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1991 Air Toxics Monitoring Report

NOTE: NO LONGER MEASURING CR-HC CONTINUOUSLY

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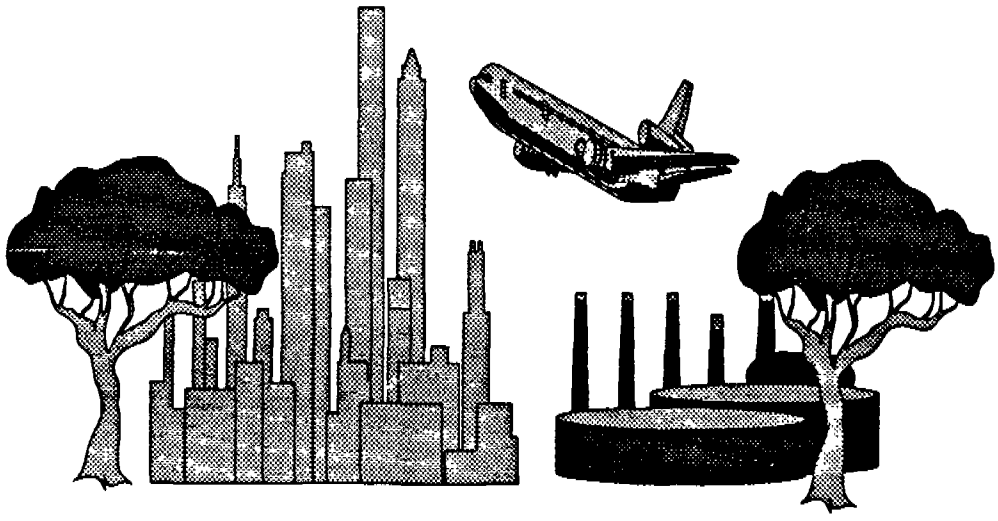

Louisiana Department of Environmental Quality
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1991 Air Toxics Monitoring Report

I. INTRODUCTION

The Louisiana Department of Environmental Quality (LDEQ) has conducted an ambient monitoring program for airborne toxic compounds since 1984. The program began by operating a single continuous monitoring station located near the Louisiana State Capitol. When first placed in operation, this site was the only monitoring station in the country capable of providing round-the-clock monitoring of Volatile Organic Compounds (VOC's). In April of 1991 a second continuous monitoring station was installed at a site near Baker Louisiana.

The LDEQ also operates six Toxic Air Monitoring Sites (TAMS) located at several areas around the Greater Baton Rouge area. These samplers are at the Baton Rouge Capitol Site, LSU, Baker, Port Allen, Geismar, and at the Capitol Regional Office. Each sampler operates once a week collecting an 8 to 10 hour sample onto a Tenax-GR sample cartridge. The Tenax-GR cartridges are later transported to the Air Toxics Laboratory for Gas Chromatography/Mass Spectroscopy analysis. In December 1991, two canister samplers also began operation at the Capitol and Baker sites. These samplers are programmed to collect a 24 hour sample once every six days.

Plans for expansion call for the addition of two continuous monitoring sites to be at Geismar and Lake Charles Louisiana. These sites should be ready to begin monitoring around April 1, 1992. These sites plus the two existing sites will be upgraded to provide expanded analytical data on ozone precursors. Additionally several additional TAMS and Canister samplers will be deployed in the other regions of the state including New Orleans, Lake Charles, Lafayette, Monroe, and Shreveport.

II. SAMPLING METHODOLOGY

The sampling and analytical equipment used in the continuous monitoring system consists of a XonTech Model 930 Organic Vapor Concentrator, a Shimadzu Gas Chromatograph, and a Spectra Physics Winner/386 Chromatograph Workstation. The XonTech concentrator contains two Tenax-GR/Carboxen-569 traps (12" length x 1/8" O.D.). These traps alternate between sample collection and sample injection. This type of combination sorbent trap provides excellent recovery for the C2 to C12 hydrocarbons. Samples are collected hourly over a 57 minute period at a flow rate of 10 CC/min for a total sample volume of about 0.57 liters. The sample flow is maintained at a constant rate by a mass flow controller contained within the sample concentrator.

The TAMS samples are collected using Anderson VOTA Samplers which are maintained and operated by personnel of the LDEQ Office of Air Quality and Radiation Protection. The samples are collected onto sorbent cartridges composed of a glass tube (5/8" O.D. x 7" long) packed with 3 grams of Tenax-GR. Each VOTA is fitted with a timer which operates the sampler weekly. Flowrates are measured using a built in rotameter. The samplers are subjected to a flow audit once every three months to ensure accurate flow measurement.

Several sampling procedures are employed to ensure the accuracy of the data generated. Each set of sample cartridges which go into the

field are accompanied by a field blank cartridge. Any amount of the target compounds found on this cartridge is subtracted from the amount found on the actual sample cartridges. Each sample set includes at least two parallel duplicate samples. Each sample cartridge is collected at a different flow rate to produce a total volume of about 5 and 10 liters respectively. The analytical results between these two cartridges must agree with 25% of each other. Backup cartridges are also utilized in at least 10% of the samples in to measure possible breakthrough. The backup cartridge must contain no more than 20% of the amounts of the target compounds found on the front tubes or be equivalent to the field blank cartridge. After sample collection, the cartridges are transported back to the Air Toxics Laboratory for analysis.

The evacuated canister samples are collected using XonTech Model 911A samplers. Before sample collection each canister is evacuated, filled with hydrocarbon free air. The canister is then blank analyzed to ensure there is no internal contamination. The canister is re-evacuated and sent out to the sampling site. About 15 liters of ambient air are collected during a single 24 hour sampling period. As a result the canister is pressurized to about 20 psig. After sample collection is completed, the canisters are transported back to the laboratory for analysis.

III. ANALYTICAL AND QA/QC METHODS

The production of high quality analytical data on a timely schedule and at a minimum cost is one of the goals of the LDEQ Air Toxics Monitoring Program. To provide data of high precision and accuracy a thorough quality control/quality assurance program has been devised and implemented for each of the monitoring programs.

Continuous Monitoring Stations

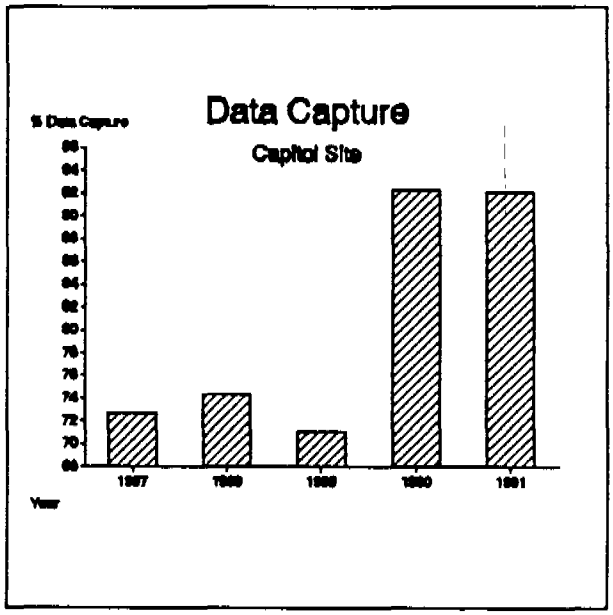
The Shimadzu gas chromatographs are currently fitted with a single megabore column (SPB-1 2.53 um x 60 m x 0.53 O.D.) connected to Photo Ionization/Flame Ionization Detectors in series. The Flame Ionization detector (FID) is used to detect selected alkane species while the Photo Ionization detector (PID) is used to detect aromatic compounds. Each detector is connected to a dual channel integrator which is part of the Chromatography Workstation. Raw chromatograms and analytical reports for each analysis are stored onto the hard disk of the workstation computer. A value for total hydrocarbons is computed by multiplying the total area of all peaks detected on the FID by the response factor of n-hexane.

Periodically the data is collected from the workstation computer and transferred to the main laboratory computer for editing, QA/QC procedures, and final storage in the laboratory database. The system is calibrated three times a week utilizing compressed gas cylinders containing known amounts of the compounds of interest. The calibrations are performed on a random basis to avoid any biasing of the overall data. Calibration standards for the continuous monitoring stations are purchased in the form of hydrocarbon mixtures contained in high pressure gas cylinders. This calibration mixture is composed of each of the target compounds at a concentration of approximately 100 ppb. The mixture is analyzed by the supplier and certified to an accuracy of +/- 10%. Before acceptance, the calibration cylinder is analyzed against gravimetric standards prepared within the laboratory. All of the tested components must be within 10% of the listed concentrations. The

calibration gas is transferred into 6 liter summa polished canisters for use at each of the monitoring sites.

The analytical system is calibrated with this mixture a minimum of three times per week. An aliquot of the mixture is collected by the XonTech sampling system and diluted to the calibration concentration of about 10 ppb per component. This calibration sample is analyzed by the gas chromatograph system. Response factors & retention times are computed and these values are compared to the previous calibration analysis. If the responses are within 20% of the previous calibration then the data set is declared valid and stored onto the station database. In most cases the variation in response has been observed to be around 5%. Periodically the analytical system is challenged with a performance audit mixture containing low ppbv concentrations of several compounds.

Data capture for each monitoring station is computed by taking the number of validated ambient samples collected at each station and dividing by the number of hours of operation. The laboratory has established a goal of 85% data capture for each of the monitoring stations. Since the monitoring program began, the data capture rate has improved greatly. The reasons for this improvement were the switch to the XonTech based concentrator system and the installation of higher quality gas chromatographs in the fall of 1989. The graph to the right shows how the data capture rate at the Capitol station has risen from around 70% in 1987 to more than 90% in 1991. Since calibrations and QA/QC samples account for about 4% of the number of analyses this means that the analytical system currently has a down time of only about 4%. The Baker station during its eight months of operation had a data capture rate of about 81%. Most of the lost data occurred during June when the station experienced several temperature control problems due to a faulty air conditioner. Since that problem has been corrected the station is maintaining a 90% data capture rate.



TAMS SAMPLES

The TAMS sample cartridges are thermally desorbed using a Tekmar Model 5010 GLT Automatic Thermal Desorber. The desorbed samples are cryogenically focused to insure maximum chromatographic peak sharpness. The analytical instrumentation consists of a Hewlett Packard 5890 gas chromatograph coupled to a Hewlett Packard Mass Selective Detector. The analytical protocol followed for the analysis is EPA Method TO-1.

Each sample cartridge before analysis is spiked with a mixture containing a d6-benzene internal standard and a 1-bromo-4-flourobenzene (BFB) surrogate. The percent BFB recovery is recorded after each

analysis.

The GC/MS tuning and mass standardization are performed according to the manufacturers instructions utilizing perflourotributylamine. A calibration standard is prepared by injecting a mixture of the target compounds into a static dilution bottle. Portions of this mixture are injected into the GC/MS system to generate a three point calibration curve. A fresh calibration curve is generated weekly and calibration checks are performed daily. Data acquisition is performed by operating the mass spectrometer in a full scan mode. The scan range is from 33 to 260 daltons.

Performance audits are periodically performed upon the analytical system. A performance audit canister containing low ppb levels of many of the target compounds is used to prepare a set of spiked sample cartridges.

CANISTER SAMPLES

The canisters are analyzed by both Gas Chromatography/Mass Spectroscopy (GC/MS) and by Gas Chromatography/Multiple Detector (GC/MD). The analytical instrumentation used for the GC/MS analysis include a Tekmar 5010 Automatic Thermal Desorber and a Hewlett Packard 5890 Gas Chromatograph coupled to a Hewlett Packard 5971 Mass Selective Detector. The GC/MD analysis is performed using a XonTech 930 Organic Vapor Concentrator coupled to a Hewlett Packard 5890 Gas Chromatograph fitted with an Electron Capture/Flame Ionization Detector series. The analytical protocol is based on EPA Method TO-14.

A minimum of four analyses are performed on each canister. The canister is first analyzed by the GC/MS system which withdraws two sample aliquot for analysis. These duplicate analyses must agree within 30% for each other. Next duplicate analyses are performed by the GC/MD analytical system. Again these duplicate analyses must agree within a 30% margin of error. Analytical results from the GC/MS and the GC/MD are then compared and must show agreement within 30%.

The GC/MS tuning and mass standardization are performed according to the manufacturers instructions utilizing perflourotributylamine. A calibration standard is prepared by injecting a mixture of the target compounds into a canister. Portions of this mixture are injected into the GC/MS system to generate a three point calibration curve. A fresh calibration curve is generated weekly and calibration checks are performed daily. Data acquisition is performed using selected ion monitoring for each of the target compounds.

The GC/MD analytical system is calibrated daily using compressed gas cylinders which contain low ppb concentrations of the target compounds. The detectors are calibrated using a single point calibration.

Spiked canisters are prepared periodically to challenge the analytical system.

