EA Project CHV 83Q

REPORT OF INVESTIGATION
CHEVRON SS 9-2582
7240 DUBLIN BOULEVARD
DUBLIN, CALIFORNIA

Prepared for

Chevron U.S.A. Inc.
San Ramon, California

Prepared by

EA Engineering, Science, and Technology, Inc.
Lafayette, California

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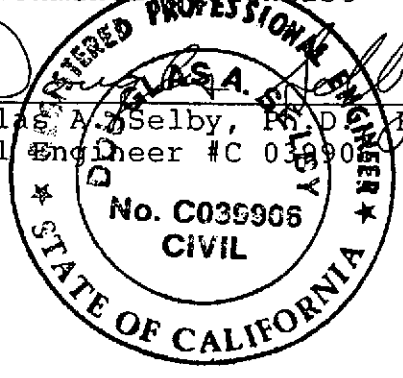
Environmental Scientist

3/25/88
Date



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3/25/88
Date

March 1988

CONTENTS

1. INTRODUCTION

1.1 SCOPE

At the request of Chevron U.S.A. Inc., EA Engineering, Science, and Technology, Inc. (EA) conducted a soil vapor contaminant assessment (SVCA) at Chevron Service Station 9-2582 in Dublin, California. This report describes the SVCA and presents the results.

1.2 SITE SETTING

Chevron Service Station (SS) 9-2582 is located at 7240 Dublin Boulevard, Dublin, Alameda County, California (Figure 1). It is on the southwestern corner of the intersection of Dublin Boulevard and Village Parkway (Figure 2). The neighborhood consists predominantly of commercial properties, but U.S. Interstate 680 and an unnamed canal border the site on the west, and there are residences to the northeast at a distance of less than one-quarter mile. There are no other known underground petroleum product storage tanks in the immediate area of the site.

The site is located in a relatively flat area at approximately 330 feet above mean sea level. The general topographic gradient is about 10 feet per mile (0.002), down to the south-southeast. There is significant topographic relief on the site itself: large planters on the north side of the station are approximately two feet higher than the paved area.

The Dougherty Hills are approximately one mile north-northeast of the site, and other hills of the Diablo Range rise from an elevation of 400 feet msl to 800 feet, beginning approximately one mile to the west. Other than the unnamed concrete channel that drains to the southeast, built to protect Highways 680 and 580 from storm runoff from the numerous intermittent streams in

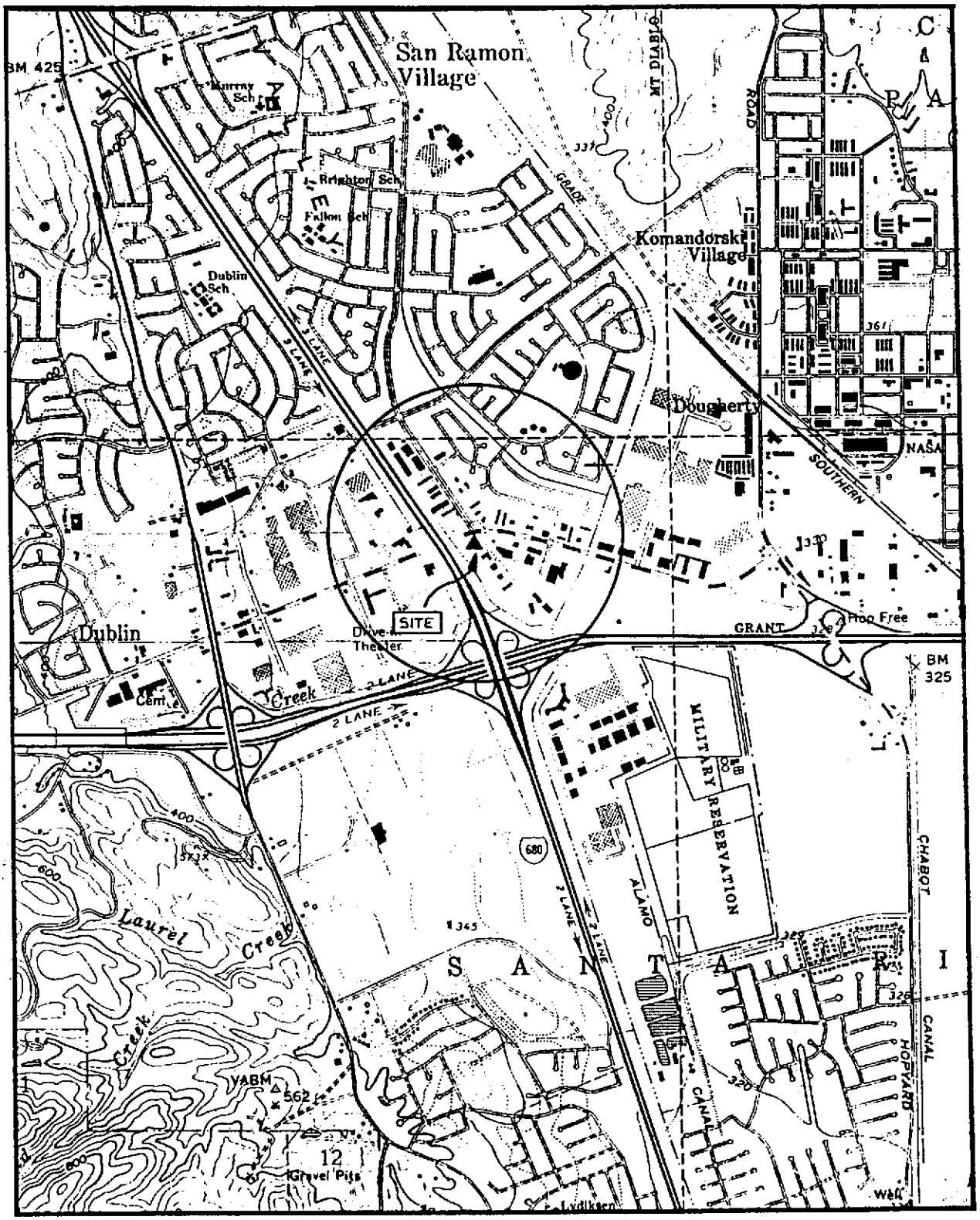

Figure 1. Location and topography of Chevron SS 9-2582, 7420 Dublin Blvd., Dublin, California

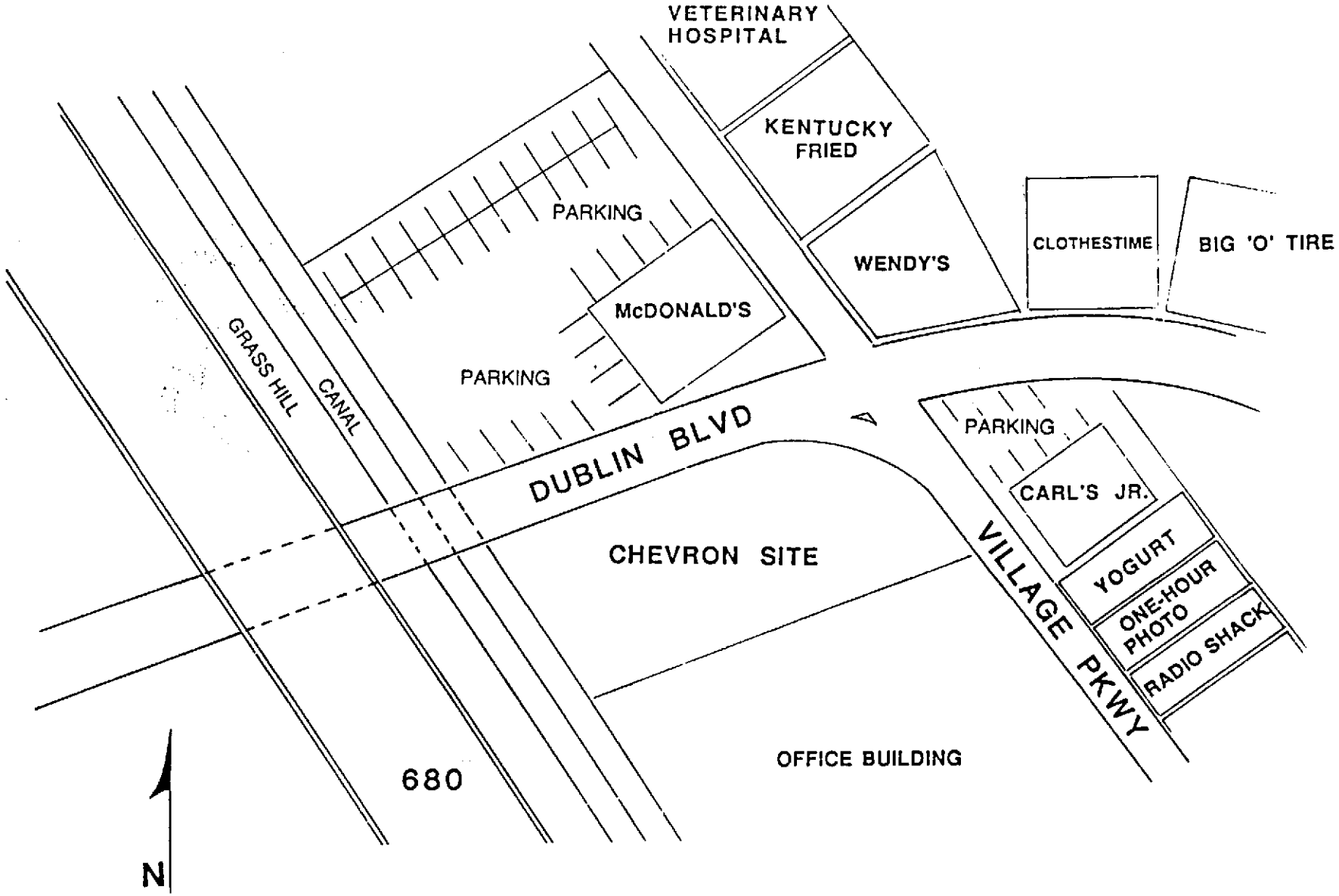

Figure 2. Land use in the vicinity of Chevron Service Station 9-2582, Dublin, California.

the hills, the nearest downgradient surface water is Laurel Creek, approximately 4,000 feet southwest of the site.

1.3 HYDROGEOLOGY AND WATER USE

The site is located on semi-consolidated and unconsolidated Quaternary alluvium which was deposited in lake, playa, and stream environments in the San Ramon Valley. The elevation of ground water in the vicinity is between 320 and 330 feet above sea level (Killingsted 1988, pers. comm.), which puts it at a depth of 10 feet or less.

No soil borings are available for this site, so the detailed local subsurface geology is unknown. The expected ground-water gradient is to the south (Killingsted 1988, personal communication).

The City of Dublin (Killingsted 1988, personal communication) has no records of public or private wells within one-half mile of the site, but because there are older businesses and homes in the area, there may be local wells not on record. The municipal water district uses reservoir water primarily, but one-third of its total water comes from wells in the region.

2. SOIL VAPOR CONTAMINANT ASSESSMENT

Following a subsurface gasoline release, as free product migrates downward towards the ground water 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 ground water, 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 ground-water, 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 11 February 1988, EA conducted an SVCA at the Dublin site. Samples of shallow soil gas were taken at 15 on-site locations (Figure 3). Vertical profiles of soil gas hydrocarbon composition were made at

- the southeastern corner of the tank field (V1, at 3, 5.5, 8, 10.5, and 13 feet)
- the northwestern corner of the tank field (V2, at 3, 10.5 and 15.5 feet)
- the southwestern corner of the tank field (V3, at 3 and 13 feet)
- the northeastern planter (V4, at 3 and 15.5 feet)
- the southern pump island (V7, at 3 and 5.5 feet)
- the northern pump island (V8, at 3 and 5.5 feet).

