

Contract A732-072

IN SITU MEASUREMENT OF  
AEROSOL ORGANIC AND ELEMENTAL CARBON  
SOUTHERN CALIFORNIA AIR QUALITY STUDY

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## ABSTRACT

An in situ carbon analyzer measured particulate organic and elemental carbon with two hour time resolution during the Southern California Air Quality Study. Organic and elemental carbon concentrations showed strong diurnal variations. Peak concentrations occurred during the daylight hours in the summer and at night in the fall. The maximum concentrations observed in the fall (maximum total carbon = 88 micrograms carbon per cubic meter) were two to three times higher than the summer maxima (maximum total carbon = 36 micrograms carbon per cubic meter). On several summer days the profiles of organic and elemental carbon were quite similar, and good correlations, comparable to those observed during the fall, were observed between organic and elemental carbon, suggesting that the organic aerosol on those days was principally primary. Comparison of the diurnal profile of organic carbon with those of elemental carbon and ozone provided evidence for considerable secondary formation of organic aerosol during three sampling periods: July 11 - 13, July 25 - 29 and August 27 - 31.

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## SUMMARY AND CONCLUSIONS

Although carbon is a major component of the Los Angeles area aerosol, there is considerable uncertainty concerning its sources. An important unresolved question concerns the role of gas to particle conversion (i.e., secondary) processes in the formation of organic aerosol. Elemental carbon has been used by many researchers as a tracer for primary (i.e., emitted in particulate form) organic aerosol. However, most of the carbonaceous aerosol information to date is in the form of 12 to 24 hour averages, and aerosol chemistry is dynamic on the time scale of minutes to hours. Development of an effective control strategy for organic aerosol will require knowledge of the contributions of direct particulate emissions and the contributions of gaseous precursors to ambient organic aerosol concentrations. An understanding of organic aerosol chemistry will require time-resolved data.

Toward this end, an in situ carbon analyzer measured fine fraction, particulate organic and elemental carbon with two hour time resolution during the Southern California Air Quality Study. Strong diurnal variations were observed in organic and elemental carbon during both summer and fall studies, but the peak concentrations during the summer occurred during the daylight hours, whereas in the winter the peak concentrations occurred at night. The maximum concentrations observed in the fall (maximum total carbon =  $88 \mu\text{gC}/\text{m}^3$ ) were two to three times higher than the summer maxima (maximum total carbon =  $36 \mu\text{gC}/\text{m}^3$ ). The profiles of organic and elemental carbon were similar for most fall days and the coefficient of determination ( $R^2$ ) between organic and elemental carbon for the entire set of fall data was 80%. Preliminary examination of the in situ analyzer data for organic and elemental carbon has shown the existence of summer days on which the correlation between OC and EC is quite high, indicating a primary origin for the organic aerosol. It has also identified three multiple day episodes during which secondary formation contributed significantly to organic aerosol concentrations. At the height of the August 27 - 31 episode secondary formation accounted for up to 70% of the organic aerosol at 1700 hrs (PDT) and about half of

the aerosol over the 24 hour period. Extensive data interpretation will be conducted over the course of the next year.

A data base of time-resolved, particulate organic and elemental carbon values now exists for an extended period of summer and fall days during which supporting measurements are abundant. This information should prove useful for analyzing organic aerosol chemistry in the Los Angeles Basin with appropriate time resolved advection - diffusion - chemical reaction models.

### Conclusions

1. Peak concentrations of organic and elemental carbon occurred during the daylight hours in the summer and at night in the fall.
2. On July 14 - 17, August 25, and November 17 - 19, the organic aerosol was predominantly from primary sources.
3. On July 11 - 13, July 25 - 29 and August 27 - 31 secondary formation of organic aerosol contributed significantly to ambient organic aerosol concentrations.
4. A data base of time-resolved, particulate organic and elemental carbon values now exists which can be used with appropriate time resolved advection - diffusion - chemical reaction models to improve the understanding of atmospheric chemistry.

## RECOMMENDATIONS

Further research is needed to understand:

1. the conditions in which high organic carbon concentrations are observed.
2. the variability of the primary organic to elemental carbon ratio.
3. the contributions of primary and secondary sources to organic aerosol contributions over the course of the study.
4. the conditions under which secondary sources contribute significantly to ambient organic aerosol concentrations.

These questions will be addressed in 1989 - 1990 at the Oregon Graduate Center with a subsequent California Air Resources Board Contract. The improved understanding resulting from this research will assist in the development of an effective policy aimed at controlling organic aerosol concentrations.

## CHAPTER 1: INTRODUCTION

Although carbon is a major component of the Los Angeles area aerosol, there is considerable uncertainty concerning its sources. An important unresolved question concerns the role of gas to particle conversion (i.e., secondary) processes in the formation of organic aerosol. Several researchers have used correlations between organic (OC) and elemental carbon (EC), ratios of OC/EC, OC/lead ratios and other such methods to estimate the contributions of primary and secondary sources to the ambient aerosol. (A literature review is presented in Appendix A.) However, most of the carbonaceous aerosol data in existence are 12 or 24 hour average concentrations. Chu and Macias (1981) observed peaks in the carbon/lead ratio around 2 pm using 2 - 6 hour samples and noted that the influence of secondary organic aerosol on the ratio would not have been detected in a 24 hour sample. Because aerosol chemistry is dynamic on the time scale of minutes to hours, an understanding of organic aerosol formation will require time-resolved data.

The Oregon Graduate Center measured particulate organic and elemental carbon with two hour time resolution during the Southern California Air Quality Study (SCAQ5). The summer component of the study was sponsored by the Motor Vehicle Manufacturers Association (Contract OGC 8725-7120C) and the fall component of the study by the California Air Resources Board (ARB) (Contract A732-072). This document reports on the particulate organic and elemental carbon concentrations observed during the study. Both summer and fall data have been provided for the interest of the California Air Resources Board. Extensive data interpretation will be undertaken in 1989 - 1990.

## CHAPTER 2: EXPERIMENTAL

An in situ carbon analyzer (Appendix B) was used to measure particulate organic (OC) and elemental carbon (EC) with approximately two-hour time resolution during SCAQS. From June 12 to July 29 and from August 17 to September 3, 1987, it was located at the Claremont site, at the eastern end of the East Bauer Parking Lot at Claremont McKenna College, south of Ninth Street and west of Claremont Boulevard in Claremont, California. During the fall study (November 6 - December 12, 1987) it was located at the Long Beach site on the grounds of the Long Beach City College, southeast of Lakewood Boulevard and Carson Street between the track and the McDonnell Douglas hangers. Specific sampling dates and times are outlined in Table 1. During summer and fall studies the carbon analyzer was situated in an air conditioned ARB trailer which was maintained at a temperature of  $25 \pm 1$  C. The trailer was lined up with the trailers of other researchers just east of the sampling platform. All participants were required to filter their pump exhaust and high volume samplers were fitted with long exhaust lines extending east of the sampling area.

The in situ carbon analyzer collected fine (i.e.,  $d_p < 2.5 \mu\text{m}$ ) ambient aerosol on quartz fiber filters (Pallflex QAOT) mounted inside the instrument. Ambient air was sampled through a 2.5 cm diameter probe extending 90 cm above the roof and capped with a rain shield and insect screen. The coarse fraction was removed with a 2.5  $\mu\text{m}$  cut-point Marple (1974) impactor with an impactor surface composed of a fritted glass filter disk (Ace Glass, Por E) set into an aluminum plate and soaked in low vapor pressure vacuum pump oil to reduce bounce (Turner and Hering, 1987). The carbon analyzer serves as a two port sampler. The quartz fiber filters mounted in the aerosol side of the analyzer collect the fine aerosol fraction and whatever vapor adsorbs on the filters. In the vapor side a Teflon filter (Gelman Teflon ringed, 47 mm diameter, 2  $\mu\text{m}$  pore size) removes the aerosol, and the quartz fiber filters which follow collect only adsorbed vapors. The vapor side measurement is used to correct for the vapor adsorption artifact on the aerosol side filters. The sampling rate was 8.7 l/min in the summer and 8.9 l/min in the fall,

and the sampling duration was varied from 40 to 200 minutes on the basis of air pollution forecasts and the instrument detection limits. The instrument generally operated on a two hour cycle in which aerosol was collected for 80 minutes followed immediately by in situ analysis for organic and elemental carbon by a thermal-optical technique. The analysis method is described in detail in Appendix B and the data treatment, in Appendix A. Elemental carbon concentrations obtained with the in situ carbon analyzer during the summer intensive study days were compared with those obtained by the Ford Motor Company photoacoustic spectrometer in Turpin et. al. (1989).