1991

IV. CONTINUOUS MONITORING SYSTEM DATA

CAPITOL SITE

CAPITOL SITE OPERATION TIME

SAMPLE TYPE	# of HOURS	% of OPERATION TIME
Ambient Samples	8,066	92.08
Calibration Samples	234	2.67
QA/QC	12	0.14
Down Time	448	5.11

During the calendar year 1991 the monitoring station collected and analyzed a total of 8,066 validated ambient air samples. This figure represents a data capture rate of 92%. The table above provides a complete breakdown on the site operation during year.

The mean average level of total hydrocarbons measured during 1991 was 44.1 parts per billion by volume (PPBV) which is slightly greater than last years average of 40.1 ppb. The table below provides a set of descriptive statistics for the hydrocarbon species monitored during the year. None of the mean average concentrations exceeded the ambient air standards as defined by the Louisiana Air Toxics regulations. As in all of the previous years monitoring data, the median concentration

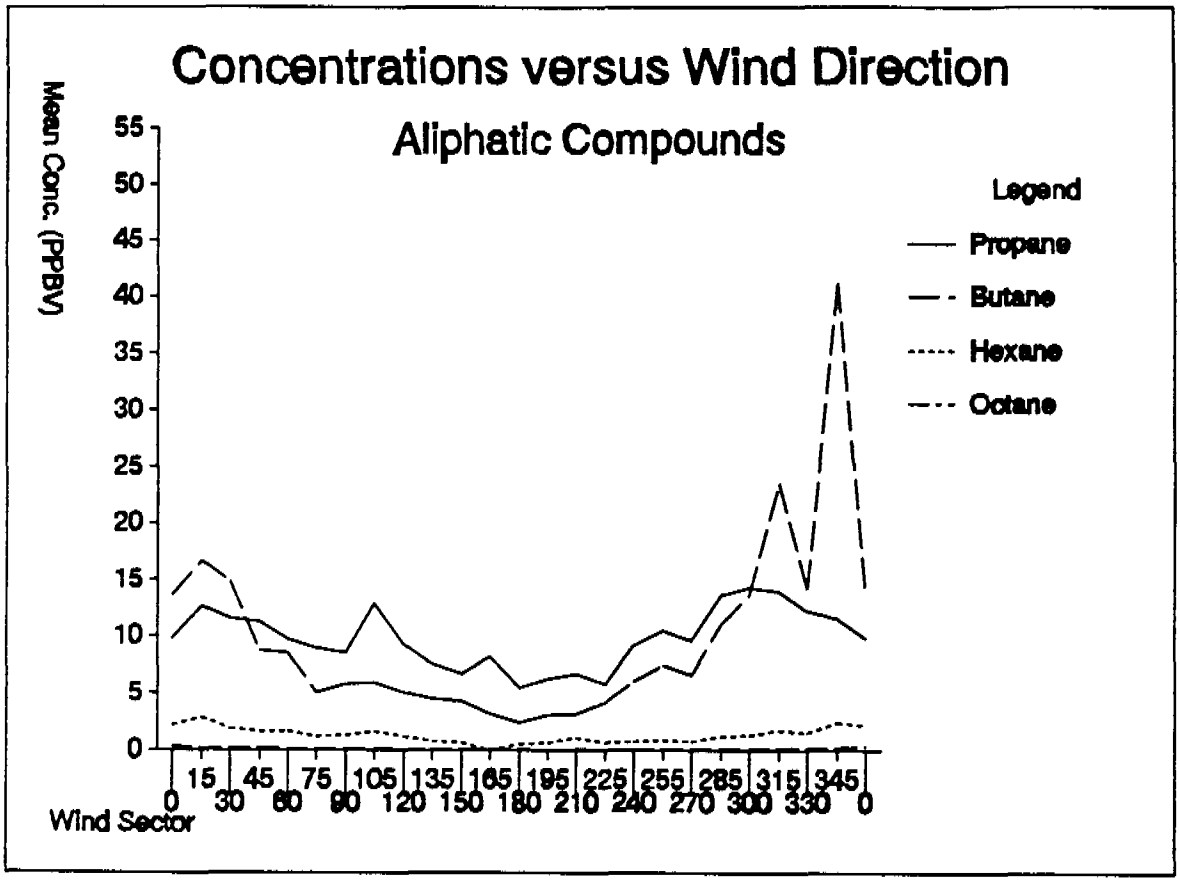
CAPITOL SITE STATISTICS

Compound	Mean	Median	Maximum
Propane	9.71	5.7	404.0
Butane	8.81	3.0	1719.1
2-methylbutane	5.79	2.9	402.7
Pentane	2.36	1.0	219.4
2-methylpentane	1.50	0.8	76.8
3-methylpentane	0.72	0.4	31.8
Hexane	1.24	0.6	109.6
Methylcyclopentane	0.58	0.3	36.5
Benzene	0.97	0.6	112.2
2-methylhexane	0.30	0.2	14.0
2,2,4-trimethylpentane	0.45	0.2	18.2
Heptane	0.25	0.1	11.1
Methylcyclohexane	0.18	0.0	11.8
Toluene	2.25	0.9	12574.3
Octane	0.10	0.0	10.6
Ethylbenzene	0.19	0.1	122.7
m+p xylene	0.66	0.4	295.5
o xylene	0.25	0.1	87.0
Cumene	0.10	0.0	10.5
1,2,4-trimethylbenzene	0.58	0.2	20.9
Unknown R-H	12.38	6.9	682.4
Total R-H	44.09	23.7	13750.0

for each of the target compounds is lower than the mean average concentration.

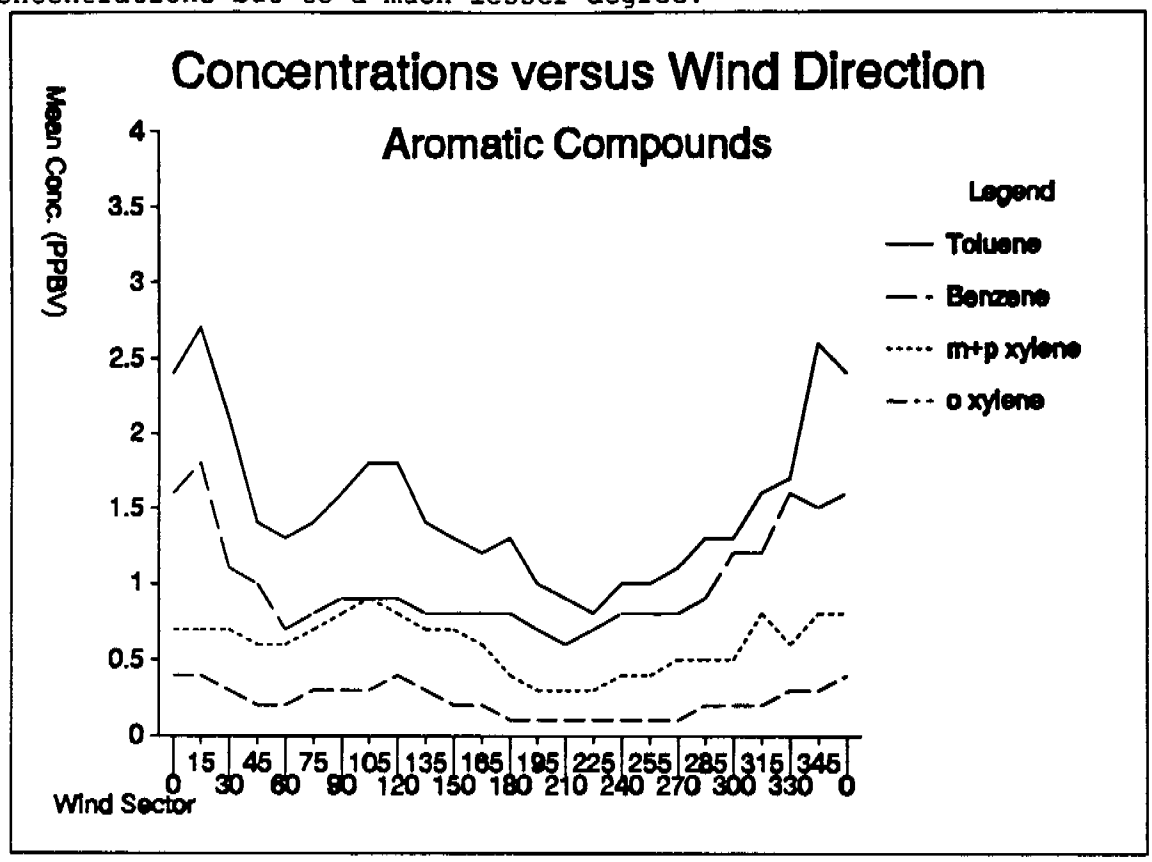
As in past years the concentration levels observed are highly variable. During any given twenty-four hour period the range of measured concentrations can be very high. By sorting the ambient data into small groups based upon different meteorological or time parameters, some explanations for this variability can be seen.

Some of this variability can be explained by examining what affect the site location and the local meteorology have upon the analytical data. Due to the proximity of this monitoring site to several large

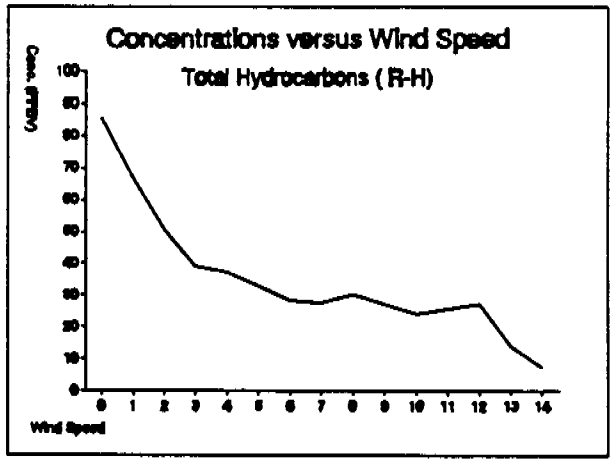


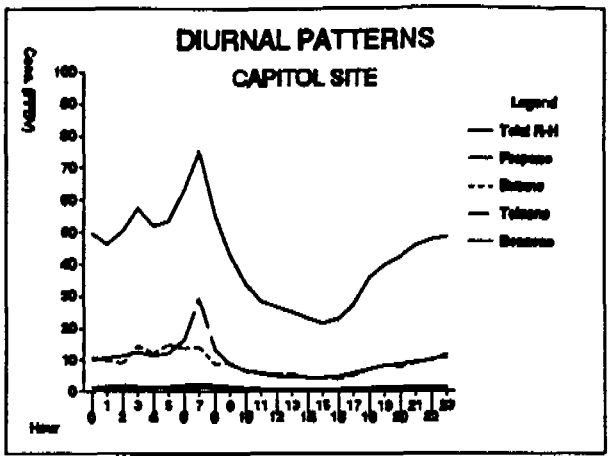
industrial facilities, the one factor that can most dramatically influence the concentrations of compounds is the wind direction. The figure above illustrates how the average concentrations of several aliphatic compounds vary with the wind direction. In preparing this graph, the data for each compound was divided into small subsets according to the prevailing wind direction at the time of sample collection. Each subset encompasses a fifteen degree sector of the compass. Mean averages were computed for each subset and all the points were plotted upon the graph. The graph shows that usually the concentrations are somewhat higher when the wind is blowing from a northerly direction. There are several petrochemical industries located in this direction which routinely emit significant amounts of volatile organic compounds. The plot for butane particularly show the influence

of an emission source located to the north-northwest. The aromatic compounds show in the graph below also show some increase in concentrations but to a much lesser degree.



The wind speed can also affect the levels of volatile organic compounds measured. A brisk breeze will help disperse pollutants while stagnant wind conditions will tend to trap pollutants around their source. The table to the right clearly shows that a drop in wind speed is usually accompanied by a rise in volatile organic compound concentration. Another weather phenomena which can greatly affect the concentrations is rainfall. During periods of steady rainfall, the measured levels of VOC's will drop a significant amount as the compounds become trapped by the water droplets and fall to the ground. Conversely during periods of heavy fog the concentrations of VOC's rise as the suspended water droplets prevent the dispersion of these compounds. In summation, changing weather patterns can result in very large changes in the observed concentrations of the target compounds.





Since meteorological conditions show diurnal variations it would be reasonable to assume that the concentrations of measured volatile organic compounds will also vary diurnally. The diurnal profile for the Capitol site, shown to the right, was prepared by sorting the data into subsets according to the hour of sample collection. The highest levels seem to occur around 7:00 am while the lowest levels were found to occur around 3:00 pm. There are several reasons why this pattern tends to hold true a majority of the time. Since the site is located within an urban/industrial area, it is going to be affected by daily vehicular traffic patterns. Vehicular traffic in Baton Rouge is heaviest during the periods 6:00 to 8:00 am and from 4:00 to 6:00 pm. The morning high concentrations observed appear to be connected to the morning "rush hour" traffic. An increase in concentrations was observed for the evening "rush hour" however the levels do not fall afterwards as they do after the morning traffic rush. Diurnal variations in meteorology will also affect the concentrations measured since the mixing height will fluctuate during the day. At night the mixing height is generally much lower which tends to keep pollutants near the surface and thus concentrations go up. Once the sun comes up and the mixing height expands upward, the pollutants are more easily dispersed and thus concentration will go down. Another important reason for the decrease in concentrations during the daylight hours is that many of these compounds play a significant role in the photochemical reactions between hydrocarbons and oxides of nitrogen to form ozone. It has been observed that the decrease in hydrocarbon concentrations during the mid-day is much greater on sunny days than it is on cloudy days when ozone formation is reduced.

