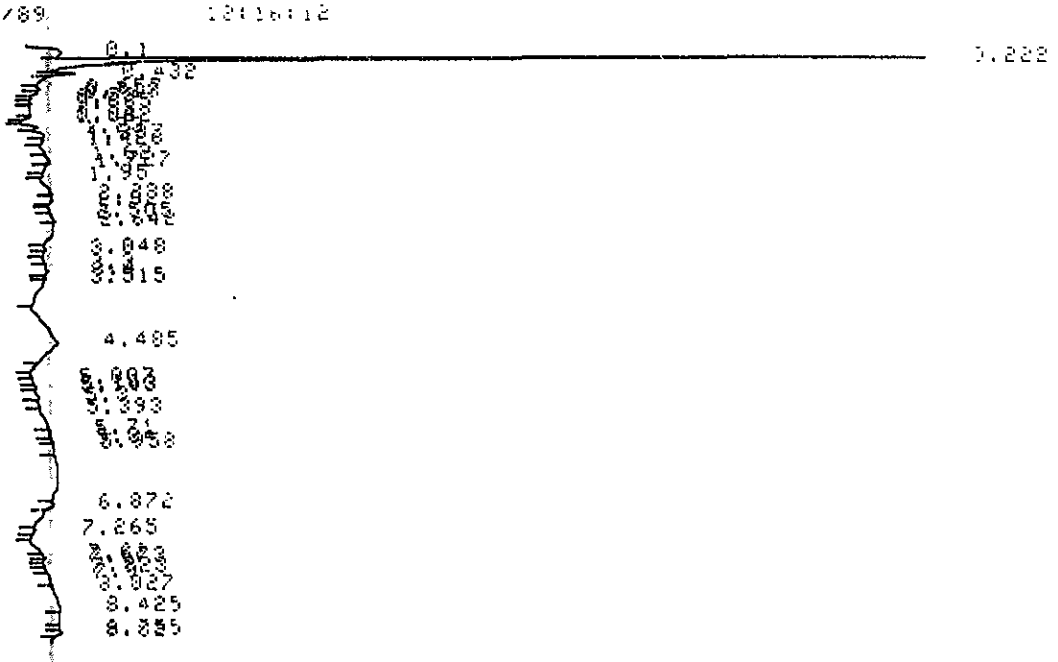
16 2

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: 10705.48
Station Number: 9-3358
Sample: V16/A
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2745

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.322	259845	V			
2	4.485	44421				
TOTAL		304266			0	

RUN
VOLUME INJECTED (UL)
50
DILUTION
1

TIME	AREA	TOTAL	AREA
M,P-XYL	OF 304266	AREA	PCT
3.9743	0	0	0
0	0	2.7053	0.196213
6.8755			

ERROR 6:UNDEF'D STATEMENT IN 390

Shimadzu 221-25412 16 3

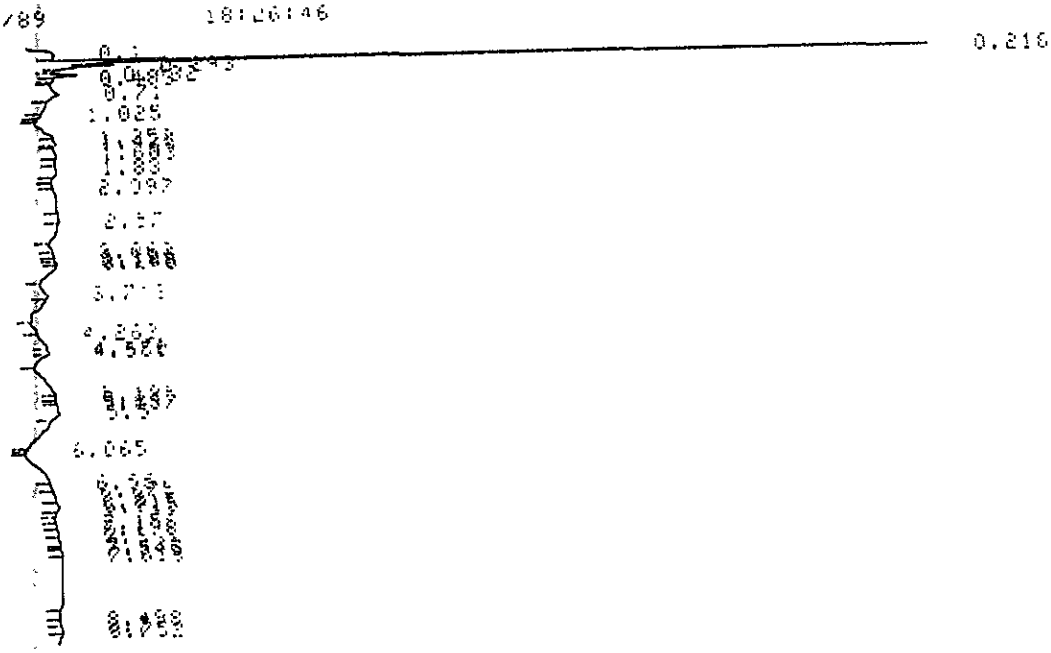
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: 10705, 48
Station Number: 9-335
Sample: V16/B
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