TABLE 1. IN SITU CARBON ANALYZER SAMPLING DATES, SCAQS

SAMPLING DATES	DOWN TIMES, COMMENTS
<b>CLAREMONT:</b>	
June 11 - July 29, 1987  (operational 93% of the above time)	2 hrs every 2-3 days late in evening, calibrations June 25 0600-0800 hrs June 30 0900-1500 hrs quartz filter change July 3 1600-July 4 1200 hrs July 10 1800-2200 hrs quartz filter change July 23 0600-1000
July 30 - August 16, 1987	run on low maintenance schedule, calibrations once a week, goal: keep instrument running between summer study and summer extension. August 4 August 14 0220-Aug 15 0220 hrs
August 17 - September 4, 1987  (operational 94% of the above time)	2 hrs every 2-3 days late in evening, calibrations August 17 1200-1400 hrs, 1600-1800 hrs quartz filter change September 1 1100-2100 hrs alternative experiment September 2 2200-0000 hrs quartz filter change
<b>LONG BEACH:</b>	
November 6 - November 20, 1987  (operational 81% of the above time)	2 hrs every 2-3 days late in evening, calibrations Nov 8 1800-Nov 10 2300 hrs disk error
December 2 - December 13, 1987  (operational 89% of the above time)	2 hrs every 2-3 days late in evening, calibrations December 7 1200-Dec 8 0000 hrs December 8 1000-1800 hrs

### CHAPTER 3: RESULTS

A descriptive interpretation of the data with a focus on two periods, August 25 - 31 and November 17 - 19, is given in "Secondary Formation of Organic Aerosol in the Los Angeles Basin: Investigation of the Diurnal Variations of Organic and Elemental Carbon" found in Appendix A. A summary of the validation procedure and validation comments associated with the in situ carbon analyzer data is presented in Appendix C. Appendix D contains graphs of particulate organic and elemental carbon concentrations over the course of several multi-day periods, and Appendix E lists summer and fall carbon data.

Comparison of the diurnal profile of organic carbon with those of elemental carbon and ozone provided evidence for considerable secondary formation of organic aerosol during three sampling periods in the summer: July 11 - 13, July 25 - 29 and August 27 - 31. On July 14 - 17 and August 25 - 26 the correlation between organic and elemental carbon was quite high, indicating that the organic aerosol was predominately primary in origin. Graphs of June 18 - 20 and June 21 - 26 are included to show the June 19, 24 and 25 intensive study days. September 2 and 3 were the final two summer intensive days. Carbon values on September 2 illustrate the transport of aged pollutants to the Claremont site. On this day the concentration of ozone in Los Angeles reached 30 pphm, but in Claremont a northeasterly wind brought thundershowers, low pollutant concentrations and a high temperature of 38 C. At 1430 hrs the wind shifted transporting aged pollutants from the west. The ozone concentration jumped from 3 pphm to 22 pphm and the organic carbon concentration reached  $16.9 \text{ igC/m}^3$  at about 1700 hrs (PDT). The ratio of organic to elemental carbon was  $1.7 \pm 0.2$  at about 1100 hrs (PDT) and was  $4.9 \pm 0.6$  at about 1900 hrs (PDT).

All six of the fall intensive study days are included in the graphs in Appendix C. November 11 and 12 was a period of moderate to high stagnation with the high pressure ridge breaking down on November 13. November 17 - 19 was a period of unstable air, with overcast skies and drizzle on November 17, and ridge rebuilding beginning on November 18. This was a period when photochemical activity was minimal, and the

organic and elemental carbon profiles on those days should be representative of primary carbonaceous aerosol. December 3 and 4 are interesting because they demonstrate the rapid changes in carbon concentrations which can result from meteorological changes typical of that time of year. On December 3 there was moderate atmospheric stagnation and afternoon sunshine. Total particulate carbon reached a maximum of  $88 \text{ igC/m}^3$ , the highest of the study. That evening clouds moved in and the airmass became unstable. On the afternoon of December 4 it rained hard and the total particulate carbon concentration dropped to  $4 \text{ igC/m}^3$ . The final two intensive study days were December 10 and 11. The profiles of organic and elemental carbon were similar throughout the fall study and the coefficient of determination ( $R^2$ ) between organic and elemental carbon for the entire set of fall data was 80%.

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## GLOSSARY OF SYMBOLS

$b_{\text{scat}}$	Extinction coefficient ( $\text{m}^{-1}$ )
$b$	Extinction coefficient ( $\text{cm}^2/\mu\text{g}$ )
$C$	Concentration ( $\mu\text{gC}/\text{m}^3$ )
$d_p$	Particle diameter
$I$	Intensity of transmitted light for the sample
$I_0$	Intensity of transmitted light for the blank
$R^2$	Coefficient of determination
$\sigma$	Standard deviation

## GLOSSARY OF ABBREVIATIONS

ABS	Optical absorbance
ARB	Air Resources Board
BV	Ball valve
C	Carbon
EC	Elemental carbon
FID	Flame ionization detector
OC	Organic carbon
PDT	Pacific daylight time
Pb	Lead
PST	Pacific standard time
pphm	Parts per hundred million
SCAQ5	Southern California Air Quality Study
SV	Solenoid valve
TC	Total carbon
$\mu\text{gC}$	$\mu\text{g}$ of carbon

Appendix A

**SECONDARY FORMATION OF ORGANIC AEROSOL IN THE LOS ANGELES BASIN:  
INVESTIGATION OF THE DIURNAL VARIATIONS OF  
ORGANIC AND ELEMENTAL CARBON**

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## INTRODUCTION

Elevated particulate concentrations in urban areas result not only from direct particulate emissions but also from the condensation of products of gas phase photochemical reactions. Aerosols emitted directly as particles are known as primary; those formed in the atmosphere are referred to as secondary aerosols. Although carbonaceous species comprise a large fraction of the urban aerosol (Shah et al., 1986), the relative contributions of primary and secondary organic components have long been disputed. The formation of secondary aerosol is believed to result from the gas phase oxidation of such precursors as olefins, cyclic olefins, di-olefins, and aromatics (Grosjean, 1977). Products with low volatility either nucleate or condense on the surfaces of pre-existing particles. As a result, secondary aerosols are found mainly in the accumulation mode (particle diameter between 0.1 and 1.0  $\mu\text{m}$ ) (Whitby et al., 1972). This size range scatters light effectively and allows deep particle penetration into the lungs.

Gas-to-particle conversion of sulfur and nitrogen species has been observed in the atmosphere, and at times these secondary processes are responsible for high concentrations of particulate mass (Grosjean, 1977). The ability of specific organic compounds to form aerosols has been demonstrated in smog chamber experiments involving sunlight irradiation of specific gaseous components (Groblicki and Nebel, 1971; O'Brien et al., 1975b; Heisler and Friedlander, 1977; McMurry and Grosjean, 1985; Stern et al., 1987). A variety of approaches has been used to estimate the magnitude of secondary formation in the atmosphere (Appel et al., 1976; Appel et al., 1979; Grosjean and Friedlander, 1975; Friedlander, 1973; Gartrell and Friedlander, 1975; O'Brien et al., 1975a; Novakov, 1982; Benner et al., 1984). However, the extent of secondary formation of organic aerosols in the atmosphere is not well understood because of the many compounds whose interactions must be taken into consideration.

Because of the complexity of the carbonaceous aerosol many investigators have found it useful to separate it into organic (OC) and elemental (EC) classes. The latter is also called black carbon or graphitic carbon and results predominantly from combustion processes. Particulate organic carbon, however, is formed by a variety of processes, including combustion and secondary formation. By assuming that elemental carbon is a tracer for primary organic aerosol, several investigators have used OC - EC correlations and OC/EC ratios to indicate the extent to which the aerosol could be associated with primary or secondary sources (Chu and Macias, 1981; Huntzicker et al., 1986; Gray et al., 1986; Wolff et al., 1983; Novakov, 1982). These studies used filter samples collected over 6 to 24 hours, and strong correlations between OC and EC were observed in all cases. In certain cases the presence of secondary organic aerosol was suggested by either an increase in the OC/EC ratio with distance downwind from a major source region or a summertime average which was higher than the winter average at a given site. However, no relationship with ozone was observed.

