Emissions From Mesoscale In-Situ Oil (Diesel)Fires: The Mobile 1994 Experiments

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ABSTRACT

A series of three mesoscale burns was conducted in 1994 to study various aspects of diesel oil burning in-situ. Extensive sampling and monitoring of these burns was conducted to determine the emissions. This was done at four downwind ground stations, one upwind ground station, and in the smoke plume using a remote-controlled helicopter. Particulate samples in air were taken and analysed for Polycyclic Aromatic Hydrocarbons (PAHs). PAHs were found to be lower in the soot than in the starting oil, although higher concentrations of the larger molecular PAHs were found in the soot and residue. Particulates in the air were measured by several means and found to be greater than recommended exposure levels only up to 100 metres downwind at ground level. Particulates from the diesel are more abundant than in crude oil fires and contain some unburned diesel constituents. Combustion gases including carbon dioxide and carbon monoxide did not reach exposure level maximums. These gases were emitted over a broad area around the fire and are not directly associated with the plume trajectory. Volatile organic compound (VOCs) emissions are extensive from fires, but the levels are less than those emitted from a crude oil fire and much less than an evaporating crude oil spill. Over 140 compounds were identified and quantified, several at possible levels of concern up to 100 metres downwind. Carbonyls, including aldehydes and ketones, were found to be higher than found at crude oil burns. Water under the burns was analysed; no analytes of concern could be found at the detection levels of the methods. The burn residue was analysed for the same compounds as the air particulate samples. PAHs were at a lower concentration in the residue than in the starting oil, however there is a slight differential concentration increase in some higher molecular weight species. Overall,

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indications from these mesoscale trials are that emissions from diesel fuel fires differ somewhat from crude oil fires in that particulate concentrations are higher, PAHs are formed during the process (although lower molecular weight PAHs were consumed), volatile organic compounds are less and the particulate material contains unburned diesel compounds.

INTRODUCTION

Twelve years of intensive laboratory and tank testing on the in-situ combustion of oil have indicated that the nature and concentrations of atmospheric emissions from in situ burning of oil offshore will normally be an acceptable tradeoff when weighed against the environmental risks and cleanup costs of shoreline contamination.

In 1991, U.S. MMS began the sponsorship, in cooperation with several agencies, of a series of mesoscale burn tests. These tests were designed to measure a series of physical parameters as well as emissions. The facilities of the Fire and Safety Test Detachment at Sand Island situated at upper Mobile Bay, Alabama, were used. There were two preliminary and 12 burn tests each with 2000-5000 gallons of crude. A variety of parameters that might affect burning and smoke production were tested. During each burn, extensive samples were taken from the oil, residue and the smoke plume itself. Besides ground station samplers, airborne samplers were also employed. Environment Canada and the U.S. Environmental Protection Agency cooperated to set up a series of instruments and samplers to monitor all suspect emissions. In 1992, a similar series of experiments was set up to monitor these burns. In 1993, a major experiment was conducted offshore Canada to measure crude oil emissions. Analyses of these trials are reported in the literature (Fingas, Li, et al., 1993; Fingas, Ackerman et al., 1994a,b; Fingas, Ackerman et al., 1995). This paper reports on the data from the 1994 trials involving diesel fuel. These trials were sponsored by the United States Coast Guard for the purpose of testing a new helicopter sampling package.

EXPERIMENTAL DETAILS

. The burn was conducted in a specially-constructed steel pan (15 X 15 m) with an outer berm filled with water. In a typical burn, diesel fuel was released and floated on 0.6 metre of water. Water was salt water pumped from Mobile Bay. The oil was ignited and the burn generally lasted about 25 min. Table 1 lists the parameters from each of the three burns (Walton, McElroy et al., 1995).

Table 1 **Parameters of the Burn Experiments**

Burn no.	Burn area m^2	Initial fuel depth (mm)	Fuel Volume (m^3)	Burn Time (s)	Burn rate ($kg/s.m^2$)	Ave. Wind speed (m/s)	Ave. Wind Direction
1	199	86	17.1	1560	0.061	1.6	38
2	231	74	17.1	1560	0.061	5.1	358
3	231	74	17.1	1440	0.063	4.7	356

It should be noted that the smoke plume from burn 1 went straight up and thus particulate and smoke data from that burn were not collected. The helicopter sampling device was also not deployed because of the upward trajectory of the soot. Usable gas results from other emissions were obtained.

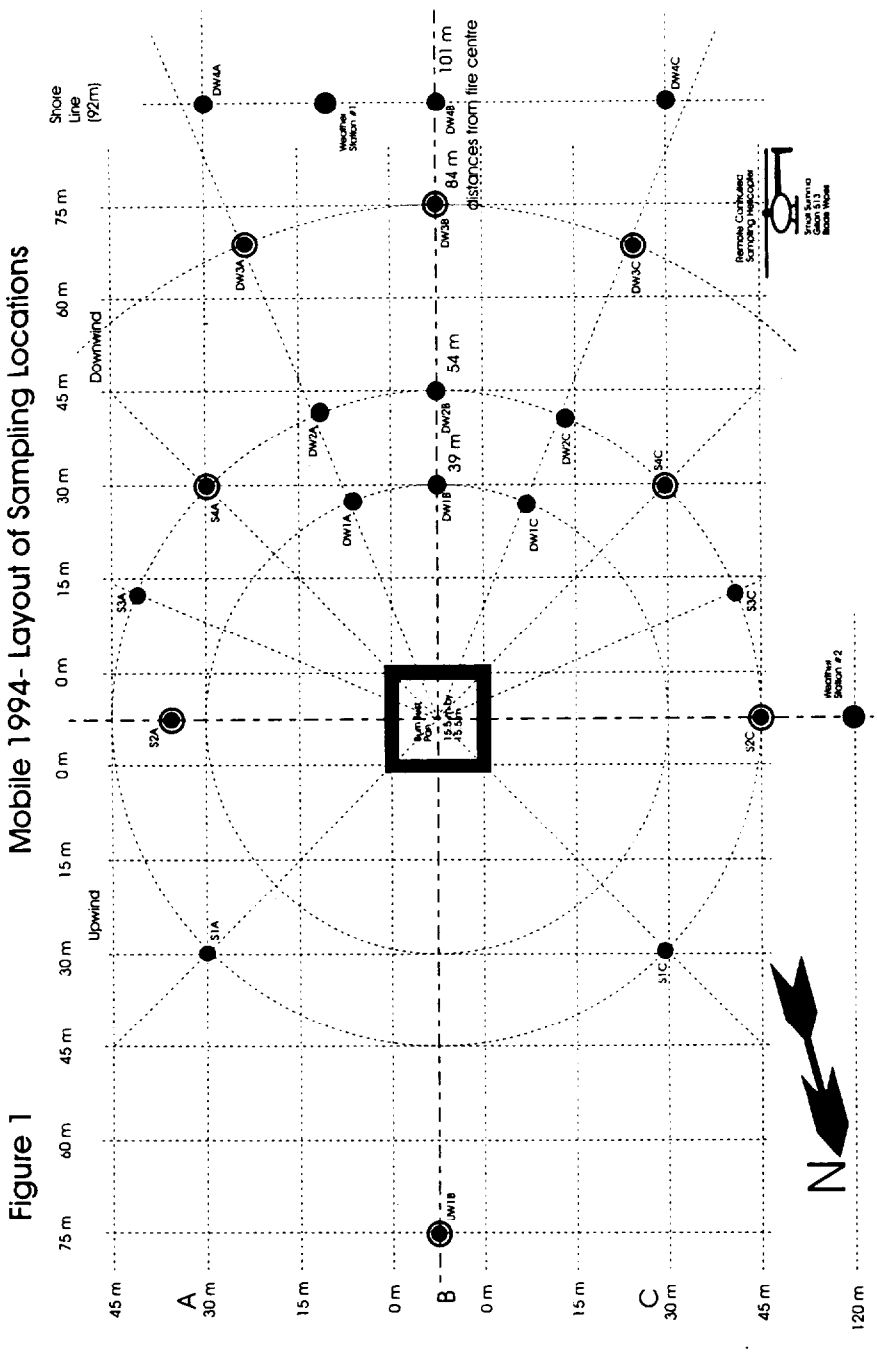

Mobile 1994- Layout of Sampling Locations
Smoke Line (92m)
Downwind
Upwind
distances from fire centre
101 m
84 m
54 m
39 m
DW4A
DW4B
DW4C
DW3A
DW3B
DW3C
DW2A
DW2B
DW2C
DW1A
DW1B
DW1C
S1A
S1C
S2A
S2C
S3A
S3C
S4A
S4C
Weather Station #1
Weather Station #2
A
B
C
N
45 m
30 m
15 m
0 m
120 m

Figure 1

A grid of 21 ground sampling stations was established as noted in Figure 1. All stations, except where noted, were at the 1-metre level. In addition 6 carbon dioxide meters were placed on stands 4 metres high at stations, DW3A, DW3B, DW3C, S2A, S4C, S2C and UW1B. The purpose of this layout was to classify the 3-dimensional distribution of carbon dioxide.

SAMPLING

Sampling methodologies and target emissions are summarized in Table 2. Detailed methods are described in the literature (Fingas, Ackerman et. al., 1994; Bissonnette, Fingas et al., 1994).

Table 2 **Summary of Sampling and Analytical Methods**

Sample Taken	Sampler	Measurement Parameter	Secondary Parameters	Additional Parameters
Soot at Ground Level	High Volume Sampler (TSP)	Dioxins and Dibenzofurans	Particulates	PAHs
	Sampling Pump (PS-1) medium volume	PAHs	Particulates	Metals
	RAM	Particulates		
	PM-10	Particulates	PAHs	
	Data Ram	Particle size		
Soot in Smoke	Sampling Pump low volume	PAHs	Particulates	Metals
	remote-controlled helicopter, helicopter sampler			
Gases	Summa Canister	Volatile Organic Compounds	CO_2	
	CO_2 Meter	Carbon Dioxide		
	SO_2 Meter	Sulphur Dioxide		
	NO_2 Meter	Nitrogen Dioxide		
	CO Meter	Carbon Monoxide		
Oil		PAHs	Metals	Full Analysis
Burn Residue		PAHs	Metals	Full Analysis
Water under Burn		PAHs	Organics	Toxicity

Particulates

Method 1 - PM-10

The Anderson high volume PM-10 unit was used. A flow rate of 1.1 to 1.7 m^3 was employed. Particulates less than 10 μm were collected on cellulose filters. Filter heads were washed with hexane prior to use. Filters were weighed before and after and also compared with trip blanks.

Method 2 - PS-1

High-volume air sampling was performed using a General Metal Works model PS-1 instrument. The PS-1 sampling heads were rinsed with hexane prior to loading the media. The sampling media consisted of a 3"diameter quartz fibre filter and a polyurethane foam (PUF) filter - 3" thick, density 0.022 g/cm^3. The media was handled

with powderless gloves. After collection, the filters were wrapped in aluminum foil and placed in the glass jar and refrigerated. The flow rate varied between 200 and 280 L/min. The volume of air going through the samplers during the experiment varied between 4000 and 7000 L.

All quartz fibre filters were pre-weighed and then weighed after the experiment. The PUF filter and fibre filter were then combined for extraction and subsequent GC-MSD analysis for PAHs.

Method 3 -TSP

A high-volume Total Suspended Particulate sampler by Anderson was used to collect particulates. The filters consisted of 8 X 10 inch quartz fibre. A flow rate of 1.1 to 1.7 m^3 was employed. The inside of the sampling unit was rinsed with hexane prior to the experiment. After sampling was completed, the filters were wrapped in aluminum foil before being placed into an envelope and refrigerated. All filters were pre-weighed and then weighed after the experiment. Particulates were later analyzed for PAHs and Dioxins and Dibenzofurans.

Method 4 - RAM

A MIE Ram-1 instrument was used to perform real-time aerosol monitoring and measure relative concentrations of airborne particulates. This instrument responds to a physical particle size of 0.1 to 30 microns. The flow rate of this instrument is 2 L/min. The instrument was connected to a data logger which recorded the data every minute.

Method 5- Data RAM

A Data-Ram was used experimentally on this burn at the DW2B station only. The unit responds to particle sizes as above but can be fixed to only measure PM-10s.

VOCs

Multiple 6 L SUMMA canisters pre-evacuated to 0.05 mm of Hg were used to collect air for analysis for VOCs and CO_2. The flow controller (restricted orifice) was adjusted to 100 cc/min for the burn. A 1 L SUMMA canister was employed on the remote-controlled helicopter and analyzed in similar manner to the 6 L canister. The 1 L canister was collected at approximately 100 cc/min. A filter was placed on the inlet to prevent the ingression of particulates.

Carbonyls

A Gilian 513A was used to pump air through a DNPH (2,4-dinitrophenylhydrazine)-silica cartridge attached via a Tygon tube. The cartridge contains 350 mg of silica coated with 1.0 mg of DNPH. The flow rate was set between 0.7 L/min and the pumped air volumes was between 11 and 18 L. The sample was wrapped in aluminum, placed in a small amber vial and refrigerated.

Water Samples

Water samples were collected for both physical and organic compound analyses. Samples were collected directly into 1 L amber bottles. Bottles were pre-cleaned with de-ionized water, oven-dried, then rinsed three times with dichloromethane and air dried. Samples were collected 10 cm below the surface, before and after burns. All samples were collected without headspace and placed in refrigerated coolers. Upon arrival at the laboratory, samples were again stored in a refrigerator and analyzed for volatiles as soon as possible.

Oil and Residue Sampling

The crude oil samples and residue samples were manually collected using a 250 mL wide-mouth jar with a Teflon-lined cap. After sampling, the bottle was immediately capped and stored in a refrigerator. When sampling the residue, the material was skimmed, however, water frequently was taken along with the burn residue. Samples were refrigerated until analysis.

CO_2

The Metrosonics AQ501 instruments were used at ground level stations. The instrument also measures carbon monoxide, moisture and temperature. All these data were recorded at intervals of one minute.

The Armstrong CD-1 carbon dioxide analysers were used at a flow rate of 1 L/min. These instrument were mounted on 4-metre poles at locations DW3A, DW3B, DW3C, S2A, S4C, S2C and UW1B. The data was logged every minute.

Carbon dioxide in the summa canisters was also subsequently measured using gas chromatographic techniques.

CO and SO_2

The Biosystems Cannonball was used for carbon monoxide and sulphur dioxide only at a flow rate of 1 L/min. The data was logged every 30 seconds. The Metrosonics instrument also measured moisture and temperature.

Sample preparation and work up prior to chemical analysis

Oil and Residue samples

Analytes: Polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH) including bio-markers, and metals.

A 1 g aliquot of oil was diluted in 10 mL hexane to precipitate asphaltenes. An aliquot equivalent to 20 mg of the oil was then spiked with surrogate PAH and bio-marker standards and fractionated on an activated silica column. The hexane and benzene fractions (hexane:benzene 1:1) that contained the saturates and aromatics respectively, were then analyzed separately using either GC/MSD or GC/FID. Internal standards for PAHs (d14-terphenyl) and TPH (5-α-androstane) were added to the final concentration fractions before analysis. The pre-injection volume was typically 0.5 mL.

Water samples

Analytes: PAHs and VOCs

Water samples were stored at 4°C until analyzed. For the determination of PAHs, aliquots of 500-1000 mL were spiked with a mixture of PAH surrogate standards and extracted three times with dichloromethane. The combined raw extract was then concentrated to a small volume. Prior to GC analysis, an internal standard of d14-terphenyl was added and the volume made up to 1 mL.

For VOCs by headspace methods, a 10-mL aliquot was placed in a 20-mL capped headspace vial and equilibrated for 45 min at 85°C. A 1-mL aliquot of the headspace was injected via a gas sampling loop into a GC/MSD.

Air/smoke samples

Analytes: PAHs, dioxin/furans (DX), metals, Summa VOCs, and carbonyls (aldehydes

and ketones)

Filter, PUF, PUF/XAD, airborne particulate samples from helicopters were individually wrapped in solvent-washed aluminum foil, placed inside a glass jar and were kept cool during transit. They were spiked with surrogate PAH and DX standards and extracted with 10% benzene with dichloromethane. The raw extract was concentrated and applied quantitatively to an activated silica column. The first fraction of hexane containing saturates was analyzed to ensure there was no carry-over. The second fraction, containing PAHs, was recovered using benzene. This fraction was concentrated, spiked with d14-terphenyl as an internal standard and made to 1 mL before GC/MSD analysis. For a few selected samples the hexane fraction was also retained and examined for the distribution of aliphatics and bio-marker compounds.

The DX samples were spiked with a mixture of carbon-13 surrogates of dioxins/furans and extracted by soxhlet using toluene. The raw extract was cleaned up using an acid/base silica column which removed the easily-oxidizable organics. This was followed by an activated alumina column which separated the dioxins/furans from interfering PCB, pesticides etc. A typical pre-injection sample volume was 20 μL.

Up to 1.2 litre of the Summa VOC sample was cryogenically trapped using liquid nitrogen on the Entec cryogenic pre-concentrator. PermaPure dryers, Nafion, were used to dry the sample stream to prevent ice formation in the lines. After trapping for 30 min at a gas flow at 40 mL/min, the trap was heated to 100°C and the non-methane organic compounds were desorbed into a GC/MSD operated in selected ion monitoring (SIM) mode. Two other determinations of each Summa canister were also performed using two GC with optimized columns and conditions to determine C2 and C3-C12 hydrocarbons.

The carbonyl samples collected on the DNPH-silica Sep-pak were wrapped individually and shipped in a capped amber vial and kept cool to minimize degradation. The cartridge was extracted using 5 mL of acetonitrile and analyzed on an HP 1090 HPLC.

Analytical protocols

All organics

A HP 5890 GC was interfaced directly to a HP 5972 MSD. The GC was equipped with a HP 7673 auto sampler. Control of the entire system, data acquisition and data handling was by a HP ChemStation (DOS series). The column used for separation was a DB-5 30-m X 0.25 mm ID capillary column with 0.25-μm film. The GC temperature program used for PAH analysis was as follows: initial, 90°C for 1 min, first temperature ramp, 25°C/min to 180°C, second temperature ramp @ 5°C/min to a final temperature of 290°C, and hold for 15 min. A 1-μL aliquot was injected in the splitless mode (purge off: 1 min). Injector, interface and source temperature were 290°C, 300°C and 180°C respectively.

For PAH and bio-marker analysis, the MSD was operated in the SIM mode, monitoring 2-3 ions of each target analyte with a dwell time of 50 millisec for each ion. Autotune was used to tune the MSD daily to ensure day-to-day reproducibility.

Daily calibration was carried out by injecting a diluted solution of SRM 1491 (nominal concentration=0.7 ppm) which contained 26 compounds covering 2- to 6-ringed PAHs. The instrument detection limit was 0.1 ppm. Daily calibrations were performed to verify the column resolution and MS sensitivity. The response of the internal standard (d14-terphenyl) was used to correct for instrumentation drift and

analytical variations.

TPH measurement was performed using GC/FID. Calibration was by means of an alkane mixture covering the range from C-8 to C-40.

Instrument detection limit: in SIM mode, 0.01-0.05 ng/μL (ppm) for target PAH.

Method detection limit: 0.1 ppb for 500 mL water; 1 ppm for 25 mg oil; 0.01 $\mu g/m^3$ for a 10-m^3 air/smoke sample volume.

Dioxins/Furans

Ultra-trace analysis of dioxins/furans was carried out on an HP 5890 GC coupled to the VG 70S, which is a double focusing high resolution MS operated in the electron impact mode. The MS was tuned using PKF to achieve a resolution of at least 10000 (10% valley). One μL of sample was injected in the splitless mode on a 60-m DB-5 capillary column, with 0.25-mm ID and 0.25-μm film thickness. The temperature program was as follows: 70°C for 1 min, 100°C to 200°C @ 40°C/min, 200°C to 235°C @ 3°C/min and hold for 10 min, 235°C to 310°C @ 8°C and held for 15 min. Injector and interface temperature were at 300°C and 290°C respectively.

The system was calibrated with a standard mixture of all 17 2,3,7,8-substituted DX/DF congeners, containing the same set of C13-labelled surrogates, C13-labelled 1,2,3,4-TCDD and 1,2,3,7,8,9-HCDD congeners which were added to the sample extracts as internal and time reference standards.

Instrument detection limit: 0.2-1 pg/μL (ppb) operated at 10000 resolution. Method detection limit: 2 pg/m^3 for a 10-m^3 sample

Headspace VOCs

The headspace analyser system consisted of a HP 19395A headspace sampler coupled directly to the heated injection port of a HP 5890 GC with MSD, via a heated interface. The headspace in each sample vial, kept at 85°C, was swept through a 1-cc internal sample loop by first pressurizing the vial. The gas sampling valve, under the control of the concentrator, was rotated so that the contents of sampling loop was swept into the GC inlet operated in a split mode (split ratio 1:5). The GC was programmed from an initial 30°C (held for 5 min) to a final temperature of 200 C at the rate of 7.5°C/min. Injection and MSD source temperature were 200°C and 160°C respectively. A 30-m HP-1 capillary column (0.32 mm ID, 1-mm film) was used for compound separation.

A mixture of alkanes, alkenes and aromatics, including benzene, toluene, ethyl benzene o-,p- and m-xylene were used to establish response factors of each class of volatile compounds.

Instrument detection limit: 0.01 ppm.

Oil Component Analysis

Oil samples were dissolved in hexane at a concentration of 50 mg/mL, and spiked with the appropriate surrogate compounds. A portion of activated silica gel (3.0 g) was placed into a 30 mm long x 10.5 mm ID chromatographic column plugged with glass wool. The column was tapped to settle the silica gel, and 0.5 cm anhydrous sodium sulphate was added. The column was pre-eluted with 20 mL of hexane, the eluent was discarded. Just prior to exposure of the sodium sulphate layer to the air, 0.4 mL (approximately 20 mg oil) was quantitatively transferred onto the column using an

additional 3 mL of hexane to complete the transfer. This 3 mL eluent was also discarded. To avoid overloading the column, no more 40 mg of oil was placed on the column. Just prior to exposure of the sodium sulphate to the air, the column was eluted with 12 mL of hexane. The eluent was collected in a centrifuge tube and label this fraction "F1". F1, the saturated fraction, was used for analysis of the distribution of n-alkanes and isoprenoids including pristane and phytane, and of C_{30} 17α(H), 21β(H)-hopane and other biomarker triterpane and sterane compounds. The column was eluted with 15 mL of 1:1 (V:V) benzene/hexane, and the eluent collected in a centrifuge tube, and labelled as "F2". F2, the aromatic fraction, was used for analysis of the target PAHs, alkylated PAH and dibenzothiophene compounds. Half of F1 and F2 were combined and designated as "F3". This fraction was used for analysis of individual and total petroleum hydrocarbons (TPH). The fractions were concentrated to the appropriate pre-injection volume (PIV), 0.5 to 1.0 mL, using nitrogen blowdown. The extracts were then spiked with the appropriate quantitation internal standard (IS) compounds (the IS 5-androstane, for determination of the individual n-alkanes and TPH; the IS d14-terphenyl, for determination of the target PAH and alkylated PAH homologues; the IS C_{30} 17β(H), 21β(H)-hopane, for determination of the biomarker compounds). To achieve lower quantitation limits, the PIV was reduced to 0.25 mL, but the extract was not blown dry to prevent loss of the volatile compounds, and more importantly, to prevent the precipitation of the high molecular weight components.

Analysis of the Water Fractions

The sample cleanup and analysis were performed according to published methods developed in our laboratory. Prior to analysis, water samples were stored at 4 ^{0}C. An aliquot of 500-1000 mL (depending on the sample volumes) was measured and transferred to a 2-litre separatory funnel, then spiked with 100 µL of deuterated PAH surrogate standards (mixture of d10-acenaphthene, d10-phenanthrene, d12-benz(a)anthracene and d12-perylene, 10 ppm each) and 100 µL of 200 ppm ortho-terphenyl in 1.0 mL acetone. Methylene chloride (DCM) (100 mL) was added to the separatory funnel. The separatory funnel was sealed and shaken vigorously for 2-3 minutes with periodic venting to release excess pressure. The organic layer was allowed to separate from the water phase for a minimum of 10 minutes, then the solvent extract was collected in an Erlenmeyer flask. (If the emulsion interface between layers was formed, mechanical techniques were employed to complete the phase separation.) The extraction was repeated two more times using fresh portions of solvent. The three solvent extracts were combined and concentrated by rotary evaporation. The concentrated extract was dried by passage through a drying funnel containing about 30 grams of anhydrous sodium sulphate. The solvent was then exchanged to hexane and reduced to 0.5 to 1.0 mL using nitrogen blowdown.

CO_2 in Summa Cannisters

A Hewlett Packard 5890 Gas Chromatograph with microvolume TCD was used with Hewlett Packard 3365 DOS ChemStation software. The Injection was via a Valco 6-port gas sampling valve with 1.0 mL loop in heated enclosure. The column was a 7 'x 0.125" Porapak R (80/100) with valve injection directly on column. The valve enclosure was maintained at 80°C, the detector block 200°C and the oven temperature started at 25°C, hold 2.5 min then ramped 25°C/min to 180°C ,hold 2.8 min. The carrier

was Helium at 40.0 mL/min. The TCD Reference was Helium at 60.0 mL/min.

The oven temperature program is primarily used to remove heavier compounds and water from the column before the next injection. The CO_2 peak emerges during the initial isothermal segment. The TCD was calibrated by injection of a known concentration of CO_2 in N_2 (4758 ppmv) obtained from Matheson Gas Products . To verify calibration linearity the CO_2 standard was dynamically diluted with CO_2 free N_2 using a master/slave mass flow controller system and various dilutions were analyzed in the same manner as the samples. A small metal bellows vacuum pump was used to draw the sample into the loop from a TEDLAR bag. The pressure inside the loop was allowed to equilibrate with ambient pressure before injection onto the column. Since the canisters supplied were under vacuum, a gauge was used to measure the pressure inside the loop when attached to the canister. A pressure correction curve was prepared to correct the analysis results for reduced pressure. Both the ambient calibration curve and the pressure correction curve are given. Any canister with a pressure below 20" Hg could not be analyzed due to the pumping capacity of the pump being used. For canisters with very low pressures (<10" Hg), the analysis is probably more representative of the gas used to clean and flush the canister than the sample taken.

RESULTS AND DISCUSSION

Particulates

Table 3 gives the summary results of particulates for all three burns. Because the smoke plume went directly up in burn 1, little particulate material was measured. The data from the PS-1 was eliminated in all three burns. The filter paper for most samples was broken and significant amounts of material was lost. The samples could, however, be used for organic material (PAH) analysis. Table 3 shows that the average measurements from the RAM, PM-10 and TSP correlate strongly at most locations. Figure 2 and 3 show the average particulate distribution, taken from the average RAM values, at the various geographic locations. This shows the heavy particulate distribution characteristic of a Diesel fire. These values are about 4 times the value expected from a similar crude oil fire. Figures 2 and 3 show the RAM data with time. These figures show that the particulate concentration varies strongly over time. Particulate arrival at a particular instrument appears to maintain a baseline value but then a burst of particulates arrive over a period of time lasting only a minute or two and then the values return to normal. This is primarily as a result of the high turbulence generated by the fire. Table 4 shows the numeric results from the DataRAM. These results show that this newer device yields data comparable to an older-style RAM.

