

**Emission Source Profiles
Applicable to CMB Receptor Modeling of
Texas PAMS VOC Data**

TNRCC Contract
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ABSTRACT

This report summarizes the results of a task performed at Desert Research Institute under TNRCC Contract #98 80078200 to develop candidate emissions composition profiles for sources expected to be found in Texas. TNRCC staff will use these profiles to apportion ambient VOC data from Photochemical Assessment Monitoring Stations (PAMS) to emission sources by chemical mass balance (CMB) receptor modeling. This report presents the applicable profiles that are currently available in the literature with accompanying documentation and citations. The profiles are compiled in both spreadsheet format and in format suitable for use as inputs to the CMB8 software. Sample files are also provided for other input files associated with CMB8. CMB8 is available by anonymous FTP at <ftp://eafs.sage.dri.edu/cmb80/model/32bit>. A user's manual (Watson et al. 1997) can be downloaded from the cmb80/manual subdirectory. A draft version of the CMB8 Applications and Validation Protocol for PM_{2.5} and VOC (Watson et al., 1998) is also available at the Desert Research Institute FTP site under the cmb80/Validation Protocol ~ subdirectory. As part of the contract, a training session was provided to TNRCC staff on November 19, 1998. This training covered the use of CMB8, and the Application and Validation Protocol with examples from recent PM_{2.5} and VOC source apportionment studies.

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1. INTRODUCTION

This report presents the applicable emission source composition profiles that can be used in Chemical Mass Balance (CMB) receptor modeling to apportion ambient hydrocarbon data from Photochemical Assessment Monitoring Stations (PAMS) in Texas. The profiles were derived from the literature and are compiled in both spreadsheet format and in format suitable for use as inputs to the CMB8 software. Sample files are also provided for other input files associated with CMB8. A training session covering CMB8 was provided to TNRCC staff on November 19, 1998.

1.1 Photochemical Assessment Monitoring Stations (PAMS)

Title I, Section 182, of the Clean Air Act Amendments of 1990 required the Environmental Protection Agency to revise existing current ambient air quality surveillance regulations. The rule required States with areas classified as serious, severe, or extreme for ozone nonattainment to establish enhanced ambient air monitoring stations called Photochemical Assessment Monitoring Stations (PAMS) as part of their State Implementation Plan (SIP) (Federal Register, 1993). Each station measures speciated hydrocarbons and carbonyl compounds, ozone, oxides of nitrogen, and surface meteorological data. Provisions of the rules require the operation of up to five PAMS stations in each nonattainment area depending on population. Additionally, each area must monitor upper air meteorology at one representative site. The program began in 1994, and is being phased-in over a five year schedule at a rate of at least one station per area per year. Table 1 shows the location and sampling schedule at PAMS sites in Texas during the period from 1994 to 1997.

Design criteria for the PAMS network are based on selection of an array of site locations relative to ozone precursor source areas and predominant wind directions associated with high ozone events. Specific monitoring objectives are to characterize precursor emission sources within the area, transport of ozone and its precursors into and out of the area, and the photochemical processes related to ozone nonattainment, as well as developing an initial urban toxic pollutant database. A maximum of five PAMS sites are required in affected nonattainment areas, depending on the population of the Metropolitan Statistical Area/Consolidated Metropolitan Statistical Area (MSA/CMSA) or nonattainment area, whichever is larger. Specific monitoring objectives associated with each of these sites result in four distinct site types.

Type 1 sites are established to characterize upwind background and transported ozone and its precursor concentrations entering the area and to identify those areas which are subjected to overwhelming transport. Type 1 sites are located in the predominant morning upwind direction from the local area of maximum precursor emissions during the ozone season. Typically, Type 1 sites will be located near the edge of the photochemical grid model domain in the predominant upwind direction from the city limits or fringe of the urbanized area.

Type 2 sites are established to monitor the magnitude and type of precursor emissions in the area where maximum precursor emissions are expected. These sites also are suited for the monitoring of urban air toxic pollutants. Type 2 sites are located immediately downwind of the

**Table 1
PAMS Sites in Texas**

State Site	Type of Site	Hydrocarbons				Carbonyl			
		1994	1995	1996	1997	1994	1995	1996	1997
Beaumont									
Sea Rim State Park	1								
Jefferson Co. Airport	2	b1, c	b1, c			d1	d1		
Dallas-Ft. Worth									
	1								
Hinton	2			a, c	a, c			d2	d2
	2A								
	3								
	4								
El Paso									
Ascarte Park	1			b3, c	b4, b5, c				
Chamizal	2		a, c	a, c	a, c		d1	d1	b4, b5, c
UTEP	3		b3, c	b3, c	b4, b5, c				
Houston-Galveston-Brazoria									
Aldine	3/1		b3, c	b6, c	b4, b5, c				
Clinton Dr.	2	a	a, c	a, c	a, c	b1	d2	b1, c	b4, b5, c
Deer Park	2			a, c	a, c			b1, c	b4, b5, c
Galleria	2A								
Galveston	3/1			b1, c	b4, b5, c				
Tomball/NW Harris	4								

Type 1 - Upwind background.

Type 2 - Maximum precursor emissions (typically located immediately downwind of the central business district).

Type 2A - A second type 2 site in the second-most predominant morning wind direction (required in larger areas).

Type 3 - Maximum ozone concentration.

Type 4 - Extreme downwind transported ozone area that may contribute to overwhelming transport in other areas.

a - 24, 1-hour samples everyday

b1 - 8, 3-hour samples everyday

b2 - 8, 3-hour samples every third day

b3 - 6, 1-hour samples on high days

b4 - 4, 3-hour samples every sixth day (6 mo.)

b5 - 5, 1-hour samples on 10 high days

b6 - 8, 3-hour samples every sixth day

c - 1, 24-hour sample every sixth day year round

d1 - 5, 3-hour samples on high days

d2 - 5, 1-hour samples on 10 high days

area of maximum precursor emissions and are typically placed near the downwind boundary of the central business district. Additionally, a second Type 2 site may be required depending on the size of the area, and will be placed in the second-most predominant morning wind direction.

Type 3 sites are intended to monitor maximum ozone concentrations occurring downwind from the area of maximum precursor emissions. Typically, Type 3 sites will be located 10 to 30 miles downwind from the fringe of the urban area.

Type 4 sites are established to characterize the extreme downwind transported ozone and its precursor concentrations exiting the area and identify those areas which are potentially contributing to overwhelming transport in other areas. Type 4 sites are located in the predominant afternoon downwind direction, as determined for the Type 3 site, from the local area of maximum precursor emissions during the ozone season. Typically, Type 4 sites are located near the downwind edge of the photochemical grid model domain.

EPA methods TO-14 and TO-11 are specified by the EPA for sampling and analysis of speciated hydrocarbons and carbonyl compounds, respectively (EPA, 1991). Table 2 lists the PAMS target hydrocarbon species. For carbonyl compounds, state and local agencies are currently required to report only formaldehyde, acetaldehyde and acetone. The EPA rule requires eight 3-hour hydrocarbon samples (midnight-3 am, 3-6 am, 6-9 am, 9-noon, noon-3 pm, 3-6 pm, 6-9 pm, and 9-midnight PDT) every day at Type 2 sites and every third day at all other PAMS sites. Sampling for carbonyl compounds is required at Type 2 sites only. In addition, one 24-hour sample is required every sixth day year-round at Type 2 sites and during the summer monitoring period at all other sites. Hydrocarbon speciation is obtained at some Type 2 PAMS site with an automated gas chromatograph. In this arrangement, ambient samples are collected each hour (typically over a 40-minute period).

Intended applications for the PAMS database include ozone and precursor trends, emission inventory reconciliation and verification, population exposure analyses, photochemical modeling support, and control strategy evaluation. The PAMS species typically account for 70 to 80 percent of the total ambient hydrocarbons at most urban locations. The PAMS hydrocarbon data are ideally suited for CMB analysis because of the level of hydrocarbon speciation, consistency among networks in measurement methods and quality assurance, and the available spatial and temporal resolution of the data. The report provides the accompanying source composition profiles that can be used to apportion ambient hydrocarbon data from PAMS sites in Texas.

1.2 Definition Of VOC Terms

Several terms are used inconsistently but interchangeably to describe different fractions of atmospheric organic material. Common definitions and units must be used for ambient concentrations, source profiles, and emissions rates. The following terms are defined as they are used throughout this report.

Table 2
PAMS Target Species

No.	Mnemonics ¹	Names	AIRS Code	Formula	MW	Convert to ug/m3	Group	k_{OH} at 298 K	Lifetime hours	CMB Fitting Species		
										Type 2 AM	Type 2 PM	Types 1,3, & 4
1	ethene	ethene	43203	C2H4	28.05	0.5736	O	8.52	6.52	*		
2	acetyl	acetylene	43206	C2H2	26.04	0.5325	Y	0.90	61.73	*	*	*
3	ethane	ethane	43202	C2H6	30.07	0.6149	P	0.27	207.30	*	*	*
4	prope	Propene	43205	C3H6	42.08	0.5737	O	26.30	2.11			
5	n_prop	n-propane	43204	C3H8	44.10	0.6012	P	1.15	48.31	*	*	*
6	i_but	isobutane	43214	C4H10	58.12	0.5943	P	2.34	23.74	*	*	*
7	lbut1e	1-butene	43280	C4H8	56.11	0.5737	O	31.40	1.77			
8	n_but	n-butane	43212	C4H10	58.12	0.5943	P	2.54	21.87	*	*	*
9	t2bute	t-2-Butene	43216	C4H8	56.11	0.5737	O	64.00	0.87			
10	c2bute	c-2-butene	43217	C4H8	56.11	0.5737	O	56.40	0.99			
11	ipenta	isopentane	43221	C5H12	72.15	0.5902	P	3.90	14.25	*	*	*
12	1_pente	1-pentene	43224	C5H10	70.13	0.5737	O	31.40	1.77			
13	n_pent	n-pentane	43220	C5H12	72.15	0.5902	P	3.94	14.10	*	*	*
14	i_pren	isoprene	43243	C5H8	68.11	0.5571	O	101.00	0.55	+	+	+
15	t2pene	t-2-Pentene	43226	C5H10	70.13	0.5737	O	67.00	0.83			
16	c2pene	c-2-pentene	43227	C5H10	70.13	0.5737	O	65.00	0.85			
17	bu22dm	2,2-dimethylbutane	43244	C6H14	86.17	0.5874	P	2.32	23.95	*	*	*
18	cpenta	cyclopentane	43242	C5H10	70.13	0.5737	P	5.16	10.77	*	*	
19	bu23dm	2,3-dimethylbutane	43284	C6H14	86.17	0.5874	P	6.20	8.96	*	*	
20	pena2m	2-methylpentane	43285	C6H14	86.17	0.5874	P	5.60	9.92	*	*	
21	pena3m	3-methylpentane	43230	C6H14	86.17	0.5874	P	5.70	9.75	*	*	
22	pl1e2me	2-methyl-1-pentene	43246	C6H12	84.16	0.5737	O	31.40	1.77			
23	n_hex	n-hexane	43231	C6H14	86.17	0.5874	P	5.61	9.90	*	*	
24	mcpna	Methylcyclopentane	43262	C6H12	84.16	0.5737	P	8.81	6.31	*	*	
25	pen24m	2,4-dimethylpentane	43247	C7H16	100.20	0.5855	P	5.10	10.89	*	*	
26	benze	benzene	45201	C6H6	78.11	0.5324	A	1.23	45.17	*	*	*
27	cyhexa	cyclohexane	43248	C6H12	84.16	0.5737	P	7.49	7.42	*	*	
28	hexa2m	2-methylhexane	43263	C7H16	98.19	0.5737	P	6.79	8.18	*	*	
29	pen23m	2,3-dimethylpentane	43291	C7H16	100.20	0.5855	P	4.87	11.41	*	*	
30	hexa3m	3-methylhexane	43249	C7H16	100.20	0.5855	P			*	*	
31	pa224m	2,2,4-trimethylpentane	43250	C8H18	114.23	0.584	P	3.68	15.10	*	*	*
32	n_hept	n-heptane	43232	C7H16	100.20	0.5855	P	7.15	7.77	*	*	
33	mecyhx	methylcyclohexane	43261	C7H14	98.19	0.5737	P	10.40	5.34	*	*	
34	pa234m	2,3,4-trimethylpentane	43252	C8H18	114.23	0.584	P	7.00	7.94	*	*	
35	tolue	toluene	43202	C7H8	92.14	0.5384	A	5.96	9.32	*	*	

Table 2 (continued)
PAMS Target Species

No.	Mnemonics ¹	Names	AIRS Code	Formula	MW	Convert to ug/m3	Group	k_{OH} at 298 K	Lifetime hours	CMB Fitting Species		
										Type 2 AM	Type 2 PM	Types 1,3, & 4
36	hep2me	2-methylheptane	43260	C8H18	114.23	0.5829	P			*	*	
37	hep3me	3-methylheptane	43253	C8H18	114.23	0.584	P	8.56	6.49	*		
38	n_oct	n-octane	43233	C8H18	114.22		P			*		
39	etbz	ethylbenzene	45203	C8H10	106.16	0.5427	A	7.10	7.82	*		
40	mp_xyl	mp-xylene	45109	C8H10	106.16	0.5427	A		4.71			
41	styr	styrene	45220	C8H8	104.14	0.5324	A	58.00	0.96			
42	o_xyl	o-xylene	45204	C8H10	106.17	0.5428	A	13.70	4.06			
43	n_non	n-nonane	43235	C9H20	128.26	0.5829	P	10.20	5.45	*		
44	iprbz	isopropylbenzene	45210	C9H12	120.20	0.5462	A	6.50	8.55	*		
45	n_prbz	n-propylbenzene	45209	C9H12	120.20	0.5462	A	6.00	9.26	*		
46	m_etol	m-ethyltoluene	45212	C9H12	120.20	0.5462	A	19.20	2.89			
47	p_etol	p-ethyltoluene	45213	C9H12	120.20	0.5462	A	12.10	4.59			
48	bz135m	1,3,5-trimethylbenzene	45207	C9H12	120.20	0.5462	A	57.50	0.97			
49	o_etol	o-ethyltoluene	45211	C9H12	120.20	0.5462	A	12.30	4.52			
50	bz124m	1,2,4-trimethylbenzene	45208	C9H12	120.20	0.5462	A	32.50	1.71			
51	n_dec	n-decane	43238	C10H22	142.29	0.582	P	11.60	4.79	*		
52	bz123m	1,2,3-trimethylbenzene	45225	C9H12	120.20	0.5462	A	32.70	1.70			
53	detbz1	m-diethylbenzene	45218	C10H14	134.22		A		3.90			
54	detbz2	p-diethylbenzene	45219	C10H14	134.22		A		3.90			
55	n_unde	n-undecane	43954	C11H24	156.30		P			*		
	other	other identified hydrocarbons										
	unid	Unidentified Hydrocarbons										
	mtbe	methyl-t-butyl ether										
	tmoc	total PAMS species	43102									
	pamhc	total PAMS species	43000									

A = aromatic, AL = Aldehyde, O = alkene (olefin), P = parafin, Y = alkyne, K = ketone, E = ether, X = haogenated, OH = alcohol

Note: Rate constants k at 298 K for the reaction of OH radicals with VOCs.

Unit: 1012 x k cm3 molecule-1 s-1

- **C_x**: Molecules containing x carbon atoms (e.g., C₇ means the molecule contains seven carbon atoms). This notation is useful since many sampling and analysis techniques respond to different numbers of carbon atoms rather than to specific compounds.
- **Organic carbon**: Gases and particles containing combinations of carbon and hydrogen atoms. Organic compounds found in ambient air may also be associated with other elements and compounds, particularly oxygen, nitrogen, sulfur, halogens, and metals. Various operational definitions based on measurement method are applied to different subsets of organic compounds.
- **Inorganic carbon**: Carbon dioxide and carbon monoxide are the most abundant inorganic gases found in the atmosphere, while amorphous graphite is the most common particulate component. Particulate elemental carbon is operationally defined by optical and combustion methods, and it contains heavy organic material as well as inorganic carbon.
- **Hydrocarbons**: Organic compounds that consist only of carbon and hydrogen atoms.
- **Reactive organic gases (ROG)**: Organic gases with potential to react (<30 day half-life) with the hydroxyl radical and other chemicals, resulting in ozone and secondary organic aerosol. The most reactive chemicals are not necessarily the largest contributors to undesirable end-products, however, as this depends on the magnitude of their emissions as well as on their reactivity.
- **Total Organic Gases (TOG)**: Organic gases with and without high hydroxyl reactivity. TOG typically includes ROG plus methane and halocarbons.
- **Non-methane hydrocarbons (NMHC, also termed "light" hydrocarbons)**: C₂ through C₁₂ (light) hydrocarbons collected in stainless steel canisters and measured by gas chromatography with flame ionization detection (GC-FID) by EPA method TO-14 (Oliver et al., 1986; U.S. EPA, 1991). NMHC excludes carbonyls, halocarbons, carbon dioxide, and carbon monoxide even though some of these may be quantified by the same method.
- **Halocarbons**: NMHC with chlorine, fluorine, and bromine compounds attached, quantified from canisters by gas chromatography with electron capture detection (GC-ECD). Methylchloride, methylchloroform, methylbromide, and various refrigerants (Freon-12, Freon-22, SUVA) are most commonly measured. These compounds have long lifetimes and are not reactive enough to cause major changes in tropospheric ozone and secondary organic aerosol.
- **Heavy hydrocarbons**: C₈ through C₂₀ hydrocarbons collected on Tenax absorbing substrates and analyzed by thermal desorption and gas chromatography. These are sometimes termed "semi-volatile" compounds because the >C₁₅ compounds are often found as both gases and particles). Most of the total hydrocarbon mass is measured in the gas phase.

- **Carbonyls:** Aldehydes, the most common being formaldehyde, acetone, and acetylaldehyde. Carbonyls are operationally defined as C₁ through C₇ oxygenated compounds measured by collection on acidified 2,4-dinitrophenylhydrazine (DNPH)-impregnated C₁₈ cartridges and analyzed by high performance liquid chromatography with UV detection (HPLC/UV)).
- **Non-Methane Organic Gases (NMOG):** NMHC plus carbonyls.
- **Total Non-Methane Organic Compounds (Total NMOC, PAMS parameter #43102):** Sum of PAMS target species plus sum of other peaks excluding halogenated compounds.
- **Oxygenated Species:** Oxygen-containing organic compounds, including MTBE, determined by gas chromatography with flame ionization detection. These are presented in units of ppbC-equivalent, which is the amount based on the equivalent response of a pure hydrocarbon. The error in this estimate depends on the species—it is a maximum for low molecular weight species and the error decreases to the point where the higher molecular weight aldehydes (e.g. nonanal, decanal) will be relatively accurate. The PAMS standard procedure of using dryers to remove water vapor from the sample also removes oxygenated species.
- **Semi-Volatile Organic Compounds (SVOC):** Particles and gases collected on filters backed with polyurathane foam (PUF) or XAD, extracted in a variety of solvents, and analyzed by gas chromatography/mass spectrometry (Chuang et al., 1987; Greaves et al., 1985). This class includes polycyclic aromatic hydrocarbons (PAHs), hopanes, steranes, guayacols, and syringols. These are heavy (>C₂₀) non-polar compounds that are gases or particles depending on ambient equilibrium conditions. The heavy hydrocarbons are often classified as SVOCs, but they are given a separate identity here for precision and clarity.
- **Volatile organic compounds (VOC):** NMHC plus heavy hydrocarbons plus carbonyls plus halocarbons, typically <C₂₀. VOC has been imprecisely used to describe most of the other categories defined above.

2. CHEMICAL MASS BALANCE

The CMB receptor model (Friedlander, 1973; Cooper and Watson, 1980; Gordon, 1980, 1988; Watson, 1984; Watson et al., 1984; 1990; 1991; Hidy and Venkataraman, 1996) consists of a least squares solution to linear equations that express each receptor chemical concentration as a linear sum of products of source profile abundances and source contributions. The source profile abundances (i.e., the mass fraction of a chemical or other property in the emissions from each source type) and the receptor concentrations, with appropriate uncertainty estimates, serve as input data to the CMB model. The output consists of the amount contributed by each source type represented by a profile to the total mass and each chemical species. The CMB calculates values for the contributions from each source-type and the uncertainties of those values.

2.1 CMB Software

CMB Version 8 (Watson et al., 1997) replaces CMB7 (U.S. EPA, 1989; Watson et al., 1990) as a more convenient method of estimating contributions from different sources to ambient chemical concentrations. CMB8 returns the same results of CMB7, but it operates in a Windows-base environment and accepts inputs and creates outputs in a wider variety of formats than CMB7. The major CMB8 enhancements are:

- Windows-based, menu-driven operations: CMB commands may be executed with hot-keys, drop down menus, or toolbar buttons.
- Multiple defaults for fitting source, fitting species, and sample selection: Up to ten combinations of fitting source profiles and fitting species may be specified in input data selection files. Different defaults can be selected with radio buttons during CMB8 operation. Subsets of source profiles, species, and samples may be specified in selection files to be selected from profile and ambient concentration data files. This is especially useful for executing the test on NFRAQS data reported here.
- Improved memory management: CMB8 memory is limited only by the available RAM on the computer, not by pre-set memory limitations. This was necessary NFRAQS source apportionment owing to the large number of additional species measurements in receptor samples and source profiles.
- Flexible input and output formats: Comma-separate value (CSV), xBASE (DBF), and worksheet (WKS) formats are support as input and output files, in addition to the blank-delimited ASCII text files (TXT) supported by CMB7. NFRAQS analysis made use of this to efficiently produce graphical and tabular summaries of source contribution estimates.
- Improved graphics: Sample pie plots, spatial pie plots, time series stacked bar charts, source profile bar charts, and ambient concentration bar charts can be created within CMB8. These can be cut from their CMB8 windows and pasted into other Windows documents.

- Improved collinearity diagnostics: The uncertainty/similarity clusters have been replaced with an singular value composition eligible space treatment that allows the user to define an acceptable error and an acceptable collinearity among weighted source profiles. This feature was used in NFRAQS to assist the compositing of separate source samples into source profile groups.
- Automatic decision-making: CMB8 calculations can be automated to eliminate negative contributions and to select a default set of profiles based on a weighted optimization of performance measures.
- User-set preferences: Output directories, output file names, positions of decimal points in output, output formats, automatic calculation alternatives, performance measure weights, eligible space tolerances, receptor concentration units, and maximum iterations for convergence can be set by the user.
- Retention from previous sessions: Options and window position preferences established in one session are carried over into subsequent sessions.

CMB8 is available by anonymous FTP at <ftp://eafs.sage.dri.edu/cmb80/model/32bit>. A user's manual (Watson et al. 1997) can be downloaded from the [cmb80/manual](#) subdirectory.

2.2 CMB Procedures and Solutions

The CMB modeling procedure requires: 1) identification of the contributing sources types; 2) selection of chemical species or other properties to be included in the calculation; 3) estimation of the fraction of each of the chemical species which is contained in each source type (source profiles); 4) estimation of the uncertainty in both ambient concentrations and source profiles; and 5) solution of the CMB equations. The CMB is implicit in multivariate factor analysis and multiple linear regression models that intend to quantitatively estimate source contributions (Watson, 1984). Multivariate models attempt to derive source profiles from the covariation in space and/or time of many different samples of atmospheric constituents that originate in different sources. These profiles are then used in a CMB to quantify source contributions to each ambient sample.

Several solutions methods have been proposed for the CMB equations: 1) single unique species to represent each source (tracer solution) (Miller et al., 1972); 2) linear programming solution (Houglund, 1973); 3) ordinary weighted least squares (weights include precisions of ambient measurements) (Friedlander, 1973; Gartrell and Friedlander, 1975); 4) ridge regression weighted least squares (Williamson and DuBose, 1983); 5) partial least squares (Geladi and Kowalski, 1986; Larson and Vong, 1989; Vong et al., 1988); 6) constrained least squares (Wang and Hopke, 1989); 7) neural networks (Song and Hopke, 1996); and 8) effective variance weighted least squares (Watson et al., 1984). The effective variance weighted solution is almost universally applied because it: 1) theoretically yields the most likely solutions to the CMB equations, providing model assumptions are met; 2) uses all available chemical measurements, not just so-called "tracer" species; 3) analytically estimates the uncertainty of the source contributions based on precisions of both the ambient concentrations and source profiles; and 4)

gives chemical species with higher precisions in both the source and receptor measurements greater influence than species with lower precisions.

2.3 CMB Input Data

CMB8 requires data for source profiles and ambient measurements with one-sigma uncertainty as input data. This report limits itself to the emissions and apportionment of the 55 PAMS compounds listed in Tables 2. Table 2 also proposes and recommends short mnemonics that can be used to identify VOCs in computerized source profile and ambient data bases and in the CMB model. The mnemonics must have less than eight alphanumeric characters for CMB model input and for efficient manipulation in data management software. VOC concentrations are usually reported in ppbC or $\mu\text{g}/\text{m}^3$ at local temperature and pressure. Either unit is acceptable for CMB analysis, but the source profile ratios must be consistent with the ambient measurements. Fortunately, the fractional abundances of most VOCs relative to NMHC vary by only a few percent when either ppbC or $\mu\text{g}/\text{m}^3$ are used for the numerator and the denominator. Concentrations from all measurement methods must be in the same unit, however. Nominal afternoon summertime residence times for a reactive environment (e.g., Los Angeles) are estimated in Table 2. These are lower limits, but they provide an indication of which components are likely to remain relatively stable between source and receptor, thereby qualifying as fitting species for CMB source apportionment. The table provides a recommended list of fitting species depending on the type of PAMS site and time of day. Chapter 4 of the CMB8 User's Manual provides information on the required input files and their format. A set of sample input files are provided in Appendix B.

2.4 Model Outputs and Performance Measures

Pace and Watson (1987) define several performance measures which are examined with each CMB. Each of the CMB results includes values for the performance measures that are used to evaluate the goodness of the solution, following the regulatory guidance of Pace and Watson (1987). The most useful performance measures are:

- Source Contribution Estimate (SCE): This is the contribution of each source type to the pollutant being apportioned, which is usually the mass concentration. Each of the SCE should be greater than zero and none should exceed the total mass concentration.
- Standard Error (STDERR): This is an indicator of the precision or certainty of each SCE. The STDERR is estimated by propagating the precisions of the receptor data and source profiles through the effective variance least-squares calculations. Its magnitude is a function of the uncertainties in the input data and the amount of collinearity (i.e., degree of similarity) among source profiles. It is desirable to have this value be much less than the source contribution estimate. When the SCE is less than the STDERR, the STDERR is interpreted as an upper limit of the source contribution.
- t-Statistic (TSTAT): This is the ratio of the source contribution estimate to the standard error. A high value for TSTAT (>2.0), shows that the relative precision of the source

contribution estimate is high and that the contribution is significant. A low TSTAT value (<2.0) means that a source contribution is not present at a level which exceeds two times the STDERR. Twice the STDERR is a reasonable estimate of the upper limit for a source contribution when TSTAT <2.0.

- **R-Square (R SQUARE) and Chi-Square (CHI SQUARE):** The R SQUARE measures the variance in the receptor concentrations which is explained by the calculated species concentrations. The CHI SQUARE statistic is the weighted sum of the squares of differences between calculated and measured species concentrations divided by the effective variance and the degrees of freedom (DF). A low R SQUARE (<0.8) indicates that the selected source profiles have not accounted for the variance in the selected receptor concentrations. A large CHI SQUARE (>4.0) means that one or more of the calculated species concentrations differs from the measured concentrations by several uncertainty intervals. The values for these statistics exceed their targets when: (1) contributing sources have been omitted from the CMB calculation; (2) one or more source profiles have been selected which do not represent the contributing source types; (3) precisions of receptor or source profile data are underestimated; and/or (4) source or receptor data are inaccurate.
- **Percent of Mass Accounted For (PERCENT MASS):** This is the ratio of the sum of the source contributions to the reconstructed mass for particulate samples. The target value is 100%, with a reasonable range of 80% to 120%. Percent mass values which are outside of this range result when: (1) source profiles have been incorrectly specified; (2) contributing source types have been omitted from the calculation; (3) mass or chemical species measurements are inaccurate; and/or (4) mass measurements are less than 10 µg/m³ and within a few precision intervals of the measurements.
- **Max. Src. Unc. and Min. Src. Proj. – Replaces U/S CLUSTERS and SUM OF CLUSTER SOURCES:** These are used in Henry's (1992) eligible space treatment of collinearity. This treatment uses two parameters, maximum source uncertainty and minimum source projection on the eligible space. These are set to default values of 1.0 and 0.95, respectively, in CMB8. Briefly, the maximum source uncertainty determines the eligible space to be spanned by the eigenvectors whose inverse singular values are less than or equal to the maximum source uncertainty. Estimable sources are defined to be those projection on the eligible space that is at least the minimum source projection. Inestimable sources are sources that are not estimable. To modify these values click in the edit boxes and edit with keyboard entry.
- **Ratio of Residual to Its Standard Error (RATIO R/U):** This is the ratio of the signed difference between the calculated and measured concentration (the residual) divided by the uncertainty of that residual (square root of the sum of the squares of the uncertainty in the calculated and measured concentrations). The RATIO R/U specifies the number of uncertainty intervals by which the calculated and measured concentrations differ. When the absolute value of the RATIO R/U exceeds 2, the residual is significant. If it is positive, then one or more of the profiles is contributing too much to that species. If it is negative, then there is an insufficient contribution to that species and a source may be

missing. The sum of the squared RATIO R/U for fitting species divided by the degrees of freedom yields the CHI-SQUARE. The highest RATIO R/U values for fitting species are the cause of high CHI SQUARE values.

- Ratio of Calculated to Measured Species (RATIO C/M): The column entitled RATIO C/M shows the ratio of calculated to measured concentration and the standard error of that ratio for every chemical species with measured data. The ratios should be near 1.00 if the model has accurately explained the measured concentrations. Ratios which deviate from unity by more than two uncertainty intervals indicate that an incorrect set of profiles is being used to explain the measured concentrations. The RATIO C/M for most species is within the target range for each example.

2.5 CMB Assumptions and Testing

CMB model assumptions are: 1) compositions of source emissions are constant over the period of ambient and source sampling; 2) chemical species do not react with each other (i.e., they add linearly); 3) all sources with a potential for significantly contributing to the receptor have been identified and have had their emissions characterized; 4) the number of sources or source categories is less than or equal to the number of species; 5) the source profiles are linearly independent of each other; and 6) measurement uncertainties are random, uncorrelated, and normally distributed.

The degree to which these assumptions are met in applications depends to a large extent on the particle and gas properties that are measured at source and receptor. CMB model performance is examined generically, by applying analytical and randomized testing methods, and specifically for each application by following an applications and validation protocol. The six assumptions are fairly restrictive and they will never be totally complied with in actual practice. Fortunately, the CMB model can tolerate reasonable deviations from these assumptions, though these deviations increase the stated uncertainties of the source contribution estimates (Cheng and Hopke, 1989; Currie et al., 1984; deCesar and Cooper, 1982; deCesar et al., 1985, 1986; Dzubay et al., 1984; Henry and Kim, 1990; Gordon et al., 1981; Henry, 1982, 1992; Javitz and Watson, 1986; Javitz et al., 1988a, 1988b; Kim and Henry, 1989; Lowenthal et al., 1987, 1988a, 1988b, 1988c, 1992, 1994; Watson, 1979, White and Macias, 1991).

The formalized protocol for CMB model application and validation (Pace and Watson, 1987; Watson et al., 1991; 1998) is applicable to the apportionment of gaseous organic compounds and particles (Watson et al., 1994; Fujita et al., 1994). This seven-step protocol: 1) determines model applicability; 2) selects a variety of profiles to represent identified contributors; 3) evaluates model outputs and performance measures; 4) identifies and evaluates deviations from model assumptions; 5) identifies and corrects input data deficiencies; 6) verifies consistency and stability of source contribution estimates; and 7) evaluates CMB results with respect to other data analysis and source assessment methods. A draft version of the CMB8 Applications and Validation Protocol for PM_{2.5} and VOC (Watson et al., 1998) is available at the Desert Research Institute FTP site under the cmb80/Validation Protocol ~ subdirectory.

2.6 CMB Limitations

CMB analysis focuses on the origins of ambient VOC concentrations rather than the fate of their end-products. A prerequisite for using receptor models is that the relative proportions of chemical species change little between source and receptor. Most ambient VOCs are oxidized in the lowest 2 km of the troposphere with tropospheric lifetimes ranging from hours to several months. For the majority of organic compounds emitted into the troposphere from either biogenic or anthropogenic sources, reaction with the OH radical is the major chemical loss process (Atkinson, 1989). Some volatile organic compounds react significantly with O₃ and/or degrade by thermal decomposition or photolysis. However, removal by reaction with O₃, or due to photolysis, can be estimated to be much less than 1% of the OH removal rate for most VOCs. Table 2 lists the rate constants and lifetimes of some hydrocarbons due to reaction with OH radical Atkinson (1989, 1990). The reactions are assumed to be of second order with reactant half life = $0.693/k[\text{OH}]$ and lifetime = $1/k[\text{OH}]$. Actual overall lifetimes may be shorter owing to competing loss processes such as photolysis. Since OH concentrations vary with the intensity of solar radiation, lifetimes will vary by location, season and time of day (Finlayson-Pitts, 1986).

With respect to Assumption 2 concerning the reactions of different species with each other, only those species with lifetimes comparable to air mass residence times were used as fitting species. For the CMB calculations performed in this study, only species with summertime lifetimes great than that of toluene (~9 hours) were used as fitting species. An exception to this is isoprene. It is included as a fitting species despite its high reactivity because it serves as a marker for biogenic emissions. The source contribution estimates underestimated the actual source contributions of biogenic emissions, i.e., they provide a lower limit to biogenic contributions. Reactive species are retained in the CMB modeling as "floating species", and provide useful diagnostic information. Because the concentrations for these species are calculated by the CMB model based on apportionments of NMHC using non-reactive species, the predicted concentrations for reactive species exceed the measured values by margins that increase with increasing reactivity of the species. Regardless of the species, the predicted and measured concentrations are generally in good agreement for morning samples indicating that ambient hydrocarbons are dominated by fresh emissions during this period.

With respect to Assumption 5 concerning collinearity, source contribution estimates often show the potential for collinearity among exhaust, liquid gasoline and gasoline vapor profiles. Uncertainty/Similarity Clusters (U/S CLUSTERS) defined by Watson et al. (1991) and based on the methods of Henry (1982; 1992) often appeared during the analyses which grouped together two or more of the profiles. The U/S CLUSTERS do not necessarily mean that profiles are collinear -- they really mean that the standard error assigned to a category representing the profiles in the clusters might be lower than the standard errors assigned to the individual source contribution estimates associated with each profile. Though the standard errors for these source types often approach 30% of the source contribution estimate, indicating collinearity uncertainty in addition to propagated analytical uncertainty, all three vehicle profiles were usually retained so that temporal and spatial variations in their contributions could be examined.

3. SOURCE COMPOSITIONS AND PROFILES

The emissions inventory is the starting point for a CMB source apportionment to identify potential contributors to ambient concentrations. Vehicle-related emissions, including exhaust, evaporated fuel, and even liquid fuel are ubiquitous in all urban areas and are always included. Architectural (i.e., paints) and industrial solvents (i.e., cleaning and process solvents, as in printing) are also common to, but highly variable in, most urban areas. Petrochemical production and oil refining are more specific to certain urban settings, such as the Texas coast, where these activities are numerous. Biogenic emissions are larger in the eastern U.S., where forests are lush, in contrast to the arid west. ROG emissions in inventories are often reported in equivalent units of methane or propane.

Source profiles are needed from representatives of these source types to apply the CMB and to translate ROG inventories into speciated inventories for air quality models. Several compilations or "libraries" of VOC source profiles have been assembled (Doskey et al., 1992; Harley et al., 1989; Fujita et al., 1994; Scheff et al., 1989a, 1989b; Shah et al., 1989; Shah and Singh, 1988; Shareef et al., 1988) from original measurements and a combination of published and unpublished test results. Most of these profiles are limited for today's CMB use because: 1) they represent older technology and fuels that are different today; 2) documentation is lacking or insufficient; 3) compound abundances are normalized to different definitions of NMOG or NMHC and are derived from a variety of measurement units; and 4) reported VOCs are not the same among profiles.

This section describes the compilation, derivation, and evaluation of the source composition profiles suitable for apportioning ambient PAMS hydrocarbon data using CMB. Table 3 lists the mnemonic of the profiles with short descriptions. The actual profiles are listed in Appendix A. They are available electronically in the file `prpams.dbf`. The profiles are expressed as weight percentages of the sum of the PAMS target species. Compounds other than the 55 Photochemical Assessment Monitoring Station (PAMS) target NMHCs that are identified by the DRI laboratory are grouped into a category named "other". Compounds reported as "unknowns" are grouped into a category named "UNID". The profiles also include total NMOC (i.e., the sum of PAMS species + other + unid) normalized to sum of PAMS species. The PAMS target compounds typically account for about 80 percent of the ambient hydrocarbons in urban areas. Although not measured in the PAMS program, methyl tert-butyl ether (MTBE) is included in the profiles because it is a major component in reformulated gasoline and in the exhaust of vehicles using RFG. By including MTBE in the profile, its ambient concentration can be predicted by CMB. The source profile data reported in units of ppbC were converted to $\mu\text{g}/\text{m}^3$ prior to calculating the weight percentages using species-specific conversion factors. One-sigma uncertainties were derived from variations among multiple measurements for a particular source type or a nominal analytical uncertainty of 10 percent with a minimum uncertainty of 0.001. The assigned uncertainties are the larger of the two values. Table 3 indicates a subset of the profiles that may be considered for use with PAMS hydrocarbon data from Texas.