Chu and Macias (1981) used lead (Pb) as a tracer for primary organic aerosol and observed definite early afternoon peaks in the carbon/Pb ratio for 2 - 6 hour samples. They noted that if 24 hour samples had

been collected rather than 2 - 6 hour samples, secondary organic aerosol would not have been detected in the C/Pb ratio. If secondary formation is only important during mid-day, its impact on the C/Pb and TC/EC ratios would be greatly diluted in a 24 hour average. Because aerosol chemistry is dynamic on the time scale of minutes to hours, an understanding of organic aerosol formation will require time-resolved data. Some two hour data have been collected by Grosjean (1984) and Appel (1979), and both observed times when the secondary formation of organic aerosol was highly significant.

## EXPERIMENTAL

During the Southern California Air Quality Study (SCAQS) an in situ carbon analyzer (Turpin et al., 1989a) was used to measure particulate organic and elemental carbon with approximately two-hour time resolution. From June 12 to July 29 and from August 17 to September 3, 1987, it was located at the Claremont site, at the eastern edge of the East Bauer Parking Lot at Claremont McKenna College in Claremont, California. During the fall study (November 6 - December 12, 1987) it was located in Long Beach at Long Beach City College between the track and the McDonnell Douglas hangers.

The in situ carbon analyzer was situated in an air conditioned California Air Resources Board trailer which was maintained at a temperature of  $25 \pm 1$  C. Two quartz fiber filters (Pallflex QAOT) mounted inside the instrument collected the fine (i.e.,  $d_p < 2.5 \mu\text{m}$ ) ambient aerosol and whatever organic vapor adsorbed on the filters. In a parallel sampler the quartz fiber filters were preceded by a Teflon filter (Gelman, ringed Teflon,  $2 \mu\text{m}$  pore) which removed particles. The parallel sampler filters provided an estimate of the organic vapor adsorption artifact on the quartz fiber aerosol filters. The coarse fraction was removed with a  $2.5 \mu\text{m}$  cut-point Marple (1974) impactor with an impactor surface composed of a fritted glass filter disk (Ace Glass, POR E) set into an aluminum plate and soaked in low vapor pressure vacuum pump oil to reduce bounce (Turner and Hering, 1987). Ambient air was sampled through a 2.5 cm diameter probe extending 90 cm above the roof and capped with a rain shield and insect screen. The sampling rate was 8.7 l/min in the summer and 8.9 l/min in the fall, and the sampling duration was varied from 40 to 200 minutes on the basis of air pollution forecasts and the instrument detection limits. The instrument generally operated on a two hour cycle in which aerosol was collected for 80 minutes followed immediately by in situ analysis for organic and elemental carbon by a thermal-optical technique.

The analysis technique corrected for the adsorption of organic gases on the sampling filter and the pyrolytic conversion of organic to elemental carbon which occurs during the analysis. The first step in the analysis was to measure the amount of adsorbed organic vapor on the quartz fiber filters behind the Teflon pre-filter. This was accomplished by thermal desorption at 650 C, oxidation of the desorbed organics to  $\text{CO}_2$ , reduction to  $\text{CH}_4$ , and measurement by a flame ionization detector. The aerosol side was then analyzed by thermal desorption at 650 C in a helium atmosphere to volatilize organic carbon. The temperature was then reduced to 350 C, and the atmosphere was changed to a mixture of 2%  $\text{O}_2$ -

98% He. Subsequently, the temperature was raised in steps to 750 C to oxidize elemental carbon, and the resultant CO<sub>2</sub> was measured as above. In the final step of the analysis, a known amount of methane was introduced for internal calibration. During organic carbon volatilization some organic carbon was pyrolytically converted to elemental carbon, resulting in a darkening of the filters. The optical transmittance through the filters was monitored throughout the analysis, and the proper split between organic and elemental carbon was considered to be the point at which enough elemental carbon had been removed to return the transmittance to its pre-pyrolysis value. Volatilization of collected organic particulate matter was minimized by keeping collection periods short. A detailed description of the method, characterization of the instrument, and comparison with other methods are given by Turpin et al. (1989a, 1989b).

An instrument blank and a three-peak internal calibration program were run every two to three days. The instrument blank analysis was a standard analysis without aerosol collection. The calibration program was identical to the standard analysis program except that a known amount of methane was automatically injected during each of the three distinct segments of the analysis. Because the instrument response differed by as much as 10% between these three conditions, appropriate response factors were incorporated into the data output. The analytical precision for the measurement of total aerosol carbon with the *in situ* carbon analyzer was 3.1%, and the detection limit was 0.2 µgC. Comparable precision is expected for organic and elemental carbon, based on our experience with the laboratory carbon analyzer (Turpin and Huntzicker, 1988; Huntzicker et al., 1982; Johnson et al., 1981). However, since each analysis uses the whole sample, these values have not been determined.

The individual analyses were all examined for unusual behavior. OC, EC, and TC concentrations were entered into data spreadsheets separately and the sums (OC + EC) were compared to the entered TC values to check for typographical errors and errors in spreadsheet data manipulations. A search for outliers was conducted by examining graphs of optical absorbance vs. elemental carbon loading (µgC). Because the laser signal showed a slight temperature dependence during the analysis, a correction was made by adjusting the laser signal in accordance with the temperature dependence that was observed on the instrument blanks. The nights of November 8, 10, and 18 and December 2 were quite foggy, and enough water collected on the sampling filters to affect the optical transmittance. As the heating of the loaded filter began, the transmittance increased slightly. The remainder of the analysis proceeded normally. A similar phenomenon has been observed in the laboratory when filters doped with a sucrose-water solution were analyzed while wet. Thus it was assumed that the increase in the initial transmittance which occurred during analysis of samples from these dew and fog intensive periods was a result of the volatilization of water from the filter. The maximum transmittance observed after water volatilization but before carbon volatilization was taken to be the reference transmittance for the pyrolysis correction in these instances.

## RESULTS

Wind trajectories in the Los Angeles basin are greatly influenced by the ocean. At night the flow is generally from the land to the ocean (land breeze), and during the day it is generally from the ocean to the land (sea breeze). In the summer, the sea breeze is strong, and the land breeze is quite weak. In the winter the opposite is true. A diagram of the Los Angeles Basin and the SCAQS sites with a few daytime wind trajectory lines typical of afternoon surface winds during July is given in Figure 1. As is evident in the diagram, the aged Long Beach air mass is typically transported through Claremont in the summer (Blumenthal et al., 1974).

The weather during the summer study was unusually cool. As a result, air quality was considerably better than is typical of Los Angeles Basin summers. As of the end of July there had been Stage I smog alerts in the basin on only 22 days, compared to 38 by July of 1986 and 53 in 1985. Stage I occurs when ozone concentrations exceed 20 pphm as an hourly average.

Strong diurnal variations were evident in organic, elemental and total carbon concentrations for both summer and fall data. In the summer peak concentrations of OC and EC occurred during the daylight hours. However, in the fall the peaks occurred at night, and the maximum concentrations ( $TC_{max} = 88 \mu\text{gC}/\text{m}^3$  on December 3) were two to three times the summer maxima ( $TC_{max} = 36 \mu\text{gC}/\text{m}^3$  on June 24). Atmospheric conditions changed very rapidly at the Long Beach site in the fall and resulted in drastic changes in aerosol concentrations over short time periods. On December 6 the total particulate carbon concentration decreased from  $75 \mu\text{gC}/\text{m}^3$  to  $4 \mu\text{gC}/\text{m}^3$  within a 24 hour period. The wind often stopped or dropped significantly during fall nights. In Claremont during the summer study the sea breeze (from the southwest) would occasionally blow continuously for 24 hours. However, the more typical situation was either a weak breeze from the northeast or no wind at all in the early to mid-morning with a strong sea breeze developing around mid-day.

Each daily EC maximum in the summer occurred either around 0900 hours or 1500 hours (PDT), and the daily OC maxima were clustered around 1500 - 1700 hours. As a result, most of the summer data fell into two categories: (1) EC and OC both peak around 1500 - 1700 hours, and (2) EC peaks around 0900 hours and OC peaks around 1500 - 1700 hours. Since elemental carbon is a tracer for primary, combustion generated, organic aerosol, a high correlation between organic and elemental carbon indicates that the organic aerosol is of primary origin. The coefficient of determination ( $R^2$ ) between OC and EC was 69% for the set of samples comprising all type (1) days and in the range of 80 - 95% for the period of July 14 - 17. For the fall data a coefficient of determination of 80% was observed. In contrast, for the set of samples comprising type (2) days OC and EC were poorly correlated ( $R^2 = 30\%$ ), indicating different origins for OC and EC during these periods. Three episodes of type (2) days were encountered during the study: July 11 - 13, July 25 - 29, and August 27 - 31.