PAHs

The samples that were collected by the PM-10, PS-1, and TSP samplers were used for PAH analysis. The analytical results for each of these collection devices is given in Tables 5 to 9. These tables show that very low amounts (or no) PAHs are carried into the soot or formed. This is different from crude oil burns, however, where there exists a high amount of PAHs in the starting oil and these are carried along with the particulate matter. In the case of Diesel fuel, large molecular-weight PAHs are created by the fire and few are in the fuel before combustion begins. Most of the PAHs are low molecular weight congeners, and this is particularly shown by the differences between the results from the PS-1 and TSP samples. PS-1 samples included a PUF filter to capture PAH volatiles and TSP did not. It is significant that the PS-1 results are much

Table 3

SUMMARY of Particulate Results (µg/m³)

Sampling Station		UW1B	DW1A	DW2A	DW3A	DW4A	DW1B	DW2B	DW3B	DW4B	DW1C	DW2C	DW3C	DW4C
Distance from fire		84m	39m	58m	92m	109m	39m	54m	84m	99m	39m	58m	92m	109m
Angle		180°	22°	22°	22°	22°	0°	0°	0°	0°	-22°	-22°	-22°	-22°
Burn 1	RAM	0<0<0		0<30<307	0<8<130	3<23<399	6<68<1154	0<18<405	14<22<54	0<5<76	0<24<243	0<13<101	0<6<32	0<0<0
		The smoke plume from burn 1 was vertical and thus low particulate levels were measured												
Burn 2														
	PM-10	-	1515	450	57		4887				454			
	PS-1		1017	-	-		5360	2144	909		770	146	-	
	TSP	-	1018	317	-		4401				340			
	RAM	0<0<0	0<2274<6325	2<1278<5855	0<187<1057	2<190<1465	291<2984<8280			13<1446<8157	1<280<2508	0<160<1365	0<29<394	0<0<0
Burn 3														
	PM-10	-	2420	696	174		3310				53			
	PS-1	14	2180	-	-		3000	880	190		150	-	-	
	TSP	-	1878	354	-		3286				-			
	RAM	0<0<0	0<2577<10000	7<111<5725	8<383<1498	0<312<1293	19<1686<8675			14<427<2488	0<58<768	8<40<420	2<14<204	0<0<0

values for RAM are shown as minimum<average<maximum

Table 4

Particulates as Measured by the DataRAM

$\mu g/m^3$ Corrected with Minimum of Total Data set

Location - DW2B (54m, 0°)

	BURN 1			BURN 2			BURN 3		
	MIN	AVE	MAX	MIN	AVE	MAX	MIN	AVE	MAX
Pre-ignition									
Minimum	5	1	0	2	0	0	0	1	2
Average	6	2	3	24	294	773	20	384	2757
Maximum	7	4	12	241	3408	8794	273	4555	20352
Burn									
Minimum	0	0	0	2	1	4	0	0	0
Average	6	43	113	14	309	938	32	887	2275
Maximum	18	428	932	97	1851	4357	354	9879	18342
Post-burn									
Minimum	3	0	7	0	1	5	3	13	19
Average	15	65	172	9	47	133	4	22	44
Maximum	82	174	477	31	147	438	5	30	62

Figure 2 Ground Level Particulate Levels - Burn 2

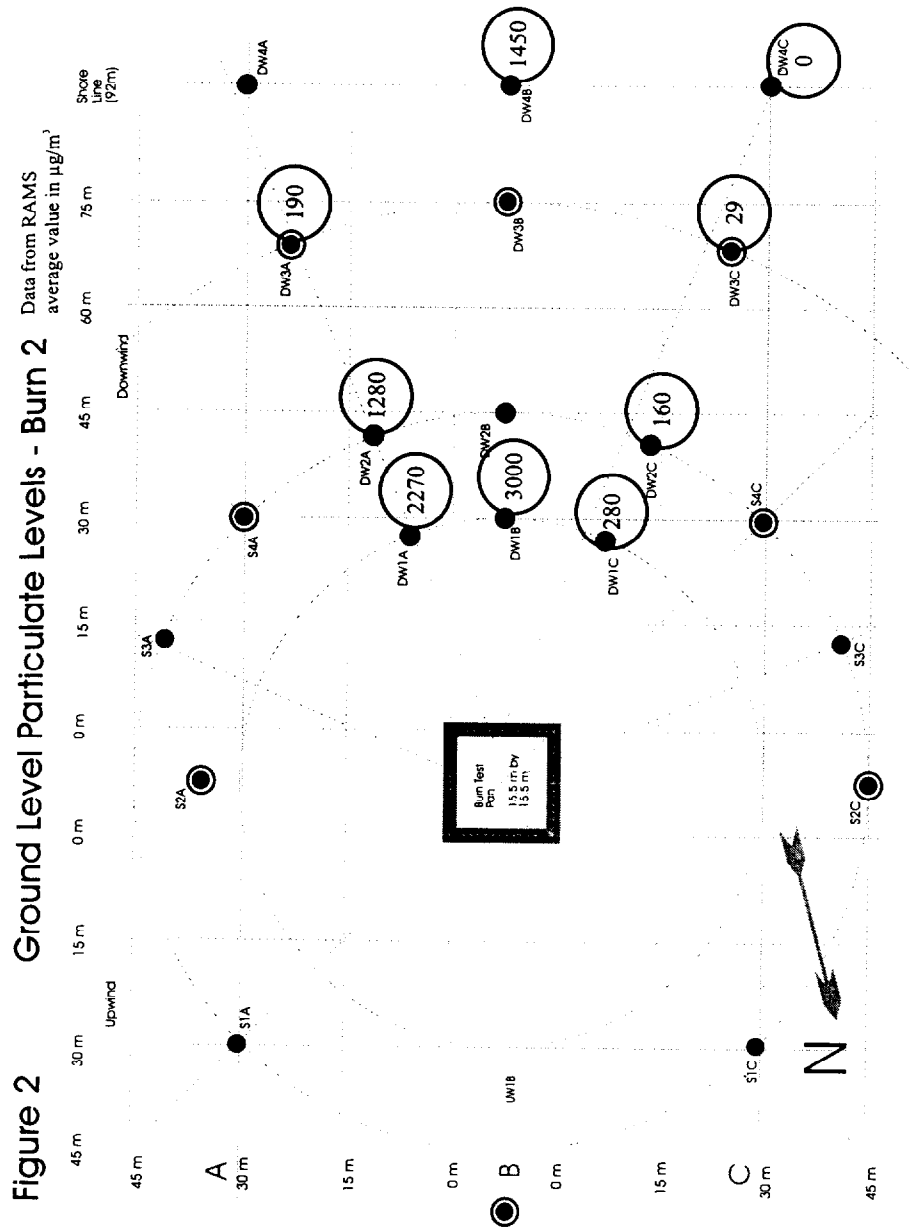


Figure 3 Ground Level Particulate Levels - Burn 3

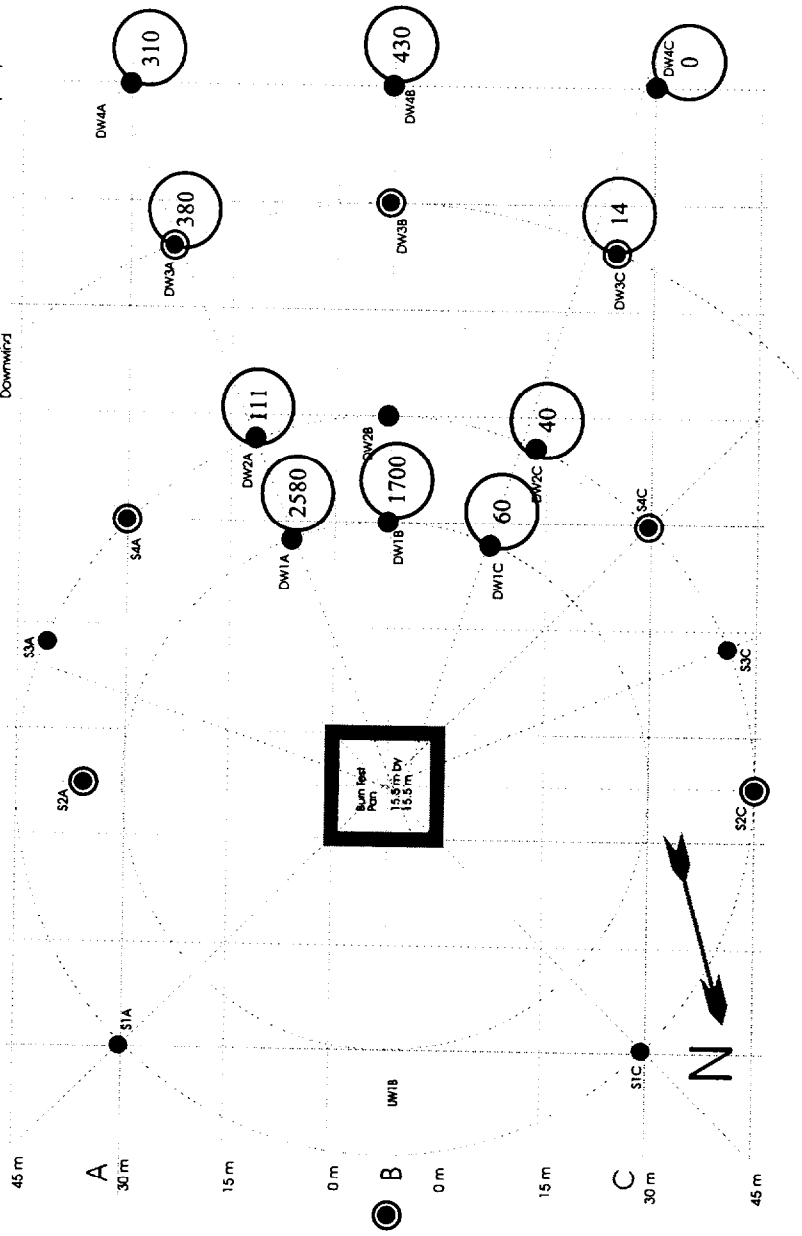


Figure 4

Particulate Concentration With Time

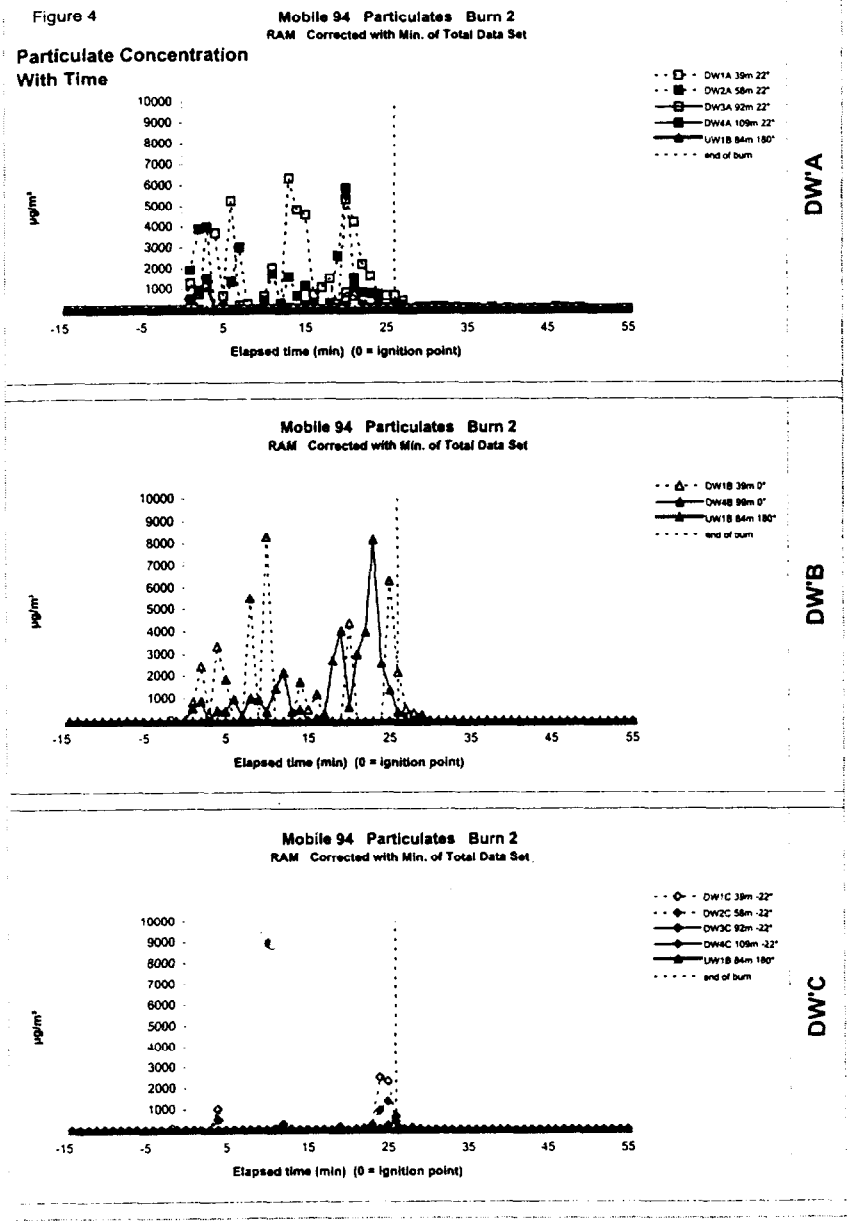


Figure 5

Particulate Concentration with Time

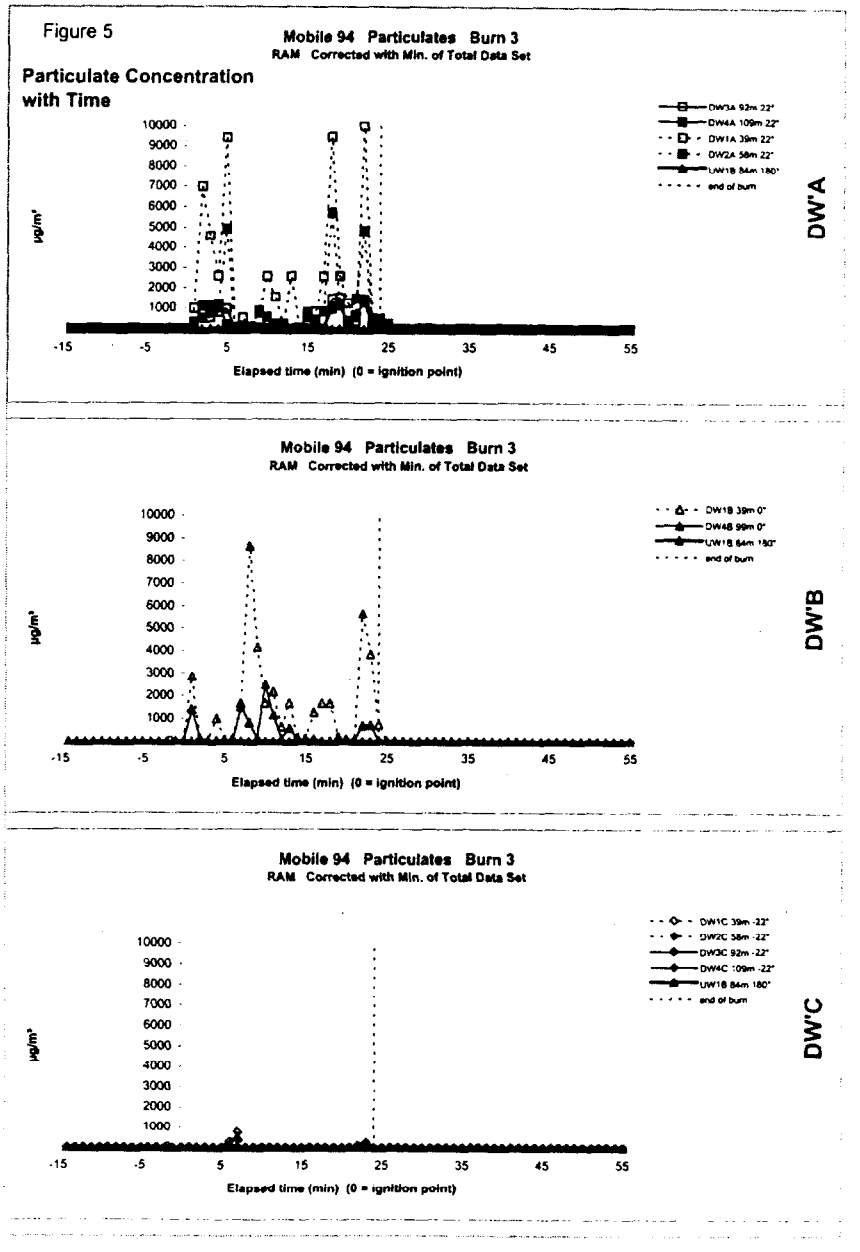


Table 5

PAH Extracted from PM-10 Samples

Sample I.D.	Burn 1		Burn 2						Burn 3					
	6261096 DW1A	6261097 DW1B	6261075 DW1A	6261070 DW2A	6261071 DW3A	6261077 DW1B	6261079 DW1C	6261073 UPWIND	6261057 DW1A	6261055 DW2A	6261054 DW3A	6261059 DW1B	6261043 DW1C	6261068 UPWIND
	39m	39m	39m	58m	82m	39m	39m		39m	58m	92m	39m	39m	
Location	22°	0°	22°	22°	22°	0°	-22°		22°	22°	22°	0°	-22°	
sample volume m³	33.9	33.8	37.9	35.9	36	32.9	41	44	31.1	29.8	36.7	26.7	36	37
PAH (µg/m³)														
Naphthalene	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00
2-Methylnaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Methylnaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biphenyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,6-Dimethylnaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other dimethynaphthalenes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,3,5-Trimethylnaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other dimethynaphthalenes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluorene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenanthrene	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
Anthracene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Methylphenthrene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
Other dimethynaphthalenes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoranthene	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.07	0.00	0.00	0.19	0.00	0.00
Pyrene	0.00	0.00	0.03	0.00	0.00	0.20	0.00	0.00	0.09	0.00	0.00	0.25	0.00	0.00
Benz(a)anthracene	0.00	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.11	0.00	0.00	0.06	0.00	0.00
Chrysene	0.00	0.00	0.02	0.00	0.00	0.16	0.00	0.00	0.10	0.00	0.00	0.08	0.00	0.00
Benzo(b)fluoranthene	0.00	0.00	0.10	0.00	0.00	0.58	0.07	0.00	0.41	0.00	0.00	0.18	0.00	0.00
Benz(k)fluoranthene	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00
Benz(e)pyrene	0.00	0.00	0.03	0.00	0.00	0.21	0.00	0.00	0.15	0.00	0.00	0.06	0.00	0.00
Benz(a)pyrene	0.00	0.00	0.05	0.00	0.00	0.40	0.03	0.00	0.23	0.00	0.00	0.05	0.00	0.00
Perylene	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indeno(123-cd)pyrene	0.00	0.00	0.06	0.00	0.00	0.37	0.04	0.00	0.23	0.00	0.00	0.08	0.00	0.00
Dibenz(ah)anthracene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benz(ghi)perylene	0.00	0.00	0.09	0.00	0.00	0.52	0.06	0.00	0.34	0.00	0.00	0.15	0.00	0.00
Sum	**0.00**	**0.00**	**0.38**	**0.00**	**0.00**	**2.99**	**0.20**	**0.00**	**1.72**	**0.06**	**0.00**	**1.23**	**0.00**	**0.00**

Table 6

PAH in PS-1 Samples, Burn 1

Location	DW1A	DW2A	DW3A	DW1B	DW2B	DW3B	DW1C	DW2C	DW3C	UPWIND
	39m	58m	92m	39m	54m	84m	39m	58m	92m	84m
	22°	22°	22°	0°	0°	0°	-22°	-22°	-22°	180°
Sample volume, cubic metre	6.07	5.82	4.38	6.22	6.24	5.92	6.20	6.00	6 (note1)	6 (note1)
PAH (µg/m³)										
NAPHTHALENE	0.10	0.09	0.10	0.17	0.08	0.12	0.13	0.18	0.10	0.03
2-METHYL NAPHTHALENE	0.25	0.20	0.09	0.55	0.22	0.21	0.20	0.17	0.06	0.02
1-METHYLNAPHTHALENE	0.23	0.14	0.06	0.49	0.19	0.14	0.17	0.12	0.04	0.01
BIPHENYL	0.19	0.13	0.05	0.46	0.21	0.14	0.18	0.14	0.04	0.01
2,6-DIMETYHLNAPHTHALENE	0.37	0.25	0.09	1.00	0.43	0.28	0.36	0.26	0.07	0.01
OTHER DIMETYHLNAPHTHALENES	1.07	0.70	0.25	2.61	1.21	0.71	0.95	0.74	0.19	0.03
ACENAPHTHYLENE	0.31	0.16	0.06	0.63	0.24	0.13	0.27	0.14	0.04	0.00
ACENAPHTHENE	0.00	0.00	0.00	0.07	0.00	0.00	0.03	0.00	0.00	0.00
2,3,5-TRIMETHYLNAPHTHYLENE	0.24	0.15	0.05	0.59	0.29	0.15	0.25	0.21	0.05	0.01
OTHER TRIMETHYLNAPHTHYLENES	1.33	0.93	0.29	3.34	1.67	0.89	1.36	1.20	0.29	0.04
FLUORENE	0.30	0.12	0.05	0.42	0.22	0.15	0.19	0.15	0.04	0.02
PHENANTHRENE	0.39	0.18	0.12	0.62	0.33	0.23	0.31	0.21	0.07	0.11
ANTHRACENE	0.04	0.03	0.01	0.13	0.06	0.03	0.07	0.03	0.01	0.01
1-METHYLPHENANTHRENE	0.10	0.01	0.01	0.04	0.02	0.02	0.07	0.01	0.01	0.01
OTHER METHYLPHENANTHRENES	0.30	0.03	0.03	0.13	0.05	0.15	0.20	0.03	0.03	0.03
FLUORANTHRENE	0.12	0.05	0.03	0.17	0.09	0.06	0.08	0.06	0.02	0.04
PYRENE	0.11	0.05	0.02	0.17	0.07	0.04	0.08	0.04	0.01	0.02
BENZ(A)ANTHRACENE	0.01	0.01	0.00	0.03	0.01	0.00	0.01	0.00	0.00	0.00
CHRYSENE	0.02	0.01	0.00	0.03	0.01	0.00	0.01	0.01	0.00	0.00
BENZ(B)FLUORANTHENE	0.03	0.01	0.00	0.05	0.02	0.01	0.03	0.00	0.00	0.00
BENZ(K)FLUORANTHENE	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
BENZO(e)PYRENE	0.01	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00
BENZO(a)PYRENE	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00
PERYLENE	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
INDENO(1,2,3-CD)PYRENE	0.01	0.01	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00
DIBENZ(a,h)ANTHRACENE	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BENZO(g,h,i)PERYLENE	0.02	0.01	0.00	0.02	0.01	0.00	0.02	0.01	0.00	0.00
TOTAL	**5.59**	**3.28**	**1.34**	**11.77**	**5.45**	**3.47**	**5.01**	**3.72**	**1.08**	**0.40**
SURROGATE RECOVERY										
d8-naphthalene	note2	0.85	0.88	0.50	0.77	1.07	note2	0.84	0.76	0.82
d10-acenaphthene		0.81	0.83	1.05	0.93	1.09		0.92	0.87	0.88
d10-phenanthrene		0.82	0.84	0.91	0.83	0.88		0.84	0.84	0.86
d12-chrysene		0.92	0.92	0.92	0.92	0.95		0.92	0.95	0.95
d12-perylene		0.75	0.78	0.71	0.92	0.71		0.78	0.89	0.86

Note 1: not available, assumed to be 6 cubic metres Note 2: Dioxin sample; not spiked

Table 6 **PAH in PS-1 Samples, Burn 1**

Location	DW1A	DW2A	DW3A	DW1B	DW2B	DW3B	DW1C	DW2C	DW3C	UPWIND
	39m	58m	92m	39m	54m	84m	39m	58m	92m	84m
	22°	22°	22°	0°	0°	0°	-22°	-22°	-22°	180°
Sample volume, cubic metre	6.07	5.82	4.38	6.22	6.24	5.92	6.20	6.00	6 (note1)	6 (note1)
PAH (µg/m³)										
NAPHTHALENE	0.10	0.09	0.10	0.17	0.08	0.12	0.13	0.18	0.10	0.03
2-METHYL NAPHTHALENE	0.25	0.20	0.09	0.55	0.22	0.21	0.20	0.17	0.06	0.02
1-METHYLNAPHTHALENE	0.23	0.14	0.06	0.49	0.19	0.14	0.17	0.12	0.04	0.01
BIPHENYL	0.19	0.13	0.05	0.46	0.21	0.14	0.18	0.14	0.04	0.01
2,6-DIMETYHLNAPHTHALENE	0.37	0.25	0.09	1.00	0.43	0.28	0.36	0.26	0.07	0.01
OTHER DIMETYHLNAPHTHALENES	1.07	0.70	0.25	2.61	1.21	0.71	0.95	0.74	0.19	0.03
ACENAPHTHYLENE	0.31	0.16	0.06	0.63	0.24	0.13	0.27	0.14	0.04	0.00
ACENAPHTHENE	0.00	0.00	0.00	0.07	0.00	0.00	0.03	0.00	0.00	0.00
2,3,5-TRIMETHYLNAPHTHYLENE	0.24	0.15	0.05	0.59	0.29	0.15	0.25	0.21	0.05	0.01
OTHER TRIMETHYLNAPHTHYLENES	1.33	0.93	0.29	3.34	1.67	0.89	1.36	1.20	0.29	0.04
FLUORENE	0.30	0.12	0.05	0.42	0.22	0.15	0.19	0.15	0.04	0.02
PHENANTHRENE	0.39	0.18	0.12	0.62	0.33	0.23	0.31	0.21	0.07	0.11
ANTHRACENE	0.04	0.03	0.01	0.13	0.06	0.03	0.07	0.03	0.01	0.01
1-METHYLPHENANTHRENE	0.10	0.01	0.01	0.04	0.02	0.02	0.07	0.01	0.01	0.01
OTHER METHYLPHENANTHRENES	0.30	0.03	0.03	0.13	0.05	0.15	0.20	0.03	0.03	0.03
FLUORANTHRENE	0.12	0.05	0.03	0.17	0.09	0.06	0.08	0.06	0.02	0.04
PYRENE	0.11	0.05	0.02	0.17	0.07	0.04	0.08	0.04	0.01	0.02
BENZ(A)ANTHRACENE	0.01	0.01	0.00	0.03	0.01	0.00	0.01	0.00	0.00	0.00
CHRYSENE	0.02	0.01	0.00	0.03	0.01	0.00	0.01	0.01	0.00	0.00
BENZ(b)FLUORANTHENE	0.03	0.01	0.00	0.05	0.02	0.01	0.03	0.00	0.00	0.00
BENZ(k)FLUORANTHENE	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
BENZO(e)PYRENE	0.01	0.00	0.00	0.02	0.00	0.00	0.01	0.00	0.00	0.00
BENZO(a)PYRENE	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.00	0.00	0.00
PERYLENE	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
INDENO(1,2,3-CD)PYRENE	0.01	0.01	0.00	0.02	0.01	0.00	0.01	0.00	0.00	0.00
DIBENZ(a,h)ANTHRACENE	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BENZO(g,h,i)PERYLENE	0.02	0.01	0.00	0.02	0.01	0.00	0.02	0.01	0.00	0.00
TOTAL	**5.59**	**3.28**	**1.34**	**11.77**	**5.45**	**3.47**	**5.01**	**3.72**	**1.08**	**0.40**
SURROGATE RECOVERY										
d8-naphthalene	note2	0.85	0.88	0.50	0.77	1.07	note2	0.84	0.76	0.82
d10-acenaphthene		0.81	0.83	1.05	0.93	1.09		0.92	0.87	0.88
d10-phenanthrene		0.82	0.84	0.91	0.83	0.88		0.84	0.84	0.86
d12-chrysene		0.92	0.92	0.92	0.92	0.95		0.92	0.95	0.95
d12-perylene		0.75	0.78	0.71	0.92	0.71		0.78	0.89	0.86

Note 1: not available, assumed to be 6 cubic metres Note 2: Dioxin sample; not spiked

Table 7

PAH in PS-1 Samples, Burn 2

Location	DW1A 39m 22°	DW2A 58m 22°	DW3A 92m 22°	DW1B 39m 0°	DW2B 54m 0°	DW3B 84m 0°	DW1C 39m -22°	DW2C 58m -22°	DW3C 92m -22°	UPWIND 84m 180°
Sample volume, cubic metre	6.46	6.39	4.84	6.52	6.54	6.23	6.59	6.78	7.10	7.1
PAH (µg/m³)										
NAPHTHALENE	0.29	0.06	0.17	1.49	0.65	0.32	0.58	0.37	0.06	0.01
2-METHYL NAPHTHALENE	0.30	0.06	0.15	1.96	0.71	0.43	0.36	0.19	0.04	0.01
1-METHYLNAPHTHALENE	0.25	0.04	0.10	1.48	0.62	0.38	0.27	0.11	0.03	0.01
BIPHENYL	0.53	0.09	0.27	1.45	0.55	0.36	0.25	0.10	0.02	0.01
2,6-DIMETYHLNAPHTHALENE	0.52	0.11	0.32	2.15	0.84	0.53	0.38	0.18	0.05	0.01
OTHER DIMETYHLNAPHTHALENES	1.40	0.27	0.92	6.24	2.37	1.47	1.13	0.55	0.12	0.03
ACENAPHTHYLENE	0.77	0.04	0.30	5.25	1.85	1.03	0.92	0.34	0.04	0.00
ACENAPHTHENE	0.00	0.00	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.01
2,3,5-TRIMETHYLNAPHTHYLENE	0.18	0.03	0.09	1.24	0.55	0.33	0.24	0.11	0.03	0.00
OTHER TRIMETHYLNAPHTHYLENES	1.09	0.20	0.67	7.26	3.12	1.85	1.41	0.70	0.16	0.00
FLUORENE	0.27	0.03	0.10	1.47	0.57	0.32	0.31	0.14	0.04	0.02
PHENANTHRENE	0.63	0.07	0.24	3.94	1.71	1.00	0.91	0.43	0.07	0.08
ANTHRACENE	0.09	0.01	0.04	0.69	0.31	0.16	0.16	0.07	0.01	0.01
1-METHYLPHENANTHRENE	0.06	0.01	0.01	0.34	0.13	0.20	0.07	0.03	0.01	0.01
OTHER METHYLPHENANTHRENES	0.18	0.02	0.03	1.02	0.42	0.72	0.23	0.10	0.03	0.02
FLUORANTHRENE	0.27	0.02	0.10	1.76	0.78	0.39	0.40	0.16	0.02	0.02
PYRENE	0.25	0.02	0.09	1.83	0.78	0.36	0.37	0.13	0.02	0.01
BENZ(A)ANTHRACENE	0.04	0.00	0.02	0.29	0.18	0.07	0.07	0.02	0.00	0.00
CHRYSENE	0.04	0.00	0.02	0.29	0.15	0.07	0.07	0.03	0.00	0.00
BENZ(b)FLUORANTHENE	0.07	0.00	0.03	0.43	0.28	0.10	0.12	0.04	0.00	0.00
BENZ(k)FLUORANTHENE	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
BENZO(e)PYRENE	0.02	0.00	0.01	0.18	0.10	0.04	0.05	0.02	0.00	0.00
BENZO(a)PYRENE	0.04	0.00	0.01	0.37	0.19	0.06	0.07	0.02	0.00	0.00
PERYLENE	0.01	0.00	0.00	0.04	0.02	0.01	0.01	0.00	0.00	0.00
INDENO(1,2,3-CD)PYRENE	0.04	0.00	0.01	0.18	0.15	0.04	0.06	0.02	0.00	0.00
DIBENZ(a,h)ANTHRACENE	0.00	0.00	0.00	0.02	0.01	0.01	0.01	0.00	0.00	0.00
BENZO(g,h,i)PERYLENE	0.04	0.00	0.02	0.18	0.20	0.06	0.08	0.03	0.00	0.00
TOTAL	**7.39**	**1.11**	**3.74**	**41.55**	**17.32**	**10.30**	**8.51**	**3.92**	**0.75**	**0.25**
SURROGATE RECOVERY										
d8-naphthalene	0.91	0.81	0.82	0.98	0.39	0.86	0.64	0.72	0.64	note2
d10-acenaphthene	0.99	0.83	0.84	1.68	0.93	1.08	0.82	0.72	0.80	
d10-phenanthrene	0.90	0.86	0.88	1.09	0.85	0.99	0.93	0.92	0.88	
d12-chrysene	0.88	0.95	0.97	0.90	0.96	0.90	0.99	0.99	0.94	
d12-perylene	0.65	0.77	0.95	0.75	0.86	0.66	0.97	0.99	1.03	