START
03/02/89 18:26:46



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2746

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.1	[illegible]				
2	0.216	106314	SV			
3	0.432	[illegible]				
4	0.71	5384				
5	5.195	[illegible]		3	0.1489	ETBEN
6	5.5	3552		4	0.1626	M/P XY
7	6.55	3064		5	0.1609	O XYL
	TOTAL	160944			0.4724	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
6.500695	0	0	0.160925
0.162563	0.146877	0.146225	0
0.11264			

ERROR 16:UNDEFD STATEMENT IN 390

Shimadzu

221-25412

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

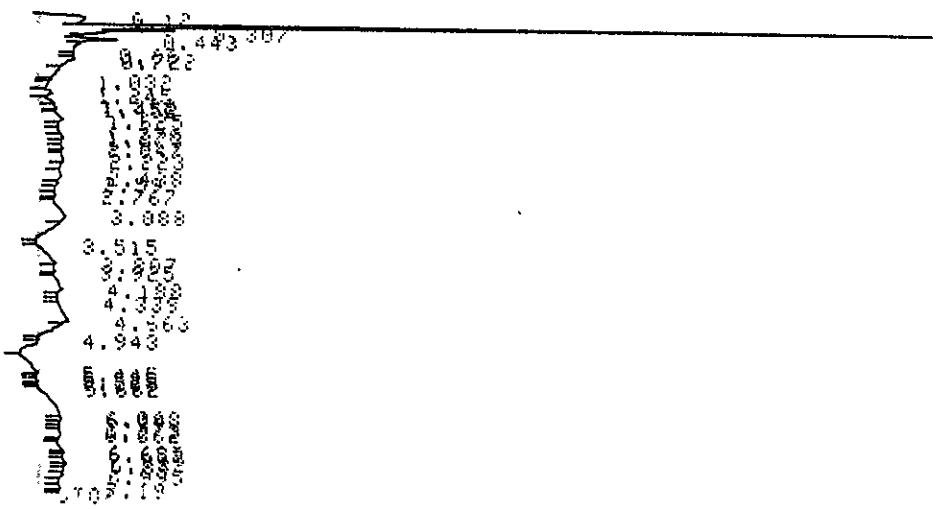
HNU 421 Gas Chromatogram report sheet

Project Number: 10705, 48
Station Number: 9-335
Sample: V16/C
Vol. Inj: 50µl

Date: 3/2/89
Analysts: MG, PP, JD
Std. Vol. Inj: 50µl
Comments:

16 4

START
93/02/09 18:40:54



CHROMATOGRAM C-932H
SAMPLE NO 0
REPORT NO 2747
FILE 0
METHOD 24
SAMPLE WT 100

PEAK NO	TIME	AREA	TYPE	UNITS	CONC	NAME
1	0.000	0.0000				
2	0.237	2.8E-02	BV			
3	0.307	45				
4	0.443	5140				
5	0.520	5412				
6	0.783	2182				
7	0.901	1716				
8	0.995	3851		3	0.1358	ETBEN
9	1.066	1.0				
TOTAL		3.7E+5			0.1358	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	PAO
IT			
16.0455	3	0	0
0	0.135816	1.29027	0
7.471%			

#ERROR# 16:UNDEF'D STATEMENT IN 390