In conclusion, during any one day many factors can influence the concentrations observed at this site. Diurnal variations, wind variations, photochemical reactions, traffic patterns, as well as variations of local point source emissions all contribute to the concentrations observed at any one time.

BAKER SITE

BAKER SITE OPERATION TIME

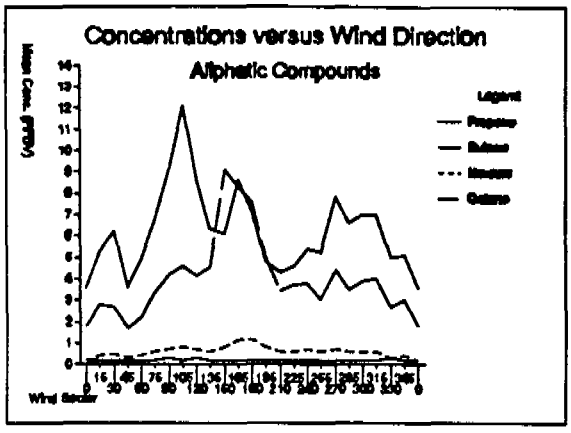
SAMPLE TYPE TIME	# of HOURS	% of OPERATION
Ambient Samples	4,797	81.25
Calibration Samples	156	2.64
QA/QC	8	0.14
Down Time	943	15.97

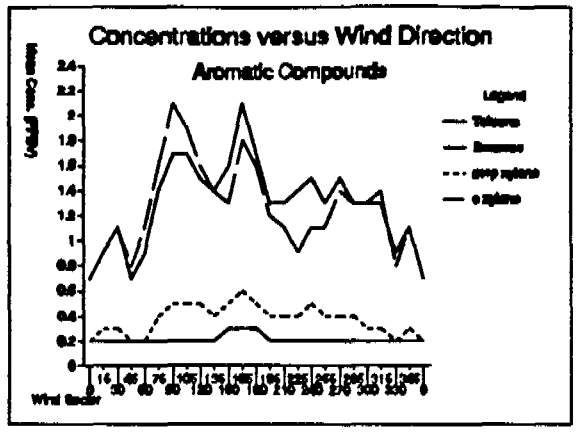
The continuous monitoring station at Baker was placed in operation on April 30, 1991. The site is located on the grounds of the Louisiana Training Institute, about two miles west of Baker and seven miles north-northwest of downtown Baton Rouge. In spite of some problems with the temperature control at the site, the equipment has performed very well and the site nearly achieved the goal of 85% data capture. The mean

BAKER SITE STATISTICS

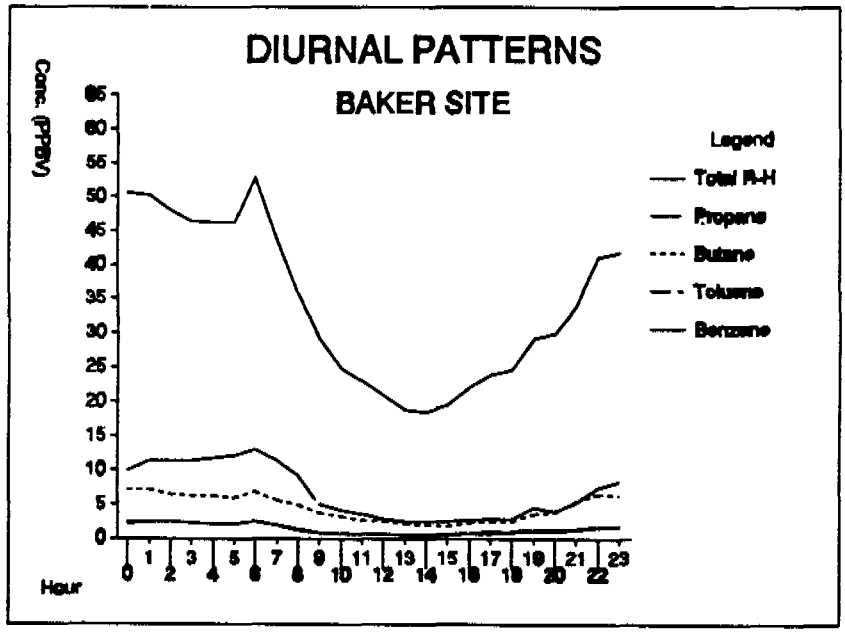
Compound	Mean	Median	Maximum
Propane	6.75	3.4	167.0
Butane	4.45	1.9	240.0
2-methylbutane	3.81	0.7	97.5
Pentane	1.63	0.7	68.6
2-methylpentane	1.11	0.6	51.0
3-methylpentane	0.41	0.2	20.6
Hexane	0.66	0.3	36.0
Methylcyclopentane	0.38	0.1	20.4
Benzene	1.35	0.6	45.5
2-methylhexane	0.28	0.2	18.6
2,2,4-trimethylpentane	0.23	0.1	10.5
Heptane	0.22	0.1	29.4
Methylcyclohexane	0.26	0.1	25.9
Toluene	1.38	0.8	34.9
Octane	0.23	0.2	10.2
Ethylbenzene	0.12	0.1	9.8
m+p xylene	0.40	0.2	11.1
o xylene	0.22	0.1	10.0
Cumene	0.12	0.1	9.7
1,2,4-trimethylbenzene	0.26	0.2	9.3
Unknown R-H	12.16	9.3	291.5
Total R-H	34.19	21.3	1035.1

average level of total hydrocarbons measured during the eight months of operation was 34.2 parts per billion. This is about 22% lower than the average level measured at the Capitol site. The table above provides the descriptive statistics for the hydrocarbon species monitored while the site was in operation. As was seen at the Capitol site, none of the annual mean average concentrations exceeded the ambient air standards as set by the Louisiana Air Toxics regulations. All of the mean average concentrations measured were lower than the mean levels measured at the Capitol site except benzene which was about 35% higher. An examination of the median concentration for benzene (0.6 ppbv) however shows it is exactly the same as it is at the capitol site. Most of the other median concentrations are also very similar to the values recorded at the Capitol site. This indicates that the Baker site is much less affected by local point sources as is the Capitol site.





When a wind direction analysis of the aromatic species is performed, in can be seen that higher concentrations are measured when the wind is coming from the direction of Baton Rouge or Baker. Conversely the lower concentrations are measured when the wind is coming from a northerly direction. The aliphatic hydrocarbons show a very similar pattern with very low levels recorded when the wind is out of a northerly direction. Since there are no major industrial point sources to the north of this site, most of the hydrocarbons measured from the north wind sector are probably from mobile and naturally occurring biogenic sources.

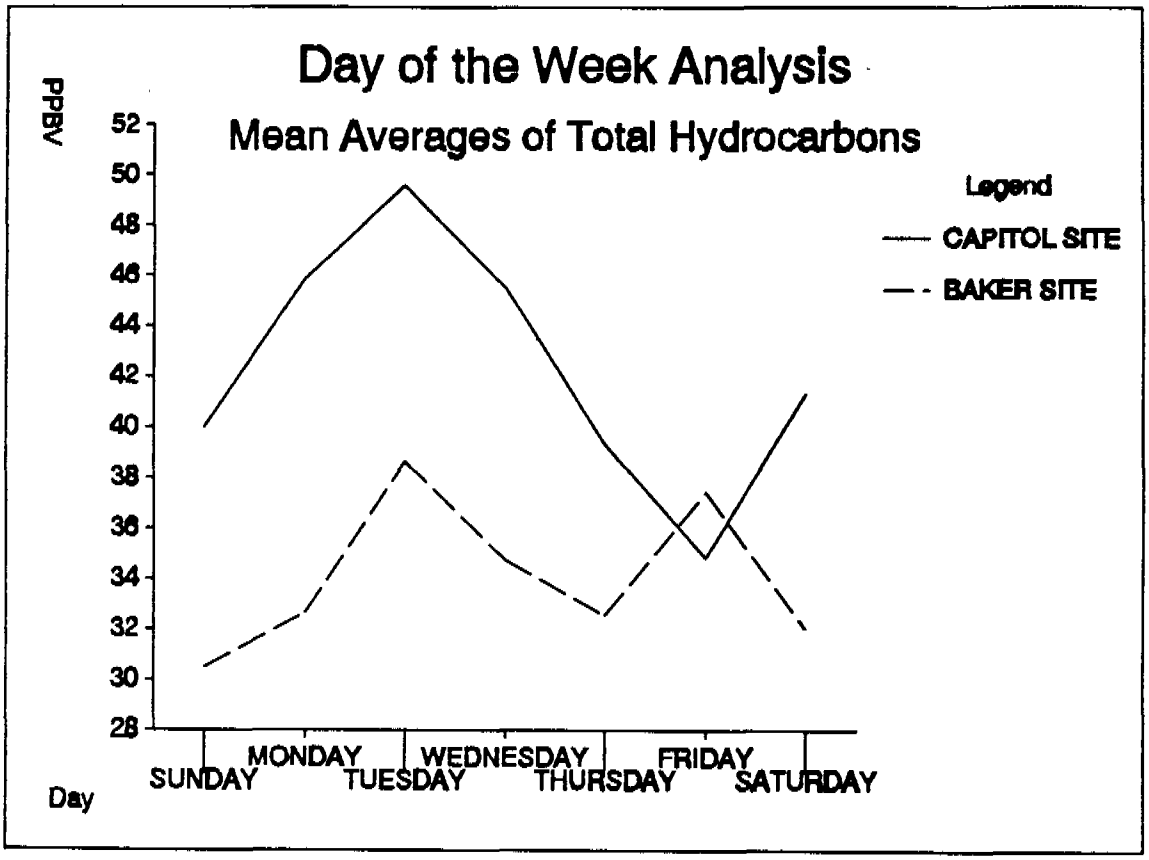


A diurnal analysis of the Baker site appears in the graph at the right. It shows a pattern which is somewhat different from the one seen at the Capitol site. The early morning "rush hour" peak occurs about one hour earlier at 6:00am and it is not as large as the peak observed at the Capitol site. The pattern shows a steady buildup during the nighttime hours with a slight peak at 6:00am followed by a steady decrease in the measured concentrations. This indicates that most of the diurnal variation is most likely caused by the local meteorology with only a slight effect from traffic patterns.

In conclusion when comparing the data generated at the Baker site to the data generated at the Capitol site the biggest difference is the effect the local point sources have upon the measured concentrations. Capitol site is effected by several local point sources and vehicular traffic flow much more than the Baker site is. Both sites are affected

by the urban plume of hydrocarbons emanating from Baton Rouge. Both sites show increased concentrations during stagnant meteorological conditions. The Baker site probably measures more naturally occurring hydrocarbons.

The graph below shows a day of the week analysis of total hydrocarbon concentrations for both sites. In performing this analysis the data from each site was divided into subsets according to the day of the week the samples were collected. The mean average concentrations from each site are plotted upon the graph. As expected the Capitol site appears to show more variation in concentrations than does the Baker



site. Both sites measured the highest average concentrations on Tuesdays. The lowest concentrations were found on Fridays at the Capitol site and on Sundays at the Baker site.

V. TAMS DATA

The operational strategy of TAMS program consisted of a weekly sampling event at each sampling station. These samplers were operated for an eight hour sampling period starting at midnight and ending at 8:00 am each sampling date. The goal of the program was to operate the samplers for 50 weeks during the year and obtain a data completeness of at least 80% at each of the sampling stations. This would provide about 40 to 50 valid samples from each site during the course of the year. Unfortunately, as seen in the Table below, none of the sampling stations

TAMS COMPLETENESS

SITE	BAKER	CAPITOL	CRO	GEISMAR	LSU	PORT A.
# SAMPLES	23	34	34	28	27	25
Completeness	46%	68%	68%	56%	54%	50%

were able to meet this goal. There are several reasons for the poor data completeness. There were frequent failures of the samplers to operate properly due to blown circuit breakers, mechanical breakdown, poor weather, and operator error. Several samples were discarded due to excessive contamination from field handling and dirty samplers. Additionally, the field staff was often called upon to work other projects which left the TAMS network unattended. Hopefully in the future some of the problems will be adequately resolved and the data completeness will improve.

During the first half of the year the GC/MS analytical system was calibrated for a total of twenty-three target compounds. In late June the target compound list was revised to include a total of thirty-two target compounds. Some of the compounds monitored during the first part of the year were dropped from the target list.

As expected, an analysis of the data from the various sites showed some similar and some very different patterns of volatile organic compounds present in the ambient air. The measured levels of benzene at the Baker, Geismar, and Port Allen sites were higher than the levels measured at the Capitol, LSU, and the Regional Office sites. The Geismar site had levels of methylene chloride, ethylbenzene and styrene which were higher than the amounts measured at any of the other sites. The Port Allen site had the highest measured levels of ethylene dichloride (1,2-dichloroethane). All of the sites had about the same measured levels of Methyl Chloroform, trichloroethylene, and Carbon tetrachloride.