Table 3
Master PAMS Source Profiles (prpams.dbf)

PNO	SOURCE	PROJECT	TYPE	PROFILE	DESCRIPTION	prtexas.dbf
P001	Biogenic	SCAQS CMB	Constructed	Biogenic	Biogenic - isoprene	x
P002	Coating	CalPoly SLO-ARB	Composite	coat_cwf	clear wood finishes	x
P003	Coating	CalPoly SLO-ARB	Composite	coat_ga	graphic arts coatings	x
P004	Coating	CalPoly SLO-ARB	Composite	coat_imc	solvent based industrial maintenance coatings	x
P005	Coating	CalPoly SLO-ARB	Composite	coat_m&hg	solvent based medium gloss/high gloss	x
P006	Coating	CalPoly SLO-ARB	Composite	coat_p&e	quick dry primers and enamels	x
P007	Coating	CalPoly SLO-ARB	Composite	coat_p&s	solvent based primers and sealers	x
P008	Coating	CalPoly SLO-ARB	Composite	coat_sts	semi-transparent stains	x
P009	Coating	CalPoly SLO-ARB	Composite	coat_tp	traffic paint	x
P010	Coating	CalPoly SLO-ARB	Composite	coat_ts	thinning solvent	x
P011	Coating	CalPoly SLO-ARB	Composite	coat_v	varnishes	x
P012	Coating	CalPoly SLO-ARB	Composite	COATcomp	composite of coatings 2-11, weighted by total U.S. sales	x
P013	Coatings	SCAQS CMB	Composite	ACoat196	CARB Modeling Data System	
P014	Coatings	SCAQS CMB	Composite	ICoat783	CARB Modeling Data System	
P015	Gas Leaks	SCAQS CMB	Composite	CNG	Commercial Natural Gas from Los Angeles, Mayrsohn et al 1976	x
P016	Gas Leaks	Paso del Norte	Composite	CNG_J	Natural gas, Juarez	x
P017	Gas Leaks	SCAQS CMB	Composite	GNG	Geogenic Natural Gas from Los Angeles, Mayrsohn et al 1976	x
P018	Gas Leaks	SCAQS CMB	Composite	LPG	Liquefied Petroleum Gas from Los Angeles, Mayrsohn et al 1976	x
P019	Gas Leaks	Paso del Norte	Composite	Prop_E	LPG from Super Energy Propane & Westex Conversion	x
P020	Gas Leaks	Paso del Norte	Composite	Prop_J	LPG from Servigas & Commercial de Juarez	x
P021	Gasoline Liquid	IMP CMB paper	Composite	Atla_liq	Composite gasoline liquid from Atlanta SOS, Conventional	x
P022	Gasoline Liquid	CRC CMB	Composite	Bogl01	Composite gasoline liquid from Boston, Summer 1995 Fed Phase 1 RFG	
P023	Gasoline Liquid	CRC CMB	Composite	LA_liqGs	Composite gasoline liquid from Los Angeles, Summer 1995 Fed Phase 1 RFG	x
P024	Gasoline Liquid	IMP CMB paper	Composite	Maga_liq	Magna Sin (unleaded)	x
P025	Gasoline Liquid	Paso del Norte	Composite	ME50R50P	50% Reg + 50% Pre Juarez	x
P026	Gasoline Liquid	Paso del Norte	Composite	ME67R33P	67% Reg + 33% Pre Juarez	x
P027	Gasoline Liquid	Paso del Norte	Composite	ME75R25P	75% Reg + 25% Pre Juarez	x
P028	Gasoline Liquid	IMP CMB paper	Composite	Nova_liq	Nova (leaded)	x
P029	Gasoline Liquid	Paso del Norte	Composite	US681220	68%R+12%M+20%P El Paso	x
P030	Gasoline Liquid	Washington	Composite	WA_Liq	Composite liquid gasoline from Seattle (5 brands, 3 grades), Conventional	x
P031	Gasoline Vapor	IMP CMB paper	Composite	Atla_HS	Composite gasoline vapor from Atlanta SOS, Conventional	x
P032	Gasoline Vapor	CRC CMB	Composite	Bogv01	Composite gasoline vapor from Boston, Summer 1995, Fed Phase 1 RFG	
P033	Gasoline Vapor	IMP CMB paper	Composite	Diurnal	Diurnal Evaporative, Mexico City	
P034	Gasoline Vapor	COAST	Individual	HSkAD_D1	Astrodome, hot soak, downwind sample.	
P035	Gasoline Vapor	COAST	Individual	HSkAD_D2	Astrodome, hot soak, downwind sample.	
P036	Gasoline Vapor	COAST	Composite	HSkAD_DC	Composite of HSkAD_D1 and HSkAD_D2.	
P037	Gasoline Vapor	COAST	Individual	HSkAD_N1	Astrodome, hot soak, downwind-upwind.	
P038	Gasoline Vapor	IMP CMB paper	Composite	HSoak	Hot Soak, Mexico City	
P039	Gasoline Vapor	COAST	Composite	HSvapGC	Composite of 14 gasoline head space vapor samples, HSvapG1 to HSvapG14	
P040	Gasoline Vapor	CRC CMB	Composite	LA_Hsvap	Composite gasoline vapor from Los Angeles, Summer 1995	x

Table 3 (Continued)
Master PAMS Source Profiles (prpams.dbf)

PNO	SOURCE	PROJECT	TYPE	PROFILE	DESCRIPTION	prtexas.dbf
P041	Gasoline Vapor	IMP CMB paper	Composite	Maga_HS	Maga Sin, Mexico City	x
P042	Gasoline Vapor	IMP CMB paper	Composite	Nova_HS	Nova, Mexico City	x
P043	Gasoline Vapor	Washington	Composite	WA_Vap	Composite from Seattle (5 brands, 3 grades)	x
P044	Industrial	COAST	Individual	BULK_plt	Composite of 5 emission profiles from miscellaneous industrial plants.	x
P045	Industrial	COAST	Individual	BULK_ter	Composite of 10 emission profiles from miscellaneous terminals.	x
P046	Industrial	Paso del Norte	Individual	ChevFC	Chevron FCC	x
P047	Industrial	Paso del Norte	Individual	ChevS	Chevron South	x
P048	Industrial	Paso del Norte	Individual	ChevT	Chevron TankFarm (Evap)	x
P049	Industrial	COAST	Individual	CHmf_eth	Composite of 6 emission profiles from ethylene production facilities.	x
P050	Industrial	COAST	Individual	CHmf_fug	Composite of 3 fugitive emission profiles from chemical mfg. facilities.	x
P051	Industrial	Paso del Norte	Individual	Delmex	Delmex	x
P052	Industrial	COAST	Individual	HG0017W	Industrial point source, Amerada Hess, principle business: special warehousing a	x
P053	Industrial	COAST	Individual	HG0048L	Industrial point source, Lyondell Citgo Refining, principle business: petroleum	x
P054	Industrial	COAST	Individual	HG0076G	Industrial point source, Fabricated Metal Products.	x
P055	Industrial	COAST	Composite	HG0130C	Industrial point source, Phibro Energy, principle business: petroleum refining.	x
P056	Industrial	COAST	Individual	HG0176B	Industrial point source, Crown Central Petroleum, pri. business: bulk fuel stor	x
P057	Industrial	COAST	Individual	HG0188R	Industrial point source, Miles Incorporated, principle business: synthetic rubb	x
P058	Industrial	COAST	Individual	HG0225N	Industrial point source, Albermarle, principle business: industrial organic che	x
P059	Industrial	COAST	Individual	HG0261J	Industrial point source, GATX Terminals, principle business: bulk storage termin	x
P060	Industrial	COAST	Individual	HG0262H	Industrial point source, GATX Terminals, principle business: bulk storage termin	x
P061	Industrial	COAST	Individual	HG0312R	Industrial point source, Chevron, principle business: bulk fuel storage termin	x
P062	Industrial	COAST	Individual	HG0562P	Industrial point source, Texas Petrochem, pri. business: organic chemical synthe	x
P063	Industrial	COAST	Individual	HG0565J	Industrial point source, Phillips Pipeline, principle business: bulk fuel stor	x
P064	Industrial	COAST	Individual	HG0566H	Industrial point source, Phillips Chemical Company, pri. bus: K-Resin polymer pr	x
P065	Industrial	COAST	Individual	HG0669T	Industrial point source, South Coast Terminals, pri. business: petrochemical ta	x
P066	Industrial	COAST	Individual	HG0786O	Industrial point source, Warren Petroleum, principle business: bulk storage ter	x
P067	Industrial	COAST	Individual	IndAM_D1	Industrial cluster, Amoco, downwind sample.	x
P068	Industrial	COAST	Individual	IndAM_D2	Industrial cluster, Amoco, downwind sample.	x
P069	Industrial	COAST	Individual	IndAM_D3	Industrial cluster, Amoco, downwind sample.	x
P070	Industrial	COAST	Composite	IndAM_DC	Composite of IndAM_D1, IndAM_D2, and IndAM_D3.	x
P071	Industrial	COAST	Individual	IndSC_D1	Industrial cluster, Ship Channel, downwind sample.	x
P072	Industrial	COAST	Individual	IndSL_D1	Industrial cluster, Shell, downwind sample.	x
P073	Industrial	COAST	Individual	IndSL_D2	Industrial cluster, Shell, downwind sample.	x
P074	Industrial	COAST	Composite	IndSL_DC	Composite of IndSL_D1, IndSL_D2.	x
P075	Industrial	COAST	Individual	IndTX_D1	Industrial cluster, Texaco, downwind sample.	x
P076	Industrial	COAST	Individual	IndTX_D2	Industrial cluster, Texaco, downwind sample.	x
P077	Industrial	COAST	Composite	IndTX_DC	Composite of IndTX_D1, IndTX_D2.	x
P078	Industrial	COAST	Individual	IndTX_N1	Industrial cluster, Texaco, downwind-upwind sample.	x
P079	Industrial	COAST	Individual	IndUC_D1	Industrial cluster, Union Carbide, downwind sample.	x
P080	Industrial	COAST	Individual	IndUC_D2	Industrial cluster, Union Carbide, downwind sample.	x

Table 3 (Continued)
Master PAMS Source Profiles (prpams.dbf)

PNO	SOURCE	PROJECT	TYPE	PROFILE	DESCRIPTION	prtexas.dbf
P081	Industrial	COAST	Composite	IndUC_DC	Composite of IndUC_D1, IndUC_D2.	x
P082	Industrial	COAST	Composite	PEin_fug	Composite of 21 fugitive emission profiles from petroleum industry facilities.	x
P083	Industrial	COAST	Composite	PEma_fug	Composite of 5 fugitive emission profiles from petroleum marketing.	x
P084	Industrial	COAST	Composite	PEst_cru	Composite of 7 emission profiles from crude oil storage tanks.	x
P085	Industrial	COAST	Composite	PEst_dis	Composite of 9 emission profiles from dist. oil storage tanks.	x
P086	Industrial	COAST	Composite	PEst_fug	Composite of 15 fugitive emission profiles from petroleum storage facilities..	x
P087	Industrial	COAST	Composite	PEst_gas	Composite of 14 emission profiles from gasoline storage tanks.	x
P088	Industrial	Paso del Norte	Individual	Zenco	Zenco	x
P089	Vehicle Exhaust	Auto/Oil	Composite	ACComp	Current Fleet FTP Composite, Conventional Fuel	
P090	Vehicle Exhaust	Auto/Oil	Composite	ACCS	Current Fleet Cold Start	
P091	Vehicle Exhaust	Auto/Oil	Composite	ACDiurn	Current Fleet Diurnal Evaporative	
P092	Vehicle Exhaust	Auto/Oil	Composite	ACHS	Current Hot Start	
P093	Vehicle Exhaust	Auto/Oil	Composite	ACHsoak	Current Fleet Hot Soak Evaporative	
P094	Vehicle Exhaust	Auto/Oil	Composite	ACRunLs	Current Fleet Running Loss	
P095	Vehicle Exhaust	Auto/Oil	Composite	ACST	Current Fleet Hot Stabilized	
P096	Vehicle Exhaust	Auto/Oil	Composite	AOComp	Older Fleet FTP Composite	
P097	Vehicle Exhaust	Auto/Oil	Composite	AOCS	Older Fleet Cold Start	
P098	Vehicle Exhaust	Auto/Oil	Composite	AODiurn	Older Fleet Diurnal Evaporative	
P099	Vehicle Exhaust	Auto/Oil	Composite	AOHS	Older Fleet Hot Start	
P100	Vehicle Exhaust	Auto/Oil	Composite	AOHsoak	Older Fleet Hot Soak Evaporative	
P101	Vehicle Exhaust	Auto/Oil	Composite	AORunLs	Older Fleet Running Loss	
P102	Vehicle Exhaust	Auto/Oil	Composite	AOST	Older Fleet Hot Stabilized	
P103	Vehicle Exhaust	CRC CMB	Composite	BoCS_Tip	Tip O'Neill Garage Cold Start	x
P104	Vehicle Exhaust	IMP CMB paper	Composite	ColdSt	Cold Start from garage measurements in Mexico City	
P105	Vehicle Exhaust	COAST	Individual	CStAD_D1	Astrodome, cold start, downwind sample.	
P106	Vehicle Exhaust	COAST	Individual	CStAD_D2	Astrodome, cold start, downwind sample.	
P107	Vehicle Exhaust	COAST	Composite	CStAD_DC	Composite of CStAD_D1 and CStAD_D2.	
P108	Vehicle Exhaust	COAST	Individual	CStAD_N1	Astrodome, cold start, downwind-upwind.	
P109	Vehicle Exhaust	Paso del Norte	Composite	Exh_J	Juarez rush hour traffic	x
P110	Vehicle Exhaust	Paso del Norte	Composite	Exh_PBa	Juarez propane bus - adjusted for Juarez traffic	x
P111	Vehicle Exhaust	IMP CMB paper	Composite	Exh_Tun	Tunnel in Mexico City	x
P112	Vehicle Exhaust	SCAQMS CMB	Composite	Exh801a	EPA 46-car Study	x
P113	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCHiComp	100% high emitters	
P114	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL10H90	90% high and 10% low emitters	
P115	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL20H80	80% high and 20% low emitters	
P116	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL30H70	70% high and 30% low emitters	
P117	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL40H60	60% high and 40% low emitters	
P118	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL50H50	50% high and 50% low emitters	
P119	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL60H40	40% high and 60% low emitters	
P120	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL70H30	30% high and 70% low emitters	

Table 3 (Continued)
Master PAMS Source Profiles (prpams.dbf)

PNO	SOURCE	PROJECT	TYPE	PROFILE	DESCRIPTION	prtexas.dbf
P121	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL80H20	20% high and 80% low emitters	
P122	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCL90H10	90% high and 10% low emitters	
P123	Vehicle Exhaust	SCAQMD Orange Co	Composite	OCLoComp	100% low emitters	
P124	Vehicle Exhaust	CRC Tunnel	Composite	Tu_Cal	Callahan Tunnel	x
P125	Vehicle Exhaust	CRC CMB	Composite	Tu_Cal0	Callahan Tunnel diesel exhaust subtracted	x
P126	Vehicle Exhaust	CRC CMB	Composite	Tu_Cal1	Callahan Tunnel diesel and minimum running loss subtracted	x
P127	Vehicle Exhaust	CRC CMB	Composite	Tu_Cal2	Callahan Tunnel diesel and maximum running loss subtracted	x
P128	Vehicle Exhaust	CRC Tunnel	Composite	Tu_Lin	Lincoln Tunnel	x
P129	Vehicle Exhaust	CRC CMB	Composite	Tu_Lin0	Lincoln Tunnel diesel exhaust subtracted	x
P130	Vehicle Exhaust	CRC CMB	Composite	Tu_Lin1	Lincoln Tunnel diesel and minimum running loss subtracted	x
P131	Vehicle Exhaust	CRC CMB	Composite	Tu_Lin2	Lincoln Tunnel diesel and maximum running loss subtracted	x
P132	Vehicle Exhaust	CRC Tunnel	Composite	Tu_MchHD	Tuscarora Tunnel Diesel	x
P133	Vehicle Exhaust	CRC Tunnel	Composite	Tu_MchLD	Tuscarora Tunnel Light Duty Gasoline	x
P134	Vehicle Exhaust	CRC Tunnel	Composite	Tu_Sep	Sepulveda Tunnel	x
P135	Vehicle Exhaust	CRC CMB	Composite	Tu_Sep0	Sepulveda Tunnel diesel exhaust subtracted	x
P136	Vehicle Exhaust	CRC CMB	Composite	Tu_Sep1	Sepulveda Tunnel diesel and minimum running loss subtracted	x
P137	Vehicle Exhaust	CRC CMB	Composite	Tu_Sep2	Sepulveda Tunnel diesel and maximum running loss subtracted	x
P138	Vehicle Exhaust	CRC Tunnel	Composite	Tu_TusHD	Fort McHenry Tunnel Diesel	x
P139	Vehicle Exhaust	CRC Tunnel	Composite	Tu_TusLD	Fort McHenry Tunnel Light Duty Gasoline	x
P140	Vehicle Exhaust	CRC Tunnel	Composite	Tu_Van	Van Nuys Tunnel	x
P141	Vehicle Exhaust	CRC CMB	Composite	Tu_Van0	Van Nuys Tunnel diesel exhaust subtracted	x
P142	Vehicle Exhaust	CRC CMB	Composite	Tu_Van1	Van Nuys Tunnel diesel and minimum running loss subtracted	x
P143	Vehicle Exhaust	CRC CMB	Composite	Tu_Van2	Van Nuys Tunnel diesel and maximum running loss subtracted	x
P144	Vehicle Exhaust	Washington	Composite	WA_Tu	Mt. Baker Tunnel emissions, downwind exhaust.	
P145	Vehicle Exhaust	Washington	Composite	WA_Tu0	Mt. Baker Tunnel emissions with diesel contributions removed.	
P146	Vehicle Exhaust	Washington	Composite	WA_Tu1	Mt. Baker Tunnel emissions with diesel and 5~10% of running loss contributions r	
P147	Vehicle Exhaust	Washington	Composite	WA_Tu2	Mt. Baker Tunnel emissions with diesel and 15~30% of running loss contributions	
P148	Vehicle Exhaust	COAST	Individual	WRuBT_D1	Baytown Tunnel, warm running, downwind sample.	
P149	Vehicle Exhaust	COAST	Individual	WRuWH_D1	Westheimer, warm running, downwind sample.	
P150	Vehicle Exhaust	COAST	Individual	WRuWH_D2	Westheimer, warm running, downwind sample.	
P151	Vehicle Exhaust	COAST	Individual	WRuWH_D3	Westheimer, warm running, downwind sample.	
P152	Vehicle Exhaust	COAST	Individual	WRuWH_D4	Westheimer, warm running, downwind sample.	
P153	Vehicle Exhaust	COAST	Composite	WRuWH_DC	Composite of WRuWH_D1, WRuWH_D2, WRuWH_D3, and WRuWH_D4.	
P154	Vehicle Exhaust	COAST	Individual	WRuWH_N1	Westheimer, warm running, downwind-upwind.	
P155	Vehicle Exhaust	COAST	Individual	WRuWH_N2	Westheimer, warm running, downwind-upwind.	
P156	Vehicle Exhaust	COAST	Composite	WRuWH_NC	Composite of WRuWH_N1, WRuWH_N2.	

3.1 Vehicle Exhaust

In urban locations, motor vehicle exhaust and evaporative emissions of gasoline are the major sources of hydrocarbon emissions. Composites of dynamometer measurements of vehicles of varying age and mileage or on-road measurements (e.g., tunnels and roadways) are commonly used to represent fleet-averaged exhaust profiles. Profiles based on dynamometer tests should include a weighted sum of exhaust profiles for noncatalyst vehicles, high-emitting vehicles and catalyst-equipped vehicles with site-specific weighting factors to approximate the fleet-averaged exhaust composition. The fuels used in the dynamometer tests should resemble the fuels used in the study region at the time the ambient samples are collected. On-road measurements are usually preferred in CMB applications because they include a composite of the exhaust from many vehicles, which more closely represents the local vehicle population than dynamometer tests of a small sample of vehicles. However, tunnel measurements also include varying amounts of diesel exhaust and running evaporative losses.

The largest body of knowledge about organic gas source compositions is related to mobile source emissions (Bailey and Eggleston, 1993; Bailey et al., 1990a, 1990b; Black et al., 1980; Booker et al., 1986; Carey and Cohen, 1980; Chan et al., 1991; Chock and Winkler, 1992; Chock et al., 1994; Conner et al., 1995; Corchnoy et al., 1992; Diehl et al., 1993; Duffy and Nelson, 1996; Fujita et al., 1997a, 1997b; Gelencsar et al., 1997; Gertler et al., 1997; Guicherit, 1997; Hampton et al., 1982, 1983; Haszpra and Szilaghi, 1994; Hlavinka and Bullin, 1988; Hoekman, 1992; Japar et al., 1990, 1991; Jensen and Hites, 1983; Kaiser et al., 1991; Kawamura et al., 1985; McCabe et al., 1992; McClenny et al., 1989; Nelson and Quigley, 1983, 1984; Pierson et al., 1996; Sagebiel et al., 1996, 1997; Sampson and Springer, 1973; Siegl et al., 1992; Sigsby et al., 1987; Simo et al., 1997; Sjoren et al., 1996; Snow et al., 1989; Stedman, 1992; Stump et al., 1989, 1990, 1992, 1996; Trier et al., 1990; Wallington et al., 1991, 1993; Williams et al., 1990; Zielinska and Fung, 1994; Zielinska et al., 1996; Zweidinger et al., 1988, 1990). These tests include emissions from spark-ignition (gasoline-fueled) vehicle exhaust, compression ignition (diesel-fueled) vehicle exhaust, liquid gasoline, and evaporative gasoline emissions from fuel handling and vehicle operation.

The gasoline-powered vehicle exhaust profile, Exh801, was derived from the Federal Test Procedure (FTP) tests of Sigsby et al. (1987) which involved 46 in-use passenger vehicles for 1975 to 1982 model years. Profile Exh801 was re-calculated by the ARB from the EPA's original measurements to provide a more complete chemical break-down. Propane/propene, benzene/cyclohexane, and toluene/2,3-dimethylhexane were not separately reported by Sigsby et al., so ratios of 3:1, 1:1 and 9:1 were assumed by the ARB for these pairs of species, respectively. However, motor vehicle exhaust profiles measured in the Caldecott Tunnel by Zielinska and Fung (1992) and in FTP dynamometer tests by Stump et al. (1989, 1990), Hoekman (1992), Burns et al. (1991) and Chock and Winkler (1992) are inconsistent with the abundances in Exh801 when the foregoing ARB ratios are used. Propane/propene, benzene/cyclohexane, and toluene/2,3-dimethylhexane ratios of 3:22, 19:1 and 1:0, consistent with those found by Zielinska and Fung (1992) were applied to obtain profile Exh801a.

Exhaust profiles were similarly developed for the Auto-Oil Program. ACCS, ACST, and ACHS are averages for incremental cold start, stabilized and hot start emissions profiles for the "current" vehicle fleet (1989) using industry average gasoline (Fuel A, based on the 1988 Motor Vehicle Manufacturers Association [MVMA] summer nationwide fuel survey). AOCs, AOST, and AOHS are the corresponding profiles for the Auto/Oil "older" fleet (1983 to 1985) using Fuel A (Burns et al., 1991, Chock et al., 1992). ACCOMP and AOCOMP are the FTP composite profiles for current and older fleets, respectively. EXHCOMP2 is a composite of AOCOMP with two on-road vehicle exhaust profiles, TU_MCHLD and SOS. This composite profile was used by Fujita et al. (1995) to apportion the hydrocarbon data for the 1992 Coastal Oxidant Assessment for Southeast Texas (COAST) Study.

On-road vehicle exhaust profiles were derived from measurements by the Desert Research Institute (DRI) in the Caldecott Tunnel (ExhCT) in the San Francisco Bay Area (Zielinska and Fung, 1992), Tuscarora Tunnel in Pennsylvania (TUSCLD), and Fort McHenry Tunnel in Baltimore (Sagebiel et al., 1995) and by roadside measurement made by the U. S. Environmental Protection Agency during the Atlanta Study as part of the Southern Oxidant Study (SOSROAD, Conner et al., 1995). The Fort McHenry Tunnel is an underwater tunnel with upgrade and downgrade segments. Separate profiles were developed for each segment (MCHLDD and MCHLDU) and a composite profile for the entire tunnel (MEHELDT). A diesel exhaust profile was developed by DRI (Sagebiel et al., 1996) from the Ft. McHenry Tunnel by extrapolating the regressions of species weight fraction as a function of the relative fractions of light-duty gasoline versus heavy-duty diesel traffic. Investigators from DRI also conducted a series of experiments in 1995 to quantify emission rates of carbon monoxide (CO), nitrogen oxides (NO_x), and speciated nonmethane hydrocarbons (NMHC) from in-use vehicles at the Lincoln Tunnel in New York (August 16-18) and at the Callahan Tunnel in Boston, MA (September 18-19) (Gertler et al., 1997). Similar experiments were conducted during the same year at the Deck Park Tunnel in Phoenix, AZ (January 24-26 and again in July 25-27), and at the Van Nuys Tunnel (June 8-12) and Sepulveda Tunnel (October 3-4) in the Los Angeles area. The sampling protocol and characteristics of the vehicle traffic for each of the tunnel measurements are described by Gertler et al. (1997). The on-road vehicle exhaust profiles represent primarily hot stabilized exhaust emissions, but also include evaporative emissions from running and resting losses.

Composite spark-ignition vehicle exhaust profiles were derived by Fujita et al. (1997a) from the DRI tunnel measurements by subtracting the contributions of diesel exhaust and running evaporative losses from each tunnel sample. First, the diesel exhaust was subtracted from the tunnel measurement by fitting a diesel exhaust profile to the tunnel samples using only decane and undecane as fitting species. These two species were used because they are enriched in diesel exhaust relative to gasoline exhaust and minimize the overestimation of the diesel contribution that would result if species common to both sources are used to determine the solution. The resulting diesel contributions to total nonmethane hydrocarbons (C₂ to C₁₁) range from 3 to 9 percent, which are consistent with the observed fractions of diesel traffic. The method described above cannot be used to remove the contributions of evaporative emissions because there are no species that exist in gasoline that does not also exist in tailpipe emissions. Instead, varying contributions of evaporative emissions were subtracted from each tunnel sample in five-percent increments from 0 to 50 percent. CMB was applied to the ten alternative diesel and evaporative

emissions-corrected samples for each tunnel run with diesel exhaust and evaporative emissions as source profile. The model performance parameters and comparisons of calculated and measured amounts of total NMHC, isobutane, n-butane, and isopentane were examined to determine the level of evaporative corrections that yield the best fit. The fit deteriorates rapidly beyond a certain level of assumed headspace vapor contribution of about 15 to 25 percent. The predicted vapor contributions do not increase above these levels of assumed vapor contribution. This is consistent with the expectation since there is a limit to the fractional contribution of running losses to hydrocarbons mixing ratios in roadway tunnels. Table 3 lists composites for the uncorrected tunnel measurements for the Callahan Tunnel (Tu_Cal), Lincoln Tunnel (Tu_Lin), Sepulveda Tunnel (Tu_Sep), and Van Nuys Tunnel (Tu_Van). Because the performance parameters for various levels of assumed headspace vapor contributions are similar up to the level at which the fit deteriorates, three sets of corrected profiles were derived for each tunnel run. One profile corresponding to no evaporative correction, or only diesel correction (Suffix of 0 attached to the uncorrected tunnel profile), and a second set of profiles that corresponds to the maximum level of evaporative correction before the fit begins to deteriorate (15-20%) (Suffix of 2). The third profile corresponds to an average between no correction and maximum correction (5-10%) (Suffix of 1). Similar profiles were also developed from measurements in the Mt. Baker, I-90 tunnel in Seattle, WA (Fujita et al. 1997).

On-road measurements were also made in Houston during the 1993 COAST (Fujita et al., 1996) and in Juarez during the 1996 Paso del Norte (Fujita, 1998) Studies. Measurements involved sampling upwind and downwind of roadways or in heavily traveled intersections. The COAST samples included upwind/downwind hot soak and cold start samples collected at the Astrodome during and immediately after a ballgame, respectively, and up upwind/downwind samples along Westheimer Road, a secondary urban road in a residential area of Houston. Samples were also collected from the Baytown Tunnel, a roadway tunnel under the Houston Ship Channel. Samples were collected in Juarez near a heavily traveled intersection during rush hour and behind a propane bus in order to obtain approximate source composition profiles for "vehicle exhaust" and a propane-powered bus, respectively. The similarity between the two profiles for species greater than four carbons show that the propane bus exhaust samples contain varying amounts of exhaust from other vehicles. The average ratios between the two profiles for these larger hydrocarbons were used to subtract the contributions of the Juarez traffic from the propane bus profile.

The profiles in Table 3 demonstrate the similarities and differences between vehicle exhaust, liquid gasoline, and evaporated gasoline profiles. With only the light hydrocarbons measured, the heavy-duty diesel and light-duty gasoline exhaust profiles are similar, and are often collinear in CMB calculations. Ethene, acetylene, 1-butene, iso-butene, propane, propene, isopentane, n-pentane, 2,2 dimethylbutane, 2-methylpentane, n-hexane, benzene, 3-methylhexane, toluene, ethylbenzene, m- & p-xylene, m-ethyltoluene, and 1,2,4-trimethylbenzene, are the most abundant compounds in either or both of these emissions. Several of these are short-lived, as shown in Table 2, and are only used in CMB calculations where fresh emissions are expected, as during early morning. Major differences between these two exhaust profiles are evident for: 1) acetylene, iso-butene, isopentane, n-hexane, and 2-methylhexane, which are most abundant in gasoline exhaust; and 2) for propene, propane, 2,2 dimethylbutane, n-decane, and n-undecane which are more abundant in diesel exhaust. Previous studies showed that source attributions

between tailpipe and evaporative emissions from receptor modeling can vary greatly depending on the particular profile chosen for tailpipe emissions (Harley et al., 1992, Fujita et al., 1994, Pierson et al., 1996). This is because tailpipe emissions are a mixture of hydrocarbons produced during combustion (e.g., acetylene, ethene, propene, and benzene) along with unburned gasoline resulting from incomplete combustion. The relative abundances of combustion by-products in the exhaust profile vary with emission control technology, level of vehicle maintenance and operating mode. In the CMB calculation, liquid gasoline represents the additional unburned gasoline (due to misfiring and other engine malfunctions) that is not included in the exhaust profile, plus evaporative emissions from gasoline spillage, hot soaks, and some portion of resting losses (leaks, permeation). The profile for gasoline headspace vapor is taken to represent fuel tank vapor losses (e.g., migration of fuel vapor from the canister).

3.2 Effect of Reformulated Gasoline on Tailpipe and Evaporative Emissions

The reformulation of gasoline has significantly effected the composition of motor-vehicle related emissions in recent years. Both the federal government and the State of California have developed specifications for reformulated gasoline (RFG). The federal program is required for all severe and extreme ozone nonattainment areas, whereas the California program applies throughout the state. Both California and federal RFGs are being introduced in two phases. California Phase 1 was introduced in 1992 and Phase 2 was introduced in 1996. Phases I of the federal program was introduced in 1995 and Phase II is scheduled for 2000. Table 4 compares the properties of conventional and reformulated gasoline.

California Phase 1 gasoline had reduced RVP (Reid vapor pressure) in summertime and 2% oxygen (about 11% methyl-tert-butyl ether) in winter. Average specifications for federal Phase I gasoline include RVP of 7.1 psi, 2.0% by weight oxygen content, and 1.0% by weight benzene content. These requirements were effective as of January 1, 1995 in nine major metropolitan areas of the United States with the worst ozone air pollution. The RFG program is federally implemented year-round in these areas as an emission reduction program to control ozone and air toxic emissions. In Texas, RFG is required in the Houston-Galveston non-attainment area of Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller counties. The Dallas-Fort Worth non-attainment area of Collin, Dallas, Denton, and Tarrant counties, voluntarily opted into the RFG program. Methyl tertiary butyl ether (MTBE) is the most common oxygenate used in Texas. Tertiary amyl methyl ether (TAME), ethyl tertiary butyl ether (ETBE), and ethanol are found in a small percentage of reformulated fuels.

The California Phase 2 RFG specifications apply to all gasoline sold in California beginning January 1, 1996, and include a maximum 80 ppmw sulfur content (average of 30 ppmw), a maximum 1.2% benzene content by volume (average of 0.8), a maximum 10.0% olefin content, a maximum 2.7% oxygen content by volume, a maximum T90 and T50 of 330 °F and 220 °F, respectively, maximum 30% aromatic hydrocarbon content by volume (average of 20%), and a maximum RVP of 7.0 psi.

Table 4
Fuel Parameter Values (national basis)

	Conventional gasoline		Gasohol Avg	Oxyfuel (2.7 wt% Oxygen)	Phase I RFG Avg
	Avg ¹	Range ²		Avg	
RVP ₃ (psi)	8.7-S 11.5-W	6.9-15.1	9.7-S 11.5-W	8.7-S 11.5-W	7.2/8.1-S 11.5-W
T ₅₀ (°F)	207	141-251	202	205	202
T ₉₀ (°F)	332	286-369	316	318	316
Aromatics (vol%)	28.6	6.1-52.2	23.9	25.8	23.4
Olefins (vol%)	10.8	0.4-29.9	8.7	8.5	8.2
Benzene (vol%)	1.60	0.1-5.18	1.60	1.60	1.0 (1.3 max)
Sulfur (ppm)	338	10-1170	305	313	302 (500 max)
MTBE ₄ (vol%)	--	0.1-13.8	--	15	11 (7.8-15)
EtOH ₄ (vol%)	--	0.1-10.4	10	7.7	5.7 (4.3-10)

1 As defined in the Clean Air Act.

2 1990 MVMA survey.

3 Winter (W) higher than Summer (S) to maintain vehicle performance.

4 Oxygenate concentrations shown are for separate batches of fuel; combinations of both MTBE and ethanol in the same blend can never be above 15 volume percent total.

Investigations of the effects of RFG on automotive emissions have been conducted through the Auto/Oil Air Quality Improvement Research Program (AQIRP), by EPA, ARB, and individual oil companies. Results of the Auto/Oil AQIRP are illustrative of the general response of automotive emissions to changes in fuel parameters.

Compositional differences of vehicle exhaust from Transitional Low Emission Vehicles (TLEVs) operating on conventional industry-average gasoline (RF-A) versus California Phase 2 RFG were summarized by the ARB (1993). The summary includes data from testing programs conducted by the ARB, the Auto/Oil AQIRP, and Chevron Research & Technology Company. The motor vehicle test data were renormalized in terms of weight fractions, and the weight fractions for each species for all tests on an individual vehicle were averaged. The composite profiles for each vehicle were averaged to create composite profiles for each fuel. Separate composite profiles were calculated for each bag of the U.S. EPA 1975 Federal Test Procedure (FTP). For the composite FTP, the average weight fraction of n-alkanes decreased from 15.3% with RF-A to 8.5% with RFG, while the branched alkanes increased from 24.5% with RF-A to 35.8% with RFG. The relative abundances of cycloalkanes and alkynes remained unchanged, while olefins and oxygenates showed slight increases with RFG. Emissions of aromatic compounds decreased from 35.2% with RF-A to 27.7% with RFG. Differences are higher for specific compounds (e.g., benzene and MTBE). These compounds or their ratios serve as useful tracers for RFG.

3.3 Cold-Start Emissions

Samples were collected by DRI in the parking garage of the T. P. O'Neill Federal Building in downtown Boston on September 12-13, 1995 in order to obtain a composition profile for cold-start emissions (Fujita et al., 1997). This garage is ideal in that there is very little traffic during the day and most vehicles leave the garage about the same time at the end of the workday. The ventilation exhaust fan, which normally runs in the afternoon from 2 to 5 p.m., reduces concentrations of VOCs in the garage to near street level prior to and during the time the vehicles leave. To ensure measurable differences between the cold-start and background samples, the ventilation period was rescheduled to run one hour earlier during our study (1 to 4 p.m.). One-hour canister samples were collected during the ventilation period ("background") and near the end of the workday at three locations within the garage on September 12 and again on September 13. The samplers were located between the garage exit and the ventilation fan about equal distance from each other at the end of a row of parking spaces nearest to the main exit aisle. On the first day of sampling, background and "cold start" samples (cold start plus background) were collected between 2:00-3:00 p.m. and 4:00-5:00 p.m., respectively. Twenty-nine vehicles entered or left the garage during the background-sampling period versus 56 vehicles that left during the cold-start sampling period. Two of the 56 vehicles were VW diesels. Background samples were collected on the second day between 1:15 and 2:15 p.m. and cold start samples were collected between 4:20 and 5:20 p.m. Twenty-eight vehicles entered or left during the background-sampling period and 53 vehicles (including one diesel vehicle) left during the cold-start sampling period. The differences in mixing ratios between the cold start and background samples were substantially higher during the second day. These measurements were used to derive a source composition profile for cold-start emissions.

3.4 Gasoline Liquid and Vapor

Running and resting losses are the two sources of evaporative loss from vehicles travelling on the road. Running losses are releases of gasoline vapor from the fuel system during vehicle operation as a result of the heating of the fuel tank. Vapors are released when the rate of fuel vapor formation exceeds the capacity of the vapor storage and purge systems. The composition of running losses tend to resemble headspace vapors if the canister is saturated, and butane-enriched vapors if the canister is not saturated. The canister similarly affects the composition of diurnal evaporative emissions. Resting loss evaporative emissions are due to migration of fuel vapors from the evaporative canister, from leaks, and from fuel permeation through joints, seals, and polymeric components of the fuel system. Most of these losses tend to appear more like whole liquid gasoline. Hot soaks also resemble liquid gasoline.

Liquid gasoline contains many compounds in common with gasoline-vehicle exhaust. It is depleted in products of combustion such as ethane, ethene, acetylene, propene, and to some extent, benzene. Evaporated gasoline is also depleted in these combustion compounds, as well as heavier hydrocarbons that volatilize more slowly from liquid fuels. Isobutane, n-butane, t-2 butene, and especially isopentane are enriched in evaporated gasoline. MTBE and its thermal decomposition product, isobutylene, stands out as a large constituent of gasoline exhaust emissions that clearly separates these from diesel in areas where it is used as an additive. These differences are sufficient for CMB separation of gasoline exhaust from liquid and evaporated gasoline, and often from diesel exhaust, in ambient air. The following gasoline samples have been analyzed and used in source apportionment studies.

Composite liquid and headspace vapor profiles consisting of averages of different brands and grades of gasoline were developed in conjunction with the Tuscarora, Fort McHenry, and SOS on-road exhaust experiments and for the Auto-Oil program. Profiles AODiurn, AOHSoak, and AORunLs are average diurnal, hot soak, and running loss emissions, respectively, for the Auto/Oil "older" fleet.

Twenty-one sets of bulk and headspace vapor chemical analyses were performed by Environmental Analytical Services (EAS) as part of COAST for gasoline and diesel fuels sold in the Houston area comprising different grades and brands (Texaco, Chevron, Exxon, Diamond Shamrock, Shell and Conoco) of fuel.

Samples of various brands and grades of gasoline were collected during the Paso del Norte study and analyzed by Consolidated Sciences, Inc. Both unleaded regular "Magna Sin" and premium grades of gasoline were collected from two different service stations in Juarez. In El Paso, regular, mid, and premium grades of gasoline were collected from four brands of gasoline (Exxon, Chevron, Circle K, and Diamond Shamrock). Three alternative composite profiles were derived for Mexican gasoline based on a weighting of regular and premium grades of 50/50 (ME50R50P), 67/33 (ME67R33P), and 75/25 (ME75R25P). The composite for the gasoline sold in El Paso (US681220) is based on a study conducted by the American Petroleum Institute, which found that regular, mid-grade, and premium grades account for 68, 12, and 20 percent of U.S. gasoline sales (API, 1996). Because headspace vapors were not analyzed in the

study, the vapor profiles obtained by Mugica et al (1997) were used in the apportionment. These profiles are for leaded and unleaded gasoline from Mexico City.

Composite liquid and headspace vapor profiles consisting of an average of different brands and grades of gasoline were derived in conjunction with the 1995 on-road emissions and receptor modeling studies in the northeastern U. S. and the Los Angeles area (Fujita et al., 1997a). Ten gasoline samples were collected by DRI in the Boston area and were analyzed at the University of California, Riverside College of Engineering Center for Environmental Research and Technology (CE-CERT) under a subcontract to DRI. DRI analyzed the headspace vapor composition for these samples. In addition, sixty liquid gasoline samples (collected from the Los Angeles area during summer of 1995) were analyzed by CE-CERT for a separate study sponsored by the South Coast Air Quality Management District. The headspace vapors for a subset of these gasoline samples were analyzed by DRI as part of a study sponsored by the California Air Resources Board of the effect of California Phase 2 reformulated gasoline (Zielinska et al., 1997). Leakage of some of the gasoline samples from Boston raised concerns about the integrity of the remaining gasoline samples, particularly in regard to the relative amounts of light hydrocarbons that tend to be more abundant in samples of gasoline headspace. The Los Angeles gasoline profiles were used for all of the tunnel profile corrections and in the previous source apportionment study by Fujita et al. (1997a). The survey of motor gasolines conducted by the National Institute of Petroleum and Energy Research (NIPER) for summer 1995 (Dickson and Sturm, 1996) show how RFGs sold in southern California differ from those sold in the Northeast. The average volume percents of saturates, olefins, total aromatics, and benzene in unleaded RFG in the Northeast are 55.1, 11.0, 23.1, and 0.67 respectively, versus 53.1, 8.6, 27.1, and 0.79, respectively, in southern California. The average RVP is 7.9 in the northeast and 7.2 in southern California. The average volume percent of MTBE is 9.8 and 10.7 percent in the northeast and southern California, respectively. The average RVP is the most significant difference between RFGs that were sold in 1995 in the northeastern U.S. versus southern California. These differences affect the amounts and composition of evaporative emissions.

Investigators from DRI analyzed fifteen samples consisting of five brands (ARCO, BP, Chevron, Texaco, and Unocal) and three grades (regular, midgrade, and premium) of gasolines sold the Seattle area as part of a hydrocarbon source apportionment study for western Washington (Fujita et al., 1997b). The liquid and headspace compositions were determined by gas chromatography at DRI. The five brands of gasoline represent ~ 92 to 95 percent of the total sales in western Washington (Fogelquist, 1997). A study conducted by the American Petroleum Institute found that premium, mid-grade, and regular grades account for 20, 12 and 68 percent of gasoline sales (API, 1996). The average volume percent of saturates, olefins, total aromatics, and benzene in unleaded gasoline sold in the Pacific Northwest in 1996 were 56.3, 10.6, 33.0, and 2.37 percent, respectively (Dickson and Sturm, 1997). The average vapor pressure at 100 °F was 7.9 psi, which is similar to the RFG sold in 1995 in the northeastern U.S. In contrast gasoline sold in southern California during the same period had an average vapor pressure of 7.0 psi (Dickson and Sturm, 1997).

3.5 Commercial Natural Gas and Liquefied Petroleum Gas

The commercial natural gas (CNG) profile is based on samples taken in the summer of 1972 at Los Angeles, CA and in the summer of 1973 at El Monte, CA (Marysohn, 1975). The geogenic natural gas (GNG) profile is based upon samples taken in the spring of 1972 in Newhall, CA and at a well head in Redondo Beach, CA in the fall of 1973. The composition of the samples of both types of natural gas did not vary despite the differences in time and location of sample collection (Fujita et al., 1994b).

Two liquefied petroleum gas samples were collected from both El Paso (Super Energy Propane and Westex Conversion) and Juarez (Servigas and Commercial de Juarez) during the 1996 Paso del Norte Study, and analyzed by the EPA. EPA also analyzed one natural gas sample from Juarez.

3.6 Surface Coatings

Although solvents from paints and industrial uses are large components of all ROG inventories, their reported profiles are few (Guo et al., 1998; Kitto et al., 1997). The most recent data are those of Censullo et al., (1996). Eleven categories of coating were analyzed in this study. In all detailed species profiles were obtained for 106 samples of water-based and solvent-based coating samples. Surface coating profiles for solvent-based industrial maintenance coatings, solvent-based medium gloss/high gloss, solvent-based primers and sealers, quick dry primers and enamels, and thinning solvent were applied in the apportionments. These are largely depleted in the species common to fuel use and production, with larger abundances of styrene, n-decane, and especially "other" compounds. The "other" VOCs are quantified and differ substantially among the different coatings tested. Most of these other compounds are oxygenated compounds that are measured in PAMS. California and other states requires special solvent and coating formulations to comply with air quality emissions requirements. Coating and solvent profiles are likely to be very specific to a particular area.

Printing ink solvents from offset (Wadden et al., 1995a, 1995b) and rotogravure are commonly identified in emissions inventories. Most of these emissions are captured, condensed, and re-used by modern printing facilities, especially the toluene used for thin rotogravure inks. The solvent emission from inks shows enrichments for styrene, n-nonane, and 1,2,4-trimethylbenzene, similar to the other solvents. Again, there is a large "Other" fraction of identified compounds that allow the separation of solvent contributions to ambient VOCs.

3.7 Organic Decay and Landfills

Landfills are sometimes identified as large TOG emitters owing to their prodigious production of methane (Brosseau and Heitz, 1994; Eitzer, 1995). A variety of reactive organic gases may accompany the methane, depending of the nature of the landfill wastes and disposal practices. Brosseau and Heitz (1994) summarize measurements from many landfills, finding acetone, alpha terpinene, benzene, butyl alcohol, dichlorobenzene, dichloromethane, ethylbenzene, ethyl mercaptan, limonene, furans, terpenes, toluene, vinyl acetate, vinyl chloride,

and xylene to be among the most abundant components of ROG. Several of these compounds, such as vinyl chloride, are not common to widespread area sources and might be used to determine landfill source contributions by CMB. Kalman (1986) identifies several VOCs outgassed by plastics when they are heated. Acetone was consistently the most abundant ROG found in emissions from the surveyed landfills, probably resulting from the anaerobic decay of discarded organic material. Similar reactions in dumpsters and trash cans, as well as in the natural environment, may account for a portion of the unexplained acetone observed by Fujita et al. (1995) in Los Angeles and by Singh et al. (1994) at more remote locations. Shonnard and Bell (1993) document substantial quantities of benzene emanating from contaminated soil, a situation that will presumably improve as modern amelioration methods are applied to these dumpsites (Fox, 1996).