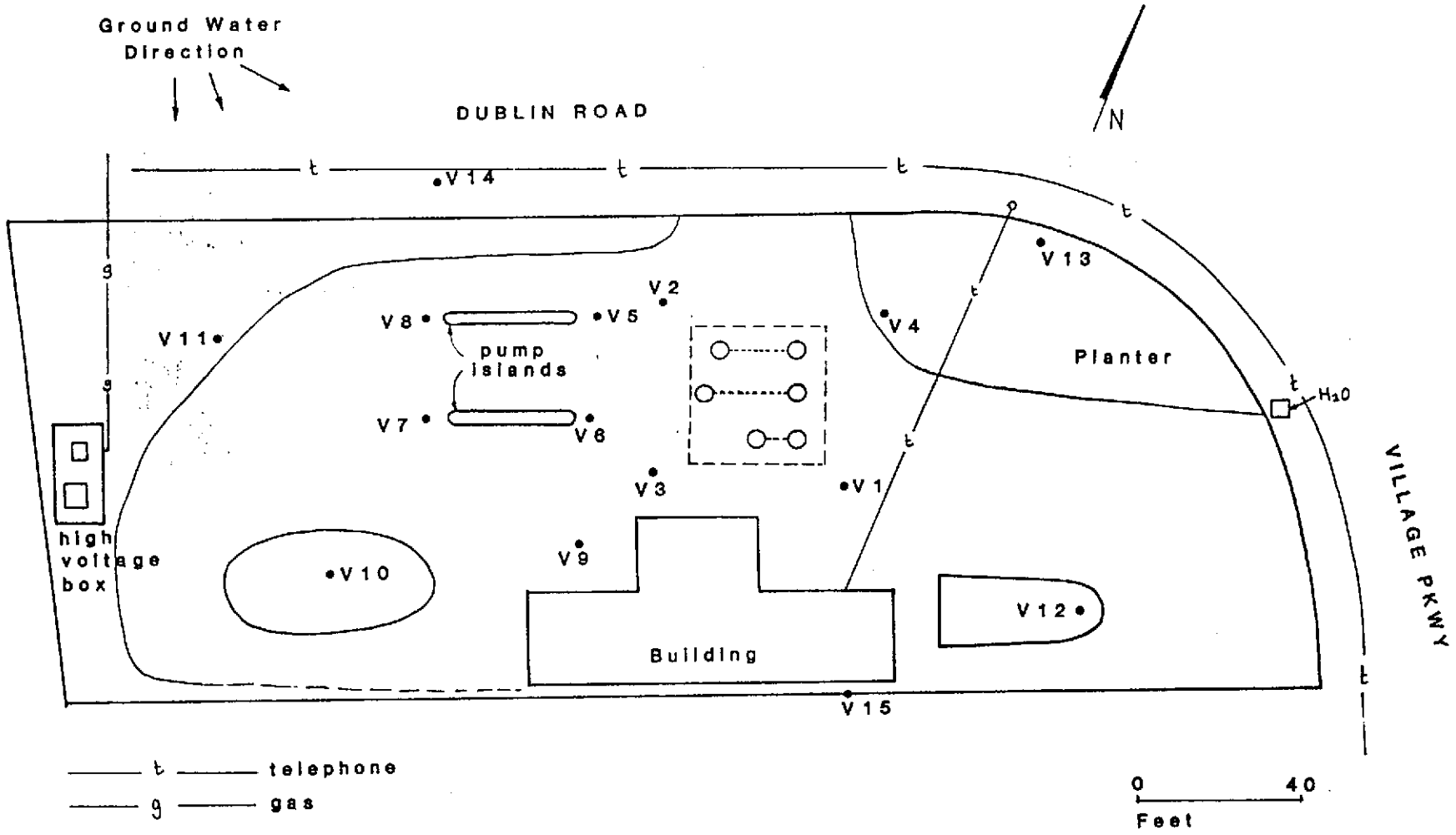

Figure 3. Site plan, with soil vapor sampling points, of Chevron SS 9-2582, Dublin, California, February 1988.

Before each sample was collected, a vacuum pump was used to purge previously collected vapor from the probe to ensure that the sample was not contaminated. The vacuum pressure reading on the purging apparatus was recorded. This vacuum pressure is related to the soil's gas permeability: a high vacuum reading suggests that there is a resistance to soil gas movement and a vacuum is being created between the tip of the probe and the pump. If this vacuum is maintained after the pumping period, a representative sample of the soil gas may not be obtained, and anomalously low hydrocarbon readings may result. In most situations, when the purging pump is turned off and the stopcock is closed the initial vacuum is released and the vacuum pressure reading drops. A low reading indicates that there is a free flow of soil gas from the vadose zone through the probe, and after purging the sample is assumed to be representative.

The samples were 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 60^{o}C and the capillary column flow rate is 10 ml/min. These conditions ensure peak retention time stability and prevent contaminant build-up within the column. Blanks are run to verify that the system is free of contamination; as necessary, the instrument is re-calibrated by injecting standards. These data 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 known concentrations of benzene, toluene, xylenes, and ethylbenzene. 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. Although petroleum hydrocarbons produce variable instrumental responses, the assumption may be made that all of the hydrocarbon constituents have response-to-concentration ratios approximately equivalent to that of benzene and that all quantifications may be based on the response ratio for benzene. 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 benzene. Similarly, the column entitled "Total Volatile Hydrocarbons" represents the sum of all V-sec responses, proportioned to that for benzene.

2.2 SVCA RESULTS

The results (Appendix B) of the SVCA conducted at the Dublin site are summarized in Table 1. The surfaces of the planters are about two feet above the paved surfaces, so for comparison of the vertical positions of constituent concentrations, the depths for points V4, V11, and V13 should be considered to be 2 feet less than those reported in Table 1. Isoconcentration contours of hydrocarbon constituents in the soil vapor are plotted in Figures 4 through 7. Moderate-to-high concentrations of hydrocarbons were detected at depths of 6 to 13 feet near the southern pump island, especially at point V7. Except for the very mobile compounds that elute prior to benzene, the hydrocarbon plumes appear to remain within the site boundaries.

TABLE 1 CONCENTRATIONS OF HYDROCARBON CONSTITUENTS IN SOIL VAPOR AT CHEVRON SS 9-2582, DUBLIN, CALIFORNIA 11 FEBRUARY 1988

Sample Location	Depth (ft)	Peaks Prior[a] to Benzene (ppm)[b]	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	Peaks Not Otherwise Identified (ppm)[b]	Total Volatile Hydro-carbons (ppm)[b]
V1/A	3	<1	<1	<1	<1	<1	<1	6	6
V1/B	5.5	<1	<1	<1	<1	<1	<1	<1	<1
V1/C	8	84	<1	<1	<1	<1	<1	<1	85
V1/D	10.5	<1	<1	<1	<1	<1	<1	<1	<1
V1/E	13	330	1	<1	<1	<1	<1	6	340
V2/A	3	<1	<1	<1	<1	<1	<1	<1	1
V2/B	10.5	<1	<1	<1	<1	<1	<1	<1	<1
V2/C	15.5	1	<1	<1	<1	<1	<1	<1	1
V3/A	3	320	<1	<1	<1	<1	<1	14	330
V3/B	13	1	<1	<1	<1	<1	<1	<1	1
V4/A	3	4	<1	<1	<1	<1	<1	<1	5
V4/B	15.5	2,000	11	6	<1	<1	<1	120	2,100
V5	3	1	<1	<1	<1	<1	<1	<1	1
V6	3	<1	<1	5	<1	<1	<1	1	6
V7/A	3	<1	<1	<1	<1	<1	<1	<1	<1
V7/B	5.5	7,500	150	200	<1	<1	3	1,800	9,700
V8/A	3	13	<1	<1	<1	<1	<1	<1	14
V8/B	5.5	1,100	65	140	<1	2	5	860	2,200
V9	4	15	<1	<1	<1	<1	<1	<1	15
V10	6.5	150	<1	<1	<1	<1	<1	<1	150
V11	6.5	<1	<1	<1	<1	<1	<1	<1	<1
V12	13	280	<1	<1	<1	<1	<1	<1	280
V13	15.5	3	<1	<1	<1	<1	<1	<1	3
V14	6.5	78	<1	<1	<1	<1	<1	<1	78
V15	13	<1	<1	<1	<1	<1	<1	<1	<1

a. Early peaks from blank data subtracted from total peaks prior to benzene.
b. Quantification based on V-sec:ppm ratio for benzene (see text).

TABLE 1 (CONT.)

BLANK DATA

Time	Peaks Prior[a] to Benzene (ppm)[b]	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	Peaks Not Otherwise Identified (ppm)[b]	Total Volatile Hydro-carbons (ppm)[b]
1040	1	<0.1	<0.3	<0.1	<0.1	<0.1	<0.1	1
1232*	1	<0.1	—	—	—	—	—	—
1528*	1	<0.1	—	—	—	—	—	—

PERCENTAGE OF STANDARD RECOVERED

Test Time	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)
1010	100	100	100	100	100
1337	104	107	137	115	126

GASOLINE STANDARD

Sample	Peaks Prior[a] to Benzene (ppm)[b]	Benzene (ppm)	Toluene (ppm)	o-Xylene (ppm)	m,p-Xylene (ppm)	Ethyl-benzene (ppm)	Peaks Not Otherwise Identified (ppm)[b]	Total Volatile Hydro-carbons (ppm)[b]
Regular	150,000	4,600	6,200	550	1,700	380	13,000	180,000

Note: * indicates an abbreviated blank chromatogram, used to determine peaks eluting prior to benzene.