Note 2: Dioxin sample; not spiked

Table 8 **PAH in PS-1 Samples, Burn 3**

Location	DW1A	DW2A	DW3A	DW1B	DW2B	DW3B	DW1C	DW2C	DW3C	UPWIND
	39m	58m	92m	39m	54m	84m	39m	58m	92m	84m
	22°	22°	22°	0°	0°	0°	-22°	-22°	-22°	180°
Sample volume, cubic metre	5.67	5.49	4.31	5.73	5.85	5.47	5.76	5.92	5.97	6.33
PAH (µg/m³)										
NAPHTHALENE	2.03	0.89	0.59	1.34	0.65	0.26	0.23	0.00	0.04	0.02
2-METHYL NAPHTHALENE	1.54	0.74	0.31	0.83	0.39	0.16	0.21	0.01	0.03	0.02
1-METHYLNAPHTHALENE	1.03	0.61	0.25	0.62	0.30	0.13	0.16	0.01	0.02	0.01
BIPHENYL	1.20	0.57	0.23	0.72	0.37	0.13	0.25	0.04	0.02	0.01
2,6-DIMETYHLNAPHTHALENE	1.64	0.83	0.32	1.00	0.50	0.19	0.38	0.08	0.04	0.02
OTHER DIMETYHLNAPHTHALENES	9.89	2.36	0.87	2.88	1.42	0.51	1.05	0.08	0.22	0.03
ACENAPHTHYLENE	3.56	1.14	0.39	1.86	0.78	0.24	0.17	0.03	0.01	0.00
ACENAPHTHENE	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00
2,3,5-TRIMETHYLNAPHTHYLENE	0.84	0.41	0.14	0.53	0.24	0.09	0.17	0.05	0.02	0.01
OTHER TRIMETHYLNAPHTHYLENES	5.08	2.64	0.90	3.24	1.56	0.56	1.10	0.30	0.25	0.05
FLUORENE	0.74	0.33	0.11	0.49	0.20	0.07	0.08	0.03	0.02	0.01
PHENANTHRENE	2.49	0.86	0.30	1.40	0.64	0.22	0.28	0.08	0.07	0.11
ANTHRACENE	0.38	0.12	0.04	0.19	0.09	0.03	0.03	0.00	0.01	0.01
1-METHYLPHENANTHRENE	0.10	0.07	0.02	0.08	0.04	0.02	0.02	0.01	0.01	0.01
OTHER METHYLPHENANTHRENES	0.34	0.19	0.06	0.24	0.10	0.06	0.06	0.03	0.02	0.03
FLUORANTHRENE	1.31	0.37	0.12	0.81	0.31	0.10	0.10	0.03	0.03	0.04
PYRENE	1.27	0.34	0.10	0.78	0.28	0.09	0.06	0.02	0.01	0.02
BENZ(A)ANTHRACENE	0.19	0.06	0.01	0.10	0.04	0.01	0.01	0.00	0.00	0.00
CHRYSENE	0.21	0.06	0.02	0.11	0.04	0.02	0.01	0.00	0.00	0.00
BENZ(b)FLUORANTHENE	0.37	0.10	0.03	0.20	0.08	0.03	0.01	0.00	0.00	0.00
BENZ(k)FLUORANTHENE	0.03	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
BENZO(e)PYRENE	0.13	0.04	0.01	0.08	0.03	0.01	0.00	0.00	0.00	0.00
BENZO(a)PYRENE	0.20	0.05	0.01	0.11	0.04	0.01	0.00	0.00	0.00	0.00
PERYLENE	0.03	0.01	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00
INDENO(1,2,3-CD)PYRENE	0.21	0.06	0.02	0.11	0.05	0.02	0.01	0.00	0.00	0.00
DIBENZ(a,h)ANTHRACENE	0.02	0.00	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00
BENZO(g,h,i)PERYLENE	0.31	0.08	0.03	0.18	0.07	0.02	0.01	0.00	0.00	0.00
TOTAL	**35.14**	**12.95**	**4.89**	**17.94**	**8.25**	**2.96**	**4.40**	**0.83**	**0.83**	**0.40**
SURROGATE RECOVERY										
d8-naphthalene	1.08	0.92	0.93	1.11	1.00	0.83	1.18	0.00	0.85	0.81
d10-acenaphthene	1.46	1.17	0.99	1.32	1.08	0.90	1.07	0.64	0.86	0.84
d10-phenanthrene	1.06	0.99	0.95	1.11	1.04	0.90	1.06	0.84	0.82	0.84
d12-chrysene	1.02	0.96	0.95	1.02	0.96	0.95	0.98	0.94	0.91	0.95
d12-perylene	0.80	0.76	0.95	0.74	0.74	0.74	0.74	0.97	0.79	0.86

Table 9

PAH Extracted from TSP Samples

Sample I.D.	Burn 1		Burn 2						Burn 3					
	6261095	6261096	6261076	6261069	6261072	6261078	6261080	6261074	6261060	6261056	6261058	6261062	6261061	6261067
	DW1A	DW1B	DW1A	DW2A	DW3A	DW1B	DW1C	UPWIND	DW1A	DW2A	DW3A	DW1B	DW1C	UPWIND
	38m	38m	38m	58m	92m	38m	38m		38m	58m	92m	38m	38m	
Location	22°	0°	22°	22°	22°	0°	-22°		22°	22°	22°	0°	-22°	
sample volume m³	33.9	34	37.9	40.1	39.6	37.3	39.5	41.1	30.7	36.6	33.2	31.1	36	33.6
PAH (µg/m³)														
Naphthalene	0.00	0.00	0.00	0.00	0.00	0.04	0.19	0.00	0.00	0.00	0.00	0.06	0.00	0.00
2-Methylnaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Methylnaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biphenyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,6-Dimethylnaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Dimethylnaphthalenes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Acenaphthene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,3,5-Trimethylnaphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Trimethylnapnthalenes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluorene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenanthrene	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00
Anthracene	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1-Methylphenthrene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Methylphenthrenes	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Fluoranthene	0.00	0.00	0.03	0.00	0.00	0.14	0.00	0.00	0.07	0.00	0.00	0.19	0.00	0.00
Pyrene	0.00	0.00	0.03	0.00	0.00	0.17	0.00	0.00	0.08	0.00	0.00	0.24	0.00	0.00
Benz(a)anthracene	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.07	0.00	0.00	0.06	0.00	0.00
Chrysene	0.00	0.00	0.00	0.00	0.00	0.11	0.00	0.00	0.07	0.00	0.00	0.07	0.00	0.00
Benzo(b)fluoranthene	0.00	0.00	0.04	0.00	0.00	0.42	0.09	0.00	0.31	0.07	0.00	0.18	0.00	0.00
Benz(k)fluoranthene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Benz(e)pyrene	0.00	0.00	0.00	0.00	0.00	0.15	0.00	0.00	0.15	0.00	0.00	0.07	0.00	0.00
Benz(a)pyrene	0.00	0.00	0.00	0.00	0.00	0.30	0.00	0.00	0.11	0.00	0.00	0.06	0.00	0.00
Perylene	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Indeno(123-cd)pyrene	0.00	0.00	0.03	0.00	0.00	0.27	0.05	0.00	0.19	0.03	0.00	0.09	0.00	0.00
Dibenz(ah)anthracene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benz(ghi)perylene	0.00	0.00	0.05	0.00	0.00	0.38	0.07	0.00	0.27	0.05	0.00	0.14	0.00	0.00
Sum	**0.00**	**0.00**	**0.18**	**0.00**	**0.00**	**2.23**	**0.39**	**0.00**	**1.31**	**0.20**	**0.00**	**1.20**	**0.00**	**0.00**

higher than the PS-1 results, indicative that many of the PAHs are volatile under these sampling conditions. PAHs were also measured in wipe samples from the remote-controlled helicopter blades. These results are shown in Table 10. These are results still show relatively low levels of PAHs even directly in the plume. In order to establish the amount of PAHs in the soot by weight, several PM-10 and TSP samples were aggregated and then analyzed. The results of these analyses are presented in Table 11. It should be noted that the values in this table are in ng/m^3, rather than the $\mu g/m^3$ in the previous tables. This shows that the levels of PAHs are still low, but that a greater abundance of alkylated PAHs are present than the parent PAH compounds. This is as expected from a combustion source. An n-alkane analysis was performed of the same samples. This is shown in Table 12. This clearly shows that a significant amount of Diesel fuel is carried with the soot. The same phenomenon does not occur with crude oil, or at least to the same extent. The distribution pattern of the n-alkanes shown in Table 12 are clearly Diesel fuel. This also indicates that one of the reasons proposed for the increased soot production with Diesel fuel is the atomization of the fuel which forms condensation nuclei around which soot forms.

VOCs

VOCs were measured using multiple gas chromatographic techniques on samples taken from Summa canisters. One-hundred and forty-eight substances were analyzed. The results of these analyses are given in the Appendix, Table A1. The values were corrected by lowering dichloromethane and hexane results to typical background values. This manipulation was necessary because these two substances were used for cleaning orifices on the canisters as well as around the test site for cleaning other samplers. Some samples showed very high values of these substances. The total value of VOCs less background values (approximately 50 $\mu g/m^3$) is shown for the three burns in Figures 6, 7 and 8. These include the values from the samples taken by the remote-controlled helicopter. These figures show that there are substantial concentrations of VOCs at ground level and that these have a distribution relevant to wind direction. It is interesting to note that even in burn 1, where the smoke plume went vertical, that there are above-background levels of VOCs at ground level. Three samples were taken by the remote-controlled helicopter. These show that the concentrations beside and under the smoke plume are near background levels. This appears to indicate that the heaviest VOC concentrations are found at the 1-metre level.

Dioxins and Dibenzofurans

Particulates sampled by the TSP (Total Suspended Particulate) sampler were analyzed for Dioxins and Dibenzofurans. Specific results are given in Table A3. These results show that the levels of all congeners are at the detectability limit or the normal background level. This shows that there is no significant Dioxin or Dibenzofuran production by the Diesel fuel fire.

Carbonyls

Carbonyls were measured using an activated absorption tube. The carbonyls measured include aldehydes and some ketones. Results from this measurement are presented in Tables A4-1, A4-2 and A4-3. These show that the following compounds are often above upwind and background levels: formaldehyde, acetaldehyde, acetone, proprionaldehyde and 2-Butanone. These are common products of incomplete combustion from sources such as vehicles. The levels found here are above what would be expected in an urban area or seen in recent crude oil fires, however the levels are

Table 10 **PAH from Helicopter Blade Wipes**

	Blade Wipe Sample		
sample size	BURN 1 48.7 mg	BURN 2 40.3 mg	Blank 0.2 mg
PAH (µg/gm)			
Naphthalene	2.77	1.27	0.00
2-Methylnaphthalene	12.19	4.35	0.00
1-Methylnaphthalene	5.87	2.21	0.00
Biphenyl	2.18	0.00	0.00
2,6-Dimethylnaphthalene	8.05	3.62	0.00
Other Dimethylnaphthalenes	19.51	9.43	0.00
Acenaphthalene	1.19	0.00	0.00
Acenaphthene	0.00	0.00	0.00
2,3,5-Trimethylnaphthalene	1.80	1.14	0.00
Other Trimethylnaphthalenes	5.13	3.23	0.00
Fluorene	0.00	0.00	0.00
Phenanthrene	0.00	1.24	0.00
Anthracene	0.00	0.00	0.00
1-Methylphenthrene	0.62	0.00	0.00
Other Methylphenthrenes	1.85	0.00	0.00
Fluoranthene	4.69	14.91	0.00
Pyrene	4.13	0.00	0.00
Benz(a)anthracene	0.00	0.00	0.00
Chrysene	0.00	0.00	0.00
Benzo(b)fluoranthene	0.00	0.00	0.00
Benz(k)fluoranthene	0.00	0.00	0.00
Benz(e)pyrene	4.53	3.18	0.00
Benz(a)pyrene	0.00	0.00	0.00
Perylene	0.00	0.00	0.00
Indeno(123-cd)pyrene	0.00	0.00	0.00
Dibenz(ah)anthracene	0.00	0.00	0.00
Benz(ghi)perylene	0.00	0.00	0.00
TOTAL	**74.51**	**44.56**	**0.00**

Table 11 **Alkylated PAH Analysis Results**

Sample Type	PM10-Burn 1	PM10-Burn 2	PM10-Burn 3	TSP-Burn 1	TSP-Burn 2	TSP-Burn 3
Sample Size	3 discs	5 discs	5 discs	3 discs	5 discs	6 discs
PAHs (ng/m³)						
Naphthalene						
C0-N	3	17	52	4	15	65
C1-N	5	11	27	4	13	38
C2-N	14	28	42	13	23	53
C3-N	11	25	28	7	15	26
C4-N	8	68	13	48	7	9
Sum	**41**	**149**	**161**	**75**	**74**	**192**
Phenanthrene						
C0-P	2	31	59	5	18	76
C1-P	7	9	68	7	20	73
C2-P	8	26	294	6	71	287
C3-P	7	36	342	5	71	258
C4-P	7	18	94	3	28	122
Sum	**31**	**121**	**857**	**26**	**208**	**816**
Dibenzothiophene						
C0-D	1	3	5	1	0	4
C1-D	1	4	24	2	3	21
C2-D	4	17	199	3	43	194
C3-D	3	19	262	2	48	201
Sum	**10**	**43**	**490**	**8**	**95**	**420**
Fluorene						
C0-F	1	0	5	2	0	6
C1-F	1	1	4	1	2	4
C2-F	0	2	10	1	4	9
C3-F	0	5	39	0	25	36
Sum	**2**	**9**	**59**	**3**	**31**	**55**
Chrysene						
C0-C	1	35	106	1	25	179
C1-C	3	15	32	0	6	48
C2-C	1	11	19	0	5	31
C3-C	1	5	12	0	5	8
Sum	6	67	169	1	41	266
TOTAL	**90**	**389**	**1736**	**113**	**448**	**1749**
C2D/C2P	0.50	0.66	0.68	0.56	0.61	0.68
C3D/C3P	0.52	0.53	0.77	0.52	0.67	0.78
Other PAHs						
Biphenyl	0.0	0.0	0.0	0.0	0.0	0.0
acenaphthalene	0.0	0.0	34.2	0.0	0.0	34.1
Acenaphthene	0.0	0.0	0.0	0.0	0.0	0.0
Anthracene	0.0	0.0	0.0	0.0	0.0	34.1
Fluoranthene	0.0	29.0	205.2	0.0	57.1	238.5
Pyrene	0.0	29.0	273.6	0.0	57.1	272.6
Benz(a)anthracene	0.0	29.0	68.4	0.0	28.5	136.3
Benzo(b)fluoranthene	not found	not found	not found	not found	not found	not found
Benzo(e)pyrene	0.0	87.0	171.0	0.0	57.1	238.5
Benzo(a)pyrene	0.0	116.0	205.2	0.0	57.1	340.7
Perylene	0.0	29.0	34.2	0.0	28.5	68.1
Indeno(1,2,3cd)pyrene	33.5	116.0	171.0	33.3	85.6	306.6
Dibenz(a,h)anthracene	0.0	0.0	0.0	0.0	0.0	34.1
Benzo(ghi)perylene	33.5	174.0	239.4	33.3	114.1	408.8
TOTAL	**67.0**	**609.1**	**1402.2**	**66.6**	**485.1**	**2112.4**

Table 12 **n-Alkane Analysis of Particulate Samples**

Sample Type Sample Size n-Alkanes (µg/m³)	PM10-Burn 1 3 discs	PM10-Burn 2 5 discs	PM10-Burn 3 6 discs	TSP-Burn 1 3 discs	TSP-Burn 2 5 discs	TSP-Burn 3 6 discs
n-C8						
n-C9						
n-C10						
n-C11						
n-C12						
n-C13						
n-C14						
n-C15	0.13	0.06	0.10	0.06	0.10	0.18
n-C16	0.10	0.07	0.13	0.08	0.12	0.13
n-C17	0.18	0.11	0.18	0.08	0.23	0.34
PRISTANE						
n-C18	0.11	0.12	0.24	0.08	0.31	0.55
PHYTANE	0.09	0.08	0.11	0.05	0.16	0.25
n-C19	0.08	0.18	0.64	0.07	0.86	1.21
n-C20	0.12	0.36	1.23	0.10	1.49	1.79
n-C21	0.18	0.50	1.54	0.10	1.50	1.90
n-C22	0.21	0.52	1.53	0.13	1.37	1.81
n-C23	0.24	1.16	1.93	0.99	1.01	1.80
n-C24	0.33	0.89	1.54	0.53	0.75	2.17
n-C25	0.45	2.89	3.78	2.96	0.90	2.38
n-C26	0.74	1.43	2.02	0.83	1.19	2.90
n-C27	1.03	2.42	3.35	2.03	1.46	3.31
n-C28	1.10	1.50	2.51	0.94	1.34	2.90
n-C29	1.18	2.23	3.10	1.74	1.72	3.51
n-C30	1.11	1.75	2.30	1.13	1.66	3.12
n-C31	1.28	1.90	2.45	1.24	1.98	3.50
n-C32	0.81	1.19	1.53	0.77	1.30	2.17
n-C33	0.80	1.18	1.37	0.66	1.43	2.26
n-C34	0.44	0.73	0.88	0.46	0.84	1.18
n-C35	0.34	0.57	0.67	0.38	0.73	0.85
n-C36	0.22	0.35	0.48	0.26	0.48	0.57
n-C37	0.19	0.29	0.40	0.23	0.43	0.41
n-C38	0.13	0.20	0.32	0.17	0.35	0.30
n-C39	0.11	0.14	0.24	0.13	0.31	0.19
n-C40	0.09	0.11	0.26	0.11	0.32	0.15
TOTAL	**11.78**	**22.91**	**34.84**	**16.31**	**24.35**	**41.84**
C17/PRISTANE	0.00	0.00	0.00	0.00	0.00	0.00
C18/PHYTANE	1.15	1.49	2.26	1.49	1.91	2.18
PRISTANE/PHYTANE	0.00	0.00	0.00	0.00	0.00	0.00

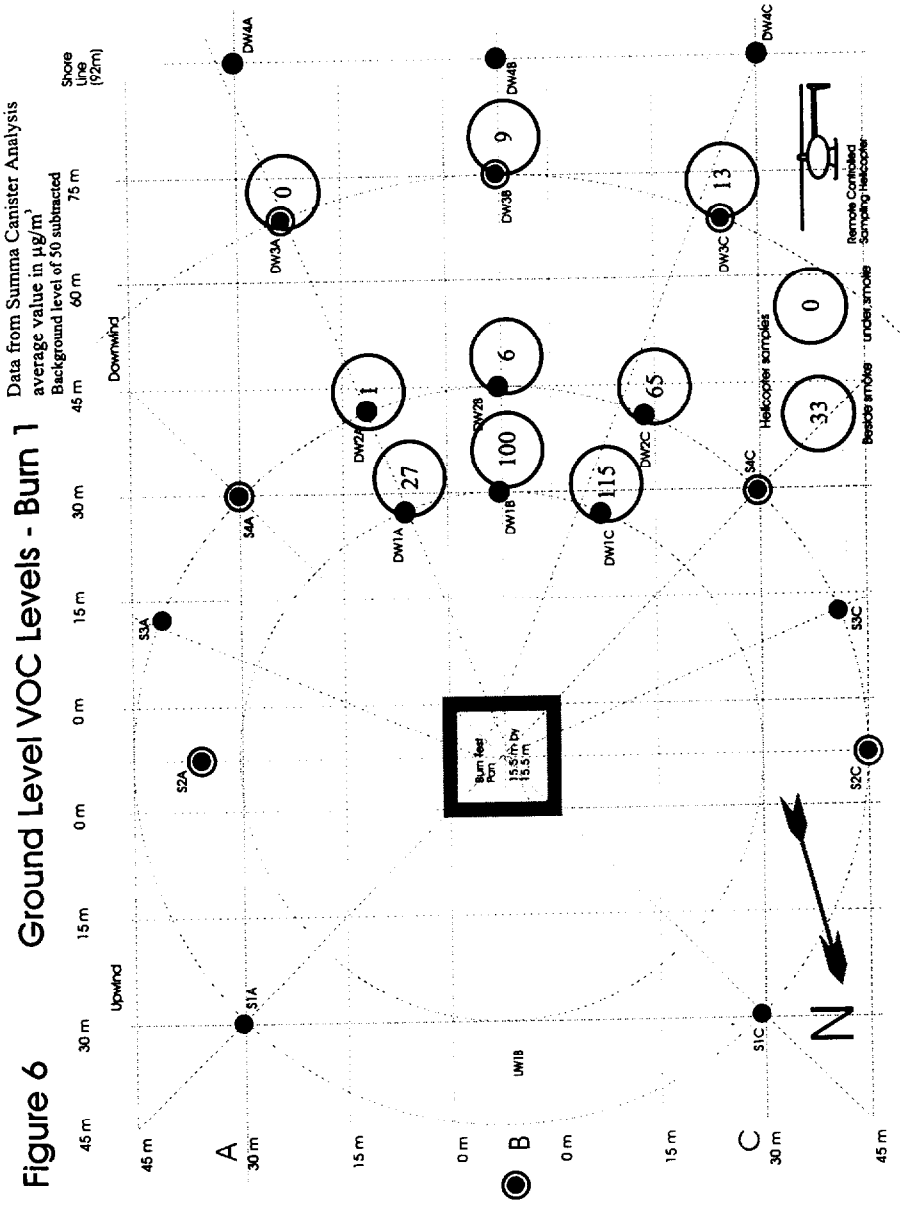
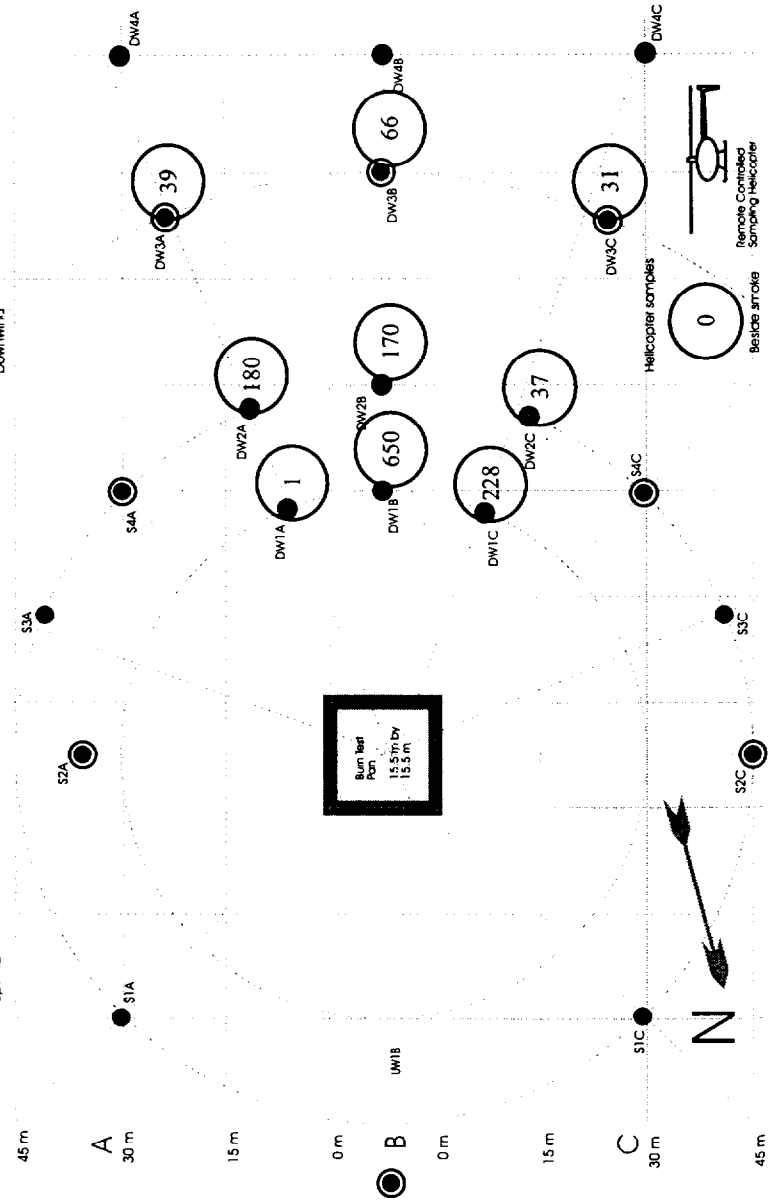


Figure 6
Ground Level VOC Levels - Burn 1
Data from Summa Canister Analysis
average value in µg/m³
Background level of 50 subtracted
Shore Line (92m)
Upwind
Downwind
45 m
30 m
15 m
0 m
60 m
75 m
A
B
C
S1A
S2A
S3A
S4A
S1C
S2C
S3C
S4C
DW1A
DW1B
DW1C
DW2A
DW2B
DW2C
DW3A
DW3B
DW3C
DW4A
DW4B
DW4C
UW1B
0
1
27
6
100
65
115
9
13
0
33
Burn Test Pan
15.5 m by 15.5 m
Helicopter samples
Beside smoke
under smoke
Remote Controlled Sampling Helicopter
N

Figure 7 Ground Level VOC Levels - Burn 2



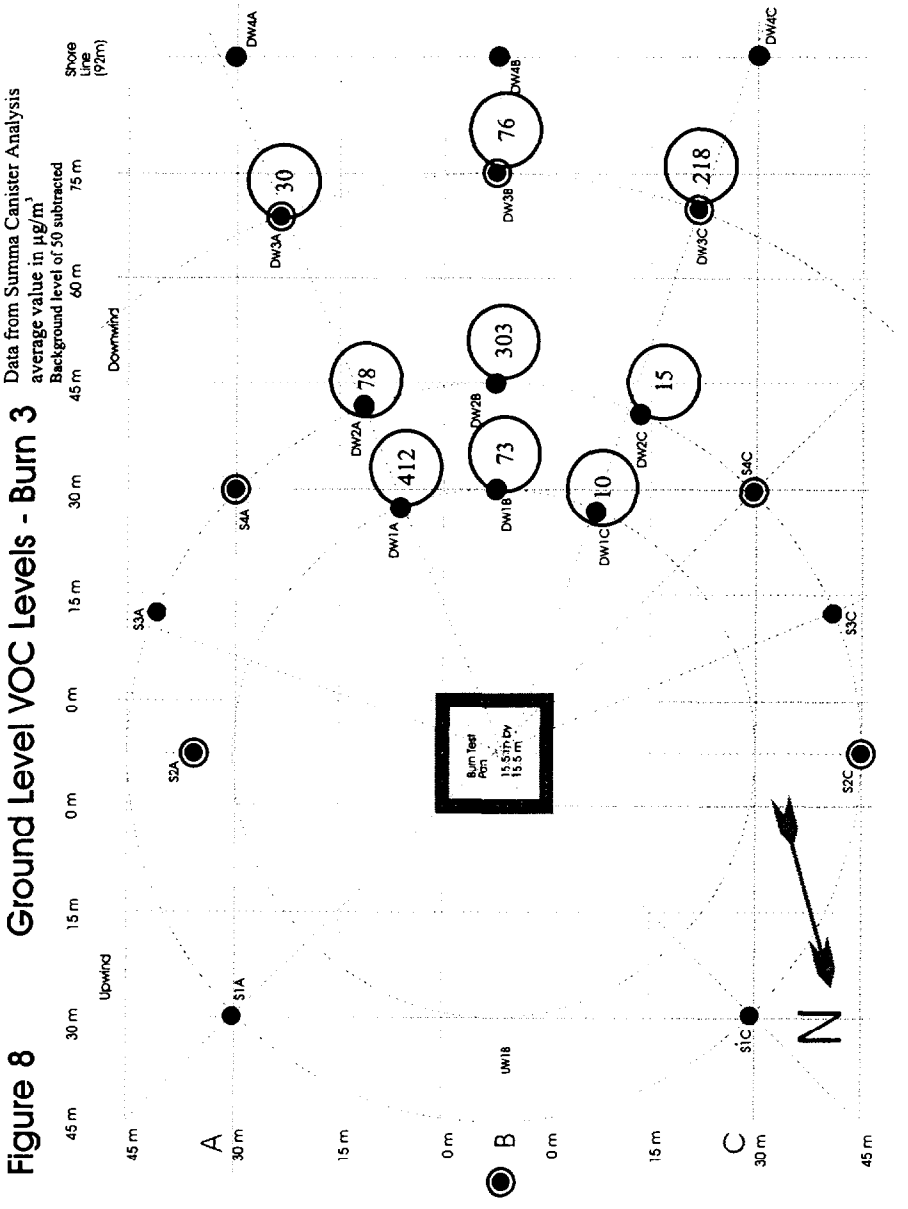


Figure 8
Ground Level VOC Levels - Burn 3
Data from Summa Canister Analysis
average value in µg/m³
Background level of 50 subtracted
Upwind
Downwind
Shore Line (92m)
45 m
30 m
15 m
0 m
60 m
75 m
A
B
C
S1A
S2A
S3A
S4A
S1C
S2C
S3C
S4C
DW1A
DW1B
DW1C
DW2A
DW2B
DW2C
DW3A
DW3B
DW3C
DW4A
DW4B
DW4C
412
73
10
78
303
15
30
76
218
Burn Test Pan 15.5 m by 15.5 m
N

already near upwind levels at 75 m downwind of the fire.