Figure 2 shows OC, EC, ozone and  $b_{scat}$  for August 25 - 31, and Table I summarizes some additional information about this period. The ozone and  $b_{scat}$  values in Figure 2 are averaged over the collection periods for OC and EC. On Tuesday, August 25, and Wednesday, August 26, the air was relatively unstable, and pollutant concentrations were low. Between August 27 and August 31 a high pressure ridge was building. Ozone concentrations increased to a Friday, August 28, peak of 29 pphm, and the visual range decreased daily, reaching a low of 9 km on Saturday, August 29. During this period strong temperature inversions developed, and several Stage I smog alerts were in effect in the basin. A weak disturbance developed in the high pressure ridge on Sunday, August 30, and a few high cirrus clouds were visible over the site on Monday. Late Monday afternoon a thin layer of clouds covered the site.

Table I. Summary Data for August 25 - 31

August	Minimum Visual Range (km)	Peak Ozone (pphm)	Peak Organic Carbon ( $\mu\text{gC}/\text{m}^3$ )	Peak Elemental Carbon ( $\mu\text{gC}/\text{m}^3$ )	Descriptive Meteorology
25 Tue	22	13	12	3	unstable
26 Wed	20	17	17	6	unstable
27 Thu	10	24	20	7	high pres. ridge building
28 Fri	14	29	23	9	high pres. ridge building
29 Sat	9	24	21	5	high pres. ridge building
30 Sun	14	21	17	3	weak disturbance in ridge
31 Mon	16	21	17	10	afternoon: thin cloud cover

August 25 (Tuesday) and 26 (Wednesday) were type (1) days, and August 27 - 31 were type (2) days. The OC and EC profiles on August 25 and 26 were quite similar, and strong correlations were observed between OC and EC ( $R^2 = 89\%$  and  $72\%$  respectively), indicating a primary origin for the organic carbon on those days. As ozone concentrations built and the temperature inversion strengthened, the profiles of OC and EC became less similar. The coefficients of determination ( $R^2$ ) between OC and EC were 50%, 38%, 0%, 24%, and 28% on August 27 - 31, respectively.

On August 27 (Thursday) and August 28 (Friday) elemental carbon concentrations peaked in the morning, probably as a result of the accumulation of fresh, local emissions. Daily minimum OC/EC ratios were  $1.7 \pm 0.1$  and  $1.4 \pm 0.1$  on August 27 and 28, respectively, and occurred around 0700 hours (PDT) on both days. In the afternoon the EC concentration decreased significantly, and the OC concentration increased significantly, reaching its maximum concentration around 1500 hours (PDT), about the same time as the peak ozone concentration. The OC/EC ratio reached a maximum of  $4.1 \pm 0.3$  on Thursday and  $4.6 \pm 0.4$  on Friday at about 1700 hours (PDT). The additional organic carbon, which cannot be explained by common origin with elemental carbon, was probably of photochemical origin.

Although OC and EC were only poorly correlated on Friday, August 28 ( $R^2 = 38\%$ ), they were not correlated at all on Saturday, August 29 ( $R^2 = 0.0\%$ ). The OC/EC ratio reached  $7.0 \pm 0.8$  at 1700 hours (PDT) on Saturday and  $7.3 \pm 1.0$  at 1500 hours (PDT) on Sunday and peaked at about the same time as the ozone concentration on both days. On other weekends OC/EC ratios as high as 14 were observed. Thus the relative contribution of secondary organic aerosol appears to be highest on weekends. Although this finding is not well understood, it probably relates to the different geographical and temporal distributions of emissions of secondary organic aerosol precursors on weekends relative to weekdays.

As shown in Figure 2, the elemental carbon peak on August 26, 27, 30 and 31 occurred at about the same time as the principal peak in the daily light scattering profile ( $b_{scat}$ ) and, with the exception of August 26, the peak OC concentration on those days lined up with the right shoulder of the  $b_{scat}$  peak. Alignment of the  $b_{scat}$  and EC peaks suggests that primary carbonaceous aerosol contributed significantly to visibility reduction on these days. On August 28 and 29 the  $b_{scat}$  peak lined up with the OC peak in the afternoon, and a left shoulder was evident in the  $b_{scat}$  data which aligned with the morning EC peak. Thus, in this episode, when secondary organic aerosol concentrations were particularly high, secondary organic aerosol appeared to contribute significantly to visibility reduction. Knowledge about the importance of other light-scattering aerosols is needed to draw more definite conclusions from this information.

The contributions of primary and secondary sources to the ambient organic aerosol were estimated for Friday, August 28, a day when conditions for secondary formation were good. The estimates were made by assuming that the primary aerosol could be described by the OC/EC ratio at the time of the peak EC concentration on the day in question. This gave a primary ratio of  $1.4 \pm 0.1$ . With this assumption the primary component of the aerosol reached a maximum concentration of  $13 \mu\text{gC}/\text{m}^3$  at about 0700 hours (PDT). The maximum reached by the secondary component was  $14 \mu\text{gC}/\text{m}^3$  at 1700 hours (PDT); this corresponded to about 70% of the organic aerosol present at that time. Over a 24 hour period secondary sources contributed approximately 55% of the organic aerosol. This method of estimating primary and secondary contributions assumes that the primary ratio is invariant over the course of the day. Emissions ratios vary considerably from source to source, and therefore the primary ratio will be influenced by meteorology, diurnal and seasonal fluctuations in emissions, and the influence of local sources. Because of the sea breeze the inland sites like Claremont receive a more representative mixture of sources than sites nearer the coast. However, the variability of the primary ratio is not known, and therefore the above figures should be considered rough estimates.

Figure 3 shows OC and EC for November 17 - 19, and Table II summarizes additional information. The ozone and  $b_{scat}$  values in Figure 3 were averaged over the collection periods for OC and EC. In contrast to the summer, the wind flow at the Long Beach site in the fall did not follow a standard daily pattern except that the air tended to be fairly still at night. From November 17 through 19 the air was unstable, and there was no stagnation. Ozone and  $b_{scat}$  were low except from about

1900 hours (PST) on November 17 to 1000 hours (PST) on November 18, when  $b_{scat}$  was elevated. The highest OC and EC concentrations of the three day period were observed during this period of high light scattering.

Table II. Summary of Data for November 17 - 19.

November	Minimum Visual Range (km)	Peak Ozone (pphm)	Peak Organic Carbon ( $\mu\text{gC}/\text{m}^3$ )	Peak Elemental Carbon ( $\mu\text{gC}/\text{m}^3$ )	Wind Dir.	Descriptive Meteorology
17 Tue	18	1	42	17	NW	overcast all day drizzle
18 Wed	15	3*	40	17	variable	morning coastal surface inversion
19 Thu	39	*	26	11	variable	---

\* Ozone data not available after noon on November 18.

The lack of sun on Tuesday, low ozone concentrations, and an unstable air mass suggest that photochemical activity, including secondary formation of organic aerosol, should have been minimal during this period. The OC and EC profiles were quite similar and the coefficients of determination between OC and EC were 80%, 91%, and 81% for November 17, 18, and 19 respectively. OC/EC ratios varied from  $1.4 \pm 0.1$  to  $3.0 \pm 0.5$ . As in the summer, the minimum ratios of OC/EC occurred between 0700 and 0900 hours (PST). The OC/EC ratio on each of these days was relatively constant except for the dip which occurred between 0700 and 0900 hours (PST). This dip could have resulted from the infusion of a large quantity of fresh emissions due to morning traffic followed by some gas-to-particle conversion later in the day. Alternatively, it could have resulted from a diurnal variation in the source contributions to the Long Beach receptor site which would produce a diurnal variation in the primary OC/EC ratio. For November 17 this would suggest that the primary ratio would be about 1.4 - 1.5 at 0700 hours and about 2.4 at 1700 hours.

#### CONCLUSION

A data base of time-resolved, particulate organic and elemental carbon values now exists for an extended period of summer and fall days during which supporting measurements are abundant. This information should prove useful for analyzing organic aerosol chemistry in the Los Angeles Basin with appropriate time resolved advection-diffusion-chemical reaction models. Preliminary examination of the *in situ* analyzer data for organic and elemental carbon has shown the existence of summer days on which the correlation between OC and EC is quite high, indicating a primary origin for the organic aerosol. It has also identified three multiple day episodes during which secondary formation contributed

significantly to organic aerosol concentrations. At the height of the August 27 - 31 episode secondary formation accounted for up to 70% of the organic aerosol at 1700 hours (PDT) and about half of the aerosol over the 24 hour period.