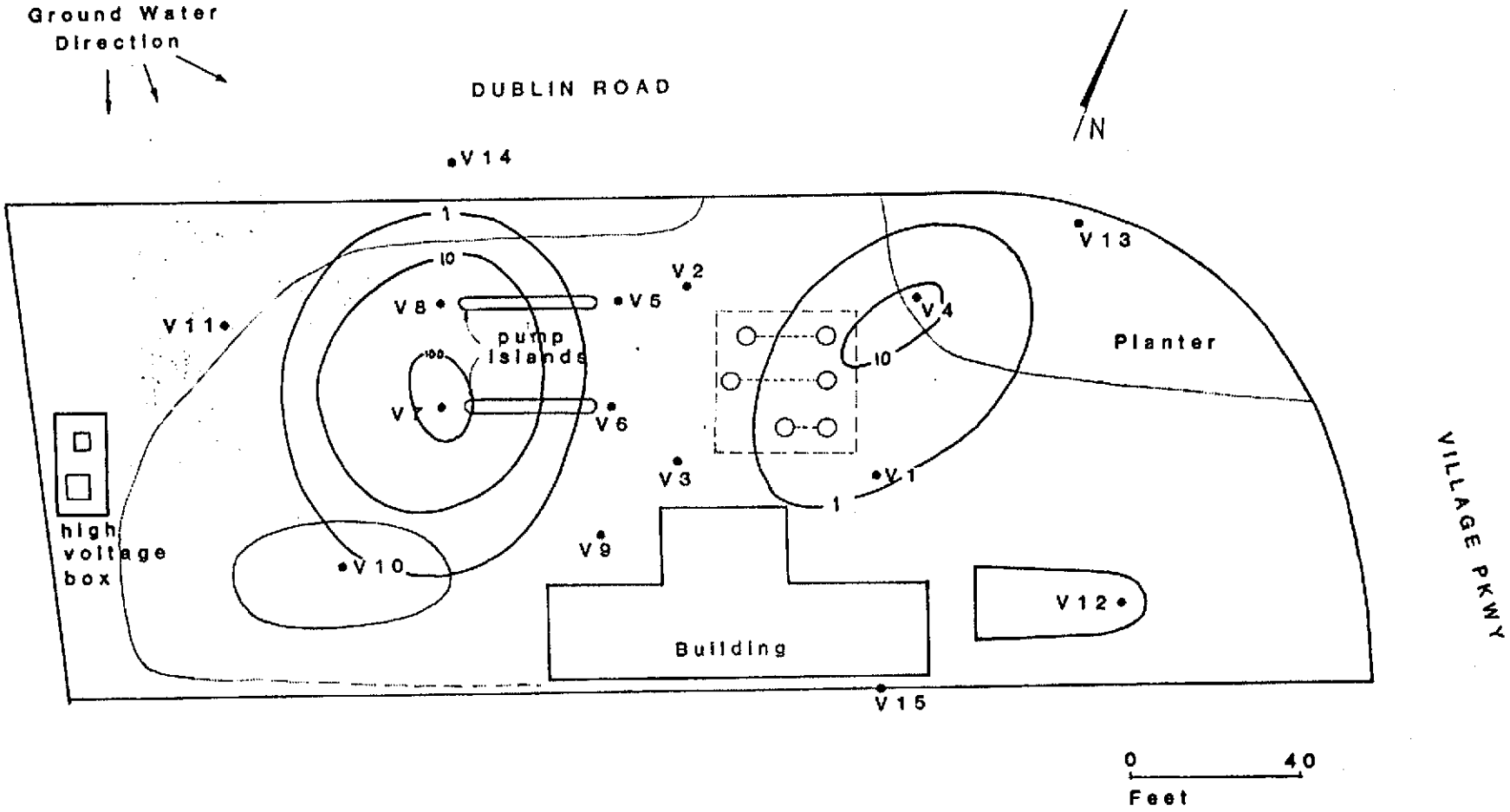

Figure 4. Isoconcentration contours (ppm) of benzene in the shallow soil gas at Chevron Service Station 9-2582, Dublin, California, February 1988.

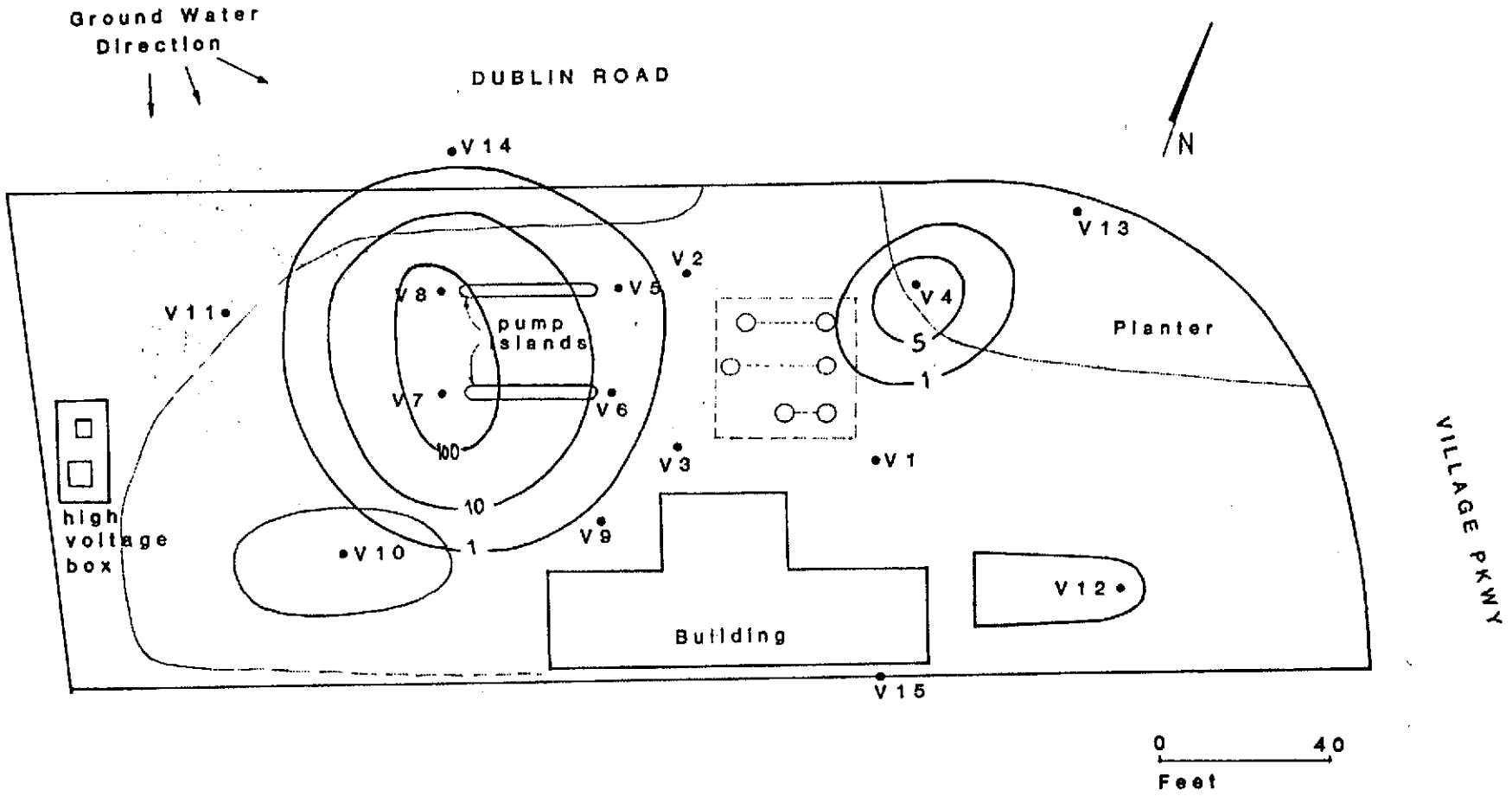

Figure 5. Isoconcentration contours (ppm) of toluene in the shallow soil gas at Chevron Service Station 9-2582, Dublin, California, February 1988.

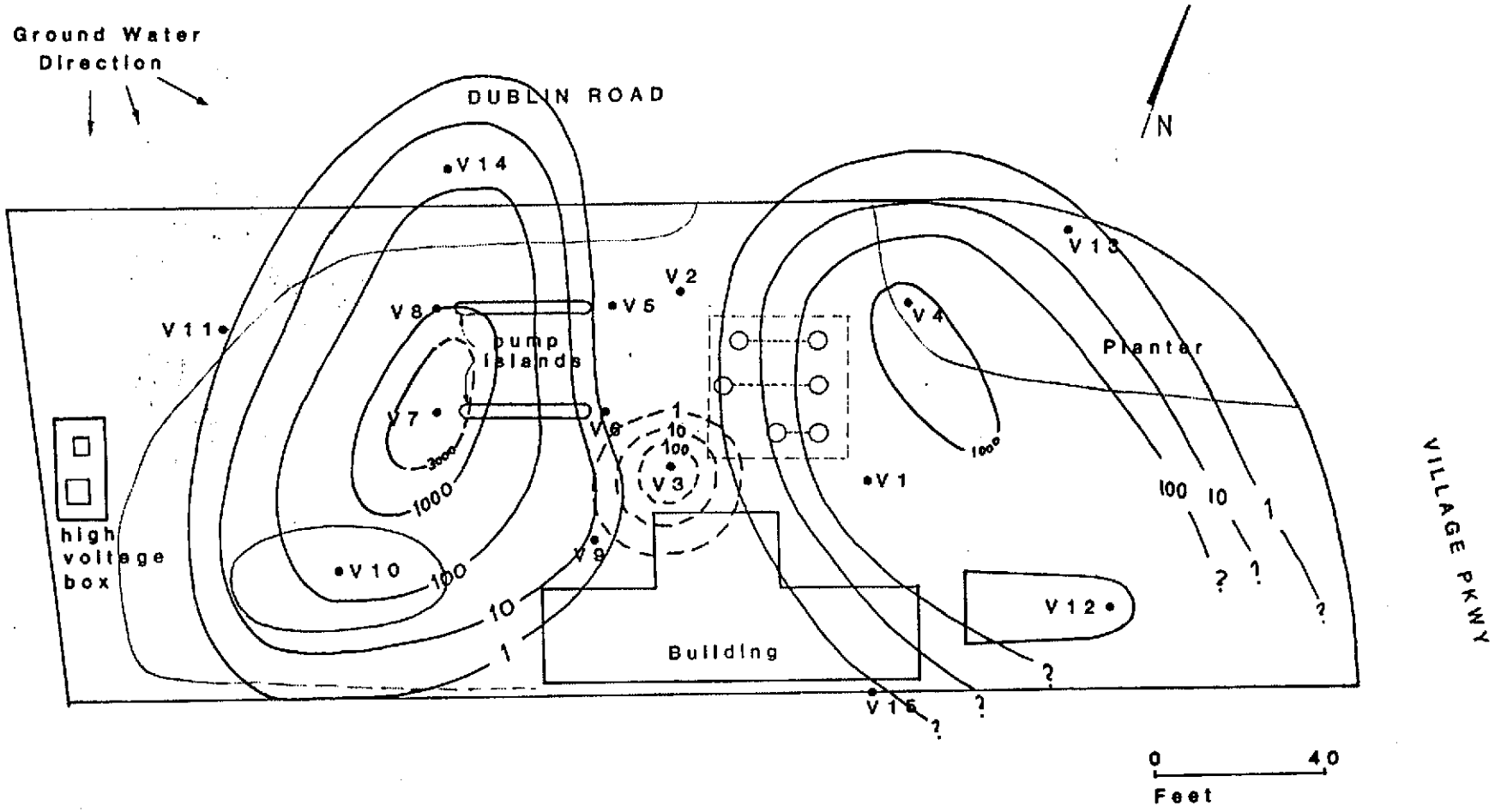

Figure 6. Isoconcentration contours (ppm) of compounds which elute prior to benzene in the shallow soil gas at Chevron Service Station 9-2582, Dublin, California, February 1988.