Water Contamination

Water samples were analyzed for a number of pollution parameters. The first was the examination for the total hydrocarbons. These are given in Table 13.

Table 13 **TPH Results of Water Samples**

Sample type	Date Sampled	TPH ($\mu g/L$ H_2O or ppb)
Background	Oct.12/94	127
Pre-burn	Oct.23/94	138
Post-burn	Oct.23/94	258
Pre-burn	Oct.26/94	122
Post-burn	Oct.26/94	140
Pre-burn	Oct.26/94	135
Post-burn	Oct.26/94	212

The water samples were analyzed for PAHs. Table 14 shows the results. The PAH loading of the water is very low and most congeners are below detectability. The water was analyzed for volatile compounds. Table 15 shows the results. This shows that there are basically no volatile compounds remaining in the water after a burn.

Oil and Residue Analysis

The physical properties of the oil and residue are given in Table 16. This shows that the burn residue has a much higher viscosity and a slightly higher density than that of the starting fuel. This was expected for crude oil, but not for Diesel fuel to the same extent as noted here. Table 17 shows the results of analysis for selected target PAHs in both the residue and the oil. This table clearly shows the trend that smaller PAHs are destroyed by the burn, but that larger PAHs are formed as a result of the burn. For all PAHs larger than Fluoranthene, there is a significant trend toward production. Table 18 shows analysis for the alkylated PAHs. The same trend is noted for the alkylated benzenes, smaller compounds are destroyed by the fire, however larger ones are produced (or concentrated) as a result of the fire. Table 19 shows the n-alkanes in the diesel and residue. Again, the smaller compounds are destroyed by the fire and the larger components are concentrated in the residue. Table 20 shows the Benzene and alkylated benzenes in the starting Diesel and in the residue. There are no measurable benzene compounds remaining in the residue. This is indicative that the heat exceeded their boiling point.

Carbon Dioxide

Carbon dioxide was measured using three different techniques, Metrosonics meters, Armstrong meters and by analysis of gases in the Summa canisters. Because of dilution problems, only part of the latter are useful. The results from all three methods do agree where there was overlap. Carbon dioxide measurement is troublesome for a number of reasons. On some instruments, moisture is not fully compensated for and

Table 14

Target PAH in Water Samples

Sample I.D. #	Background	BURN 1		BURN 2		BURN 3	
		Pre-burn	Post-burn	Pre-burn	Post-burn	Pre-burn	Post-burn
(µg/L H_2O)	MB-01	MB-02	MB-03	MB-04	MB-05	MB-06	MB-07
PAH Compounds							
Naphthalene	0.0	0.0	0.0	0.0	0.0	0.0	0.1
2-Methyl-Naphthalene	0.0	0.0	0.0	0.0	0.0	0.0	0.2
1-Methyl-Naphthalene	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Biphenyl	0.0	0.0	0.1	0.1	0.3	0.4	1.2
2,6-Dimethyl-naphthalene	0.0	0.0	1.7	0.4	0.8	1.1	2.3
Acenaphthalene	0.0	0.0	0.2	0.0	0.1	0.1	0.3
Acenaphtene	0.0	0.0	0.1	0.0	0.1	0.1	0.2
2,3,5-Trimethyl-naphthalene	0.0	0.0	0.9	0.3	0.5	0.6	1.0
Fluorene	0.0	0.0	0.4	0.1	0.2	0.2	0.7
Dibenzothiophene	0.0	0.0	0.3	0.1	0.1	0.2	0.3
Phenanthrene	0.0	0.0	0.2	0.0	0.1	0.1	0.5
Anthracene	0.0	0.0	0.1	0.0	0.1	0.1	0.1
1-methyl-phenanthrene	0.0	0.0	0.4	0.2	0.3	0.3	0.4
Fluoranthene	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Pyrene	0.0	0.0	0.1	0.1	0.1	0.1	0.1
Benz(a)anthracene	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Chrysene	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzo(B) fluoranthene	not found	not found	0.0	0.0	0.0	0.0	0.0
Benzo(K) fluoranthene	not found	not found	0.0	0.0	0.0	0.0	0.0
Benzo(e)pyrene	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzo(a)pyrene	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Perylene	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Indeno(1,2,3cd)pyrene	0.0	0.0	not found	0.0	0.0	0.0	not found
Dibenz(a,h)anthracene	0.0	0.0	not found	0.0	not found	not found	0.0
Benzo(ghi)perylene	0.0	0.0	0.0	not found	not found	0.0	0.0
Other C2-N	0.0	0.0	3.6	0.6	1.5	2.0	5.6
Other C3-N + C4-N	0.0	0.0	11.6	1.7	3.0	4.0	7.1
TOTAL	**0.0**	**0.0**	**19.8**	**3.7**	**7.3**	**9.4**	**20.4**
d14-Terphenyl (IS)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
d10-Acenaphthalene	30%	50%	50%	50%	60%	80%	90%
d-10-Phenanthrene	40%	70%	70%	60%	80%	90%	100%
d12-Benz(a)anthracene	130%	140%	80%	100%	130%	140%	100%
d12-Perylene	70%	70%	70%	50%	70%	70%	80%

Table 16

Headspace VOC results from Water samples taken from Test Tank

	Background ... MB-01			Pre-burn 1 ... MB-02			Post-burn 1 ... MB-03			Pre-burn 2 ... MB3-04			Post-burn 2 ... MB3-05			Pre-burn 3 ... MB3-06			Post-burn 3 ... MB3-07		
	rep 1	rep 2	AVE	rep 1	rep 2	AVE	rep 1	rep 2	AVE	rep 1	rep 2	AVE	rep 1	rep 2	AVE	rep 1	rep 2	AVE	rep 1	rep 2	AVE
VOC (ppm)																					
**d8-Toluene*spike	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2-Methylbutane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
n-Pentane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dichloromethane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2-Methylpentane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hexane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cyclopentane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2,4-Dimethylpentane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03
Cyclohexane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Heptane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cycloheptane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Toluene	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.05	0.05	0.05
n-Octane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ethylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
p-Xylene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
o-Xylene	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.03	0.03
n-Propylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Decane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
C3-benzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01
n-butylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Naphthalene	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Dodecane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tridecane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tetradecane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pentadecane	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total:	0.02	0.00	0.01	0.00	0.00	0.00	0.06	0.06	0.06	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.12	0.12	0.12

Table 16

Physical Properties of Diesel and Burn Residue

	MB3-13 pre-burn 1	MB3-14 post-burn 1 residue	MB3-15 pre-burn 2	MB3-16 post-burn 2 residue	MB3-17 pre-burn 3	MB3-18 post-burn 3 residue
Water content ... %	0.0	8.0	0.0	1.8	0.0	0.3
Density (15°C) ... g/mL	0.8391	0.8923*	0.8391	0.8876*	0.8389	0.8675*
Viscosity (15°C) ... cP ... 1000/s	4.77		4.72		4.67	
Viscosity (15°C) ... cP ... 10/s		645.2		874.3		308.7
Viscosity (15°C) ... cP ... 1/s		15680		4971		2689
Shear Rate						

* In all residue samples, water was seen in the sample while being injected into the density meter. Every effort was made to avoid any free water but there is always a possibility of some free water still present in the residue. It should be noted that MB3-18 had the least amount of noticeable free water.

Table 17

Target PAHs in Diesel and Residue Samples

PAH (µg/g oil)	Background	BURN 1		BURN 2		BURN 3	
		Pre-burn	Post-burn	Pre-burn	Post-burn	Pre-burn	Post-burn
	MB3-08	MB3-013	MB3-014	MB3-015	MB3-016	MB3-017	MB3-018
Naphthalene	232.1	239.1	22.1	219.2	46.8	233.4	54.2
2-Methyl-Naphthalene	1025.2	1065.4	83.6	1031.5	80.6	1020.6	159.5
1-Methyl-Naphthalene	713.6	719.6	73.3	723.9	74.2	752.3	135.7
Biphenyl	309.9	320.2	48.4	310.8	43.7	351.0	91.4
2,6-Dimethyl-naphthalene	766.8	766.6	159.7	791.6	150.6	877.6	279.1
Acenaphthalene	10.5	9.7	31.5	15.8	78.8	10.5	84.0
Acenaphthene	73.5	72.8	19.4	63.1	29.1	71.2	33.7
2,3,5-Trimethyl-naphthalene	462.2	538.6	217.8	539.1	242.8	593.0	370.4
Fluorene	241.4	250.4	126.8	250.0	120.7	262.2	170.1
Dibenzothiophene	511.4	562.9	383.3	561.1	441.1	572.9	512.9
Phenanthrene	253.6	270.4	239.7	291.9	367.8	297.7	381.9
Anthracene	10.5	9.7	24.2	9.7	48.6	14.2	38.5
1-methyl-phenanthrene	141.8	213.5	261.4	136.0	364.3	166.0	399.4
Fluoranthene	5.3	4.9	9.7	4.9	58.3	4.7	48.1
Pyrene	5.3	9.7	38.7	9.7	92.3	9.5	72.2
Benz(a)anthracene	0.0	0.0	9.7	0.0	19.4	0.0	14.4
Chrysene	6.8	6.9	46.4	8.0	48.4	6.6	45.3
Benzo(b)fluoranthene	0.0	0.0	4.8	0.0	9.7	0.0	9.6
Benzo(k)fluoranthene	0.0	0.0	4.8	0.0	14.6	0.0	9.6
Benzo(e)pyrene	0.0	0.0	0.0	0.0	14.6	0.0	14.4
Benzo(a)pyrene	0.0	0.0	9.7	0.0	24.3	0.0	19.2
Perylene	0.0	0.0	0.0	0.0	0.0	0.0	4.8
Indeno(1,2,3cd)pyrene	0.0	0.0	9.7	0.0	24.3	0.0	14.4
Dibenz(a,h)anthracene	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Benzo(ghi)perylene	0.0	0.0	9.7	0.0	24.3	0.0	19.2
SUM (before H2O content)	4769.8	5060.4	1834.4	4966.3	2419.2	5243.4	2982.3
SUM (after H2O content)	4769.8	5060.4	1993.9	4966.3	2463.5	5243.4	2991.3

Table 18

Alkylated PAHs in Diesel and Residue Samples

PAH (µg/g oil)		Diesel	BURN 1		BURN 2		BURN 3	
			Pre-burn	Post-burn	Pre-burn	Post-burn	Pre-burn	Post-burn
		MB3-08	MB3-013	MB3-014	MB3-015	MB3-016	MB3-017	MB3-018
NAPH.	C0-N	232.1	239.1	22.1	219.2	46.8	233.4	54.2
	C1-N	1738.7	1785.0	156.8	1755.3	154.8	1772.9	295.2
	C2-N	4599.2	4785.5	924.5	5018.9	810.3	5172.2	1489.0
	C3-N	6305.4	6746.1	2286.2	6817.9	2220.9	7015.8	3465.0
	C4-N	2984.1	3154.1	1604.5	3282.4	1728.3	3275.2	2241.3
	Total	**15859.5**	**16709.8**	**4994.2**	**17093.7**	**4961.2**	**17469.5**	**7544.7**
PHEN.	C0-P	253.6	270.4	239.7	291.9	367.8	297.7	381.9
	C1-P	909.6	1018.7	971.9	957.9	1117.3	985.4	1197.8
	C2-P	955.8	1013.6	1521.7	1148.3	1589.7	1175.1	1751.4
	C3-P	534.9	623.6	1104.3	609.8	1199.2	624.6	1159.7
	C4-P	199.3	217.8	573.6	216.8	619.0	223.7	550.8
	Total	**2853.2**	**3144.1**	**4411.1**	**3224.7**	**4893.0**	**3306.5**	**5041.6**
DIBENS	C0-D	511.4	562.9	383.3	561.1	441.1	572.9	512.9
	C1-D	1507.1	1577.1	1432.8	1637.3	1659.8	1669.9	1814.7
	C2-D	2019.6	2081.8	2523.8	2194.9	2902.8	2222.0	3083.1
	C3-D	982.2	1034.3	1587.8	1051.8	1810.1	1083.6	1768.1
	Total	**5020.3**	**5256.1**	**5927.7**	**5445.1**	**6813.8**	**5548.3**	**7178.8**
FLUO.	C0-F	241.4	250.4	126.8	250.0	120.7	262.2	170.1
	C1-F	1002.3	1107.0	655.4	1086.2	745.6	1128.1	928.0
	C2-F	1421.7	1466.8	1158.8	1495.1	1263.2	1453.9	1504.9
	C3-F	1236.9	1223.4	1291.3	1229.2	1463.2	1262.5	1590.2
	Total	**3902.3**	**4047.5**	**3232.3**	**4060.5**	**3592.7**	**4106.7**	**4193.3**
CHRY.	C0-C	6.8	6.9	46.4	8.0	48.4	6.6	45.3
	C1-C	9.1	11.0	94.9	10.9	89.3	11.6	76.6
	C2-C	7.5	7.3	138.1	8.4	110.3	8.1	103.9
	C3-C	1.9	1.3	64.8	2.1	55.3	2.3	38.9
	Total	**25.3**	**26.5**	**344.3**	**29.3**	**303.2**	**28.6**	**264.7**
SUM (before H2O content)		27660.5	29184.1	18909.5	29853.2	20563.8	30459.8	24223.0
SUM (after H2O content)		27660.5	29184.1	20553.3	29853.2	20940.7	30459.8	24295.9
Relative ratios C1-DBT		1.00 : 0.67: 0.12	1.00 : 0.67: 0.12	1.00 : 0.68: 0.13	1.00 : 0.65: 0.12	1.00 : 0.68: 0.13	1.00 : 0.64: 0.11	1.00 : 0.67: 0.12

Table 19

Distribution of n-Alkanes in Diesel and Residue Samples

Sample I.D. #	Diesel	BURN 1		BURN 2		BURN 3	
		Pre-burn	Post-burn	Pre-burn	Post-burn	Pre-burn	Post-burn
(mg/g oil)	MB3-08	MB3-013	MB3-014	MB3-015	MB3-016	MB3-017	MB3-018
n-Alkanes							
n-C8	0.43	0.46		0.40		0.44	
n-C9	1.31	1.38		1.23		1.33	
n-C10	2.63	2.77		2.54		2.70	
n-C11	4.92	5.24	0.02	5.04	0.02	5.26	0.07
n-C12	7.59	7.96	0.23	7.81	0.17	8.05	0.44
n-C13	11.69	12.39	1.20	12.17	0.94	12.51	1.98
n-C14	16.55	17.25	3.54	16.96	3.17	17.27	5.49
n-C15	18.24	19.12	6.45	18.56	6.61	20.00	10.35
n-C16	18.96	19.51	9.10	18.56	10.39	20.01	13.34
n-C17	20.13	21.15	12.71	20.19	15.38	20.21	18.77
PRISTANE	4.34	4.48	2.77	4.42	3.09	4.01	3.59
n-C18	14.29	15.53	11.39	15.19	14.95	15.19	16.45
PHYTANE	4.28	4.27	3.13	4.30	4.11	4.26	4.40
n-C19	9.99	10.50	9.24	10.20	12.01	10.34	12.53
n-C20	7.97	8.36	8.87	8.11	11.45	8.26	11.44
n-C21	5.65	5.89	7.96	5.77	9.95	5.87	9.66
n-C22	3.81	4.01	6.97	3.94	8.31	4.01	7.77
n-C23	2.37	2.49	5.85	2.45	6.63	2.48	6.01
n-C24	1.43	1.48	4.98	1.49	5.31	1.50	4.59
n-C25	0.78	0.81	4.04	0.81	4.07	0.83	3.50
n-C26	0.43	0.46	3.38	0.46	3.17	0.46	2.70
n-C27	0.25	0.26	2.72	0.25	2.53	0.26	2.10
n-C28	0.12	0.14	2.23	0.14	1.95	0.15	1.58
n-C29	0.09	0.08	1.80	0.08	1.53	0.09	1.21
n-C30	0.05	0.05	1.32	0.06	1.12	0.04	0.87
n-C31	0.04	0.03	1.21	0.03	1.02	0.03	0.75
n-C32	0.02	0.02	0.84	0.02	0.71	0.02	0.51
n-C33	0.01	0.02	0.61	0.01	0.50	0.01	0.36
n-C34	0.01	0.01	0.38	0.01	0.33	0.01	0.22
n-C35	0.00	0.01	0.25	0.01	0.21	0.00	0.15
n-C36			0.16		0.15		0.10
n-C37			0.13		0.10		0.09
n-C38			0.09		0.10		0.05
n-C39			0.08		0.07		0.03
n-C40			0.08		0.06		0.03
TOTAL (before H2O content)	158.37	166.13	113.73	161.21	130.09	165.59	141.16
TOTAL (after H2O content)	158.35	166.12	123.53	161.18	132.47	165.53	138.24
C17/PRISTANE	4.64	4.73	4.59	4.57	4.99	5.04	5.24
C18/PHYTANE	3.34	3.64	3.64	3.53	3.63	3.56	3.74
PRISTANE/PHYTANE	1.01	1.05	0.88	1.03	0.75	0.94	0.82

Table 20

BTEX in Diesel and Residue Samples

Benzene Compds. (mg/g oil)	Diesel	BURN 1		BURN 2		BURN 3	
		Pre-burn	Post-burn	Pre-burn	Post-burn	Pre-burn	Post-burn
	MB3-08	MB3-013	MB3-014	MB3-015	MB3-016	MB3-017	MB3-018
Benzene	0.14	0.13	0.00	0.13	0.00	0.13	0.00
Toluene	0.36	0.31	0.00	0.36	0.00	0.34	0.00
Ethylbenzene	0.32	0.31	0.00	0.36	0.00	0.34	0.00
m-xylene	2.44	2.37	0.00	2.41	0.00	2.32	0.00
o-xylene	1.18	1.16	0.00	1.16	0.00	1.14	0.00
isopropylbenzene	0.09	0.09	0.00	0.09	0.00	0.08	0.00
propylbenzene	0.36	0.36	0.00	0.36	0.00	0.34	0.00
3-ethyltoluene, 4-ethyltoluene	1.31	1.29	0.00	1.25	0.00	1.22	0.00
1,3,5, trimethylbenzene	1.13	1.07	0.00	1.12	0.00	1.10	0.00
2-ethyltoluene	0.50	0.49	0.00	0.54	0.00	0.51	0.00
1,2,4 trimethylbenzene	3.12	3.04	0.00	3.30	0.00	3.12	0.00
1,2,3-Trimethylbenzene	1.04	0.98	0.00	1.12	0.00	1.10	0.00
butylbenzene	0.18	0.18	0.00	0.22	0.00	0.21	0.00
1,2,4,5 tetramethylbenzene	0.63	0.54	0.00	0.58	0.00	0.55	0.00
Amylbenzene	0.14	0.13	0.00	0.18	0.00	0.17	0.00
Pentamethylbenzene	0.45	0.49	0.00	0.49	0.00	0.46	0.04
1-phenylheptane	0.36	0.36	0.00	0.36	0.00	0.42	0.04
Hexamethylbenzene	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BTEX (before H2O correction)	4.43	4.29	0.00	4.42	0.00	4.26	0.00
C3-Benzenes (before H2O correction)	7.56	7.32	0.00	7.77	0.00	7.47	0.00
BTEX + C3-Benzenes (before H2O correction)	12.0	11.6	0.00	12.2	0.00	11.7	0.00
BTEX (after H2O correction)	4.43	4.29	0.00	4.42	0.00	4.26	0.00
C3-Benzenes (after H2O correction)	7.56	7.32	0.00	7.77	0.00	7.47	0.00
BTEX + C3-Benzenes (after H2O correction)	12.0	11.6	0.00	12.2	0.00	11.7	0.00

elevates readings. On other instruments, there may be inadequate filtration and particulate matter can interfere. An additional difficulty, is that instruments are constructed for industrial hygiene use where the levels are much lower, temperatures less variant and lower, humidities much less variable and mechanical conditions less severe. Electronic instruments are also prone to drift during the course of the day. The measurements here were subject to some of these difficulties, however, most readings required correction to baseline. The readings from the Metrosonic instrument went negative when exposed to very high levels of moisture, heat and carbon dioxide. These readings were conservatively corrected by drawing a straight baseline from the pre-burn average to the top of the recovery peak. All values were corrected to the ambient carbon dioxide measured, generally around 300 ppm.

The distribution of carbon dioxide is illustrated in Figure 9, 10 and 11. Values from the 4-metre sampling heights and the 1-m sampling heights are illustrated and are the values corrected with the minimum of each sample run. The values are averages of the carbon dioxide measured above background levels. The 1-metre measurements were taken with Metrosonics instruments and the 4-metre measurements with Armstrong instruments. These figures clearly show that the majority of the carbon dioxide moves along the ground. Concentrations are just above background levels at the 4-metre sample heights. The diagrams also show that carbon dioxide does not move with the smoke plume. This is particularly illustrated in burn 1. The smoke moved vertically for the most part and the concentrations of carbon dioxide are still higher at the first downwind 1-metre sampling points. The maximum excess concentrations of carbon dioxide at the surface are about an order higher than those found in the smoke plume. A further consideration is the time variation of the carbon dioxide concentrations. Figure 12 shows these concentrations for burn 2 at the downwind stations B. This figure shows that there is no correlation between the arrival of carbon dioxide, particulates and carbon monoxide at these downwind stations. The figure also shows that the variance in carbon dioxide concentrations at sampling stations is large.

Carbon Monoxide

Table 21 shows the results of measurements of carbon monoxide at the 1 m level with both the Metrosonics and Cannonball instruments. The measurements between the two instruments do not correlate well, however, when the values recorded by one instrument are high, so is the other. The ground distribution of carbon monoxide is similar to that of the carbon dioxide in that it appears to be higher at ground level and is distributed exponentially away from the source fire.

Sulphur Dioxide, Humidity and Temperature

Sulphur dioxide measurements taken with the Cannonball instrument show no measurable concentrations throughout the experiment. This is not surprising since the sulphur content of the diesel is very low and since most sulphur dioxide would be in an acid aerosol form not detectable by the instrument. Moisture (in the form of relative humidity) and temperature were recorded using the Metrosonic instruments. These data are summarized in Tables 22 and 23. These tables show that changes resulting from the fire are only detectable in the first row of instruments near the fire. The temperature increases a maximum of 22°C and relative humidity decreases by as much as 30%. The latter would probably be due to the increase in temperature. These effects are not seen at the other sampling stations.