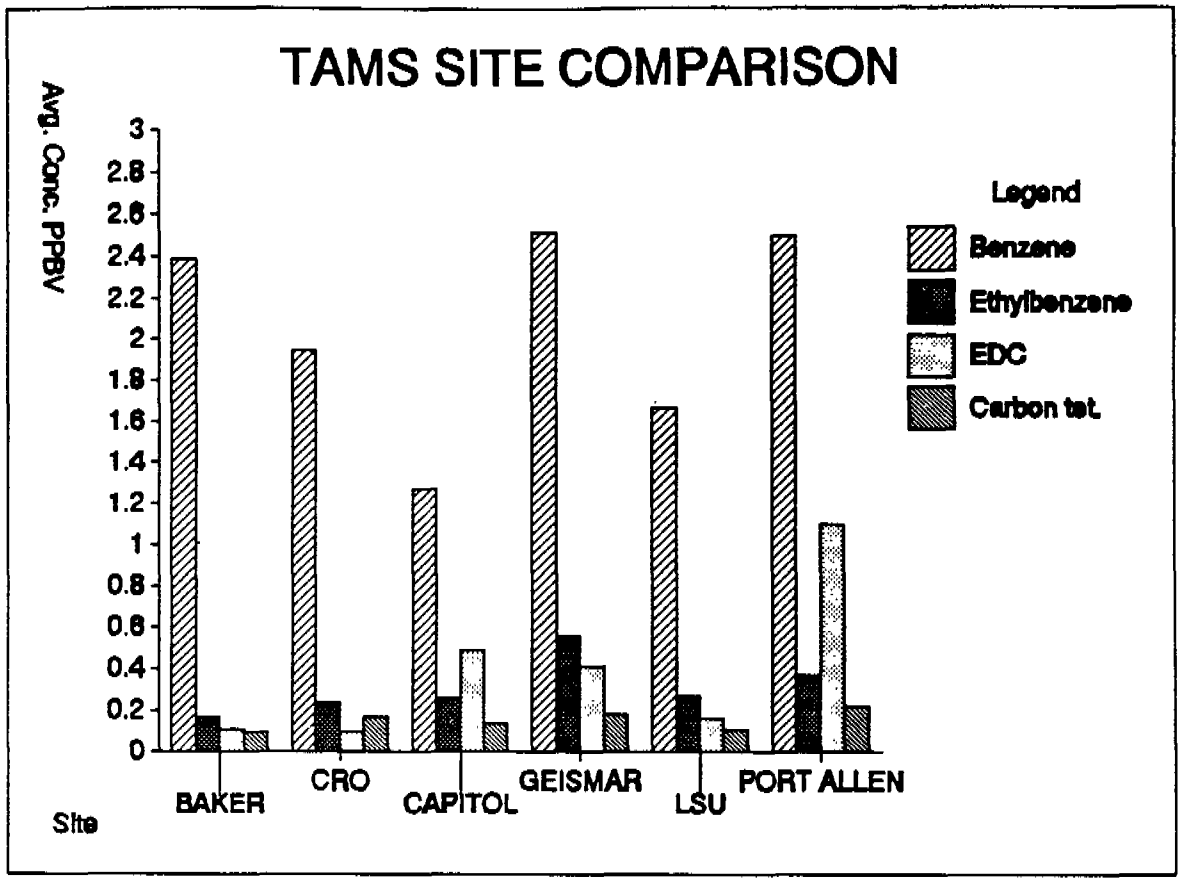
The orientation of each site to the local point sources as well as the local meteorology are most likely responsible for the differences in concentrations observed. The table above provides the mean average concentrations measured at each of the TAMS sites. A more detailed summary of the results from each site is listed in the appendix of this report.

1991

TAMS DATA COMPARISON
MEAN AVERAGE CONCENTRATIONS in PPBV

Compound	BAKER	CAPITOL	CRO	GEISMAR	LSU	PORT A.
Acrylonitrile *	0.01	0.03	0.07	0.02	0.44	0.05
Allyl Chloride *	N/D	N/D	N/D	N/D	N/D	N/D
Acetone **	3.27	6.03	3.28	4.91	7.33	6.71
1,1-dichloroethene **	N/D	0.01	0.01	0.01	N/D	N/D
Methylene Chloride **	0.03	0.09	0.38	0.83	0.17	0.18
Carbon disulfide **	N/D	0.03	0.12	0.03	0.05	0.07
t-1,2-dichloroethene **	N/D	0.01	N/D	N/D	N/D	N/D
1,1-dichloroethane **	N/D	0.01	N/D	N/D	N/D	0.01
2-Butanone **	4.44	1.06	0.44	1.85	3.30	1.60
c-1,2-dichloroethene **	N/D	N/D	N/D	N/D	N/D	N/D
Chloroform	0.04	0.07	0.08	0.09	0.06	0.26
EDC — 1,2-dichloroethane	0.11	0.49	0.10	0.41	0.16	1.10
Methyl Chloroform	0.23	0.28	0.42	0.28	0.23	0.47
Benzene	2.39	1.27	1.95	2.52	1.67	2.50
Carbon Tetrachloride	0.10	0.14	0.17	0.18	0.11	0.22
1,2-dichloropropane	N/D	N/D	N/D	N/D	N/D	N/D
Bromodichloromethane	N/D	N/D	N/D	N/D	0.01	N/D
Trichloroethylene	0.03	0.02	0.02	0.01	0.01	0.02
1-Heptene *	0.02	N/D	N/D	N/D	0.01	0.03
n-Heptane *	0.30	0.41	0.32	0.18	0.27	1.00
c-1,3-dichloropropene **	N/D	N/D	N/D	N/D	N/D	N/D
4-methyl-2-pentanone **	0.01	N/D	0.01	0.01	N/D	0.06
t-1,3-dichloropropene **	N/D	N/D	N/D	N/D	N/D	N/D
1,1,2-trichloroethane **	N/D	N/D	N/D	N/D	N/D	N/D
Toluene	1.63	1.87	2.41	2.16	1.67	3.05
1,3-dichloropropane *	0.00	0.00	0.00	0.00	0.00	0.00
Ethylene Dibromide *	0.00	0.00	0.00	0.00	0.00	0.00
2-Hexanone **	0.40	0.01	0.01	0.17	0.62	0.05
Dibromochloromethane **	N/D	N/D	N/D	N/D	N/D	N/D
Perchloroethylene	0.02	0.08	0.05	0.05	0.07	0.50
Chlorobenzene	0.01	N/D	0.01	0.08	N/D	0.01
Ethylbenzene	0.17	0.26	0.24	0.56	0.27	0.37
m-Xylene	0.50	0.68	0.63	0.27	0.74	0.95
p-Xylene	0.17	0.22	0.21	0.09	0.25	0.31
Bromoform	N/D	N/D	N/D	N/D	N/D	N/D
Styrene **	0.09	0.14	0.09	0.77	0.10	0.27
Tetrachloroethane **	N/D	N/D	N/D	N/D	N/D	N/D
o-Xylene	0.21	0.34	0.29	0.14	0.31	0.44
Cumene *	0.01	0.02	0.01	0.01	0.02	0.04
Bromobenzene *	N/D	N/D	N/D	N/D	N/D	N/D

Note: The calibration mixture was changed on 6/19/91
* denotes compound measured from 1/1/91 thru 6/18/91
** denotes compound measured from 6/19/91 thru 12/31/91
All other compounds were measured during the entire year.



All samples analyzed were subjected to qualitative analysis utilizing a computer library search routine to identify each of the chromatographic peaks. In virtually all of the samples analyzed about 95% of the compounds detected were aliphatic and aromatic hydrocarbons. The pattern of hydrocarbons found in the ambient air is very similar to the classic profile of gasoline. This suggests that mobile sources as well as evaporative emissions are major sources of these compounds in the ambient air. During the warm weather months an increase in the amounts of natural hydrocarbons such as isoprene, and alpha & beta pinene has been observed.

Since the TAMS sites are less expensive to operate, it is desirable to determine if they can generate similar annual average concentrations as observed in the continuous monitoring stations. Since the Baker and Capitol sites have both sampling and analytical systems an easy comparison can be made. When a direct comparison of the data is first made it can be seen that the TAMS data generated at each site is about 20 to 40% higher than the continuous monitoring system data. The most likely cause of this difference is the sampling strategies used in ach of the systems.

Since the hourly concentration observed in the continuous monitoring sites vary diurnally, the eight hour sampling strategy used in the TAMS network will most likely produce a different annual average than a

Continuous Monitoring System Data

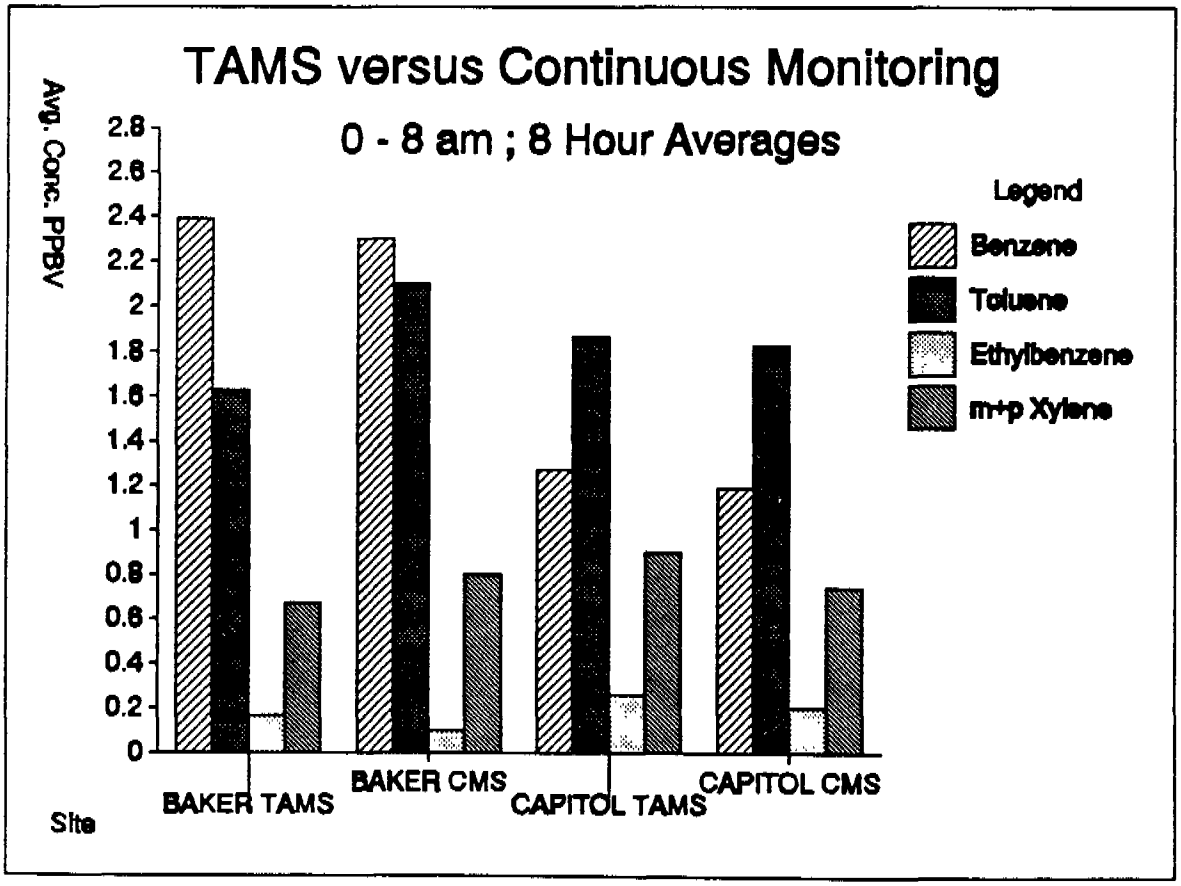
Baker Site 8 Hour Averages

Averaging Period	0:00 - 7:00	8:00 - 15:00	16:00 - 23:00
# of Samples	1599	1552	1645
Benzene	2.3	0.7	1.1
Toluene	2.1	0.8	1.3
Ethylbenzene	0.1	0.1	0.1
m+p Xylene	0.6	0.2	0.4
o Xylene	0.2	0.2	0.2

Capitol Site 8 Hour Averages

Averaging Period	0:00 - 7:00	8:00 - 15:00	16:00 - 23:00
# of Samples	2747	2547	2769
Benzene	1.2	0.8	0.9
Toluene	1.8	1.1	1.5
Ethylbenzene	0.2	0.1	0.2
m+p Xylene	0.7	0.4	0.7
o Xylene	0.3	0.2	0.3

sampling strategy based upon twenty-four one hour samples. The table above divides the continuous monitoring system data into annual averages for three 8 hour periods. The continuous monitoring system eight hour averages from the period midnight to 8:00am are then compared in the graph below to the TAMS data which reflect that same sampling strategy.