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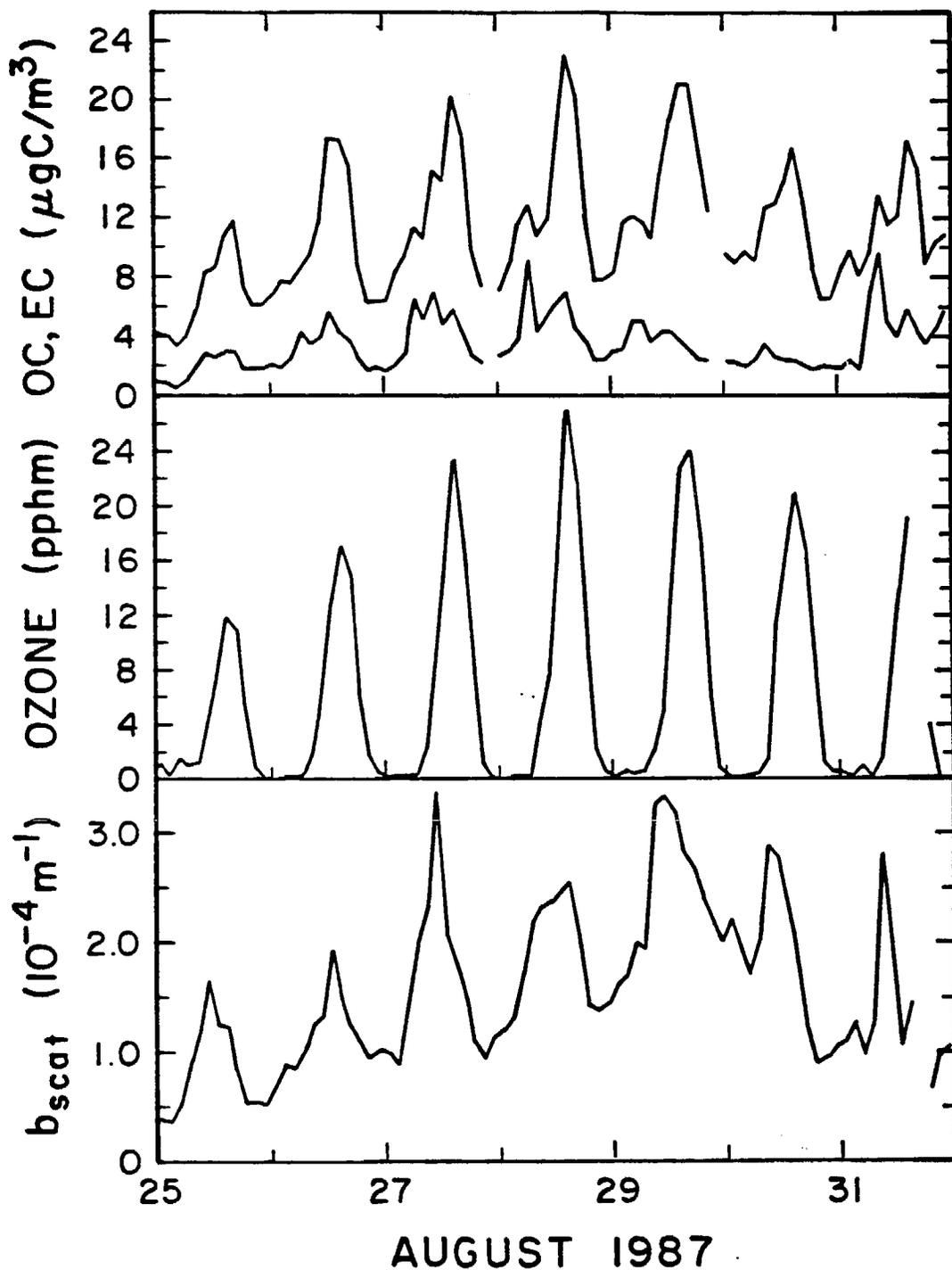


Figure A.2. Concentrations of organic and elemental carbon ( $\mu\text{gC}/\text{m}^3$ ), ozone (pphm) and  $b_{\text{scat}}$  ( $10^{-4} \text{m}^{-1}$ ) for August 25 - 31, 1987 at Claremont, CA. Ozone and  $b_{\text{scat}}$  are averaged to correspond with the 80 minute collection periods of the in situ carbon analyzer, and data are plotted at the midpoints of their averaging periods. Time is Pacific Daylight Time (PDT).

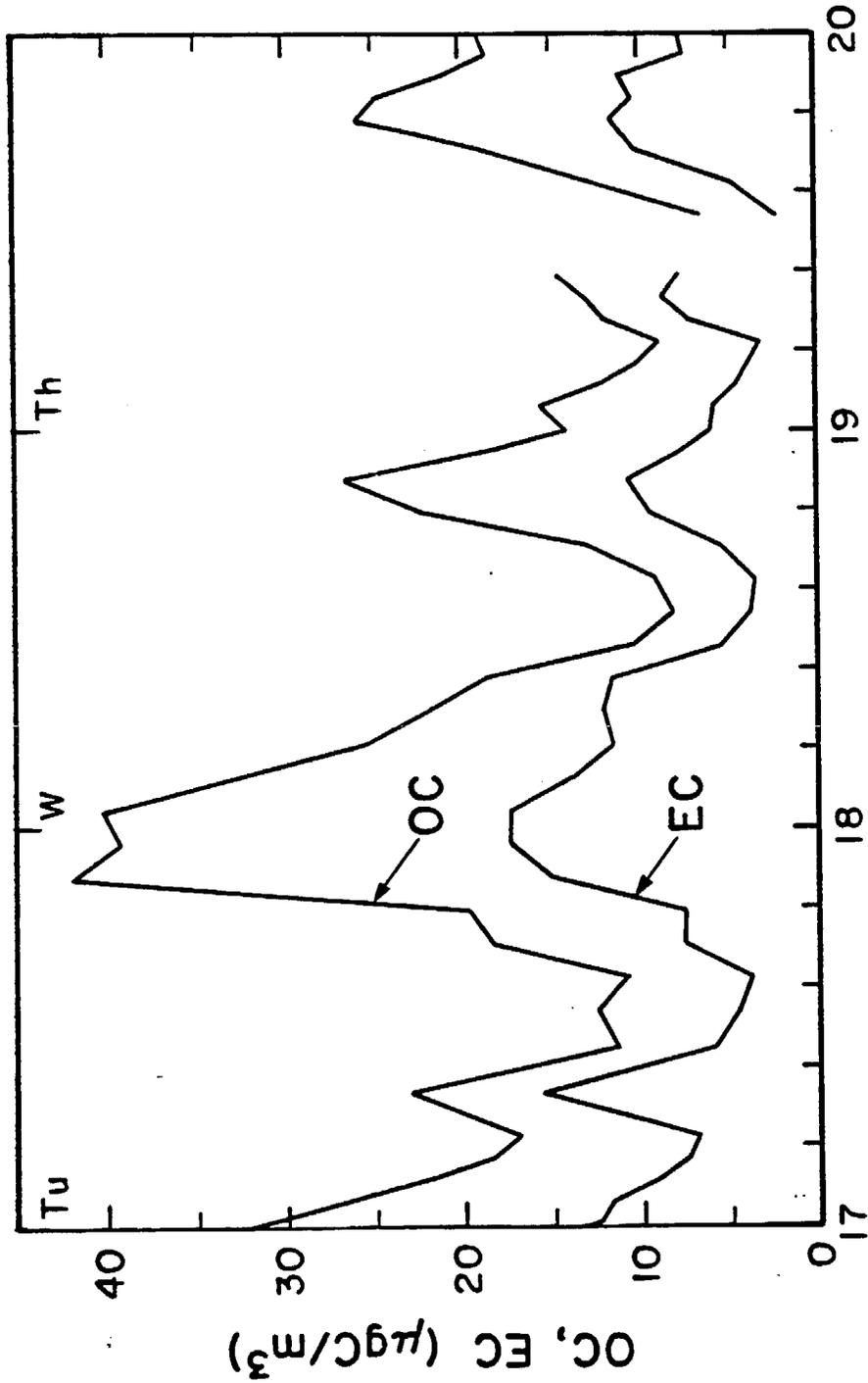


Figure A.3. Concentrations of organic and elemental carbon ( $\mu\text{gC}/\text{m}^3$ ) for November 17 - 19 at Long Beach, CA. Data are 80 minute averages, plotted at the midpoints of their averaging periods. Time is Pacific Standard Time (PST).