Figure 9 Ground Level CO_2 Levels - Burn 1

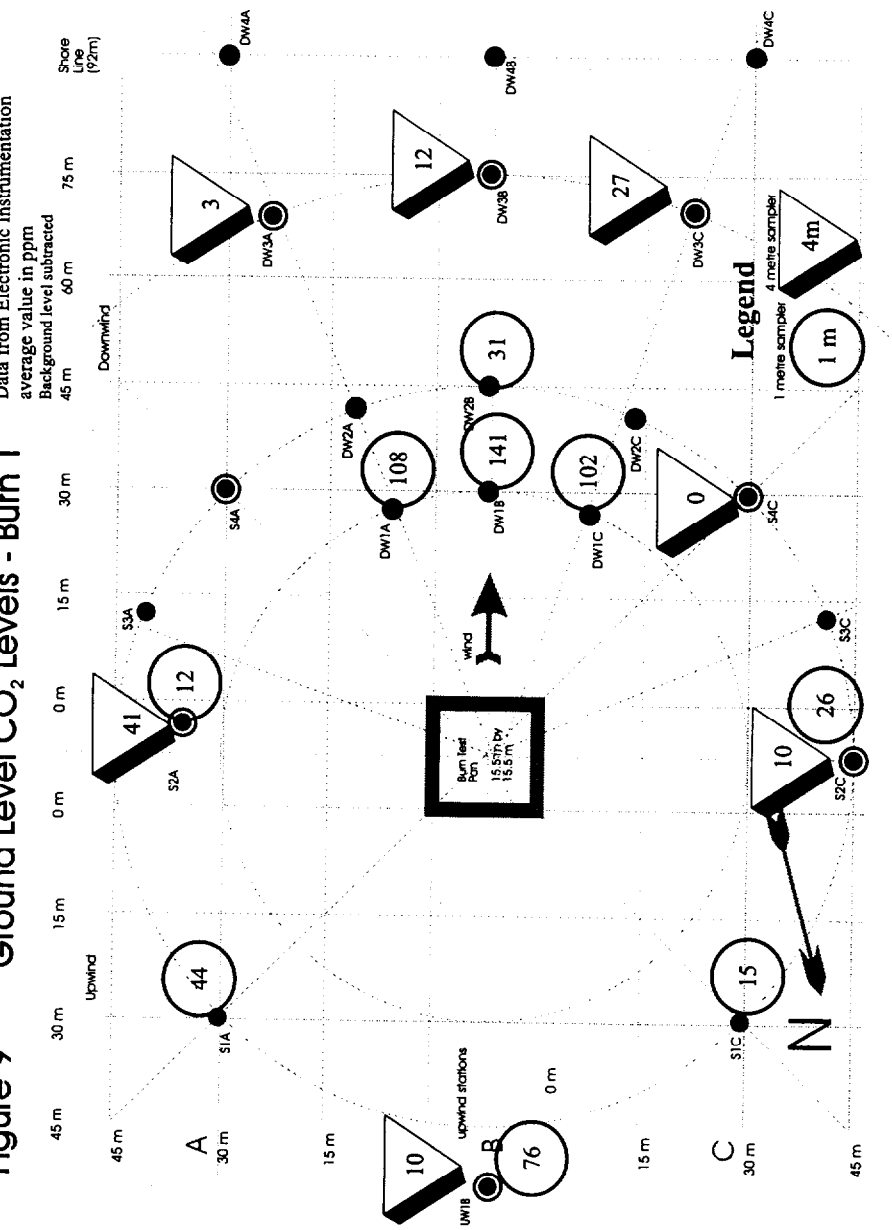


Figure 10 Ground Level CO_2 Levels - Burn 2

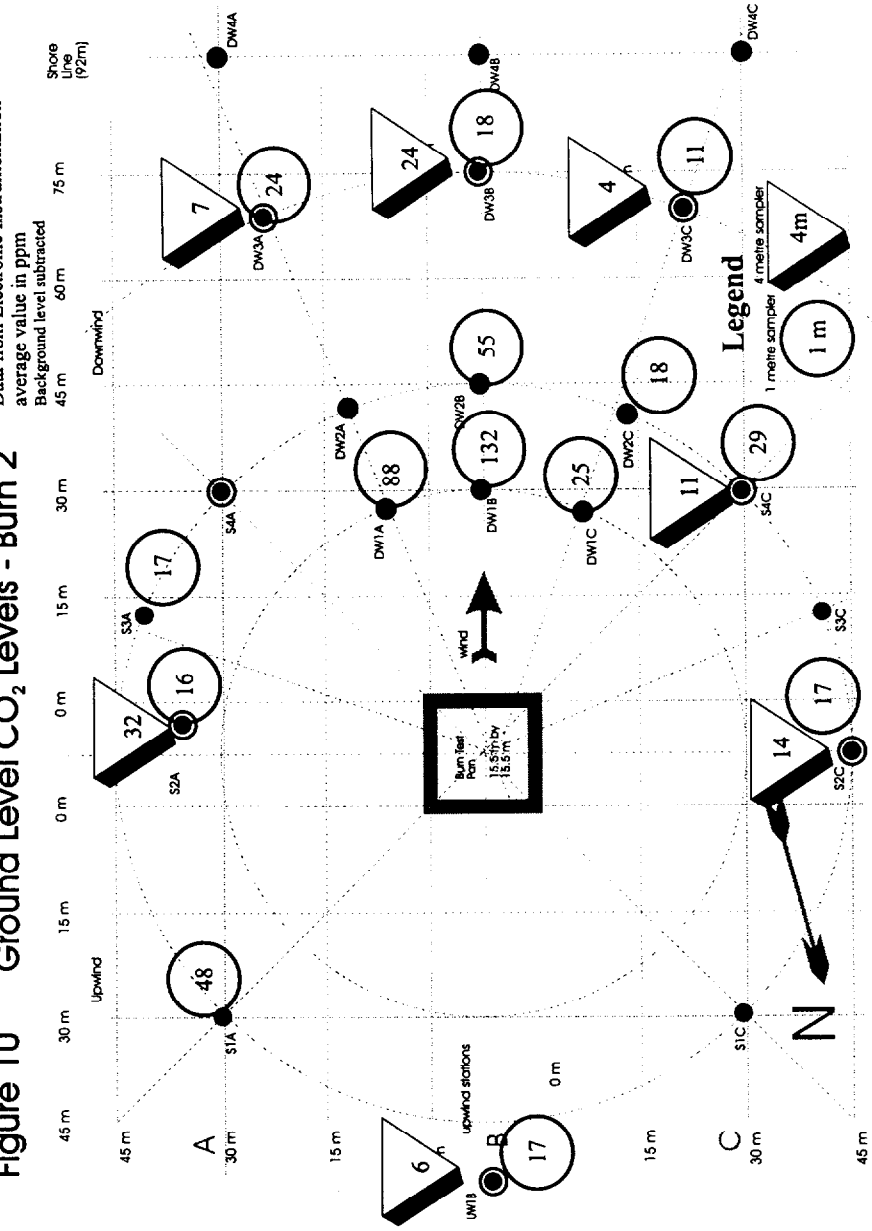


Figure 11 Ground Level CO_2 Levels - Burn 3

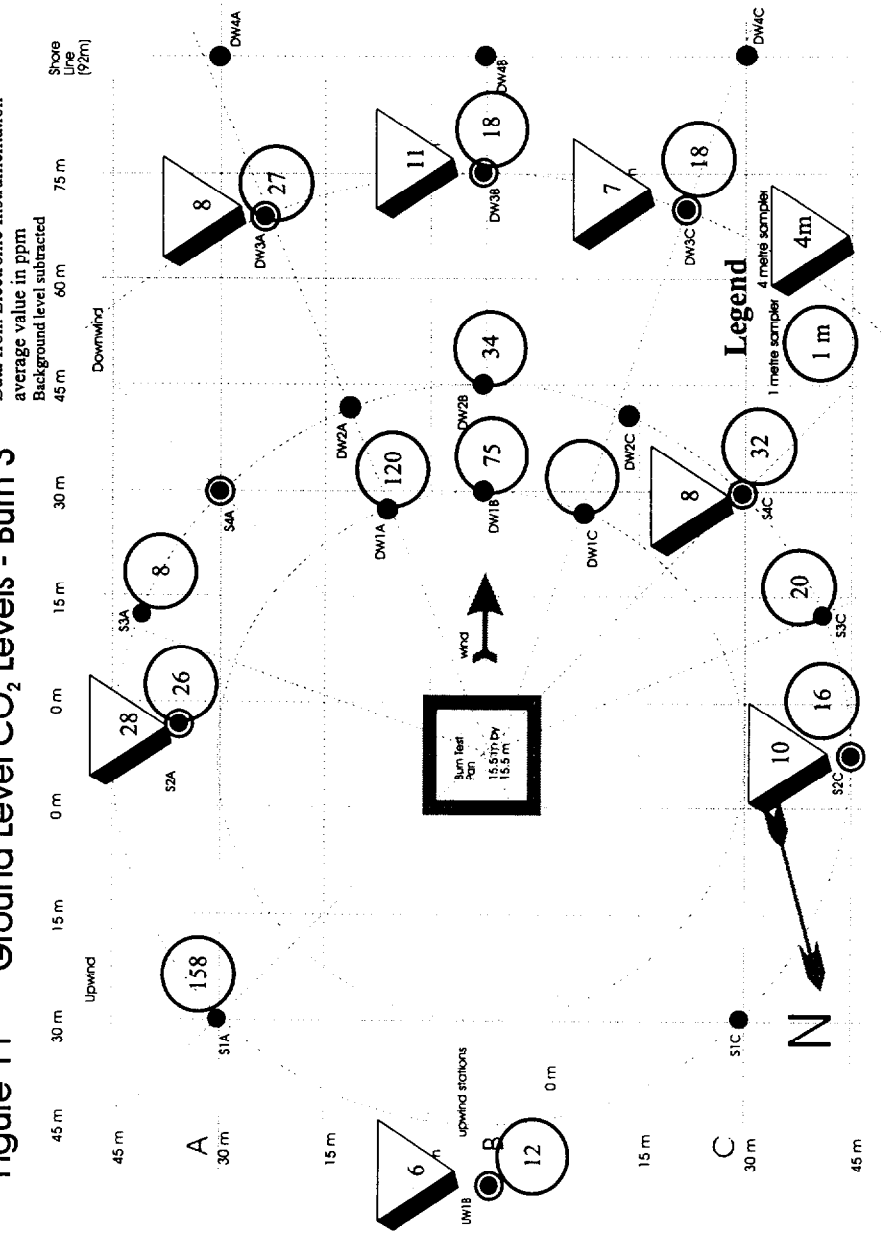
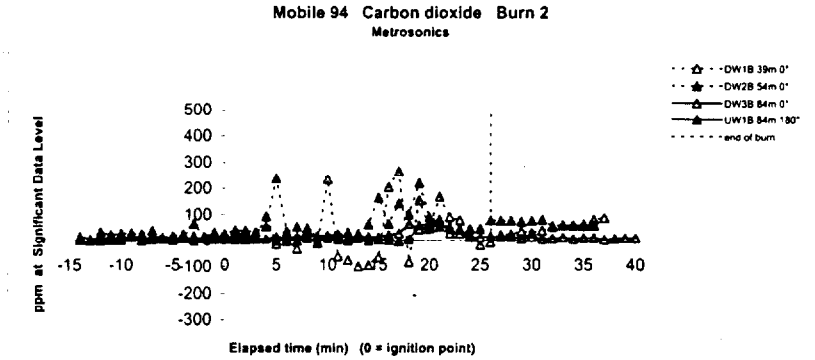
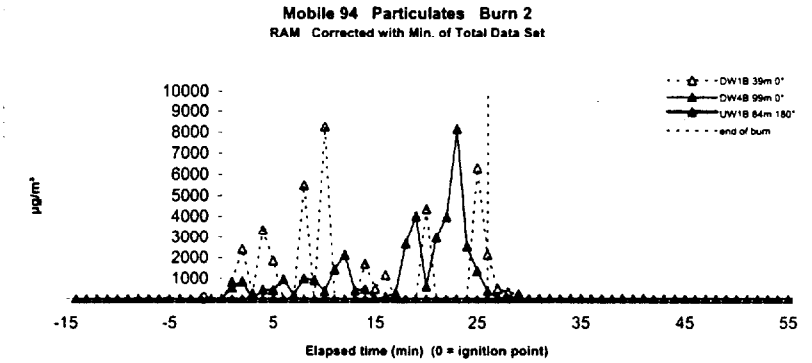


Figure 12 **Plots of Carbon Dioxide, Particulates and Carbon Monoxide at the Downwind Stations B During Burn 2**





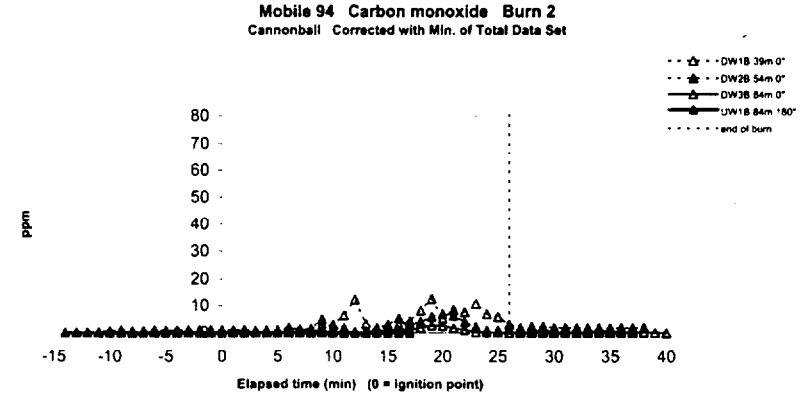


Table 21

Carbon monoxide Summary

ppm at Significant Data Level

	DW1A 39m 22°	DW2A 58m 22°	DW3A 92m 22°	DW1B 39m 0°	DW2B 64m 0°	DW3B 84m 0°	DW1C 39m -22°	DW2C 58m -22°	DW3C 92m -22°	S3A 59m 68°	S1A 50m 135°	UW1B 84m 180°
Burn 1	**Metrosonics Instruments**											
Minimum	0			0	1		0				-2	
Average	19			9	18		41				-1	
Maximum	45			16	35		73				2	
Burn 1	**Cannonball Instruments**											
Minimum	-1	0	-1	0	2	0	0	-2	-3			
Average	0	0	0	0	4	0	0	-1	-1			
Maximum	3	1	0	0	6	1	1	0	0			
Burn 2	**Metrosonics Instruments**											
Minimum	0		0	0	0	0	0			0	0	0
Average	4		0	3	2	0	3			1	1	0
Maximum	16		2	11	6	1	5			1	3	1
Burn 2	**Cannonball Instruments**											
Minimum	0	2	1	0	0	0	0			1	0	
Average	0	2	1	0	0	0	0			1	0	
Maximum	0	3	1	1	0	0	0			1	0	
Burn 3	**Metrosonics Instruments**											
Minimum	0		-1	0	0	0				0	0	0
Average	4		0	1	1	0				1	2	0
Maximum	13		1	5	2	0				2	4	0
Burn 3	**Cannonball Instruments**											
Minimum			0							1	0	
Average			0							1	1	
Maximum			0							2	1	

Table 22

Percent Relative humidity

Data Taken with Metrosonics Instruments

Values in % Humidity	DW1A 39m 22°	DW2A 58m 22°	DW3A 92m 22°	DW1B 39m 0°	DW2B 64m 0°	DW3B 84m 0°	DW1C 39m -22°	DW2C 58m -22°	DW3C 82m -22°	S3A 59m 68°	S2A 44m 90°	S1A 50m 135°	S4C 52m -45°	S3C 67m -68°	S2C 58m -90°	S1C 52m -135°	UW1B 84m 180°
Pre-burn 1																	
Minimum	40			37	37		36				35	36		41	38	39	
Average	43			39	39		38				37	39		42	39	41	
Maximum	46			40	41		40				40	43		45	41	43	
Burn 1																	
Minimum	25			8	22		16				32	34		37	32	32	
Average	30			16	27		22				34	37		40	36	37	
Maximum	41			36	36		35				40	40		44	41	43	
Post-burn 1																	
Minimum	36			30	35		31				32	36		38	34	35	
Average	39			33	37		32				36	39		38	35	37	
Maximum	42			35	38		33				40	43		40	37	38	
Pre-burn 2																	
Minimum	60	60	56	56	55	60	55	57	55	57	55	66			57		
Average	61	61	58	57	57	61	57	59	57	59	56	67			59		
Maximum	64	63	60	59	61	64	60	61	58	60	58	68			61		
Burn 2																	
Minimum	33	48	52	22	39	53	42	49	53	46	39	50			50		
Average	42	52	53	34	46	56	48	53	56	50	44	55			53		
Maximum	59	62	59	56	56	63	58	59	58	60	57	64			60		
Post-burn 2																	
Minimum	53	54	52	47	49	54	50	53	51								
Average	54	55	52	48	50	55	51	54	52								
Maximum	56	57	54	50	52	56	52	55	53								
Pre-burn 3																	
Minimum	43		41	40	37	42			40	40	37	41	42		41		41
Average	45		42	41	39	44			41	41	39	43	43		42		42
Maximum	46		43	42	40	45			42	42	40	44	44		42		44
Burn 3																	
Minimum	27		41	17	31	42			40	34	26	30	39		36		37
Average	33		43	25	36	45			42	36	31	35	40		38		39
Maximum	42		45	37	41	48			43	40	38	39	41		41		42
Post-burn 3																	
Minimum			40			42											
Average			42			43											
Maximum			44			44											

Table 23

Air Temperature

(°C)	DW1A 39m 22°	DW2A 68m 22°	DW3A 92m 22°	DW1B 39m 0°	DW2B 64m 0°	DW3B 84m 0°	DW1C 39m -22°	DW2C 68m -22°	DW3C 92m -22°	S3A 59m 68°	S2A 44m 90°	S1A 60m 135°	S4C 52m -45°	S3C 67m -68°	S2C 68m -90°	S1C 52m -135°	UW1B 84m 180°
Pre-burn 1																	
Minimum	34			33	34		31				32	33		30	32	32	
Average	35			33	35		32				33	34		30	32	33	
Maximum	36			34	36		34				34	35		31	33	33	
Burn 1																	
Minimum	38			35	35		34				30	31		31	31	31	
Average	49			48	41		47				33	32		32	32	33	
Maximum	57			57	44		57				34	34		34	34	35	
Post-burn 1																	
Minimum	34			34	35		33				30	31		30	32	33	
Average	34			34	35		33				31	32		31	33	33	
Maximum	35			35	35		33				33	33		31	33	33	
Pre-burn 2																	
Minimum	18	17	16	16	17	16	16	16	16	16	15	15	17		16		
Average	19	18	17	17	18	18	17	17	17	17	16	15	17		17		
Maximum	19	18	17	17	19	17	17	17	17	17	16	15	18		17		
Burn 2																	
Minimum	22	17	17	17	20	16	17	16	16	17	15	15	17		17		
Average	27	20	18	25	23	18	20	18	17	20	21	17	20		19		
Maximum	33	22	19	32	25	19	22	19	18	22	23	18	21		20		
Post-burn 2																	
Minimum	20	19	18	19	20	18	18	18	18								
Average	21	19	18	20	20	18	18	18	19								
Maximum	21	20	19	21	21	19	19	18	19								
Pre-burn 3																	
Minimum	23		21	23	23	21			22	22	22	22	22		22		22
Average	24		21	23	24	22			23	22	22	22	22		22		22
Maximum	24		22	23	24	22			23	23	23	22	23		23		22
Burn 3																	
Minimum	27		21	23	24	20			20	23	23	22	23		22		22
Average	32		21	30	26	21			21	26	27	24	25		23		23
Maximum	38		22	35	29	22			23	28	31	26	26		24		23
Post-burn 3																	
Minimum			21			22											
Average			21			22											
Maximum			22			23											

Summary and Conclusions

Particulates

The diesel burns produced an abundance of particulate matter. The concentrations at the same distances were approximately 4 times that for similar-sized crude oil burns. This particulate matter was distributed exponentially downwind from the fire. Concentrations at ground level (1 m) were still above normal occupational health limits (150 $\mu g/m^3$) as far downwind as 99 m. This also contrasts with the crude oil burns conducted in the past where the limit was generally not exceeded nearer than 99 m. No size distribution data were achieved, PM-10 concentrations were about the same as the total particulate concentration. This may be indicative that most material is of PM-10 category or that the PM-10 unit breaks of the particles into smaller units.

PAHs

Diesel contains low levels of PAHs with smaller molecular size. These are largely consumed by the fire, as evidence by lower concentrations both in the soot and in the burn residue. Larger PAHs are either created or concentrated by the fire. Larger PAHs, some of which are not even detectable in the Diesel fuel, are found both in the soot and in the residue. The concentrations of these larger PAHs are however low and often just above detection limits.

VOCs

One-hundred and forty-eight volatile organic compounds were measured from samples taken in Summa canisters. The concentrations of VOCs are relatively low compared to a typical crude oil burn. Concentrations appear to be under human health limits even at the closest monitoring station. Concentrations appear to be highest at the ground (1 m) and are distributed exponentially downwind from the fire source.

Dioxins and Dibenzofurans

Particulates precipitated downwind were analyzed for dioxins and dibenzofurans. The levels of these toxic compounds were at background levels indicating no production by the diesel fire.

Carbonyls

Carbonyls were measured using a sensitive and specialized technique. The diesel burns produce low amounts of the small aldehydes (formaldehyde, acetaldehyde, etc.) and ketones (acetone, etc.). These would not be a health concern even close to the source fire. The concentrations of these are again distributed exponentially downwards away from the fire.

Emission into the Water under the Burn

The water under the fire received hydrocarbons. The total petroleum hydrocarbons rose by as much as 120 ppb or by as little 10 ppb. These are not high concentrations since the burns were conducted using a limited amount of water. These concentrations would not result in fish mortality, even in this confined water body. No PAHs could be detected in the water.

Oil and Residue

The residue showed high viscosity similar to that seen in crude oil burns. The concentration of larger PAHs was higher in the residue than in the starting oil. This is probably due to creation of these larger PAHs, but could possible be due to concentration. Smaller PAHs are in lower concentration in the residue than in the starting oil.

Carbon Dioxide

An extensive array of 16 Metrosonic instruments at 1 m height, 7 Armstrong instruments at 4 m and 10 Summa canisters was used to characterize the 3-dimensional distribution of carbon dioxide. Concentrations of carbon dioxide are highest at the 1 m level and fall to background levels at the 4 m level. Concentrations at ground level are as high as 10 times that of the plume. Concentrations are distributed exponentially downwards away from the fire. Distribution along the ground is broader than for particulates.

Other Gases

Carbon monoxide appears to be distributed in the same way as carbon dioxide. Sulphur dioxide was not detected at these diesel fires.

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Appendix Table A1 **Volatile Organic Compounds**

Results in µg/m3	Mobile'94, EPA 56, 20 min	Mobile'94, ESD 13870, 20 min	Mobile'94, EPA 41, 20 min	Mobile'94, ESD 13875, 20 min	Mobile'94, ESD 17, 20 min	Mobile'94, ESD 12, 20 min	Mobile'94, ESD 20, 20 min	Mobile'94, ESD 13874, 20 min
	MS65P.D	MS92P.D	MS79P.D	MS97P.D	MS91P.D	MS89P.D	MS90P.D	MS95P.D
	EPA 56	ESD 13870	EPA 41	ESD 13875	ESD 17	ESD 12	ESD 20	ESD 13874
	Trip blank	Trip blank	Background	Blank	Upwind	Upwind-1	Upwind-3	
Total VOC's:	**8.6**	**15.2**	**44.6**	**120.5**	**43.2**	**137.6**	**44.3**	**103.8**
Pre-Correction Values		**15.3**	**47.4**	**204.5**	**352.4**	**526.5**	**58.9**	**106.9**
Toluene / Benzene			**2.6**	**4.9**	**2.9**	**0.7**	**2.3**	**5.0**
m,p-Xylene/o-Xylene			**2.8**	**1.7**	**1.5**	**0.6**	**1.8**	**1.9**
m,p-Xylene/Ethylbenzene			**3.9**	**3.4**	**2.1**	**0.0**	**2.4**	**4.6**
o-Xylene/Ethylbenzene			**1.4**	**2.1**	**1.5**	**0.0**	**1.4**	**2.3**
* 1,4-Difluorobenzene								
87 Bromochloromethane								
107 Chlorobenzene-d5								
118 1-Bromo-4-Fluorobenzene								
2 Propene	0.3	0.9	1.4	2.5	0.3	0.7	0.0	4.0
3 Propane	0.0	0.5	2.5	3.5	3.2	6.0	2.2	5.0
4 Freon22 (Chlorodifluoromethane)	0.1	0.5	0.4	0.4	0.4	0.8	0.5	0.9
5 Freon12 (Dichlorodifluoromethane)	0.8	0.2	2.9	2.7	3.0	2.9	6.0	2.8
6 Propyne								
7 Chloromethane	0.1	0.2	1.2	1.7	1.2	1.5	1.1	1.9
8 Isobutane (2-Methylpropane)	0.0	0.1	0.5	1.2	0.8	0.2	0.5	0.9
9 Freon114 (1,2-Dichlorotetrafluoroethane)	0.1	0.1	0.2	0.3	0.5	0.3	0.8	0.3
10 Vinylchloride (Chloroethene)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 1-Butene/2-Methylpropene	1.0	1.1	3.0	9.7	1.3	3.6	2.5	9.5
12 1,3-Butadiene	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2
13 *Butane*	0.1	0.2	1.9	3.2	1.4	2.9	1.8	1.9
14 t-2-Butene	0.0	0.1	0.0	0.4	0.0	0.1	0.0	0.6
15 2,2-Dimethylpropane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 Bromomethane	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.2
17 1-Butyne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18 c-2-Butene	0.0	0.2	0.0	0.5	0.0	0.1	0.0	0.8
19 Chloroethane	0.0	0.1	0.0	0.2	0.0	0.1	0.0	0.3
20 2-Methylbutane	0.0	0.2	2.8	5.4	1.2	2.3	2.2	0.9
21 Freon11 (Trichlorofluoromethane)	0.0	0.1	1.7	1.0	1.0	1.0	1.0	1.0
22 1-Pentene	0.0	0.1	0.2	0.4	0.0	0.3	0.0	0.2
23 2-Methyl-1-Butene	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.2
24 Pentane	0.0	0.2	1.8	5.7	0.8	5.2	1.4	0.9
25 Isoprene (2-Methyl-1,3-Butadiene)	0.0	0.3	1.5	1.8	0.0	0.5	0.0	1.2
26 Ethylbromide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27 *t-2-Pentene*	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28 1,1-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
29 c-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30 Dichloromethane	0.1	0.2	0.2	3.4	0.5	0.2	0.5	0.7
31 2-Methyl-2-Butene	0.0	0.1	0.2	0.3	0.0	0.4	0.0	0.3
32 Freon113 (1,1,2-Trichlorotrifluoroethan	0.7	0.6	1.2	1.8	2.3	1.4	3.6	1.8
33 2,2-Dimethylbutane	0.0	0.0	0.2	0.2	0.0	0.1	0.0	0.2
34 Cyclopentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35 t-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36 4-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37 3-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38 1,1-Dichloroethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39 Cyclopentane	0.0	0.0	0.1	0.2	0.0	0.1	0.0	0.0
40 2,3-Dimethylbutane	0.0	0.0	0.2	0.2	0.0	0.1	0.0	0.0
41 t-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42 2-Methylpentane	2.3	7.0	5.9	8.9	10.4	7.8	11.0	20.0
43 c-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44 *3-Methylpentane*	0.0	0.1	0.6	1.4	0.7	0.5	0.7	0.2
45 1-Hexene/2-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
46 c-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48 Hexane	0.2	0.4	0.9	1.5	1.5	1.5	1.5	1.6
49 Chloroform	0.0	0.0	0.1	0.4	0.0	0.8	0.0	0.0
50 t-3-Hexene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
51 2-Ethyl-1-Butene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52 t-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53 c-2-Hexene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54 c-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix Table A1 **Volatile Organic Compounds**

Results in µg/m3	Mobile'94, EPA 56, 20 min.	Mobile'94, ESD 13870, 20 min.	Mobile'94, EPA 41, 20 min.	Mobile'94, ESD 13875, 20 min.	Mobile'94, ESD 17, 20 min	Mobile'94 ESD 12, 20 min	Mobile'94, ESD 20, 20 min	Mobile'94, ESD 13874, 20 min.
	MS65P.D	MS92P.D	MS79P.D	MS97P.D	MS91P.D	MS89P.D	MS90P.D	MS95P.D
	EPA 56	ESD 13870	EPA 41	ESD 13875	ESD 17	ESD 12	ESD 20	ESD 13874
	Trip blank	Trip blank	Background	Blank	Upwind	Upwind-1	Upwind-2	
Total VOC's:	**8.6**	**15.2**	**44.6**	**120.5**	**43.2**	**137.6**	**44.3**	**103.8**
Pre-Correction Values		**15.3**	**47.4**	**204.5**	**352.4**	**526.5**	**58.9**	**108.9**
Toluene / Benzene			2.6	4.9	2.9	0.7	2.3	5.0
m,p-Xylene/o-Xylene			2.8	1.7	1.5	0.6	1.8	1.9
m,p-Xylene/Ethylbenzene			3.9	3.4	2.1	0.0	2.4	4.6
p-Xylene/Ethylbenzene			1.4	2.1	1.5	0.0	1.4	2.3
55 2,2-Dimethylpentane	0.0	0.0	0.1	0.0	1.3	0.0	0.0	0.0
56 1,2-Dichloroethane	0.0	0.0	0.0	0.0	0.2	0.1	0.0	0.0
57 Methylcyclopentane	0.0	0.0	0.2	0.5	0.0	0.0	0.0	0.2
58 2,4-Dimethylpentane	0.0	0.0	0.2	0.1	0.0	0.1	0.0	0.0
59 1,1,1-Trichloroethane	0.0	0.0	0.6	0.6	0.6	3.1	0.6	0.5
60 2,2,3-Trimethylbutane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61 1-Methylcyclopentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
62 Benzene	0.1	0.1	0.9	1.7	0.7	1.3	1.0	0.8
63 Carbontetrachloride	0.0	0.0	0.5	0.5	0.5	0.5	0.6	0.5
64 Cyclohexane	0.0	0.1	0.1	0.2	0.0	0.5	0.0	0.4
65 2-Methylhexane	0.0	0.0	0.9	0.0	0.0	0.2	0.3	0.1
66 2,3-Dimethylpentane	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.0
67 Cyclohexene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
68 3-Methylhexane	0.0	0.0	1.1	0.4	0.2	0.4	0.5	0.2
69 Dibromomethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70 1,2-Dichloropropane	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
71 Bromodichloromethane								
72 Trichloroethene	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
73 1-Heptene								
74 2,2,4-Trimethylpentane	0.0	0.0	0.3	0.4	0.2	2.5	0.2	0.1
75 t-3-Heptene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76 c-3-Heptene								
77 Heptane	0.0	0.1	1.0	0.6	0.3	1.0	0.4	0.7
78 t-2-Heptene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
79 c-2-Heptene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80 c-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81 2,2-Dimethylhexane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82 Methylcyclohexane	0.0	0.0	0.2	0.1	0.0	0.7	0.0	0.5
83 2,5-Dimethylhexane	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0
84 2,4-Dimethylhexane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
85 c/t-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86 1,1,2-Trichloroethane	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.2
87 Bromotrichloromethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88 2,3,4-Trimethylpentane	0.0	0.0	0.1	0.2	0.0	1.1	0.0	0.0
89 Toluene	2.5	0.9	2.3	8.2	2.1	0.9	2.4	3.9
90 2-Methylheptane	0.0	0.0	0.1	0.2	0.2	0.8	0.2	0.3
91 4-Methylheptane	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.1
92 1-Methylcyclohexene	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
93 Dibromochloromethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94 3-Methylheptane	0.0	0.0	0.1	0.2	0.0	0.9	0.0	0.2
95 c-1,3-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.2
96 t-1,4-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
97 EDB (1,2-Dibromoethane)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98 2,2,5-Trimethylhexane	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
99 1-Octene								
100 Octane	0.0	0.1	0.1	0.5	0.0	1.9	0.0	0.9
101 t-1,2-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1
102 t-2-Octene	0.0	0.0	0.1	0.3	0.0	0.0	0.0	0.0
103 Tetrachloroethene	0.0	0.0	0.0	0.2	0.0	0.2	0.0	0.0
104 c-1,4/t-1,3-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
105 c-2-Octene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
106 c-1,2-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
108 Chlorobenzene	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
109 Ethylbenzene	0.0	0.0	0.3	2.5	0.2	15.3	0.2	0.8
110 m/p-Xylene	0.1	0.2	1.1	8.6	0.4	0.2	0.5	3.8

Appendix Table A1 **Volatile Organic Compounds**

Results in µg/m3	Mobile'94, EPA 56, 20 min MS65P.D EPA 56 Trip blank	Mobile'94, ESD 13870, 20 min MS92P.D ESD 13870 Trip blank	Mobile'94, EPA 41, 20 min MS79P.D EPA 41 Background	Mobile'94, ESD 13875, 20 min MS97P.D ESD 13875 Blank	Mobile'94 ESD 17, 20 min. MS91P.D ESD 17 Upwind	Mobile'94 ESD 12, 20 min MS89P.D ESD 12 Upwind-1	Mobile'94, ESD 20, 20 min MS90P.D ESD 20 Upwind-3	Mobile'94, ESD 13874, 20 min MS95P.D ESD 13874
Total VOC's:	**8.6**	**15.2**	**44.6**	**120.5**	**43.2**	**137.6**	**44.3**	**103.8**
Pre-Correction Values		**15.3**	**47.4**	**204.5**	**352.4**	**528.5**	**58.9**	**106.9**
Toluene / Benzene			**2.6**	**4.9**	**2.9**	**0.7**	**2.3**	**5.0**
m,p-Xylene/o-Xylene			**2.8**	**1.7**	**1.5**	**0.8**	**1.8**	**1.9**
m,p-Xylene/Ethylbenzene			**3.9**	**3.4**	**2.1**	**0.0**	**2.4**	**4.6**
o-Xylene/Ethylbenzene			**1.4**	**2.1**	**1.5**	**0.0**	**1.4**	**2.3**
111 Bromoform	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112 1,4-Dichlorobutane	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
113 Styrene	0.0	0.0	0.1	6.3	0.4	1.6	0.0	0.6
114 1,1,2,2-Tetrachloroethane	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
115 o-Xylene 116 1-Nonene	0.0	0.1	0.4	5.2	0.3	0.4	0.3	1.9
117 Nonane	0.0	0.1	0.1	1.7	0.0	9.6	0.0	1.5
119 iso-Propylbenzene	0.0	0.0	0.0	0.3	0.0	0.8	0.0	0.2
120 3,6-Dimethyloctane	0.0	0.0	0.0	1.6	0.0	5.4	0.0	0.6
121 n-Propylbenzene	0.0	0.0	0.1	0.3	0.0	1.0	0.0	0.2
122 3-Ethyltoluene	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
123 4-Ethyltoluene	0.0	0.0	0.1	0.4	0.0	1.1	0.0	0.2
124 1,3,5-Trimethylbenzene	0.0	0.0	0.1	0.6	0.0	1.7	0.0	0.4
125 2-Ethyltoluene 126 1-Decene	0.0	0.0	0.1	0.5	0.0	1.3	0.0	0.3
127 tert-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128 1,2,4-Trimethylbenzene	0.0	0.1	0.2	2.4	0.0	7.0	0.0	1.5
129 Decane	0.0	0.1	0.0	1.9	0.0	6.0	0.0	9.1
130 Benzyl chloride (alpha-Chlorotoluene)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
131 1,3-Dichlorobenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
132 1,4-Dichlorobenzene	0.0	0.0	0.0	0.4	0.0	0.4	0.0	0.2
133 iso-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
134 sec-Butylbenzene	0.0	0.0	0.0	0.1	0.0	0.3	0.0	0.0
135 1,2,3-Trimethylbenzene	0.0	0.0	0.0	1.0	0.0	2.3	0.0	0.6
136 p-Cymene	0.0	0.0	0.1	4.6	0.0	9.4	0.0	2.2
137 1,2-Dichlorobenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
138 Indane	0.0	0.0	0.0	0.3	0.0	0.9	0.0	0.2
139 1,3-Diethylbenzene	0.0	0.0	0.0	0.2	0.0	0.4	0.0	0.1
140 1,4-Diethylbenzene	0.0	0.0	0.0	1.0	0.0	1.6	0.0	0.5
141 n-Butylbenzene	0.0	0.0	0.0	0.2	0.0	0.5	0.0	0.1
142 1,2-Diethylbenzene	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
143 Undecane	0.0	0.0	0.1	0.8	0.0	2.0	0.0	7.4
144 1,2,4-Trichlorobenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
145 Naphthalene	0.0	0.0	0.0	0.6	0.0	0.5	0.0	0.4
146 Dodecane	0.0	0.1	0.0	4.8	0.0	5.4	0.0	2.3
147 Hexachlorbutadiene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
148 Hexylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix Table A1