The graph shows that the eight hour annual average concentrations for Baker and Capitol sites are now very comparable to the averages generated by the TAMS samplers.

In conclusion,the TAMS samplers as they are currently operated, will generate annual average concentrations which are somewhat higher than the averages produced by a 24 hour automated gas chromatograph system. Since the TAMS samplers are already running at the low end of their flow range a switch to a twenty-four hour sampling schedule will be difficult to implement accurately.

VI. Canister Data

The canister samples were collected using XonTech Model 911A samplers operated by personnel from the LDEQ Office of Air Quality and Radiation Protection. The samplers were programmed to operate once a week for a twenty-four hour sampling period (midnight to midnight). The two canister samplers currently in operation are located at the Baker and the Capitol sites. Some addition canister samplers are planned to be put in operation at site locations still to be determined. Since the canister sampling and analysis system was only in operation during the last part of 1991 there were only a few samples collected at each site.

The canister samplers were put into operation in October of 1991. A total of 15 samples were collected at the Baker site while 14 samples were collected at the Capitol site. The analysis was performed using a Gas Chromatography/Multidetector system (GC/MD). Due to delays in acquiring the calibration cylinder containing the halogenated volatile organic compounds only the Flame Ionization Detector (FID) was calibrated. The samples were analyzed on the FID using the same calibration standard used in the continuous monitoring stations. Concentrations for total hydrocarbons as were calculated using the total

FID CANISTER DATA

Compound	Baker Mean	Capitol Mean
Propane	13.35	15.59
Butane	7.31	10.08
2-methylbutane	3.43	6.56
Pentane	1.68	2.55
2-methylpentane	1.13	1.40
3-methylpentane	0.79	0.95
Hexane	0.86	1.36
Methylcyclopentane	0.67	0.96
Benzene	1.12	0.96
2-methylhexane	1.28	0.79
2,2,4-trimethylpentane	0.57	0.63
Heptane	0.45	0.52
Methylcyclohexane	0.38	0.31
Toluene	1.48	1.73
Octane	0.19	0.19
Ethylbenzene	0.35	0.36
m+p Xylene	0.81	1.10
o Xylene	0.30	0.42
Cumene	0.02	0.17
1,2,4-trimethylbenzene	0.52	0.61
Total RH (as Hexane)	93.88	84.59
Total RH (as Methane)	563.28	507.56

area of all the peaks in the chromatogram and dividing by the response factor for hexane. Total hydrocarbons as methane was calculated by multiplying the Total RH(hexane) concentration by a factor of six.

In December 1991 the GC/MS analysis system was placed in operation. A total of six samples from each site were analyzed by both the GC/MD and the GC/MS analytical systems. The GC/MS analysis system was calibrated with a 38 component target compound calibration standard with included some of the highly volatile organic compounds such as vinyl chloride. The table below shoe the results of those analyses.

GC/MS Canister Data

CANISTER DATA
(6 Samples at each site)

Compound	Mean Average Capitol Site	Mean Average Baker Site
Freon-12	1.21	1.76
Chloromethane	1.41	1.63
Vinyl Chloride	1.26	0.34
Bromomethane	0.17	0.05
Chloroethane	0.05	0.06
Acetone	5.03	6.50
Freon-11	0.63	0.58
1,1-dichloroethene	0.00	0.01
Methylene Chloride	0.17	0.18
Carbon disulfide	0.37	0.28
t-1,2-dichloroethene	0.00	0.01
1,1-dichloroethane	0.01	0.01
2-Butanone	0.68	1.34
c-1,2-dichloroethene	0.00	0.01
Chloroform	0.08	0.05
1,2-dichloroethane	0.42	0.24
Methyl Chloroform	0.31	0.28
Benzene	0.85	0.84
Carbon Tetrachloride	0.14	0.15
1,2-dichloropropane	0.00	0.01
Bromodichloromethane	0.02	0.00
Trichloroethylene	0.06	0.08
c-1,3-dichloropropene	0.00	0.01
4-methyl-2-pentanone	0.06	0.07
t-1,3-dichloropropene	0.00	0.00
1,1,2-trichloroethane	0.02	0.01
Toluene	2.16	1.57
2-Hexanone	0.20	0.84
Dibromochloromethane	0.00	0.00
Perchloroethylene	0.04	0.04
Chlorobenzene	0.01	0.06
Ethylbenzene	0.24	0.17
m-Xylene	0.68	0.46
p-Xylene	0.23	0.46
Bromoform	0.00	0.00
Styrene	0.11	0.23
Tetrachloroethane	0.01	0.23
o-Xylene	0.31	0.18

Since only a few samples were collected, a comparison of the data generated by the canister based system and the data generated by the automated gas chromatograph system would not produce totally conclusive results. However based on the few samples that were generated it appears that the two analytical systems agree with each other reasonably well.

APPENDIX

1991 CAPITOL SITE MONTHLY SUMMARY

MONTH	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE
Samples	688	578	714	671	681	502
Ave. Ambient Temp.	9	12	16	20	23	26
Propane	11.9	11.7	9.7	6.7	5.4	14.1
Butane	9.9	16.2	9.2	3.8	2.7	3.4
2-Methylbutane	4.5	8.4	5.4	3.9	2.8	4.5
Pentane	2.0	4.5	2.2	1.6	1.3	2.0
2-methylpentane	1.2	1.7	1.2	1.0	.8	1.1
3-Methylpentane	.6	.9	.7	.6	.5	.6
Hexane	1.0	1.4	1.4	1.0	.8	1.0
Methylcyclopentane	.5	.6	.5	.5	.3	.4
Benzene	1.2	.9	.9	.8	.7	.8
2-methylhexane	.3	.4	.3	.2	.2	.2
trimethylpentane	.6	.5	.6	.4	.3	.3
Heptane	.3	.3	.3	.2	.1	.1
Methylcyclohexane	.2	.2	.2	.1	.1	.1
Toluene	1.8	1.2	1.4	1.3	1.6	1.3
Octane	.1	.1	.1	.1	.1	.0
Ethylbenzene	.2	.1	.2	.2	.1	.1
m+p Xylene	.8	.5	.5	.5	.5	.5
o Xylene	.3	.2	.2	.2	.2	.3
Cumene	.1	.1	.1	.0	.0	.0
Trimethylbenzene	1.2	.3	.3	.3	.3	.3
Total RH	37.9	56.5	43.8	31.6	27.1	32.3

MONTH	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Samples	723	698	693	727	672	692
Ave. Ambient Temp.	26	26	23	19	12	15
Propane	9.9	10.7	7.5	7.7	11.8	11.1
Butane	4.2	4.5	9.2	9.8	9.7	23.0
2-methylbutane	6.0	6.2	6.7	6.5	7.1	7.7
Pentane	2.6	2.6	1.6	1.2	2.8	4.0
2-methylpentane	1.4	1.4	1.9	1.9	2.2	2.3
3-methylpentane	.7	.7	.8	.8	.8	.9
Hexane	1.1	1.1	1.3	1.9	1.4	1.3
Methylcyclopentane	.5	.6	.6	.8	.8	.7
Benzene	.9	1.4	.8	.9	1.1	1.0
2-Methylhexane	.3	.3	.4	.4	.4	.4
Trimethylpentane	.4	.4	.5	.5	.4	.5
Heptane	.2	.2	.3	.3	.3	.3
Methylcyclohexane	.2	.2	.2	.2	.2	.2
Toluene	1.4	1.6	1.6	1.6	1.2	1.8
Octane	.1	.1	.1	.1	.2	.1
Ethylbenzene	.2	.2	.2	.2	.2	.2
m+p Xylene	.7	.6	.7	.7	.6	.8
o Xylene	.2	.2	.3	.3	.2	.3
Cumene	.0	.0	.6	.1	.1	.0
Trimethylbenzene	.4	.3	1.3	1.7	.3	.3
Total RH	38.7	40.7	48.7	47.2	45.4	58.3

1991 BAKER SITE MONTHLY SUMMARY

MONTH	APRIL	MAY	JUNE
Samples	28	360	578
Ave. Ambient Temp.	19	24	25
Propane	4.1	3.2	5.2
Butane	2.1	2.4	4.1
2-Methylbutane	2.1	2.4	4.3
Pentane	.8	.9	2.0
2-Methylpentane	1.0	.7	1.3
3-Methylpentane	.6	.2	.5
Hexane	.6	.4	.8
Methylcyclohexane	.5	.3	.4
Benzene	1.2	.8	1.6
2-Methylhexane	.5	.2	.3
Trimethylpentane	.5	.2	.3
Heptane	.5	.1	.2
Methylcyclohexane	.5	.1	.3
Toluene	.8	1.4	1.4
Octane	.4	.0	.2
Ethylbenzene	.3	.1	.1
m+p Xylene	.4	.2	.4
o Xylene	.3	.3	.2
Cumene	.4	.1	.1
Trimethylbenzene	.2	.1	.2
Total RH	27.8	27.5	40.1

MONTH	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
Samples	573	707	612	653	668	617
Ave. Ambient Temp.	27	26	22	19	13	14
Propane	5.5	7.2	5.2	8.3	8.5	9.0
Butane	3.2	4.7	2.9	5.9	5.8	5.6
2-Methylbutane	3.8	4.9	3.3	4.3	3.8	3.1
Pentane	1.8	2.3	1.2	1.8	1.4	1.3
2-Methylpentane	1.1	1.4	.9	1.3	1.1	.9
3-Methylpentane	.4	.5	.3	.5	.4	.4
Hexane	.7	.9	.5	.7	.6	.6
Methylcyclopentane	.4	.5	.3	.4	.3	.3
Benzene	1.4	1.7	1.4	1.6	1.0	1.0
2-Methylhexane	.3	.4	.2	.4	.3	.2
Trimethylpentane	.3	.2	.2	.3	.2	.2
Heptane	.2	.3	.2	.3	.2	.2
Methylcyclohexane	.3	.4	.2	.3	.2	.2
Toluene	1.5	1.7	1.3	1.6	1.2	1.1
Octane	.3	.3	.3	.3	.2	.1
Ethylbenzene	.2	.1	.1	.1	.1	.1
m+p Xylene	.4	.4	.4	.5	.4	.3
o Xylene	.2	.2	.2	.3	.2	.2
Cumene	.2	.2	.1	.1	.1	.0
Trimethylbenzene	.2	.2	.2	.3	.5	.3
Total RH	36.9	42.6	26.3	33.5	30.0	33.9

1991 BAKER SITE DAY-OF-THE-WEEK SUMMARY

DAY_OF_WEEK	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Samples	568	636	727	744	757	703	661
Propane	5.6	6.3	8.3	6.9	6.5	7.0	6.1
Butane	3.7	4.7	5.2	4.5	4.0	4.8	4.1
2-Methylbutane	3.1	3.5	4.3	4.2	3.7	4.1	3.6
Pentane	1.5	1.4	1.9	1.7	1.5	1.8	1.5
2-Methylpentane	.9	1.0	1.3	1.2	1.1	1.2	1.0
3-Methylpentane	.4	.4	.5	.4	.4	.5	.4
Hexane	.6	.6	.8	.7	.6	.7	.6
Methylcyclopentane	.3	.3	.5	.4	.3	.4	.3
Benzene	1.3	1.3	1.6	1.3	1.2	1.5	1.2
2-Methylhexane	.3	.3	.3	.3	.3	.3	.2
Trimethylpentane	.2	.2	.3	.2	.2	.3	.2
Heptane	.2	.2	.3	.2	.2	.3	.2
Methylcyclohexane	.2	.2	.3	.3	.2	.3	.2
Toluene	1.3	1.3	1.6	1.4	1.3	1.5	1.3
Octane	.3	.2	.3	.2	.2	.2	.2
Ethylbenzene	.1	.1	.1	.1	.1	.1	.1
m+p Xylene	.3	.4	.5	.4	.4	.4	.4
o Xylene	.2	.2	.2	.2	.2	.3	.2
Cumene	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.3	.3	.3	.2	.2	.3	.3
Total RH	30.5	32.6	38.6	34.7	32.5	37.4	32.0

1991 CAPITOL SITE DAY-OF-THE-WEEK ANALYSIS

DAY_OF_WEEK	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Samples	1137	1088	1175	1162	1150	1123	1228
Propane	8.8	10.2	11.3	10.4	9.5	8.8	9.1
Butane	8.3	8.1	12.4	8.9	7.0	6.7	10.0
2-Methylbutane	6.0	6.6	6.4	6.3	4.9	4.4	5.9
Pentane	2.4	2.8	2.9	2.4	2.1	1.6	2.4
2-Methylpentane	1.4	1.6	1.7	1.6	1.3	1.3	1.6
3-Methylpentane	.7	.8	.8	.8	.7	.6	.7
Hexane	1.4	1.4	1.3	1.3	1.1	1.0	1.1
Methylcyclopentane	.5	.8	.7	.6	.5	.5	.6
Benzene	.8	1.0	1.1	1.1	.9	.8	1.0
2-Methylhexane	.3	.4	.3	.3	.3	.2	.3
Trimethylpentane	.4	.5	.5	.5	.5	.4	.4
Heptane	.3	.3	.3	.3	.2	.2	.2
Methylcyclohexane	.2	.2	.2	.2	.2	.1	.2
Toluene	1.5	1.6	1.7	1.6	1.4	1.3	1.4
Octane	.1	.1	.1	.1	.1	.1	.1
Ethylbenzene	.1	.2	.2	.2	.2	.2	.1
m+p Xylene	.5	.7	.7	.7	.6	.6	.5
o Xylene	.2	.3	.3	.2	.3	.2	.2
Cumene	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.5	.6	.6	.6	.7	.5	.5
Total RH	40.0	45.9	49.6	45.5	39.3	34.8	41.3