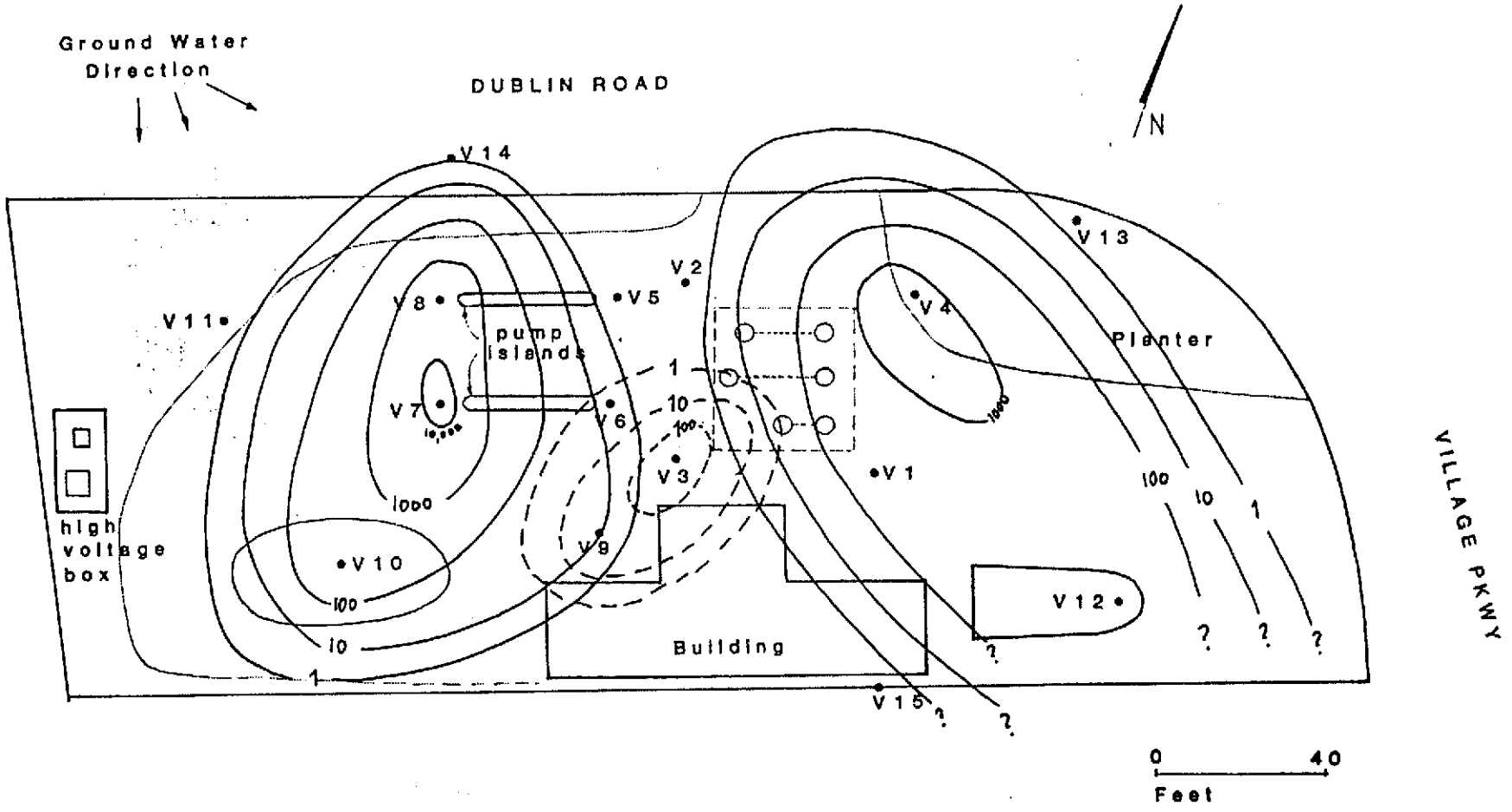

Figure 7. Isoconcentration contours (ppm) of total volatile hydrocarbons in the shallow soil gas at Chevron Service Station 9-2582, Dublin, California, February 1988.

Low levels of hydrocarbons were detected in the vicinity of the the northeastern planter and the tank field. The relative concentrations of the hydrocarbons suggest that these are the weathered residues of petroleum products rather than material of recent origin: there is little benzene and ethylbenzene relative to the concentrations of toluene and the small-molecular-weight compounds which elute prior to benzene. The extent of this contamination towards the southeast is unknown.

Finally, low-to-moderate concentrations of compounds which elute prior to benzene were found between the pump islands and the tank field at a relatively shallow depth (3-4 feet, see Figure 5). Neither benzene nor toluene was found at levels above the detection limit. It is unclear if this area has the same source as either of the other plumes, because V3 did not have any detected hydrocarbons at 13 feet (the depth at which hydrocarbons were found in the area of the tank field) and because V9, V6, and V5 (the locations between V3 and V7) did not have any detectable hydrocarbons.

2.3 DISCUSSION

The SVCA detected two (possibly three) areas of soil gas hydrocarbons at the Dublin site. Based on their chromatographic responses, most of the detected hydrocarbons in the eastern area of the site are low-boiling-point, low-molecular-weight compounds, probably alkanes such as pentane. Alkanes have a very low level of human toxicity (Sandmeyer 1981).

The highest detected concentrations of benzene (150 ppm) and toluene (200 ppm) were found at point V7 (see Table 1). These values can be used with Henry's Law to make order-of-magnitude estimates of potential ground-water concentrations. Inherent in this estimate is the assumption that product has reached ground water, which has not been confirmed for this site. A Henry's Law constant (H) is the ratio of a chemical's concentration in air to

its concentration in water at equilibrium (see Appendix A). It can be estimated by

$$H = C_{sv}/C_w$$

where

H = Henry's Law constant, atm·L/mole
C_{sv} = vapor concentration, atm
C_w = water concentration, mole/L.

For estimating ground-water concentrations, this equation can be rearranged as:

$$C_w = C_{sv}/H.$$

To make the units compatible, the following conversions are used: 1 ppm soil vapor = $1x10^{-6}$ atmosphere; 1 mole = mole weight expressed in milligrams. The molecular weights of benzene and toluene are $78x10^3$ mg/mole and $92x10^3$ mg/mole, respectively (EPA 1986). Their Henry's Law constants are 5.6 atm·L/mole and 6.4 atm·L/mole, respectively (EPA 1986). Using these values, the expected ground-water concentration of benzene can be estimated as

$$C_{w\text{-Benzene}} = 0.014\ C_{sv\text{-benzene}}.$$

For toluene, the ground-water concentration can be estimated by

$$C_{w\text{-toluene}} = 0.014\ C_{sv\text{-toluene}}.$$

On the basis of these equations, the order-of-magnitude estimates of dissolved benzene and toluene concentrations at the Dublin site would be 2 mg/L and 3 mg/L, respectively.

These levels can be put into perspective by comparing them to ground-water saturation values. A study sponsored by the San Francisco Bay Regional Water Quality Control Board (1985) found that gasoline-saturated ground water contained as high as 40 mg/L benzene and between 9 and 76 mg/L toluene. The estimated levels are an order of magnitude below those associated with water saturation.

3. CONCLUSIONS

The SVCA found two areas of hydrocarbon soil gas contaminination. One area seems to be associated with the tank field, although the highest measured levels of hydrocarbons were found in a planter northeast of the tank field. The levels of benzene and toluene within this plume are low (less than 10 ppm) and most of the detected hydrocarbons are suspected to be nontoxic alkanes. This suggests that the source of these hydrocarbons may be weathered gasoline.

A more significant area of contamination was detected in the vicinity of the pump islands. The relative concentrations of the hydrocarbons suggests that the source is fresher than the material discussed above. The benzene and toluene plumes in this area do not extend beyond the site boundaries. The SVCA results suggest that the levels of dissolved benzene and toluene in ground water under the site could be as high as 2 mg/L and 3 mg/L, respectively.

4. REFERENCES

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Appendix A

Principles and Application of Soil Vapor Contaminant Assessment

APPENDIX A: PRINCIPLES AND APPLICATION 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 ground water, 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 ground water, 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 ground water 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 ground water, 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 ground water or soil vapor and migrate as the result of a variety of interacting forces. In ground water, contaminants will migrate with the ground-water 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 ground water 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 ground water from the free product and, once in ground water, 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 ground water. 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 ground water, 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 ground water, 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.

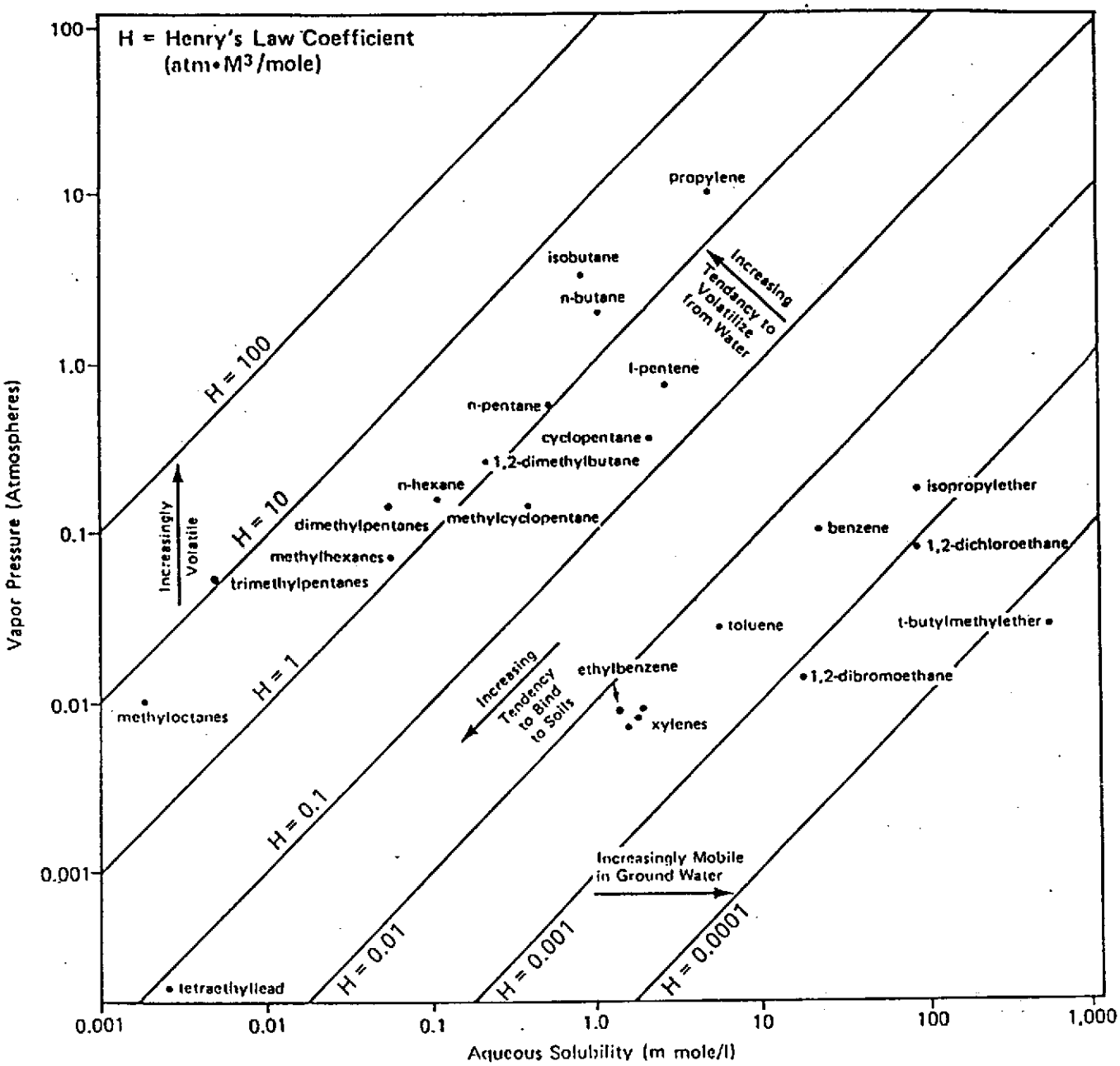


Figure A-1. Vapor pressures, solubilities, and corresponding Henry's Law constants for major constituents of gasoline.