Results in µg/m3	Mobile'94, ESD 13877, 20 min	Mobile'94, ESD13872(#4), 20 min.	Mobile'94, ESD 9, 20 min.	Mobile'94, ESD 5, 20 min.	Mobile'94, EPA 79, 20 min.	Mobile '94, EPA 115, 20 min	Mobile'94, ESD 19, 20 min.	Mobile '94, EPA 120, 10 min.
	MS96P D	MS94P D	MS88P D	MS48P D	MS71P D	MS35P D	MS49P D	MS76N D
	ESD 13877	ESD 13872	ESD 9	ESD 5	EPA 79	EPA 115	ESD 19	EPA 120
				DW1A-1	DW1A-2	DW1A-3	DW1B-1	DW1B-2
Total VOC's:	146.9	92.1	296.4	77.4	50.2	466.9	149.9	700.9
Pre-Correction Values	153.3	178.4	1287.6	89.9	53.8	751.6	220.7	754.2
Toluene / Benzene	6.3	7.7	14.7	0.9	1.6	1.0	1.1	1.4
m,p-Xylene/o-Xylene	1.9	2.6	1.9	2.3	1.4	2.4	2.3	2.4
m,p-Xylene/Ethylbenzene	4.6	4.7	3.3	3.9	1.5	4.9	5.0	5.7
o-Xylene/Ethylbenzene	2.5	1.8	1.8	1.7	1.1	2.1	2.2	2.3
1 1,4-Difluorobenzene								
47 Bromochloromethane								
107 Chlorobenzene-d5								
118 1-Bromo-4-Fluorobenzene								
2 Propene	8.6	2.1	1.5	3.6	1.1	14.0	4.3	21.1
3 Propane	5.0	3.3	7.2	17.3	0.8	2.9	3.2	4.9
4 Freon22 (Chlorodifluoromethane)	1.1	0.5	8.7	0.4	0.0	0.7	0.4	0.6
5 Freon12 (Dichlorodifluoromethane)	2.7	3.0	7.7	4.6	0.3	8.3	4.6	6.4
6 Propyne								
7 Chloromethane	2.0	1.2	1.6	1.2	0.2	1.0	1.7	2.6
8 Isobutane (2-Methylpropane)	1.9	1.0	9.5	1.0	0.2	3.4	1.2	1.3
9 Freon114 (1,2-Dichlorotetrafluoroethane)	0.3	0.4	0.8	0.5	0.1	0.9	0.5	0.5
10 Vinylchloride (Chloroethene)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 1-Butene/2-Methylpropene	15.3	2.9	3.3	2.9	0.9	14.3	5.3	11.5
12 1,3-Butadiene	0.3	0.0	0.0	1.4	0.2	8.5	1.1	9.8
13 Butane	2.6	1.9	6.1	1.9	0.4	3.2	2.3	5.2
14 t-2-Butene	0.5	0.1	0.0	0.3	0.1	0.9	0.3	0.5
15 2,2-Dimethylpropane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 Bromomethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17 1-Butyne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
18 c-2-Butene	0.8	0.2	0.0	0.4	0.1	1.0	0.3	0.7
19 Chloroethane	0.4	0.0	0.0	0.5	0.0	0.4	1.7	0.0
20 2-Methylbutane	2.1	2.0	6.1	2.5	1.0	9.6	3.3	12.3
21 Freon11 (Trichlorofluoromethane)	1.0	1.0	1.0	1.0	1.0	1.0	1.8	1.0
22 1-Pentene	0.9	0.3	0.0	1.6	0.0	14.1	2.5	2.4
23 2-Methyl-1-Butene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
24 Pentane	2.2	1.6	4.5	1.6	0.9	5.3	2.1	11.9
25 Isoprene (2-Methyl-1,3-Butadiene)	2.4	0.6	0.0	1.1	0.0	0.6	2.9	1.7
26 Ethylbromide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27 t-2-Pentene	0.2	0.0	0.0	0.0	0.0	0.4	0.0	0.0
28 1,1-Dichloroethene	0.0	0.0	0.0	0.0	0.2	0.0	0.5	0.0
29 c-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
30 Dichloromethane	1.8	1.1	1.1	0.4	0.1	1.1	0.3	0.5
31 2-Methyl-2-Butene	0.4	0.2	0.4	0.0	0.0	0.4	0.0	0.8
32 Freon113 (1,1,2-Trichlorotrifluoroethan	1.8	2.1	4.8	2.7	0.5	5.2	2.7	4.1
33 2,2-Dimethylbutane	0.1	0.0	0.3	0.2	0.1	0.7	0.2	1.2
34 Cyclopentene	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.5
35 t-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36 4-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
37 3-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
38 1,1-Dichloroethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39 Cyclopentane	0.1	0.0	0.0	0.0	0.1	0.6	0.0	1.3
40 2,3-Dimethylbutane	0.1	0.0	0.3	0.2	0.1	0.8	0.0	1.4
41 t-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42 2-Methylpentane	14.9	12.8	16.4	6.2	1.4	7.8	10.5	14.3
43 c-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44 3-Methylpentane	0.6	2.1	18.9	0.5	0.6	3.5	0.8	7.5
45 1-Hexene/2-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7
46 c-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48 Hexane	1.9	1.5	1.5	0.7	6.8	11.5	1.6	29.0
49 Chloroform	0.1	0.0	0.5	0.0	0.0	0.0	0.0	0.0
50 t-2-Hexene	0.0	0.0	0.0	0.6	0.0	2.8	0.5	0.0
51 2-Ethyl-1-Butene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52 t-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53 c-2-Hexene	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0
54 c-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix Table A1

Results in µg/m3	Mobile'94, ESD 13877, 20 min.	Mobile'94, ESD13872(#4), 20 min.	Mobile'94, ESD 9, 20 min.	Mobile'94, ESD 5, 20 min.	Mobile'94 EPA 79, 20 min.	Mobile '94, EPA 115, 20 min.	Mobile'94, ESD 19, 20 min.	Mobile '94 EPA 120, 10 min.
	MS98P.D	MS94P.D	MS88P.D	MS48P.D	MS71P.D	MS35P.D	MS49P.D	MS76N.D
	ESD 13877	ESD 13872	ESD 9	ESD 5	EPA 79	EPA 115	ESD 19	EPA 120
				DW1A-1	DW1A-2	DW1A-3	DW1B-1	DW1B-2
Total VOC's:	**146.9**	**92.1**	**290.4**	**77.4**	**50.2**	**466.8**	**149.9**	**700.9**
Pre-Correction Values	**153.3**	**176.4**	**1287.6**	**89.6**	**53.8**	**751.8**	**220.7**	**754.2**
Toluene / Benzene	6.3	7.7	14.7	0.9	1.6	1.0	1.1	1.4
m,p-Xylene/o-Xylene	1.9	2.6	1.9	2.3	1.4	2.4	2.3	2.4
m,p-Xylene/Ethylbenzene	4.6	4.7	3.3	3.9	1.5	4.9	5.0	5.7
o-Xylene/Ethylbenzene	2.5	1.8	1.8	1.7	1.1	2.1	2.2	2.3
55 2,2-Dimethylpentane	0.0	0.4	3.5	0.0	0.1	0.5	0.2	1.0
56 1,2-Dichloroethane	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
57 Methylcyclopentane	0.3	7.7	62.6	0.2	1.2	4.1	0.7	9.3
58 2,4-Dimethylpentane	0.0	0.0	0.0	0.0	0.1	0.9	0.4	1.8
59 1,1,1-Trichloroethane	0.7	0.5	24.6	0.6	0.1	0.7	0.9	0.8
60 2,2,3-Trimethylbutane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
61 1-Methylcyclopentene	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.7
62 Benzene	1.3	1.6	2.6	3.3	2.1	28.1	5.1	37.4
63 Carbontetrachloride	0.5	0.5	0.6	0.5	0.0	0.5	0.5	0.7
64 Cyclohexane	0.5	0.1	1.8	0.2	1.3	6.6	1.0	15.3
65 2-Methylhexane	0.0	0.0	0.4	0.5	2.6	14.8	8.1	23.1
66 2,3-Dimethylpentane	0.1	0.0	0.0	0.4	0.9	5.7	3.2	8.2
67 Cyclohexene	0.0	0.0	0.0	0.3	0.0	1.6	0.6	0.4
68 3-Methylhexane	0.5	0.4	0.8	0.9	3.3	18.9	11.3	29.9
69 Dibromomethane	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70 1,2-Dichloropropane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71 Bromodichloromethane								
72 Trichloroethene	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0
73 1-Heptene								
74 2,2,4-Trimethylpentane	0.4	0.2	1.7	0.4	0.1	0.6	0.4	1.1
75 t-3-Heptene	0.0	0.0	0.0	0.0	0.0	24.7	9.2	5.2
76 c-3-Heptene								
77 Heptane	1.2	0.4	1.3	1.3	5.6	33.3	12.4	59.9
78 t-2-Heptene	0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.2
79 c-2-Heptene	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.6
80 c-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81 2,2-Dimethylhexane	0.0	0.0	0.0	0.0	0.1	0.4	0.2	0.9
82 Methylcyclohexane	0.8	0.0	0.8	0.5	4.1	21.5	4.3	51.5
83 2,5-Dimethylhexane	0.0	0.0	0.0	0.0	0.2	0.8	0.3	1.7
84 2,4-Dimethylhexane	0.0	0.0	0.3	0.0	0.3	1.9	0.7	2.6
85 cit-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86 1,1,2-Trichloroethane	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.4
87 Bromotrichloromethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88 2,3,4-Trimethylpentane	0.2	0.0	0.6	0.2	0.0	0.4	0.2	0.4
89 Toluene	8.2	12.5	38.3	2.9	3.4	27.1	5.7	50.6
90 2-Methylheptane	0.5	0.2	0.6	0.0	0.9	6.8	0.9	12.9
91 4-Methylheptane	0.0	0.0	0.0	0.0	0.2	1.4	0.3	4.5
92 1-Methylcyclohexene	0.2	0.0	0.0	0.3	0.0	2.9	0.5	0.9
93 Dibromochloromethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94 3-Methylheptane	0.4	0.0	0.5	0.2	0.6	4.2	0.6	8.9
95 c-1,3-Dimethylcyclohexane	0.0	0.0	0.3	0.0	0.8	5.1	1.0	12.2
96 t-1,4-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.4	2.8	0.6	6.1
97 EDB (1,2-Dibromoethane)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98 2,2,5-Trimethylhexane	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.2
99 1-Octene								
100 Octane	1.4	0.2	0.9	0.4	1.8	13.5	2.3	27.5
101 t-1,2-Dimethylcyclohexane	0.2	0.0	0.0	0.0	0.5	2.8	0.5	6.6
102 t-2-Octene	0.7	0.0	0.0	0.6	0.6	0.0	2.4	8.8
103 Tetrachloroethene	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
104 c-1,4/t-1,3-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.3	1.6	0.3	3.9
105 c-2-Octene	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
106 c-1,2-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.1	0.5	0.2	1.2
108 Chlorobenzene	0.0	0.0	0.0	0.0	0.2	1.0	0.2	2.1
109 Ethylbenzene	1.5	1.6	4.5	0.4	0.2	4.3	0.8	6.5
110 m/p-Xylene	6.8	7.6	15.2	1.6	0.3	20.9	3.8	36.7

Appendix Table A1

Results in µg/m3	Mobile'94, ESD 13877, 20 min.	Mobile'94, ESD13872(#4), 20 min.	Mobile'94, ESD 9, 20 min.	Mobile'94, ESD 5, 20 min.	Mobile'94, EPA 79, 20 min	Mobile '94 EPA 115, 20 min.	Mobile '94 ESD 19, 20 min	Mobile '94 EPA 120, 10 min
	MS96P D	MS94P D	MS88P D	MS48P D	MS71P.D	MS35P D	MS49P D	MS78N D
	ESD 13877	ESD 13872	ESD 9	ESD 5	EPA 79	EPA 115	ESD 19	EPA 120
				DW1A-1	DW1A-2	DW1A-3	DW1B-1	DW1B-2
Total VOC's:	**146.9**	**92.1**	**290.4**	**77.4**	**50.2**	**466.8**	**149.9**	**700.9**
Pre-Correction Values	**153.3**	**178.4**	**1287.6**	**89.0**	**53.8**	**751.6**	**220.7**	**754.2**
Toluene / Benzene	6.3	7.7	14.7	0.9	1.5	1.0	1.1	1.4
m,p-Xylene/o-Xylene	1.9	2.6	1.9	2.3	1.4	2.4	2.3	2.4
m,p-Xylene/Ethylbenzene	4.6	4.7	3.3	3.9	1.5	4.9	5.0	5.7
o-Xylene/Ethylbenzene	2.5	1.8	1.8	1.7	1.1	2.1	2.2	2.3
111 Bromoform	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112 1,4-Dichlorobutane	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0
113 Styrene	2.3	0.0	0.0	0.3	0.0	7.4	0.0	5.2
114 1,1,2,2-Tetrachloroethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
115 o-Xylene 116 1-Hexene	3.6	2.9	8.2	0.7	0.2	8.8	1.7	15.1
117 Nonane	2.2	0.5	2.7	0.4	0.6	11.1	1.7	18.2
119 iso-Propylbenzene	0.2	0.0	0.3	0.0	0.0	0.6	0.0	1.0
120 3,6-Dimethyloctane	1.0	0.2	1.0	0.3	0.0	2.4	0.3	0.8
121 n-Propylbenzene	0.3	0.3	0.6	0.0	0.0	1.0	0.3	1.7
122 3-Ethyltoluene	0.0	0.0	0.0	0.2	0.0	3.0	0.6	4.8
123 4-Ethyltoluene	0.4	0.4	0.3	0.0	0.0	1.7	0.3	2.6
124 1,3,5-Trimethylbenzene	0.6	0.4	0.0	0.0	0.0	2.7	0.3	4.1
125 2-Ethyltoluene 126 1-Decene	0.4	0.3	0.4	0.0	0.0	1.6	0.3	2.4
127 tert-Butylbenzene	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0
128 1,2,4-Trimethylbenzene	2.2	1.4	0.4	0.4	0.0	6.9	1.1	10.7
129 Decane	13.5	4.5	6.5	1.2	0.0	7.7	2.1	9.3
130 Benzyl chloride (alpha-Chlorotoluene)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
131 1,3-Dichlorobenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
132 1,4-Dichlorobenzene	0.4	0.2	1.2	0.0	0.0	0.5	0.2	0.5
133 iso-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
134 sec-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.5
135 1,2,3-Trimethylbenzene	0.8	0.4	0.0	0.0	0.0	1.8	0.3	2.7
136 p-Cymene	2.7	0.5	0.0	0.0	0.0	0.0	0.2	1.0
137 1,2-Dichlorobenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
138 Indane	0.2	0.2	0.0	0.0	0.0	0.3	0.0	0.4
139 1,3-Diethylbenzene	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3
140 1,4-Diethylbenzene	0.6	0.2	0.0	0.0	0.0	1.2	0.2	1.7
141 n-Butylbenzene	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4
142 1,2-Diethylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
143 Undecane	9.2	2.6	0.3	1.1	0.0	5.6	1.8	4.1
144 1,2,4-Trichlorobenzene	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.7
145 Naphthalene	0.7	0.2	0.0	0.0	0.0	7.1	0.2	6.4
146 Dodecane	5.2	0.2	0.0	1.4	0.0	6.0	2.3	2.2
147 Hexachlorbutadiene	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.5
148 Hexylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3

Appendix Table A1

Results in µg/m3	Mobile '94, EPA 21, 20 min	Mobile'94, ESD 8, 20 min	Mobile '94, EPA 54, 10 min	Mobile '94, Summa 84 20 min	Mobile 94 ESD 11, 20 min	Mobile 94 EPA 68, 10 min	Mobile 94 EPA 39, 20 min	Mobile 94 ESD 18, 20 min
	MS36P D	MS70P D	MS79N D	MS37P D	MS50P D	MS80N D	MS46P D	MS51P D
	EPA 21	ESD 8	EPA 54	EPA 84	ESD 11	EPA 68	EPA 39	ESD 18
	DW1B-3	DW1C-1	DW1C-2	DW1C-3	DW2A-1	DW2A-2	DW2A-3	DW2B-1
Total VOC's:	122.5	165.4	278.2	60.1	49.4	230.8	128.1	55.7
Pre-Correction Values	158.0	175.0	283.5	60.7	50.6	242.3	150.3	65.7
Toluene / Benzene	0.8	2.6	1.0	1.9	0.8	1.4	0.4	0.8
m,p-Xylene/o-Xylene	2.3	2.3	2.4	2.7	2.4	2.3	3.0	2.3
m,p-Xylene/Ethylbenzene	4.9	5.9	5.0	4.1	3.9	4.9	4.2	3.6
o-Xylene/Ethylbenzene	2.1	2.5	2.0	1.5	1.8	2.1	1.4	1.6
[illegible]								
47 [illegible]								
107 [illegible]								
116 [illegible]								
2 Propene	3.3	1.5	3.1	2.0	2.2	5.0	5.6	2.0
1 Propane	3.3	3.0	2.7	3.5	3.1	3.9	5.9	4.5
4 Freon22 (Chlorodifluoromethane)	0.3	0.4	0.6	0.4	0.5	0.8	0.5	0.3
5 Freon12 (Dichlorodifluoromethane)	4.0	3.2	7.8	5.3	3.6	9.5	5.7	3.4
6 Propyne								
7 Chloromethane	1.2	1.5	1.8	1.6	1.2	2.2	1.9	1.6
8 Isobutane (2-Methylpropane)	0.6	1.3	1.3	0.4	0.6	0.9	1.4	1.0
9 Freon114 (1,2-Dichlorotetrafluoroethane)	0.4	0.4	1.1	0.7	0.3	1.2	0.6	0.3
10 Vinylchloride (Chloroethene)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 1-Butene/2-Methylpropene	4.3	1.6	3.9	4.4	2.2	8.4	10.8	1.4
12 1,3-Butadiene	1.0	0.4	1.2	0.0	0.7	2.6	2.8	0.6
13 Butane	2.7	2.7	2.9	1.6	1.8	2.7	2.4	2.1
14 t-2-Butene	0.2	0.0	0.0	0.0	0.1	0.0	0.3	0.2
15 2,2-Dimethylpropane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 Bromomethane	0.2	0.0	0.0	0.0	0.0	0.0	0.3	0.0
17 1-Butyne	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
18 c-2-Butene	0.2	0.2	0.0	0.2	0.2	0.5	0.3	0.2
19 Chloroethane	0.0	0.6	0.0	0.3	0.6	0.0	0.2	0.9
20 2-Methylbutane	3.4	4.3	2.9	1.9	2.3	3.8	3.5	2.5
21 Freon11 (Trichlorofluoromethane)	1.7	1.9	3.8	1.8	1.7	2.4	1.8	1.7
22 1-Pentene	1.2	0.0	0.4	0.0	1.3	0.9	13.7	0.0
23 2-Methyl-1-Butene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
24 Pentane	2.9	2.6	2.5	1.3	1.4	3.5	2.2	1.5
25 Isoprene (2-Methyl-1,3-Butadiene)	0.1	0.2	0.0	0.0	1.2	0.0	2.4	0.3
26 Ethylbromide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27 t-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
28 1,1-Dichloroethene	0.0	0.3	1.6	0.0	0.0	0.0	0.0	0.0
29 c-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30 Dichloromethane	1.2	0.2	0.9	1.7	0.2	0.8	0.5	0.2
31 2-Methyl-2-Butene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
32 Freon113 (1,1,2-Trichlorotrifluoroethan	2.5	2.3	7.7	4.3	1.7	7.9	4.4	1.4
33 2,2-Dimethylbutane	0.2	0.3	0.0	0.0	0.1	0.0	0.2	0.2
34 Cyclopentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
35 t-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36 4-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37 3-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38 1,1-Dichloroethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39 Cyclopentane	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.1
40 2,3-Dimethylbutane	0.2	0.3	0.0	0.0	0.2	0.5	0.0	5.4
41 t-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42 2-Methylpentane	4.9	5.8	9.3	4.7	5.4	16.2	7.2	5.3
43 c-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44 3-Methylpentane	1.2	1.2	3.3	0.4	0.4	2.7	0.6	0.4
45 1-Hexene/2-Methyl-1-Pentene	0.0	0.0	0.7	0.0	0.0	1.0	3.4	0.0
46 c-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
48 Hexane	3.6	2.9	129.3	1.1	0.5	27.7	1.4	0.6
49 Chloroform	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50 t-2-Hexene	0.4	0.0	0.0	0.2	0.2	0.0	1.0	0.3
51 2-Ethyl-1-Butene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52 t-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53 c-2-Hexene	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0
54 c-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Appendix Table A1

Results in µg/m3	Mobile '94, EPA 21, 20 min.	Mobile'94, ESD 8, 20 min	Mobile '94, EPA 54, 10 min.	Mobile '94, Summa 84, 20 min.	Mobile'94, ESD 11, 20 min.	Mobile '94, EPA 68, 10 min	Mobile'94, EPA 39, 20 min	Mobile'94 ESD 18, 20 min.
	MS36P.D	MS70P.D	MS79N.D	MS37P.D	MS50P.D	MS80N.D	MS46P.D	MS51P.D
	EPA 21	ESD 8	EPA 54	EPA 84	ESD 11	EPA 68	EPA 39	ESD 18
	DW1B-3	DW1C-1	DW1C-2	DW1C-3	DW2A-1	DW2A-2	DW2A-3	DW2B-1
Total VOC's:	**122.5**	**165.4**	**278.2**	**60.1**	**49.4**	**230.0**	**128.1**	**55.7**
Pre-Correction Values	**158.0**	**175.8**	**283.5**	**60.7**	**50.8**	**242.3**	**150.3**	**65.7**
Toluene / Benzene	0.8	2.8	1.0	1.9	0.8	1.4	0.4	0.8
m,p-Xylene/o-Xylene	2.3	2.3	2.4	2.7	2.4	2.3	3.0	2.3
m,p-Xylene/Ethylbenzene	4.9	5.9	5.0	4.1	3.9	4.9	4.2	3.6
o-Xylene/Ethylbenzene	2.1	2.5	2.0	1.5	1.6	2.1	1.4	1.6
55 2,2-Dimethylpentane	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
56 1,2-Dichloroethane	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57 Methylcyclopentane	1.1	1.2	9.3	0.3	0.2	4.4	0.3	0.2
58 2,4-Dimethylpentane	0.3	0.5	0.0	0.0	0.0	0.4	0.0	0.1
59 1,1,1-Trichloroethane	0.6	1.0	3.4	0.7	0.6	0.7	0.8	0.6
60 2,2,3-Trimethylbutane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61 1-Methylcyclopentene	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
62 Benzene	8.5	3.4	8.8	1.1	2.5	11.0	10.7	2.4
63 Carbontetrachloride	0.6	0.5	0.8	0.6	0.5	0.6	0.5	0.5
64 Cyclohexane	1.7	2.2	1.4	0.4	0.0	3.5	0.2	0.1
65 2-Methylhexane	3.5	10.8	4.3	1.8	0.7	4.4	1.2	0.7
66 2,3-Dimethylpentane	1.3	4.0	1.8	0.7	0.3	1.5	0.6	0.3
67 Cyclohexene	0.0	0.0	0.0	0.0	0.2	0.0	0.7	0.1
68 3-Methylhexane	4.4	14.4	6.2	2.3	0.8	5.7	1.6	0.8
69 Dibromomethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
70 1,2-Dichloropropane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
71 Bromodichloromethane								
72 Trichloroethene	0.1	0.0	5.1	0.0	0.0	0.0	0.2	0.0
73 1-Hexene								
74 2,2,4-Trimethylpentane	0.2	0.5	0.4	0.0	0.3	0.0	0.2	0.3
75 t-3-Heptene	6.7	0.0	0.8	0.0	0.0	1.2	0.4	0.0
76 c-3-Heptene								
77 Heptane	8.1	18.3	9.7	3.3	0.9	12.7	2.2	0.9
78 t-2-Heptene	0.0	0.0	0.0	0.0	0.3	0.0	2.2	0.2
79 c-2-Heptene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80 c-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81 2,2-Dimethylhexane	0.1	0.3	0.0	0.0	0.0	0.0	0.0	0.0
82 Methylcyclohexane	5.3	9.3	4.7	1.1	0.2	10.6	0.6	0.3
83 2,5-Dimethylhexane	0.3	0.5	0.0	0.0	0.0	0.0	0.0	0.0
84 2,4-Dimethylhexane	0.5	1.1	0.4	0.2	0.1	0.6	0.0	0.1
85 c/t-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86 1,1,2-Trichloroethane	0.0	0.0	0.4	0.0	0.0	0.6	0.0	0.0
87 Bromotrichloromethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88 2,3,4-Trimethylpentane	0.0	0.2	0.0	0.0	0.1	0.0	0.0	0.1
89 Toluene	6.6	8.9	8.3	2.2	2.1	15.3	4.2	2.0
90 2-Methylheptane	1.8	2.3	1.2	0.3	0.0	2.5	0.0	0.2
91 4-Methylheptane	0.4	0.9	0.0	0.0	0.0	0.8	0.0	0.0
92 1-Methylcyclohexene	0.2	0.0	0.0	0.3	0.2	0.0	1.3	0.0
93 Dibromochloromethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94 3-Methylheptane	0.9	1.6	1.0	0.2	0.0	1.5	0.3	0.2
95 c-1,3-Dimethylcyclohexane	1.3	2.3	1.1	0.2	0.0	2.3	0.0	0.0
96 t-1,4-Dimethylcyclohexane	0.7	1.3	0.5	0.0	0.0	1.3	0.0	0.0
97 EDB (1,2-Dibromoethane)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98 2,2,5-Trimethylhexane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
99 1-Octene								
100 Octane	3.5	5.3	2.8	0.7	0.2	5.3	0.6	0.2
101 t-1,2-Dimethylcyclohexane	0.7	1.4	0.6	0.0	0.0	1.3	0.0	0.0
102 t-2-Octene	0.0	1.9	1.3	1.0	0.2	1.6	1.2	0.2
103 Tetrachloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
104 c-1,4/t-1,3-Dimethylcyclohexane	0.4	0.8	0.0	0.0	0.0	0.8	0.0	0.0
105 c-2-Octene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
106 c-1,2-Dimethylcyclohexane	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0
108 Chlorobenzene	0.2	0.4	0.0	0.0	0.0	0.4	0.0	0.0
109 Ethylbenzene	0.9	1.3	1.1	0.3	0.3	1.6	0.4	0.3
110 m/p-Xylene	4.3	7.5	5.4	1.4	1.1	7.9	1.8	1.0