Appendix B

**An In Situ, Time-Resolved Analyzer  
For Aerosol Organic and Elemental Carbon**

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#### ABSTRACT

An in situ carbon analyzer has been developed to investigate the aerosol chemistry of organic carbon. Uncertainties due to sample handling and loss of organic carbon during storage were eliminated by combining the sampling and analysis functions into a single instrument which could operate on a time cycle as short as 90 minutes. Carbon analysis was accomplished with a thermal-optical method with corrections made for the vapor adsorption artifact and for pyrolytic conversion of organic to elemental carbon during the carbon analysis. Total aerosol carbon uncertainties are 3.1% with detection limits of 0.2  $\mu\text{g}$  carbon. The in situ carbon analyzer was operated during the Carbonaceous Species Methods Comparison Study in Glendora, California, in the summer of 1986. Concentrations of total, organic, and elemental carbon showed strong diurnal variations with peaks occurring during the daylight hours. Comparison of the diurnal profile of organic carbon with those of elemental carbon, a tracer for primary combustion aerosol, and ozone, and indicator of photochemical activity, provided evidence for the secondary formation of organic aerosol in the atmosphere.

## Introduction

Carbonaceous aerosol is recognized as a major component of both urban and rural aerosols (Shah et al., 1986; Gray et al., 1984). It can originate from both primary and secondary processes. The former are associated with direct emission of carbon-containing particles into the atmosphere and include incomplete combustion, industrial processes, and biological emissions (e.g. pollens and plant waxes). Elemental carbon (i.e., soot) is predominantly a product of combustion processes and is therefore a good tracer for combustion-generated organic aerosol. Secondary carbonaceous aerosol is formed in the atmosphere by condensation of products of photochemical reactions. Although laboratory experiments have demonstrated the secondary formation of organic aerosols (e.g., Heisler and Friedlander, 1977; McMurry and Grosjean, 1985), there is considerable uncertainty concerning the importance of secondary processes in the formation of organic aerosols in the ambient atmosphere.

Progress in the understanding of this problem has been hampered by the lack of adequate time resolution in conventional filter sampling methods for organic aerosol. These methods involve the collection of aerosol by drawing ambient air through filters which are then transported to the laboratory for analysis at a later time. Sample handling, aerosol aging uncertainties (e.g., volatilization loss during storage), and limitations in the analytical method contribute to high detection limits. To overcome these problems, long sampling periods are usually required, and consequently, most of the concentration data for carbonaceous aerosol is in the form of 12 or 24 hour averages. Because

atmospheric chemistry is dynamic on the time scale of minutes to hours, a great deal of information is lost in these long averaging periods. In particular, diurnal cycles which could be associated with secondary formation processes, have been difficult to resolve.

Filter sampling for organic aerosol is complicated by two additional problems. Adsorption of organic vapors on the sampling filter comprises a positive artifact, and volatilization, which removes material from the filter, is a negative artifact (Cadle et al., 1983; McDow, 1986). The latter can occur when there is a change in ambient air quality causing a re-distribution of material between gas and particulate phases and when the collected particulate material is exposed to a pressure drop during sampling.

McDow (1986) has shown that the correction for vapor adsorption can be approximated with a two-port, parallel sampler. One port contains a quartz fiber filter which collects the ambient aerosol and whatever organic vapors adsorb on the filter. In the other port a Teflon filter is followed by a quartz fiber backup filter. The Teflon filter removes the particulate material but because of its low surface area adsorbs a relatively small amount of organic vapors in comparison to a quartz fiber filter. The backup filter collects only adsorbable organic vapors and provides an estimate of the amount of organic vapor adsorbing on the quartz fiber aerosol filter. The concentration of organic aerosol can then be determined by the difference between the organic carbon concentrations on the quartz fiber aerosol filter and the quartz fiber backup filter behind the Teflon filter.

## THE IN SITU CARBON ANALYZER

Because of the need to obtain improved time resolution, low detection limits, and minimal influence from sampling artifacts, an in situ carbon analyzer was developed. This instrument combines the sampling function of a conventional filter sampler with the analytical function of a thermal-optical carbon analyzer (Huntzicker et al., 1982; Johnson et al., 1981). The sampling section of the instrument shown in Figure 1 consists of two independent filter samplers which provide for the collection of aerosol and the determination of the vapor adsorption artifact. In each sampler two back-to-back, circular disks (1.5 cm diameter) of a quartz fiber filter (Pallflex QAOT) are mounted inside the carbon analyzer as shown in Figure 2. (Two filter disks are necessary to prevent rupture during sampling.) In the aerosol-side sampler ambient air is drawn through a 2.5  $\mu\text{m}$  cut-point Marple (1974) impactor, and the fine fraction of the aerosol is collected on the quartz fiber filters along with whatever organic vapor adsorbs on the filters. Between the impactor and the filters is a ball valve (BV) which is used to isolate the system from the atmosphere during the analytical part of the cycle. A ball valve is used for this application to permit the unimpeded flow of aerosol into the instrument during the sampling part of the cycle. On the vapor side a Teflon filter (Gelman Teflon ringed, 47 mm diameter, 2  $\mu\text{m}$  pore size filter) is mounted upstream of the quartz fiber filters to remove particles from the sample air. As a result, any organic carbon on the vapor-side sampling filters is adsorbed organic vapor. A Teflon solenoid valve (SV2) isolates the vapor side from the atmosphere during analysis. Both sampling lines

draw from a common manifold, and the flow in both sides is maintained at 8.5 l/min.. This sampling rate corresponds to a filter face velocity of 80 cm/s.

Ambient air is drawn through the filters with a pump for a preset period of time. At the end of the sampling period the aerosol ball valve (BV), the vapor-side solenoid valve (SV2), and the pump solenoid valves (SV3, SV4) close, and the instrument is converted to a carbon analyzer similar in design to the Oregon Graduate Center laboratory carbon analyzer (Huntzicker et al., 1982; Johnson et al., 1981). After purging the system with helium, the vapor side is analyzed by rapid heating to 650 C. Adsorbed organic vapors are volatilized and oxidized to CO<sub>2</sub> in a 1000 C MnO<sub>2</sub> bed. The CO<sub>2</sub> is reduced to CH<sub>4</sub> in a 500 C nickel-firebrick methanator and measured in a flame ionization detector (FID). At the completion of the adsorbed vapor measurement solenoid valve (SV6) switches, and the filters from the aerosol side of the instrument are analyzed. The first step in this process involves heating to 650 C in a helium atmosphere to volatilize adsorbed organic vapors and particulate organic carbon. At the completion of this process the temperature is reduced to about 350 C, and the atmosphere is changed to 2% O<sub>2</sub>-98% He to oxidize elemental carbon. The temperature is increased in steps to 750 C, ensuring complete removal of elemental carbon. In the final step of the analysis, a known amount of methane is introduced for calibration purposes.

During organic carbon volatilization some organic carbon is pyrolytically converted to elemental carbon (i.e., charring). Correction for pyrolytic conversion is accomplished by monitoring the transmittance of a chopped 633 nm He-Ne laser light through the aerosol-

side filter during the analysis. Figure 3a shows the laser transmittance for a typical analysis. At the beginning of the analysis the transmittance through the loaded filter is sampled. As the aerosol-side temperature is raised and organic material is removed, pyrolysis occurs; this results in a darkening of the filter and a decrease in transmittance. When oxygen is added elemental carbon begins to oxidize, and the transmittance increases until the filter is clean. The point at which the transmittance regains its initial value is considered to be the split between organic and elemental carbon. This split is shown in Figure 3 by the long line extending upwards from the time axis. All material prior to the split is considered organic and after, elemental. Some temperature dependence has been observed in the laser system as seen by the increase in transmittance when the temperature of the aerosol-side oven is reduced at the end of the analysis. The influence of this effect on the results is small and can be minimized experimentally or corrected in the computations.

Figure 3b shows the time behavior of the FID during the carbon analysis. The first peak corresponds to adsorbed organic vapor on the vapor-side quartz fiber filter. The second and third peaks represent material removed from the aerosol filter before and after the addition of oxygen. The final peak is the calibration. The temperature profile of the aerosol-side oven is shown in Figure 3c; the vapor-side oven temperature is not shown.