Appendix B

SVCA Data Sheets and Chromatograms

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

SVCA DATA SHEET

HNU 421 Gas Chromatograph

Project Number: CAV83Q

Date: 2/11/88

Station Number: 9-2582

Analysts: MAE / KH / DP

Site Location: 7440 Dublin Blvd at Village Parkway, Dublin, CA

Sample Location	Time	Depth	Purge Time (min)	Vacuum (in Hg)	Vacuum Release (min)	Comments
Std	1010	—		—		New RSL 160 Capillary Column (Ca Resolve
						Carrier gas ≈ 10 ml/min. EB from
V1A	1023	3	10'	21	0	No Odor 100 ml
V1B	1045	5.5		27	1	
V2A	1055	3		7	0	
V1C	1110	8		21	0.5	
V2B	1121	10.5		25	0	
V1D	1136	10.5		27	.25	
V2C	1150	15.5		25	.25	
V1E	1204	13.0		25	.5	
V3A	1219	3		17	0	Odor AHn=10 20 ml
Blank	1232	—		—	—	— Attn=6 100 ml
Range Test	1238	—		0	0	No Odor.
V5	1246	3		25	.75	Near lines]
V6	1255	3		28	25.	Near lines] Sampled at 5" Vac. 50 ml
V4A	1308	3		28	60.	2' Upgradient. Sampled at 27" Vac. 50 ml
V3B	1321	13		28	.25	100 ml
Std	1337	—	—	—	—	50 ml
V7A	1348	3	10	27	1	100 ml
V4B	1359	15.5		28	10	S. Odor 50 ml
V9	1414	4		27	1	No Odor 100 ml
V7B	1425	5.5		27	0	Odor 20 ml
V8A	1437	3		27	0	No Odor. 100 ml
V12	1501	13		25	1	Solid Nipple
System Blank	1528	—	—	—	—	—
V13	1535	15.5	10	27	3	No Odor
V12	1552	13		17	0	S. Odor.
V8B	1609	5.5		17	0	Odor.
V11	1657	6.5		25	.25	No Odor.

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

SVCA DATA SHEET

HNU 421 Gas Chromatograph

Project Number: CHV83Q

Date: 2/11/88

Station Number: 9-2582

Analysts: MAE/KH/DP

Site Location: 7440 Dublin Blvd. (at Village Parkway), Dublin, CA

Sample Location	Time	Depth	Purge Time (min)	Vacuum (in Hg)	Vacuum Release (min)	Comments
V10	1712	6.5	10	17 ~~25~~	0	No Odor. 100 mL
V14	1728	6.5	↓	17	0	S. Odor. ↓
V15	1749	13.0	↓	27	2	No Odor.
Charcoal Regulator	1803	–	–	–	–	1 ul HS.

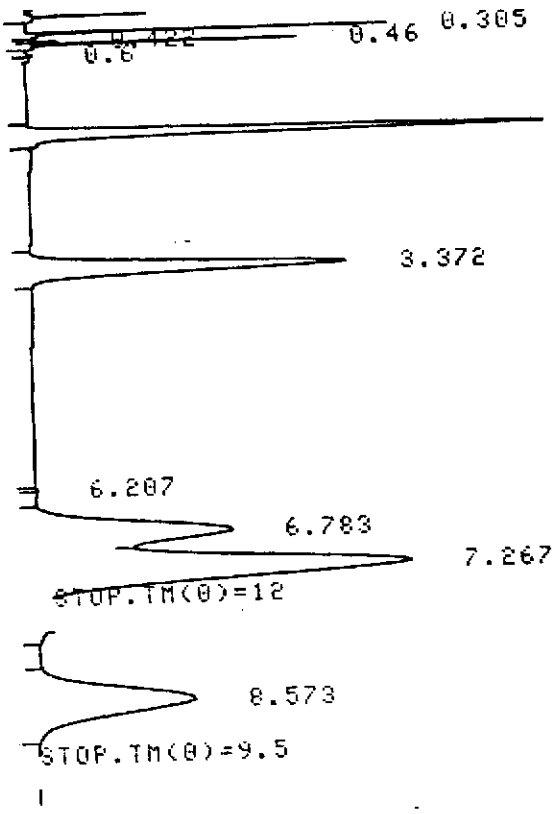
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: SH
Vol. Inj: 50 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

02/11/88 10:10:24



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2397

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.305	18845				
2	0.422	3156	V			
3	0.46	13283	V			
4	1.63	159969				
5	3.372	186642				
6	6.783	226546				
7	7.267	480450	V			
8	8.573	225290				
	TOTAL	1314182			0	

EDIT ID

IDNO	NAME	TIME	FACTOR	CONC
1	BEN	1.6	5.13442E-5	10
2	TOL	3.4	4.17932E-5	10
3	ET BEN	6.8	1.18743E-5	10
4	M-P XL	7.3	3.52378E-5	20
5	O-XYL	8.6	3.78385E-5	10

END
CALIB 1

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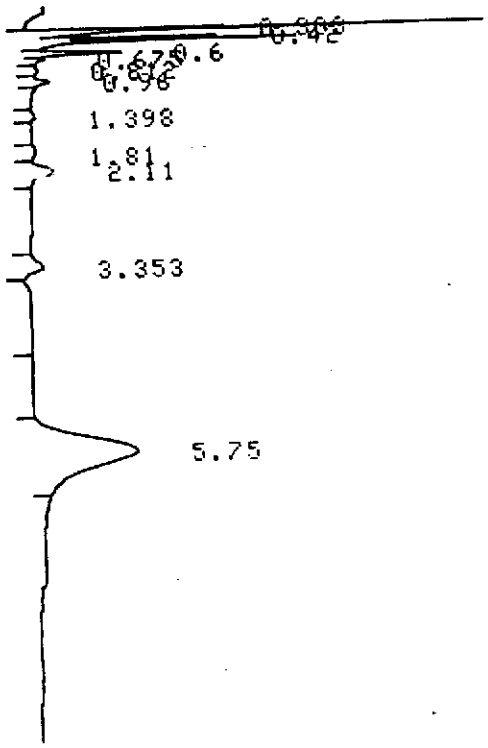
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V1A
Vol. Inj: None

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

START
02/11/88 10:23:54



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2399

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.303	46942				
2	0.42	41824	V			
3	0.6	16671	V			
4	0.675	3202	V			
5	0.812	2084	V			
6	0.96	3740	V			
7	1.398	1488				
8	1.81	1661				
9	2.11	13069				
10	3.353	9940		2	0.5326	TOL
11	5.75	159692				
	TOTAL	300312			0.5326	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

Shimadzu

221-25412

075

0-XYL

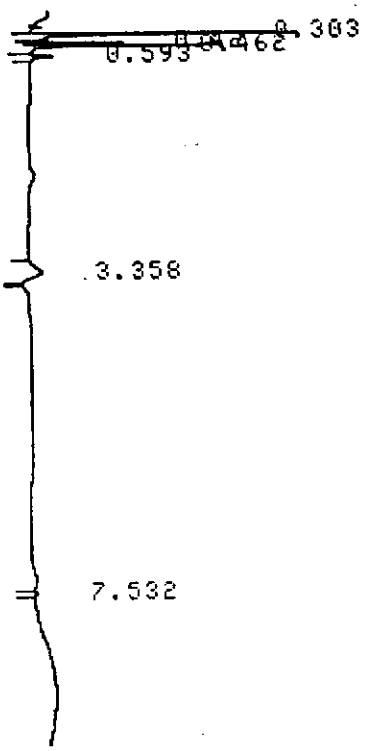
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: 121B
Vol. Inj: 100 ml

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 ml
Comments:

START
02/11/88 10:40:40



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2400

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.303	27298				
2	0.42	7477	V			
3	0.462	10767	V			
4	0.593	3484				
5	3.358	8714		2	0.4669	TOL
	TOTAL	57741			0.4669	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
-1.59321	0	0.23345	0
0	0	0.0389251	-1.32083

ERROR 16:UNDEF'D STATEMENT IN 410

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076

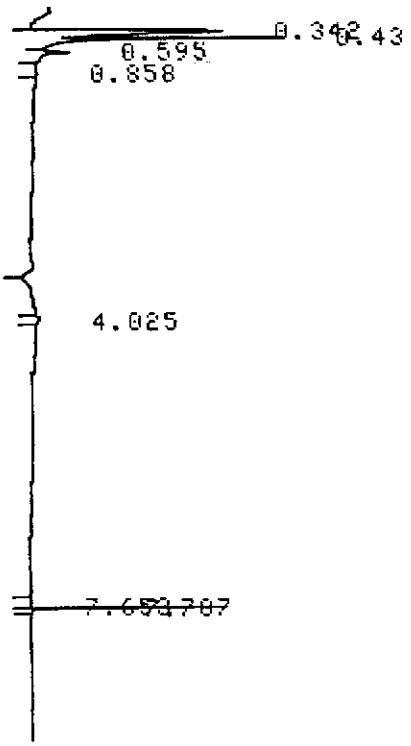
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V7A
Vol. Injected: 100 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

START
02/11/88 10:55:34



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2402

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.342	44261				
2	0.43	29020	V			
3	0.595	8244	V			
4	7.787	4448				
	TOTAL	85973			0	

LIST
BASIC PROGRAM

```
1       B=1.05
2       PB=57000
3       EB=0
5       X2=0
7       X1=0
8       NI=0
10      I=0
```

⊕ Shinadu 221-25412 077

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

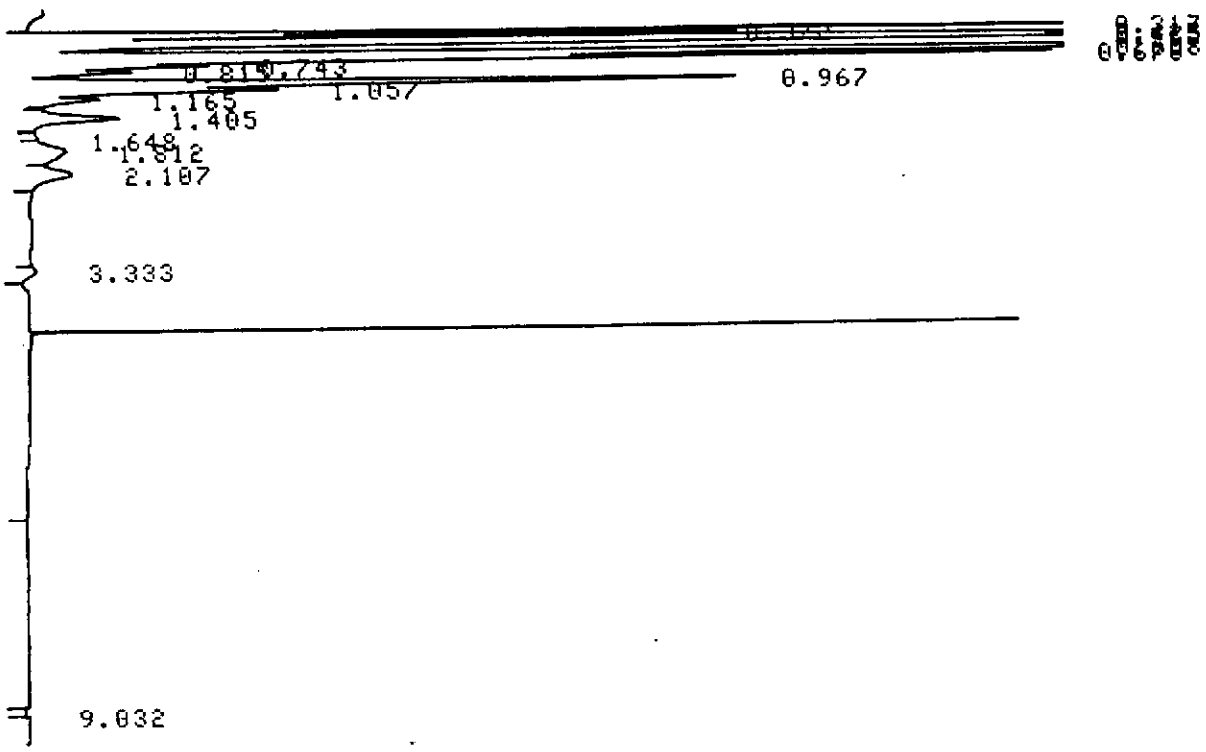
HNU 421 Gas Chromatogram report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: VIC
Vol. Inj: 100 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ERROR [illegible] STATEMENT [illegible]