1991 BAKER SITE DIURNAL ANALYSIS

HOUR	0	1	2	3	4	5	6	7
Samples	204	202	205	199	197	197	199	196
Propane	9.9	11.3	11.3	11.4	11.7	12.0	12.9	11.3
Butane	7.2	7.2	6.4	6.2	6.3	6.0	6.8	5.5
2-Methylbutane	5.4	5.3	4.9	4.9	4.8	4.8	5.1	4.6
Pentane	2.6	2.6	2.4	2.3	2.2	2.3	2.6	2.2
2-Methylpentane	1.9	1.7	1.7	1.5	1.5	1.5	1.8	1.4
3-Methylpentane	.7	.7	.7	.7	.6	.6	.7	.6
Hexane	1.1	1.1	1.1	1.0	1.0	1.0	1.1	.9
Methylcyclopentane	.7	.7	.7	.6	.6	.6	.7	.5
Benzene	2.4	2.5	2.5	2.3	2.1	2.2	2.5	1.9
2-Methylhexane	.5	.4	.4	.4	.3	.4	.4	.4
Trimethylpentane	.3	.3	.3	.3	.2	.3	.4	.3
Heptane	.4	.4	.4	.3	.3	.3	.4	.3
Methylcyclohexane	.6	.6	.5	.5	.5	.5	.6	.4
Toluene	2.2	2.2	2.1	1.9	1.8	2.0	2.5	1.9
Octane	.3	.3	.2	.2	.2	.2	.2	.2
Ethylbenzene	.2	.1	.1	.1	.1	.1	.2	.2
m+p Xylene	.6	.6	.5	.5	.5	.6	.8	.6
o Xylene	.2	.2	.2	.2	.2	.2	.3	.2
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.3	.3	.3	.3	.3	.2	.3	.3
Total RH	50.6	50.3	48.0	46.5	46.2	46.3	52.8	43.5

HOUR	8	9	10	11	12	13	14	15
Samples	193	180	182	192	196	196	206	207
Propane	9.1	5.0	4.1	3.5	2.9	2.5	2.4	2.4
Butane	4.9	3.8	3.2	2.7	2.4	2.1	1.9	1.8
2-Methylbutane	3.8	3.4	3.0	2.7	2.6	2.4	2.3	2.3
Pentane	1.6	1.1	1.0	.9	.8	.5	.6	.6
2-Methylpentane	1.1	.8	.8	.7	.6	.5	.5	.5
3-Methylpentane	.4	.3	.3	.3	.2	.2	.2	.2
Hexane	.7	.5	.4	.5	.3	.2	.2	.3
Methylcyclopentane	.4	.3	.2	.2	.2	.1	.1	.1
Benzene	1.2	.8	.6	.6	.6	.5	.5	.5
2-Methylhexane	.2	.2	.2	.2	.2	.1	.1	.2
Trimethylpentane	.3	.2	.2	.2	.1	.1	.1	.1
Heptane	.2	.1	.1	.1	.1	.1	.1	.1
Methylcyclohexane	.2	.1	.1	.1	.1	.0	.0	.0
Toluene	1.3	.9	.8	.7	.7	.5	.6	.6
Octane	.2	.2	.2	.3	.3	.3	.3	.2
Ethylbenzene	.1	.1	.1	.2	.1	.0	.0	.1
m+p Xylene	.4	.2	.2	.2	.2	.1	.1	.2
o Xylene	.2	.2	.2	.3	.2	.2	.2	.2
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.2	.2	.3	.3	.3	.3	.2	.2
Total RH	35.7	29.1	24.7	23.0	21.0	18.7	18.4	19.4

1991 BAKER SITE DIURNAL ANALYSIS (CONT)

HOUR	16	17	18	19	20	21	22	23
Samples	206	205	207	206	207	202	206	206
Propane	2.7	2.9	2.9	4.5	4.0	5.2	7.4	8.2
Butane	2.3	2.4	2.5	3.6	3.7	5.4	6.4	6.3
2-Methylbutane	2.7	2.7	2.9	3.5	3.5	4.3	4.7	4.9
Pentane	.9	1.0	1.5	1.6	1.7	1.7	2.1	2.1
2-MethylPentane	.6	.7	.8	.9	1.1	1.2	1.5	1.4
3-MethylPentane	.2	.3	.3	.4	.4	.5	.6	.6
Hexane	.3	.4	.4	.5	.6	.6	.8	.9
Methylcyclopentane	.1	.2	.2	.3	.3	.4	.5	.5
Benzene	.6	.7	.8	1.0	1.0	1.2	1.6	1.7
2-Methylhexane	.2	.2	.2	.3	.3	.3	.4	.4
Trimethylpentane	.1	.2	.2	.2	.3	.3	.3	.3
Heptane	.1	.1	.1	.2	.2	.2	.3	
Methylcyclohexane	.0	.1	.1	.1	.2	.2	.3	.3
Toluene	.8	1.0	1.1	1.3	1.3	1.4	1.7	1.7
Octane	.2	.2	.2	.2	.2	.2	.2	.2
Ethylbenzene	.1	.1	.1	.1	.1	.1	.2	.1
m+p Xylene	.2	.3	.4	.4	.4	.5	.6	.5
o Xylene	.2	.2	.2	.2	.2	.2	.2	.2
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.2	.3	.2	.2	.3	.3	.3	.3
Total RH	22.1	23.8	24.6	29.0	29.8	33.8	41.0	41.8

1991 CAPITOL SITE DIURNAL ANALYSIS

HOUR	0	1	2	3	4	5	6	7
Samples	343	344	343	345	342	345	341	344
Propane	10.2	10.5	11.3	12.4	11.5	12.0	16.5	29.2
Butane	10.9	9.7	9.0	14.5	12.2	14.7	13.6	14.2
2-Methylbutane	6.6	5.7	6.3	7.8	6.8	7.1	8.0	8.1
Pentane	3.0	2.3	3.0	3.2	3.1	3.3	3.7	3.9
2-methylpentane	1.6	1.4	1.6	1.8	1.8	1.8	2.1	2.1
3-Methylpentane	.8	.8	.8	.9	.9	.9	1.1	1.1
Hexane	1.6	1.5	2.0	1.9	1.8	1.7	1.9	2.0
Methylcyclopentane	.7	.6	.7	.8	.7	.8	.8	.9
Benzene	1.1	1.0	1.2	1.4	1.2	1.1	1.2	1.4
2-Methylhexane	.3	.3	.3	.4	.3	.3	.4	.5
Trimethylpentane	.6	.6	.5	.5	.5	.4	.6	.7
Heptane	.3	.3	.3	.3	.3	.3	.4	.4
Methylcyclohexane	.2	.2	.2	.2	.2	.2	.3	.4
Toluene	1.8	1.7	2.2	1.7	1.5	1.5	2.0	2.3
Octane	.1	.1	.1	.1	.1	.1	.1	.2
Ethylbenzene	.2	.2	.2	.2	.2	.2	.2	.3
m+p Xylene	.8	.7	.7	.7	.6	.6	.8	1.0
o Xylene	.3	.3	.3	.2	.2	.2	.3	.5
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.7	.7	.7	.6	.6	.5	.6	.7
Total RH	49.6	46.0	50.4	57.2	52.0	53.6	63.0	75.3

HOUR	8	9	10	11	12	13	14	15
Sample	333	280	291	316	325	330	334	338
Propane	13.1	8.7	6.8	5.6	4.9	4.6	4.5	4.5
Butane	8.7	8.9	6.4	6.0	5.4	5.4	4.4	4.3
2-Methylbutane	7.7	6.2	4.8	4.7	4.2	4.4	3.6	3.4
Pentane	3.2	2.2	1.9	1.5	1.7	1.4	1.3	1.1
2-Methylpentane	2.1	1.6	1.4	1.2	1.1	1.0	.9	.9
3-Methylpentane	1.0	.8	.6	.5	.4	.4	.4	.3
Hexane	1.7	1.2	.9	.7	.6	.6	.5	.4
Methylcyclopentane	.9	.7	.5	.4	.3	.2	.2	.2
Benzene	1.2	1.0	.9	.7	.7	.6	.6	.6
2-Methylhexane	.5	.4	.2	.2	.2	.2	.1	.1
Trimethylpentane	.7	.5	.4	.3	.2	.2	.2	.2
Heptane	.4	.3	.2	.1	.1	.1	.1	.1
Methylcyclohexane	.3	.2	.2	.1	.1	.1	.1	.1
Toluene	2.1	1.6	1.3	1.0	.9	.9	.8	.8
Octane	.2	.1	.1	.1	.1	.1	.1	.0
Ethylbenzene	.3	.2	.1	.1	.1	.1	.1	.1
m+p Xylene	.9	.6	.5	.3	.3	.2	.3	.3
o Xylene	.3	.3	.2	.1	.1	.1	.1	.1
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.6	.5	.4	.4	.4	.4	.5	.5
Total RH	55.6	43.1	33.7	28.5	26.5	24.9	22.8	21.3

1991 CAPITOL SITE DIURNAL ANALYSIS (CONT)

HOUR	16	17	18	19	20	21	22	23
Samples	346	349	347	349	345	345	343	345
Propane	4.8	5.9	7.1	8.1	8.6	9.4	9.9	11.7
Butane	3.9	5.1	7.2	8.2	7.8	9.2	10.1	10.5
2-Methylbutane	3.3	4.2	5.5	5.6	5.5	6.2	6.2	6.7
Pentane	1.2	1.6	2.4	2.0	2.2	2.2	2.5	2.7
2-Methylpentane	.9	1.1	1.4	1.5	1.6	1.7	1.7	1.7
3-Methylpentane	.4	.5	.6	.6	.7	.9	.9	.9
Hexane	.6	.7	.9	1.0	1.2	1.4	1.4	1.5
Methylcyclopentane	.2	.3	.5	.5	.6	.7	.7	.7
Benzene	.7	.7	.9	1.0	.9	1.0	1.1	1.2
2-Methylhexane	.2	.2	.3	.3	.3	.4	.4	.4
Trimethylpentane	.3	.3	.4	.4	.5	.5	.6	.5
Heptane	.1	.1	.2	.2	.3	.3	.3	.3
Methylcyclohexane	.1	.1	.1	.2	.2	.2	.2	.2
Toluene	.9	1.1	1.3	1.6	1.6	1.7	1.8	1.8
Octane	.1	.1	.1	.1	.1	.1	.1	.1
Ethylbenzene	.1	.1	.2	.2	.3	.2	.2	.2
m+p Xylene	.4	.4	.6	.7	1.0	.8	.8	.8
o Xylene	.1	.2	.2	.3	.3	.3	.3	.3
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.5	.5	.6	.6	.7	.7	.7	.7
Total RH	23.0	27.1	35.8	39.5	42.2	45.6	47.8	48.6

1991 CAPITOL SITE DIURNAL ANALYSIS

HOUR	0	1	2	3	4	5	6	7
Samples	343	344	343	345	342	345	341	344
Propane	10.2	10.5	11.3	12.4	11.5	12.0	16.5	29.2
Butane	10.9	9.7	9.0	14.5	12.2	14.7	13.6	14.2
2-Methylbutane	6.6	5.7	6.3	7.8	6.8	7.1	8.0	8.1
Pentane	3.0	2.3	3.0	3.2	3.1	3.3	3.7	3.9
2-Methylpentane	1.6	1.4	1.6	1.8	1.8	1.8	2.1	2.1
3-Methylpentane	.8	.8	.8	.9	.9	.9	1.1	1.1
Hexane	1.6	1.5	2.0	1.9	1.8	1.7	1.9	2.0
Methylcyclopentane	.7	.6	.7	.8	.7	.8	.8	.9
Benzene	1.1	1.0	1.2	1.4	1.2	1.1	1.2	1.4
2-Methylhexane	.3	.3	.3	.4	.3	.3	.4	.5
Trimethylpentane	.6	.6	.5	.5	.5	.4	.6	.7
Heptane	.3	.3	.3	.3	.3	.3	.4	.4
Methylcyclohexane	.2	.2	.2	.2	.2	.2	.3	.4
Toluene	1.8	1.7	2.2	1.7	1.5	1.5	2.0	2.3
Octane	.1	.1	.1	.1	.1	.1	.1	.2
Ethylbenzene	.2	.2	.2	.2	.2	.2	.2	.3
m+p Xylene	.8	.7	.7	.7	.6	.6	.8	1.0
o Xylene	.3	.3	.3	.2	.2	.2	.3	.5
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.7	.7	.7	.6	.6	.5	.6	.7
Total RH	49.6	46.0	50.4	57.2	52.0	53.6	63.0	75.3