3.8 Industrial Sources

Petrochemical production, especially the production of gasoline and other fuel oils (Sexton and Westberg, 1979, 1983; Fujita et al., 1995), can be a large contribution in areas such as Houston (Fujita et al., 1995). Ethane, propene, propane, n-pentane, t-2 hexene, benzene, n-heptane, toluene, and n-octane are abundant species. Most of these overlap with liquid and evaporated gasoline vapors. Of particular interest is the large fraction of unidentified NMHC in the canister chromatogram. This fraction includes real, but unreported, chemical compounds that are not in the other profiles. If properly quantified, these could probably assist the CMB resolution of refinery and other petrochemical sources.

A series of net upwind/downwind property-line samples were collected during the COAST Study at ten separate chemical and refining complexes in the Houston area (nine sets from the Exxon Baytown Cluster east of Houston in Baytown; six sets from the Celanese Hoechst Cluster southeast of Houston just south of the Bayport Ship Channel between Shoreacres and Seabrook; four set around the Amoco Industrial Cluster in Texas City; four sets around the Union Carbide facility in Texas City; two sets at the Dow Texas - Plant B facility in Freeport; one set at the Dow Texas - Oyster Creek facility in Freeport; four sets around the Texaco facility at Port Arthur; three sets around the Solvay Polymers Industrial Cluster located east of Houston on the south side of the Houston ship channel; and three sets around the Shell Industrial Cluster east of Houston between Pasadena and Deer Park on the north side of Highway 225. Additionally, four sets of samples were collected randomly in the Houston Ship Channel along Interstate 10 and Highway 225. Also four sample sets were taken simultaneously at each of two locations to estimate the spatial variability of ambient measurements in the Houston Ship Channel area. The two locations were along Post Oak Road (north/south) and Clinton Drive (east/west).

During the initial source profile development, it was realized that additional point source information was needed to supplement the COAST source measurement (Fujita et al., 1996). Two database files were provided by TNRCC, one file containing source identification information, source location, hourly and/or daily VOC emissions and VOC profile code for each hour (if available, or 24-hour composite profile) and a second file containing the VOC source composition data by profile code. From this information, speciation profiles and composite

source profiles were derived by source type and facility-specific source profiles for fifteen facilities located nearest to the Clinton site. Source profiles were also derived for fugitive emissions from petroleum industry facilities, petroleum marketing and storage facilities.

Hydrocarbon samples were collected during the Paso del Norte Study between 8/6/96 and 8/17/96 at several source-specific locations described as Chevron Tank, Chevron Tank South, Chevron Tank FCC, Delmex (ITT), Delmex downwind, Zenco, and Paint Shop. The first three sites are intended to represent fugitive VOC emissions from refinery operations. Delmex and Zenco are located in the industrial area of Juarez, and the paint operation is an auto body shop.

3.9 Coal-Fired Power Stations

Garcia et al. (1992) found small quantities of VOC emitted by several French coal-fired power stations, with benzene, toluene, ethylbenzene, xylenes, tetrachloroethane, benzaldehyde, and phenol being the most abundant compounds. Abundances of these compounds were substantially enriched over their abundances in the fuel, indicating that these compounds did not combust as well as other fuel components or that they partially formed as part of the combustion process. Some data have also been reported for petroleum fires (Booher and Janke, 1997), food and beverage production (Passant et al., 1993); household products and indoor building materials (Sack et al., 1992; Sanchez et al., 1987), ferry boats (Cooper et al., 1996), the application of hot asphalt (Kitto et al., 1997), fish rendering (Ohira et al., 1976), and phytoplankton in the ocean (McKay et al., 1996).

3.10 Biogenic Emissions

Biogenic VOC emissions from trees and shrubs (Arnts and Meeks, 1981; Arnts et al., 1982; Altshueller, 1983; Benjamin et al., 1997; Bertin et al., 1997; Cao et al., 1997; Chameides et al., 1988; Ciccioli et al., 1995, 1997a, 1997b; Das, 1992; Fuentes et al., 1996; Gay, 1987; Grosjean et al., 1993a, 1993b; Guenther et al., 1993, 1994, 1996; Hewitt and Street, 1992; Hov et al., 1983; Jobson et al., 1994; Juttner, 1988; Kempf et al., 1996; Khalil and Rasmussen, 1992; Lamb et al., 1984, 1985, 1986, 1987, 1993; Nondek et al., 1992; Oliver et al., 1984; Owen et al., 1997; Pier et al., 1997; Riba et al., 1987, ; Roberts et al., 1985; Schuh et al., 1997; Shaw et al., 1983; Street et al., 1997; Tanner and Zielinska, 1994, Tingey, 1981; Tingey et al., '978, 1981; Winer et al., 1992; Yokouchi and Ambe, 1988; Young et al., 1997; Zhang et al., 1992) are typically reported for isoprene and monoterpenes such as alpha-pinene and beta-pinene. These compounds are very reactive and are usually detected only in forested areas. Isodorov et al. (1985) found a wide variety of heavy hydrocarbons in air dominated by different types of plants and trees that might be more stable indicators of biogenic contributions to ambient VOCs.

Because terpene are not reliably measured in canister samples, isoprene is typically used as a sole marker (i.e., taken to constitute 100 percent of NMHC) in the biogenic emissions profile (BIOGENIC). Biogenic NMHC emissions are highly reactive in the atmosphere, and biogenic source contributions derived from CMB modeling will supply only a lower limit to the actual contributions from biogenic emissions.

3.11 Unidentified

Most source profiles used in this study contain a UNID component, which represents the fractional compositions of NMHC that were not assigned to individual, identified species in the gas chromatographic analysis. A single constituent source profile (UNID is taken to constitute 100 percent of NMHC) has been used in the past (Fujita et al., 1994b) to account for the contributions from this component. The difference between the measured total NMHC and the sum of the source contributions from fitted sources is named as "unexplained". The "unexplained" source contributions in this report refer to the differences between the measured NMHC and the sum of the predicted contributions from those identified source categories. Nearly all of the unexplained mass is related to UNID that is not assigned to the identified categories. The fraction of UNID is consistently higher in downwind and afternoon samples, which suggests that much of this residual UNID could be secondary organic species produced by photochemical reactions.

3.12 On-going Source Profile Development

DRI is currently conducting a hydrocarbon source apportionment study in Austin, TX as part of the 1998 Central Texas On-Road Hydrocarbon Study. The objective of this study is to determine the relative contribution of motor vehicles to ambient hydrocarbon levels in the Austin area. During the week of August 17, 1998, DRI collected source-oriented samples at a truck stop, on I-35 and surface streets, and in industrial areas of Austin. Samples were also collected for natural gas, biogenic emissions, and decay of organic matter. Samples of vehicle exhaust are intended to represent four combinations of traffic and vehicle fleet characteristics: 1) free-flowing freeway, 2) congested freeway, 3) major surface arterial, and 4) heavy-duty diesel truck exhaust. All ambient samples and motor vehicle source samples will include measurements of C8 to C18 hydrocarbons in order to enhance the resolution in apportionment of diesel versus gasoline exhaust. The contributions of diesel exhaust in each of the urban vehicle exhaust profiles will be determined by Chemical Mass Balance using fitting species that are specific to only to diesel exhaust. Subtracting the diesel contributions from the urban exhaust profiles yields profiles that are specific to gasoline-powered vehicle exhaust. The relative abundances of ethane and propane in these urban vehicle profiles will be reduced to what is typically measured in dynamometer and tunnel measurements. Profiles are also being developed for surface coatings and gasoline samples. Table 5 lists the specific source composition samples that will be developed for the project. Data for source samples will be delivered by the end of January, 1999.

Table 5
Source Samples Collected for the Central Texas On-Road Hydrocarbon Study

Code	Mnemonic	Size	Project	Srctype	Short_Desc
CT001	CTMVT01	G	Central Tx On-Road Study	Motor Vehicle	Diesel_S1 I-35 Exit 221 Truck Stop
CT002	CTMVT02	G	Central Tx On-Road Study	Motor Vehicle	Diesel_S2 I-35 Exit 221 Truck Stop
CT003	CTMVFL01	G	Central Tx On-Road Study	Motor Vehicle	Freeway25_S1 I-35 Woodland to Slaughter
CT004	CTMVFH01	G	Central Tx On-Road Study	Motor Vehicle	Freeway65_S1 I-35 Woodland to Slaughter
CT005	CTMVFH02	G	Central Tx On-Road Study	Motor Vehicle	Freeway65_S2 I-35 Woodland to Slaughter
CT006	CTIND01	G	Central Tx On-Road Study	Industrial	Industrial_S1 Near Advance Micro Devices
CT007	CTOD01	G	Central Tx On-Road Study	Organic Decay	Organic Decay_S1 Carrow's Restaurant I-35 & Koenig
CT008	CTMVT03	G	Central Tx On-Road Study	Motor Vehicle	Diesel_S3 I-35 Exit 221 Truck Stop
CT009	CTMVFL02	G	Central Tx On-Road Study	Motor Vehicle	Freeway25_S2 I-35 Woodland to Slaughter
CT010	CTMVFH03	G	Central Tx On-Road Study	Motor Vehicle	Freeway65_S3 I-35 Woodland to Slaughter
CT011	CTBIO01	G	Central Tx On-Road Study	Biogenic	Biogenic_S1 McKinney Falls State Park
CT012	CTBIO02	G	Central Tx On-Road Study	Biogenic	Biogenic_S3 McKinney Falls State Park
CT013	CTMVSRO1	G	Central Tx On-Road Study	Motor Vehicle	Surface Road_S1 South Austin
CT014	CTMVSRO2	G	Central Tx On-Road Study	Motor Vehicle	Surface Road_S2 Downtown Austin
CT015	CTIND02	G	Central Tx On-Road Study	Industrial	Industrial_S2 Southeast Austin Industrial Area
CT016	CTIND03	G	Central Tx On-Road Study	Industrial	Industrial_S3 Southeast Austin Industrial Area
CT017	CTBIO04	G	Central Tx On-Road Study	Biogenic	Biogenic_S4 McKinney Falls State Park
CT018	CTIND04	G	Central Tx On-Road Study	Industrial	Industrial_S4 Near Motorola
CT019	CTMVSRO3	G	Central Tx On-Road Study	Motor Vehicle	Surface Road_S3 Oakhills area
CT020	CTMVSRO4	G	Central Tx On-Road Study	Motor Vehicle	Surface Road_S4 Williamson Creek area
CT021	CTOD02	G	Central Tx On-Road Study	Organic Decay	Organic Decay_S2 Shoney's Restaurant
CT022	CTCNG01	G	Central Tx On-Road Study	Natural Gas	CNG_S1 Lone Star Gas Company
CT023	CTCNG02	G	Central Tx On-Road Study	Natural Gas	CNG_S2 Southern Union Gas Company
CT024	CTLPG01	G	Central Tx On-Road Study	Petroleum Gas	LPG_S1
CT025	CTGASL01	G	Central Tx On-Road Study	Gasoline	GAS01 Diamond Shamrock Unleaded
CT026	CTGASL02	G	Central Tx On-Road Study	Gasoline	GAS02 Diamond Shamrock Unleaded Plus
CT027	CTGASL03	G	Central Tx On-Road Study	Gasoline	GAS03 Diamond Shamrock Unleaded Super
CT028	CTGASL04	G	Central Tx On-Road Study	Gasoline	GAS04 EXXON Unleaded
CT029	CTGASL05	G	Central Tx On-Road Study	Gasoline	GAS05 EXXON Unleaded Plus
CT030	CTGASL06	G	Central Tx On-Road Study	Gasoline	GAS06 EXXON Unleaded Supreme
CT031	CTGASL07	G	Central Tx On-Road Study	Gasoline	GAS07 Texaco Unleaded
CT032	CTGASL08	G	Central Tx On-Road Study	Gasoline	GAS08 Texaco Unleaded Plus
CT033	CTGASL09	G	Central Tx On-Road Study	Gasoline	GAS09 Texaco Unleaded Premium
CT034	CTCOAT01	G	Central Tx On-Road Study	Surface Coatings	INK01 Toyo Ink Mfg Co Various Ink
CT035	CTCOAT02	G	Central Tx On-Road Study	Surface Coatings	INK02 Prisco A766 Powerklene UK
CT036	CTCOAT03	G	Central Tx On-Road Study	Surface Coatings	INK03 Prisco A216 Superklene 2P
CT037	CTCOAT04	G	Central Tx On-Road Study	Surface Coatings	PNT01A GlasUrit ** 55 Polyester Basecoat
CT038	CTCOAT05	G	Central Tx On-Road Study	Surface Coatings	PNT01B GlasUrit ** 352-91 Reducer
CT039	CTCOAT06	G	Central Tx On-Road Study	Surface Coatings	PNT02A GlasUrit ** 923-94 HS Clear
CT040	CTCOAT07	G	Central Tx On-Road Study	Surface Coatings	PNT02B GlasUrit ** 929-83 HS Hardener
CT041	CTCOAT08	G	Central Tx On-Road Study	Surface Coatings	PNT03A RM/Limco ** Supreme Enamel Basecoat
CT042	CTCOAT09	G	Central Tx On-Road Study	Surface Coatings	PNT03B RM/Limco ** LBR1370 Reducer
CT043	CTCOAT10	G	Central Tx On-Road Study	Surface Coatings	PNT04A RM/Limco ** LC1300 Urethane Clear
CT044	CTCOAT11	G	Central Tx On-Road Study	Surface Coatings	PNT04B RM/Limco ** LH1301 Acrylic Enamel Hardener
CT045	CTCOAT12	G	Central Tx On-Road Study	Surface Coatings	PNT05A RM/Diamont ** M6922 Polyester Basecoat
CT046	CTCOAT13	G	Central Tx On-Road Study	Surface Coatings	PNT05B RM/Diamont ** UR50 Reducer
CT047	CTCOAT14	G	Central Tx On-Road Study	Surface Coatings	PNT06A RM/Diamont ** DC88 Diamond Clear
CT048	CTCOAT15	G	Central Tx On-Road Study	Surface Coatings	PNT06B RM/Diamont ** DH44 Diamond Clear Hardener
CT049	CTCOAT16	G	Central Tx On-Road Study	Surface Coatings	PNT07 Sherwin Williams B20 W201 Pro Mar 200 Exterior
CT050	CTCOAT17	G	Central Tx On-Road Study	Surface Coatings	PNT08 Sherwin Williams A82 W596 A-100 Exterior Latex
CT051	CTCOAT18	G	Central Tx On-Road Study	Surface Coatings	PNT09 Sherwin Williams A87 W41 Superpaint Interior Latex
CT052	CTCOAT19	G	Central Tx On-Road Study	Surface Coatings	PNT10 Behr 75 Interior Enamel Undercoat
CT053	CTCOAT20	G	Central Tx On-Road Study	Surface Coatings	PNT11 Behr 436 Exterior Waterbased Primer Sealer
CT054	CTCOAT21	G	Central Tx On-Road Study	Surface Coatings	PNT12 Behr 3050 Interior Semigloss Enamel
CT055	CTCOAT22	G	Central Tx On-Road Study	Surface Coatings	PNT13 Behr 4560 Exterior Flat

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APPENDIX A
Master PAMS Source Profiles

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P001 Biogenic G	P002 coat_cwf G	P003 coat_ga G	P004 coat_ime G	P005 coat_m&hg G	P006 coat_p&e G	P007 coat_p&s G
ethene	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
acetyl	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
ethane	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
prope	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
n_prop	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
i_buta	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
lbutle	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
n_buta	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
t2bute	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
c2bute	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
ipenta	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
pente1	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
n_pent	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
i_pren	100.00 ± 10.00	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
t2pene	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
c2pene	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
bu22dm	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
cpenta	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
bu23dm	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
pena2m	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.04 ± 0.01	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
pena3m	0.00 ± 0.10	0.00 ± 0.41	0.25 ± 0.06	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
ple2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
mcypna	0.00 ± 0.10	0.13 ± 0.03	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.13 ± 0.03	0.00 ± 0.62
pen24m	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.09 ± 0.02	0.00 ± 0.70	0.00 ± 0.62
benze	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
cyhexa	0.00 ± 0.10	0.45 ± 0.11	0.00 ± 0.65	0.00 ± 0.55	0.07 ± 0.02	0.00 ± 0.70	0.00 ± 0.62
hexa2m	0.00 ± 0.10	0.62 ± 0.16	0.00 ± 0.65	0.07 ± 0.02	0.00 ± 0.91	0.00 ± 0.70	0.12 ± 0.03
pen23m	0.00 ± 0.10	0.34 ± 0.09	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.07 ± 0.02
hexa3m	0.00 ± 0.10	1.04 ± 0.26	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.29 ± 0.07
pa224m	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
n_hept	0.00 ± 0.10	3.10 ± 0.78	0.00 ± 0.65	0.61 ± 0.15	0.00 ± 0.91	0.00 ± 0.70	2.48 ± 0.62
mecyhx	0.00 ± 0.10	3.86 ± 0.96	0.00 ± 0.65	1.39 ± 0.35	0.00 ± 0.91	0.61 ± 0.15	5.41 ± 1.35
pa234m	0.00 ± 0.10	0.07 ± 0.02	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.28 ± 0.07	0.09 ± 0.02
tolue	0.00 ± 0.10	14.61 ± 3.65	0.36 ± 0.09	8.57 ± 2.14	0.29 ± 0.07	0.00 ± 0.70	6.15 ± 1.54
hep2me	0.00 ± 0.10	0.77 ± 0.19	0.00 ± 0.65	0.97 ± 0.24	0.37 ± 0.10	3.82 ± 0.96	1.27 ± 0.32
hep3me	0.00 ± 0.10	0.43 ± 0.11	0.00 ± 0.65	0.70 ± 0.17	0.26 ± 0.07	3.24 ± 0.81	1.02 ± 0.25
n_oct	0.00 ± 0.10	1.64 ± 0.41	0.24 ± 0.06	2.81 ± 0.70	1.11 ± 0.28	8.67 ± 2.17	2.24 ± 0.56
etbz	0.00 ± 0.10	7.26 ± 1.82	4.33 ± 1.08	4.51 ± 1.13	0.00 ± 0.91	2.59 ± 0.65	1.43 ± 0.36
mp_xyl	0.00 ± 0.10	27.93 ± 6.98	15.51 ± 3.88	16.95 ± 4.24	11.47 ± 2.87	9.32 ± 2.33	5.47 ± 1.37
styr	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.10 ± 0.02
o_xyl	0.00 ± 0.10	11.41 ± 2.85	6.18 ± 1.55	9.20 ± 2.30	5.26 ± 1.31	4.25 ± 1.06	2.90 ± 0.72
n_non	0.00 ± 0.10	4.22 ± 1.05	8.34 ± 2.09	2.75 ± 0.69	10.52 ± 2.63	0.00 ± 0.70	4.28 ± 1.07
iprbz	0.00 ± 0.10	0.00 ± 0.41	0.70 ± 0.18	0.86 ± 0.22	1.04 ± 0.26	0.52 ± 0.13	0.61 ± 0.15
n_prbz	0.00 ± 0.10	0.58 ± 0.15	2.44 ± 0.61	1.25 ± 0.31	1.16 ± 0.29	0.97 ± 0.24	1.64 ± 0.41
m_etol	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
p_etol	0.00 ± 0.10	2.15 ± 0.54	6.30 ± 1.58	4.28 ± 1.07	6.60 ± 1.65	4.20 ± 1.05	4.75 ± 1.19
bz135m	0.00 ± 0.10	2.20 ± 0.55	7.84 ± 1.96	3.61 ± 0.90	5.82 ± 1.45	4.36 ± 1.09	4.21 ± 1.05
o_etol	0.00 ± 0.10	0.00 ± 0.41	0.00 ± 0.65	0.00 ± 0.55	0.00 ± 0.91	0.00 ± 0.70	0.00 ± 0.62
bz124m	0.00 ± 0.10	2.55 ± 0.64	14.22 ± 3.55	16.01 ± 4.00	15.38 ± 3.84	11.85 ± 2.96	13.88 ± 3.47
n_dec	0.00 ± 0.10	11.16 ± 2.79	20.66 ± 5.16	16.90 ± 4.22	39.39 ± 9.85	29.95 ± 7.49	16.46 ± 4.11
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.41	0.79 ± 0.20	0.61 ± 0.15	1.16 ± 0.29	0.00 ± 0.70	0.00 ± 0.62
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	3.46 ± 0.87	11.84 ± 2.96	7.90 ± 1.98	0.00 ± 0.91	15.26 ± 3.82	25.14 ± 6.29
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
unid	0.00 ± 0.10	101.55 ± 25.39	219.76 ± 54.94	167.47 ± 41.87	348.59 ± 87.15	245.09 ± 61.27	206.10 ± 51.53
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tmoc	100.00 ± 10.00	201.55 ± 20.15	319.76 ± 31.98	267.47 ± 26.75	448.59 ± 44.86	345.09 ± 34.51	306.10 ± 30.61

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno	P008	P009	P010	P011	P012	P013	P014
Profile	coat_sts	coat_tp	coat_ts	coat_v	COATcomp	ACoat196	ICoat783
Size	G	G	G	G	G	G	G
ethene	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
acetyl	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
ethane	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
prope	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
n_prop	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
i_buta	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
lbut1e	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
n_buta	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
t2bute	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
c2bute	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
ipenta	0.00 ± 0.66	0.00 ± 0.65	0.01 ± 0.00	0.00 ± 0.68	0.00 ± 0.00	0.00 ± 0.10	0.00 ± 0.14
pentel	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
n_pent	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
i_pren	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
t2pene	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.14
c2pene	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
bu22dm	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
cpenta	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
bu23dm	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
pena2m	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.01 ± 0.01	0.00 ± 0.10	0.00 ± 0.14
pena3m	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.01 ± 0.07	0.00 ± 0.10	0.00 ± 0.14
pie2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.14
n_hex	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	38.71 ± 7.74	0.00 ± 0.14
mcypna	0.00 ± 0.66	0.00 ± 0.65	0.02 ± 0.01	0.00 ± 0.68	0.04 ± 0.06	0.00 ± 0.10	0.00 ± 0.14
pen24m	0.00 ± 0.66	0.00 ± 0.65	0.18 ± 0.04	0.00 ± 0.68	0.01 ± 0.07	0.00 ± 0.10	3.31 ± 0.67
benze	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
cyhexa	0.00 ± 0.66	0.00 ± 0.65	0.38 ± 0.10	0.00 ± 0.68	0.15 ± 0.23	38.71 ± 7.74	0.97 ± 0.24
hexa2m	0.00 ± 0.66	0.00 ± 0.65	3.02 ± 0.75	0.00 ± 0.68	0.28 ± 1.22	0.00 ± 0.10	0.00 ± 0.14
pen23m	0.00 ± 0.66	0.00 ± 0.65	0.41 ± 0.10	0.00 ± 0.68	0.12 ± 0.21	0.00 ± 0.10	0.00 ± 0.14
hexa3m	0.00 ± 0.66	0.00 ± 0.65	0.36 ± 0.09	0.00 ± 0.68	0.34 ± 0.45	0.00 ± 0.10	0.00 ± 0.14
pa224m	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
n_hept	0.00 ± 0.66	0.00 ± 0.65	11.95 ± 2.99	0.00 ± 0.68	1.57 ± 4.82	0.00 ± 0.10	5.65 ± 1.14
mecyhx	0.07 ± 0.02	0.67 ± 0.17	22.96 ± 5.74	0.05 ± 0.01	2.61 ± 9.12	0.00 ± 0.10	7.00 ± 1.41
pa234m	0.00 ± 0.66	0.00 ± 0.65	0.22 ± 0.06	0.00 ± 0.68	0.05 ± 0.10	0.00 ± 0.10	0.00 ± 0.14
tolue	0.69 ± 0.17	0.41 ± 0.10	9.72 ± 2.43	0.22 ± 0.05	6.91 ± 6.86	9.67 ± 1.94	73.55 ± 14.70
hep2me	0.07 ± 0.02	6.17 ± 1.54	5.10 ± 1.27	0.13 ± 0.03	1.36 ± 2.34	0.00 ± 0.10	0.00 ± 0.14
hep3me	0.00 ± 0.66	4.49 ± 1.12	3.23 ± 0.81	0.00 ± 0.68	0.96 ± 1.62	0.00 ± 0.10	0.00 ± 0.14
n_oct	0.54 ± 0.14	18.09 ± 4.52	9.03 ± 2.26	0.78 ± 0.19	3.44 ± 5.30	0.00 ± 0.10	0.00 ± 0.14
etbz	0.91 ± 0.23	3.33 ± 0.83	1.02 ± 0.25	1.47 ± 0.37	3.82 ± 2.85	8.04 ± 1.61	0.97 ± 0.24
mp_xyl	2.89 ± 0.72	11.52 ± 2.88	3.45 ± 0.86	4.00 ± 1.00	15.40 ± 10.58	4.86 ± 0.98	0.00 ± 0.14
styr	0.00 ± 0.66	0.00 ± 0.65	0.04 ± 0.01	0.00 ± 0.68	0.01 ± 0.03	0.00 ± 0.10	0.00 ± 0.14
o_xyl	2.89 ± 0.72	6.27 ± 1.57	0.75 ± 0.19	2.62 ± 0.66	7.18 ± 4.36	0.00 ± 0.10	8.56 ± 1.71
n_non	3.15 ± 0.79	3.31 ± 0.83	2.75 ± 0.69	8.66 ± 2.17	4.54 ± 2.30	0.00 ± 0.10	0.00 ± 0.14
iprbz	2.34 ± 0.58	0.00 ± 0.65	0.10 ± 0.02	1.10 ± 0.28	0.63 ± 0.57	0.00 ± 0.10	0.00 ± 0.14
n_prbz	5.96 ± 1.49	0.00 ± 0.65	0.11 ± 0.03	3.04 ± 0.76	1.46 ± 1.46	0.00 ± 0.10	0.00 ± 0.14
m_etol	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
p_etol	8.86 ± 2.22	5.08 ± 1.27	1.05 ± 0.26	7.24 ± 1.81	4.51 ± 1.66	0.00 ± 0.10	0.00 ± 0.14
bz135m	11.14 ± 2.79	0.91 ± 0.23	0.27 ± 0.07	6.69 ± 1.67	4.14 ± 2.64	0.00 ± 0.10	0.00 ± 0.14
o_etol	0.00 ± 0.66	0.00 ± 0.65	0.00 ± 0.43	0.00 ± 0.68	0.00 ± 0.44	0.00 ± 0.10	0.00 ± 0.14
bz124m	18.68 ± 4.67	10.29 ± 2.57	3.24 ± 0.81	16.58 ± 4.15	11.13 ± 4.31	0.00 ± 0.10	0.00 ± 0.14
n_dec	7.29 ± 1.82	17.79 ± 4.45	10.17 ± 2.54	32.56 ± 8.14	18.12 ± 6.01	0.00 ± 0.10	0.00 ± 0.14
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.14
detbz1	0.67 ± 0.17	0.00 ± 0.65	0.00 ± 0.43	1.42 ± 0.35	0.39 ± 0.42	0.00 ± 0.10	0.00 ± 0.14
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.14
n_unde	33.86 ± 8.46	11.66 ± 2.92	10.47 ± 2.62	13.43 ± 3.35	10.81 ± 8.14	0.00 ± 0.10	0.00 ± 0.14
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
unid	224.77 ± 56.19	221.37 ± 55.34	112.39 ± 28.10	236.99 ± 59.25	186.46 ± 22.67	0.01 ± 15.98	42.61 ± 22.83
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.14
tnmoc	324.77 ± 32.48	321.37 ± 32.14	212.39 ± 21.24	336.99 ± 33.70	286.46 ± 28.65	100.01 ± 10.00	142.61 ± 14.26

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P015 CNG G	P016 CNG_J G	P017 GNG G	P018 LPG G	P019 Prop_E G	P020 Prop_J G	P021 Atla_liq G
ethene	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.01 ± 0.15
acetyl	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.15
ethane	69.19 ± 10.38	76.28 ± 11.45	16.49 ± 2.48	4.11 ± 0.62	7.31 ± 1.12	1.51 ± 0.30	0.03 ± 0.15
prope	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	5.11 ± 0.77	0.25 ± 0.20	0.13 ± 0.21	0.06 ± 0.15
n_prop	21.23 ± 3.19	15.39 ± 2.32	26.30 ± 3.94	90.58 ± 13.59	91.91 ± 13.79	85.83 ± 12.89	0.12 ± 0.15
i_buta	2.09 ± 0.33	2.21 ± 0.39	6.16 ± 0.93	0.20 ± 0.10	0.42 ± 0.21	2.47 ± 0.42	0.91 ± 0.18
lbutle	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.20 ± 0.15
n_buta	3.10 ± 0.48	3.68 ± 0.59	15.24 ± 2.29	0.00 ± 0.10	0.11 ± 0.20	9.61 ± 4.73	4.93 ± 0.52
t2bute	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.38 ± 0.16
c2bute	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.35 ± 0.16
ipenta	0.69 ± 0.15	1.27 ± 0.27	6.47 ± 0.98	0.00 ± 0.10	0.00 ± 0.20	0.34 ± 0.21	11.25 ± 1.14
pentel	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.60 ± 0.16
n_pent	0.69 ± 0.15	1.18 ± 0.26	6.47 ± 0.98	0.00 ± 0.10	0.00 ± 0.20	0.10 ± 0.20	4.21 ± 0.45
i_pren	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.06 ± 0.15
t2pene	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.15
c2pene	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.76 ± 0.17
bu22dm	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.54 ± 0.16
cpenta	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.41 ± 0.16
bu23dm	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.15
pena2m	0.30 ± 0.11	0.00 ± 0.20	3.02 ± 0.47	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	4.40 ± 0.47
pena3m	0.10 ± 0.10	0.00 ± 0.20	1.57 ± 0.26	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	2.73 ± 0.31
pie2me	0.00 ± 0.10	0.00 ± 0.00	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	0.40 ± 0.12	0.00 ± 0.20	1.88 ± 0.30	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	2.29 ± 0.27
mcypna	0.99 ± 0.18	0.00 ± 0.20	2.71 ± 0.42	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	1.68 ± 0.23
pen24m	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	1.15 ± 0.19
benze	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	2.34 ± 0.28
cyhexa	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.38 ± 0.16
hexa2m	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	1.95 ± 0.25
pen23m	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	1.56 ± 0.22
hexa3m	0.20 ± 0.10	0.00 ± 0.20	4.70 ± 0.71	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	1.94 ± 0.25
pa224m	0.30 ± 0.11	0.00 ± 0.20	0.94 ± 0.18	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	4.30 ± 0.46
n_hept	0.20 ± 0.10	0.00 ± 0.20	1.25 ± 0.22	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	1.30 ± 0.20
mecyhx	0.10 ± 0.10	0.00 ± 0.20	2.30 ± 0.36	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.87 ± 0.18
pa234m	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	2.03 ± 0.25
tolue	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	12.38 ± 1.25
hep2me	0.40 ± 0.12	0.00 ± 0.20	3.44 ± 0.53	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.76 ± 0.17
hep3me	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.92 ± 0.18
n_oct	0.00 ± 0.10	0.00 ± 0.20	1.05 ± 0.19	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.69 ± 0.17
etbz	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	2.75 ± 0.31
mp_xyl	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	9.62 ± 0.97
styr	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.29 ± 0.16
o_xyl	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	3.97 ± 0.43
n_non	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.33 ± 0.16
iprbz	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.37 ± 0.16
n_prbz	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	1.08 ± 0.19
m_etol	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	3.95 ± 0.42
p_etol	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.15
bz135m	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	2.17 ± 0.27
o_etol	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.15
bz124m	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	6.38 ± 0.66
n_dec	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.30 ± 0.16
bz123m	0.00 ± 0.10	0.00 ± 0.00	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.15
detbz2	0.00 ± 0.10	0.00 ± 0.00	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.20	0.00 ± 0.20	0.31 ± 0.16
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.15
unid	0.49 ± 15.42	0.00 ± 0.20	4.58 ± 8.01	0.00 ± 19.30	0.00 ± 0.20	0.27 ± 0.31	0.00 ± 0.15
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	100.49 ± 10.05	100.00 ± 10.00	104.58 ± 10.46	100.00 ± 10.00	100.00 ± 10.00	100.27 ± 10.03	100.00 ± 10.00

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P022 Bog101 G	P023 LA_liqGs G	P024 Maga_liq G	P025 ME50R50P G	P026 ME67R33P G	P027 ME75R25P G	P028 Nova_liq G
ethene	0.00 ± 0.03	0.00 ± 0.00	0.00 ± 0.15	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.17
acetyl	0.00 ± 0.03	0.00 ± 0.16	0.00 ± 0.15	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.17
ethane	0.00 ± 0.03	0.00 ± 0.00	0.00 ± 0.15	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.17
prope	0.00 ± 0.03	0.01 ± 0.01	0.00 ± 0.15	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.17
n_prop	0.00 ± 0.03	0.10 ± 0.08	0.06 ± 0.15	0.02 ± 0.01	0.02 ± 0.01	0.02 ± 0.01	0.23 ± 0.17
i_buta	0.15 ± 0.03	0.81 ± 0.65	0.43 ± 0.16	0.57 ± 0.11	0.54 ± 0.13	0.53 ± 0.15	0.74 ± 0.18
lbutle	0.02 ± 0.03	0.12 ± 0.06	0.24 ± 0.15	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.01	0.18 ± 0.17
n_buta	0.91 ± 0.10	4.44 ± 3.21	3.64 ± 0.39	2.79 ± 0.46	2.61 ± 0.56	2.52 ± 0.60	2.89 ± 0.33
t2bute	0.05 ± 0.03	0.18 ± 0.10	0.35 ± 0.16	0.04 ± 0.01	0.04 ± 0.01	0.04 ± 0.01	0.43 ± 0.17
c2bute	0.08 ± 0.03	0.18 ± 0.10	0.35 ± 0.16	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.01	0.43 ± 0.17
ipenta	9.76 ± 0.98	10.47 ± 2.09	13.75 ± 1.38	5.37 ± 1.21	5.74 ± 1.45	5.92 ± 1.57	9.92 ± 1.01
pente l	0.25 ± 0.03	0.33 ± 0.16	0.44 ± 0.16	0.23 ± 0.05	0.26 ± 0.06	0.28 ± 0.07	0.56 ± 0.18
n_pent	3.48 ± 0.36	3.45 ± 1.20	7.32 ± 0.75	3.18 ± 0.50	3.50 ± 0.63	3.65 ± 0.69	7.54 ± 0.77
i_pren	0.03 ± 0.03	0.02 ± 0.02	0.00 ± 0.15	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.17
t2pene	0.71 ± 0.08	0.78 ± 0.32	0.00 ± 0.15	0.61 ± 0.09	0.70 ± 0.12	0.75 ± 0.13	0.00 ± 0.17
c2pene	0.41 ± 0.05	0.45 ± 0.18	0.53 ± 0.16	0.34 ± 0.06	0.40 ± 0.07	0.43 ± 0.08	0.73 ± 0.18
bu22dm	0.61 ± 0.07	0.32 ± 0.40	0.97 ± 0.18	0.39 ± 0.06	0.42 ± 0.07	0.44 ± 0.07	0.48 ± 0.17
cpenta	0.54 ± 0.07	0.26 ± 0.29	0.59 ± 0.16	0.38 ± 0.07	0.44 ± 0.07	0.46 ± 0.07	0.64 ± 0.18
bu23dm	1.93 ± 0.20	1.83 ± 0.55	0.00 ± 0.15	1.33 ± 0.09	1.38 ± 0.09	1.40 ± 0.09	0.00 ± 0.17
pena2m	4.84 ± 0.49	4.85 ± 1.38	5.91 ± 0.61	3.53 ± 0.21	3.83 ± 0.23	3.97 ± 0.23	6.09 ± 0.63
pena3m	3.20 ± 0.32	2.91 ± 0.81	0.00 ± 0.15	2.37 ± 0.14	2.53 ± 0.14	2.61 ± 0.14	0.00 ± 0.17
p1e2me	0.30 ± 0.05	0.21 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	2.86 ± 0.29	2.37 ± 0.84	3.69 ± 0.40	3.05 ± 0.19	3.33 ± 0.18	3.46 ± 0.17	6.90 ± 0.71
mcpyna	1.73 ± 0.17	3.36 ± 1.28	1.64 ± 0.22	1.73 ± 0.03	2.10 ± 0.04	2.27 ± 0.04	2.64 ± 0.31
pen24m	2.38 ± 0.24	1.97 ± 1.11	1.14 ± 0.19	1.65 ± 0.49	1.60 ± 0.61	1.58 ± 0.67	0.63 ± 0.18
benze	0.95 ± 0.10	1.31 ± 0.39	1.72 ± 0.23	3.05 ± 0.79	2.78 ± 0.95	2.64 ± 1.03	2.26 ± 0.28
cyhexa	0.56 ± 0.07	0.49 ± 0.63	0.30 ± 0.15	0.88 ± 0.02	1.12 ± 0.02	1.23 ± 0.02	0.86 ± 0.19
hexa2m	2.30 ± 0.24	2.34 ± 0.49	2.98 ± 0.33	2.01 ± 0.20	2.07 ± 0.14	2.10 ± 0.15	4.26 ± 0.46
pen23m	4.45 ± 0.44	3.50 ± 2.66	0.00 ± 0.15	3.31 ± 0.29	3.33 ± 0.24	3.34 ± 0.22	0.00 ± 0.17
hexa3m	2.54 ± 0.25	2.48 ± 0.40	1.94 ± 0.25	2.30 ± 0.12	2.36 ± 0.12	2.38 ± 0.12	3.33 ± 0.37
pa224m	11.03 ± 1.10	4.95 ± 3.51	10.66 ± 1.08	4.58 ± 1.20	4.45 ± 0.86	4.38 ± 0.69	0.36 ± 0.17
n_hept	1.88 ± 0.19	1.55 ± 0.33	1.78 ± 0.23	1.87 ± 0.09	1.97 ± 0.10	2.01 ± 0.10	5.02 ± 0.53
mecyhx	0.96 ± 0.10	1.00 ± 0.50	0.73 ± 0.17	0.63 ± 0.03	0.77 ± 0.03	0.84 ± 0.04	1.95 ± 0.26
pa234m	4.38 ± 0.44	2.27 ± 1.59	4.99 ± 0.52	1.71 ± 0.44	1.81 ± 0.34	1.87 ± 0.28	0.53 ± 0.17
tolue	7.49 ± 0.74	10.61 ± 2.87	11.31 ± 1.14	16.46 ± 0.63	15.50 ± 0.67	15.04 ± 0.69	6.52 ± 0.67
hep2me	1.20 ± 0.12	0.97 ± 0.18	0.83 ± 0.17	0.72 ± 0.04	0.77 ± 0.04	0.80 ± 0.05	2.21 ± 0.28
hep3me	1.15 ± 0.12	0.99 ± 0.20	0.97 ± 0.18	0.76 ± 0.04	0.80 ± 0.05	0.81 ± 0.05	2.29 ± 0.28
n_oct	1.13 ± 0.22	0.80 ± 0.22	1.18 ± 0.19	0.68 ± 0.03	0.73 ± 0.04	0.76 ± 0.04	4.13 ± 0.44
etbz	2.06 ± 0.20	2.17 ± 0.45	2.02 ± 0.25	3.57 ± 0.17	3.42 ± 0.17	3.35 ± 0.18	2.05 ± 0.26
mp_xyl	8.27 ± 0.83	9.24 ± 1.82	5.57 ± 0.58	11.67 ± 0.86	11.01 ± 0.82	10.70 ± 0.79	6.70 ± 0.69
styr	0.00 ± 0.03	0.00 ± 0.16	0.00 ± 0.15	0.23 ± 0.01	0.26 ± 0.02	0.28 ± 0.02	0.00 ± 0.17
o_xyl	3.38 ± 0.37	3.45 ± 0.75	2.17 ± 0.27	4.29 ± 0.29	4.06 ± 0.28	3.95 ± 0.28	2.63 ± 0.31
n_non	0.36 ± 0.14	0.32 ± 0.15	0.82 ± 0.17	0.24 ± 0.06	0.28 ± 0.07	0.30 ± 0.07	2.92 ± 0.34
iprbz	0.19 ± 0.07	0.15 ± 0.06	0.21 ± 0.15	0.26 ± 0.01	0.25 ± 0.01	0.25 ± 0.02	0.23 ± 0.17
n_prbz	0.74 ± 0.34	0.66 ± 0.13	0.77 ± 0.17	0.92 ± 0.04	0.89 ± 0.04	0.88 ± 0.05	0.84 ± 0.18
m_etol	2.88 ± 0.29	2.44 ± 0.42	2.31 ± 0.28	2.90 ± 0.18	2.80 ± 0.18	2.75 ± 0.18	2.26 ± 0.28
p_etol	1.22 ± 0.15	1.06 ± 0.20	0.00 ± 0.15	1.34 ± 0.08	1.29 ± 0.08	1.26 ± 0.08	0.00 ± 0.17
bz135m	0.00 ± 0.03	1.35 ± 0.24	1.17 ± 0.19	1.51 ± 0.11	1.46 ± 0.11	1.43 ± 0.10	1.32 ± 0.21
o_etol	0.81 ± 0.30	0.94 ± 0.16	0.00 ± 0.15	1.01 ± 0.05	0.99 ± 0.06	0.99 ± 0.06	0.00 ± 0.17
bz124m	4.80 ± 0.66	4.25 ± 0.85	3.39 ± 0.37	4.59 ± 0.25	4.43 ± 0.26	4.35 ± 0.27	3.60 ± 0.40
n_dec	0.12 ± 0.03	0.20 ± 0.10	0.73 ± 0.17	0.11 ± 0.02	0.13 ± 0.02	0.14 ± 0.02	2.01 ± 0.26
bz123m	0.61 ± 0.51	0.91 ± 0.22	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.17 ± 0.14	0.25 ± 0.06	0.00 ± 0.15	0.31 ± 0.01	0.31 ± 0.01	0.32 ± 0.01	0.00 ± 0.17
detbz2	0.27 ± 0.19	0.00 ± 0.16	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.17 ± 0.08	0.13 ± 0.07	0.39 ± 0.16	0.50 ± 0.03	0.49 ± 0.03	0.49 ± 0.03	0.66 ± 0.18
other	15.64 ± 1.57	14.66 ± 2.89	0.00 ± 0.15	24.07 ± 1.43	26.06 ± 1.51	27.01 ± 1.55	0.00 ± 0.17
unid	34.06 ± 3.40	23.86 ± 5.91	0.00 ± 0.15	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.17
mtbe	17.15 ± 1.71	15.45 ± 6.09	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	149.70 ± 14.97	138.51 ± 13.85	100.00 ± 10.00	124.07 ± 12.41	126.06 ± 12.61	127.01 ± 12.70	100.00 ± 10.00