START
02/11/88 11:10:19



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2403

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.317	553337				
2	0.372	54523	V			
3	0.425	406697	V			
4	0.465	495028	V			
5	0.608	783343	V			
6	0.678	156036	V			
7	0.743	27094	V			
8	0.815	18041	V			
9	0.967	169151				
10	1.057	47278	V			
11	1.165	5590				
12	1.405	28832				
13	1.812	16456				
14	2.107	17493				
15	3.333	2062		2	0.1105	TOL
	TOTAL	2780959			0.1105	

Skinadas 221-25412 078

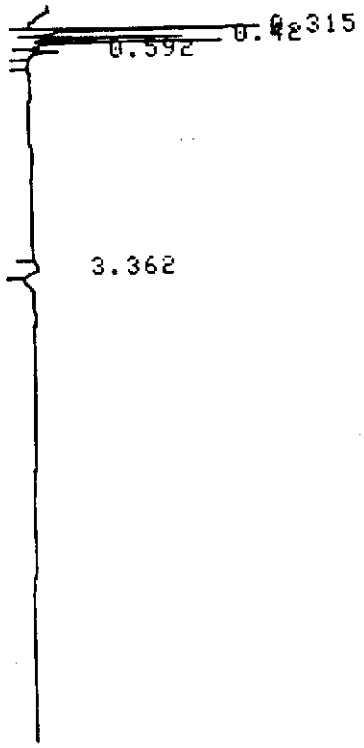
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V2B
Vol. Inj: 100 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ERROR 16:UNDEF'D STATEMENT IN 410
START
02/11/88 11:21:28



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2404

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.315	26510				
2	0.42	23238	V			
3	0.592	4614	V			
4	3.362	3727		2	0.1997	TOL
	TOTAL	58089			0.1997	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
-0.0824426	0	0.0998312	0
0	0	0.0166456	0.0340342

ERROR 16:UNDEF'D STATEMENT IN 410

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079

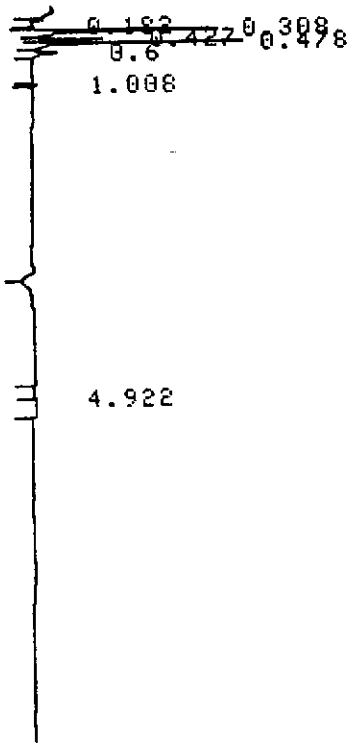
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V1D
Vol. Inj: 100 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

START
02/11/88 11:36:22



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2405

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.182	1817				
2	0.308	22378				
3	0.427	6608	V			
4	0.478	12829	V			
5	0.6	4340	V			
	TOTAL	47973			0	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
-0.282154	0	0	0
0	0	2.98023E-8	-0.282154

END OF STATEMENT IN 410

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

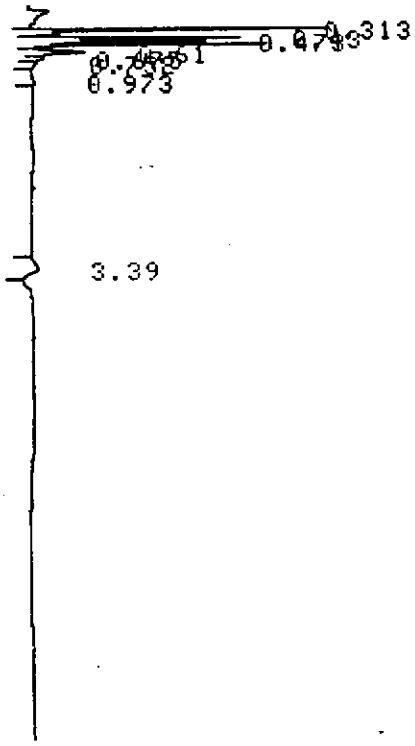
HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V2C 2
Vol. Inj: 100 ml

Date: 2/11/88
Analysts: MSE / KH / DP
Std. Vol. Inj: 50 ml
Comments:

30

ERROR 16:UNDEFD SYMTCHECK
START
02/11/88 11:50:28



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2406

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.313	27805				
2	0.43	18974	V			
3	0.473	29170	V			
4	0.61	10416	V			
5	0.675	2813	V			
6	0.752	1067	V			
7	0.973	1008				
8	3.39	6474		2	0.3469	TOL
		---			---	
	TOTAL	97725			0.3469	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET.BEN	PNOI	TVH
1.27856	0	0.173436	0
			1.27291

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

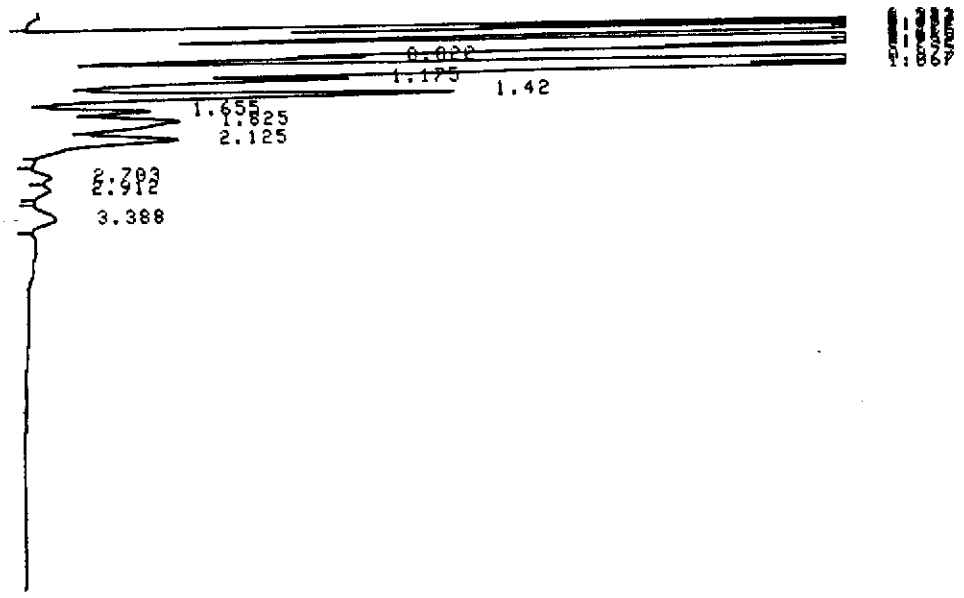
HNU 421 Gas Chromatogram
report sheet

Project Number: CHV830
Station Number: 9-2582
Sample: VIE
Vol. Inj: 100 µl

Date: 2/11/88
Analysts: MME / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ERROR 16:UNDEF'D SYMBOL: ...

START
02/11/88 12:04:24



CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2407

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.323	1499881	E			
2	0.377	208862	V			
3	0.43	1405522	V			
4	0.472	2163615	VE			
5	0.615	3114170	VE			
6	0.685	790326	V			
7	0.752	192337	V			
8	0.822	67137	V			
9	0.977	777400				
10	1.067	287368	V			
11	1.175	93807	V			
12	1.42	165857				
13	1.655	39173		1	2.4488	BEN
14	1.825	89764	V			
15	2.125	72173				
16	2.703	7858				
17	2.912	6603				
18	3.388	25367		2	1.3591	TOL
	TOTAL	11007214			3.8079	

RUN
VOLUME INJECTED (UL)

221-25412

081

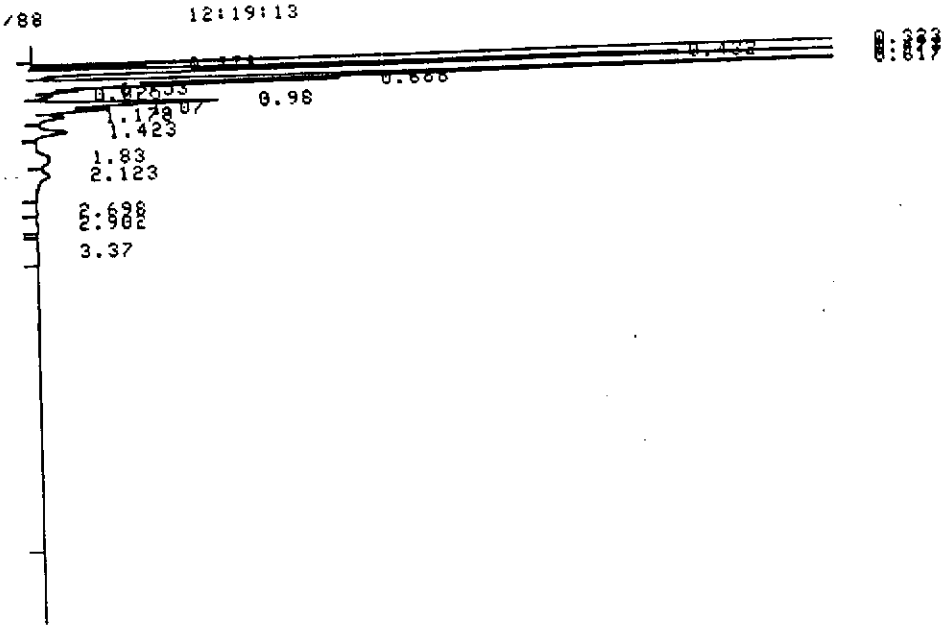
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V3A
Vol. Inj: 100 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ERROR 16:UNDEF'D STATEMENT IN ...
A.SAVE 1,50
ATTEN(0)=10
START
02/11/88 12:19:13



CHROMATOGRAM 1 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2408

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.323	767838	E			
2	0.378	152739	V			
3	0.432	1186926	V			
4	0.473	1783844	VE			
5	0.617	3561554	VE			
6	0.688	962617	V			
7	0.753	136550	V			
8	0.825	62084	V			
9	0.98	912321				
10	1.07	359069	V			
11	1.178	144162	V			
12	1.423	206216				
13	1.83	230521				
14	2.123	181970	V			
15	2.698	9259				
16	2.902	12149				
17	3.37	25317		2	1.3565	TOL
	TOTAL	10694329			1.3565	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PN01	TVH
318.127	0	0.678229	0
0	0	13.6749	332.48

ERROR 16:UNDEF'D STATEMENT IN 410

J. Kinsella 221-25412

082

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

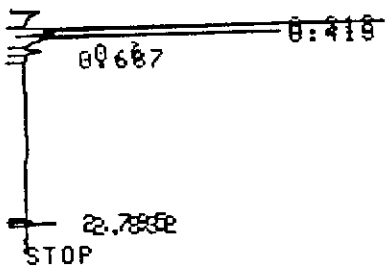
Project Number: CHV83Q
Station Number: 9-2582
Sample: Blank
Vol. Inj: 100 µl

Date: 2/11/88
Analysts: MSE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ERROR 10: UNDEF'D STATEMENT ...