Appendix Table A1

Results in µg/m3	Mobile '94, EPA 21, 20 min.	Mobile'94, ESD 8, 20 min.	Mobile '94, EPA 54, 10 min	Mobile '94, Summa 84, 20 min.	Mobile'94, ESD 11, 20 min	Mobile '94 EPA 68, 10 min	Mobile'94, EPA 39, 20 min	Mobile'94, ESD 18, 20 min
	MS36P.D	MS70P.D	MS79N.D	MS37P.D	MS50P.D	MS80N.D	MS46P.D	MS51P.D
	EPA 21	ESD 8	EPA 54	EPA 84	ESD 11	EPA 68	EPA 39	ESD 18
	DW1B-3	DW1C-1	DW1C-2	DW1C-3	DW2A-1	DW2A-2	DW2A-3	DW2B-1
Total VOC's:	**122.5**	**165.4**	**278.2**	**60.1**	**49.4**	**230.0**	**128.1**	**55.7**
Pre-Correction Values	**158.0**	**175.0**	**283.5**	**60.7**	**50.6**	**242.3**	**150.3**	**65.7**
Toluene / Benzene	0.8	2.8	1.0	1.9	0.8	1.4	0.4	0.8
m,p-Xylene/o-Xylene	2.3	2.3	2.4	2.7	2.4	2.3	3.0	2.3
m,p-Xylene/Ethylbenzene	4.9	5.9	5.0	4.1	3.8	4.9	4.2	3.6
o-Xylene/Ethylbenzene	2.1	2.5	2.0	1.8	1.6	2.1	1.4	1.6
111 Bromoform	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
112 1,4-Dichlorobutane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
113 Styrene	0.0	0.0	0.0	0.0	0.0	0.0	2.1	0.6
114 1,1,2,2-Tetrachloroethane	0.5	0.0	0.0	0.0	0.0	0.0	0.5	0.0
115 o-Xylene	1.9	3.2	2.2	0.5	0.5	3.4	0.6	0.4
116 1-Nonene								
117 Nonane	2.7	4.2	2.6	0.6	0.2	3.9	0.6	0.2
119 iso-Propylbenzene	0.1	0.2	0.0	0.0	0.0	0.0	0.0	0.0
120 3,6-Dimethyloctane	0.6	0.2	0.5	0.0	0.2	0.5	0.2	0.1
121 n-Propylbenzene	0.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0
122 3-Ethyltoluene	0.4	1.1	0.0	0.2	0.2	0.9	0.4	0.2
123 4-Ethyltoluene	0.2	0.6	0.0	0.0	0.0	0.5	0.2	0.1
124 1,3,5-Trimethylbenzene	0.2	0.7	0.0	0.0	0.0	0.6	0.2	0.1
125 2-Ethyltoluene	0.3	0.6	0.0	0.0	0.0	0.5	0.0	0.1
126 1-Decene								
127 tert-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128 1,2,4-Trimethylbenzene	0.6	2.1	0.9	0.4	0.3	1.7	0.6	0.3
129 Decene	1.5	3.2	1.9	0.5	0.8	2.3	0.7	0.6
130 Benzyl chloride (alpha-Chlorotoluene)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
131 1,3-Dichlorobenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
132 1,4-Dichlorobenzene	0.0	0.1	0.0	0.3	0.0	0.4	0.0	0.0
133 iso-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
134 sec-Butylbenzene	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
135 1,2,3-Trimethylbenzene	0.1	0.5	0.0	0.0	0.0	0.5	0.2	0.1
136 p-Cymene	0.0	0.2	0.0	0.0	0.0	1.4	0.3	0.1
137 1,2-Dichlorobenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
138 Indane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
139 1,3-Diethylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
140 1,4-Diethylbenzene	0.0	0.2	0.0	0.0	0.0	0.0	0.3	0.0
141 n-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
142 1,2-Diethylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
143 Undecane	0.9	1.6	0.9	0.4	0.6	1.0	0.9	0.8
144 1,2,4-Trichlorobenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0
145 Naphthalene	0.2	0.1	1.0	0.4	0.2	3.1	2.1	0.3
146 Dodecane	0.7	1.2	0.0	0.3	0.9	0.6	1.5	1.6
147 Hexachlorobutadiene	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
148 Hexylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.0

Appendix Table A1

Results in µg/m3	Mobile '94, ESD 14, 20 min.	Mobile'94, EPA 49, 20 min.	Mobile'94, ESD 13, 20 min.	Mobile'94, EPA 35, 20 min.	Mobile'94, EPA 26, 20 min.	Mobile'94, ESD 15, 20 min.	Mobile'94, EPA 124, 20 min.	Mobile'94, EPA 105, 20 min.
	MS61N D	MS47P D	MS78P D	MS55P D	MS63P D	MS66P D	MS56P D	MS59P D
	ESD 14	EPA 49	ESD 13	EPA 35	EPA 25	ESD 15	EPA 124	EPA 105
	DW2B-2	DW2B-3	DW2C-1	DW2C-2	DW2C-3	DW3A-1	DW3A-2	DW3A-3
Total VOC's:	**228.8**	**352.9**	**115.3**	**86.5**	**85.2**	**43.3**	**89.0**	**79.8**
Pre-Correction Values	**234.0**	**397.4**	**132.3**	**96.8**	**67.3**	**43.8**	**107.5**	**109.2**
Toluene / Benzene	0.8	6.9	4.4	6.7	4.5	2.8	1.1	1.1
m,p-Xylene/o-Xylene	2.4	2.6	2.3	1.5	2.8	2.0	2.8	2.5
m,p-Xylene/Ethylbenzene	4.5	3.8	5.9	1.4	3.1	4.1	3.7	3.9
o-Xylene/Ethylbenzene	1.9	1.5	2.5	0.9	1.1	2.0	1.3	1.6
1,3,5-Trimethylbenzene								
87 Bromochloromethane								
107 Chlorobenzene-d5								
119 1-Bromo-4-Fluorobenzene								
2 Propene	16.3	2.2	0.4	2.6	0.9	0.7	9.3	3.0
3 Propane	3.5	17.9	4.0	3.5	4.1	2.5	3.0	2.8
4 Freon22 (Chlorodifluoromethane)	0.4	1.3	0.4	0.7	0.4	0.5	0.4	0.5
5 Freon12 (Dichlorodifluoromethane)	6.3	11.0	2.7	4.5	5.3	3.3	3.7	3.7
6 Propyne								
7 Chloromethane	1.7	1.7	1.3	1.0	1.3	1.3	1.1	1.1
8 Isobutane (2-Methylpropane)	0.8	33.5	1.0	0.7	2.2	0.8	0.5	0.6
9 Freon114 (1,2-Dichlorotetrafluoroethane)	0.8	0.6	0.2	0.5	0.4	0.6	0.3	0.0
10 Vinylchloride (Chloroethene)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11 1-Butene/2-Methylpropene	7.7	5.8	1.1	8.0	3.3	2.8	7.5	3.7
12 1,3-Butadiene	7.5	0.8	0.0	0.5	0.0	0.0	0.8	1.1
13 Butane	2.1	4.9	2.6	1.7	1.8	1.6	1.7	2.2
14 t-2-Butene	0.6	0.0	0.0	0.2	0.0	0.0	1.2	0.0
15 2,2-Dimethylpropane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
16 Bromomethane	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.0
17 1-Butyne	0.3	0.0	0.0	0.3	0.0	0.0	0.0	0.0
18 c-2-Butene	0.8	0.2	0.0	0.2	0.0	0.0	1.2	0.3
19 Chloroethane	0.0	0.2	0.1	0.0	0.1	0.0	0.0	0.0
20 2-Methylbutane	3.2	56.2	3.8	1.5	6.8	2.0	1.5	3.7
21 Freon11 (Trichlorofluoromethane)	2.0	27.5	1.6	2.0	4.6	1.9	1.8	1.9
22 1-Pentene	1.3	0.0	0.0	0.0	0.0	0.0	3.4	0.0
23 2-Methyl-1-Butene	0.0	0.0	0.1	0.0	0.0	0.0	0.2	0.0
24 Pentane	2.8	33.2	2.2	1.0	4.6	1.2	1.0	2.5
25 Isoprene (2-Methyl-1,3-Butadiene)	0.8	2.1	2.3	1.2	0.0	0.2	1.3	0.0
26 Ethylbromide	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
27 t-2-Pentene	0.3	0.0	0.0	0.0	0.0	0.0	0.4	0.1
28 1,1-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
29 c-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0
30 Dichloromethane	0.5	2.6	0.2	0.4	0.7	0.5	0.3	0.0
31 2-Methyl-2-Butene	0.6	0.3	0.1	0.2	0.0	0.0	0.5	0.1
32 Freon113 (1,1,2-Trichlorotrifluoroethan	5.2	4.2	1.2	3.2	2.4	3.1	1.7	1.4
33 2,2-Dimethylbutane	0.3	0.6	0.2	0.0	0.1	0.0	0.1	0.2
34 Cyclopentene	0.4	0.0	0.0	0.0	0.0	0.0	0.2	0.0
35 t-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
36 4-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37 3-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
38 1,1-Dichloroethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39 Cyclopentane	0.3	1.4	0.2	0.0	0.2	0.0	0.0	0.0
40 2,3-Dimethylbutane	0.3	0.5	0.2	0.0	0.0	0.0	0.0	0.2
41 t-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
42 2-Methylpentane	8.7	7.7	5.5	6.9	2.9	9.6	5.8	2.1
43 c-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
44 3-Methylpentane	2.0	2.1	0.9	0.6	0.5	0.4	0.3	0.9
45 1-Hexene/2-Methyl-1-Pentene	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
46 c-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
48 Hexane	28.9	9.8	2.2	18.4	1.9	0.5	4.3	2.3
49 Chloroform	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0
50 t-2-Hexene	0.4	0.5	0.0	0.0	0.0	0.0	0.6	0.0
51 2-Ethyl-1-Butene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
52 t-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
53 c-2-Hexene	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
54 c-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0

Appendix Table A1

Results in µg/m3	Mobile '94, ESD 14, 20 min.	Mobile'94, EPA 49, 20 min.	Mobile'94, ESD 13, 20 min.	Mobile'94, EPA 35, 20 min.	Mobile'94, EPA 26, 20 min.	Mobile'94 ESD 15, 20 min.	Mobile'94, EPA 124, 20 min.	Mobile'94 EPA 105, 20 min.
	MS81N.D	MS47P.D	MS78P.D	MS55P.D	MS63P.D	MS66P.D	MS56P.D	MS59P.D
	ESD 14	EPA 49	ESD 13	EPA 35	EPA 26	ESD 15	EPA 124	EPA 105
	DW2B-2	DW2B-3	DW2C-1	DW2C-2	DW2C-3	DW3A-1	DW3A-2	DW3A-3
Total VOC's:	**220.8**	**352.9**	**115.3**	**86.5**	**65.2**	**43.3**	**89.0**	**79.8**
Pre-Correction Values	**234.0**	**397.4**	**132.3**	**96.8**	**67.3**	**43.8**	**107.5**	**109.2**
Toluene / Benzene	0.8	6.9	4.4	6.7	4.5	2.8	1.1	1.1
m,p-Xylene/o-Xylene	2.4	2.6	2.3	1.5	2.8	2.6	2.8	2.5
m,p-Xylene/Ethylbenzene	4.5	3.8	5.9	1.4	3.1	4.1	3.7	3.9
o-Xylene/Ethylbenzene	1.9	1.5	2.5	0.9	1.1	2.0	1.3	1.6
55 2,2-Dimethylpentane	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
56 1,2-Dichloroethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
57 Methylcyclopentane	4.2	1.8	0.9	1.5	0.3	0.0	0.6	0.6
58 2,4-Dimethylpentane	0.4	0.3	0.3	0.0	0.2	0.0	0.1	0.2
59 1,1,1-Trichloroethane	1.0	1.9	0.5	0.8	0.7	0.9	0.9	0.7
60 2,2,3-Trimethylbutane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
61 1-Methylcyclopentene	0.4	0.2	0.0	0.0	0.0	0.0	0.2	0.1
62 Benzene	17.5	6.5	1.4	1.6	1.1	0.8	2.6	4.9
63 Carbontetrachloride	0.6	0.6	0.5	0.5	0.5	0.5	0.7	0.6
64 Cyclohexane	3.0	2.0	1.4	0.0	0.5	0.0	0.2	1.0
65 2-Methylhexane	3.6	2.8	5.0	1.2	1.7	0.3	0.0	0.0
66 2,3-Dimethylpentane	1.2	1.1	2.3	0.5	0.8	0.0	0.5	0.5
67 Cyclohexene	0.3	0.3	0.0	0.0	0.0	0.0	0.4	0.0
68 3-Methylhexane	4.4	3.6	8.3	1.6	2.4	0.5	1.7	2.1
69 Dibromomethane	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
70 1,2-Dichloropropane	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
71 Bromodichloromethane								
72 Trichloroethene	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
73 t-Heptene								
74 2,2,4-Trimethylpentane	0.3	0.6	0.5	0.2	0.2	0.3	0.2	0.2
75 t,3-Heptene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
76 c,3-Heptene								
77 Heptane	9.9	5.0	10.7	1.6	2.5	0.5	2.2	4.1
78 t-2-Heptene	0.0	1.1	0.0	0.0	0.0	0.0	0.0	0.0
79 c-2-Heptene	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80 c-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
81 2,2-Dimethylhexane	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
82 Methylcyclohexane	9.4	2.9	5.7	0.4	0.5	0.0	0.5	3.5
83 2,5-Dimethylhexane	0.3	0.2	0.3	0.0	0.0	0.0	0.0	0.1
84 2,4-Dimethylhexane	0.5	0.4	0.5	0.0	0.2	0.0	0.1	0.2
85 c/t-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
86 1,1,2-Trichloroethane	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
87 Bromotrichloromethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
88 2,3,4-Trimethylpentane	0.0	0.6	0.2	0.0	0.0	0.0	0.1	0.1
89 Toluene	13.4	45.2	6.0	10.5	4.9	2.3	3.0	5.5
90 2-Methylheptane	2.3	0.5	1.6	0.0	0.0	0.0	0.1	1.0
91 4-Methylheptane	0.7	0.3	0.6	0.0	0.0	0.0	0.0	0.0
92 1-Methylcyclohexene	0.7	0.8	0.0	0.0	0.0	0.0	0.6	0.0
93 Dibromochloromethane	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
94 3-Methylheptane	1.7	0.7	1.1	0.0	0.0	0.0	0.1	0.7
95 c-1,3-Dimethylcyclohexane	2.3	0.8	1.5	0.0	0.0	0.0	0.3	0.0
96 t-1,4-Dimethylcyclohexane	1.3	0.5	0.7	0.0	0.0	0.0	0.0	0.0
97 EDB (1,2-Dibromoethane)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
98 2,2,5-Trimethylhexane	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
99 t-Octene								
100 Octane	4.9	1.9	3.5	0.2	0.2	0.2	16.3	2.1
101 t-1,2-Dimethylcyclohexane	1.2	0.4	0.8	0.0	0.0	0.0	0.0	0.5
102 t-2-Octene	2.4	2.6	1.6	0.0	0.0	0.0	0.0	1.5
103 Tetrachloroethene	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
104 c-1,4/t-1,3-Dimethylcyclohexane	0.7	0.3	0.5	0.0	0.0	0.0	0.0	0.3
105 c-2-Octene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
106 c-1,2-Dimethylcyclohexane	0.2	0.0	0.2	0.0	0.0	0.0	0.0	0.0
108 Chlorobenzene	0.4	0.5	0.3	0.0	0.0	0.0	0.0	0.2
109 Ethylbenzene	1.6	1.5	0.9	0.8	0.2	0.3	0.3	0.9
110 m/p-Xylene	7.1	5.9	5.1	1.2	0.7	1.2	1.0	3.5

Appendix Table A1

Results in µg/m3	Mobile '94, ESD 14, 20 min.	Mobile'94, EPA 49, 20 min.	Mobile'94, ESD 13, 20 min.	Mobile'94, EPA 35, 20 min.	Mobile'94, EPA 26, 20 min.	Mobile'94, ESD 15, 20 min.	Mobile'94 EPA 124, 20 min.	Mobile'94, EPA 105, 20 min.
	MS81N D	MS47P D	MS78P D	MS55P D	MS63P D	MS66P D	MS56P D	MS59P D
	ESD 14	EPA 49	ESD 13	EPA 35	EPA 26	ESD 15	EPA 124	EPA 105
	DW2B-2	DW2B-3	DW2C-1	DW2C-2	DW2C-3	DW3A-1	DW3A-2	DW3A-3
Total VOC's:	**220.8**	**352.9**	**115.3**	**86.5**	**85.2**	**43.3**	**89.0**	**79.8**
Pre-Correction Values	**234.0**	**397.4**	**132.3**	**96.8**	**87.3**	**43.8**	**107.5**	**109.2**
Toluene / Benzene	8.8	8.9	4.4	8.7	4.5	2.8	1.1	1.1
m,p-Xylene/o-Xylene	2.4	2.6	2.3	1.5	2.8	2.0	2.8	2.5
m,p-Xylene/Ethylbenzene	4.5	3.8	5.9	1.4	3.1	4.1	3.7	3.9
o-Xylene/Ethylbenzene	1.9	1.5	2.5	0.9	1.1	2.0	1.3	1.6
111 Bromoform	0.0	0.0	0.2	0.0	0.1	0.0	0.0	0.0
112 1,4-Dichlorobutane	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
113 Styrene	0.3	7.6	0.3	0.0	0.0	0.0	0.0	0.0
114 1,1,2,2-Tetrachloroethane	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
115 o-Xylene	2.9	2.2	2.2	0.8	0.3	0.8	0.3	1.4
116 [illegible]								
117 Nonane	3.5	1.6	2.7	0.2	0.2	0.3	0.2	1.6
119 iso-Propylbenzene	0.0	0.2	0.2	0.0	0.0	0.0	0.0	0.1
120 3,6-Dimethyloctane	0.0	0.4	0.1	0.2	0.0	0.0	0.0	0.2
121 n-Propylbenzene	0.3	0.4	0.3	0.0	0.0	0.0	0.0	0.2
122 3-Ethyltoluene	0.8	1.3	0.8	0.7	0.1	0.0	0.1	0.3
123 4-Ethyltoluene	0.4	0.6	0.5	0.0	0.0	0.0	0.0	0.2
124 1,3,5-Trimethylbenzene	0.3	0.8	0.6	0.0	0.0	0.0	0.1	0.4
125 2-Ethyltoluene	0.4	0.6	0.4	0.0	0.0	0.0	0.0	0.3
126 n-Decane								
127 tert-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
128 1,2,4-Trimethylbenzene	1.2	2.3	1.8	0.3	0.2	0.0	0.2	1.1
129 Decane	2.1	2.2	2.1	0.4	0.3	0.7	0.3	1.1
130 Benzyl chloride (alpha-Chlorotoluene)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
131 1,3-Dichlorobenzene	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
132 1,4-Dichlorobenzene	0.0	0.3	0.2	0.1	0.0	0.0	0.1	0.1
133 iso-Butylbenzene	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
134 sec-Butylbenzene	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
135 1,2,3-Trimethylbenzene	0.3	0.6	0.5	0.0	0.0	0.0	0.0	0.3
136 p-Cymene	0.2	1.4	0.2	0.0	0.3	0.0	0.1	0.0
137 1,2-Dichlorobenzene	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
138 Indane	0.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0
139 1,3-Diethylbenzene	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
140 1,4-Diethylbenzene	0.0	0.4	0.3	0.0	0.0	0.0	0.0	0.2
141 n-Butylbenzene	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
142 1,2-Diethylbenzene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
143 Undecane	1.1	2.7	1.1	0.2	0.2	0.2	0.2	0.8
144 1,2,4-Trichlorobenzene	0.0	0.0	0.3	0.4	0.3	0.0	0.0	0.0
145 Naphthalene	0.9	1.4	0.3	0.6	0.5	0.0	0.2	0.9
146 Dodecane	0.8	1.9	0.5	0.2	0.2	0.0	0.1	0.9
147 Hexachlorobutadiene	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0
148 Hexylbenzene	0.0	0.0	0.1	0.2	0.2	0.0	0.0	0.0

Appendix Table A1

Results in µg/m3	Mobile'94, ESD 16, 20 min.	Mobile'94, ESD 6, 20 min.	Mobile'94, EPA 38, 20 min.	Mobile'94, ESD 7, 20 min.	Mobile'94 EPA 126, 20 min.	Mobile'94, EPA 50, 20 min.
	MS75P D	MS58P D	MS60P D	MS60P D	MS57P D	MS64P D
	ESD 16	ESD 6	EPA 38	ESD 7	EPA 126	EPA 50
	DW3B-1	DW3B-2	DW3B-3	DW3C-1	DW3C-2	DW3C-3
Total VOC's:	58.8	116.1	125.6	63.3	81.4	268.4
Pre-Correction Values	61.4	158.4	139.6	73.8	106.2	269.8
Toluene / Benzene	2.0	0.8	2.4	3.7	2.5	22.2
m,p-Xylene/o-Xylene	2.1	3.2	1.1	2.1	2.5	2.8
m,p-Xylene/Ethylbenzene	3.5	4.1	66.3	4.4	3.1	3.1
o-Xylene/Ethylbenzene	1.7	1.8	63.1	2.1	1.3	1.1
1 1,1-Difluoroethane						
47 Bromochloromethane						
107 Chlorobenzene-d5						
116 1-Bromo-4-Fluorobenzene						
2 Propane	1.0	8.1	4.0	0.4	1.3	1.3
3 Propane	2.5	4.5	2.8	5.0	3.3	25.6
4 Freon22 (Chlorodifluoromethane)	0.9	0.4	0.0	0.4	0.5	2.4
5 Freon12 (Dichlorodifluoromethane)	3.6	4.1	5.9	3.3	4.0	5.8
6 Propene						
7 Chloromethane	1.3	1.1	5.1	1.3	1.2	1.1
8 Isobutane (2-Methylpropane)	1.1	0.7	0.8	1.0	0.7	64.3
9 Freon114 (1,2-Dichlorotetrafluroethane)	0.5	0.5	0.5	0.4	0.4	0.4
10 Vinylchloride (Chloroethene)	0.0	0.0	0.0	0.0	0.0	0.0
11 1-Butene/2-Methylpropene	1.7	2.5	8.3	1.7	4.0	5.7
12 1,3-Butadiene	0.3	3.5	0.0	0.0	0.2	0.0
13 Butane	2.2	1.8	1.7	2.4	1.8	6.3
14 t-2-Butene	0.0	0.0	0.0	0.0	0.0	0.2
15 2,2-Dimethylpropane	0.0	0.0	0.0	0.0	0.0	0.0
16 Bromomethane	0.0	0.0	0.0	0.1	0.0	0.2
17 1-Butyne	0.0	0.0	0.0	0.0	0.0	0.0
18 c-2-Butene	0.0	0.5	0.4	0.0	0.0	0.2
19 Chloroethane	0.2	0.0	2.0	0.0	0.0	0.1
20 2-Methylbutane	2.3	2.3	1.9	2.9	1.8	45.3
21 Freon11 (Trichlorofluoromethane)	1.9	1.8	1.8	1.8	2.6	9.0
22 1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0
23 2-Methyl-1-Butene	0.0	0.0	0.0	0.0	0.0	0.0
24 Pentane	1.4	1.8	1.3	1.5	1.1	12.9
25 Isoprene (2-Methyl-1,3-Butadiene)	1.0	0.0	0.0	0.6	0.7	0.1
26 Ethylbromide	0.0	0.0	0.0	0.0	0.0	0.0
27 t-2-Pentene	0.0	0.2	0.1	0.0	0.0	0.0
28 1,1-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0
29 c-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0
30 Dichloromethane	8.2	0.0	0.8	0.3	0.6	2.7
31 2-Methyl-2-Butene	0.0	0.2	0.1	0.0	0.0	0.2
32 Freon113 (1,1,2-Trichlorotrifluoroethan	2.5	2.7	2.7	2.4	2.1	2.4
33 2,2-Dimethylbutane	0.0	0.0	0.6	0.1	0.1	0.6
34 Cyclopentene	0.0	0.2	0.0	0.0	0.0	0.0
35 t-1,2-Dichloroethene	0.0	0.0	0.9	0.0	0.0	0.2
36 4-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0
37 3-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0
38 1,1-Dichloroethane	0.0	0.0	0.0	0.0	0.0	0.0
39 Cyclopentane	0.0	0.0	0.0	0.0	0.0	0.7
40 2,3-Dimethylbutane	0.0	0.0	0.0	0.2	0.1	0.5
41 t-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0
42 2-Methylpentane	9.5	4.4	4.0	8.6	1.8	11.0
43 c-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0
44 3-Methylpentane	0.5	1.1	0.4	3.5	0.5	1.4
45 1-Hexene/2-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0	0.0
46 c-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0	0.0
48 Hexane	1.9	18.5	0.8	1.0	15.5	3.5
49 Chloroform	0.0	0.0	0.0	0.0	0.1	0.1
50 t-2-Hexene	0.0	0.0	0.0	0.0	0.0	0.0
51 2-Ethyl-1-Butene	0.0	0.0	0.0	0.0	0.0	0.0
52 t-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0
53 c-2-Hexene	0.0	0.0	0.0	0.0	0.0	0.0
54 c-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0	0.0

Appendix Table A1

Results in µg/m3	Mobile'94 ESD 16. 20 min	Mobile'94 ESD 6. 20 min	Mobile'94 EPA 36. 20 min	Mobile'94 ESD 7. 20 min	Mobile'94 EPA 126. 20 min	Mobile'94 EPA 50. 20 min
	MS75P D	MS58P D	MS60P D	MS80P D	MS57P D	MS64P D
	ESD 16	ESD 6	EPA 36	ESD 7	EPA 126	EPA 50
	DW3B-1	DW3B-2	DW3B-3	DW3C-1	DW3C-2	DW3C-3
Total VOC's:	58.8	116.1	125.6	63.3	81.4	268.4
Pre-Correction Values	61.4	158.4	138.6	73.8	106.2	269.8
Toluene / Benzene	2.0	6.8	2.4	3.7	2.5	22.2
m,p-Xylene/o-Xylene	2.1	2.2	1.1	2.1	2.5	2.8
m,p-Xylene/Ethylbenzene	3.5	4.1	66.3	4.4	3.1	3.1
o-Xylene/Ethylbenzene	1.7	1.8	63.1	2.1	1.3	1.1
55 2,2-Dimethylpentane	0.0	0.0	0.0	0.0	0.0	0.2
56 1,2-Dichloroethane	0.0	0.0	0.0	0.0	0.0	0.0
57 Methylcyclopentane	0.2	2.3	0.2	0.4	1.9	0.6
58 2,4-Dimethylpentane	0.0	0.2	0.0	0.2	0.2	0.3
59 1,1,1-Trichloroethane	0.9	0.7	0.7	0.6	1.0	2.1
60 2,2,3-Trimethylbutane	0.0	0.0	0.0	0.0	0.0	0.0
61 1-Methylcyclopentene	0.0	0.2	0.0	0.0	0.1	0.0
62 Benzene	1.4	8.8	3.1	0.9	1.4	1.7
63 Carbontetrachloride	0.5	0.5	0.5	0.5	0.7	0.5
64 Cyclohexane	0.2	1.6	0.0	0.6	0.2	0.9
65 2-Methylhexane	0.6	0.0	0.0	2.3	0.0	2.5
66 2,3-Dimethylpentane	0.3	0.7	0.5	0.9	0.8	1.2
67 Cyclohexene	0.0	0.0	0.0	0.0	0.7	0.0
68 3-Methylhexane	0.5	2.8	2.2	2.9	2.4	3.4
69 Dibromomethane	0.2	0.0	0.0	0.0	0.0	0.0
70 1,2-Dichloropropane	0.0	0.0	0.0	0.0	0.0	0.0
71 Bromodichloromethane						
72 Trichloroethene	0.0	0.0	1.5	0.0	0.0	0.3
73 1-Heptene						
74 2,2,4-Trimethylpentane	0.3	0.2	0.2	0.3	0.2	0.6
75 t-3-Heptene	0.0	0.0	0.0	0.0	0.0	0.0
76 c-3-Heptene						
77 Heptane	0.6	5.4	2.4	3.7	2.3	3.4
78 t-2-Heptene	0.0	0.0	0.0	0.0	0.0	0.0
79 c-2-Heptene	0.0	0.0	0.0	0.0	0.0	0.0
80 c-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0
81 2,2-Dimethylhexane	0.0	0.0	0.0	0.0	0.0	0.0
82 Methylcyclohexane	0.2	5.0	0.5	2.0	0.5	0.7
83 2,5-Dimethylhexane	0.0	0.2	0.0	0.1	0.0	0.0
84 2,4-Dimethylhexane	0.0	0.3	0.0	0.3	0.1	0.3
85 c/t-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0	0.0
86 t-1,2-Trichloroethane	0.0	0.0	0.0	0.0	0.0	0.0
87 Bromotrichloromethane	0.0	0.0	0.0	0.0	0.0	0.0
88 2,3,4-Trimethylpentane	0.0	0.0	0.0	0.0	0.0	0.2
89 Toluene	2.8	7.1	7.3	3.3	3.5	37.4
90 2-Methylheptane	0.0	1.4	0.0	0.7	0.1	0.1
91 4-Methylheptane	0.0	0.0	0.0	0.2	0.0	0.0
92 1-Methylcyclohexene	0.0	0.0	0.0	0.0	0.5	0.0
93 Dibromochloromethane	0.0	0.0	0.0	0.0	0.0	0.0
94 3-Methylheptane	0.0	0.6	0.0	0.4	0.0	0.2
95 c-1,3-Dimethylcyclohexane	0.0	0.0	0.0	0.5	0.4	0.0
96 t-1,4-Dimethylcyclohexane	0.0	0.0	0.0	0.3	0.0	0.0
97 EDB (1,2-Dibromoethane)	0.0	0.0	0.0	0.0	0.0	0.0
98 2,2,5-Trimethylhexane	0.0	0.0	0.0	0.0	0.0	0.0
99 1-Octene						
100 Octane	0.2	2.5	0.2	1.3	12.8	0.3
101 t-1,2-Dimethylcyclohexane	0.0	0.7	0.0	0.3	0.0	0.0
102 t-2-Octene	0.0	2.6	0.0	0.3	1.9	0.1
103 Tetrachloroethene	0.0	0.0	2.8	0.0	0.0	0.2
104 c-1,4/t-1,3-Dimethylcyclohexane	0.0	0.3	0.0	0.0	0.0	0.0
105 c-2-Octene	0.0	0.0	0.0	0.0	0.0	0.0
106 c-1,2-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0	0.0
108 Chlorobenzene	0.0	0.2	0.8	0.0	0.0	0.0
109 Ethylbenzene	0.4	0.8	0.3	0.4	0.3	0.7
110 m/p-Xylene	1.4	3.4	23.0	1.9	1.0	2.2