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P029 US681220 G	P030 WA_Liq G	P031 Atla_HS G	P032 Bogv01 G	P033 Diurnal G	P034 HskAD_D1 G	P035 HskAD_D2 G
ethene	0.00 ± 0.13	0.00 ± 0.20	0.01 ± 0.12	0.00 ± 0.07	1.61 ± 0.05	0.96 ± 0.12	2.16 ± 0.21
acetyl	0.00 ± 0.13	0.00 ± 0.20	0.01 ± 0.12	0.00 ± 0.07	2.23 ± 0.02	0.64 ± 0.09	0.39 ± 0.05
ethane	0.00 ± 0.13	0.00 ± 0.20	0.17 ± 0.12	0.00 ± 0.07	0.47 ± 0.07	2.23 ± 0.22	0.25 ± 0.04
prope	0.01 ± 0.01	0.00 ± 0.20	0.16 ± 0.12	0.00 ± 0.07	0.82 ± 0.01	0.86 ± 0.10	1.81 ± 0.18
n_prop	0.04 ± 0.02	0.00 ± 0.20	1.14 ± 0.16	0.04 ± 0.07	4.50 ± 0.13	2.11 ± 0.22	0.73 ± 0.09
i_buta	0.41 ± 0.12	0.27 ± 0.14	6.03 ± 0.62	1.63 ± 0.60	3.95 ± 0.07	1.46 ± 0.15	1.45 ± 0.14
lbut1e	0.03 ± 0.05	0.00 ± 0.20	1.04 ± 0.16	1.14 ± 0.48	0.52 ± 0.28	1.08 ± 0.12	2.06 ± 0.21
n_buta	2.31 ± 0.74	3.03 ± 1.25	25.64 ± 2.57	6.91 ± 2.45	7.71 ± 0.13	6.38 ± 0.64	8.56 ± 0.86
t2bute	0.14 ± 0.10	0.06 ± 0.03	1.81 ± 0.22	0.30 ± 0.16	0.80 ± 0.05	0.00 ± 0.07	0.57 ± 0.07
c2bute	0.01 ± 0.00	0.07 ± 0.04	1.62 ± 0.20	0.45 ± 0.16	0.67 ± 0.02	0.58 ± 0.09	0.57 ± 0.07
ipenta	8.13 ± 0.57	10.01 ± 2.09	32.82 ± 3.28	30.25 ± 8.56	15.26 ± 0.71	19.90 ± 1.99	19.15 ± 1.91
pente1	0.22 ± 0.20	0.30 ± 0.10	1.40 ± 0.18	0.66 ± 0.17	0.52 ± 0.03	0.86 ± 0.10	0.97 ± 0.11
n_pent	5.07 ± 1.13	6.67 ± 2.65	8.70 ± 0.88	8.02 ± 1.94	10.04 ± 0.26	6.05 ± 0.60	6.27 ± 0.63
i_pren	0.00 ± 0.13	0.01 ± 0.01	0.08 ± 0.12	0.10 ± 0.07	0.13 ± 0.15	0.72 ± 0.09	1.27 ± 0.13
t2pene	0.87 ± 0.25	0.00 ± 0.00	0.00 ± 0.12	1.50 ± 0.35	0.00 ± 0.13	2.10 ± 0.22	1.77 ± 0.18
c2pene	0.43 ± 0.17	0.29 ± 0.18	1.47 ± 0.19	0.82 ± 0.19	0.61 ± 0.02	1.10 ± 0.12	0.89 ± 0.09
bu22dm	0.29 ± 0.03	0.34 ± 0.10	0.80 ± 0.14	0.99 ± 0.16	0.70 ± 0.00	0.58 ± 0.09	0.57 ± 0.07
cpenta	1.03 ± 0.38	0.04 ± 0.25	0.51 ± 0.13	0.78 ± 0.10	0.70 ± 0.05	0.67 ± 0.09	0.68 ± 0.07
bu23dm	2.12 ± 0.77	2.10 ± 0.45	0.00 ± 0.02	0.00 ± 0.07	0.00 ± 0.13	1.13 ± 0.12	1.23 ± 0.13
pena2m	4.64 ± 0.46	4.61 ± 1.52	4.15 ± 0.43	5.60 ± 0.56	4.67 ± 0.38	4.21 ± 0.43	4.38 ± 0.45
pena3m	2.78 ± 0.92	2.80 ± 0.89	2.27 ± 0.26	3.30 ± 0.33	2.67 ± 0.21	3.20 ± 0.33	3.29 ± 0.34
p1e2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.33 ± 0.07	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	4.32 ± 0.54	3.84 ± 1.48	1.41 ± 0.18	2.45 ± 0.27	4.79 ± 0.18	2.18 ± 0.22	2.11 ± 0.21
mcypna	2.69 ± 0.45	0.00 ± 0.20	0.95 ± 0.15	1.44 ± 0.23	1.33 ± 0.06	1.15 ± 0.14	1.20 ± 0.13
pen24m	1.52 ± 1.06	1.25 ± 1.08	0.61 ± 0.13	1.70 ± 0.37	0.37 ± 0.03	0.62 ± 0.09	0.72 ± 0.09
benze	3.04 ± 0.43	3.21 ± 0.56	1.01 ± 0.16	0.81 ± 0.17	2.31 ± 0.02	2.87 ± 0.29	3.34 ± 0.34
cyhexa	1.22 ± 0.30	0.54 ± 0.31	0.14 ± 0.12	0.43 ± 0.12	0.45 ± 0.01	0.65 ± 0.09	0.25 ± 0.04
hexa2m	2.07 ± 0.09	1.66 ± 0.23	0.54 ± 0.13	1.21 ± 0.62	1.13 ± 0.12	1.24 ± 0.14	1.36 ± 0.14
pen23m	2.44 ± 1.82	2.48 ± 2.48	0.54 ± 0.13	2.62 ± 0.89	0.45 ± 0.03	0.91 ± 0.12	0.73 ± 0.09
hexa3m	2.25 ± 0.10	1.96 ± 0.13	0.52 ± 0.13	1.47 ± 0.55	1.25 ± 0.23	3.16 ± 0.33	1.57 ± 0.16
pa224m	4.57 ± 1.49	3.87 ± 3.62	1.16 ± 0.17	6.20 ± 2.48	1.85 ± 0.11	3.13 ± 0.33	4.11 ± 0.41
n_hept	1.96 ± 0.10	1.62 ± 0.20	0.24 ± 0.12	0.98 ± 0.42	1.46 ± 0.03	0.79 ± 0.09	0.88 ± 0.09
mecyhx	1.16 ± 0.24	0.34 ± 0.17	0.14 ± 0.12	0.56 ± 0.24	0.57 ± 0.04	0.60 ± 0.09	0.30 ± 0.04
pa234m	2.04 ± 0.46	1.68 ± 1.43	0.27 ± 0.12	1.81 ± 1.06	0.89 ± 0.01	1.31 ± 0.14	1.56 ± 0.16
tolue	13.64 ± 0.63	15.93 ± 3.11	1.48 ± 0.19	5.30 ± 2.45	5.93 ± 0.40	9.66 ± 0.96	8.22 ± 0.82
hep2me	0.67 ± 0.13	0.66 ± 0.10	0.07 ± 0.12	0.52 ± 0.23	0.57 ± 0.18	0.27 ± 0.07	0.43 ± 0.05
hep3me	0.66 ± 0.14	0.74 ± 0.11	0.01 ± 0.12	0.53 ± 0.24	0.24 ± 0.04	0.24 ± 0.07	0.52 ± 0.07
n_oct	0.63 ± 0.17	0.59 ± 0.11	0.04 ± 0.12	0.40 ± 0.17	0.68 ± 0.04	0.41 ± 0.07	0.39 ± 0.05
etbz	2.37 ± 0.36	2.82 ± 0.64	0.12 ± 0.12	0.82 ± 0.37	1.53 ± 0.60	1.68 ± 0.17	1.59 ± 0.16
mp_xyl	9.53 ± 1.47	10.45 ± 2.22	0.38 ± 0.12	3.41 ± 1.41	7.16 ± 3.93	4.97 ± 0.50	5.24 ± 0.52
styr	0.23 ± 0.03	0.00 ± 0.20	0.02 ± 0.12	0.06 ± 0.07	0.20 ± 0.08	0.96 ± 0.12	0.55 ± 0.07
o_xyl	3.47 ± 0.61	3.94 ± 0.86	0.14 ± 0.12	1.24 ± 0.52	2.55 ± 1.61	1.91 ± 0.21	1.97 ± 0.20
n_non	0.30 ± 0.10	0.31 ± 0.13	0.01 ± 0.12	0.13 ± 0.04	0.57 ± 0.01	0.24 ± 0.07	0.23 ± 0.04
iprbz	0.16 ± 0.06	0.19 ± 0.04	0.06 ± 0.12	0.03 ± 0.01	0.15 ± 0.01	0.00 ± 0.05	0.20 ± 0.04
n_prbz	0.65 ± 0.13	0.83 ± 0.14	0.02 ± 0.12	0.22 ± 0.10	0.36 ± 0.00	0.50 ± 0.07	0.48 ± 0.05
m_etol	2.23 ± 0.37	2.56 ± 0.32	0.09 ± 0.12	0.73 ± 0.30	1.21 ± 0.15	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.98 ± 0.23	1.11 ± 0.16	0.00 ± 0.12	0.32 ± 0.14	0.00 ± 0.13	0.00 ± 0.10	0.00 ± 0.10
bz135m	1.22 ± 0.25	1.31 ± 0.36	0.04 ± 0.12	0.39 ± 0.16	0.72 ± 0.02	0.58 ± 0.09	0.68 ± 0.07
o_etol	0.70 ± 0.12	0.90 ± 0.14	0.00 ± 0.12	0.23 ± 0.10	0.00 ± 0.13	0.00 ± 0.10	0.00 ± 0.10
bz124m	3.86 ± 0.77	4.11 ± 1.17	0.13 ± 0.12	1.14 ± 0.40	1.84 ± 0.16	3.13 ± 0.33	2.34 ± 0.23
n_dec	0.17 ± 0.03	0.02 ± 0.03	0.00 ± 0.12	0.06 ± 0.07	0.43 ± 0.01	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.22 ± 0.12	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.26 ± 0.03	0.35 ± 0.07	0.00 ± 0.12	0.01 ± 0.07	0.00 ± 0.13	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.10 ± 0.07	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.45 ± 0.14	0.13 ± 0.04	0.00 ± 0.12	0.01 ± 0.07	0.41 ± 0.02	0.00 ± 0.10	0.00 ± 0.10
other	27.67 ± 3.38	18.01 ± 5.34	0.00 ± 0.12	10.35 ± 2.81	0.00 ± 0.13	0.00 ± 0.10	0.00 ± 0.10
unid	0.00 ± 0.13	3.58 ± 1.31	0.00 ± 0.12	5.28 ± 1.61	0.00 ± 0.13	67.02 ± 2.70	76.53 ± 2.63
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	24.85 ± 3.19	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	127.67 ± 12.77	121.59 ± 12.16	100.00 ± 10.00	115.63 ± 11.56	100.00 ± 10.00	167.02 ± 16.70	176.53 ± 17.65

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno	P036	P037	P038	P039	P040	P041	P042
Profile	HSKAD_DC	HSKAD_N1	HSOAK	HSvapGC	LA_Hsvap	Maga_HS	Nova_HS
Size	G	G	G	G	G	G	G
ethene	1.54 ± 0.79	2.97 ± 0.58	0.64 ± 0.15	0.00 ± 0.10	0.00 ± 0.14	0.00 ± 0.12	0.00 ± 0.12
acetyl	0.51 ± 0.18	0.00 ± 0.55	0.57 ± 0.20	0.00 ± 0.10	0.00 ± 0.14	0.17 ± 0.13	0.17 ± 0.12
ethane	1.26 ± 1.44	0.00 ± 0.33	0.14 ± 0.05	0.00 ± 0.10	0.00 ± 0.14	0.00 ± 0.12	0.00 ± 0.12
prope	1.33 ± 0.63	0.94 ± 0.57	0.20 ± 0.07	0.01 ± 0.01	0.04 ± 0.02	0.11 ± 0.12	0.00 ± 0.12
n_prop	1.44 ± 1.02	0.00 ± 0.60	0.48 ± 0.16	0.02 ± 0.04	0.88 ± 0.28	1.44 ± 0.19	3.41 ± 0.36
i_buta	1.45 ± 0.11	0.00 ± 1.74	1.08 ± 0.27	1.09 ± 1.33	2.97 ± 0.96	4.80 ± 0.50	5.70 ± 0.58
lbut1e	1.56 ± 0.65	1.55 ± 0.60	0.17 ± 0.07	0.17 ± 0.12	0.69 ± 0.17	0.06 ± 0.12	0.08 ± 0.12
n_buta	7.45 ± 1.35	7.40 ± 2.47	4.73 ± 0.71	15.01 ± 4.90	8.73 ± 2.69	19.82 ± 1.99	15.47 ± 1.55
t2bute	0.28 ± 0.39	0.57 ± 0.22	0.91 ± 0.11	0.65 ± 0.54	0.76 ± 0.23	2.19 ± 0.25	2.64 ± 0.29
c2bute	0.58 ± 0.05	0.43 ± 0.22	0.82 ± 0.12	0.91 ± 0.58	0.67 ± 0.21	1.91 ± 0.23	2.52 ± 0.28
ipenta	19.54 ± 1.38	18.47 ± 5.39	24.32 ± 1.18	34.72 ± 13.66	23.85 ± 5.97	36.40 ± 3.64	30.10 ± 3.01
pentel	0.91 ± 0.07	1.19 ± 0.28	0.77 ± 0.04	0.93 ± 0.92	0.69 ± 0.16	0.98 ± 0.16	1.23 ± 0.17
n_pent	6.17 ± 0.44	6.06 ± 1.77	14.97 ± 1.15	9.82 ± 4.98	5.96 ± 1.28	11.91 ± 1.20	16.13 ± 1.62
i_pren	0.98 ± 0.35	0.00 ± 0.52	0.09 ± 0.01	0.31 ± 0.71	0.04 ± 0.01	0.10 ± 0.12	0.06 ± 0.12
t2pene	1.93 ± 0.28	1.79 ± 0.50	0.00 ± 0.13	3.36 ± 1.56	1.36 ± 0.28	0.00 ± 0.12	0.00 ± 0.12
c2pene	1.00 ± 0.18	0.87 ± 0.27	0.91 ± 0.04	1.67 ± 0.95	0.72 ± 0.15	0.93 ± 0.15	1.28 ± 0.18
bu22dm	0.58 ± 0.05	0.99 ± 0.18	1.33 ± 0.06	0.68 ± 0.64	0.45 ± 0.14	1.16 ± 0.17	0.90 ± 0.15
cpenta	0.67 ± 0.05	0.53 ± 0.23	1.04 ± 0.00	1.60 ± 1.08	0.58 ± 0.09	0.00 ± 0.12	0.00 ± 0.12
bu23dm	1.19 ± 0.09	1.95 ± 0.33	0.00 ± 0.13	2.59 ± 1.52	0.00 ± 0.14	0.00 ± 0.12	0.00 ± 0.12
pena2m	4.29 ± 0.30	9.40 ± 1.07	7.63 ± 0.20	5.63 ± 2.78	4.56 ± 0.68	4.71 ± 0.49	5.69 ± 0.58
pena3m	3.24 ± 0.23	7.95 ± 0.80	4.25 ± 0.10	3.56 ± 0.90	2.59 ± 0.42	2.52 ± 0.28	3.11 ± 0.33
ple2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.20 ± 0.05	0.00 ± 0.10	0.00 ± 0.10
n_hex	2.16 ± 0.16	1.29 ± 0.65	5.45 ± 0.14	2.08 ± 1.12	1.76 ± 0.36	2.03 ± 0.24	3.66 ± 0.39
mcypna	1.17 ± 0.09	0.95 ± 0.37	1.72 ± 0.01	1.57 ± 0.61	2.90 ± 0.68	0.87 ± 0.15	1.34 ± 0.18
pen24m	0.67 ± 0.05	0.65 ± 0.25	0.77 ± 0.11	0.75 ± 0.38	1.29 ± 0.63	0.52 ± 0.14	0.30 ± 0.12
benze	3.10 ± 0.25	2.14 ± 1.00	2.46 ± 0.07	1.28 ± 0.39	1.17 ± 0.28	0.76 ± 0.14	0.93 ± 0.15
cyhexa	0.46 ± 0.30	0.00 ± 0.15	0.47 ± 0.03	0.17 ± 0.11	0.74 ± 0.29	0.20 ± 0.13	0.36 ± 0.13
hexa2m	1.30 ± 0.11	1.84 ± 0.38	1.33 ± 0.05	0.75 ± 0.47	1.59 ± 0.50	0.48 ± 0.13	0.70 ± 0.14
pen23m	0.82 ± 0.16	0.20 ± 0.27	0.69 ± 0.09	0.60 ± 0.36	2.18 ± 1.48	0.31 ± 0.13	0.25 ± 0.12
hexa3m	2.38 ± 1.19	1.69 ± 0.45	1.35 ± 0.05	0.84 ± 0.45	1.69 ± 0.51	0.48 ± 0.13	0.69 ± 0.14
pa224m	3.61 ± 0.58	5.26 ± 1.10	4.13 ± 1.11	1.71 ± 1.54	3.34 ± 1.94	2.13 ± 0.25	0.41 ± 0.13
n_hept	0.84 ± 0.07	1.07 ± 0.27	1.24 ± 0.00	0.49 ± 0.21	1.08 ± 0.34	0.37 ± 0.13	0.60 ± 0.14
mecyhx	0.46 ± 0.23	0.00 ± 0.18	0.57 ± 0.02	0.23 ± 0.22	0.89 ± 0.37	0.15 ± 0.13	0.30 ± 0.12
pa234m	1.42 ± 0.14	2.04 ± 0.43	1.60 ± 0.43	0.68 ± 0.59	1.41 ± 1.12	0.48 ± 0.13	0.11 ± 0.12
tolue	8.95 ± 1.26	6.83 ± 2.39	4.21 ± 0.48	3.63 ± 1.27	7.68 ± 2.70	1.26 ± 0.18	0.77 ± 0.14
hep2me	0.35 ± 0.11	0.62 ± 0.17	0.38 ± 0.02	0.12 ± 0.05	0.64 ± 0.22	0.06 ± 0.12	0.10 ± 0.12
hep3me	0.37 ± 0.18	0.53 ± 0.18	0.17 ± 0.01	0.12 ± 0.12	0.67 ± 0.24	0.05 ± 0.12	0.08 ± 0.12
n_oct	0.40 ± 0.05	0.00 ± 0.20	0.46 ± 0.02	0.09 ± 0.10	0.49 ± 0.21	0.05 ± 0.12	0.10 ± 0.12
etbz	1.63 ± 0.12	1.62 ± 0.45	0.79 ± 0.15	0.31 ± 0.22	1.31 ± 0.43	0.06 ± 0.12	0.06 ± 0.12
mp_xyl	5.10 ± 0.37	5.04 ± 1.47	3.24 ± 0.66	1.09 ± 0.45	5.73 ± 1.77	0.19 ± 0.13	0.22 ± 0.12
styr	0.77 ± 0.32	0.38 ± 0.22	0.07 ± 0.00	0.01 ± 0.01	0.08 ± 0.07	0.02 ± 0.12	0.04 ± 0.12
o_xyl	1.94 ± 0.14	1.80 ± 0.57	1.21 ± 0.23	0.38 ± 0.16	2.02 ± 0.66	0.06 ± 0.12	0.08 ± 0.12
n_non	0.25 ± 0.04	0.00 ± 0.17	0.26 ± 0.02	0.02 ± 0.02	0.18 ± 0.09	0.02 ± 0.12	0.04 ± 0.12
iprbz	0.11 ± 0.14	0.48 ± 0.13	0.09 ± 0.01	0.02 ± 0.01	0.05 ± 0.03	0.00 ± 0.12	0.00 ± 0.12
n_prbz	0.49 ± 0.05	0.58 ± 0.17	0.21 ± 0.03	0.05 ± 0.05	0.31 ± 0.12	0.01 ± 0.12	0.01 ± 0.12
m_etol	0.00 ± 0.10	0.00 ± 0.10	0.65 ± 0.11	0.00 ± 0.00	1.15 ± 0.41	0.05 ± 0.12	0.06 ± 0.12
p_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.13	0.00 ± 0.00	0.51 ± 0.18	0.00 ± 0.12	0.00 ± 0.12
bz135m	0.63 ± 0.05	0.84 ± 0.22	0.36 ± 0.06	0.07 ± 0.07	0.63 ± 0.24	0.04 ± 0.12	0.10 ± 0.12
o_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.13	0.00 ± 0.00	0.37 ± 0.14	0.00 ± 0.12	0.00 ± 0.12
bz124m	2.73 ± 0.65	1.09 ± 0.75	0.86 ± 0.14	0.18 ± 0.17	1.93 ± 0.75	0.07 ± 0.12	0.12 ± 0.12
n_dec	0.00 ± 0.10	0.00 ± 0.10	0.13 ± 0.01	0.00 ± 0.10	0.09 ± 0.04	0.02 ± 0.12	0.05 ± 0.12
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.41 ± 0.18	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.13	0.00 ± 0.10	0.01 ± 0.01	0.00 ± 0.12	0.00 ± 0.12
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.11 ± 0.08	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	0.00 ± 0.10	0.07 ± 0.00	0.00 ± 0.10	0.04 ± 0.03	0.02 ± 0.12	0.04 ± 0.12
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.13	0.00 ± 0.10	9.47 ± 1.60	0.00 ± 0.12	0.00 ± 0.12
unid	71.67 ± 4.71	65.23 ± 7.70	0.00 ± 0.13	16.10 ± 7.25	6.01 ± 2.09	0.00 ± 0.12	0.00 ± 0.12
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	19.38 ± 2.13	0.00 ± 0.10	0.00 ± 0.10
tnmoc	171.67 ± 17.17	165.23 ± 16.52	100.00 ± 10.00	116.10 ± 11.61	115.49 ± 11.55	100.00 ± 10.00	100.00 ± 10.00

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P043 WA_Vap G	P044 BULK_plt G	P045 BULK_ter G	P046 ChevFC G	P047 ChevS G	P048 ChevT G	P049 CHmf_eth G
ethene	0.00 ± 0.17	0.00 ± 0.14	0.00 ± 0.15	2.38 ± 0.36	1.73 ± 0.73	0.81 ± 1.23	43.78 ± 20.89
acetyl	0.00 ± 0.17	0.00 ± 0.14	0.00 ± 0.15	0.42 ± 0.20	0.41 ± 0.43	0.49 ± 0.95	0.00 ± 0.11
ethane	0.00 ± 0.17	0.36 ± 0.37	0.80 ± 0.62	23.35 ± 15.71	21.24 ± 13.92	1.68 ± 1.71	1.57 ± 3.83
prope	0.00 ± 0.17	0.00 ± 0.14	2.05 ± 6.47	3.37 ± 1.51	3.20 ± 2.54	0.27 ± 0.81	3.34 ± 8.17
n_prop	0.00 ± 0.17	1.69 ± 2.29	5.82 ± 3.71	21.82 ± 3.28	16.75 ± 3.71	3.16 ± 2.10	2.96 ± 2.67
i_buta	2.85 ± 1.30	6.57 ± 5.62	15.09 ± 3.50	4.32 ± 1.04	4.33 ± 0.76	4.09 ± 4.24	42.76 ± 35.95
lbutle	0.00 ± 0.17	0.00 ± 0.14	0.00 ± 0.15	1.07 ± 0.28	2.11 ± 1.54	0.28 ± 1.08	0.66 ± 1.61
n_buta	24.67 ± 12.40	50.62 ± 39.18	36.03 ± 9.23	11.43 ± 6.24	7.65 ± 1.89	13.87 ± 8.38	0.65 ± 1.58
t2bute	0.41 ± 0.40	0.50 ± 0.51	1.19 ± 0.25	0.31 ± 0.13	0.69 ± 0.47	0.42 ± 1.46	0.00 ± 0.11
c2bute	0.52 ± 0.46	0.40 ± 0.41	0.92 ± 0.21	0.29 ± 0.06	0.49 ± 0.20	0.57 ± 1.73	0.00 ± 0.11
ipenta	29.58 ± 4.76	0.50 ± 1.22	2.11 ± 4.49	3.58 ± 1.07	4.29 ± 1.92	13.28 ± 7.82	0.16 ± 0.40
pente1	0.72 ± 0.25	0.43 ± 0.50	0.90 ± 0.24	0.44 ± 0.30	1.08 ± 0.44	0.63 ± 1.79	0.00 ± 0.11
n_pent	12.69 ± 4.30	4.45 ± 3.90	10.43 ± 1.60	3.98 ± 0.60	5.12 ± 0.77	8.10 ± 5.55	0.34 ± 0.82
i_pren	0.05 ± 0.03	0.00 ± 0.14	0.00 ± 0.15	0.03 ± 0.05	0.07 ± 0.07	0.08 ± 0.75	0.00 ± 0.11
t2pene	0.00 ± 0.00	0.63 ± 0.67	1.42 ± 0.39	0.29 ± 0.21	0.76 ± 0.12	1.08 ± 2.37	0.00 ± 0.11
c2pene	0.55 ± 0.35	0.31 ± 0.33	0.70 ± 0.18	0.15 ± 0.11	0.39 ± 0.06	0.60 ± 1.76	0.00 ± 0.11
bu22dm	0.45 ± 0.10	1.04 ± 1.45	1.10 ± 0.50	0.08 ± 0.08	0.16 ± 0.14	0.41 ± 1.22	0.00 ± 0.11
cpenta	0.81 ± 0.31	0.30 ± 0.30	0.71 ± 0.15	0.46 ± 0.08	0.60 ± 0.09	0.83 ± 1.68	0.00 ± 0.11
bu23dm	1.28 ± 0.75	0.00 ± 0.14	0.00 ± 0.15	0.38 ± 0.21	0.44 ± 0.40	1.53 ± 2.58	0.00 ± 0.11
pena2m	3.73 ± 1.23	0.16 ± 0.31	0.37 ± 0.77	1.41 ± 0.36	1.81 ± 0.72	3.96 ± 3.81	0.00 ± 0.11
pena3m	2.08 ± 0.75	1.41 ± 1.47	2.51 ± 0.73	0.82 ± 0.25	0.99 ± 0.50	2.58 ± 3.00	0.00 ± 0.11
ple2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	2.25 ± 1.09	10.49 ± 4.05	4.55 ± 2.05	1.98 ± 0.30	2.93 ± 0.44	4.12 ± 3.58	2.67 ± 3.16
mcypna	0.05 ± 0.03	1.02 ± 0.94	2.11 ± 0.50	1.15 ± 0.20	1.32 ± 0.29	2.82 ± 2.95	0.00 ± 0.11
pen24m	0.51 ± 0.64	0.24 ± 0.23	0.59 ± 0.12	0.65 ± 0.52	0.65 ± 0.74	1.40 ± 2.39	0.00 ± 0.11
benze	1.47 ± 0.62	2.96 ± 0.67	2.52 ± 0.85	1.25 ± 0.41	0.98 ± 0.67	2.56 ± 2.84	0.44 ± 1.08
cyhexa	0.26 ± 0.17	0.71 ± 0.63	0.43 ± 0.16	0.58 ± 0.32	0.42 ± 0.15	1.67 ± 2.16	0.00 ± 0.11
hexa2m	0.55 ± 0.37	0.46 ± 1.11	0.21 ± 0.43	0.53 ± 0.09	0.82 ± 0.50	1.29 ± 1.98	0.00 ± 0.11
pen23m	0.79 ± 1.05	0.00 ± 0.14	0.00 ± 0.15	1.17 ± 0.90	0.99 ± 1.15	2.06 ± 2.80	0.00 ± 0.11
hexa3m	0.66 ± 0.42	0.28 ± 0.24	0.73 ± 0.24	0.57 ± 0.17	0.74 ± 0.33	1.38 ± 2.02	0.00 ± 0.11
pa224m	0.94 ± 1.13	0.14 ± 0.20	0.30 ± 0.21	0.00 ± 0.05	0.00 ± 0.02	0.00 ± 0.69	0.00 ± 0.11
n_hept	0.48 ± 0.32	1.48 ± 0.94	1.14 ± 0.42	1.31 ± 0.59	2.23 ± 0.49	1.33 ± 1.91	0.53 ± 0.68
mecyhx	0.10 ± 0.08	0.10 ± 0.09	0.30 ± 0.15	0.75 ± 0.38	0.51 ± 0.10	0.99 ± 1.62	0.00 ± 0.11
pa234m	0.31 ± 0.44	0.04 ± 0.04	0.10 ± 0.01	0.72 ± 0.50	0.60 ± 0.49	0.78 ± 1.59	0.00 ± 0.11
tolue	4.59 ± 3.35	8.37 ± 7.65	2.97 ± 2.66	2.26 ± 0.85	2.80 ± 1.79	6.19 ± 3.94	0.09 ± 0.21
hep2me	0.16 ± 0.11	0.00 ± 0.14	0.00 ± 0.15	0.39 ± 0.07	0.59 ± 0.09	0.39 ± 1.11	0.00 ± 0.11
hep3me	0.18 ± 0.13	0.07 ± 0.06	0.21 ± 0.13	0.23 ± 0.06	0.35 ± 0.13	0.34 ± 1.07	0.00 ± 0.11
n_oct	0.14 ± 0.10	0.10 ± 0.04	0.10 ± 0.09	0.97 ± 0.48	1.54 ± 0.23	0.62 ± 1.24	0.00 ± 0.11
etbz	0.70 ± 0.74	1.68 ± 2.26	0.34 ± 0.42	0.45 ± 0.08	0.69 ± 0.38	1.57 ± 1.74	0.01 ± 0.01
mp_xyl	2.52 ± 2.67	0.00 ± 0.14	0.00 ± 0.15	0.89 ± 0.14	1.56 ± 0.87	5.11 ± 5.61	0.00 ± 0.11
styr	0.00 ± 0.17	0.73 ± 1.78	0.00 ± 0.15	0.26 ± 0.10	0.09 ± 0.03	0.25 ± 0.72	0.04 ± 0.11
o_xyl	0.95 ± 0.99	1.54 ± 3.64	0.52 ± 0.76	0.54 ± 0.09	0.92 ± 0.69	2.48 ± 2.14	0.00 ± 0.11
n_non	0.05 ± 0.04	0.00 ± 0.14	0.01 ± 0.01	0.75 ± 0.33	1.10 ± 0.17	0.35 ± 1.03	0.00 ± 0.11
iprbz	0.04 ± 0.04	0.20 ± 0.43	0.22 ± 0.45	0.17 ± 0.06	0.16 ± 0.13	0.22 ± 0.84	0.00 ± 0.11
n_prbz	0.15 ± 0.15	0.00 ± 0.14	0.01 ± 0.01	0.13 ± 0.05	0.23 ± 0.11	0.30 ± 0.91	0.00 ± 0.11
m_etol	0.45 ± 0.44	0.00 ± 0.00	0.00 ± 0.00	0.27 ± 0.06	0.63 ± 0.40	0.76 ± 1.32	0.00 ± 0.10
p_etol	0.20 ± 0.20	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.05	0.00 ± 0.02	0.00 ± 0.69	0.00 ± 0.10
bz135m	0.22 ± 0.21	0.01 ± 0.01	0.03 ± 0.15	0.21 ± 0.06	0.41 ± 0.23	0.43 ± 1.09	0.00 ± 0.11
o_etol	0.16 ± 0.16	0.00 ± 0.00	0.00 ± 0.00	0.12 ± 0.05	0.24 ± 0.16	0.29 ± 0.91	0.00 ± 0.10
bz124m	0.66 ± 0.65	0.03 ± 0.03	0.46 ± 0.82	0.38 ± 0.07	0.92 ± 0.79	1.07 ± 1.64	0.00 ± 0.11
n_dec	0.00 ± 0.01	0.00 ± 0.10	0.00 ± 0.10	0.56 ± 0.13	0.78 ± 0.12	0.28 ± 0.95	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.04 ± 0.04	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.05	0.00 ± 0.02	0.00 ± 0.69	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.01 ± 0.02	0.00 ± 0.10	0.00 ± 0.10	0.37 ± 0.07	0.48 ± 0.09	0.22 ± 0.89	0.00 ± 0.10
other	4.59 ± 2.22	0.00 ± 0.10	0.00 ± 0.10	7.30 ± 1.10	9.31 ± 3.14	8.52 ± 5.21	0.00 ± 0.10
unid	0.77 ± 0.41	41.41 ± 41.17	46.39 ± 13.89	13.53 ± 3.99	15.89 ± 8.08	18.35 ± 7.21	9.81 ± 42.84
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	105.36 ± 10.54	141.41 ± 14.14	146.39 ± 14.64	120.83 ± 12.08	125.20 ± 12.52	126.87 ± 12.69	109.81 ± 10.98

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P050 CHmf_fug G	P051 Delmex G	P052 HG0017W G	P053 HG0048L G	P054 HG0076G G	P055 HG0130C G	P056 HG0176B G
ethene	25.39 ± 19.98	2.20 ± 0.38	0.00 ± 0.22	2.24 ± 0.68	1.51 ± 0.46	5.54 ± 1.67	0.00 ± 0.20
acetyl	0.45 ± 0.20	1.26 ± 0.26	0.00 ± 0.22	0.02 ± 0.02	0.16 ± 0.16	0.30 ± 0.08	0.00 ± 0.20
ethane	0.29 ± 0.13	4.71 ± 1.50	1.03 ± 0.31	3.28 ± 0.99	0.00 ± 0.21	4.45 ± 1.33	0.24 ± 0.08
prope	9.78 ± 11.55	1.25 ± 0.26	0.00 ± 0.22	2.77 ± 0.83	0.00 ± 0.21	5.88 ± 1.77	0.00 ± 0.20
n_prop	9.15 ± 12.47	6.65 ± 1.01	4.83 ± 1.43	11.01 ± 3.31	0.00 ± 0.21	11.85 ± 3.55	1.49 ± 0.44
i_buta	32.11 ± 27.85	1.35 ± 0.35	3.80 ± 1.16	3.24 ± 0.97	0.00 ± 0.21	3.72 ± 1.12	5.69 ± 1.71
lbut1e	0.00 ± 0.12	0.68 ± 0.96	0.04 ± 0.04	0.08 ± 0.08	0.30 ± 0.10	1.04 ± 0.31	0.37 ± 0.11
n_buta	0.28 ± 0.13	4.41 ± 1.23	16.44 ± 4.91	10.37 ± 3.11	0.00 ± 0.21	11.60 ± 3.49	3.95 ± 1.19
t2bute	0.00 ± 0.12	0.22 ± 0.18	0.44 ± 0.44	0.18 ± 0.06	0.00 ± 0.21	0.15 ± 0.15	0.11 ± 0.11
c2bute	0.00 ± 0.12	0.23 ± 0.18	0.36 ± 0.36	0.14 ± 0.14	0.00 ± 0.21	0.12 ± 0.12	0.10 ± 0.10
ipenta	0.01 ± 0.01	7.33 ± 2.48	10.09 ± 3.04	9.88 ± 2.97	0.00 ± 0.21	12.13 ± 3.63	3.35 ± 1.01
pentel	0.00 ± 0.12	0.82 ± 0.22	3.88 ± 1.16	0.15 ± 0.15	0.00 ± 0.21	4.09 ± 1.22	1.71 ± 0.52
n_pent	0.05 ± 0.02	5.80 ± 2.75	8.00 ± 2.41	5.32 ± 1.60	0.00 ± 0.21	0.13 ± 0.13	0.10 ± 0.10
i_pren	0.00 ± 0.12	2.50 ± 0.42	3.53 ± 1.07	0.00 ± 0.20	0.00 ± 0.21	0.02 ± 0.02	0.00 ± 0.20
t2pene	0.00 ± 0.12	0.75 ± 0.26	0.58 ± 0.18	0.23 ± 0.08	0.00 ± 0.21	0.18 ± 0.05	0.15 ± 0.15
c2pene	0.00 ± 0.12	0.37 ± 0.19	0.31 ± 0.31	0.11 ± 0.11	0.00 ± 0.21	0.08 ± 0.08	0.08 ± 0.08
bu22dm	0.00 ± 0.12	0.42 ± 0.19	0.44 ± 0.44	0.17 ± 0.05	0.00 ± 0.21	0.15 ± 0.15	0.11 ± 0.11
cpenta	0.00 ± 0.12	0.33 ± 0.18	0.18 ± 0.18	0.11 ± 0.11	0.00 ± 0.21	0.40 ± 0.12	0.26 ± 0.08
bu23dm	0.00 ± 0.12	0.69 ± 0.21	0.00 ± 0.22	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.20
pena2m	0.00 ± 0.12	2.60 ± 0.43	0.00 ± 0.22	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.57 ± 0.18
pena3m	0.00 ± 0.12	1.69 ± 0.35	0.84 ± 0.27	0.34 ± 0.11	0.00 ± 0.21	0.28 ± 0.08	0.21 ± 0.06
pie2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	5.40 ± 6.72	2.19 ± 0.48	7.11 ± 2.14	3.21 ± 0.95	0.16 ± 0.16	6.07 ± 1.82	6.60 ± 1.99
mcypna	0.00 ± 0.12	1.20 ± 0.25	0.76 ± 0.23	0.42 ± 0.12	0.00 ± 0.21	0.20 ± 0.07	1.19 ± 0.36
pen24m	0.00 ± 0.12	0.55 ± 0.19	0.18 ± 0.18	0.08 ± 0.08	0.00 ± 0.21	0.07 ± 0.07	0.03 ± 0.03
benze	8.78 ± 12.86	1.98 ± 0.38	2.01 ± 0.63	16.57 ± 4.98	1.21 ± 0.35	6.38 ± 1.92	5.24 ± 1.58
cyhexa	0.18 ± 0.08	0.49 ± 0.19	3.62 ± 1.07	0.48 ± 0.14	0.16 ± 0.16	1.10 ± 0.33	0.02 ± 0.02
hexa2m	0.00 ± 0.12	1.89 ± 0.33	0.00 ± 0.22	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.20
pen23m	0.00 ± 0.12	0.87 ± 0.27	0.00 ± 0.22	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.20
hexa3m	0.00 ± 0.12	0.00 ± 0.18	0.18 ± 0.18	0.08 ± 0.08	0.00 ± 0.21	0.05 ± 0.05	0.03 ± 0.03
pa224m	0.00 ± 0.12	0.00 ± 0.18	0.18 ± 0.18	0.06 ± 0.06	0.00 ± 0.21	0.05 ± 0.05	0.03 ± 0.03
n_hept	0.00 ± 0.12	0.65 ± 0.20	6.88 ± 2.06	2.14 ± 0.63	0.00 ± 0.21	6.82 ± 2.05	3.09 ± 0.92
mecyhx	0.00 ± 0.12	0.00 ± 0.18	0.09 ± 0.09	0.22 ± 0.06	0.00 ± 0.21	0.23 ± 0.07	0.28 ± 0.08
pa234m	0.00 ± 0.12	0.87 ± 0.22	0.04 ± 0.04	0.02 ± 0.02	0.00 ± 0.21	0.02 ± 0.02	0.00 ± 0.20
tolue	0.37 ± 0.17	11.93 ± 3.78	4.02 ± 1.21	10.47 ± 3.14	0.46 ± 0.12	6.20 ± 1.87	23.54 ± 7.05
hep2me	0.00 ± 0.12	0.00 ± 0.18	0.00 ± 0.22	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.20
hep3me	0.00 ± 0.12	0.18 ± 0.18	0.04 ± 0.04	0.02 ± 0.02	0.00 ± 0.21	0.02 ± 0.02	0.00 ± 0.20
n_oct	0.00 ± 0.12	0.19 ± 0.26	2.41 ± 0.71	1.53 ± 0.46	0.00 ± 0.21	2.86 ± 0.86	0.08 ± 0.08
etbz	0.13 ± 0.06	2.28 ± 0.57	4.55 ± 1.38	3.98 ± 1.19	1.51 ± 0.46	1.22 ± 0.36	6.26 ± 1.88
mp_xyl	0.00 ± 0.12	8.85 ± 2.89	3.84 ± 1.16	3.17 ± 0.95	61.46 ± 18.43	2.53 ± 0.76	23.26 ± 6.97
styr	0.81 ± 0.37	7.31 ± 3.13	0.04 ± 0.04	0.99 ± 0.29	0.30 ± 0.10	0.84 ± 0.25	0.21 ± 0.06
o_xyl	0.04 ± 0.01	4.09 ± 0.89	5.18 ± 1.57	6.15 ± 1.84	30.82 ± 9.25	1.30 ± 0.40	10.06 ± 3.01
n_non	0.00 ± 0.12	0.58 ± 0.20	0.13 ± 0.13	0.62 ± 0.18	0.00 ± 0.21	0.76 ± 0.23	0.00 ± 0.20
iprbz	6.79 ± 11.77	0.25 ± 0.18	3.62 ± 1.07	0.09 ± 0.09	0.00 ± 0.21	0.08 ± 0.08	0.42 ± 0.13
n_prbz	0.00 ± 0.12	0.56 ± 0.20	0.23 ± 0.23	0.02 ± 0.02	0.00 ± 0.21	0.00 ± 0.20	1.18 ± 0.36
m_etol	0.00 ± 0.10	1.15 ± 0.41	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.00 ± 0.10	0.00 ± 0.18	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz135m	0.00 ± 0.12	1.77 ± 0.62	0.00 ± 0.22	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.20
o_etol	0.00 ± 0.10	0.40 ± 0.19	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz124m	0.00 ± 0.12	2.10 ± 0.78	0.04 ± 0.04	0.02 ± 0.02	1.97 ± 0.58	1.05 ± 0.31	0.00 ± 0.20
n_dec	0.00 ± 0.10	0.58 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.18	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	0.84 ± 0.22	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
other	0.00 ± 0.10	54.67 ± 18.86	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
unid	20.57 ± 42.59	93.06 ± 13.98	3.78 ± 8.17	0.01 ± 8.79	4.08 ± 20.65	0.04 ± 8.08	0.04 ± 11.16
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	120.57 ± 12.06	247.74 ± 24.77	103.78 ± 10.38	100.01 ± 10.00	104.08 ± 10.41	100.04 ± 10.00	100.04 ± 10.00