System control, analysis, and data acquisition are all accomplished by an Apple II-Plus computer. At the end of each analysis the computer performs the pyrolysis correction, integrates the peaks, corrects for the vapor adsorption artifact, and presents the results in  $\mu\text{gC}/\text{m}^3$ . Any

volatilization artifact is minimized because the repeated removal of the major aerosol components (including sulfates and nitrates) during the analytical part of the operating cycle minimizes the buildup of a pressure drop resulting from the accumulation of particulate material on the filter.

#### Instrument Characterization

The analytical precision for total carbon (i.e., particulate + adsorbed vapor) was estimated by multiple injections of a known amount of  $\text{CH}_4$  into the aerosol oven and measurement of the instrument response using the standard analysis program of the in situ analyzer. Ten injections of 180  $\mu\text{l}$  of 5.39%  $\text{CH}_4$  in He were made, and the resultant coefficient of variation was 1.3%. The corresponding detection limit ( $3\sigma$ ) was 0.2  $\mu\text{g}$ .

The accuracy of the  $\text{CH}_4$  injection approach was checked by cross-calibrating against the laboratory thermal-optical carbon analyzer. In this experiment the response of the laboratory analyzer to known amounts of sucrose deposited on quartz fiber filter disks and to  $\text{CH}_4$  injections was measured. The latter involved 10 injections ranging between 2 and 25  $\mu\text{gC}$ . The ratio of the methane to sucrose responses was  $1.01 \pm 0.05$ . Thus, there is no difference between the two approaches at a 95% level of confidence, and it can be concluded that the methane injection method is a valid calibration for the in situ analyzer. The methane injection experiment also demonstrated the linearity of the in situ analyzer response over the range studied. A linear regression between the mass of carbon injected and the instrument response gave a very good fit ( $R^2=99.5\%$ ).

To check for consistency between the aerosol and vapor sides of the instrument, a set of experiments in which both sides were pre-filtered with a Teflon filter was run. In this configuration the analytical filters in both sides collect adsorbable organic vapor and should be equivalent. Eight runs involving the sampling of ambient air for periods of either three or eight hours were made at the Oregon Graduate Center in Beaverton, Oregon. The pooled standard deviation of the difference between the two sides was  $0.068 \mu\text{gC}/\text{m}^3$ , which was equivalent to a coefficient of variation of 2.2%. Because total aerosol carbon is determined by the difference between the two sides, the compounded analytical precision for the measurement of total aerosol carbon with the in situ analyzer was 3.1%.

Since each in situ analysis uses the whole sample, it is not possible to determine separate analytical precisions for organic and elemental carbon. However, results from replicate analysis of 16 ambient filter samples using the laboratory carbon analyzer should provide some insight into this question. One-way analysis of variance on the results gave the following standard deviations: total carbon, 7.0%; organic carbon, 8.4%; and elemental carbon 6.9%. (The total carbon uncertainty is larger than that obtained in the sucrose (4%) and methane injection (1%) experiments for the laboratory analyzer. This is probably because of variability in the distribution of particulate matter on the filter and error introduced during sample handling.) Because in situ analyzer uncertainties for both total carbon (1.3%) and total particulate carbon (3.1%) are less than the total carbon uncertainty for the laboratory analyzer (7%), it is likely that the precision uncertainties for organic and elemental carbon in the in situ

analyzer are also less than for the laboratory analyzer.

The transit time between the sampling filter and the FID was determined experimentally by aligning the initial increase in optical transmission, which results from EC removal, with the arrival of CO<sub>2</sub> from the oxidation of elemental carbon at the FID. Good agreement was found between the experimentally determined transit time and the expected transit time calculated from flow conditions. The laser signal responds immediately to the removal of material from the filter whereas the FID signal is delayed by the transit time. Proper correction for the pyrolytic conversion of organic to elemental carbon requires that these signals be aligned.

The split between organic and elemental carbon is considered to be the point at which the transmittance regains its initial value. This determination is based on the following assumptions: (1) elemental carbon is the only component of the sample which affects the optical transmittance and either (2) the pyrolytically generated EC and the original EC have the same extinction coefficient or (3) the pyrolytically generated EC is removed first.

The first assumption was tested with an experiment in which sucrose aerosol was generated in the laboratory and sampled with the in situ analyzer. Analysis of 9 samples containing 15 to 90 µgC showed that the presence of significant amounts of a light scattering particles did not affect the transmittance. The transmittance through the loaded filter (initial laser signal) was almost identical to the transmittance through the clean filter (final laser signal) and although a large fraction of the organic material underwent pyrolysis, the sample was properly reported as entirely organic. The negligible effect of the deposited

particles on the transmittance resulted because light scattering from the quartz fibers of the filter itself overwhelmed that from the deposited particles. Sampling and analysis of sucrose aerosol used only the aerosol side sampler and a typical analysis is shown in Figure 4. Assumption (1) has not been adequately tested for samples containing colored compounds such as might be present in wood smoke.

Insight into the second and third assumptions was provided by the following observations. Quartz fiber filters which have been used to collect the fine particle fraction of ambient aerosol exhibit a grayish color on their front surface, and the shade depends on the amount of particulate matter collected. The back side of the filter, however, is white. If the filter is subjected to laboratory carbon analysis only up to the end of the organic analysis (i.e. vaporization in a He atmosphere without O<sub>2</sub>) and then removed from the analyzer, both the front and back sides exhibit a grayish color. This suggests the following model for pyrolytic generation of elemental carbon in quartz fiber filters. During organic carbon analysis some of the volatilized carbon undergoes a surface chemical reaction with the quartz fibers to produce a thin film of elemental carbon on the quartz fiber filters. Because elemental carbon is now distributed throughout the filter - rather than only near the front surface, the back of the filter appears gray.

This film of elemental carbon has much more surface area per mass of carbon than the original EC and would therefore be expected to oxidize much more rapidly than the original EC upon the introduction of O<sub>2</sub> during the analysis. Thus if this model is correct, assumption (3) holds, and the pyrolysis correction procedure used in the in situ analyzer should be valid. Because of the size and morphological

dependence of optical absorption this model also suggests that the pyrolytically generated elemental carbon and original elemental carbon should exhibit different optical absorbances (i.e., assumption (2) is invalid). This is also consistent with our observations which indicate that EC measured before the OC-EC split has a greater extinction coefficient than after the split.

The response of optical transmittance to filter loading was investigated by sampling a black ink aerosol generated in the laboratory. A solution of 2.9 g/l of Staedtler mars 745 black drawing ink (Hogan, 1985) was nebulized, deionized in a  $^{85}\text{Kr}$  charge neutralizer, aged in continuous flow chambers, and sampled at 9 l/min with the in situ carbon analyzer. Twelve samples containing between 1 and 100  $\mu\text{g}$  of elemental carbon were collected. Beer's law adapted for particles on filters is  $I=I_0\exp(-bC)$  where  $I$  and  $I_0$  are the intensities of transmitted light for the sample and blank,  $C$  is the concentration ( $\mu\text{gC}/\text{cm}^2$ ) and  $b$  is the extinction coefficient ( $\text{cm}^2/\mu\text{g}$ ). Optical absorbance ( $\text{ABS} = -\ln I/I_0$ ) varies linearly with elemental carbon loading to about 25  $\mu\text{gC}$  as shown in Figure 5. Beyond this point Beer's law breaks down, and increases in filter loading have a diminishing affect on the absorbance.

In another experiment, aerosol was collected until no further change in the transmittance was observed. However, the transmittance through this filter, which was essentially perfectly black, was not zero. This was also observed by Gundel et al. (1984) who attributed this observation to a "light pipe" effect which they observed through an optical microscope. The in situ carbon analyzer transmittance has been adjusted to read zero through a perfectly black filter. The breakdown

of Beer's law occurs at a high enough loading that it will not affect the sensitivity of the pyrolysis correction in the range in which the instrument is operated.

#### Comparison With The Conventional Sampling And Analysis Method

Organic and elemental carbon concentrations were measured by the in situ carbon analyzer and by manual sampling during the Carbonaceous Species Methods Comparison Study in Glendora, California, in August, 1986. The in situ carbon analyzer was assembled in a trailer provided by the California Air Resources Board. Ambient air was sampled at 8.5 l/min through a 2.54 cm diameter manifold extending 1 meter above the roof and capped with a rain shield and bug screen. It operated on a cycle ranging from 90 to 180 minutes. Analysis time accounted for 40 minutes of that cycle. Instrument blanks were measured every evening by setting the program to collect for zero minutes followed by carbon analysis. A three-peak internal calibration program was also run daily. This program was identical to the normal analysis program except that the methane calibration loop was switched on-line during the vapor-side analysis, again during the He segment of the aerosol-side analysis, and during the final stages of the O<sub>2</sub>-He segment (i.e., the elemental carbon part of the cycle). Because the instrument response differed by as much as 10% between these three conditions, appropriate response factors were incorporated into the data output. A slight temperature dependence was observed in the laser signal of the blank and calibration runs. These runs were used to adjust the initial laser value in the sample runs to the equivalent value at the temperature at which the OC-EC split occurs. The correction, which was applied to the data, was about 3% and did not

significantly alter the results.