Appendix Table A1

Results in µg/m3	Mobile'94, ESD 16, 20 min.	Mobile'94, ESD 6, 20 min.	Mobile'94, EPA 36, 20 min.	Mobile'94, ESD 7, 20 min.	Mobile'94, EPA 126, 20 min.	Mobile'94, EPA 50, 20 min.
	MS75P.D	MS58P.D	MS60P.D	MS80P.D	MS57P.D	MS64P.D
	ESD 16	ESD 6	EPA 36	ESD 7	EPA 126	EPA 50
	DW3B-1	DW3B-2	DW3B-3	DW3C-1	DW3C-2	DW3C-3
Total VOC's:	**58.8**	**116.1**	**125.6**	**83.3**	**81.4**	**268.4**
Pre-Correction Values	**61.4**	**158.4**	**139.6**	**73.8**	**106.2**	**269.8**
Toluene / Benzene	2.0	0.8	2.4	3.7	2.5	22.2
m,p-Xylene/o-Xylene	2.1	2.2	1.1	2.1	2.5	2.8
m,p-Xylene/Ethylbenzene	3.5	4.1	66.3	4.4	3.1	3.1
o-Xylene/Ethylbenzene	1.7	1.8	83.1	2.1	1.3	1.1
111 Bromoform	0.3	0.0	0.0	0.0	0.0	0.0
112 1,4-Dichlorobutane	0.2	0.0	0.0	0.0	0.0	0.0
113 Styrene	0.3	0.0	0.0	0.0	0.2	0.0
114 1,1,2,2-Tetrachloroethane	0.0	0.0	0.0	0.0	0.0	0.0
115 o-Xylene	0.7	1.6	21.9	0.9	0.4	0.8
116 1-Nonene						
117 Nonane	0.3	1.7	0.3	1.0	0.2	0.3
119 iso-Propylbenzene	0.0	0.1	0.3	0.0	0.1	0.0
120 3,6-Dimethyloctane	0.0	0.3	0.2	0.3	0.2	0.2
121 n-Propylbenzene	0.0	0.2	0.3	0.0	0.0	0.2
122 3-Ethyltoluene	0.2	0.0	0.5	0.0	0.2	0.3
123 4-Ethyltoluene	0.2	0.0	0.2	0.0	0.0	0.2
124 1,3,5-Trimethylbenzene	0.0	0.0	0.2	0.0	0.0	0.1
125 2-Ethyltoluene	0.0	0.2	0.2	0.0	0.0	0.2
126 1-Decene						
127 tert-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0
128 1,2,4-Trimethylbenzene	0.3	0.4	0.8	0.2	0.3	0.4
129 Decane	0.8	1.1	0.7	1.2	0.5	0.4
130 Benzyl chloride (alpha-Chlorotoluene)	0.0	0.0	0.0	0.0	0.0	0.0
131 1,3-Dichlorobenzene	0.2	0.0	0.0	0.0	0.0	0.0
132 1,4-Dichlorobenzene	0.3	0.0	0.2	0.0	0.1	0.5
133 Iso-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0
134 sec-Butylbenzene	0.0	0.0	0.0	0.0	0.0	0.0
135 1,2,3-Trimethylbenzene	0.0	0.0	0.2	0.0	0.0	0.0
136 p-Cymene	0.1	0.0	0.6	0.0	0.2	0.1
137 1,2-Dichlorobenzene	0.2	0.0	0.0	0.0	0.0	0.0
138 Indane	0.1	0.0	0.0	0.0	0.0	0.0
139 1,3-Diethylbenzene	0.0	0.0	0.4	0.0	0.0	0.0
140 1,4-Diethylbenzene	0.0	0.0	1.5	0.0	0.1	0.0
141 n-Butylbenzene	0.0	0.0	0.1	0.0	0.0	0.0
142 1,2-Diethylbenzene	0.0	0.0	0.0	0.0	0.0	0.0
143 Undecane	0.4	0.5	1.6	0.3	0.4	0.3
144 1,2,4-Trichlorobenzene	0.4	0.0	0.0	0.0	0.0	0.0
145 Naphthalene	1.0	0.0	1.4	0.0	0.4	0.0
146 Dodecane	0.3	0.2	0.9	0.0	0.4	0.0
147 Hexachlorobutadiene	0.3	0.3	0.0	0.0	0.0	0.0
148 Hexylbenzene	0.4	0.0	0.0	0.0	0.0	0.0

Table A2 **VOC results of Summa canisters from Remote Helicopters**

Results in µg/m3	Back Ground ESD 13875	Trip blank ESD 13878	BURN 1 beside plume ESD 13874	BURN 1 under plume ESD 13877	BURN 2 beside plume ESD 13871 (dup)
Total VOC's:	**115.2**	**15.2**	**104.6**	**148.7**	**105.5**
values before correction	204.5	15.3	106.9	153.3	176.4
Toluene / Benzene	2.3		5.0	6.3	7.7
m,p-Xylene/o-Xylene	1.7		1.9	1.9	2.6
m,p-Xylene/Ethylbenzene	3.4		4.6	4.6	4.7
o-Xylene/Ethylbenzene	2.1				
1,4-Difluorobenzene					
Bromochloromethane					
Chlorobenzene-d5					
1-Bromo-4-Fluorobenzene					
Propene	2.5	0.9	4.0	8.6	2.1
Propane	3.5	0.5	5.0	5.0	3.3
Freon22 (Chlorodifluoromethane)	0.4	0.5	0.9	1.1	0.5
Freon12 (Dichlorodifluoromethane)	2.7	0.2	2.8	2.7	3.0
Propyne					
Chloromethane	1.7	0.2	1.9	2.0	1.2
Isobutane (2-Methylpropane)	1.2	0.1	0.9	1.9	1.0
Freon114 (1,2-Dichlorotetrafluoroethane)	0.3	0.1	0.3	0.3	0.4
Vinylchloride (Chloroethene)	0.0	0.0	0.0	0.0	0.0
1-Butene/2-Methylpropene	9.7	1.1	9.5	15.3	2.9
1,3-Butadiene	0.0	0.1	0.2	0.3	0.0
Butane	3.2	0.2	1.9	2.6	1.9
t-2-Butene	0.4	0.1	0.6	0.5	0.1
2,2-Dimethylpropane	0.0	0.0	0.0	0.0	0.0
Bromomethane	0.0	0.0	0.2	0.0	0.0
1-Butyne	0.0	0.0	0.0	0.0	0.0
c-2-Butene	0.6	0.2	0.8	0.8	0.2
Chloroethane	0.2	0.1	0.3	0.4	0.0
2-Methylbutane	5.4	0.2	0.9	2.1	2.0
Freon11 (Trichlorofluoromethane)	0.1	0.1	1.8	2.9	3.5
1-Pentene	0.4	0.1	0.2	0.9	0.3
2-Methyl-1-Butene	0.2	0.0	0.2	0.0	0.0
Pentane	5.7	0.2	0.9	2.2	1.6
Isoprene (2-Methyl-1,3-Butadiene)	1.6	0.3	1.2	2.4	0.6
Ethylbromide	0.0	0.0	0.0	0.0	0.0
t-2-Pentene	0.0	0.0	0.0	0.2	0.0
1,1-Dichloroethene	0.0	0.0	0.0	0.0	0.0
c-2-Pentene	0.0	0.0	0.0	0.0	0.0
Dichloromethane	3.4	0.2	0.7	1.8	1.1
2-Methyl-2-Butene	0.3	0.1	0.3	0.4	0.2
Freon113 (1,1,2-Trichlorotrifluoroethane	1.8	0.6	1.8	1.8	2.1
2,2-Dimethylbutane	0.2	0.0	0.2	0.1	0.0
Cyclopentene	0.0	0.0	0.0	0.0	0.0
t-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0
4-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0
3-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0
1,1-Dichloroethane	0.0	0.0	0.0	0.0	0.0
Cyclopentane	0.2	0.0	0.0	0.1	0.0
2,3-Dimethylbutane	0.2	0.0	0.0	0.1	0.0
t-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0
2-Methylpentane	8.9	7.0	20.0	14.9	12.8
c-4-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0
3-Methylpentane	1.4	0.1	0.2	0.6	2.1
1-Hexene/2-Methyl-1-Pentene	0.0	0.0	0.0	0.0	0.0
c-1,2-Dichloroethene	0.0	0.0	0.0	0.0	0.0
Hexane	1.6	0.4	1.6	1.9	12.4
Chloroform	0.4	0.0	0.0	0.1	0.0
t-2-Hexene	0.0	0.0	0.0	0.0	0.0
2-Ethyl-1-Butene	0.0	0.0	0.0	0.0	0.0
t-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0
c-2-Hexene	0.0	0.0	0.0	0.0	0.0
c-3-Methyl-2-Pentene	0.0	0.0	0.0	0.0	0.0
2,2-Dimethylpentane	0.0	0.0	0.0	0.0	0.4
1,2-Dichloroethane	0.0	0.0	0.0	0.0	0.0
Methylcyclopentane	0.5	0.0	0.2	0.3	7.7
2,4-Dimethylpentane	0.1	0.0	0.0	0.0	0.0
1,1,1-Trichloroethane	0.6	0.0	0.5	0.7	0.6
2,2,3-Trimethylbutane	0.0	0.0	0.0	0.0	0.0
1-Methylcyclopentene	0.0	0.0	0.0	0.0	0.0
Benzene	1.7	0.1	0.8	1.3	1.6
Carbontetrachloride	0.5	0.0	0.5	0.5	0.5
Cyclohexane	0.2	0.1	0.4	0.5	0.1
2-Methylhexane	0.0	0.0	0.1	0.0	0.0
2,3-Dimethylpentane	0.1	0.0	0.0	0.1	0.0
Cyclohexene	0.0	0.0	0.0	0.0	0.0
3-Methylhexane	0.4	0.0	0.2	0.5	0.4
Dibromomethane	0.0	0.0	0.0	0.2	0.0

Table A2

VOC results of Summa canisters from Remote Helicopters

Results in µg/m3	Back Ground ESD 13675	Trip blank ESD 13676	BURN 1 beside plume ESD 13674	BURN 1 under plume ESD 13677	BURN 2 beside plume ESD 13671 (#6)
1,2-Dichloropropane	0.0	0.0	0.0	0.0	0.0
Bromodichloromethane					
Trichloroethene	0.0	0.0	0.0	0.0	0.0
1-Heptene					
2,2,4-Trimethylpentane	0.4	0.0	0.1	0.4	0.2
t-3-Heptene	0.0	0.0	0.0	0.0	0.0
c-3-Heptene					
Heptane	0.6	0.1	0.7	1.2	0.4
t-2-Heptene	0.0	0.0	0.0	0.0	0.0
c-2-Heptene	0.0	0.0	0.0	0.4	0.0
c-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0
2,2-Dimethylhexane	0.0	0.0	0.0	0.0	0.0
Methylcyclohexane	0.1	0.0	0.5	0.8	0.0
2,5-Dimethylhexane	0.0	0.0	0.0	0.0	0.0
2,4-Dimethylhexane	0.0	0.0	0.0	0.0	0.0
c/t-1,3-Dichloropropene	0.0	0.0	0.0	0.0	0.0
1,1,2-Trichloroethane	0.3	0.0	0.2	0.1	0.3
Bromotrichloromethane	0.0	0.0	0.0	0.0	0.0
2,3,4-Trimethylpentane	0.2	0.0	0.0	0.2	0.0
Toluene	3.9	0.9	3.9	8.2	12.5
2-Methylheptane	0.2	0.0	0.3	0.5	0.2
4-Methylheptane	0.0	0.0	0.1	0.0	0.0
1-Methylcyclohexene	0.0	0.0	0.0	0.2	0.0
Dibromochloromethane	0.0	0.0	0.0	0.0	0.0
3-Methylheptane	0.2	0.0	0.2	0.4	0.0
c-1,3-Dimethylcyclohexane	0.0	0.0	0.2	0.0	0.0
t-1,4-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0
EDB (1,2-Dibromoethane)	0.0	0.0	0.0	0.0	0.0
2,2,5-Trimethylhexane	0.0	0.0	0.0	0.1	0.1
1-Octene					
Octane	0.5	0.1	0.9	1.4	0.2
t-1,2-Dimethylcyclohexane	0.0	0.0	0.1	0.2	0.0
t-2-Octene	0.3	0.0	0.0	0.7	0.0
Tetrachloroethene	0.2	0.0	0.0	0.0	0.1
c-1,4/t-1,3-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0
c-2-Octene	0.0	0.0	0.0	0.0	0.0
c-1,2-Dimethylcyclohexane	0.0	0.0	0.0	0.0	0.0
Chlorobenzene	0.0	0.0	0.0	0.0	0.0
Ethylbenzene	2.5	0.0	0.8	1.5	1.6
m/p-Xylene	8.6	0.2	3.8	6.8	7.6
Bromoform	0.0	0.0	0.0	0.0	0.0
1,4-Dichlorobutane	0.0	0.0	0.0	0.0	0.0
Styrene	6.3	0.0	0.8	2.3	0.0
1,1,2,2-Tetrachloroethane	0.0	0.0	0.0	0.0	0.0
o-Xylene	5.2	0.1	1.9	3.6	2.9
1-Nonene					
Nonane	1.7	0.1	1.5	2.2	0.5
iso-Propylbenzene	0.3	0.0	0.2	0.2	0.0
3,6-Dimethyloctane	1.6	0.0	0.6	1.0	0.2
n-Propylbenzene	0.3	0.0	0.2	0.3	0.3
3-Ethyltoluene	0.0	0.0	0.0	0.0	0.0
4-Ethyltoluene	0.4	0.0	0.2	0.4	0.4
1,3,5-Trimethylbenzene	0.6	0.0	0.4	0.6	0.4
2-Ethyltoluene	0.5	0.0	0.3	0.4	0.3
1-Decene					
tert-Butylbenzene	0.0	0.0	0.0	0.0	0.0
1,2,4-Trimethylbenzene	2.4	0.1	1.5	2.2	1.4
Decane	4.5	0.1	9.1	13.5	4.5
Benzyl chloride (alpha-Chlorotoluene)	0.0	0.0	0.0	0.0	0.0
1,3-Dichlorobenzene	0.0	0.0	0.1	0.0	0.0
1,4-Dichlorobenzene	0.4	0.0	0.2	0.4	0.2
iso-Butylbenzene	0.0	0.0	0.0	0.0	0.0
sec-Butylbenzene	0.1	0.0	0.0	0.0	0.0
1,2,3-Trimethylbenzene	1.0	0.0	0.6	0.8	0.4
p-Cymene	4.6	0.0	2.2	2.7	0.5
1,2-Dichlorobenzene	0.0	0.0	0.0	0.0	0.0
Indane	0.3	0.0	0.2	0.2	0.2
1,3-Diethylbenzene	0.2	0.0	0.1	0.2	0.0
1,4-Diethylbenzene	1.0	0.0	0.5	0.8	0.2
n-Butylbenzene	0.2	0.0	0.1	0.2	0.0
1,2-Diethylbenzene	0.0	0.0	0.0	0.0	0.0
Undecane	2.6	0.0	7.4	9.2	2.6
1,2,4-Trichlorobenzene	0.0	0.0	0.0	0.0	0.0
Naphthalene	0.6	0.0	0.4	0.7	0.2
Dodecane	0.2	0.1	2.3	5.2	0.2
Hexachlorbutadiene	0.0	0.0	0.0	0.0	0.0
Hexylbenzene	0.0	0.0	0.0	0.0	0.0

Table A3-1 **Dioxin/Furan Analysis**
Sample - PS-11

Congener	pg/m3	Maximum TEQ	Homologue	pg/m3	DL	MP
2378-TCDD	N.D.	N.C.	Total TCDD	N.D.	0.22	0
12378-P5CDD*	N.D.	N.C.	Total P5CDD	N.D.	0.22	0
123478-H6CDD*	N.D.	N.C.	Total H6CDD	N.D.	0.22	0
123678-H6CDD*	N.D.	N.C.	Total H7CDD	1.07	0.3	2
123789-H6CDD*	N.D.	N.C.	OCDD	2.48	0.6	1
1234678-H7CDD*	0.62	0.01				
OCDD	2.48	0	Total PCDD	3.55		
2378-TCDF	0.28	0.03				
12378-P5CDF*	N.D.	N.C.	Total TCDF	0.39	0.22	2
23478-P5CDF*	N.D.	N.C.	Total P5CDF	N.D.	0.22	0
123478-H6CDF*	N.D.	N.C.	Total H6CDF	N.D.	0.22	0
123678-H6CDF*	N.D.	N.C.	Total H7CDF	N.D.	0.6	0
234678-H6CDF*	N.D.	N.C.	OCDF	N.D.	1	0
123789-H6CDF*	N.D.	N.C.				
1234678-H7CDF	N.D.	N.C.	Total PCDF	0.39		
1234789-H7CDF	N.D.	N.C.				
OCDF	N.D.	N.C.				
TOTAL TEQ		0.04				

Surrogate	Amount Added, ng	Recovery %
13C12-TCDD	2	83
13C12-TCDF	2	74
13C12-P5CDD	2	70
13C12-P5CDF	2	72
13C12-H6CDD	2	84
13C12-H6CDF	2	91
13C12-H7CDD	2	75
13C12-H7CDF	2	80
13C12-OCDD	4	49

Note:
(1) Results are corrected for surrogate recovery
(2) DL = detection limit (pg/m3/analyte peak); NP = number of analyte peaks.
(3) * represents maximum possible amount as this isomer could coelute with other isomer(s).
(4) N.D. = not detected.
(5) Numbers in brackets represent values not detected due to incorrect ratio.
(6) TEQ = Toxic Equivalents as 2, 3, 7, 8-TCDD using International Toxic Equivalency Factors.
(7) N.C. = not calculable.

Table A3-2 **Dioxin/Furan Analysis**
Sample - PS-70

Congener	pg/m3	Maximum TEQ	Homologue	pg/m3	DL	MP
2378-TCDD	N.D.	N.C.	Total TCDD	N.D.	0.25	0
12378-P5CDD*	N.D.	N.C.	Total P5CDD	N.D.	0.25	0
123478-H6CDD*	N.D.	N.C.	Total H6CDD	N.D.	0.6	0
123678-H6CDD*	N.D.	N.C.	Total H7CDD	1.44	0.6	2
123789-H6CDD*	N.D.	N.C.	OCDD	3.54	2	1
1234678-H7CDD*	0.66	0.01				
OCDD	3.54	0	Total PCDD	4.98		
2378-TCDF	0.26	0.03				
12378-P5CDF*	N.D.	N.C.	Total TCDF	1.44	0.25	13
23478-P5CDF*	N.D.	N.C.	Total P5CDF	N.D.	0.25	0
123478-H6CDF*	N.D.	N.C.	Total H6CDF	N.D.	0.3	0
123678-H6CDF*	N.D.	N.C.	Total H7CDF	N.D.	0.6	0
234678-H6CDF*	N.D.	N.C.	OCDF	N.D.	2	0
123789-H6CDF*	N.D.	N.C.				
1234678-H7CDF	N.D.	N.C.	Total PCDF	1.44		
1234789-H7CDF	N.D.	N.C.				
OCDF	N.D.	N.C.				
TOTAL TEQ		0.04				

Surrogate	Amount Added, ng	Recovery %
13C12-TCDD	2	67
13C12-TCDF	2	62
13C12-P5CDD	2	78
13C12-P5CDF	2	72
13C12-H6CDD	2	70
13C12-H6CDF	2	74
13C12-H7CDD	2	57
13C12-H7CDF	2	60
13C12-OCDD	4	38

Note:
(1) Results are corrected for surrogate recovery
(2) DL = detection limit (pg/m3/analyte peak); NP = number of analyte peaks.
(3) * represents maximum possible amount as this isomer could coelute with other isomer(s).
(4) N.D. = not detected.
(5) Numbers in brackets represent values not detected due to incorrect ratio.
(6) TEQ = Toxic Equivalents as 2, 3, 7, 8-TCDD using International Toxic Equivalency Factors.
(7) N.C. = not calculable.

Table A3-3 **Dioxin/Furan Analysis**
Sample - PS-71

Congener	pg/m3	Maximum TEQ	Homologue	pg/m3	DL	MP
2378-TCDD	N.D.	N.C.	Total TCDD	N.D.	0.26	0
12378-P5CDD*	N.D.	N.C.	Total P5CDD	N.D.	0.25	0
123478-H6CDD*	N.D.	N.C.	Total H6CDD	N.D.	0.25	0
123678-H6CDD*	N.D.	N.C.	Total H7CDD	1.55	0.32	2
123789-H6CDD*	N.D.	N.C.	OCDD	2.97	0.64	1
1234678-H7CDD*	0.77	0.01				
OCDD	2.97	0	Total PCDD	4.52		
2378-TCDF	0.26	0.03				
12378-P5CDF*	N.D.	N.C.	Total TCDF	0.45	0.25	2
23478-P5CDF*	N.D.	N.C.	Total P5CDF	N.D.	0.25	0
123478-H6CDF*	N.D.	N.C.	Total H6CDF	N.D.	0.25	0
123678-H6CDF*	N.D.	N.C.	Total H7CDF	N.D.	0.32	0
234678-H6CDF*	N.D.	N.C.	OCDF	N.D.	0.64	0
123789-H6CDF*	N.D.	N.C.				
1234678-H7CDF	N.D.	N.C.	Total PCDF	0.45		
1234789-H7CDF	N.D.	N.C.				
OCDF	N.D.	N.C.				
TOTAL TEQ		0.04				

Surrogate	Amount Added, ng	Recovery %
13C12-TCDD	2	51
13C12-TCDF	2	49
13C12-P5CDD	2	59
13C12-P5CDF	2	56
13C12-H6CDD	2	51
13C12-H6CDF	2	53
13C12-H7CDD	2	45
13C12-H7CDF	2	46
13C12-OCDD	4	31

Note:
(1) Results are corrected for surrogate recovery
(2) DL = detection limit (pg/m3/analyte peak); NP = number of analyte peaks.
(3) * represents maximum possible amount as this isomer could coelute with other isomer(s).
(4) N.D. = not detected.
(5) Numbers in brackets represent values not detected due to incorrect ratio.
(6) TEQ = Toxic Equivalents as 2, 3, 7, 8-TCDD using International Toxic Equivalency Factors.
(7) N.C. = not calculable.

Table A3-4 **Dioxin/Furan Analysis**
Sample - Method Blank

Congener	pg/m3	Maximum TEQ	Homologue	pg/m3	DL	MP
2378-TCDD	N.D.	N.C.	Total TCDD	N.D.	0.6	0
12378-P5CDD*	N.D.	N.C.	Total P5CDD	N.D.	0.6	0
123478-H6CDD*	N.D.	N.C.	Total H6CDD	N.D.	1	0
123678-H6CDD*	N.D.	N.C.	Total H7CDD	N.D.	1	0
123789-H6CDD*	N.D.	N.C.	OCDD	3.8	2	1
1234678-H7CDD*	[1]	[0.01]				
OCDD	3.8	0	Total PCDD	3.8		
2378-TCDF	0.6	0.06				
12378-P5CDF*	N.D.	N.C.	Total TCDF	0.6	0.6	1
23478-P5CDF*	N.D.	N.C.	Total P5CDF	N.D.	0.6	0
123478-H6CDF*	N.D.	N.C.	Total H6CDF	N.D.	1	0
123678-H6CDF*	N.D.	N.C.	Total H7CDF	N.D.	1	0
234678-H6CDF*	N.D.	N.C.	OCDF	N.D.	4	0
123789-H6CDF*	N.D.	N.C.				
1234678-H7CDF	N.D.	N.C.	Total PCDF	0.6		
1234789-H7CDF	N.D.	N.C.				
OCDF	N.D.	N.C.				
TOTAL TEQ		0.06				

Surrogate	Amount Added, ng	Recovery %
13C12-TCDD	1	86
13C12-TCDF	1	85
13C12-P5CDD	1	80
13C12-P5CDF	1	79
13C12-H6CDD	1	89
13C12-H6CDF	1	91
13C12-H7CDD	1	89
13C12-H7CDF	1	90
13C12-OCDD	2	71

Note:
(1) Results are corrected for surrogate recovery
(2) DL = detection limit (pg/m3/analyte peak); NP = number of analyte peaks.
(3) * represents maximum possible amount as this isomer could coelute with other isomer(s).
(4) N.D. = not detected.
(5) Numbers in brackets represent values not detected due to incorrect ratio.
(6) TEQ = Toxic Equivalents as 2, 3, 7, 8-TCDD using International Toxic Equivalency Factors.
(7) N.C. = not calculable.

Table A4-1 **Carbonyl Analysis from DNPH cartriges - Burn 1**

Values in µg/m³	UW1B 84m 180°	DW1A 39m 22°	DW2A 68m 22°	DW3A 92m 22°	DW1B 39m 0°	DW2B 64m 0°	DW3B 84m 0°	DW1C 39m -22°	DW2C 68m -22°	DW3C 92m -22°	Background	Trip Blank
Total	36	131	94	116	124	96	107	93	96	92	16	0
Formaldehyde	5.292	24.244	17.571	19.870	20.179	18.639	19.872	17.262	20.157	16.080	5.117	0.062
Acetaldehyde	13.698	53.381	36.212	42.664	48.331	38.095	43.103	38.934	39.613	39.986	9.435	0.101
Acetone	7.960	17.658	12.141	15.856	13.295	12.253	13.842	11.260	10.771	8.253	0.447	0.191
Acrolein	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Propionaldehyde	3.737	12.648	9.462	15.533	14.299	9.120	11.235	7.741	9.644	9.902	0.000	0.000
Crotonaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2-Butanone	2.452	10.705	8.158	8.137	12.372	6.853	7.719	7.863	6.052	5.577	0.000	0.000
Iso/n-Butylaldehyde	2.816	11.946	10.364	14.176	15.210	9.801	10.696	9.443	9.200	12.006	0.000	0.000
Benzaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2 Pentanone/Isovaleraldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Valeraldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
o-Tolualdehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m/p-Tolualdehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MIBK	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hexanal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2,5-Dimethylbenzaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Data corrected using Trip Blank values

Table A4-2 **Carbonyl Analysis from DNPH cartriges - Burn 2**

Values in µg/m³	UW1B 84m 180°	DW1A 39m 22°	DW2A 58m 22°	DW3A 92m 22°	DW1B 39m 0°	DW2B 54m 0°	DW1C 39m -22°	DW2C 58m -22°	DW3C 92m -22°	Background	Trip Blank
Total	**75**	**113**	**69**	**62**	**174**	**121**	**82**	**80**	**75**	**15**	0
Formaldehyde	9.664	44.015	18.436	16.528	49.742	34.466	15.053	9.271	11.829	5.117	0.062
Acetaldehyde	26.542	31.505	24.034	21.548	44.815	41.073	30.882	28.190	34.653	9.435	0.101
Acetone	6.379	11.740	6.036	5.412	38.506	12.101	8.233	12.691	9.570	0.447	0.191
Acrolein	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Propionaldehyde	9.957	9.017	5.698	5.109	17.546	12.092	8.155	9.379	6.773	0.000	0.000
Crotonaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2-Butanone	10.142	6.355	6.290	5.639	11.172	8.878	6.133	11.387	7.103	0.000	0.000
Iso/n-Butylaldehyde	11.693	9.891	8.055	7.222	12.467	12.175	13.248	8.550	5.356	0.000	0.000
Benzaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2-Pentanone/Isovaleraldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Valeraldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
o-Tolualdehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m/p-Tolualdehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MIBK	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hexanal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2,5-Dimethylbenzaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Data corrected using Trip Blank values

Table A4-3

Carbonyl Analysis from DNPH cartriges - Burn 3

Values in µg/m³	UW1B 84m 180°	DW1A 39m 22°	DW2A 58m 22°	DW3A 92m 22°	DW1B 39m 0°	DW2B 54m 0°	DW1C 39m -22°	DW2C 58m -22°	DW3C 92m -22°	Background	Trip Blank
Total	114	111	97	108	71	49	56	66	48	15	0
Formaldehyde	15.641	31.599	21.451	15.664	10.349	11.387	10.895	10.360	10.205	5.117	0.062
Acetaldehyde	42.971	31.867	25.161	39.432	20.197	22.056	27.184	21.714	24.852	9.435	0.101
Acetone	12.657	12.142	15.132	19.512	11.628	6.875	10.070	7.878	6.413	0.447	0.191
Acrolein	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Propionaldehyde	13.155	12.757	11.715	11.233	5.849	8.862	8.018	8.193	6.353	0.000	0.000
Crotonaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2-Butanone	14.438	9.340	14.883	22.480	14.142	0.000	0.000	8.194	0.000	0.000	0.000
Iso/n-Butylaldehyde	15.090	13.284	8.599	0.000	8.425	0.000	0.000	9.242	0.000	0.000	0.000
Benzaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2-Pentanone/Isovaleraldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Valeraldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
o-Tolualdehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
m/p-Tolualdehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
MIBK	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Hexanal	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
2,5-Dimethylbenzaldehyde	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Data corrected using Trip Blank values