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P057 HG0188R G	P058 HG0225N G	P059 HG0261J G	P060 HG0262H G	P061 HG0312R G	P062 HG0562P G	P063 HG0565J G
ethene	0.00 ± 0.20	70.62 ± 21.20	0.00 ± 0.20	0.14 ± 0.14	0.00 ± 0.20	16.75 ± 5.04	0.00 ± 0.20
acetyl	0.00 ± 0.20	1.78 ± 0.52	0.00 ± 0.20	0.04 ± 0.04	0.00 ± 0.20	4.23 ± 1.25	0.00 ± 0.20
ethane	0.00 ± 0.20	1.13 ± 0.35	0.26 ± 0.08	0.60 ± 0.18	1.01 ± 0.31	2.76 ± 0.81	2.39 ± 0.73
prope	0.00 ± 0.20	2.25 ± 0.69	0.00 ± 0.20	0.04 ± 0.04	0.00 ± 0.20	5.47 ± 1.64	0.02 ± 0.02
n_prop	0.00 ± 0.20	2.82 ± 0.87	1.85 ± 0.56	2.17 ± 0.65	6.59 ± 1.97	13.39 ± 4.00	10.34 ± 3.10
i_buta	0.00 ± 0.20	0.56 ± 0.17	4.92 ± 1.48	3.54 ± 1.06	11.81 ± 3.54	17.22 ± 5.17	5.49 ± 1.65
lbut1e	0.00 ± 0.20	0.91 ± 0.26	0.00 ± 0.20	0.04 ± 0.04	0.00 ± 0.20	1.55 ± 0.47	0.22 ± 0.22
n_buta	4.11 ± 1.23	1.30 ± 0.39	51.91 ± 15.57	10.19 ± 3.04	24.62 ± 7.39	4.91 ± 1.47	0.00 ± 0.20
t2bute	0.00 ± 0.20	0.00 ± 0.20	0.51 ± 0.16	0.41 ± 0.41	0.83 ± 0.25	0.00 ± 0.21	0.49 ± 0.15
c2bute	0.00 ± 0.20	0.00 ± 0.20	0.40 ± 0.12	0.32 ± 0.32	0.65 ± 0.19	0.00 ± 0.21	0.40 ± 0.11
ipenta	0.00 ± 0.20	0.30 ± 0.30	17.35 ± 5.21	8.94 ± 2.68	19.38 ± 5.81	0.73 ± 0.21	10.86 ± 3.25
pente1	0.00 ± 0.20	0.00 ± 0.20	0.41 ± 0.12	5.20 ± 1.57	0.61 ± 0.19	0.04 ± 0.04	0.40 ± 0.11
n_pent	0.00 ± 0.20	0.22 ± 0.22	4.37 ± 1.32	4.24 ± 1.29	8.63 ± 2.59	0.60 ± 0.17	0.00 ± 0.20
i_pren	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	4.83 ± 1.47	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20
t2pene	0.00 ± 0.20	0.00 ± 0.20	0.67 ± 0.20	0.55 ± 0.18	0.98 ± 0.30	0.00 ± 0.21	0.64 ± 0.20
c2pene	0.00 ± 0.20	0.00 ± 0.20	0.32 ± 0.10	0.23 ± 0.23	0.48 ± 0.14	0.00 ± 0.21	0.30 ± 0.09
bu22dm	0.00 ± 0.20	0.00 ± 0.20	0.51 ± 0.16	0.41 ± 0.41	0.78 ± 0.23	0.00 ± 0.21	0.51 ± 0.15
cpenta	0.00 ± 0.20	0.00 ± 0.20	0.30 ± 0.09	0.23 ± 0.23	0.50 ± 0.15	0.00 ± 0.21	0.07 ± 0.07
bu23dm	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20
pena2m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20
pena3m	0.00 ± 0.20	0.00 ± 0.20	0.98 ± 0.29	0.78 ± 0.23	1.65 ± 0.49	0.00 ± 0.21	0.17 ± 0.17
p1e2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	0.00 ± 0.20	0.82 ± 0.26	7.39 ± 2.22	12.71 ± 3.82	3.01 ± 0.91	0.17 ± 0.17	3.82 ± 1.14
mcypna	0.00 ± 0.20	0.00 ± 0.20	0.70 ± 0.21	0.60 ± 0.18	1.51 ± 0.46	0.00 ± 0.21	0.26 ± 0.09
pen24m	0.00 ± 0.20	0.00 ± 0.20	0.21 ± 0.07	0.18 ± 0.18	0.43 ± 0.12	0.00 ± 0.21	0.20 ± 0.20
benze	1.04 ± 0.31	7.02 ± 2.12	1.60 ± 0.48	9.95 ± 2.99	2.69 ± 0.80	16.88 ± 5.08	8.61 ± 2.59
cyhexa	0.00 ± 0.20	0.69 ± 0.22	0.71 ± 0.21	6.96 ± 2.07	0.27 ± 0.09	1.72 ± 0.51	0.11 ± 0.11
hexa2m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20
pen23m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20
hexa3m	0.00 ± 0.20	0.00 ± 0.20	0.21 ± 0.07	0.14 ± 0.14	0.56 ± 0.16	0.00 ± 0.21	0.20 ± 0.20
pa224m	0.00 ± 0.20	0.00 ± 0.20	0.20 ± 0.06	0.14 ± 0.14	0.16 ± 0.05	0.00 ± 0.21	0.17 ± 0.17
n_hept	0.00 ± 0.20	0.78 ± 0.22	0.77 ± 0.22	5.99 ± 1.80	1.14 ± 0.35	0.04 ± 0.04	0.81 ± 0.24
mecyhx	0.00 ± 0.20	0.00 ± 0.20	0.06 ± 0.06	0.04 ± 0.04	0.24 ± 0.08	0.00 ± 0.21	0.09 ± 0.09
pa234m	0.00 ± 0.20	0.00 ± 0.20	0.03 ± 0.03	0.04 ± 0.04	0.08 ± 0.08	0.00 ± 0.21	0.04 ± 0.04
tolue	0.00 ± 0.20	3.03 ± 0.91	2.79 ± 0.84	2.68 ± 0.78	5.98 ± 1.80	3.66 ± 1.12	17.69 ± 5.32
hep2me	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20	0.00 ± 0.21	0.00 ± 0.20
hep3me	0.00 ± 0.20	0.00 ± 0.20	0.03 ± 0.03	0.04 ± 0.04	0.16 ± 0.05	0.00 ± 0.21	0.04 ± 0.04
n_oct	0.00 ± 0.20	1.60 ± 0.48	0.07 ± 0.07	0.74 ± 0.23	0.09 ± 0.09	0.04 ± 0.04	5.76 ± 1.73
etbz	0.00 ± 0.20	0.52 ± 0.17	0.06 ± 0.06	1.61 ± 0.51	0.86 ± 0.25	1.25 ± 0.39	4.59 ± 1.39
mp_xyl	63.24 ± 18.98	0.17 ± 0.17	0.17 ± 0.06	1.70 ± 0.51	0.20 ± 0.05	0.39 ± 0.39	16.37 ± 4.92
styr	0.00 ± 0.20	3.25 ± 1.00	0.00 ± 0.20	2.21 ± 0.65	0.00 ± 0.20	7.71 ± 2.32	0.17 ± 0.17
o_xyl	31.61 ± 9.48	0.22 ± 0.22	0.10 ± 0.10	5.67 ± 1.70	1.62 ± 0.49	0.47 ± 0.13	7.20 ± 2.16
n_non	0.00 ± 0.20	0.00 ± 0.20	0.06 ± 0.06	0.47 ± 0.47	0.02 ± 0.02	0.00 ± 0.21	0.20 ± 0.20
iprbz	0.00 ± 0.20	0.00 ± 0.20	0.02 ± 0.02	5.16 ± 1.57	0.83 ± 0.25	0.00 ± 0.21	0.35 ± 0.11
n_prbz	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.04 ± 0.04	0.02 ± 0.02	0.00 ± 0.21	0.99 ± 0.30
m_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz135m	0.00 ± 0.20	0.00 ± 0.20	0.01 ± 0.01	0.00 ± 0.21	0.02 ± 0.02	0.00 ± 0.21	0.00 ± 0.20
o_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz124m	0.00 ± 0.20	0.00 ± 0.20	0.03 ± 0.03	0.00 ± 0.21	1.57 ± 0.47	0.00 ± 0.21	0.00 ± 0.20
n_dec	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
unid	0.04 ± 21.25	0.05 ± 21.41	0.20 ± 16.74	0.16 ± 8.09	0.51 ± 10.86	6.99 ± 10.42	0.19 ± 9.71
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	100.04 ± 10.00	100.05 ± 10.01	100.20 ± 10.02	100.16 ± 10.02	100.51 ± 10.05	106.99 ± 10.70	100.19 ± 10.02

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P064	P065	P066	P067	P068	P069	P070
	HG0566H G	HG0669T G	HG0786O G	IndAM_D1 G	IndAM_D2 G	IndAM_D3 G	IndAM_DC G
ethene	20.91 ± 6.28	0.00 ± 0.20	8.71 ± 2.62	0.28 ± 0.03	3.63 ± 0.37	0.38 ± 0.04	1.46 ± 1.94
acetyl	0.08 ± 0.08	0.00 ± 0.20	0.01 ± 0.01	1.65 ± 0.16	0.06 ± 0.00	0.14 ± 0.01	0.58 ± 0.81
ethane	0.05 ± 0.05	9.19 ± 2.75	0.00 ± 0.20	1.60 ± 0.16	4.58 ± 0.45	5.00 ± 0.50	3.82 ± 2.05
prope	26.72 ± 8.01	0.00 ± 0.20	11.46 ± 3.43	0.49 ± 0.05	2.21 ± 0.23	12.68 ± 1.27	5.40 ± 7.05
n_prop	2.54 ± 0.76	16.92 ± 5.09	13.35 ± 4.01	15.26 ± 1.52	13.42 ± 1.35	7.68 ± 0.78	11.94 ± 3.27
i_buta	28.30 ± 8.49	0.96 ± 0.29	1.71 ± 0.51	6.66 ± 0.66	4.85 ± 0.48	9.50 ± 0.95	7.05 ± 2.71
lbutle	0.50 ± 0.15	0.00 ± 0.20	0.18 ± 0.05	0.16 ± 0.02	0.13 ± 0.01	6.62 ± 0.67	2.45 ± 3.98
n_buta	0.14 ± 0.04	15.94 ± 4.77	2.03 ± 0.61	10.16 ± 1.01	7.55 ± 0.75	7.62 ± 0.76	8.36 ± 0.82
t2bute	0.00 ± 0.20	0.00 ± 0.20	0.74 ± 0.22	0.14 ± 0.02	0.18 ± 0.01	3.23 ± 0.33	1.24 ± 1.90
c2bute	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.14 ± 0.02	0.16 ± 0.01	2.44 ± 0.25	0.96 ± 1.40
ipenta	0.66 ± 0.20	7.26 ± 2.17	20.46 ± 6.14	11.65 ± 1.17	11.14 ± 1.11	13.67 ± 1.36	12.19 ± 2.07
pentel	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.19 ± 0.02	0.26 ± 0.03	0.79 ± 0.08	0.42 ± 0.36
n_pent	0.01 ± 0.01	3.86 ± 1.16	16.19 ± 4.86	7.94 ± 0.79	9.31 ± 0.94	3.98 ± 0.39	7.00 ± 2.65
i_pren	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.05 ± 0.02	0.33 ± 0.03	0.05 ± 0.01	0.14 ± 0.16
t2pene	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.13 ± 0.02	0.38 ± 0.04	1.55 ± 0.16	0.72 ± 0.82
c2pene	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.06 ± 0.02	0.16 ± 0.01	0.78 ± 0.08	0.35 ± 0.42
bu22dm	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	1.09 ± 0.11	1.73 ± 0.17	1.06 ± 0.11	1.29 ± 0.41
cpenta	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.95 ± 0.09	0.91 ± 0.09	0.34 ± 0.04	0.72 ± 0.30
bu23dm	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.89 ± 0.09	1.38 ± 0.14	0.84 ± 0.08	1.04 ± 0.32
pena2m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	4.00 ± 0.40	5.70 ± 0.57	3.08 ± 0.31	4.25 ± 1.37
pena3m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	2.83 ± 0.28	3.56 ± 0.35	1.85 ± 0.19	2.74 ± 0.84
pl2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	3.32 ± 1.00	2.41 ± 0.72	23.38 ± 7.01	3.64 ± 0.36	5.04 ± 0.51	1.62 ± 0.16	3.40 ± 1.71
mcpna	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	1.46 ± 0.14	1.57 ± 0.16	1.12 ± 0.11	1.37 ± 0.20
pen24m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.41 ± 0.05	0.31 ± 0.03	0.41 ± 0.04	0.38 ± 0.06
benze	0.29 ± 0.09	26.08 ± 7.84	0.70 ± 0.21	17.33 ± 1.72	3.16 ± 0.31	1.05 ± 0.11	6.73 ± 7.96
cyhexa	13.87 ± 4.16	0.00 ± 0.20	0.02 ± 0.02	0.63 ± 0.06	0.94 ± 0.10	0.42 ± 0.04	0.67 ± 0.26
hexa2m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	1.06 ± 0.11	0.84 ± 0.09	0.97 ± 0.10	0.96 ± 0.09
pen23m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.43 ± 0.05	0.58 ± 0.06	0.52 ± 0.05	0.51 ± 0.10
hexa3m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	2.74 ± 0.27	0.96 ± 0.10	1.10 ± 0.11	1.55 ± 0.82
pa224m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.08 ± 0.02	0.67 ± 0.07	0.79 ± 0.08	0.54 ± 0.41
n_hept	0.37 ± 0.11	2.41 ± 0.72	0.00 ± 0.20	0.62 ± 0.06	2.00 ± 0.20	1.09 ± 0.11	1.26 ± 0.74
mecyhx	0.01 ± 0.01	0.00 ± 0.20	0.00 ± 0.20	0.16 ± 0.02	1.60 ± 0.16	0.78 ± 0.08	0.87 ± 0.75
pa234m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.05 ± 0.02	0.24 ± 0.03	0.30 ± 0.03	0.20 ± 0.14
tolue	0.04 ± 0.04	11.60 ± 3.47	0.63 ± 0.19	1.74 ± 0.17	2.13 ± 0.21	1.84 ± 0.18	1.91 ± 0.29
hep2me	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.25 ± 0.03	0.72 ± 0.07	0.44 ± 0.04	0.48 ± 0.26
hep3me	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.11 ± 0.02	0.48 ± 0.04	0.38 ± 0.04	0.33 ± 0.20
n_oct	0.00 ± 0.20	1.93 ± 0.58	0.00 ± 0.20	0.30 ± 0.03	1.52 ± 0.16	0.59 ± 0.05	0.81 ± 0.65
etbz	0.09 ± 0.09	0.00 ± 0.20	0.06 ± 0.06	0.22 ± 0.03	0.65 ± 0.07	0.48 ± 0.05	0.46 ± 0.23
mp_xyl	0.01 ± 0.01	0.00 ± 0.20	0.22 ± 0.07	0.68 ± 0.06	2.00 ± 0.20	1.66 ± 0.16	1.48 ± 0.75
styr	2.05 ± 0.62	0.00 ± 0.20	0.02 ± 0.02	0.84 ± 0.08	0.17 ± 0.01	0.11 ± 0.01	0.35 ± 0.36
o_xyl	0.02 ± 0.02	0.00 ± 0.20	0.10 ± 0.10	0.27 ± 0.03	0.78 ± 0.07	0.48 ± 0.05	0.52 ± 0.27
n_non	0.00 ± 0.20	1.45 ± 0.43	0.00 ± 0.20	0.21 ± 0.02	0.91 ± 0.09	0.38 ± 0.04	0.51 ± 0.38
iprbz	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.02	0.13 ± 0.01	0.07 ± 0.01	0.07 ± 0.06
n_prbz	0.00 ± 0.20	0.00 ± 0.20	0.01 ± 0.01	0.05 ± 0.02	0.18 ± 0.01	0.00 ± 0.01	0.07 ± 0.10
m_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz135m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.06 ± 0.02	0.26 ± 0.03	0.04 ± 0.01	0.13 ± 0.12
o_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz124m	0.00 ± 0.20	0.00 ± 0.20	0.00 ± 0.20	0.35 ± 0.03	0.52 ± 0.06	0.12 ± 0.01	0.33 ± 0.20
n_dec	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
unid	1.63 ± 13.96	0.00 ± 11.72	0.64 ± 12.09	57.70 ± 3.07	40.89 ± 2.50	32.35 ± 2.64	42.95 ± 9.26
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	101.63 ± 10.16	100.00 ± 10.00	100.64 ± 10.06	157.70 ± 15.77	140.89 ± 14.09	132.35 ± 13.23	142.95 ± 14.30

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P071	P072	P073	P074	P075	P076	P077
	IndSC_D1 G	IndSL_D1 G	IndSL_D2 G	IndSL_DC G	IndTX_D1 G	IndTX_D2 G	IndTX_DC G
ethene	2.07 ± 0.20	2.93 ± 0.29	0.46 ± 0.09	1.77 ± 1.91	2.23 ± 0.22	0.44 ± 0.06	1.30 ± 1.18
acetyl	3.05 ± 0.30	1.30 ± 0.13	1.82 ± 0.19	1.54 ± 0.23	6.28 ± 0.63	0.43 ± 0.06	3.24 ± 3.94
ethane	4.48 ± 0.45	5.26 ± 0.53	1.71 ± 0.19	3.61 ± 2.83	0.61 ± 0.06	5.29 ± 0.52	3.05 ± 3.47
prope	3.00 ± 0.30	1.70 ± 0.18	14.09 ± 1.42	7.49 ± 8.03	25.30 ± 2.53	1.93 ± 0.19	13.14 ± 15.74
n_prop	5.07 ± 0.50	4.62 ± 0.47	8.18 ± 0.82	6.29 ± 1.93	7.49 ± 0.75	3.28 ± 0.33	5.29 ± 2.67
i_buta	8.43 ± 0.85	4.41 ± 0.44	19.80 ± 1.97	11.60 ± 9.77	1.73 ± 0.18	4.10 ± 0.41	2.97 ± 1.85
lbutle	1.43 ± 0.14	0.58 ± 0.06	2.30 ± 0.24	1.38 ± 1.09	1.40 ± 0.15	3.17 ± 0.32	2.32 ± 1.38
n_buta	6.52 ± 0.65	6.05 ± 0.60	7.83 ± 0.78	6.87 ± 0.62	2.97 ± 0.30	15.21 ± 1.53	9.34 ± 9.19
t2bute	0.26 ± 0.04	0.26 ± 0.03	0.00 ± 0.09	0.13 ± 0.20	0.39 ± 0.04	0.54 ± 0.06	0.46 ± 0.13
c2bute	0.29 ± 0.04	0.30 ± 0.04	0.43 ± 0.09	0.36 ± 0.05	0.27 ± 0.03	0.55 ± 0.06	0.42 ± 0.21
ipenta	10.86 ± 1.08	45.68 ± 4.57	6.55 ± 0.66	27.39 ± 30.10	7.01 ± 0.70	9.77 ± 0.98	8.46 ± 2.45
pente l	0.49 ± 0.06	0.35 ± 0.04	0.32 ± 0.09	0.34 ± 0.05	0.07 ± 0.01	0.74 ± 0.08	0.42 ± 0.49
n_pent	4.09 ± 0.42	2.52 ± 0.25	2.74 ± 0.29	2.62 ± 0.19	4.60 ± 0.46	4.19 ± 0.41	4.39 ± 0.32
i_pren	1.34 ± 0.14	0.59 ± 0.06	0.89 ± 0.11	0.74 ± 0.13	0.30 ± 0.03	0.39 ± 0.04	0.34 ± 0.09
t2pene	0.88 ± 0.10	0.49 ± 0.05	0.34 ± 0.09	0.42 ± 0.15	0.28 ± 0.03	0.88 ± 0.10	0.59 ± 0.46
c2pene	0.48 ± 0.06	0.26 ± 0.03	0.23 ± 0.09	0.25 ± 0.04	0.66 ± 0.07	0.45 ± 0.06	0.54 ± 0.11
bu22dm	0.10 ± 0.04	0.24 ± 0.03	0.26 ± 0.09	0.25 ± 0.04	0.22 ± 0.03	0.26 ± 0.03	0.24 ± 0.04
cpenta	0.48 ± 0.06	0.37 ± 0.04	0.53 ± 0.10	0.44 ± 0.08	1.00 ± 0.10	0.34 ± 0.04	0.66 ± 0.43
bu23dm	0.66 ± 0.07	0.47 ± 0.05	0.53 ± 0.10	0.50 ± 0.05	0.49 ± 0.06	0.89 ± 0.10	0.70 ± 0.32
pena2m	2.88 ± 0.29	1.93 ± 0.19	2.08 ± 0.22	2.00 ± 0.15	1.93 ± 0.19	2.09 ± 0.21	2.02 ± 0.24
pena3m	0.84 ± 0.10	1.40 ± 0.14	1.52 ± 0.17	1.45 ± 0.11	1.32 ± 0.13	1.82 ± 0.18	1.58 ± 0.44
ple2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	3.21 ± 0.33	1.51 ± 0.15	3.72 ± 0.39	2.54 ± 1.32	3.14 ± 0.31	4.83 ± 0.48	4.03 ± 1.42
mcypna	0.98 ± 0.10	0.71 ± 0.08	0.89 ± 0.11	0.79 ± 0.07	3.65 ± 0.36	2.11 ± 0.21	2.85 ± 0.92
pen24m	0.45 ± 0.06	0.26 ± 0.03	0.39 ± 0.09	0.32 ± 0.05	0.18 ± 0.03	0.78 ± 0.08	0.50 ± 0.44
benze	2.53 ± 0.26	1.99 ± 0.20	3.89 ± 0.40	2.89 ± 1.07	9.16 ± 0.91	7.13 ± 0.72	8.10 ± 0.97
cyhexa	0.32 ± 0.04	0.43 ± 0.05	2.14 ± 0.22	1.23 ± 1.09	1.67 ± 0.16	2.49 ± 0.25	2.11 ± 0.70
hexa2m	0.99 ± 0.10	0.57 ± 0.06	0.79 ± 0.11	0.67 ± 0.09	0.39 ± 0.04	2.57 ± 0.26	1.53 ± 1.63
pen23m	0.48 ± 0.06	0.29 ± 0.04	0.43 ± 0.09	0.36 ± 0.07	0.19 ± 0.03	1.21 ± 0.12	0.72 ± 0.77
hexa3m	1.22 ± 0.13	0.72 ± 0.08	1.45 ± 0.17	1.06 ± 0.42	0.76 ± 0.07	3.98 ± 0.40	2.44 ± 2.41
pa224m	2.09 ± 0.20	1.28 ± 0.13	1.13 ± 0.14	1.21 ± 0.21	0.30 ± 0.03	1.95 ± 0.19	1.16 ± 1.25
n_hept	0.72 ± 0.09	0.48 ± 0.05	0.42 ± 0.09	0.44 ± 0.08	0.88 ± 0.09	3.37 ± 0.34	2.18 ± 1.88
mecyhx	0.56 ± 0.07	0.40 ± 0.04	0.46 ± 0.09	0.43 ± 0.05	0.46 ± 0.04	1.31 ± 0.14	0.90 ± 0.66
pa234m	0.75 ± 0.09	0.43 ± 0.05	0.34 ± 0.09	0.39 ± 0.09	0.06 ± 0.01	0.40 ± 0.04	0.24 ± 0.26
tolue	7.56 ± 0.76	2.96 ± 0.30	3.88 ± 0.40	3.40 ± 0.32	1.57 ± 0.16	4.17 ± 0.41	2.92 ± 2.01
hep2me	0.40 ± 0.06	0.23 ± 0.03	0.00 ± 0.09	0.12 ± 0.16	0.22 ± 0.03	0.37 ± 0.04	0.30 ± 0.11
hep3me	0.46 ± 0.06	0.28 ± 0.03	0.00 ± 0.09	0.15 ± 0.21	0.18 ± 0.03	0.36 ± 0.04	0.27 ± 0.14
n_oct	0.55 ± 0.07	0.29 ± 0.04	0.59 ± 0.10	0.43 ± 0.17	0.39 ± 0.04	0.43 ± 0.06	0.42 ± 0.04
etbz	2.20 ± 0.23	0.59 ± 0.06	1.32 ± 0.14	0.94 ± 0.43	0.21 ± 0.03	1.03 ± 0.11	0.63 ± 0.62
mp_xyl	9.12 ± 0.91	2.13 ± 0.21	2.01 ± 0.22	2.07 ± 0.28	0.58 ± 0.06	2.73 ± 0.28	1.69 ± 1.61
styr	2.26 ± 0.23	0.49 ± 0.05	1.03 ± 0.13	0.74 ± 0.31	0.16 ± 0.03	0.33 ± 0.04	0.24 ± 0.13
o_xyl	2.23 ± 0.23	0.77 ± 0.08	0.92 ± 0.11	0.85 ± 0.07	0.30 ± 0.03	0.61 ± 0.07	0.46 ± 0.24
n_non	0.40 ± 0.06	0.16 ± 0.03	0.00 ± 0.09	0.09 ± 0.12	0.37 ± 0.04	0.39 ± 0.04	0.37 ± 0.03
iprbz	0.43 ± 0.06	0.19 ± 0.03	0.00 ± 0.07	0.09 ± 0.13	0.00 ± 0.01	0.00 ± 0.01	0.00 ± 0.01
n_prbz	0.35 ± 0.06	0.13 ± 0.03	0.00 ± 0.07	0.07 ± 0.09	0.00 ± 0.01	0.00 ± 0.01	0.00 ± 0.01
m_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz135m	0.48 ± 0.06	0.24 ± 0.03	0.50 ± 0.10	0.36 ± 0.16	0.10 ± 0.01	0.22 ± 0.03	0.16 ± 0.10
o_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz124m	1.57 ± 0.16	0.77 ± 0.08	1.08 ± 0.13	0.91 ± 0.12	8.50 ± 0.85	0.47 ± 0.06	4.31 ± 5.43
n_dec	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
unid	42.16 ± 2.29	24.51 ± 4.74	42.06 ± 2.99	32.72 ± 9.34	48.91 ± 3.20	35.53 ± 2.41	41.95 ± 7.02
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	142.16 ± 14.22	124.51 ± 12.45	142.06 ± 14.21	132.72 ± 13.27	148.91 ± 14.89	135.53 ± 13.55	141.95 ± 14.19

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P078	P079	P080	P081	P082	P083	P084
	IndTX_N1 G	IndUC_D1 G	IndUC_D2 G	IndUC_DC G	PEin_fug G	PEma_fug G	PEst_cru G
ethene	0.00 ± 0.22	0.94 ± 0.10	1.15 ± 0.11	1.05 ± 0.19	0.15 ± 0.69	0.00 ± 0.15	0.00 ± 0.12
acetyl	0.00 ± 0.17	1.83 ± 0.18	15.18 ± 1.51	8.68 ± 9.75	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
ethane	4.62 ± 0.88	8.37 ± 0.84	1.06 ± 0.11	4.62 ± 5.01	3.36 ± 2.64	1.52 ± 0.51	5.04 ± 2.00
prope	1.62 ± 0.32	2.89 ± 0.30	0.47 ± 0.06	1.65 ± 1.65	7.77 ± 20.10	0.00 ± 0.15	0.47 ± 1.25
n_prop	0.03 ± 0.70	14.82 ± 1.48	1.17 ± 0.11	7.83 ± 9.34	16.58 ± 12.01	5.51 ± 3.63	20.45 ± 0.82
i_buta	5.33 ± 0.64	6.66 ± 0.68	0.93 ± 0.09	3.73 ± 3.90	4.44 ± 8.06	0.41 ± 0.92	5.35 ± 4.58
lbutle	3.78 ± 0.50	0.56 ± 0.06	0.13 ± 0.04	0.35 ± 0.29	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
n_buta	20.57 ± 2.33	11.65 ± 1.16	3.65 ± 0.36	7.55 ± 5.38	13.91 ± 20.82	12.31 ± 4.15	29.64 ± 3.36
t2bute	0.62 ± 0.09	0.22 ± 0.04	0.19 ± 0.04	0.19 ± 0.02	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
c2bute	0.62 ± 0.09	0.36 ± 0.06	0.21 ± 0.04	0.27 ± 0.10	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
ipenta	10.57 ± 1.55	9.85 ± 0.98	9.35 ± 0.95	9.59 ± 0.68	0.72 ± 3.27	0.00 ± 0.15	0.00 ± 0.12
pente1	0.88 ± 0.13	0.40 ± 0.06	0.34 ± 0.06	0.37 ± 0.04	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
n_pent	4.68 ± 0.66	5.88 ± 0.60	3.96 ± 0.40	4.89 ± 1.17	3.37 ± 3.67	7.55 ± 2.54	15.45 ± 2.46
i_pren	0.15 ± 0.08	1.02 ± 0.10	1.27 ± 0.13	1.15 ± 0.21	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
t2pene	0.85 ± 0.15	0.44 ± 0.06	0.89 ± 0.09	0.66 ± 0.33	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
c2pene	0.45 ± 0.08	0.18 ± 0.04	0.44 ± 0.06	0.31 ± 0.19	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
bu22dm	0.23 ± 0.06	0.52 ± 0.06	1.55 ± 0.15	1.05 ± 0.78	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
cpenta	0.32 ± 0.07	0.42 ± 0.06	1.02 ± 0.11	0.72 ± 0.45	0.35 ± 0.59	0.10 ± 0.04	0.00 ± 0.12
bu23dm	1.16 ± 0.15	0.66 ± 0.08	1.31 ± 0.13	0.99 ± 0.50	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
pena2m	1.48 ± 0.37	2.79 ± 0.28	3.75 ± 0.38	3.28 ± 0.80	0.00 ± 0.14	0.28 ± 0.61	0.00 ± 0.12
pena3m	0.84 ± 0.35	2.01 ± 0.20	2.42 ± 0.25	2.23 ± 0.37	0.00 ± 0.14	0.22 ± 0.31	0.00 ± 0.12
ple2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	5.27 ± 0.76	2.71 ± 0.28	3.22 ± 0.32	2.97 ± 0.47	9.65 ± 11.38	14.37 ± 9.98	7.62 ± 7.42
mcyprna	2.54 ± 0.33	1.28 ± 0.12	0.53 ± 0.06	0.89 ± 0.49	0.73 ± 3.34	0.47 ± 0.22	0.00 ± 0.12
pen24m	0.89 ± 0.13	0.38 ± 0.06	0.55 ± 0.08	0.47 ± 0.14	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
benze	8.94 ± 1.11	3.07 ± 0.30	4.75 ± 0.47	3.92 ± 1.34	10.10 ± 18.02	15.33 ± 29.89	1.26 ± 1.37
cyhexa	3.62 ± 0.39	1.56 ± 0.16	2.63 ± 0.27	2.10 ± 0.83	0.55 ± 0.83	0.03 ± 0.04	0.80 ± 1.04
hexa2m	3.25 ± 0.40	0.84 ± 0.08	1.04 ± 0.11	0.93 ± 0.17	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
pen23m	1.48 ± 0.20	0.62 ± 0.08	0.97 ± 0.09	0.80 ± 0.27	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
hexa3m	5.16 ± 0.61	1.30 ± 0.14	1.97 ± 0.21	1.65 ± 0.54	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
pa224m	1.10 ± 0.36	1.34 ± 0.14	1.44 ± 0.15	1.40 ± 0.14	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
n_hept	4.57 ± 0.52	1.71 ± 0.18	1.67 ± 0.17	1.69 ± 0.12	7.05 ± 14.44	7.88 ± 2.16	7.71 ± 4.11
mecyhx	1.58 ± 0.21	1.83 ± 0.18	2.33 ± 0.23	2.10 ± 0.43	1.63 ± 3.78	0.07 ± 0.03	0.00 ± 0.12
pa234m	0.00 ± 0.12	0.32 ± 0.04	0.42 ± 0.06	0.37 ± 0.08	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
tolue	0.00 ± 1.63	3.33 ± 0.34	3.67 ± 0.36	3.50 ± 0.37	11.11 ± 17.84	17.44 ± 11.69	0.96 ± 0.74
hep2me	0.27 ± 0.08	0.52 ± 0.06	0.87 ± 0.09	0.70 ± 0.29	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
hep3me	0.20 ± 0.08	0.40 ± 0.06	0.91 ± 0.09	0.66 ± 0.39	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
n_oct	0.20 ± 0.09	0.96 ± 0.10	1.27 ± 0.13	1.13 ± 0.25	4.59 ± 9.78	4.04 ± 1.19	5.08 ± 3.97
etbz	0.55 ± 0.20	0.68 ± 0.08	1.53 ± 0.15	1.13 ± 0.64	1.77 ± 2.63	2.65 ± 1.38	0.08 ± 0.12
mp_xyl	1.19 ± 0.51	1.81 ± 0.18	9.07 ± 0.91	5.53 ± 5.32	0.00 ± 0.14	6.22 ± 2.10	0.00 ± 0.12
styr	0.14 ± 0.07	0.68 ± 0.08	0.49 ± 0.06	0.58 ± 0.12	0.00 ± 0.14	0.06 ± 0.03	0.00 ± 0.12
o_xyl	0.00 ± 0.16	0.68 ± 0.08	3.67 ± 0.36	2.21 ± 2.19	0.72 ± 2.26	2.61 ± 0.87	0.04 ± 0.07
n_non	0.25 ± 0.08	0.54 ± 0.06	0.97 ± 0.09	0.76 ± 0.33	0.87 ± 1.25	0.01 ± 0.03	0.00 ± 0.12
iprbz	0.00 ± 0.05	0.00 ± 0.02	0.32 ± 0.06	0.16 ± 0.23	0.01 ± 0.04	0.15 ± 0.03	0.05 ± 0.11
n_prbz	0.00 ± 0.05	0.14 ± 0.04	0.47 ± 0.06	0.31 ± 0.23	0.00 ± 0.14	0.38 ± 0.13	0.00 ± 0.12
m_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz135m	0.00 ± 0.07	0.30 ± 0.04	1.67 ± 0.17	1.01 ± 1.01	0.00 ± 0.14	0.00 ± 0.15	0.00 ± 0.12
o_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz124m	0.00 ± 0.15	0.56 ± 0.06	3.14 ± 0.32	1.88 ± 1.88	0.56 ± 1.33	0.39 ± 0.85	0.01 ± 0.05
n_dec	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
unid	13.46 ± 4.11	87.38 ± 2.85	68.77 ± 3.09	77.83 ± 10.27	40.49 ± 46.88	45.66 ± 34.39	20.96 ± 9.34
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	113.46 ± 11.35	187.38 ± 18.74	168.77 ± 16.88	177.83 ± 17.78	140.49 ± 14.05	145.66 ± 14.57	120.96 ± 12.10

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P085 PEst_dis G	P086 PEst_fug G	P087 PEst_gas G	P088 Zenco G	P089 ACComp G	P090 ACCS G	P091 ACDiurn G
ethene	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	2.76 ± 0.99	8.77 ± 1.75	9.78 ± 1.96	0.00 ± 0.15
acetyl	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	3.20 ± 1.42	3.03 ± 0.61	4.08 ± 0.81	0.00 ± 0.15
ethane	2.95 ± 0.66	1.17 ± 0.68	0.11 ± 0.02	10.39 ± 1.57	3.78 ± 0.74	2.32 ± 0.47	0.44 ± 0.08
prope	0.00 ± 0.14	12.39 ± 31.53	0.00 ± 0.16	1.02 ± 0.24	3.98 ± 0.81	4.93 ± 0.98	0.00 ± 0.15
n_prop	17.56 ± 3.95	9.48 ± 9.95	1.66 ± 0.33	22.36 ± 3.37	0.47 ± 0.07	0.57 ± 0.11	1.15 ± 0.24
i_buta	10.15 ± 2.28	2.04 ± 4.16	13.02 ± 2.68	3.66 ± 2.28	0.40 ± 0.07	0.40 ± 0.08	2.34 ± 0.48
lbut1e	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	0.46 ± 0.14	2.43 ± 0.28	3.14 ± 0.32	0.00 ± 0.15
n_buta	38.84 ± 14.74	13.78 ± 16.43	44.57 ± 12.43	3.69 ± 0.77	7.15 ± 1.42	4.51 ± 0.91	44.34 ± 8.87
t2bute	0.00 ± 0.14	0.00 ± 0.13	1.59 ± 0.33	0.09 ± 0.12	0.54 ± 0.13	0.74 ± 0.15	0.00 ± 0.15
c2bute	0.00 ± 0.14	0.00 ± 0.13	1.29 ± 0.27	0.57 ± 0.81	0.81 ± 0.13	0.74 ± 0.15	0.79 ± 0.16
ipenta	0.00 ± 0.14	0.17 ± 0.68	0.00 ± 0.16	3.56 ± 0.98	5.26 ± 1.08	3.57 ± 0.72	9.60 ± 1.92
pente1	0.00 ± 0.14	0.00 ± 0.13	1.35 ± 0.27	0.19 ± 0.12	0.27 ± 0.07	0.36 ± 0.08	1.11 ± 0.22
n_pent	11.02 ± 2.48	3.37 ± 1.58	11.33 ± 2.33	3.93 ± 1.55	3.30 ± 0.67	2.63 ± 0.53	4.87 ± 0.97
i_pren	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	0.19 ± 0.12	0.40 ± 0.07	0.51 ± 0.09	0.00 ± 0.15
t2pene	0.00 ± 0.14	0.00 ± 0.13	2.14 ± 0.43	0.26 ± 0.12	0.34 ± 0.07	0.49 ± 0.09	1.33 ± 0.26
c2pene	0.00 ± 0.14	0.00 ± 0.13	1.05 ± 0.22	0.14 ± 0.12	0.34 ± 0.07	0.43 ± 0.09	0.97 ± 0.20
bu22dm	0.00 ± 0.14	0.00 ± 0.13	1.63 ± 0.33	0.17 ± 0.12	1.08 ± 0.20	0.96 ± 0.19	1.23 ± 0.24
cpenta	0.00 ± 0.14	0.20 ± 0.37	0.96 ± 0.19	0.19 ± 0.12	0.27 ± 0.07	0.36 ± 0.08	0.59 ± 0.12
bu23dm	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	0.47 ± 0.14	1.35 ± 0.27	1.23 ± 0.25	1.05 ± 0.22
pena2m	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	1.53 ± 0.26	4.18 ± 0.81	3.59 ± 0.72	2.75 ± 0.55
pena3m	0.00 ± 0.14	0.00 ± 0.13	3.11 ± 0.64	0.99 ± 0.19	2.09 ± 0.40	1.85 ± 0.38	1.52 ± 0.30
ple2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.27 ± 0.07	0.32 ± 0.06	0.00 ± 0.15
n_hex	7.76 ± 1.36	8.23 ± 7.05	5.85 ± 2.53	1.29 ± 0.23	2.02 ± 0.40	1.79 ± 0.36	1.58 ± 0.32
mcypna	0.00 ± 0.14	0.00 ± 0.13	2.20 ± 0.45	0.73 ± 0.17	0.74 ± 0.13	0.77 ± 0.15	0.89 ± 0.18
pen24m	0.00 ± 0.14	0.00 ± 0.13	0.67 ± 0.14	0.45 ± 0.14	0.81 ± 0.13	0.81 ± 0.17	0.69 ± 0.14
benze	3.55 ± 0.90	27.38 ± 20.79	2.21 ± 1.43	1.58 ± 0.39	7.28 ± 1.48	5.91 ± 1.19	1.84 ± 0.38
cyhexa	1.70 ± 2.43	0.61 ± 1.15	0.67 ± 0.32	0.47 ± 0.23	0.20 ± 0.07	0.25 ± 0.06	0.00 ± 0.15
hexa2m	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	0.90 ± 0.18	1.01 ± 0.20	1.04 ± 0.21	0.67 ± 0.14
pen23m	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	0.78 ± 0.17	1.21 ± 0.27	1.17 ± 0.23	0.79 ± 0.16
hexa3m	0.00 ± 0.14	0.00 ± 0.13	0.65 ± 0.13	0.61 ± 0.15	1.15 ± 0.20	1.13 ± 0.23	0.79 ± 0.16
pa224m	0.00 ± 0.14	0.00 ± 0.13	0.65 ± 0.13	0.00 ± 0.12	3.44 ± 0.67	2.85 ± 0.57	1.37 ± 0.28
n_hept	2.35 ± 0.32	6.46 ± 7.41	0.62 ± 0.18	0.63 ± 0.15	0.74 ± 0.13	0.79 ± 0.15	0.65 ± 0.14
mecyhx	0.00 ± 0.14	0.29 ± 0.85	0.18 ± 0.03	0.36 ± 0.15	0.34 ± 0.07	0.47 ± 0.09	0.00 ± 0.15
pa234m	0.00 ± 0.14	0.00 ± 0.13	0.11 ± 0.02	0.65 ± 0.15	1.35 ± 0.27	1.45 ± 0.28	1.21 ± 0.24
tolue	2.85 ± 1.60	5.45 ± 5.85	1.96 ± 1.20	20.23 ± 3.04	8.63 ± 1.75	8.84 ± 1.78	5.01 ± 1.01
hep2me	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	0.25 ± 0.12	0.47 ± 0.07	0.59 ± 0.11	0.67 ± 0.14
hep3me	0.00 ± 0.14	0.00 ± 0.13	0.10 ± 0.02	0.24 ± 0.12	0.74 ± 0.13	0.91 ± 0.19	0.77 ± 0.16
n_oct	0.01 ± 0.03	3.02 ± 2.90	0.05 ± 0.03	0.36 ± 0.23	0.47 ± 0.07	0.57 ± 0.11	0.53 ± 0.10
etbz	0.44 ± 0.90	1.87 ± 3.39	0.10 ± 0.10	0.94 ± 0.18	2.90 ± 0.61	3.44 ± 0.68	1.37 ± 0.28
mp_xyl	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	2.24 ± 0.58	6.88 ± 1.35	8.10 ± 1.62	3.19 ± 0.63
styr	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	1.87 ± 0.77	0.40 ± 0.07	0.59 ± 0.11	0.00 ± 0.15
o_xyl	0.18 ± 0.55	1.26 ± 4.08	0.06 ± 0.02	1.02 ± 0.21	2.29 ± 0.47	2.80 ± 0.57	1.17 ± 0.24
n_non	0.06 ± 0.17	1.25 ± 1.03	0.00 ± 0.16	0.41 ± 0.15	0.00 ± 0.12	0.00 ± 0.12	0.00 ± 0.15
iprbz	0.07 ± 0.10	0.12 ± 0.40	0.02 ± 0.02	0.11 ± 0.12	0.00 ± 0.12	0.00 ± 0.12	0.00 ± 0.15
n_prbz	0.00 ± 0.14	0.00 ± 0.13	0.00 ± 0.16	0.28 ± 0.12	0.40 ± 0.07	0.53 ± 0.11	0.34 ± 0.06
m_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.63 ± 0.15	1.75 ± 0.34	2.21 ± 0.43	0.63 ± 0.12
p_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.12	0.74 ± 0.13	0.96 ± 0.19	0.49 ± 0.10
bz135m	0.00 ± 0.14	0.00 ± 0.13	0.03 ± 0.16	0.59 ± 0.15	0.74 ± 0.13	0.98 ± 0.19	0.42 ± 0.08
o_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.25 ± 0.12	0.61 ± 0.13	0.76 ± 0.15	0.00 ± 0.15
bz124m	0.51 ± 1.37	1.46 ± 4.11	0.08 ± 0.03	1.12 ± 0.21	2.02 ± 0.40	2.59 ± 0.51	0.83 ± 0.16
n_dec	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.73 ± 0.32	0.00 ± 0.12	0.00 ± 0.12	0.00 ± 0.15
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.40 ± 0.07	0.53 ± 0.11	0.00 ± 0.15
detbz1	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.12	0.00 ± 0.12	0.00 ± 0.12	0.00 ± 0.15
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.12	0.00 ± 0.12	0.00 ± 0.15
n_unde	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.43 ± 0.13	0.00 ± 0.12	0.00 ± 0.12	0.00 ± 0.15
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	11.19 ± 2.48	9.17 ± 0.40	12.18 ± 0.51	11.27 ± 0.95
unid	38.27 ± 16.11	32.61 ± 44.86	56.15 ± 13.38	41.00 ± 6.16	6.47 ± 4.32	8.39 ± 4.25	29.90 ± 9.37
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.12	0.00 ± 0.12	1.92 ± 0.38
tnmoc	138.27 ± 13.83	132.61 ± 13.26	156.15 ± 15.62	152.19 ± 15.22	115.64 ± 11.56	120.57 ± 12.06	141.17 ± 14.12