HOUR	8	9	10	11	12	13	14	15
Samples	333	280	291	316	325	330	334	338
Propane	13.1	8.7	6.8	5.6	4.9	4.6	4.5	4.5
Butane	8.7	8.9	6.4	6.0	5.4	5.4	4.4	4.3
2-Methylbutane	7.7	6.2	4.8	4.7	4.2	4.4	3.6	3.4
Pentane	3.2	2.2	1.9	1.5	1.7	1.4	1.3	1.1
2-Methylpentane	2.1	1.6	1.4	1.2	1.1	1.0	.9	.9
3-Methylpentane	1.0	.8	.6	.5	.4	.4	.4	.3
Hexane	1.7	1.2	.9	.7	.6	.6	.5	.4
Methylcyclopentane	.9	.7	.5	.4	.3	.2	.2	.2
Benzene	1.2	1.0	.9	.7	.7	.6	.6	.6
2-Methylhexane	.5	.4	.2	.2	.2	.2	.1	.1
Trimethylpentane	.7	.5	.4	.3	.2	.2	.2	.2
Heptane	.4	.3	.2	.1	.1	.1	.1	.1
Methylcyclohexane	.3	.2	.2	.1	.1	.1	.1	.1
Toluene	2.1	1.6	1.3	1.0	.9	.9	.8	.8
Octane	.2	.1	.1	.1	.1	.1	.1	.0
Ethylbenzene	.3	.2	.1	.1	.1	.1	.1	.1
m+p Xylene	.9	.6	.5	.3	.3	.2	.3	.3
o Xylene	.3	.3	.2	.1	.1	.1	.1	.1
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.6	.5	.4	.4	.4	.4	.5	.5
Total RH	55.6	43.1	33.7	28.5	26.5	24.9	22.8	21.3

1991 CAPITOL SITE DIURNAL ANALYSIS (CONT)

HOUR	16	17	18	19	20	21	22	23
Samples	346	349	347	349	345	345	343	345
Propane	4.8	5.9	7.1	8.1	8.6	9.4	9.9	11.7
Butane	3.9	5.1	7.2	8.2	7.8	9.2	10.1	10.5
2-Methylbutane	3.3	4.2	5.5	5.6	5.5	6.2	6.2	6.7
Pentane	1.2	1.6	2.4	2.0	2.2	2.2	2.5	2.7
2-Methylpentane	.9	1.1	1.4	1.5	1.6	1.7	1.7	1.7
3-Methylpentane	.4	.5	.6	.6	.7	.9	.9	.9
Hexane	.6	.7	.9	1.0	1.2	1.4	1.4	1.5
Methylcyclopentane	.2	.3	.5	.5	.6	.7	.7	.7
Benzene	.7	.7	.9	1.0	.9	1.0	1.1	1.2
2-Methylhexane	.2	.2	.3	.3	.3	.4	.4	.4
Trimethylpentane	.3	.3	.4	.4	.5	.5	.6	.5
Heptane	.1	.1	.2	.2	.3	.3	.3	.3
Methylcyclohexane	.1	.1	.1	.2	.2	.2	.2	.2
Toluene	.9	1.1	1.3	1.6	1.6	1.7	1.8	1.8
Octane	.1	.1	.1	.1	.1	.1	.1	.1
Ethylbenzene	.1	.1	.2	.2	.3	.2	.2	.2
m+p Xylene	.4	.4	.6	.7	1.0	.8	.8	.8
o Xylene	.1	.2	.2	.3	.3	.3	.3	.3
Cumene	.1	.1	.1	.1	.1	.1	.1	.1
Trimethylbenzene	.5	.5	.6	.6	.7	.7	.7	.7
Total RH	23.0	27.1	35.8	39.5	42.2	45.6	47.8	48.6

CAPITOL SITE TAMS DATA

Compound	Mean Average	Minimum	Maximum
Acrylonitrile *	0.03	0.00	0.41
Allyl Chloride *	0.00	0.00	0.00
Acetone **	6.03	0.00	25.00
1,1-dichloroethene **	0.01	0.00	0.07
Methylene Chloride **	0.09	0.00	0.64
Carbon disulfide **	0.03	0.00	0.13
t-1,2-dichloroethene **	0.01	0.00	0.12
1,1-dichloroethane **	0.01	0.00	0.11
2-Butanone **	1.06	0.00	3.16
c-1,2-dichloroethene **	0.00	0.00	0.05
Chloroform	0.07	0.00	0.48
1,2-dichloroethane	0.49	0.00	5.22
Methyl Chloroform	0.28	0.14	0.77
Benzene	1.27	0.00	4.96
Carbon Tetrachloride	0.14	0.00	0.35
1,2-dichloropropane	0.00	0.00	0.01
Bromodichloromethane **	0.00	0.00	0.04
Trichloroethylene	0.02	0.00	0.21
1-Heptene *	0.00	0.00	0.08
n-Heptane *	0.41	0.03	1.12
c-1,3-dichloropropene **	0.00	0.00	0.00
4-methyl-2-pentanone **	0.00	0.00	0.10
t-1,3-dichloropropene **	0.00	0.00	0.00
1,1,2-trichloroethane **	0.00	0.00	0.00
Toluene	1.87	0.31	8.44
1,3-dichloropropane *	0.00	0.00	0.00
Ethylene Dibromide *	0.00	0.00	0.00
2-Hexanone **	0.01	0.00	0.22
Dibromochloromethane **	0.00	0.00	0.00
Perchloroethylene	0.08	0.00	0.66
Chlorobenzene	0.00	0.00	0.07
Ethylbenzene	0.26	0.05	1.23
m-Xylene	0.68	0.08	3.70
p-Xylene	0.22	0.04	1.23
Bromoform	0.00	0.00	0.01
Styrene **	0.14	0.00	0.62
Tetrachloroethane **	0.00	0.00	0.06
o-Xylene	0.34	0.07	1.69
Cumene *	0.02	0.00	0.10
Bromobenzene *	0.00	0.00	0.00

Note:

* denotes compound measured prior to 6/19/91
** denotes compound measured after 6/19/91

All other compounds were measured during the entire year.

BAKER SITE TAMS DATA

Compound	Mean Average	Minimum	Maximum
Acrylonitrile *	0.01	0.00	0.06
Allyl Chloride *	0.00	0.00	0.00
Acetone **	3.27	0.00	15.80
1,1-dichloroethene **	0.00	0.00	0.01
Methylene Chloride **	0.03	0.00	0.35
Carbon disulfide **	0.04	0.00	0.16
t-1,2-dichloroethene **	0.00	0.00	0.00
1,1-dichloroethane **	0.00	0.00	0.00
2-Butanone **	4.44	0.00	20.16
c-1,2-dichloroethene **	0.00	0.00	0.00
Chloroform	0.04	0.00	0.19
1,2-dichloroethane	0.11	0.00	0.61
Methyl Chloroform	0.23	0.00	2.20
Benzene	2.39	0.00	8.17
Carbon Tetrachloride	0.10	0.03	0.21
1,2-dichloropropane	0.00	0.00	0.04
Bromodichloromethane **	0.00	0.00	0.00
Trichloroethylene	0.03	0.00	0.52
1-Heptene *	0.02	0.00	0.14
n-Heptane *	0.30	0.00	0.80
c-1,3-dichloropropene **	0.00	0.00	0.03
4-methyl-2-pentanone **	0.01	0.00	0.27
t-1,3-dichloropropene **	0.00	0.00	0.04
1,1,2-trichloroethane **	0.00	0.00	0.01
Toluene	1.63	0.24	5.59
1,3-dichloropropane *	0.00	0.00	0.00
Ethylene Dibromide *	0.00	0.00	0.00
2-Hexanone **	0.40	0.00	2.70
Dibromochloromethane **	0.00	0.00	0.00
Perchloroethylene	0.02	0.00	0.07
Chlorobenzene	0.01	0.00	0.03
Ethylbenzene	0.17	0.03	0.55
m-Xylene	0.50	0.04	1.65
p-Xylene	0.17	0.01	0.55
Bromoform	0.00	0.00	0.00
Styrene **	0.09	0.00	0.26
Tetrachloroethane **	0.00	0.00	0.03
o-Xylene	0.21	0.02	0.88
Cumene *	0.01	0.00	0.05
Bromobenzene *	0.00	0.00	0.00

Note:

* denotes compound measured prior to 6/19/91
** denotes compound measured after 6/19/91

All other compounds were measured during the entire year.

GEISMAR SITE TAMS DATA

Compound	Mean Average	Minimum	Maximum
Acrylonitrile *	0.02	0.00	0.12
Allyl Chloride *	0.00	0.00	0.00
Acetone **	4.91	0.00	23.28
1,1-dichloroethene **	0.01	0.00	0.08
Methylene Chloride **	0.83	0.00	6.58
Carbon disulfide **	0.03	0.00	0.12
t-1,2-dichloroethene **	0.00	0.00	0.00
1,1-dichloroethane **	0.00	0.00	0.02
2-Butanone **	1.85	0.00	22.25
c-1,2-dichlorbethene **	0.00	0.00	0.02
Chloroform	0.09	0.00	0.31
1,2-dichloroethane	0.41	0.00	1.81
Methyl Chloroform	0.28	0.00	1.07
Benzene	2.52	0.00	13.56
Carbon Tetrachloride	0.18	0.00	0.46
1,2-dichloropropane	0.00	0.00	0.00
Bromodichloromethane **	0.00	0.00	0.01
Trichloroethylene	0.01	0.00	0.11
1-Heptene *	0.00	0.00	0.00
n-Heptane *	0.18	0.00	0.57
c-1,3-dichloropropene **	0.00	0.00	0.00
4-methyl-2-pentanone **	0.01	0.00	0.03
t-1,3-dichloropropene **	0.00	0.00	0.00
1,1,2-trichloroethane **	0.00	0.00	0.00
Toluene	2.16	0.21	13.77
1,3-dichloropropane *	0.00	0.00	0.00
Ethylene Dibromide *	0.00	0.00	0.00
2-Hexanone **	0.17	0.00	2.41
Dibromochloromethane **	0.00	0.00	0.00
Perchloroethylene	0.05	0.00	0.29
Chlorobenzene	0.08	0.00	0.53
Ethylbenzene	0.56	0.01	9.13
m-Xylene	0.27	0.00	0.71
p-Xylene	0.09	0.00	0.24
Bromoform	0.00	0.00	0.00
Styrene **	0.77	0.03	6.09
Tetrachloroethane **	0.00	0.00	0.01
o-Xylene	0.14	0.00	0.41
Cumene *	0.01	0.00	0.06
Bromobenzene *	0.00	0.00	0.00

Note:

* denotes compound measured prior to 6/19/91
** denotes compound measured after 6/19/91

All other compounds were measured during the entire year.

L S U SITE TAMS DATA

Compound	Mean Average	Minimum	Maximum
Acrylonitrile *	0.44	0.00	8.40
Allyl Chloride *	0.00	0.00	0.00
Acetone **	7.33	0.00	26.61
1,1-dichloroethene **	0.00	0.00	0.03
Methylene Chloride **	0.17	0.00	1.32
Carbon disulfide **	0.05	0.00	0.27
t-1,2-dichloroethene **	0.00	0.00	0.00
1,1-dichloroethane **	0.00	0.00	0.01
2-Butanone **	3.30	0.24	20.78
c-1,2-dichloroethene **	0.00	0.00	0.01
Chloroform	0.06	0.00	0.39
1,2-dichloroethane	0.16	0.00	2.13
Methyl Chloroform	0.23	0.02	0.57
Benzene	1.67	0.00	5.91
Carbon Tetrachloride	0.11	0.03	0.35
1,2-dichloropropane	0.00	0.00	0.01
Bromodichloromethane **	0.01	0.00	0.09
Trichloroethylene	0.01	0.00	0.10
1-Heptene *	0.01	0.00	0.09
n-Heptane *	0.27	0.06	0.78
c-1,3-dichloropropene **	0.00	0.00	0.00
4-methyl-2-pentanone **	0.00	0.00	0.09
t-1,3-dichloropropene **	0.00	0.00	0.00
1,1,2-trichloroethane **	0.00	0.00	0.02
Toluene	1.67	0.19	8.06
1,3-dichloropropane *	0.00	0.00	0.04
Ethylene Dibromide *	0.00	0.00	0.00
2-Hexanone **	0.62	0.00	3.15
Dibromochloromethane **	0.00	0.00	0.00
Perchloroethylene	0.07	0.00	0.63
Chlorobenzene	0.00	0.00	0.04
Ethylbenzene	0.27	0.02	1.18
m-Xylene	0.74	0.07	3.73
p-Xylene	0.25	0.02	1.24
Bromoform	0.00	0.00	0.00
Styrene **	0.10	0.00	0.70
Tetrachloroethane **	0.00	0.00	0.03
o-Xylene	0.31	0.03	1.57
Cumene *	0.02	0.00	0.08
Bromobenzene *	0.00	0.00	0.00

Note:

* denotes compound measured prior to 6/19/91
** denotes compound measured after 6/19/91

All other compounds were measured during the entire year.