START
02/11/88 12:32:38

ATTEN(0)=6



CHROMATOGRAM 2 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2409

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.312	28626				
2	0.413	18001	V			
3	0.6	2981	V			
	TOTAL	49608			0	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
-0.231042	0	0	0
0	0	0	-0.231042

ERROR 10: UNDEF'D STATEMENT IN 410

Shimadzu

221-25412

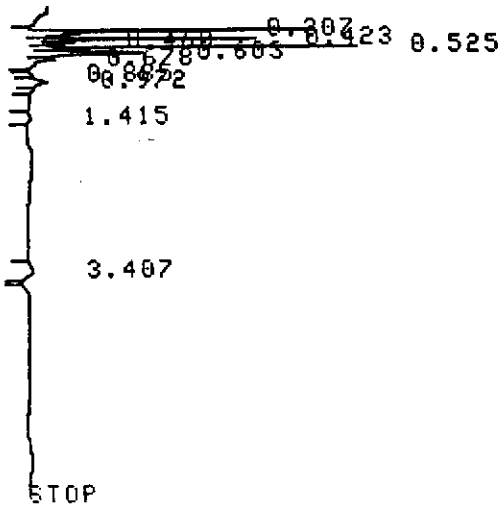
083

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: CHV83Q
Date: 2/11/88
Station Number: 9-2582
Analysts: MAE / KH / DP
Sample: Gauge Test
Std. Vol. Inj: 50 µl
Vol. Inj: 100 µl
Comments:

ERROR 16:UNDEFD STATEMENT IN 410
START
02/11/88 12:38:00



CHROMATOGRAM 3 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2410
FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.307	30721				
2	0.423	19017	V			
3	0.468	6470	V			
4	0.525	17707	V			
5	0.603	21677	V			
6	0.678	7501	V			
7	0.972	3085				
8	1.415	1750				
9	3.407	4488		2	0.2405	TOL
	TOTAL	112415			0.2405	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
1.59179	0	0.120227	0
0	0	0.0200462	1.73206

ERROR 16:UNDEFD STATEMENT IN 410

Shinadex 221-25412

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

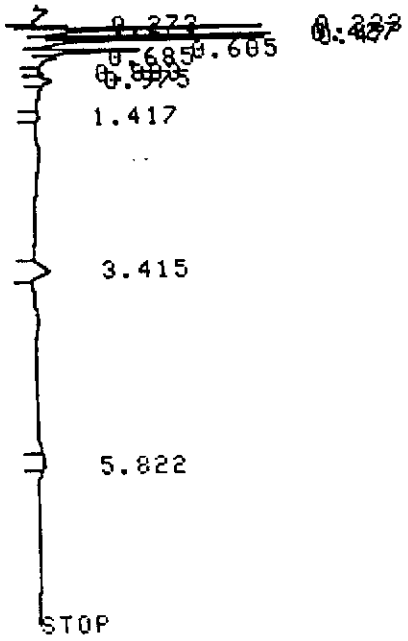
Project Number: CHV83Q
Station Number: 9-2582
Sample: V5
Vol. Inj: 100 ml

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 ml
Comments:

084

ERROR [illegible]

START
02/11/88 12:46:47



CHROMATOGRAM 4 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2411

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.273	1669				
2	0.323	31147	V			
3	0.427	19680	V			
4	0.47	19111	V			
5	0.605	17841	V			
6	0.685	5093	V			
7	0.975	2370				
8	3.415	7718		2	0.4135	TOL
	TOTAL	104629			0.4135	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
[illegible]	0	0.206751	0
[illegible]	0	0.0344729	1.4887

[illegible] 410

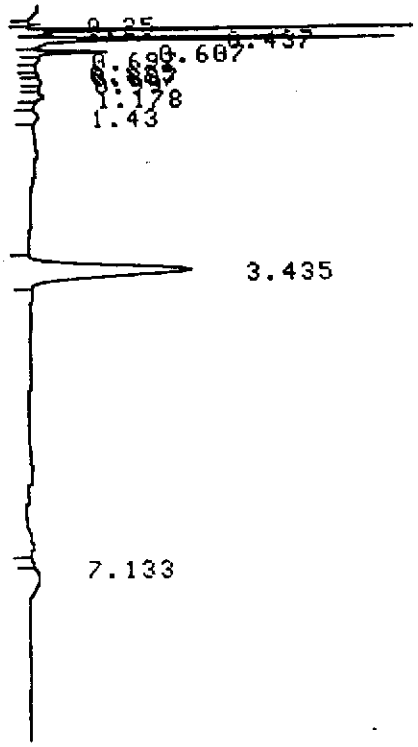
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V6
Vol. Inj: 50 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ERROR 16:UNDEF'D STATEMENT IN 410
START
02/11/88 12:55:47



CHROMATOGRAM 5 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2412

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.437	34314				
2	0.607	9621				
3	1.178	1762				
4	1.43	1712				
5	3.435	97389		2	5.218	TOL
	TOTAL	144798			5.218	

RUN
VOLUME INJECTED (UL)
? ~~100~~ 50 µl
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
-0.299773	0	2.60898 x2	0
0	0	0.435016 x2	2.74423 x2

ERROR 16:UNDEF'D STATEMENT IN 410

⊕ Shinadzu 221-25412 085

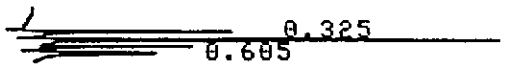
SCIENCE, AND TECHNOLOGY, INC.

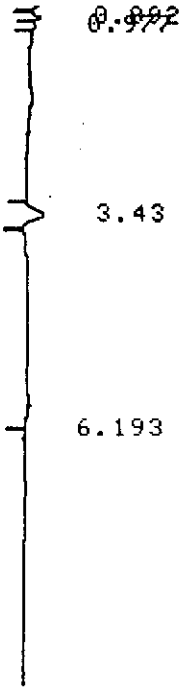
HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: UHR
Vol. Inj: 50 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

START
02/11/88 13:08:21





CHROMATOGRAM 6 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2413

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.325	18777				
2	0.43	48038	V			
3	0.605	24534	SV			
4	0.892	1634				
5	3.43	11215		2	0.6009	TOL
	TOTAL	104197			0.6009	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB BEN TOL O-XYL

Shimadzu 221-25412

086

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

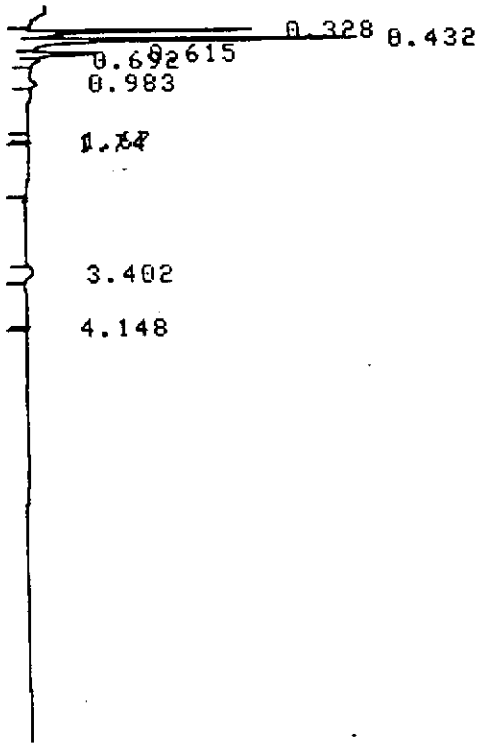
HNU 421 Gas Chromatogram report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V3B
Vol. Inj: 100 ml

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 ml
Comments:

ERROR

START
02/11/88 13:21:40



CHROMATOGRAM 7 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2414

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.328	29448				
2	0.432	40947	V			
3	0.615	11745	V			
4	0.692	2596	V			
5	0.983	1645	V			
6	3.402	1932		2	0.1035	TOL
	TOTAL	88312			0.1035	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
0.918389	0	0.0517473	0
0	0	0.00862809	0.978685

Schmidt 171-7417

001

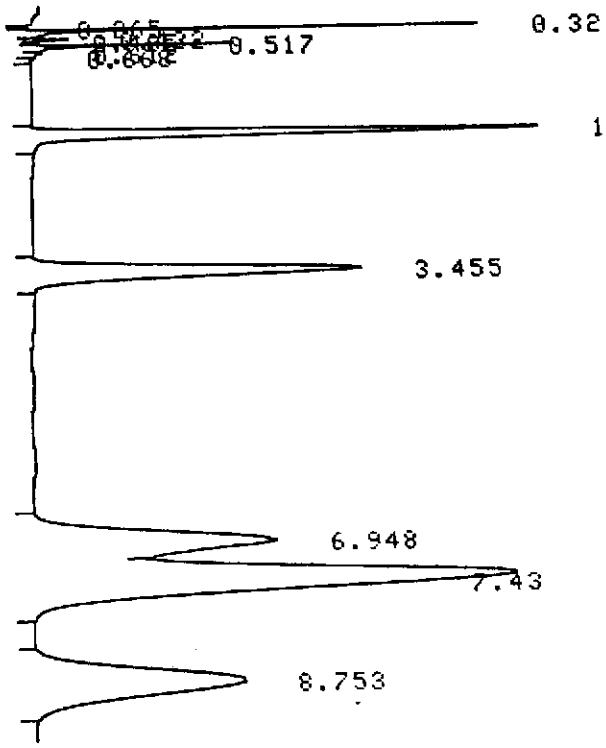
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: SB
Vol. Inj: 50 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ERROR 10: UNDEFINED STATEMENT IN 410
START
02/11/88 13:37:58



CHROMATOGRAM 8 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2415

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.32	23331	V			
2	0.432	4097	V			
3	0.465	1950	V			
4	0.517	14363	V			
5	0.612	2475	V			
6	1.672	160664		1	10.0434	BEN
7	3.455	199145		2	10.6699	TOL
8	6.948	285593		3	12.6064	ET BEN
9	7.43	622332	V	4	25.9062	M-P XL
10	8.753	310492		5	13.7819	O-XYL
	TOTAL	1624444			73.0078	

START

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

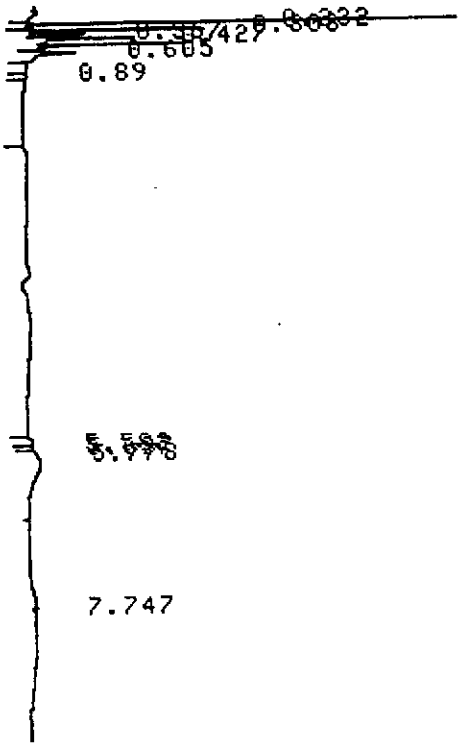
HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V7A
Vol. Inj: 100 ml

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

Shinadra 221-25412 088

02/11/88 13:48:07



CHROMATOGRAM 9 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2416

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.232	12164				
2	0.308	18050				
3	0.367	6109	V			
4	0.427	23846	V			
5	0.605	9462	V			
	TOTAL	69631			0	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
0.394794	0	0	0
0	0	-2.98023E-8	0.394794