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile	P092 ACHS G	P093 ACHsoak G	P094 ACRunLs G	P095 ACST G	P096 AOCComp G	P097 AOCS G	P098 AODiurn G
ethene	5.93 ± 1.20	0.00 ± 0.17	0.00 ± 0.12	5.52 ± 1.16	8.88 ± 1.79	9.57 ± 1.91	0.00 ± 0.14
acetyl	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	4.70 ± 0.93	8.47 ± 1.70	0.00 ± 0.14
ethane	5.16 ± 1.03	0.00 ± 0.17	0.00 ± 0.12	11.05 ± 2.18	5.55 ± 1.10	2.91 ± 0.58	0.01 ± 0.00
prope	2.67 ± 0.52	0.00 ± 0.17	0.00 ± 0.12	2.47 ± 0.44	3.24 ± 0.66	3.97 ± 0.79	0.00 ± 0.14
n_prop	0.00 ± 0.14	0.75 ± 0.16	0.00 ± 0.12	2.18 ± 0.44	0.30 ± 0.05	0.21 ± 0.05	0.97 ± 0.19
i_buta	2.67 ± 0.52	2.01 ± 0.40	4.33 ± 0.87	0.00 ± 0.16	0.22 ± 0.05	0.17 ± 0.03	1.80 ± 0.36
lbutle	2.06 ± 0.32	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	2.06 ± 0.24	2.60 ± 0.29	0.00 ± 0.14
n_buta	11.18 ± 2.24	17.54 ± 3.51	67.36 ± 13.47	7.41 ± 1.45	8.41 ± 1.68	4.48 ± 0.89	38.57 ± 7.71
t2bute	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	0.36 ± 0.08	0.48 ± 0.09	0.00 ± 0.14
c2bute	1.38 ± 0.26	1.78 ± 0.36	0.00 ± 0.12	4.36 ± 0.87	0.19 ± 0.03	0.26 ± 0.06	0.00 ± 0.14
ipenta	6.96 ± 1.38	7.80 ± 1.56	7.28 ± 1.46	5.09 ± 1.02	6.13 ± 1.24	3.54 ± 0.71	13.60 ± 2.72
pentel	0.00 ± 0.14	1.05 ± 0.22	0.49 ± 0.10	0.00 ± 0.16	0.14 ± 0.03	0.23 ± 0.05	0.58 ± 0.11
n_pent	4.21 ± 0.86	5.94 ± 1.18	2.65 ± 0.53	4.94 ± 1.02	4.40 ± 0.88	2.67 ± 0.54	8.30 ± 1.65
i_pren	0.00 ± 0.14	1.13 ± 0.22	0.00 ± 0.12	0.00 ± 0.16	0.25 ± 0.05	0.34 ± 0.07	0.00 ± 0.14
t2pene	0.00 ± 0.14	1.48 ± 0.30	0.90 ± 0.18	0.00 ± 0.16	0.33 ± 0.05	0.41 ± 0.08	1.42 ± 0.29
c2pene	0.00 ± 0.14	0.95 ± 0.20	0.52 ± 0.10	0.00 ± 0.16	0.14 ± 0.03	0.23 ± 0.05	0.86 ± 0.18
bu22dm	2.67 ± 0.52	1.42 ± 0.28	0.75 ± 0.15	3.05 ± 0.58	1.87 ± 0.38	1.08 ± 0.22	1.43 ± 0.29
cpenta	0.00 ± 0.14	0.79 ± 0.16	0.00 ± 0.12	0.00 ± 0.16	0.36 ± 0.08	0.24 ± 0.05	0.48 ± 0.10
bu23dm	2.32 ± 0.43	1.80 ± 0.36	0.73 ± 0.15	2.91 ± 0.58	2.06 ± 0.41	1.52 ± 0.31	1.58 ± 0.31
pena2m	4.90 ± 0.95	4.82 ± 0.97	2.35 ± 0.47	5.81 ± 1.16	5.33 ± 1.07	3.94 ± 0.79	5.10 ± 1.02
pena3m	2.67 ± 0.52	2.55 ± 0.51	0.90 ± 0.18	3.34 ± 0.73	2.75 ± 0.55	2.07 ± 0.41	2.04 ± 0.41
ple2me	0.00 ± 0.14	1.42 ± 0.28	0.00 ± 0.12	0.00 ± 0.16	0.11 ± 0.03	0.16 ± 0.03	0.34 ± 0.06
n_hex	2.49 ± 0.52	2.74 ± 0.55	1.44 ± 0.29	3.63 ± 0.73	2.56 ± 0.52	2.04 ± 0.41	1.89 ± 0.38
mcypna	1.55 ± 0.34	1.24 ± 0.26	0.00 ± 0.12	1.74 ± 0.29	0.93 ± 0.19	0.84 ± 0.17	0.71 ± 0.14
pen24m	1.46 ± 0.26	1.01 ± 0.20	0.91 ± 0.18	2.03 ± 0.44	0.96 ± 0.19	0.85 ± 0.17	0.54 ± 0.11
benze	6.79 ± 1.38	3.61 ± 0.73	0.54 ± 0.11	9.88 ± 2.03	4.40 ± 0.88	5.35 ± 1.07	1.48 ± 0.30
cyhexa	0.00 ± 0.14	0.51 ± 0.10	0.00 ± 0.12	0.00 ± 0.16	0.16 ± 0.03	0.21 ± 0.05	0.49 ± 0.10
hexa2m	1.55 ± 0.34	1.42 ± 0.28	0.56 ± 0.11	2.03 ± 0.44	1.18 ± 0.25	1.17 ± 0.23	0.71 ± 0.14
pen23m	1.89 ± 0.34	1.40 ± 0.28	1.31 ± 0.26	2.47 ± 0.44	1.65 ± 0.33	1.40 ± 0.28	0.63 ± 0.13
hexa3m	1.63 ± 0.34	1.38 ± 0.28	0.52 ± 0.10	2.33 ± 0.44	1.43 ± 0.27	1.33 ± 0.26	0.66 ± 0.14
pa224m	3.61 ± 0.69	1.97 ± 0.40	3.03 ± 0.61	4.80 ± 1.02	3.82 ± 0.77	3.29 ± 0.65	1.14 ± 0.23
n_hept	1.46 ± 0.26	1.44 ± 0.30	0.27 ± 0.05	1.74 ± 0.29	0.82 ± 0.16	1.04 ± 0.21	0.46 ± 0.09
mecyhx	0.00 ± 0.14	0.97 ± 0.20	0.00 ± 0.12	0.00 ± 0.16	0.38 ± 0.08	0.45 ± 0.09	0.33 ± 0.06
pa234m	2.41 ± 0.52	1.76 ± 0.36	1.88 ± 0.38	0.00 ± 0.16	1.62 ± 0.33	1.62 ± 0.32	0.63 ± 0.13
tolue	5.85 ± 1.20	10.82 ± 2.17	1.29 ± 0.26	5.38 ± 1.02	5.52 ± 1.10	7.20 ± 1.44	4.41 ± 0.88
hep2me	0.86 ± 0.17	0.67 ± 0.14	0.00 ± 0.12	0.00 ± 0.16	0.66 ± 0.14	0.72 ± 0.15	0.34 ± 0.06
hep3me	1.20 ± 0.26	1.07 ± 0.22	0.00 ± 0.12	0.00 ± 0.16	0.88 ± 0.16	0.96 ± 0.19	0.38 ± 0.08
n_oct	0.95 ± 0.17	0.63 ± 0.12	0.00 ± 0.12	0.00 ± 0.16	0.44 ± 0.08	0.54 ± 0.10	0.31 ± 0.06
etbz	1.89 ± 0.34	2.57 ± 0.51	0.00 ± 0.12	2.76 ± 0.58	2.06 ± 0.41	2.83 ± 0.56	1.23 ± 0.25
mp_xyl	4.04 ± 0.77	5.49 ± 1.11	0.00 ± 0.12	3.05 ± 0.58	4.84 ± 0.96	6.66 ± 1.33	2.75 ± 0.55
styr	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	0.33 ± 0.05	0.49 ± 0.10	0.00 ± 0.14
o_xyl	1.46 ± 0.26	2.13 ± 0.43	0.00 ± 0.12	0.00 ± 0.16	1.65 ± 0.33	2.24 ± 0.45	0.95 ± 0.19
n_non	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	0.11 ± 0.03	0.17 ± 0.03	0.00 ± 0.14
iprbz	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	0.00 ± 0.11	0.00 ± 0.12	0.00 ± 0.14
n_prbz	0.00 ± 0.14	0.45 ± 0.10	0.00 ± 0.12	0.00 ± 0.16	0.49 ± 0.11	0.49 ± 0.10	0.28 ± 0.05
m_etol	1.12 ± 0.26	1.07 ± 0.22	0.00 ± 0.12	0.00 ± 0.16	1.48 ± 0.30	1.75 ± 0.36	0.89 ± 0.18
p_etol	0.60 ± 0.09	0.65 ± 0.14	0.00 ± 0.12	0.00 ± 0.16	0.58 ± 0.11	0.84 ± 0.17	0.43 ± 0.09
bz135m	0.69 ± 0.17	0.57 ± 0.12	0.00 ± 0.12	0.00 ± 0.16	0.58 ± 0.11	0.80 ± 0.16	0.43 ± 0.09
o_etol	0.60 ± 0.09	0.49 ± 0.10	0.00 ± 0.12	0.00 ± 0.16	0.38 ± 0.08	0.58 ± 0.11	0.24 ± 0.05
bz124m	1.12 ± 0.26	1.54 ± 0.32	0.00 ± 0.12	0.00 ± 0.16	1.29 ± 0.25	3.01 ± 0.61	0.75 ± 0.15
n_dec	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	0.00 ± 0.11	0.00 ± 0.12	0.00 ± 0.14
bz123m	0.00 ± 0.14	0.57 ± 0.12	0.00 ± 0.12	0.00 ± 0.16	0.30 ± 0.05	0.52 ± 0.10	0.21 ± 0.04
detbz1	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	0.19 ± 0.03	0.22 ± 0.05	0.00 ± 0.14
detbz2	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	0.33 ± 0.05	0.48 ± 0.09	0.00 ± 0.14
n_unde	0.00 ± 0.14	0.00 ± 0.17	0.00 ± 0.12	0.00 ± 0.16	0.30 ± 0.05	0.50 ± 0.10	0.00 ± 0.14
other	6.10 ± 0.43	19.39 ± 0.81	2.36 ± 0.24	0.00 ± 0.16	8.05 ± 0.33	11.15 ± 0.42	13.89 ± 0.95
unid	32.33 ± 4.39	43.35 ± 5.27	14.77 ± 13.63	63.66 ± 4.80	1.40 ± 4.20	2.91 ± 4.21	18.25 ± 8.61
mtbe	0.00 ± 0.14	2.80 ± 0.55	0.00 ± 0.12	0.00 ± 0.16	0.25 ± 0.05	0.23 ± 0.05	1.57 ± 0.31
tnmoc	138.43 ± 13.84	162.74 ± 16.27	117.13 ± 11.71	163.66 ± 16.37	109.45 ± 10.95	114.06 ± 11.41	132.14 ± 13.21

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P099 AOHS G	P100 AOHsoak G	P101 AORunLs G	P102 AOST G	P103 BoCS_Tip G	P104 ColdSt G	P105 CStAD_D1 G
ethene	8.40 ± 1.69	0.40 ± 0.08	0.00 ± 0.11	5.43 ± 1.08	6.74 ± 0.87	5.36 ± 0.35	3.69 ± 0.38
acetyl	5.17 ± 1.03	0.09 ± 0.02	0.00 ± 0.11	0.00 ± 0.14	6.86 ± 0.68	10.92 ± 1.22	0.46 ± 0.08
ethane	4.59 ± 0.91	0.14 ± 0.03	0.00 ± 0.11	7.92 ± 1.57	0.90 ± 0.12	0.63 ± 0.05	14.51 ± 1.44
prope	3.15 ± 0.63	0.00 ± 0.14	0.00 ± 0.11	2.94 ± 0.58	3.99 ± 0.40	2.12 ± 0.13	0.42 ± 0.08
n_prop	0.38 ± 0.08	0.59 ± 0.12	0.17 ± 0.03	0.83 ± 0.17	0.12 ± 0.01	0.72 ± 0.04	2.42 ± 0.26
i_but	0.35 ± 0.08	0.64 ± 0.12	1.80 ± 0.36	0.66 ± 0.12	0.16 ± 0.03	0.69 ± 0.04	6.09 ± 0.62
lbutle	2.17 ± 0.24	0.00 ± 0.14	0.00 ± 0.11	1.78 ± 0.28	4.28 ± 0.25	0.72 ± 0.03	2.20 ± 0.22
n_but	7.54 ± 1.51	12.00 ± 2.39	58.59 ± 11.72	13.34 ± 2.65	1.29 ± 0.13	2.79 ± 0.17	7.56 ± 0.76
t2bute	0.48 ± 0.10	0.00 ± 0.14	0.00 ± 0.11	0.00 ± 0.14	0.50 ± 0.05	0.45 ± 0.01	0.20 ± 0.06
c2bute	0.40 ± 0.08	0.00 ± 0.14	0.00 ± 0.11	0.00 ± 0.14	0.39 ± 0.25	0.36 ± 0.02	0.22 ± 0.06
ipenta	5.70 ± 1.13	6.76 ± 1.35	17.72 ± 3.54	7.75 ± 1.53	6.45 ± 0.65	9.73 ± 0.32	11.12 ± 1.12
pentel	0.50 ± 0.10	0.33 ± 0.06	0.45 ± 0.09	0.00 ± 0.14	0.39 ± 0.04	0.40 ± 0.01	0.50 ± 0.08
n_pent	4.11 ± 0.83	5.58 ± 1.12	8.47 ± 1.69	5.39 ± 1.08	3.72 ± 0.37	7.06 ± 0.18	5.27 ± 0.54
i_pren	0.73 ± 0.15	0.00 ± 0.14	0.02 ± 0.00	0.00 ± 0.14	0.62 ± 0.06	0.26 ± 0.01	1.34 ± 0.14
t2pene	0.48 ± 0.10	1.12 ± 0.22	1.28 ± 0.26	0.46 ± 0.08	1.02 ± 0.10	0.00 ± 0.13	0.78 ± 0.10
c2pene	0.76 ± 0.15	0.64 ± 0.12	0.71 ± 0.14	0.00 ± 0.14	0.50 ± 0.05	0.49 ± 0.01	0.40 ± 0.08
bu22dm	1.64 ± 0.33	1.21 ± 0.25	1.42 ± 0.28	2.82 ± 0.58	0.66 ± 0.06	0.78 ± 0.02	0.54 ± 0.10
cpenta	0.43 ± 0.08	0.47 ± 0.09	0.15 ± 0.03	1.12 ± 0.21	0.48 ± 0.05	0.65 ± 0.03	0.56 ± 0.08
bu23dm	1.92 ± 0.38	1.71 ± 0.34	1.21 ± 0.24	3.07 ± 0.62	0.97 ± 0.10	0.00 ± 0.13	0.86 ± 0.10
pena2m	4.79 ± 0.96	5.70 ± 1.13	3.56 ± 0.71	6.55 ± 1.33	3.62 ± 0.36	4.74 ± 0.07	0.00 ± 0.06
pena3m	2.50 ± 0.50	2.77 ± 0.56	1.38 ± 0.28	3.36 ± 0.66	2.18 ± 0.22	2.79 ± 0.05	2.30 ± 0.24
ple2me	0.28 ± 0.05	0.44 ± 0.09	0.10 ± 0.02	0.00 ± 0.14	0.21 ± 0.03	0.00 ± 0.10	0.00 ± 0.10
n_hex	2.30 ± 0.45	2.97 ± 0.59	1.09 ± 0.22	2.90 ± 0.58	2.34 ± 0.23	4.48 ± 0.01	2.53 ± 0.26
mcypna	0.91 ± 0.18	1.21 ± 0.25	0.21 ± 0.04	1.99 ± 0.41	1.33 ± 0.13	1.54 ± 0.02	1.18 ± 0.14
pen24m	0.86 ± 0.18	0.90 ± 0.19	0.13 ± 0.03	1.08 ± 0.21	1.30 ± 0.13	0.65 ± 0.01	0.00 ± 0.06
benze	3.71 ± 0.73	3.96 ± 0.79	0.11 ± 0.02	2.16 ± 0.41	3.68 ± 0.37	3.31 ± 0.00	3.39 ± 0.34
cyhexa	0.55 ± 0.10	0.45 ± 0.09	0.04 ± 0.01	0.58 ± 0.12	0.43 ± 0.04	0.55 ± 0.00	0.54 ± 0.08
hexa2m	1.03 ± 0.20	1.27 ± 0.25	0.20 ± 0.04	1.49 ± 0.29	1.51 ± 0.16	1.59 ± 0.00	1.02 ± 0.12
pen23m	1.31 ± 0.25	1.40 ± 0.28	0.13 ± 0.03	2.45 ± 0.50	1.90 ± 0.19	0.72 ± 0.01	0.82 ± 0.10
hexa3m	1.26 ± 0.25	1.38 ± 0.28	0.18 ± 0.04	1.57 ± 0.33	1.67 ± 0.17	1.67 ± 0.00	2.40 ± 0.26
pa224m	3.33 ± 0.66	2.47 ± 0.50	0.30 ± 0.06	4.02 ± 0.79	4.77 ± 0.48	3.70 ± 0.06	2.69 ± 0.28
n_hept	0.81 ± 0.15	1.13 ± 0.23	0.13 ± 0.03	0.70 ± 0.12	1.19 ± 0.12	1.77 ± 0.02	0.94 ± 0.12
mecyhx	0.61 ± 0.13	0.73 ± 0.14	0.00 ± 0.11	1.08 ± 0.21	0.36 ± 0.08	0.92 ± 0.01	0.88 ± 0.12
pa234m	1.49 ± 0.30	1.48 ± 0.30	0.12 ± 0.02	2.86 ± 0.58	1.78 ± 0.18	1.74 ± 0.02	1.00 ± 0.12
tolue	4.72 ± 0.93	13.08 ± 2.61	0.17 ± 0.03	1.62 ± 0.33	10.68 ± 1.07	7.17 ± 0.10	6.33 ± 0.64
hep2me	0.55 ± 0.10	0.67 ± 0.14	0.05 ± 0.01	1.16 ± 0.25	0.57 ± 0.05	0.76 ± 0.01	0.62 ± 0.10
hep3me	0.83 ± 0.18	0.85 ± 0.17	0.07 ± 0.01	1.33 ± 0.25	0.72 ± 0.08	0.32 ± 0.01	0.24 ± 0.06
n_oct	0.50 ± 0.10	0.57 ± 0.11	0.02 ± 0.00	0.87 ± 0.17	0.45 ± 0.06	1.01 ± 0.02	0.52 ± 0.10
etbz	1.92 ± 0.38	4.07 ± 0.81	0.04 ± 0.01	0.87 ± 0.17	1.90 ± 0.19	1.54 ± 0.10	1.30 ± 0.14
mp_xyl	4.41 ± 0.88	9.54 ± 1.91	0.06 ± 0.01	1.70 ± 0.33	7.08 ± 0.71	5.79 ± 0.38	3.19 ± 0.32
styr	1.59 ± 0.33	0.00 ± 0.14	0.00 ± 0.11	0.00 ± 0.14	0.56 ± 0.06	0.27 ± 0.00	5.79 ± 0.58
o_xyl	1.77 ± 0.35	3.15 ± 0.64	0.00 ± 0.11	0.79 ± 0.17	2.42 ± 0.25	2.02 ± 0.13	1.46 ± 0.16
n_non	0.38 ± 0.08	0.25 ± 0.05	0.00 ± 0.11	0.00 ± 0.14	0.01 ± 0.03	0.78 ± 0.03	0.36 ± 0.06
iprbz	0.00 ± 0.15	0.00 ± 0.14	0.00 ± 0.11	0.00 ± 0.14	0.00 ± 0.01	0.20 ± 0.00	0.00 ± 0.06
n_prbz	1.08 ± 0.23	0.71 ± 0.14	0.00 ± 0.11	3.15 ± 0.62	0.39 ± 0.04	0.46 ± 0.02	0.50 ± 0.08
m_etol	1.44 ± 0.28	2.11 ± 0.42	0.00 ± 0.11	2.24 ± 0.46	1.68 ± 0.17	1.52 ± 0.08	0.00 ± 0.10
p_etol	0.83 ± 0.18	0.90 ± 0.19	0.00 ± 0.11	0.00 ± 0.14	0.72 ± 0.08	0.00 ± 0.13	0.00 ± 0.10
bz135m	0.66 ± 0.13	0.90 ± 0.19	0.00 ± 0.11	0.00 ± 0.14	0.72 ± 0.08	0.94 ± 0.05	0.48 ± 0.08
o_etol	0.96 ± 0.20	0.64 ± 0.12	0.00 ± 0.11	0.00 ± 0.14	0.56 ± 0.06	0.00 ± 0.13	0.00 ± 0.10
bz124m	1.66 ± 0.33	2.55 ± 0.51	0.00 ± 0.11	0.00 ± 0.14	2.35 ± 0.23	2.27 ± 0.14	0.34 ± 0.06
n_dec	0.00 ± 0.15	0.00 ± 0.14	0.00 ± 0.11	0.00 ± 0.14	0.00 ± 0.01	0.43 ± 0.02	0.00 ± 0.10
bz123m	0.73 ± 0.15	0.48 ± 0.09	0.00 ± 0.11	0.00 ± 0.14	0.48 ± 0.05	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.50 ± 0.10	0.00 ± 0.14	0.00 ± 0.11	0.00 ± 0.14	0.12 ± 0.03	0.00 ± 0.13	0.00 ± 0.10
detbz2	0.68 ± 0.13	0.00 ± 0.14	0.00 ± 0.11	0.00 ± 0.14	0.50 ± 0.05	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.43 ± 0.08	0.00 ± 0.14	0.00 ± 0.11	0.00 ± 0.14	0.00 ± 0.01	0.24 ± 0.04	0.00 ± 0.10
other	16.62 ± 0.66	16.78 ± 0.68	1.74 ± 0.18	7.38 ± 0.54	10.68 ± 1.07	0.00 ± 0.13	0.00 ± 0.10
unid	26.23 ± 3.93	20.36 ± 5.05	2.88 ± 0.29	35.97 ± 4.60	7.69 ± 1.24	0.00 ± 0.13	94.93 ± 2.55
mtbe	0.45 ± 0.10	3.20 ± 0.64	2.84 ± 0.57	0.00 ± 0.14	7.44 ± 0.75	0.00 ± 0.10	0.00 ± 0.10
tnmoc	142.85 ± 14.29	137.14 ± 13.71	104.62 ± 10.46	143.35 ± 14.33	118.37 ± 11.84	100.00 ± 10.00	194.93 ± 19.49

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P106 CStAD_D2 G	P107 CStAD_DC G	P108 CStAD_N1 G	P109 Exh_J G	P110 Exh_PBa G	P111 Exh_Tun G	P112 Exh801a G
ethene	6.08 ± 0.62	4.96 ± 2.13	8.86 ± 0.88	5.38 ± 0.81	6.39 ± 0.96	5.60 ± 0.46	12.97 ± 2.59
acetyl	1.58 ± 0.16	1.07 ± 0.88	0.86 ± 0.27	5.46 ± 1.43	3.78 ± 0.59	9.96 ± 1.23	3.64 ± 0.75
ethane	5.52 ± 0.55	9.72 ± 5.43	7.56 ± 0.81	0.99 ± 0.15	2.11 ± 0.56	0.88 ± 0.07	3.75 ± 0.76
prope	1.04 ± 0.11	0.75 ± 0.51	0.00 ± 0.22	2.08 ± 0.78	5.05 ± 2.32	2.30 ± 0.21	4.11 ± 0.82
n_prop	3.41 ± 0.33	2.96 ± 0.97	3.87 ± 0.50	3.17 ± 0.48	58.66 ± 8.80	2.72 ± 0.68	0.56 ± 0.17
i_buta	0.40 ± 0.04	3.07 ± 3.73	0.00 ± 0.47	0.89 ± 0.13	3.56 ± 1.70	1.21 ± 0.19	1.20 ± 0.27
lbut1e	0.00 ± 0.02	1.03 ± 1.46	0.00 ± 0.13	0.00 ± 0.01	0.00 ± 0.21	0.80 ± 0.12	1.12 ± 0.12
n_buta	3.50 ± 0.35	5.39 ± 2.36	1.91 ± 0.59	3.85 ± 0.58	18.12 ± 10.62	3.31 ± 0.34	8.43 ± 1.69
t2bute	0.46 ± 0.05	0.34 ± 0.21	0.41 ± 0.07	1.00 ± 0.46	1.65 ± 2.34	0.41 ± 0.04	0.29 ± 0.14
c2bute	0.42 ± 0.05	0.34 ± 0.17	0.40 ± 0.07	0.32 ± 0.05	0.06 ± 0.01	0.34 ± 0.04	0.77 ± 0.20
ipenta	8.84 ± 0.88	9.90 ± 0.71	6.43 ± 1.44	9.12 ± 1.37	0.57 ± 0.27	7.85 ± 0.95	6.46 ± 1.29
pentel	0.60 ± 0.07	0.56 ± 0.13	0.58 ± 0.09	0.44 ± 0.07	0.05 ± 0.01	0.39 ± 0.03	0.41 ± 0.16
n_pent	4.27 ± 0.42	4.74 ± 0.34	3.87 ± 0.67	4.80 ± 0.72	0.00 ± 0.21	6.25 ± 0.55	2.89 ± 0.59
i_pren	0.88 ± 0.09	1.09 ± 0.22	0.00 ± 0.20	0.24 ± 0.04	0.00 ± 0.21	0.23 ± 0.03	0.00 ± 0.13
t2pene	1.21 ± 0.12	1.01 ± 0.41	1.12 ± 0.20	1.00 ± 0.15	0.00 ± 0.21	0.00 ± 0.14	0.56 ± 0.17
c2pene	0.63 ± 0.07	0.52 ± 0.22	0.58 ± 0.11	0.51 ± 0.08	0.00 ± 0.21	0.39 ± 0.04	0.35 ± 0.14
bu22dm	0.35 ± 0.04	0.45 ± 0.09	0.45 ± 0.05	0.38 ± 0.06	0.00 ± 0.21	0.40 ± 0.03	0.58 ± 0.17
cpenta	0.53 ± 0.05	0.54 ± 0.06	0.50 ± 0.09	0.48 ± 0.07	0.00 ± 0.21	0.22 ± 0.01	0.27 ± 0.14
bu23dm	1.13 ± 0.11	0.99 ± 0.28	1.06 ± 0.18	1.23 ± 0.18	0.00 ± 0.21	0.00 ± 0.14	1.06 ± 0.25
pena2m	3.97 ± 0.40	2.12 ± 3.00	3.87 ± 0.61	3.48 ± 0.52	0.00 ± 0.21	3.77 ± 0.19	2.50 ± 0.52
pena3m	2.71 ± 0.26	2.53 ± 0.51	2.43 ± 0.43	2.17 ± 0.32	0.00 ± 0.21	2.34 ± 0.11	1.79 ± 0.38
pl2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.13
n_hex	2.16 ± 0.21	2.34 ± 0.17	2.09 ± 0.34	2.77 ± 0.42	0.00 ± 0.21	4.18 ± 0.15	1.20 ± 0.27
mcypna	1.32 ± 0.12	1.25 ± 0.21	1.33 ± 0.20	1.84 ± 0.28	0.00 ± 0.21	1.24 ± 0.04	1.20 ± 0.27
pen24m	1.04 ± 0.11	0.56 ± 0.79	1.19 ± 0.16	1.33 ± 0.20	0.00 ± 0.21	0.47 ± 0.01	1.07 ± 0.25
benze	3.66 ± 0.37	3.52 ± 0.52	3.38 ± 0.58	4.66 ± 0.70	0.00 ± 0.21	3.54 ± 0.19	5.13 ± 1.03
cyhexa	0.32 ± 0.04	0.41 ± 0.11	0.34 ± 0.05	0.93 ± 0.14	0.00 ± 0.21	0.46 ± 0.01	0.29 ± 0.14
hexa2m	1.62 ± 0.16	1.33 ± 0.54	1.64 ± 0.25	1.56 ± 0.23	0.00 ± 0.21	1.39 ± 0.03	0.99 ± 0.24
pen23m	0.77 ± 0.07	0.79 ± 0.06	0.77 ± 0.13	2.05 ± 0.31	0.00 ± 0.21	0.57 ± 0.01	0.99 ± 0.24
hexa3m	1.99 ± 0.19	2.19 ± 0.15	2.11 ± 0.31	1.73 ± 0.26	0.00 ± 0.21	1.53 ± 0.04	1.80 ± 0.38
pa224m	3.94 ± 0.39	3.35 ± 1.20	3.87 ± 0.59	0.00 ± 0.01	0.00 ± 0.21	1.85 ± 0.11	3.81 ± 0.77
n_hept	1.02 ± 0.11	0.99 ± 0.15	1.10 ± 0.16	1.68 ± 0.25	0.00 ± 0.21	1.72 ± 0.04	1.02 ± 0.24
mecyhx	0.44 ± 0.05	0.66 ± 0.24	0.41 ± 0.07	0.88 ± 0.13	0.00 ± 0.21	0.63 ± 0.03	0.84 ± 0.21
pa234m	1.81 ± 0.18	1.44 ± 0.71	1.94 ± 0.27	1.33 ± 0.20	0.00 ± 0.21	0.88 ± 0.07	0.22 ± 0.14
tolue	10.34 ± 1.04	8.46 ± 3.61	10.59 ± 1.58	10.71 ± 1.61	0.00 ± 0.21	7.48 ± 0.15	9.30 ± 1.86
hep2me	0.58 ± 0.05	0.60 ± 0.06	0.63 ± 0.09	0.57 ± 0.09	0.00 ± 0.21	0.86 ± 0.17	0.43 ± 0.16
hep3me	0.70 ± 0.07	0.49 ± 0.37	0.74 ± 0.11	0.72 ± 0.11	0.00 ± 0.21	0.81 ± 0.04	0.72 ± 0.20
n_oct	0.72 ± 0.07	0.64 ± 0.21	0.81 ± 0.11	0.55 ± 0.08	0.00 ± 0.21	1.20 ± 0.06	0.58 ± 0.17
etbz	2.41 ± 0.25	1.89 ± 0.95	2.54 ± 0.36	2.12 ± 0.32	0.00 ± 0.21	1.94 ± 0.44	1.03 ± 0.25
mp_xyl	7.30 ± 0.74	5.37 ± 3.41	7.54 ± 1.12	6.33 ± 0.95	0.00 ± 0.21	6.95 ± 1.42	4.35 ± 0.88
styr	0.84 ± 0.09	3.15 ± 3.20	0.88 ± 0.13	0.48 ± 0.07	0.00 ± 0.21	0.44 ± 0.03	0.00 ± 0.13
o_xyl	2.88 ± 0.28	2.21 ± 1.20	3.04 ± 0.43	2.55 ± 0.38	0.00 ± 0.21	2.48 ± 0.43	2.90 ± 0.60
n_non	0.21 ± 0.02	0.28 ± 0.07	0.20 ± 0.04	0.20 ± 0.03	0.00 ± 0.21	1.08 ± 0.07	0.41 ± 0.16
iprbz	0.25 ± 0.04	0.13 ± 0.19	0.25 ± 0.05	0.30 ± 0.05	0.00 ± 0.21	0.25 ± 0.01	0.00 ± 0.13
n_prbz	0.86 ± 0.09	0.69 ± 0.32	0.90 ± 0.13	0.60 ± 0.09	0.00 ± 0.21	0.62 ± 0.03	0.90 ± 0.22
m_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	1.77 ± 0.27	0.00 ± 0.21	2.06 ± 0.14	2.13 ± 0.21
p_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.38 ± 0.53	0.00 ± 0.21	0.00 ± 0.14	0.00 ± 0.13
bz135m	1.30 ± 0.12	0.92 ± 0.66	1.46 ± 0.20	1.00 ± 0.15	0.00 ± 0.21	1.34 ± 0.11	0.00 ± 0.13
o_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.68 ± 0.10	0.00 ± 0.21	0.00 ± 0.14	0.37 ± 0.04
bz124m	3.97 ± 0.40	2.27 ± 2.77	5.47 ± 0.58	2.84 ± 0.43	0.00 ± 0.21	3.24 ± 0.25	4.37 ± 0.88
n_dec	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.28 ± 0.04	0.00 ± 0.21	0.83 ± 0.06	0.22 ± 0.02
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.13
detbz1	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.01	0.00 ± 0.21	0.00 ± 0.14	0.00 ± 0.13
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.13
n_unde	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.18 ± 0.03	0.00 ± 0.21	0.58 ± 0.10	0.00 ± 0.13
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	10.65 ± 1.60	0.00 ± 0.21	0.00 ± 0.14	0.00 ± 0.13
unid	72.55 ± 2.16	82.98 ± 8.09	76.85 ± 3.37	16.66 ± 2.51	0.00 ± 0.21	0.00 ± 0.14	33.14 ± 8.77
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.13
tnmoc	172.55 ± 17.26	182.98 ± 18.30	176.85 ± 17.68	127.32 ± 12.73	100.00 ± 10.00	100.00 ± 10.00	133.14 ± 13.31