PORT ALLEN SITE TAMS DATA

Compound	Mean Average	Minimum	Maximum
Acrylonitrile *	0.05	0.00	0.28
Allyl Chloride *	0.00	0.00	0.00
Acetone **	6.71	0.00	33.63
1,1-dichloroethene **	0.00	0.00	0.02
Methylene Chloride **	0.18	0.00	1.20
Carbon disulfide **	0.07	0.00	0.34
t-1,2-dichloroethene **	0.00	0.00	0.00
1,1-dichloroethane **	0.01	0.00	0.04
2-Butanone **	1.60	0.00	9.83
c-1,2-dichloroethene **	0.00	0.00	0.01
Chloroform	0.26	0.00	2.40
1,2-dichloroethane	1.10	0.00	9.83
Methyl Chloroform	0.47	0.00	1.97
Benzene	2.50	0.00	24.14
Carbon Tetrachloride	0.22	0.04	1.06
1,2-dichloropropane	0.00	0.00	0.02
Bromodichloromethane **	0.00	0.00	0.04
Trichloroethylene	0.02	0.00	0.19
1-Heptene *	0.03	0.00	0.31
n-Heptane *	1.00	0.00	4.34
c-1,3-dichloropropene **	0.00	0.00	0.00
4-methyl-2-pentanone **	0.06	0.00	0.62
t-1,3-dichloropropene **	0.00	0.00	0.00
1,1,2-trichloroethane **	0.00	0.00	0.01
Toluene	3.05	0.02	24.90
1,3-dichloropropane *	0.00	0.00	0.06
Ethylene Dibromide *	0.00	0.00	0.04
2-Hexanone **	0.05	0.00	1.09
Dibromochloromethane **	0.00	0.00	0.00
Perchloroethylene	0.50	0.00	11.60
Chlorobenzene	0.01	0.00	0.29
Ethylbenzene	0.37	0.01	2.68
m-Xylene	0.95	0.05	7.65
p-Xylene	0.31	0.01	2.55
Bromoform	0.00	0.00	0.00
Styrene **	0.27	0.02	0.78
Tetrachloroethane **	0.00	0.00	0.01
o-Xylene	0.44	0.02	3.64
Cumene *	0.04	0.00	0.23
Bromobenzene *	0.00	0.00	0.00

Note:

* denotes compound measured prior to 6/19/91
** denotes compound measured after 6/19/91

All other compounds were measured during the entire year.

CAPITOL REGIONAL OFFICE SITE TAMS DATA

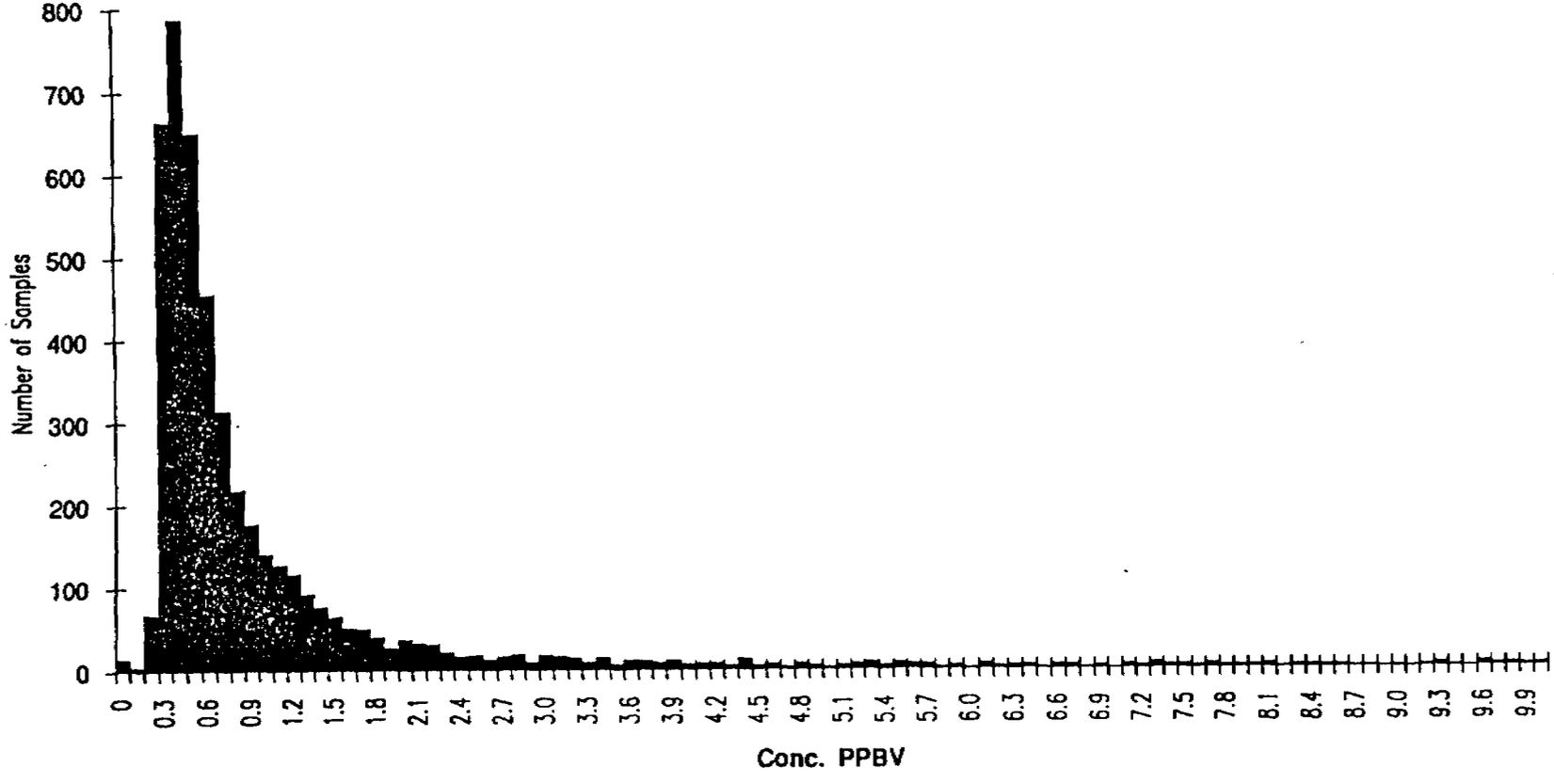
Compound	Mean Average	Minimum	Maximum
Acrylonitrile *	0.07	0.00	0.76
Allyl Chloride *	0.00	0.00	0.00
Acetone **	3.28	0.00	12.69
1,1-dichloroethene **	0.01	0.00	0.08
Methylene Chloride **	0.38	0.00	2.81
Carbon disulfide **	0.12	0.00	0.53
t-1,2-dichloroethene **	0.00	0.00	0.00
1,1-dichloroethane **	0.00	0.00	0.04
2-Butanone **	0.44	0.00	1.51
c-1,2-dichloroethene **	0.00	0.00	0.06
Chloroform	0.06	0.00	0.27
1,2-dichloroethane	0.10	0.00	0.80
Methyl Chloroform	0.42	0.00	2.06
Benzene	1.95	0.00	8.19
Carbon Tetrachloride	0.17	0.00	1.32
1,2-dichloropropane	0.00	0.00	0.06
Bromodichloromethane **	0.00	0.00	0.07
Trichloroethylene	0.02	0.00	0.09
1-Heptene *	0.00	0.00	0.06
n-Heptane *	0.32	0.02	0.68
c-1,3-dichloropropene **	0.00	0.00	0.02
4-methyl-2-pentanone **	0.01	0.00	0.07
t-1,3-dichloropropene **	0.00	0.00	0.00
1,1,2-trichloroethane **	0.00	0.00	0.01
Toluene	2.41	0.35	9.51
1,3-dichloropropane *	0.00	0.00	0.02
Ethylene Dibromide *	0.00	0.00	0.00
2-Hexanone **	0.01	0.00	0.10
Dibromochloromethane **	0.00	0.00	0.00
Perchloroethylene	0.05	0.00	0.25
Chlorobenzene	0.01	0.00	0.08
Ethylbenzene	0.24	0.02	0.69
m-Xylene	0.63	0.07	1.84
p-Xylene	0.21	0.06	0.61
Bromoform	0.00	0.00	0.00
Styrene **	0.09	0.02	0.29
Tetrachloroethane **	0.00	0.00	0.01
o-Xylene	0.29	0.08	0.76
Cumene *	0.01	0.00	0.05
Bromobenzene *	0.00	0.00	0.00

Note:

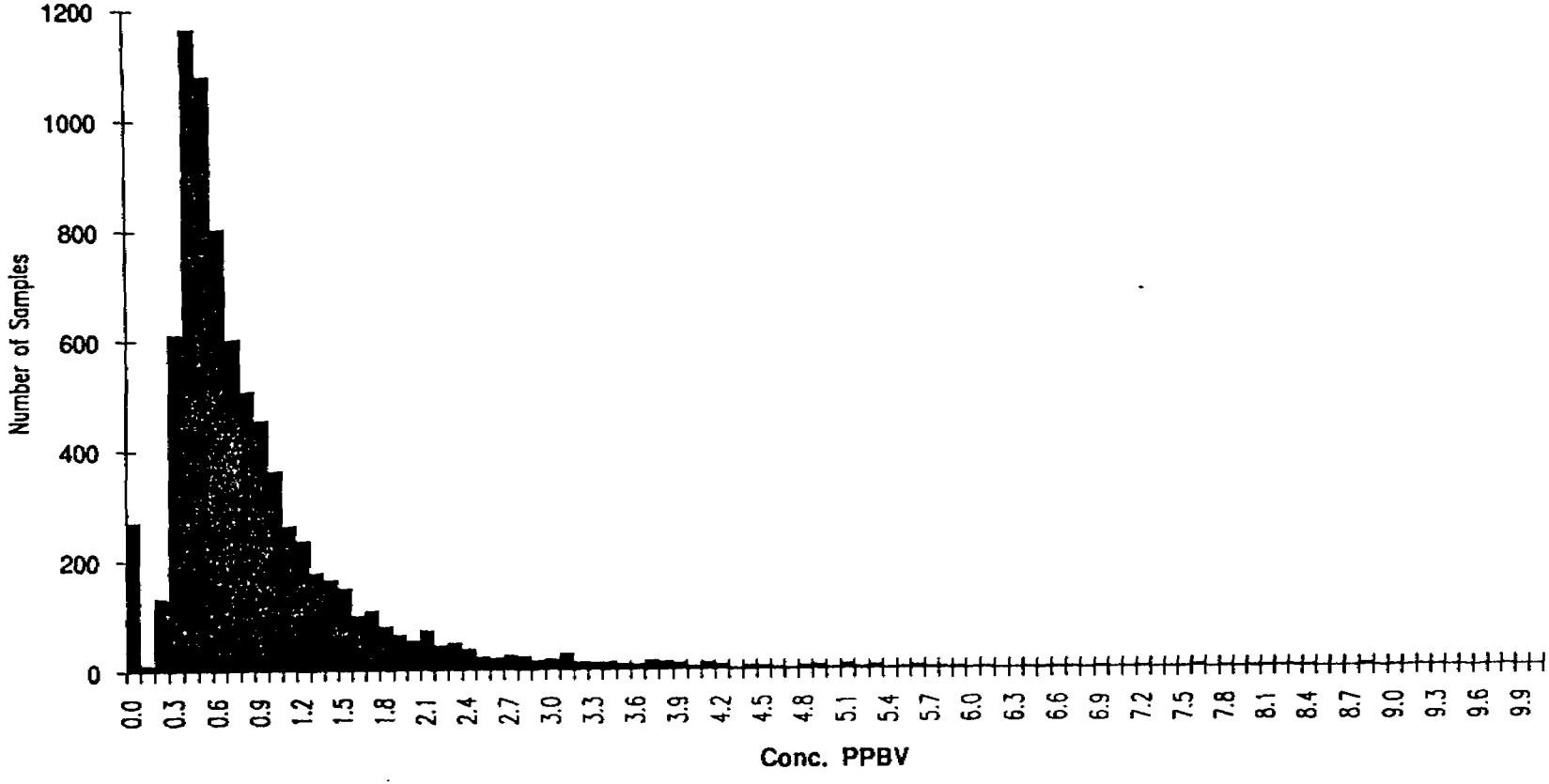
* denotes compound measured prior to 6/19/91
** denotes compound measured after 6/19/91

All other compounds were measured during the entire year.

Frequency Distribution of Benzene Concentrations - Baker Site



Frequency Distribution of Benzene Concentrations - Capitol Site



Frequency Distribution of Total Hydrocarbon Concentrations - Capitol Site