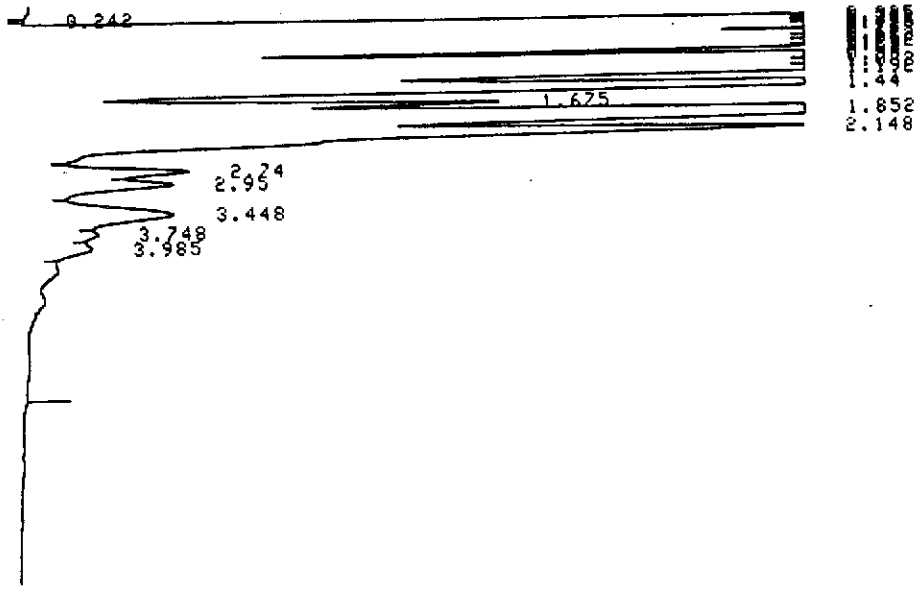
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: VHB
Vol. Inj: 50 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ERROR 16:UNDEF'D STATEMENT IN 410
START
02/11/88 13:59:23



CHROMATOGRAM 10 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2417

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.325	2633616	E			
2	0.382	1304300	VE			
3	0.435	3363462	VE			
4	0.475	4547469	VE			
5	0.62	6330704	VE			
6	0.682	4578805	VE			
7	0.762	1233031	V			
8	0.83	285669	V			
9	0.99	4216411	VE			
10	1.082	1620475	V			
11	1.192	1024594	V			
12	1.44	1116278	V			
13	1.675	170015		1	10.628	BEN
14	1.852	972134	V			
15	2.148	677417	V			
16	2.74	89610				
17	2.95	87039	V			
18	3.448	106104		2	5.6849	TOL
19	3.748	3732				
20	3.985	13360				
	TOTAL	34374196			16.3128	

RUN
VOLUME INJECTED (UL)
? 50
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
2014.53	10.628	5.68486	0
	0	116.174	2147.02

⊕ Shinadex 221-25412

089

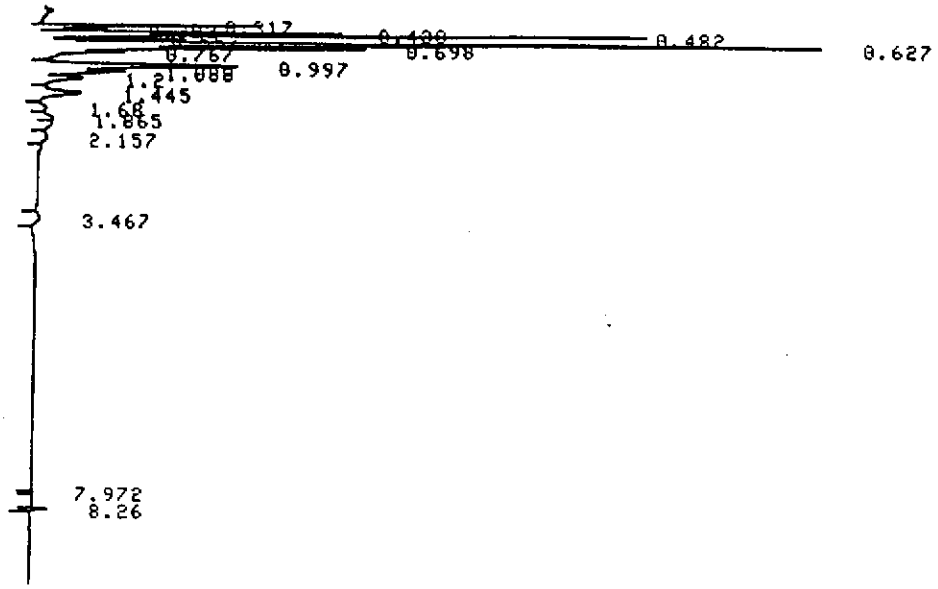
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V9
Vol. Inj: 100ul

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 ul
Comments:

START
02/11/88 14:14:31



CHROMATOGRAM 11 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2418

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.317	31154				
2	0.383	7702	V			
3	0.438	37835	V			
4	0.482	82868	V			
5	0.557	9980	V			
6	0.627	175931	V			
7	0.698	67932	V			
8	0.767	19832	V			
9	0.997	59607				
10	1.088	18947	V			
11	1.2	7477				
12	1.445	16524				
13	1.68	1778		1	0.1112	BEN
14	1.865	1731				
15	2.157	2584				
16	3.467	3276		2	0.1755	TOL
17	8.26	2256		5	0.1001	O-XYL
	TOTAL	547408			0.3868	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB	BEN	TOL	O-XYL
M,P-XYL	ET BEN	PNOI	TVH
14.9648	0.0555856	0.0877614	0.0500687
0	0	0.169956	15.3282

ERROR 16:UNDEF'D STATEMENT IN 410

⊕ Shinadu

221-25412

090

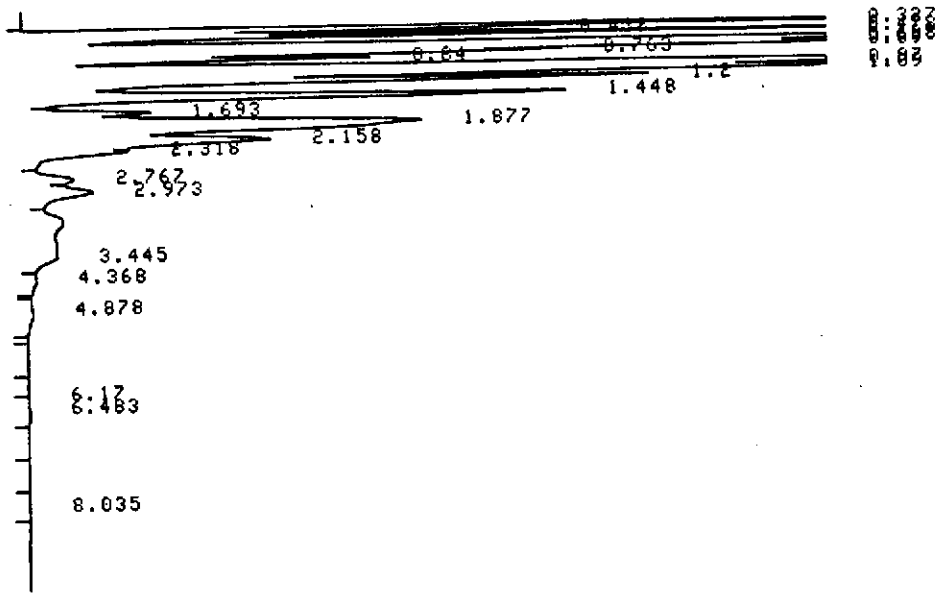
EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram
report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V7B
Vol. Inj: 20 µl

Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ATTEN(0)=10
START
02/11/88 14:25:14



CHROMATOGRAM 12 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2419

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.327	5380940	E			
2	0.438	1127908	V			
3	0.478	3376438	VE			
4	0.628	6593595	VE			
5	0.69	5381449	VE			
6	0.763	1828727	V			
7	0.84	1658643	V			
8	0.97	8745656	VE			
9	1.09	5598505	VE			
10	1.2	4000197	V			
11	1.448	4341440	V			
12	1.693	944587	V	1	59.048	BEN
13	1.877	6334347	V			
14	2.158	3026820	V			
15	2.318	769773	V			
16	2.767	454879				
17	2.973	922555	V			
18	3.445	1470927	V	2	78.8099	TOL
19	4.368	34214				
20	4.878	91221				
21	6.17	1749				
22	6.483	31198		3	1.3771	ET BEN
23	8.035	10478				
	TOTAL	62126200			139.235	

RUN
VOLUME INJECTED (UL)
? 20
DILUTION
? 1

PBB	BEN	TOL	O-XYL
	ET BEN	PNOI	TVH

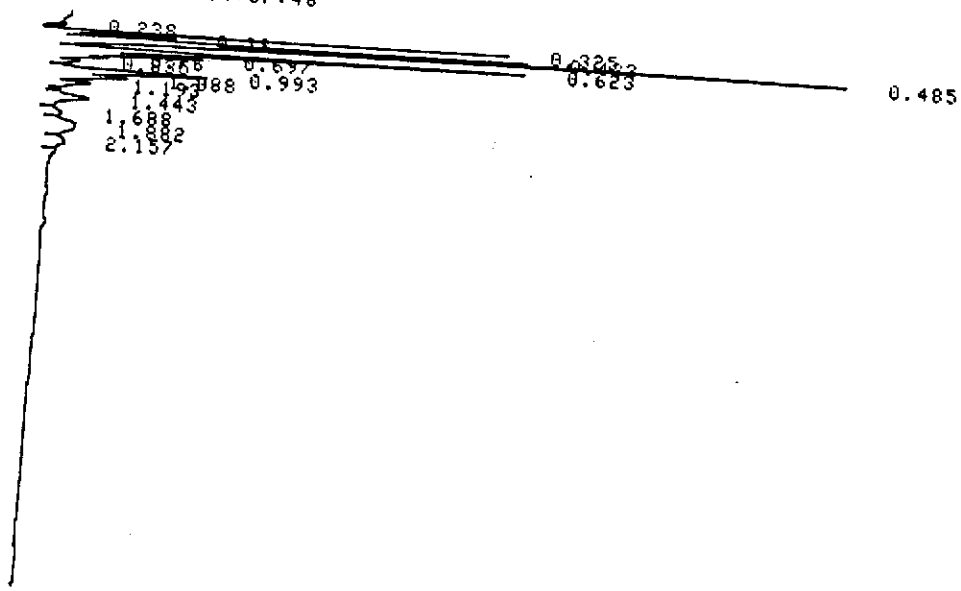
⊕ Skinner 221-2541 091

EA ENGINEERING, SCIENCE, AND TECHNOLOGY, INC.

HNU 421 Gas Chromatogram report sheet

Project Number: CHV83Q
Station Number: 9-2582
Sample: V8A
Vol. Inj: 100 µl
Date: 2/11/88
Analysts: MAE / KH / DP
Std. Vol. Inj: 50 µl
Comments:

ATTEN(0)=6
START
02/11/88 14:37:48



CHROMATOGRAM 13 MEMORIZED

CHROMATOPAC C-R3A
SAMPLE NO 0
REPORT NO 2420

FILE 0
METHOD 24
SAMPLE WT 100

PKNO	TIME	AREA	MK	IDNO	CONC	NAME
1	0.325	44986				
2	0.38	12341	V			
3	0.433	56074	V			
4	0.485	129433	V			
5	0.623	98564	V			
6	0.697	33968	V			
7	0.76	8814	V			
8	0.835	4717	V			
9	0.993	45878				
10	1.088	16831	V			
11	1.193	5627				
12	1.443	14543				
13	1.688	2329				
14	1.882	14953		1	0.1456	BEN
15	2.157	4450				
	TOTAL	493507			0.1456	

RUN
VOLUME INJECTED (UL)
? 100
DILUTION
? 1

PBB
M,P-XYL 12.9642
0
BEN
ET BEN 0.0727998
0
TOL
PNOI 0
0.606441
O-XYL
TVH 0
13.6434

**ERROR# 16:UNDEF'D STATEMENT IN

⊕ Simadzu 221-25412

092