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P113 OCHiComp G	P114 OCL10H90 G	P115 OCL20H80 G	P116 OCL30H70 G	P117 OCL40H60 G	P118 OCL50H50 G	P119 OCL60H40 G
ethene	5.95 ± 4.27	6.32 ± 4.20	6.69 ± 4.13	7.06 ± 4.07	7.41 ± 4.01	7.76 ± 3.95	8.10 ± 3.89
acetyl	2.20 ± 1.65	1.96 ± 1.47	1.73 ± 1.30	1.50 ± 1.13	1.27 ± 0.96	1.05 ± 0.80	0.84 ± 0.63
ethane	0.58 ± 0.41	1.45 ± 0.74	2.29 ± 1.07	3.12 ± 1.39	3.93 ± 1.70	4.73 ± 2.01	5.51 ± 2.32
prope	2.62 ± 1.66	2.80 ± 1.70	2.97 ± 1.74	3.13 ± 1.78	3.30 ± 1.82	3.46 ± 1.85	3.62 ± 1.89
n_prop	0.08 ± 0.03	0.08 ± 0.04	0.09 ± 0.05	0.10 ± 0.06	0.11 ± 0.06	0.11 ± 0.07	0.12 ± 0.08
i_buta	4.73 ± 3.61	4.25 ± 3.23	3.78 ± 2.86	3.32 ± 2.50	2.87 ± 2.14	2.42 ± 1.79	1.99 ± 1.45
lbut1e	3.20 ± 1.71	3.44 ± 1.70	3.68 ± 1.69	3.91 ± 1.67	4.14 ± 1.66	4.36 ± 1.65	4.58 ± 1.64
n_buta	1.50 ± 0.41	1.47 ± 0.43	1.45 ± 0.46	1.42 ± 0.48	1.39 ± 0.51	1.36 ± 0.53	1.33 ± 0.55
t2bute	0.25 ± 0.08	0.25 ± 0.08	0.26 ± 0.09	0.26 ± 0.09	0.27 ± 0.09	0.27 ± 0.10	0.28 ± 0.10
c2bute	0.23 ± 0.05	0.23 ± 0.06	0.24 ± 0.08	0.24 ± 0.09	0.25 ± 0.10	0.25 ± 0.11	0.26 ± 0.12
ipenta	7.03 ± 1.18	7.38 ± 1.34	7.71 ± 1.50	8.05 ± 1.65	8.37 ± 1.80	8.69 ± 1.94	9.00 ± 2.09
pentel	0.31 ± 0.09	0.30 ± 0.10	0.29 ± 0.11	0.28 ± 0.11	0.27 ± 0.12	0.26 ± 0.13	0.25 ± 0.14
n_pent	2.55 ± 0.74	2.59 ± 0.76	2.62 ± 0.79	2.65 ± 0.81	2.68 ± 0.84	2.71 ± 0.86	2.74 ± 0.88
i_pren	0.02 ± 0.01	0.02 ± 0.01	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.01	0.01 ± 0.00
t2pene	0.59 ± 0.22	0.54 ± 0.21	0.50 ± 0.20	0.46 ± 0.20	0.42 ± 0.19	0.38 ± 0.19	0.35 ± 0.18
c2pene	0.29 ± 0.09	0.27 ± 0.09	0.25 ± 0.09	0.24 ± 0.10	0.23 ± 0.10	0.21 ± 0.10	0.20 ± 0.10
bu22dm	0.34 ± 0.35	0.34 ± 0.33	0.33 ± 0.31	0.33 ± 0.30	0.33 ± 0.28	0.33 ± 0.26	0.33 ± 0.24
cpenta	0.47 ± 0.15	0.46 ± 0.15	0.45 ± 0.15	0.44 ± 0.15	0.43 ± 0.16	0.42 ± 0.16	0.41 ± 0.16
bu23dm	1.10 ± 0.11	1.13 ± 0.15	1.16 ± 0.18	1.20 ± 0.22	1.23 ± 0.25	1.26 ± 0.28	1.29 ± 0.31
pena2m	3.57 ± 0.85	3.72 ± 1.32	3.87 ± 1.78	4.01 ± 2.23	4.15 ± 2.68	4.29 ± 3.11	4.42 ± 3.54
pena3m	2.16 ± 0.55	2.26 ± 0.64	2.37 ± 0.73	2.47 ± 0.82	2.58 ± 0.91	2.68 ± 0.99	2.77 ± 1.08
pie2me	0.24 ± 0.13	0.23 ± 0.14	0.21 ± 0.16	0.20 ± 0.17	0.19 ± 0.19	0.18 ± 0.20	0.17 ± 0.22
n_hex	1.70 ± 0.50	1.73 ± 0.50	1.75 ± 0.49	1.78 ± 0.49	1.80 ± 0.48	1.82 ± 0.48	1.84 ± 0.48
mecypna	2.81 ± 1.02	2.80 ± 0.99	2.79 ± 0.96	2.78 ± 0.93	2.78 ± 0.90	2.77 ± 0.87	2.76 ± 0.85
pen24m	1.16 ± 0.47	1.15 ± 0.50	1.14 ± 0.53	1.13 ± 0.56	1.12 ± 0.59	1.11 ± 0.62	1.11 ± 0.65
benze	3.49 ± 1.63	4.38 ± 2.11	5.24 ± 2.58	6.09 ± 3.04	6.92 ± 3.49	7.73 ± 3.94	8.53 ± 4.37
cyhexa	0.79 ± 0.26	0.76 ± 0.25	0.73 ± 0.24	0.71 ± 0.23	0.68 ± 0.21	0.66 ± 0.20	0.63 ± 0.19
hexa2m	1.64 ± 0.23	1.66 ± 0.26	1.68 ± 0.28	1.70 ± 0.30	1.72 ± 0.32	1.74 ± 0.35	1.76 ± 0.37
pen23m	1.97 ± 0.91	1.98 ± 0.98	1.99 ± 1.06	2.00 ± 1.13	2.01 ± 1.20	2.02 ± 1.27	2.03 ± 1.34
hexa3m	1.68 ± 0.22	1.72 ± 0.24	1.75 ± 0.26	1.79 ± 0.28	1.82 ± 0.30	1.86 ± 0.31	1.89 ± 0.33
pa224m	3.50 ± 1.13	3.54 ± 1.32	3.58 ± 1.50	3.62 ± 1.68	3.66 ± 1.85	3.69 ± 2.02	3.73 ± 2.19
n_hept	1.20 ± 0.20	1.18 ± 0.22	1.17 ± 0.23	1.16 ± 0.25	1.15 ± 0.26	1.13 ± 0.28	1.12 ± 0.29
mecyhx	1.18 ± 0.51	1.19 ± 0.49	1.20 ± 0.46	1.21 ± 0.44	1.22 ± 0.42	1.23 ± 0.40	1.23 ± 0.38
pa234m	1.21 ± 0.66	1.20 ± 0.70	1.19 ± 0.73	1.18 ± 0.77	1.17 ± 0.81	1.16 ± 0.84	1.15 ± 0.88
tolue	10.35 ± 2.39	9.94 ± 2.59	9.54 ± 2.79	9.15 ± 2.99	8.76 ± 3.18	8.39 ± 3.37	8.02 ± 3.55
hep2me	0.76 ± 0.18	0.78 ± 0.21	0.79 ± 0.23	0.81 ± 0.26	0.82 ± 0.28	0.83 ± 0.31	0.85 ± 0.33
hep3me	0.96 ± 0.29	0.97 ± 0.31	0.99 ± 0.32	1.00 ± 0.34	1.02 ± 0.35	1.03 ± 0.37	1.04 ± 0.38
n_oct	0.61 ± 0.18	0.61 ± 0.20	0.62 ± 0.22	0.62 ± 0.24	0.63 ± 0.27	0.63 ± 0.29	0.64 ± 0.31
etbz	2.02 ± 0.27	1.87 ± 0.30	1.72 ± 0.34	1.57 ± 0.37	1.43 ± 0.40	1.29 ± 0.44	1.15 ± 0.47
mp_xyl	8.22 ± 1.09	7.55 ± 1.19	6.90 ± 1.30	6.27 ± 1.41	5.64 ± 1.51	5.03 ± 1.61	4.43 ± 1.71
styr	0.37 ± 0.15	0.37 ± 0.15	0.37 ± 0.16	0.37 ± 0.17	0.37 ± 0.17	0.37 ± 0.18	0.37 ± 0.19
o_xyl	3.16 ± 0.47	2.89 ± 0.49	2.62 ± 0.51	2.36 ± 0.53	2.10 ± 0.55	1.85 ± 0.57	1.60 ± 0.59
n_non	0.17 ± 0.02	0.17 ± 0.04	0.17 ± 0.05	0.17 ± 0.07	0.17 ± 0.08	0.17 ± 0.10	0.17 ± 0.11
iprbz	0.11 ± 0.14	0.11 ± 0.13	0.10 ± 0.13	0.10 ± 0.12	0.09 ± 0.12	0.09 ± 0.11	0.08 ± 0.10
n_prbz	0.56 ± 0.12	0.50 ± 0.11	0.45 ± 0.11	0.40 ± 0.10	0.35 ± 0.10	0.30 ± 0.09	0.25 ± 0.08
m_etol	2.27 ± 0.32	2.09 ± 0.37	1.91 ± 0.41	1.73 ± 0.45	1.55 ± 0.49	1.38 ± 0.53	1.21 ± 0.56
p_etol	1.01 ± 0.17	0.98 ± 0.20	0.95 ± 0.23	0.92 ± 0.26	0.89 ± 0.29	0.86 ± 0.32	0.83 ± 0.35
bz135m	1.19 ± 0.21	1.07 ± 0.19	0.94 ± 0.18	0.82 ± 0.17	0.70 ± 0.15	0.59 ± 0.14	0.47 ± 0.13
o_etol	0.81 ± 0.09	0.74 ± 0.09	0.66 ± 0.09	0.58 ± 0.09	0.51 ± 0.09	0.44 ± 0.10	0.37 ± 0.10
bz124m	3.86 ± 0.52	3.45 ± 0.47	3.04 ± 0.43	2.64 ± 0.39	2.25 ± 0.34	1.86 ± 0.30	1.49 ± 0.26
n_dec	0.11 ± 0.05	0.12 ± 0.06	0.12 ± 0.06	0.13 ± 0.07	0.13 ± 0.08	0.14 ± 0.08	0.14 ± 0.09
bz123m	0.94 ± 0.12	0.84 ± 0.11	0.74 ± 0.10	0.65 ± 0.10	0.55 ± 0.09	0.46 ± 0.08	0.37 ± 0.07
detbz1	0.10 ± 0.03	0.09 ± 0.04	0.08 ± 0.04	0.08 ± 0.04	0.07 ± 0.05	0.06 ± 0.05	0.06 ± 0.05
detbz2	0.26 ± 0.05	0.25 ± 0.07	0.23 ± 0.08	0.22 ± 0.10	0.20 ± 0.11	0.19 ± 0.13	0.18 ± 0.14
n_unde	0.06 ± 0.05	0.06 ± 0.05	0.07 ± 0.06	0.08 ± 0.06	0.08 ± 0.07	0.09 ± 0.07	0.10 ± 0.07
other	18.58 ± 3.68	18.37 ± 4.04	18.16 ± 4.39	17.96 ± 4.73	17.76 ± 5.07	17.56 ± 5.41	17.37 ± 5.73
unid	6.46 ± 2.09	5.86 ± 1.98	5.26 ± 1.88	4.68 ± 1.78	4.11 ± 1.68	3.56 ± 1.58	3.01 ± 1.48
mtbe	8.45 ± 4.48	7.94 ± 4.36	7.44 ± 4.24	6.95 ± 4.12	6.47 ± 4.00	5.99 ± 3.89	5.53 ± 3.78
tnmoc	125.04 ± 12.50	124.22 ± 12.42	123.42 ± 12.34	122.64 ± 12.26	121.87 ± 12.19	121.11 ± 12.11	120.37 ± 12.04

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P120 OCL70H30 G	P121 OCL80H20 G	P122 OCL90H10 G	P123 OCLoComp G	P124 Tu_Cal G	P125 Tu_Cal0 G	P126 Tu_Cal1 G
ethene	8.43 ± 3.83	8.76 ± 3.77	9.08 ± 3.71	9.40 ± 3.66	7.67 ± 0.85	7.51 ± 0.65	8.04 ± 0.73
acetyl	0.62 ± 0.48	0.42 ± 0.32	0.21 ± 0.17	0.01 ± 0.02	4.29 ± 0.43	4.43 ± 0.32	4.74 ± 0.36
ethane	6.28 ± 2.61	7.03 ± 2.91	7.77 ± 3.19	8.49 ± 3.47	2.05 ± 0.24	2.14 ± 0.23	2.28 ± 0.26
prope	3.78 ± 1.93	3.93 ± 1.96	4.08 ± 1.99	4.23 ± 2.03	4.38 ± 0.45	4.41 ± 0.27	4.72 ± 0.31
n_prop	0.13 ± 0.09	0.14 ± 0.09	0.14 ± 0.10	0.15 ± 0.11	0.25 ± 0.07	0.10 ± 0.00	0.10 ± 0.00
i_buta	1.56 ± 1.11	1.14 ± 0.78	0.73 ± 0.46	0.33 ± 0.14	0.61 ± 0.10	0.63 ± 0.09	0.56 ± 0.10
lbut1e	4.79 ± 1.62	5.00 ± 1.61	5.21 ± 1.60	5.41 ± 1.59	3.75 ± 0.45	3.81 ± 0.41	3.99 ± 0.44
n_buta	1.31 ± 0.58	1.28 ± 0.60	1.26 ± 0.62	1.23 ± 0.64	2.49 ± 0.36	2.64 ± 0.27	2.34 ± 0.31
t2bute	0.28 ± 0.10	0.29 ± 0.10	0.29 ± 0.11	0.30 ± 0.11	0.62 ± 0.07	0.64 ± 0.06	0.66 ± 0.06
c2bute	0.26 ± 0.13	0.26 ± 0.14	0.27 ± 0.15	0.27 ± 0.16	0.37 ± 0.06	0.38 ± 0.03	0.38 ± 0.03
ipenta	9.31 ± 2.23	9.61 ± 2.37	9.91 ± 2.50	10.20 ± 2.64	10.07 ± 1.01	10.77 ± 0.34	9.40 ± 0.58
pentel	0.24 ± 0.15	0.23 ± 0.16	0.22 ± 0.17	0.21 ± 0.18	0.31 ± 0.05	0.26 ± 0.04	0.23 ± 0.04
n_pent	2.77 ± 0.91	2.80 ± 0.93	2.83 ± 0.95	2.86 ± 0.97	4.00 ± 0.40	4.19 ± 0.12	3.92 ± 0.15
i_pren	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.12	0.00 ± 0.05	0.01 ± 0.01	0.00 ± 0.00
t2pene	0.31 ± 0.18	0.27 ± 0.17	0.24 ± 0.16	0.20 ± 0.16	0.67 ± 0.07	0.70 ± 0.04	0.65 ± 0.05
c2pene	0.18 ± 0.11	0.17 ± 0.11	0.16 ± 0.11	0.14 ± 0.12	0.35 ± 0.06	0.35 ± 0.03	0.31 ± 0.03
bu22dm	0.33 ± 0.23	0.32 ± 0.21	0.32 ± 0.19	0.32 ± 0.18	0.84 ± 0.10	0.70 ± 0.05	0.68 ± 0.06
cpenta	0.41 ± 0.17	0.40 ± 0.17	0.39 ± 0.17	0.38 ± 0.17	0.43 ± 0.06	0.45 ± 0.01	0.43 ± 0.01
bu23dm	1.32 ± 0.35	1.35 ± 0.38	1.38 ± 0.41	1.41 ± 0.44	1.25 ± 0.14	1.32 ± 0.03	1.41 ± 0.05
pena2m	4.56 ± 3.96	4.69 ± 4.37	4.81 ± 4.77	4.94 ± 5.17	3.77 ± 0.38	3.91 ± 0.16	3.79 ± 0.17
pena3m	2.87 ± 1.16	2.97 ± 1.24	3.06 ± 1.32	3.15 ± 1.40	2.28 ± 0.24	2.38 ± 0.05	2.32 ± 0.06
ple2me	0.16 ± 0.23	0.14 ± 0.25	0.13 ± 0.26	0.12 ± 0.27	0.21 ± 0.10	0.20 ± 0.09	0.20 ± 0.10
n_hex	1.86 ± 0.47	1.89 ± 0.47	1.91 ± 0.46	1.93 ± 0.46	2.18 ± 0.22	2.28 ± 0.03	2.26 ± 0.03
mcpyna	2.75 ± 0.82	2.74 ± 0.79	2.74 ± 0.77	2.73 ± 0.74	1.19 ± 0.12	1.24 ± 0.04	1.22 ± 0.04
pen24m	1.10 ± 0.68	1.09 ± 0.70	1.08 ± 0.73	1.07 ± 0.75	1.40 ± 0.15	1.48 ± 0.03	1.46 ± 0.03
benze	9.32 ± 4.80	10.09 ± 5.22	10.84 ± 5.63	11.58 ± 6.03	3.54 ± 0.36	3.56 ± 0.15	3.75 ± 0.18
cyhexa	0.61 ± 0.18	0.58 ± 0.17	0.56 ± 0.16	0.54 ± 0.16	0.43 ± 0.06	0.45 ± 0.00	0.45 ± 0.01
hexa2m	1.78 ± 0.39	1.80 ± 0.41	1.82 ± 0.43	1.83 ± 0.45	1.36 ± 0.15	1.47 ± 0.03	1.49 ± 0.04
pen23m	2.03 ± 1.40	2.04 ± 1.47	2.05 ± 1.53	2.06 ± 1.60	2.43 ± 0.25	2.54 ± 0.03	2.54 ± 0.03
hexa3m	1.92 ± 0.35	1.95 ± 0.37	1.99 ± 0.38	2.02 ± 0.40	1.50 ± 0.16	1.43 ± 0.04	1.43 ± 0.04
pa224m	3.76 ± 2.36	3.80 ± 2.52	3.83 ± 2.68	3.87 ± 2.83	5.62 ± 0.57	5.94 ± 0.17	5.92 ± 0.18
n_hept	1.11 ± 0.30	1.10 ± 0.32	1.09 ± 0.33	1.07 ± 0.34	1.04 ± 0.11	1.06 ± 0.01	1.07 ± 0.01
mecyhx	1.24 ± 0.36	1.25 ± 0.34	1.26 ± 0.32	1.27 ± 0.30	0.68 ± 0.09	0.71 ± 0.02	0.72 ± 0.02
pa234m	1.14 ± 0.91	1.14 ± 0.94	1.13 ± 0.98	1.12 ± 1.01	1.91 ± 0.20	2.03 ± 0.08	2.04 ± 0.09
tolue	7.65 ± 3.74	7.29 ± 3.91	6.94 ± 4.09	6.60 ± 4.26	7.59 ± 0.75	7.82 ± 0.30	8.00 ± 0.33
hep2me	0.86 ± 0.36	0.87 ± 0.38	0.89 ± 0.40	0.90 ± 0.42	0.59 ± 0.07	0.63 ± 0.02	0.64 ± 0.03
hep3me	1.06 ± 0.40	1.07 ± 0.41	1.08 ± 0.43	1.09 ± 0.44	0.61 ± 0.10	0.61 ± 0.09	0.62 ± 0.10
n_oct	0.64 ± 0.33	0.65 ± 0.35	0.65 ± 0.37	0.65 ± 0.39	0.53 ± 0.07	0.55 ± 0.04	0.56 ± 0.05
etbz	1.02 ± 0.50	0.89 ± 0.53	0.76 ± 0.56	0.63 ± 0.59	1.32 ± 0.14	1.19 ± 0.10	1.21 ± 0.11
mp_xyl	3.84 ± 1.81	3.26 ± 1.90	2.69 ± 2.00	2.13 ± 2.09	5.16 ± 0.52	4.68 ± 0.29	4.77 ± 0.32
styr	0.37 ± 0.19	0.37 ± 0.20	0.37 ± 0.21	0.37 ± 0.21	0.30 ± 0.05	0.18 ± 0.05	0.18 ± 0.05
o_xyl	1.36 ± 0.61	1.12 ± 0.63	0.88 ± 0.64	0.65 ± 0.66	1.88 ± 0.20	1.72 ± 0.17	1.76 ± 0.18
n_non	0.17 ± 0.12	0.17 ± 0.14	0.17 ± 0.15	0.17 ± 0.16	0.27 ± 0.05	0.22 ± 0.02	0.22 ± 0.02
iprbz	0.08 ± 0.10	0.07 ± 0.09	0.07 ± 0.09	0.07 ± 0.08	0.11 ± 0.05	0.10 ± 0.02	0.10 ± 0.02
n_prbz	0.21 ± 0.08	0.16 ± 0.07	0.12 ± 0.07	0.07 ± 0.06	0.38 ± 0.06	0.32 ± 0.03	0.33 ± 0.04
m_etol	1.05 ± 0.60	0.89 ± 0.64	0.73 ± 0.68	0.57 ± 0.71	1.55 ± 0.16	1.35 ± 0.08	1.39 ± 0.09
p_etol	0.80 ± 0.38	0.77 ± 0.40	0.75 ± 0.43	0.72 ± 0.46	0.64 ± 0.07	0.59 ± 0.02	0.60 ± 0.02
bzl135m	0.36 ± 0.12	0.25 ± 0.10	0.14 ± 0.09	0.04 ± 0.08	0.88 ± 0.10	0.78 ± 0.03	0.81 ± 0.04
o_etol	0.30 ± 0.10	0.23 ± 0.10	0.16 ± 0.10	0.10 ± 0.10	0.51 ± 0.06	0.39 ± 0.05	0.40 ± 0.06
bzl124m	1.12 ± 0.22	0.75 ± 0.18	0.40 ± 0.14	0.05 ± 0.11	2.33 ± 0.24	1.92 ± 0.18	1.98 ± 0.19
n_dec	0.15 ± 0.10	0.15 ± 0.10	0.16 ± 0.11	0.16 ± 0.12	0.26 ± 0.11	0.08 ± 0.02	0.08 ± 0.02
bzl123m	0.28 ± 0.06	0.19 ± 0.06	0.10 ± 0.05	0.02 ± 0.04	0.59 ± 0.07	0.50 ± 0.01	0.52 ± 0.01
detbz1	0.05 ± 0.06	0.04 ± 0.06	0.04 ± 0.06	0.03 ± 0.07	0.09 ± 0.05	0.09 ± 0.05	0.10 ± 0.05
detbz2	0.16 ± 0.15	0.15 ± 0.17	0.14 ± 0.18	0.12 ± 0.19	0.37 ± 0.06	0.40 ± 0.03	0.42 ± 0.03
n_unde	0.10 ± 0.08	0.11 ± 0.08	0.11 ± 0.09	0.12 ± 0.09	0.31 ± 0.16	0.00 ± 0.13	0.00 ± 0.13
other	17.18 ± 6.05	16.99 ± 6.36	16.81 ± 6.67	16.63 ± 6.97	10.79 ± 1.08	12.62 ± 0.39	12.77 ± 0.42
unid	2.47 ± 1.39	1.94 ± 1.29	1.43 ± 1.20	0.92 ± 1.11	5.94 ± 0.59	6.38 ± 0.53	6.46 ± 0.57
mtbe	5.07 ± 3.67	4.63 ± 3.56	4.19 ± 3.46	3.76 ± 3.36	4.37 ± 0.43	4.70 ± 0.20	3.29 ± 0.53
tnmoc	119.65 ± 11.96	118.93 ± 11.89	118.24 ± 11.82	117.55 ± 11.75	116.73 ± 11.67	118.99 ± 11.90	119.23 ± 11.92

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P127 Tu_Cal2 G	P128 Tu_Lin G	P129 Tu_Lin0 G	P130 Tu_Lin1 G	P131 Tu_Lin2 G	P132 Tu_MchHD G	P133 Tu_MchLD G
ethene	9.08 ± 0.78	7.70 ± 0.42	7.17 ± 1.06	8.30 ± 0.24	9.71 ± 0.33	9.87 ± 2.81	7.26 ± 0.67
acetyl	5.35 ± 0.38	4.20 ± 0.31	4.51 ± 0.31	4.74 ± 0.42	5.55 ± 0.50	2.55 ± 1.71	2.48 ± 0.41
ethane	2.58 ± 0.28	1.72 ± 0.31	1.78 ± 0.36	2.13 ± 0.11	2.49 ± 0.14	1.18 ± 0.68	1.79 ± 0.16
prope	5.33 ± 0.32	3.47 ± 0.29	3.31 ± 0.55	3.87 ± 0.13	4.53 ± 0.17	3.99 ± 0.93	2.76 ± 0.22
n_prop	0.11 ± 0.00	0.25 ± 0.04	0.04 ± 0.05	0.06 ± 0.06	0.06 ± 0.06	2.22 ± 1.05	0.12 ± 0.25
i_buta	0.42 ± 0.11	0.87 ± 0.28	1.01 ± 0.42	0.63 ± 0.11	0.46 ± 0.12	0.27 ± 0.29	0.25 ± 0.07
lbut1e	4.36 ± 0.50	4.24 ± 0.20	4.50 ± 0.20	4.74 ± 0.13	5.36 ± 0.17	2.95 ± 0.55	1.84 ± 0.15
n_buta	1.74 ± 0.33	3.59 ± 1.06	4.30 ± 1.70	2.74 ± 0.16	2.04 ± 0.21	0.64 ± 1.58	2.14 ± 0.38
t2bute	0.71 ± 0.07	0.63 ± 0.13	0.73 ± 0.20	0.59 ± 0.04	0.64 ± 0.05	0.24 ± 0.44	0.42 ± 0.10
c2bute	0.37 ± 0.03	0.54 ± 0.04	0.59 ± 0.07	0.54 ± 0.05	0.56 ± 0.06	0.29 ± 0.11	0.31 ± 0.03
ipenta	6.68 ± 0.41	10.44 ± 1.42	12.42 ± 2.74	8.84 ± 1.09	5.19 ± 1.33	1.31 ± 3.43	10.57 ± 0.82
pente1	0.17 ± 0.04	0.55 ± 0.12	0.50 ± 0.09	0.41 ± 0.05	0.37 ± 0.06	0.89 ± 0.21	0.36 ± 0.05
n_pent	3.38 ± 0.14	3.58 ± 0.23	4.01 ± 0.48	3.27 ± 0.20	2.47 ± 0.24	1.52 ± 1.27	3.20 ± 0.30
i_pren	0.00 ± 0.12	0.00 ± 0.12	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.12	0.00 ± 0.30	0.36 ± 0.07
t2pene	0.54 ± 0.05	1.01 ± 0.12	1.15 ± 0.23	0.92 ± 0.02	0.83 ± 0.03	0.36 ± 0.38	0.71 ± 0.09
c2pene	0.25 ± 0.03	0.52 ± 0.06	0.57 ± 0.10	0.46 ± 0.02	0.40 ± 0.03	0.29 ± 0.19	0.42 ± 0.05
bu22dm	0.64 ± 0.06	0.94 ± 0.13	0.59 ± 0.42	0.85 ± 0.07	0.82 ± 0.08	2.63 ± 0.98	0.92 ± 0.23
cpenta	0.38 ± 0.01	0.38 ± 0.01	0.39 ± 0.02	0.36 ± 0.02	0.29 ± 0.03	0.32 ± 0.23	0.37 ± 0.06
bu23dm	1.60 ± 0.04	1.04 ± 0.01	1.19 ± 0.09	1.17 ± 0.03	1.37 ± 0.05	0.32 ± 0.62	1.27 ± 0.15
pena2m	3.56 ± 0.19	3.56 ± 0.08	3.87 ± 0.05	3.61 ± 0.06	3.27 ± 0.08	1.97 ± 1.08	3.42 ± 0.26
pena3m	2.19 ± 0.06	2.19 ± 0.14	2.43 ± 0.06	2.34 ± 0.03	2.18 ± 0.03	0.91 ± 0.68	1.92 ± 0.16
ple2me	0.18 ± 0.11	0.23 ± 0.03	0.22 ± 0.04	0.24 ± 0.02	0.22 ± 0.03	0.22 ± 0.19	0.18 ± 0.04
n_hex	2.24 ± 0.04	1.91 ± 0.23	2.08 ± 0.21	2.13 ± 0.14	2.07 ± 0.17	0.96 ± 0.60	1.56 ± 0.14
mcypna	1.19 ± 0.04	1.34 ± 0.12	1.47 ± 0.09	1.50 ± 0.02	1.51 ± 0.03	0.62 ± 0.48	1.18 ± 0.11
pen24m	1.43 ± 0.03	0.83 ± 0.06	0.93 ± 0.05	0.86 ± 0.06	0.71 ± 0.07	0.36 ± 0.27	0.82 ± 0.06
benze	4.14 ± 0.18	3.69 ± 0.27	3.74 ± 0.38	4.14 ± 0.11	4.70 ± 0.15	3.19 ± 1.52	4.90 ± 0.36
cyhexa	0.45 ± 0.01	0.31 ± 0.03	0.32 ± 0.04	0.31 ± 0.05	0.29 ± 0.06	0.23 ± 0.09	0.20 ± 0.02
hexa2m	1.53 ± 0.04	1.40 ± 0.18	1.66 ± 0.06	1.69 ± 0.02	1.77 ± 0.03	0.00 ± 0.11	0.00 ± 0.11
pen23m	2.53 ± 0.04	1.22 ± 0.07	1.27 ± 0.08	1.19 ± 0.05	0.95 ± 0.07	0.91 ± 0.37	0.99 ± 0.09
hexa3m	1.42 ± 0.04	1.46 ± 0.18	1.26 ± 0.39	1.50 ± 0.04	1.51 ± 0.04	2.31 ± 1.29	1.62 ± 0.31
pa224m	5.88 ± 0.21	4.20 ± 0.19	4.72 ± 0.09	4.45 ± 0.10	4.15 ± 0.12	1.48 ± 1.26	3.82 ± 0.30
n_hept	1.08 ± 0.01	0.89 ± 0.11	0.93 ± 0.12	1.00 ± 0.02	1.00 ± 0.02	0.57 ± 0.30	0.81 ± 0.07
mecyhx	0.74 ± 0.02	0.62 ± 0.11	0.65 ± 0.12	0.70 ± 0.12	0.73 ± 0.13	0.44 ± 0.27	0.48 ± 0.06
pa234m	2.07 ± 0.10	1.39 ± 0.11	1.59 ± 0.06	1.54 ± 0.07	1.49 ± 0.08	0.32 ± 0.44	1.37 ± 0.11
tolue	8.35 ± 0.36	8.49 ± 0.92	9.17 ± 0.84	9.78 ± 0.47	10.54 ± 0.56	4.50 ± 3.64	9.44 ± 0.87
hep2me	0.66 ± 0.03	0.55 ± 0.06	0.65 ± 0.02	0.65 ± 0.01	0.68 ± 0.01	0.00 ± 0.21	0.50 ± 0.05
hep3me	0.63 ± 0.11	0.61 ± 0.08	0.63 ± 0.09	0.69 ± 0.01	0.71 ± 0.01	0.44 ± 0.22	0.53 ± 0.05
n_oct	0.58 ± 0.05	0.46 ± 0.02	0.49 ± 0.02	0.50 ± 0.01	0.52 ± 0.01	0.31 ± 0.17	0.35 ± 0.04
etbz	1.26 ± 0.12	1.45 ± 0.12	1.15 ± 0.40	1.44 ± 0.02	1.55 ± 0.03	2.85 ± 1.98	2.33 ± 0.47
mp_xyl	4.95 ± 0.35	5.38 ± 0.46	4.14 ± 1.56	5.23 ± 0.06	5.54 ± 0.08	10.99 ± 6.84	7.91 ± 1.63
styr	0.20 ± 0.05	0.20 ± 0.09	0.07 ± 0.05	0.10 ± 0.03	0.11 ± 0.03	1.85 ± 0.73	1.04 ± 0.17
o_xyl	1.82 ± 0.20	2.00 ± 0.13	1.62 ± 0.47	1.95 ± 0.03	2.07 ± 0.04	3.73 ± 2.27	2.90 ± 0.54
n_non	0.23 ± 0.02	0.33 ± 0.11	0.18 ± 0.03	0.17 ± 0.02	0.17 ± 0.03	1.12 ± 0.35	0.25 ± 0.08
iprbz	0.11 ± 0.02	0.09 ± 0.03	0.05 ± 0.01	0.05 ± 0.01	0.06 ± 0.01	0.33 ± 0.17	0.20 ± 0.04
n_prbz	0.35 ± 0.04	0.44 ± 0.03	0.30 ± 0.13	0.40 ± 0.02	0.43 ± 0.03	1.06 ± 0.68	0.73 ± 0.16
m_etol	1.48 ± 0.09	1.73 ± 0.14	1.20 ± 0.56	1.62 ± 0.08	1.77 ± 0.10	4.15 ± 2.88	3.04 ± 0.69
p_etol	0.64 ± 0.03	0.73 ± 0.04	0.59 ± 0.15	0.71 ± 0.04	0.77 ± 0.05	1.40 ± 0.73	0.99 ± 0.17
bz135m	0.86 ± 0.04	0.98 ± 0.06	0.75 ± 0.13	0.86 ± 0.05	0.94 ± 0.06	2.09 ± 1.09	1.34 ± 0.26
o_etol	0.42 ± 0.07	0.59 ± 0.05	0.32 ± 0.23	0.49 ± 0.03	0.53 ± 0.03	2.00 ± 1.12	1.16 ± 0.27
bz124m	2.09 ± 0.22	2.75 ± 0.30	1.74 ± 1.09	2.54 ± 0.19	2.78 ± 0.22	7.46 ± 4.64	5.00 ± 1.11
n_dec	0.09 ± 0.03	0.50 ± 0.28	0.09 ± 0.04	0.07 ± 0.01	0.07 ± 0.01	2.62 ± 0.64	0.26 ± 0.17
bz123m	0.56 ± 0.01	0.68 ± 0.05	0.48 ± 0.14	0.59 ± 0.05	0.66 ± 0.05	1.67 ± 1.04	1.20 ± 0.27
detbz1	0.11 ± 0.06	0.14 ± 0.12	0.18 ± 0.17	0.07 ± 0.02	0.08 ± 0.02	0.00 ± 0.11	0.00 ± 0.11
detbz2	0.46 ± 0.04	0.44 ± 0.02	0.53 ± 0.06	0.51 ± 0.03	0.58 ± 0.03	0.00 ± 0.11	0.00 ± 0.11
n_unde	0.00 ± 0.12	0.77 ± 0.50	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.12	5.32 ± 1.04	0.18 ± 0.28
other	13.09 ± 0.46	5.61 ± 0.17	12.80 ± 0.53	12.49 ± 0.63	12.85 ± 0.73	8.51 ± 0.85	8.09 ± 0.81
unid	6.61 ± 0.64	7.50 ± 0.85	9.00 ± 1.73	7.87 ± 0.94	8.31 ± 1.09	0.40 ± 0.04	0.56 ± 0.06
mtbe	0.48 ± 0.24	5.71 ± 0.99	6.98 ± 1.95	4.04 ± 0.51	0.59 ± 0.60	0.00 ± 0.11	0.00 ± 0.11
tnmoc	119.70 ± 11.97	113.11 ± 11.31	121.80 ± 12.18	120.36 ± 12.04	121.16 ± 12.12	108.91 ± 10.89	108.65 ± 10.87

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P134 Tu_Sep G	P135 Tu_Sep0 G	P136 Tu_Sep1 G	P137 Tu_Sep2 G	P138 Tu_TusHD G	P139 Tu_TusLD G	P140 Tu_Van G
ethene	7.34 ± 1.33	7.22 ± 1.38	7.56 ± 1.43	8.20 ± 1.62	10.70 ± 1.81	9.63 ± 0.75	6.62 ± 0.93
acetyl	5.30 ± 0.43	5.42 ± 0.43	5.68 ± 0.45	6.16 ± 0.64	1.93 ± 0.75	2.61 ± 0.31	8.31 ± 2.97
ethane	1.65 ± 0.26	1.68 ± 0.26	1.75 ± 0.27	1.91 ± 0.39	0.48 ± 0.48	2.32 ± 0.20	1.42 ± 0.41
prope	3.40 ± 0.42	3.37 ± 0.43	3.53 ± 0.44	3.82 ± 0.47	4.91 ± 1.05	3.85 ± 0.43	1.68 ± 0.45
n_prop	0.72 ± 0.60	0.65 ± 0.62	0.64 ± 0.65	0.66 ± 0.71	0.96 ± 0.59	0.39 ± 0.24	0.38 ± 0.58
i_buta	0.39 ± 0.11	0.39 ± 0.12	0.27 ± 0.12	0.06 ± 0.01	0.92 ± 0.38	0.64 ± 0.16	0.47 ± 0.19
lbut1e	3.72 ± 0.31	3.75 ± 0.31	3.89 ± 0.33	4.15 ± 0.32	3.55 ± 0.84	3.50 ± 0.35	3.24 ± 0.30
n_buta	1.82 ± 0.24	1.87 ± 0.24	1.54 ± 0.26	0.96 ± 0.13	2.88 ± 1.72	3.35 ± 0.71	1.46 ± 0.32
t2bute	0.36 ± 0.03	0.36 ± 0.03	0.35 ± 0.03	0.31 ± 0.03	0.00 ± 0.21	0.35 ± 0.09	0.44 ± 0.05
c2bute	0.33 ± 0.03	0.34 ± 0.03	0.32 ± 0.03	0.29 ± 0.03	0.45 ± 0.24	0.52 ± 0.10	0.29 ± 0.02
ipenta	8.57 ± 0.66	8.89 ± 0.68	8.17 ± 0.73	6.86 ± 1.23	9.32 ± 5.76	9.63 ± 2.37	8.75 ± 1.11
pen1e	0.30 ± 0.03	0.27 ± 0.03	0.25 ± 0.03	0.22 ± 0.03	0.96 ± 0.33	0.34 ± 0.14	0.31 ± 0.03
n_pent	3.56 ± 0.54	3.65 ± 0.57	3.54 ± 0.59	3.35 ± 0.60	2.81 ± 2.32	3.63 ± 0.96	3.28 ± 0.24
i_pren	0.22 ± 0.15	0.20 ± 0.16	0.21 ± 0.17	0.22 ± 0.19	0.53 ± 0.24	0.42 ± 0.10	0.31 ± 0.05
t2pene	0.56 ± 0.05	0.57 ± 0.05	0.53 ± 0.05	0.46 ± 0.05	0.84 ± 0.56	0.71 ± 0.23	0.51 ± 0.11
c2pene	0.31 ± 0.03	0.31 ± 0.03	0.29 ± 0.03	0.25 ± 0.03	0.32 ± 0.32	0.45 ± 0.13	0.31 ± 0.03
bu22dm	0.37 ± 0.04	0.27 ± 0.04	0.26 ± 0.04	0.24 ± 0.05	3.71 ± 1.04	0.97 ± 0.43	0.22 ± 0.02
cpenta	0.48 ± 0.03	0.49 ± 0.03	0.49 ± 0.03	0.48 ± 0.04	0.26 ± 0.36	0.39 ± 0.15	0.45 ± 0.04
bu23dm	1.02 ± 0.09	1.06 ± 0.09	1.11 ± 0.10	1.20 ± 0.13	0.97 ± 0.62	0.93 ± 0.25	1.05 ± 0.22
pena2m	3.66 ± 0.20	3.74 ± 0.22	3.70 ± 0.23	3.63 ± 0.24	3.03 ± 2.29	3.17 ± 0.94	3.36 ± 0.54
pena3m	2.28 ± 0.14	2.35 ± 0.16	2.33 ± 0.16	2.31 ± 0.18	1.86 ± 1.43	1.97 ± 0.59	1.99 ± 0.20
pl1e2me	0.18 ± 0.05	0.18 ± 0.05	0.18 ± 0.05	0.18 ± 0.05	1.33 ± 0.39	0.00 ± 0.16	0.08 ± 0.16
n_hex	2.01 ± 0.12	2.05 ± 0.13	2.07 ± 0.13	2.09 ± 0.14	1.86 ± 1.14	1.58 ± 0.47	2.09 ± 1.31
mcyppna	2.77 ± 0.18	2.87 ± 0.19	2.86 ± 0.20	2.86 ± 0.22	1.15 ± 0.99	1.27 ± 0.41	4.29 ± 2.14
pen24m	1.00 ± 0.07	1.03 ± 0.07	1.02 ± 0.08	1.00 ± 0.09	0.35 ± 0.34	0.64 ± 0.14	1.35 ± 0.59
benze	4.31 ± 0.18	4.35 ± 0.19	4.51 ± 0.20	4.77 ± 0.13	4.21 ± 1.51	6.13 ± 0.62	4.01 ± 0.33
cyhexa	0.87 ± 0.06	0.89 ± 0.07	0.90 ± 0.07	0.91 ± 0.07	0.40 ± 0.40	0.36 ± 0.16	0.70 ± 0.12
hexa2m	1.60 ± 0.09	1.68 ± 0.09	1.68 ± 0.10	1.68 ± 0.10	0.00 ± 0.12	0.00 ± 0.11	1.86 ± 0.89
pen23m	1.54 ± 0.12	1.57 ± 0.13	1.54 ± 0.14	1.48 ± 0.17	0.58 ± 0.34	0.80 ± 0.14	2.06 ± 0.48
hexa3m	1.71 ± 0.12	1.69 ± 0.14	1.69 ± 0.14	1.68 ± 0.16	1.24 ± 0.60	1.00 ± 0.25	1.56 ± 0.19
pa224m	2.49 ± 0.20	2.54 ± 0.21	2.50 ± 0.22	2.42 ± 0.28	2.00 ± 1.06	2.58 ± 0.44	2.96 ± 0.98
n_hept	1.18 ± 0.07	1.20 ± 0.08	1.21 ± 0.08	1.22 ± 0.08	0.93 ± 0.50	0.64 ± 0.21	0.82 ± 0.31
mecyhx	1.09 ± 0.06	1.12 ± 0.06	1.13 ± 0.07	1.15 ± 0.06	0.48 ± 0.40	0.50 ± 0.16	1.15 ± 0.25
pa234m	0.80 ± 0.03	0.82 ± 0.04	0.79 ± 0.04	0.74 ± 0.07	0.56 ± 0.46	0.86 ± 0.19	1.01 ± 0.30
tolue	9.20 ± 0.50	9.41 ± 0.54	9.49 ± 0.57	9.62 ± 0.55	6.76 ± 3.78	9.50 ± 1.56	8.09 ± 1.11
hep2me	0.65 ± 0.04	0.68 ± 0.04	0.68 ± 0.05	0.68 ± 0.05	0.77 ± 0.96	0.53 ± 0.40	0.67 ± 0.06
hep3me	0.82 ± 0.06	0.83 ± 0.06	0.84 ± 0.06	0.85 ± 0.06	0.55 ± 0.37	0.48 ± 0.15	0.87 ± 0.14
n_oct	0.47 ± 0.06	0.48 ± 0.06	0.48 ± 0.06	0.47 ± 0.07	0.73 ± 0.22	0.28 ± 0.09	0.47 ± 0.06
etbz	1.70 ± 0.13	1.65 ± 0.14	1.67 ± 0.15	1.69 ± 0.15	1.22 ± 0.86	1.88 ± 0.35	1.42 ± 0.19
mp_xyl	7.12 ± 0.49	6.94 ± 0.53	7.00 ± 0.56	7.09 ± 0.56	5.28 ± 3.55	7.03 ± 1.46	6.63 ± 0.57
styr	0.47 ± 0.10	0.41 ± 0.10	0.42 ± 0.11	0.46 ± 0.13	1.40 ± 0.35	1.06 ± 0.14	0.29 ± 0.12
o_xyl	2.44 ± 0.21	2.38 ± 0.23	2.40 ± 0.24	2.42 ± 0.24	2.10 ± 1.42	2.69 ± 0.58	2.33 ± 0.30
n_non	0.20 ± 0.03	0.16 ± 0.04	0.16 ± 0.04	0.16 ± 0.04	0.65 ± 0.10	0.06 ± 0.04	0.19 ± 0.04
iprbz	0.11 ± 0.01	0.10 ± 0.01	0.10 ± 0.01	0.11 ± 0.02	0.36 ± 0.41	0.33 ± 0.17	0.21 ± 0.08
n_prbz	0.41 ± 0.02	0.38 ± 0.02	0.38 ± 0.02	0.39 ± 0.02	0.50 ± 0.36	0.55 ± 0.15	0.31 ± 0.09
m_etol	1.80 ± 0.12	1.70 ± 0.13	1.72 ± 0.14	1.77 ± 0.13	1.99 ± 1.13	2.11 ± 0.46	1.80 ± 0.16
p_etol	0.74 ± 0.09	0.72 ± 0.09	0.73 ± 0.10	0.74 ± 0.11	0.76 ± 0.46	0.84 ± 0.19	0.75 ± 0.09
bz135m	0.94 ± 0.11	0.89 ± 0.11	0.90 ± 0.11	0.93 ± 0.13	1.10 ± 0.64	1.11 ± 0.26	1.03 ± 0.09
o_etol	0.59 ± 0.05	0.52 ± 0.05	0.53 ± 0.05	0.54 ± 0.06	1.51 ± 0.57	0.91 ± 0.24	0.55 ± 0.08
bz124m	2.97 ± 0.19	2.77 ± 0.21	2.81 ± 0.22	2.87 ± 0.22	3.26 ± 2.02	3.54 ± 0.83	3.78 ± 1.38
n_dec	0.16 ± 0.02	0.05 ± 0.01	0.05 ± 0.01	0.04 ± 0.01	1.66 ± 0.13	0.03 ± 0.05	0.25 ± 0.02
bz123m	0.66 ± 0.03	0.62 ± 0.04	0.63 ± 0.04	0.65 ± 0.04	1.13 ± 0.53	0.93 ± 0.22	0.71 ± 0.12
detbz1	0.26 ± 0.08	0.27 ± 0.08	0.28 ± 0.09	0.30 ± 0.10	0.00 ± 0.12	0.00 ± 0.11	0.28 ± 0.11
detbz2	0.39 ± 0.01	0.41 ± 0.01	0.42 ± 0.01	0.45 ± 0.01	0.00 ± 0.12	0.00 ± 0.11	0.47 ± 0.50
n_unde	0.18 ± 0.03	0.00 ± 0.13	0.00 ± 0.13	0.00 ± 0.12	3.12 ± 0.18	0.00 ± 0.08	0.24 ± 0.04
other	5.17 ± 0.57	13.04 ± 0.70	13.21 ± 0.73	13.50 ± 0.66	13.07 ± 1.31	7.13 ± 0.71	4.84 ± 2.20
unid	5.41 ± 1.69	5.63 ± 1.78	5.62 ± 1.86	5.62 ± 1.93	0.70 ± 0.07	1.10 ± 0.11	5.39 ± 2.89
mtbe	5.63 ± 0.80	5.88 ± 0.85	5.23 ± 0.87	4.06 ± 1.21	0.00 ± 0.12	0.00 ± 0.11	6.48 ± 1.42
tnmoc	110.58 ± 11.06	118.68 ± 11.87	118.83 ± 11.88	119.12 ± 11.91	113.77 ± 11.38	108.23 ± 10.82	110.23 ± 11.02

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P141 Tu_Van0 G	P142 Tu_Van1 G	P143 Tu_Van2 G	P144 WA_Tu G	P145 WA_Tu0 G	P146 WA_Tu1 G	P147 WA_Tu2 G
ethene	6.69 ± 0.82	6.58 ± 0.66	8.55 ± 0.29	10.16 ± 0.25	12.14 ± 0.55	13.01 ± 0.64	15.23 ± 1.17
acetyl	7.37 ± 1.13	7.42 ± 0.63	7.66 ± 0.82	6.30 ± 0.34	6.09 ± 0.35	6.50 ± 0.38	7.64 ± 0.69
ethane	1.52 ± 0.40	1.63 ± 0.57	2.13 ± 0.37	2.58 ± 0.18	2.24 ± 0.29	2.48 ± 0.33	2.91 ± 0.44
prope	1.62 ± 0.46	1.56 ± 0.42	2.26 ± 0.30	4.36 ± 0.10	5.29 ± 0.19	5.69 ± 0.26	6.66 ± 0.49
n_prop	0.33 ± 0.61	0.92 ± 0.75	0.58 ± 0.82	1.40 ± 0.17	0.16 ± 0.21	0.22 ± 0.24	0.28 ± 0.28
i_buta	0.40 ± 0.27	0.38 ± 0.31	0.08 ± 0.04	0.58 ± 0.04	0.24 ± 0.12	0.08 ± 0.07	0.00 ± 0.17
lbut le	3.26 ± 0.33	3.33 ± 0.18	4.02 ± 0.47	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
n_buta	1.53 ± 0.34	1.37 ± 0.21	0.27 ± 0.17	4.73 ± 0.20	4.45 ± 0.37	2.82 ± 0.70	0.21 ± 0.38
t2bute	0.46 ± 0.05	0.44 ± 0.01	0.43 ± 0.04	0.31 ± 0.02	0.35 ± 0.02	0.35 ± 0.02	0.35 ± 0.02
c2bute	0.29 ± 0.03	0.24 ± 0.02	0.23 ± 0.06	0.24 ± 0.01	0.28 ± 0.02	0.26 ± 0.02	0.21 ± 0.03
ipenta	9.12 ± 1.35	8.13 ± 1.46	5.38 ± 1.48	7.62 ± 0.19	7.84 ± 0.51	6.28 ± 0.74	2.02 ± 1.64
pentel	0.27 ± 0.03	0.23 ± 0.01	0.21 ± 0.06	0.30 ± 0.01	0.31 ± 0.04	0.28 ± 0.02	0.20 ± 0.05
n_pent	3.37 ± 0.19	3.30 ± 0.16	2.93 ± 0.10	4.93 ± 0.10	4.95 ± 0.31	4.58 ± 0.30	3.31 ± 0.55
i_pren	0.32 ± 0.06	0.37 ± 0.02	0.36 ± 0.08	0.22 ± 0.07	0.19 ± 0.11	0.24 ± 0.09	0.26 ± 0.12
t2pene	0.51 ± 0.13	0.42 ± 0.06	0.38 ± 0.22	0.38 ± 0.02	0.40 ± 0.02	0.34 ± 0.04	0.20 ± 0.07
c2pene	0.32 ± 0.04	0.27 ± 0.01	0.24 ± 0.08	0.22 ± 0.01	0.22 ± 0.01	0.20 ± 0.01	0.12 ± 0.03
bu22dm	0.07 ± 0.03	0.02 ± 0.02	0.03 ± 0.02	0.72 ± 0.11	0.89 ± 0.13	0.94 ± 0.15	1.02 ± 0.17
cpenta	0.46 ± 0.05	0.41 ± 0.01	0.46 ± 0.06	0.50 ± 0.01	0.51 ± 0.04	0.51 ± 0.02	0.47 ± 0.03
bu23dm	1.13 ± 0.26	1.19 ± 0.12	1.16 ± 0.33	0.76 ± 0.04	0.81 ± 0.06	0.76 ± 0.07	0.58 ± 0.10
pena2m	3.56 ± 0.53	3.88 ± 0.05	3.48 ± 0.37	2.93 ± 0.07	3.04 ± 0.16	3.02 ± 0.17	2.84 ± 0.20
pena3m	2.15 ± 0.10	2.06 ± 0.01	2.00 ± 0.12	1.78 ± 0.02	1.84 ± 0.07	1.82 ± 0.08	1.74 ± 0.09
ple2me	0.08 ± 0.16	0.00 ± 0.12	0.14 ± 0.20	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hex	2.23 ± 1.44	3.55 ± 1.24	2.73 ± 2.19	2.42 ± 0.06	2.45 ± 0.11	2.52 ± 0.11	2.56 ± 0.13
mcpyna	3.07 ± 2.40	1.59 ± 1.30	4.27 ± 2.44	1.34 ± 0.02	1.37 ± 0.05	1.49 ± 0.06	1.74 ± 0.14
pen24m	1.48 ± 0.71	1.69 ± 0.77	1.04 ± 0.49	0.56 ± 0.05	0.59 ± 0.07	0.58 ± 0.08	0.52 ± 0.10
benze	4.19 ± 0.16	4.44 ± 0.20	4.75 ± 0.54	7.20 ± 0.20	7.74 ± 0.32	8.16 ± 0.32	9.26 ± 0.58
cyhexa	0.76 ± 0.10	0.81 ± 0.08	0.81 ± 0.12	0.41 ± 0.01	0.39 ± 0.04	0.41 ± 0.02	0.45 ± 0.02
hexa2m	2.05 ± 0.93	2.97 ± 1.20	2.61 ± 1.43	0.92 ± 0.01	0.95 ± 0.05	0.98 ± 0.05	1.02 ± 0.07
pen23m	2.16 ± 0.55	2.34 ± 0.17	2.08 ± 0.77	1.00 ± 0.07	1.02 ± 0.11	1.02 ± 0.12	0.95 ± 0.15
hexa3m	1.57 ± 0.12	1.58 ± 0.13	1.60 ± 0.15	1.14 ± 0.06	1.10 ± 0.11	1.13 ± 0.13	1.19 ± 0.16
pa224m	3.28 ± 1.06	3.01 ± 0.39	2.75 ± 1.26	1.66 ± 0.14	1.75 ± 0.20	1.79 ± 0.24	1.83 ± 0.29
n_hept	0.75 ± 0.28	0.88 ± 0.00	0.51 ± 0.26	0.82 ± 0.06	0.75 ± 0.09	0.77 ± 0.11	0.83 ± 0.13
mecyhx	1.18 ± 0.26	1.39 ± 0.19	1.23 ± 0.42	0.37 ± 0.02	0.22 ± 0.07	0.26 ± 0.06	0.29 ± 0.08
pa234m	1.17 ± 0.25	0.98 ± 0.18	0.99 ± 0.32	0.58 ± 0.07	0.62 ± 0.09	0.63 ± 0.11	0.63 ± 0.13
tolue	8.87 ± 0.54	8.66 ± 0.76	8.71 ± 0.19	12.97 ± 0.37	12.58 ± 0.26	13.16 ± 0.35	14.43 ± 0.74
hep2me	0.72 ± 0.07	0.71 ± 0.03	0.74 ± 0.10	0.35 ± 0.01	0.35 ± 0.02	0.37 ± 0.02	0.38 ± 0.03
hep3me	0.92 ± 0.15	0.94 ± 0.17	0.97 ± 0.19	0.38 ± 0.04	0.40 ± 0.06	0.41 ± 0.07	0.44 ± 0.08
n_oct	0.47 ± 0.05	0.46 ± 0.06	0.42 ± 0.03	0.28 ± 0.08	0.25 ± 0.12	0.26 ± 0.13	0.29 ± 0.13
etbz	1.39 ± 0.18	1.33 ± 0.16	1.42 ± 0.14	1.94 ± 0.05	1.94 ± 0.06	2.02 ± 0.07	2.19 ± 0.12
mp_xyl	6.51 ± 0.55	6.14 ± 0.17	6.82 ± 0.53	7.18 ± 0.17	7.21 ± 0.26	7.49 ± 0.32	8.10 ± 0.49
styr	0.23 ± 0.07	0.23 ± 0.07	0.32 ± 0.04	0.65 ± 0.06	0.62 ± 0.06	0.67 ± 0.07	0.80 ± 0.10
o_xyl	2.35 ± 0.25	2.24 ± 0.10	2.49 ± 0.21	2.58 ± 0.06	2.58 ± 0.09	2.67 ± 0.11	2.87 ± 0.17
n_non	0.13 ± 0.05	0.13 ± 0.06	0.09 ± 0.04	0.16 ± 0.07	0.09 ± 0.07	0.11 ± 0.07	0.12 ± 0.07
iprbz	0.21 ± 0.08	0.29 ± 0.10	0.29 ± 0.12	0.13 ± 0.00	0.11 ± 0.01	0.12 ± 0.00	0.13 ± 0.01
n_prbz	0.30 ± 0.04	0.32 ± 0.03	0.30 ± 0.04	0.42 ± 0.01	0.40 ± 0.02	0.41 ± 0.02	0.45 ± 0.03
m_etol	1.70 ± 0.17	1.60 ± 0.15	1.81 ± 0.14	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.74 ± 0.10	0.68 ± 0.12	0.75 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz135m	0.99 ± 0.08	0.99 ± 0.05	1.04 ± 0.10	0.91 ± 0.02	0.87 ± 0.07	0.91 ± 0.08	1.00 ± 0.12
o_etol	0.48 ± 0.08	0.43 ± 0.09	0.49 ± 0.08	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz124m	3.67 ± 1.66	3.79 ± 2.42	3.04 ± 0.84	2.63 ± 0.07	1.40 ± 0.77	1.28 ± 0.77	1.28 ± 0.83
n_dec	0.09 ± 0.02	0.09 ± 0.02	0.11 ± 0.01	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.69 ± 0.12	0.59 ± 0.14	0.72 ± 0.15	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.29 ± 0.11	0.38 ± 0.15	0.39 ± 0.18	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.60 ± 0.53	0.64 ± 0.52	0.90 ± 0.64	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.13	0.00 ± 0.12	0.00 ± 0.13	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
other	14.46 ± 2.15	14.10 ± 2.98	16.31 ± 2.11	8.44 ± 0.40	7.37 ± 0.69	7.51 ± 0.81	7.58 ± 1.00
unid	5.71 ± 3.40	1.87 ± 2.29	5.89 ± 4.69	3.84 ± 0.22	2.70 ± 0.87	2.75 ± 1.00	2.95 ± 1.15
mtbe	6.75 ± 1.67	5.86 ± 1.43	2.91 ± 0.86	0.00 ± 0.00	0.01 ± 0.01	0.02 ± 0.01	0.02 ± 0.01
tmoc	120.16 ± 12.02	115.98 ± 11.60	122.19 ± 12.22	112.28 ± 11.23	110.07 ± 11.01	110.26 ± 11.03	110.53 ± 11.05

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P148	P149	P150	P151	P152	P153	P154
	WRuBT_D1 G	WRuWH_D1 G	WRuWH_D2 G	WRuWH_D3 G	WRuWH_D4 G	WRuWH_DC G	WRuWH_N1 G
ethene	1.04 ± 0.11	0.98 ± 0.09	1.69 ± 0.16	3.49 ± 0.36	1.51 ± 0.16	1.89 ± 1.01	0.05 ± 0.71
acetyl	0.25 ± 0.03	2.64 ± 0.27	5.67 ± 0.57	0.39 ± 0.07	3.98 ± 0.40	3.23 ± 2.39	2.81 ± 2.21
ethane	11.72 ± 1.17	3.86 ± 0.39	5.07 ± 0.51	5.69 ± 0.56	5.05 ± 0.51	4.91 ± 0.70	2.61 ± 1.98
prope	6.77 ± 0.67	2.75 ± 0.28	2.61 ± 0.25	1.61 ± 0.17	3.19 ± 0.32	2.54 ± 0.68	4.30 ± 0.85
n_prop	1.47 ± 0.15	5.38 ± 0.53	5.59 ± 0.55	1.71 ± 0.19	5.40 ± 0.54	4.57 ± 2.00	2.40 ± 2.21
i_butane	1.73 ± 0.18	2.92 ± 0.30	3.19 ± 0.31	2.91 ± 0.29	3.03 ± 0.32	3.02 ± 0.31	1.47 ± 1.25
n_butane	5.92 ± 0.59	7.47 ± 0.75	8.02 ± 0.81	7.54 ± 0.75	8.67 ± 0.88	1.54 ± 0.75	4.05 ± 0.48
t2butane	0.54 ± 0.05	0.38 ± 0.03	0.27 ± 0.03	0.31 ± 0.07	0.40 ± 0.07	0.34 ± 0.05	0.42 ± 0.11
c2butane	0.44 ± 0.04	0.30 ± 0.03	0.27 ± 0.03	0.31 ± 0.07	0.40 ± 0.05	0.33 ± 0.03	0.45 ± 0.11
ipentane	12.88 ± 1.29	12.74 ± 1.27	12.96 ± 1.29	13.23 ± 1.33	13.21 ± 1.33	13.02 ± 0.80	14.53 ± 4.59
pentane	0.56 ± 0.05	0.58 ± 0.06	0.42 ± 0.04	0.55 ± 0.07	0.67 ± 0.09	0.55 ± 0.08	0.00 ± 0.22
n_pentane	4.38 ± 0.44	4.64 ± 0.47	4.56 ± 0.45	4.75 ± 0.48	4.61 ± 0.46	4.63 ± 0.31	4.98 ± 1.62
i_pentane	0.52 ± 0.05	0.70 ± 0.08	1.33 ± 0.13	1.68 ± 0.17	1.21 ± 0.12	1.22 ± 0.39	0.70 ± 0.53
t2pentane	1.21 ± 0.12	0.92 ± 0.09	0.81 ± 0.07	1.09 ± 0.12	1.12 ± 0.12	0.98 ± 0.07	1.30 ± 0.28
c2pentane	0.65 ± 0.07	0.47 ± 0.05	0.43 ± 0.04	0.53 ± 0.07	0.60 ± 0.09	0.50 ± 0.03	0.74 ± 0.15
bu22dm	0.55 ± 0.05	0.48 ± 0.05	0.04 ± 0.01	0.50 ± 0.07	0.58 ± 0.07	0.39 ± 0.23	0.00 ± 0.11
cpentane	0.65 ± 0.07	0.53 ± 0.05	0.52 ± 0.06	0.53 ± 0.07	0.51 ± 0.07	0.52 ± 0.05	0.54 ± 0.20
bu23dm	1.18 ± 0.12	1.08 ± 0.11	1.03 ± 0.10	1.15 ± 0.14	1.28 ± 0.14	1.12 ± 0.07	1.24 ± 0.37
pena2m	4.29 ± 0.43	3.50 ± 0.34	4.23 ± 0.42	3.97 ± 0.39	3.37 ± 0.33	3.77 ± 0.60	6.31 ± 1.42
pena3m	2.67 ± 0.26	2.42 ± 0.25	2.35 ± 0.24	2.70 ± 0.27	2.61 ± 0.26	2.52 ± 0.13	2.37 ± 0.85
ple2me	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_hexane	2.40 ± 0.25	2.13 ± 0.22	2.01 ± 0.19	2.29 ± 0.24	1.82 ± 0.19	2.06 ± 0.24	1.67 ± 0.74
mcpna	1.33 ± 0.14	1.27 ± 0.13	1.18 ± 0.12	1.20 ± 0.14	1.03 ± 0.11	1.17 ± 0.16	1.25 ± 0.43
pen24m	0.63 ± 0.07	0.61 ± 0.06	0.63 ± 0.06	0.68 ± 0.09	0.54 ± 0.07	0.62 ± 0.08	0.97 ± 0.22
benzene	3.83 ± 0.38	3.89 ± 0.39	3.58 ± 0.36	4.34 ± 0.44	4.33 ± 0.44	4.01 ± 0.20	4.56 ± 1.24
cyhexane	0.30 ± 0.03	0.48 ± 0.05	0.45 ± 0.04	0.56 ± 0.07	0.56 ± 0.07	0.52 ± 0.03	0.25 ± 0.19
hexa2m	1.39 ± 0.14	1.23 ± 0.13	1.12 ± 0.12	1.21 ± 0.14	1.03 ± 0.12	1.15 ± 0.15	1.22 ± 0.40
pen23m	0.62 ± 0.07	0.58 ± 0.06	0.60 ± 0.06	0.63 ± 0.09	0.49 ± 0.07	0.57 ± 0.08	0.51 ± 0.23
hexa3m	1.46 ± 0.15	1.38 ± 0.14	1.35 ± 0.13	1.45 ± 0.15	1.03 ± 0.12	1.32 ± 0.23	0.82 ± 0.53
pa224m	3.94 ± 0.40	3.41 ± 0.34	3.10 ± 0.31	3.78 ± 0.38	3.68 ± 0.37	3.48 ± 0.18	3.83 ± 1.08
n_heptane	1.15 ± 0.11	0.84 ± 0.08	0.78 ± 0.07	0.89 ± 0.10	0.88 ± 0.11	0.85 ± 0.05	1.09 ± 0.28
mecyhx	0.05 ± 0.01	0.81 ± 0.08	0.78 ± 0.07	0.56 ± 0.07	0.12 ± 0.05	0.59 ± 0.36	0.74 ± 0.28
pa234m	1.36 ± 0.14	1.28 ± 0.13	1.14 ± 0.12	1.47 ± 0.15	1.30 ± 0.14	1.30 ± 0.10	1.67 ± 0.39
toluene	7.27 ± 0.73	9.14 ± 0.91	7.98 ± 0.79	8.96 ± 0.91	7.89 ± 0.79	8.50 ± 0.91	8.74 ± 2.83
hep2me	0.54 ± 0.05	0.48 ± 0.05	0.43 ± 0.04	0.46 ± 0.07	0.47 ± 0.07	0.46 ± 0.03	0.49 ± 0.15
hep3me	0.51 ± 0.05	0.50 ± 0.05	0.43 ± 0.04	0.55 ± 0.07	0.49 ± 0.07	0.49 ± 0.03	0.51 ± 0.15
n_octane	0.45 ± 0.04	0.48 ± 0.05	0.43 ± 0.04	0.56 ± 0.07	0.46 ± 0.07	0.49 ± 0.05	0.53 ± 0.15
etbz	1.24 ± 0.12	1.97 ± 0.20	1.66 ± 0.16	1.81 ± 0.19	1.46 ± 0.16	1.74 ± 0.29	1.96 ± 0.59
mp_xyl	3.70 ± 0.37	5.97 ± 0.59	5.04 ± 0.51	5.45 ± 0.55	3.96 ± 0.40	5.14 ± 1.06	6.12 ± 1.76
styr	0.44 ± 0.04	0.56 ± 0.06	0.51 ± 0.04	1.16 ± 0.12	0.40 ± 0.05	0.65 ± 0.31	0.42 ± 0.20
o_xyl	1.42 ± 0.14	2.22 ± 0.22	1.87 ± 0.18	2.19 ± 0.22	1.91 ± 0.19	2.05 ± 0.21	2.40 ± 0.65
n_nonane	0.12 ± 0.01	0.33 ± 0.03	0.34 ± 0.03	0.32 ± 0.07	0.25 ± 0.05	0.31 ± 0.07	0.31 ± 0.14
iprbz	0.03 ± 0.01	0.20 ± 0.03	0.21 ± 0.03	0.29 ± 0.07	0.14 ± 0.05	0.21 ± 0.07	0.25 ± 0.09
n_prbz	0.27 ± 0.03	0.44 ± 0.05	0.46 ± 0.04	0.58 ± 0.07	0.44 ± 0.07	0.49 ± 0.07	0.70 ± 0.17
m_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz135m	0.56 ± 0.05	0.81 ± 0.08	0.73 ± 0.07	0.92 ± 0.10	0.86 ± 0.09	0.83 ± 0.05	0.93 ± 0.26
o_etol	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz124m	2.02 ± 0.21	2.49 ± 0.25	0.46 ± 0.04	0.70 ± 0.09	2.51 ± 0.25	1.53 ± 1.09	0.00 ± 0.23
n_decane	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
n_undecane	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
other	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
unid	34.18 ± 2.40	54.13 ± 2.27	48.18 ± 2.29	68.01 ± 2.31	72.58 ± 2.32	60.10 ± 7.04	51.84 ± 8.32
mtbe	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10	0.00 ± 0.10
tnmoc	134.18 ± 13.42	154.13 ± 15.41	148.18 ± 14.82	168.01 ± 16.80	172.58 ± 17.26	160.10 ± 16.01	151.84 ± 15.18

Appendix A
Master PAMS Source Profiles (Weight Percent)

Pno Profile Size	P155	P156
	WRuWH_N2 G	WRuWH_NC G
ethene	0.00 ± 0.51	0.03 ± 0.46
acetyl	4.38 ± 0.76	3.53 ± 1.26
ethane	0.00 ± 1.36	1.43 ± 2.03
prope	4.03 ± 0.61	4.19 ± 0.77
n_prop	4.53 ± 1.10	3.35 ± 1.31
i_buta	2.86 ± 0.61	2.09 ± 0.75
lbutle	0.00 ± 0.19	2.23 ± 3.15
n_buta	9.30 ± 1.69	7.94 ± 1.81
t2bute	0.59 ± 0.13	0.49 ± 0.09
c2bute	0.51 ± 0.13	0.48 ± 0.09
ipenta	14.91 ± 2.54	14.70 ± 2.78
pente l	0.81 ± 0.17	0.36 ± 0.51
n_pent	4.05 ± 0.93	4.56 ± 1.29
i_pren	1.02 ± 0.27	0.83 ± 0.31
t2pene	1.36 ± 0.25	1.33 ± 0.19
c2pene	0.76 ± 0.15	0.75 ± 0.10
bu22dm	0.64 ± 0.15	0.29 ± 0.41
cpenta	0.59 ± 0.15	0.56 ± 0.12
bu23dm	1.53 ± 0.27	1.36 ± 0.24
pena2m	3.50 ± 0.66	5.06 ± 2.69
pena3m	2.80 ± 0.51	2.55 ± 0.53
p1e2me	0.00 ± 0.10	0.00 ± 0.10
n_hex	1.72 ± 0.38	1.70 ± 0.44
mcpyna	1.06 ± 0.25	1.18 ± 0.31
pen24m	0.53 ± 0.15	0.77 ± 0.43
benze	5.51 ± 0.81	4.99 ± 0.78
cyhexa	0.00 ± 0.19	0.14 ± 0.19
hexa2m	1.16 ± 0.23	1.19 ± 0.24
pen23m	0.42 ± 0.15	0.48 ± 0.14
hexa3m	0.91 ± 0.25	0.85 ± 0.31
pa224m	4.36 ± 0.70	4.07 ± 0.68
n_hept	1.04 ± 0.21	0.90 ± 0.19
mecyhx	0.00 ± 0.13	0.58 ± 0.80
pa234m	1.42 ± 0.28	1.55 ± 0.39
tolue	8.90 ± 1.52	8.80 ± 1.70
hep2me	0.63 ± 0.15	0.54 ± 0.12
hep3me	0.51 ± 0.15	0.51 ± 0.12
n_oct	0.28 ± 0.15	0.41 ± 0.22
etbz	1.50 ± 0.30	1.75 ± 0.56
mp_xyl	3.79 ± 0.80	5.07 ± 2.37
styr	0.36 ± 0.13	0.39 ± 0.12
o_xyl	2.10 ± 0.38	2.26 ± 0.53
n_non	0.04 ± 0.13	0.19 ± 0.20
iprbz	0.25 ± 0.11	0.24 ± 0.07
n_prbz	0.42 ± 0.13	0.58 ± 0.29
m_etol	0.00 ± 0.10	0.00 ± 0.10
p_etol	0.00 ± 0.10	0.00 ± 0.10
bz135m	0.99 ± 0.19	0.95 ± 0.17
o_etol	0.00 ± 0.10	0.00 ± 0.10
bz124m	3.92 ± 0.47	1.77 ± 2.50
n_dec	0.00 ± 0.10	0.00 ± 0.10
bz123m	0.00 ± 0.10	0.00 ± 0.10
detbz1	0.00 ± 0.10	0.00 ± 0.10
detbz2	0.00 ± 0.10	0.00 ± 0.10
n_unde	0.00 ± 0.10	0.00 ± 0.10
other	0.00 ± 0.10	0.00 ± 0.10
unid	85.62 ± 4.62	67.03 ± 14.05
mtbe	0.00 ± 0.10	0.00 ± 0.10
tnmoc	185.62 ± 18.56	167.03 ± 16.70

APPENDIX B
Sample CMB8 Input Files

APPENDIX B SAMPLE INPUT FILES

CMB input and output files can have any eight-character file name with a three-character extension that indicates the file type. The most convenient and universal naming convention is PPXXXXYY.SSS, where:

PP: Type of file. Common definitions are:

- **IN**-File identifying other input data file names.
- **SO**-Source profile selection file, identifying default fitting profiles and source profile descriptions.
- **PO**-Species selection file, identifying default fitting species.
- **DS**-Data selection file, identifying samples to be selected from the ambient data file for apportionment during a CMB session.
- **AD**-Ambient data file, containing the measured ambient concentrations and their precisions.
- **PR**-Source profile file, containing mass-fraction chemical abundances and their uncertainties.
- **OU**-Output file, containing report or data base output.

XXXX: Study identifier. This four-letter code allows separate studies to be distinguished from one another.

YY: Session or report identifier. This two-letter code can be assigned to variations on input data files or to distinguish report and data base output files. For example, input data files might be divided up by season or by sampling site to be evaluated in separate CMB modeling sessions. YY might take on the values 'WI' for winter, 'SP' for spring, 'SU' for summer, and 'FA' for fall. Default output filenames can be designated in the options menu with 'RP' identifying the report file and 'DB' representing the data base file. Output files should be written into separate directories, as designated in the Options menu, when different input files are used for the same project.

SSS: File format identifier. The following file extensions are recognized by CMB8:

IN8: Input filename ASCII text file. CMB8 lists files with this extension when the program is executed and when CMB8 input files are requested using the File menu.

SEL: Fitting profile, fitting species, and sample selection ASCII text files. CMB8 recognizes that files with this extension contain default selections that can be entered external to the program. This extension applies only to the SO, PO, and DS file types.

CSV: Ambient data or source profile comma separated value ASCII text file. Each field is separated by a comma. Comma-delimited ASCII data base output files are written with this extension.

DBF: X-base data base file generated by dBASE or FoxPro compatible data management software. Most commonly used spreadsheets offer this as an output option. DBASE or FoxPro output files are written with this extension.

TXT: Ambient data or source profile data blank-delimited ASCII text file. Blank-delimited ASCII data base output files are written with this extension.

DAT: Ambient or source profile data ASCII text file, blank delimited. File structure is identical to TXT extensions.

WKS: Lotus 1-2-3 version 1 spreadsheet format. Most commonly used spreadsheets offer this as an output option. This is the most useful output format for the data base output file when source contribution estimates will be analyzed using a spreadsheet.

CMB8 converts the CSV, DBF, and WKS input data files to blank-delimited (TXT) files that are actually used by the program. This file carries the TXT suffix and may be used in subsequent modeling sessions to minimize startup time.

Six data files are used for input to CMB8. Only the ambient and source profile data files are required, however. Though optional, the remaining four files provide substantial user convenience by establishing commonly used defaults and sample subsets that would otherwise need to be initialized each time CMB8 is run.

B.1 Input Filename File: INXXXXYY.IN8

This fixed format file contains a list of the names of other CMB8 input data files. This filename, which is normally entered in response to the first few prompts when CMB8 is started, consists of five lines as shown below. These lines, in succession, contain the names of the files which are described in the following sub-sections. INCH0796.IN8 is an example of this file structure used in CMB8.

```
sotexas.sel  
popams.sel  
xx  
adch0796.dbf  
prtexas.dbf
```

File name entries should be left justified. For the CMB8 32 bit version, the only restriction on file names is that they are acceptable to the operating system. This means that extended file names may be used. For the CMB8 16 bit version, each filename can be up to eight characters in length with up to a three-character suffix, and the fully qualified path plus file name should be less than 256 characters in length. The purpose of this file is to save the effort of keying in the input filename individually. If an INXXXXYY.IN8 filename is not entered at the appropriate prompt, CMB8 will request the names of individual data input filenames.

B.2 Source (SO*.SEL), Species (PO*.SEL), and Sample Selection (DS*.SEL) Input Files

The source, species and sample selection files provide defaults that do not have to be entered from the program each time a CMB8 session is begun. These files limit the profiles, species, and ambient data records to those listed in the selection files, even though a larger number may be included in the ambient and source profile data files. This means that the data files need not be edited when only subsets of variables are desired for a specific CMB8 modeling session. The source and species selection files also allow default sets of fitting profiles and species to be designated, making it unnecessary to select these at the beginning of each CMB8 session. Variable definitions can also be documented in these files. Sampling site coordinates can be documented in the sample selection file.

Following is an example of the source profile selection file SOTEXAS.SEL:

```
P001 Biogenic *
P002 coat_cwf
P003 coat_ga
P004 coat_imc
P005 coat_m&hg
P006 coat_p&e
P007 coat_p&s
P008 coat_sts
P009 coat_tp
P010 coat_ts
P011 coat_v
P012 COATcomp
P015 CNG *
P016 CNG_J
P017 GNG
P018 LPG
P019 Prop_E *
P020 Prop_J
P021 Atla_liq
P023 LA_liqGs *
P024 Maga_liq
P025 ME50R50P
P026 ME67R33P
P027 ME75R25P
P028 Nova_liq
P029 US681220
P030 WA_Liq
P031 Atla_HS
P039 HSvapGC
P040 LA_Hsvap *
P041 Maga_HS
P042 Nova_HS
P043 WA_Vap
P044 BULK_plt
P045 BULK_ter
P046 ChevFC
P047 ChevS
P048 ChevT
P049 CHmf_eth
P050 CHmf_fug
P051 Delmex
P070 IndAM_DC
P074 IndSL_DC
```

P077	IndTX_DC	
P081	IndUC_DC	
P082	PEin_fug	
P083	PEma_fug	
P084	PEst_cru	
P085	PEst_dis	
P086	PEst_fug	
P087	PEst_gas	
P088	Zenco	
P103	BoCS_Tip	
P109	Exh_J	
P110	Exh_PBa	
P111	Exh_Tun	
P112	Exh801a	
P124	Tu_Cal	
P125	Tu_Cal0	
P126	Tu_Cal1	
P127	Tu_Cal2	
P128	Tu_Lin	
P129	Tu_Lin0	
P130	Tu_Lin1	
P131	Tu_Lin2	
P132	Tu_MchHD	*
P133	Tu_MchLD	
P134	Tu_Sep	
P135	Tu_Sep0	
P136	Tu_Sep1	
P137	Tu_Sep2	
P138	Tu_TusHD	
P139	Tu_TusLD	
P140	Tu_Van	
P141	Tu_Van0	
P142	Tu_Van1	*
P143	Tu_Van2	

A source code with up to six characters is located in Columns 1 to 6 and an eight-character profile name is located in Columns 9 to 16. Asterisks in Column 19 designates the default fitting profiles when CMB8 is executed, and columns 21,23,25,27, 29, 31,33,35 and 37 can contain nine other default profile combinations that are selectable from the program. The maximum number of species is essentially unlimited. Text comments can be added to this file beginning at the 39th column to document the source profiles.

Following is an example of the species selection file POPAMS.SEL:

ETHENE	ETHENEU	*		
ACETYL	ACETYLU	*	*	*
ETHANE	ETHANEU	*	*	*
PROPE	PROPEU			
N_PROP	N_PROPU	*	*	*
I_BUTA	I_BUTAU	*	*	*
LBUT1E	LBUT1EU			
N_BUTA	N_BUTAU	*	*	*
T2BUTE	T2BUTEU			
C2BUTE	C2BUTEU			
IPENTA	IPENTAU	*	*	*
PENTE1	PENTE1U			
N_PENT	N_PENTU	*	*	*

I_PREN	I_PRENU	*	*	*
T2PENE	T2PENEU			
C2PENE	C2PENEU			
BU22DM	BU22DMU	*	*	*
CPENTA	CPENTAU	*	*	
BU23DM	BU23DMU	*		
PENA2M	PENA2MU	*	*	
PENA3M	PENA3MU	*	*	
P1E2ME	P1E2MEU			
N_HEX	N_HEXU	*	*	
MCYPNA	MCYPNAU	*		
PEN24M	PEN24MU	*	*	
BENZE	BENZEU	*	*	*
CYHEXA	CYHEXAU	*		
HEXA2M	HEXA2MU	*		
PEN23M	PEN23MU	*	*	
HEXA3M	HEXA3MU	*	*	
PA224M	PA224MU	*	*	*
N_HEPT	N_HEPTU	*		
MECYHX	MECYHXU	*		
PA234M	PA234MU	*		
TOLUE	TOLUEU	*	*	
HEP2ME	HEP2MEU	*	*	
HEP3ME	HEP3MEU	*		
N_OCT	N_OCTU	*		
ETBZ	ETBZU	*		
MP_XYL	MP_XYLU			
STYR	STYRU			
O_XYL	O_XYLU			
N_NON	N_NONU	*		
IPRBZ	IPRBZU	*		
N_PRBZ	N_PRBZU	*		
M_ETOL	M_ETOLU			
P_ETOL	P_ETOLU			
BZ135M	BZ135MU			
O_ETOL	O_ETOLU			
BZ124M	BZ124MU			
N_DEC	N_DECU	*		
BZ123M	BZ123MU			
DET BZ1	DET BZ1U			
DET BZ2	DET BZ2U			
N_UNDE	N_UNDEU	*		
OTHER	OTHERU			
UNID	UNIDU			
MTBE	MTBEU			
TNMOC	TNMOCU			

A species code with up to six characters is located in Columns 1 to 6 and an eight-character species name is located in Columns 9 to 16. Asterisks in Column 19 designates the default fitting species when CMB8 is executed, and columns 21,23,25,27, 29, 31,33,35 and 37 can contain nine other default species combinations that are selectable from the program. The maximum number of species is essentially unlimited. Text comments can be added to this file beginning at the 39th column to document the meaning and units of the chemical components.

For the ambient data records selection file, columns 1 through 12 are for the site ID, columns 14 through 21 are for the date, columns 23 and 24 for the sample duration, columns 26

and 27 for the sample start hour, and columns 29-33 for the particle size fraction, if appropriate. Intermediate columns should be blank. An asterisk in column 35 selects a record. In addition columns 37 through 46 and columns 48 through 57 may contain x and y coordinates, respectively, for use in the Spatial Pie plots (see below). These should be in floating point format, e.g., 123.456, and should increase in value from left to right and from bottom to top. UTM coordinates are suitable as well as fractional longitudes and latitudes, if the longitudes are expressed as negative numbers.

The file structure through the first 5 fields is that of the ambient data input, with columns 1-12 for the site name, columns 13-20 for the sample date, columns 22-23 for the sample duration (in hours), columns 25 and 26 for the sample start time (hour beginning), columns 28-32 for the particle size fraction, column 34 for an asterisk to identify this sample as a section for apportionment, columns 37-45 for the x-coordinate (west-east) of the corresponding sampling sites, and columns 47-55 for the y-coordinate (south-north) of the corresponding site. Site coordinates should be selected so that they are of increasing magnitude from west to east and from south to north. The negative longitude coordinate in columns 37 through 46 above meets that criterion. Coordinates should be in fractional units. UTM coordinates can also be used when they are all from the same zone. These coordinates are used for the spatial plotting display. Site coordinates are optional, and their columns are ignored if they are left blank. Only the first reference to a sampling site code requires coordinates to be supplied. These are assumed to be constant for all subsequent references to this site code.

B.3 Ambient Data Input File (AD*.CSV, AD*.DBF, AD*.TXT AD*.WKS)

Ambient data files may be formatted as column-separated values in ASCII text (CSV), xBASE (DBF), blank-delimited ASCII text (TXT), or Lotus Worksheet (WKS). The CSV and DBF formats are preferred, as they are easier to prepare in spreadsheet (e.g. Microsoft Excel, Corel QuatroPro, Lotus 123) and data base (e.g. Microsoft Access, dBASE) software than the other formats. The WKS format creates large files and requires substantial translation time for CMB8 input and output, so it is the least desirable of these alternatives. The TXT format is most consistent with CMB7, so older CMB7 data files can be used for CMB8 input without modification. The appropriate file extension must be associated with each format, as CMB8 recognizes the file type by this extension.

The delimited forms of this file do not require fixed format spacing, only that a comma (or a blank character for TXT files) separate each field from prior and subsequent fields. The first line contains the field identifiers, and these must be identical to those named in the selection files. The limitations on each field are:

- Field 1: Site ID (up to 12 characters)
- Field 2: Sampling date (up to 8 characters)
- Field 3: Sample duration (up to 2 characters)
- Field 4: Sample start hour (up to 2 characters)

Field 5: Particle size fraction (up to 5 characters)

Field 6: Mass concentration (any number of characters in integer, floating point, or exponential format)

Field 7: Precision of mass concentration (same format as Field 6)

Field 8+2n: Concentrations of chemical species (same format as Field 6), where $n = 0, 1, 2, \dots$

Field 9+2n: Precisions of species concentrations (same format as Field 6), where $n = 0, 1, 2, \dots$

A sample file ADCH0796.dbf consisting of the July 1996 auto-GC data from the Chamizal Site in El Paso is provided with this report. CMB8 always assumes that Field 6 is the total mass concentration, and it does not use this as a fitting species. For CMB8 the total number of ambient data records can reach into the thousands, limited only by computer memory. This makes it especially useful for examining multi-species hourly data obtained from automated gas chromatographs and time-of-flight mass spectrometers. Any designator can be placed in the size column for non-segregated samples, such as "PM25" or "VOC". Where semi-volatile materials are being apportioned, the particle (PART) and gas (GAS) phases are good designations.

Missing values for chemical concentrations are designated by placing a -99. in the species concentration and precision fields. A species for which the value is missing cannot be used as a fitting species for that sample. Precisions that exceed zero must be assigned to all chemical concentrations used as fitting species. CMB8 will return an error message when it finds zero or negative precisions.

B.4 Source Profile Input File (PR*.CSV, PR*.DBF, PR*.TXT, PR*.WKS)

Source profile data files may be formatted as column-separated values in ASCII text (CSV), xBASE (DBF), blank-delimited ASCII text (TXT), or Lotus Worksheets (WKS). The CSV and DBF formats are the most portable and easily prepared. The appropriate file extension must be associated with each format, as CMB8 recognizes the file type by this extension. Examples of each file type are provided with the CMB8DSJV.EXE test data. The file PRTEXAS.dbf is provide.

The delimited forms of this file do not require fixed format spacing, only that a comma (or a blank character for TXT files) separate each field from prior and subsequent fields. The first line contains the field identifiers, and these must be identical to those named in the selection files. The limitations on each field are:

Field 1: Profile number or source code (up to six characters)

Field 2: Source mnemonic (up to eight characters)

Field 3: Particle size fraction (up to five characters). Use "G" for gas.

Field 4+2n: Fraction of species in primary mass of source emissions (floating point or exponential format), where $n = 0, 1, 2, \dots$

Field 5+2n: Variability of fraction of species in primary mass of source emissions (same format as Field 4), where $n = 0, 1, 2, \dots$

The first record of the profile file contains the species codes for each field. These identifiers can be up to six alphanumeric characters in length, and must correspond to the identifiers used in the ambient data file. Source profile abundances are expressed in fractions of total mass, not in percent. This file does not contain a mass concentration field, as does the ambient data file, because all species abundances have been divided by this mass. The total number of records included depends on the number of species, number of sources, and size of the computer memory.

From one to four different size fraction identifiers may be used, but these must be the same as those used in the ambient data and sample selection files. Missing values for chemical species in source profile files can be replaced by a best estimate with a large uncertainty if they are to be used as fitting species, or with -99 if they will not be used. Default values of 0 for the fraction and 0.0001 to 0.01 for the precision are often chosen for species that are expected to be present in small abundances. This indicates that the species is present in source emissions at a concentration less than .01% to 1%. A smaller value may be appropriate for certain source-types and species. A precision value that exceeds zero must be entered for all fitting species. CMB8 will return an error message when it detects precisions that are less than or equal to zero.