Manual samples were collected with a two-port sampler. Sampler inlets were capped with rain shields and bug screens and shaded from the sun. One port contained a 2.5  $\mu\text{m}$  cut-point Marple (1974) impactor followed by a 47 mm quartz fiber filter (Pallflex QAOT) for aerosol collection. The second port contained a 47 mm Teflon filter (Zefluor, 2  $\mu\text{m}$  pore size) followed by a quartz fiber filter for the vapor adsorption estimate. Both ports sampled ambient air at a flow rate of 25 l/min which was equivalent to a filter face velocity of about 43 cm/s. The impactor surface was cleaned and coated daily with Apiezon N vacuum grease to reduce bounce (Cheng and Yeh, 1979; Esmen et al., 1978). For the first two days of the study 4-hour samples were collected during the day and an 8-hour sample at night. For the remaining 7 days 12 hour samples were collected. The samples were analyzed for OC, EC and TC using the laboratory thermal-optical carbon analyzer.

Figures 6 - 8 compare in situ concentrations for total, organic and elemental particulate carbon with manual sampler concentrations. In situ results are composites of measured values, averaged over the collection period of the manual sampler. Linear regression fits with 95 percent confidence intervals are given in Table 1. The fits are quite good for total and elemental carbon ( $R^2=92\%$  and  $98\%$  respectively). For organic carbon, however, the regression was significant only within 90% confidence intervals despite the fact that  $R^2=85\%$ . This resulted from the small number of samples available for comparison and the inherent variability in the measurement. (Unfortunately, less samples were available for the organic and elemental carbon comparisons because of a malfunction in the optical transmittance system during the first week of

the study.) Participation in the Southern California Air Quality Study will yield more data for future comparison.

A paired, two-sided t-test showed no significant difference between in situ and manual sampler results for total, organic or elemental carbon at the 95% confidence level. However, for elemental carbon a single-sided t-test indicated that the in situ values were significantly less than the manual sampler values. The magnitude of that difference was about 14 percent. The most likely cause of this discrepancy relates to the different optical systems used in the in situ and laboratory analyzers for the pyrolysis correction. The former uses optical transmittance, but the latter uses optical reflectance. The observed difference is probably a fundamental one resulting from the different types of optical measurements and is still under investigation. Despite the lower level of confidence in the in situ - manual comparison for organic carbon, it is reasonable to conclude that since good agreement is seen for particulate total and elemental carbon (apart from the systematic deviation for the later) the in situ analyzer also provides reliable results for aerosol organic carbon.

#### Ambient Measurements

Total aerosol carbon data from the Carbonaceous Species Methods Comparison Study are plotted in Figure 9. Despite the gaps in the data which occurred during calibration and service periods, strong diurnal variations are seen for total, organic, and elemental carbon with peak concentrations occurring during the daylight hours. For these data the vapor artifact comprised 30 to 60% of the organic material on the filter, and 30 to 50% of the material removed after the addition of

oxygen during carbon analysis was pyrolyzed organic material. Thus, both corrections were significant.

Concentrations of particulate organic and elemental carbon and ozone, an indicator of atmospheric photochemical activity, are plotted for August 19 and 20 in Figures 10 and 11. Ozone data are from the California Air Resources Board Haagen-Smit Laboratory. Each data point represents the midpoint of the sampling period. For both days mid-day temperatures exceeded 32 C, and there was a strong ground-based inversion on the morning of August 20.

On August 19 ozone peaked at about 2 pm (1400 PDT) at a concentration of about 23 pphm, indicating "moderate" photochemical smog. Both organic and elemental carbon exhibited similar diurnal patterns with their peaks broadly distributed over much of the mid-day. Because elemental carbon is a tracer for primary, combustion-generated aerosol, it is likely that the organic aerosol on this day was principally primary. The in situ data do not provide evidence for a strong secondary component on August 19.

The situation of August 20, however, is quite different. Elemental carbon showed a distinct maximum at about 0900 (PDT) which corresponded with the highest carbon monoxide concentrations recorded during the study, 4 ppm as a 1 hour average. These pollutant levels are probably a result of the accumulation of local emissions during the morning inversion. Organic carbon experienced a secondary maximum at this time which was probably also the result of primary emissions. The ratio of OC/EC was 1.3. However, as the elemental carbon concentration fell sharply, the concentrations of organic carbon and ozone rose sharply and reached their maxima in early afternoon. At about this time the ratio

of organic to elemental carbon also reached its maximum (5.2). These observations strongly suggest a secondary origin for the afternoon peak in organic carbon.

Further investigation of the roles of primary and secondary processes in the formation of organic aerosol is underway. The in situ carbon analyzer was used in the Southern California Air Quality Study in Claremont, California (summer, 1987), and in Long Beach, California (fall, 1987), and interpretation of these data will be reported in a subsequent publication.

#### ACKNOWLEDGMENT

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Because this paper has not been reviewed by EPA, no endorsement by EPA should be inferred. Additionally, the mention of trade names does not imply endorsement by either EPA or the California Air Resources Board.

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TABLE 1. REGRESSION RESULTS FOR COMPARISON OF IN SITU AND MANUAL METHODS.

Uncertainties are 95% confidence intervals for total and elemental carbon and 90% for organic carbon. The number of samples comprising the regression is indicated by n, and  $R^2$  is the percentage of the variance explained by the regression.

$$\text{In Situ} = a + b (\text{Manual})$$

	a	b	$R^2$	n
Total Carbon	$0.8 \pm 2$	$1.0 \pm 0.2$	92%	12
Organic Carbon	$-0.9 \pm 6$	$1.2 \pm 0.7$	85%	5
Elemental Carbon	$-0.2 \pm 1$	$0.9 \pm 0.3$	98%	5

## Figure Captions

Figure 1. Schematic of in situ carbon analyzer. BV: ball valve; SV1-SV6 solenoid valves.

Figure 2. Filter mounting system for in situ carbon analyzer. The backing sleeve provides a support on which the two back-to-back quartz fiber filter disks are mounted.

Figure 3. Typical output for in situ carbon analyzer. (a) Optical transmittance; (b) flame ionization detector; (c) temperature of aerosol-side oven. The vertical line occurring at about 18.5 minutes is the split time between organic and elemental carbon.

Figure 4. Typical in situ carbon analyzer output for a sucrose aerosol collection. Optical transmittance, flame ionization detector, and oven temperature. The dashed line is drawn horizontally from the initial laser transmittance signal.

Figure 5. Comparison of optical absorbance ( $-\ln I/I_0$ ) and elemental carbon loading ( $\mu\text{g}$ ) for the in situ carbon analyzer. The filter area is  $1.77 \text{ cm}^2$ .

Figure 6. Comparison of in situ and manual sampler results ( $\mu\text{gC}/\text{m}^3$ ) for total particulate carbon. The solid line is the linear least squares fit of Table 1.

Figure 7. Comparison of in situ and manual sampler results ( $\mu\text{gC}/\text{m}^3$ ) for particulate organic carbon. The solid line is the linear least squares fit of Table 1.

Figure 8. Comparison of in situ and manual sampler results ( $\mu\text{gC}/\text{m}^3$ ) for particulate elemental carbon. The solid line is the linear least squares fit of Table 1.

Figure 9. Total particulate carbon concentration ( $\mu\text{gC}/\text{m}^3$ ) at Glendora, California, August 12-21, 1986.

Figure 10. Concentrations of ozone (pphm), particulate organic carbon ( $\mu\text{gC}/\text{m}^3$ ), and particulate elemental carbon ( $\mu\text{gC}/\text{m}^3$ ) at Glendora, California, August 19, 1986.

Figure 11. Concentrations of ozone (pphm), particulate organic carbon ( $\mu\text{gC}/\text{m}^3$ ), and particulate elemental carbon ( $\mu\text{gC}/\text{m}^3$ ) at Glendora, California, August 20, 1986.

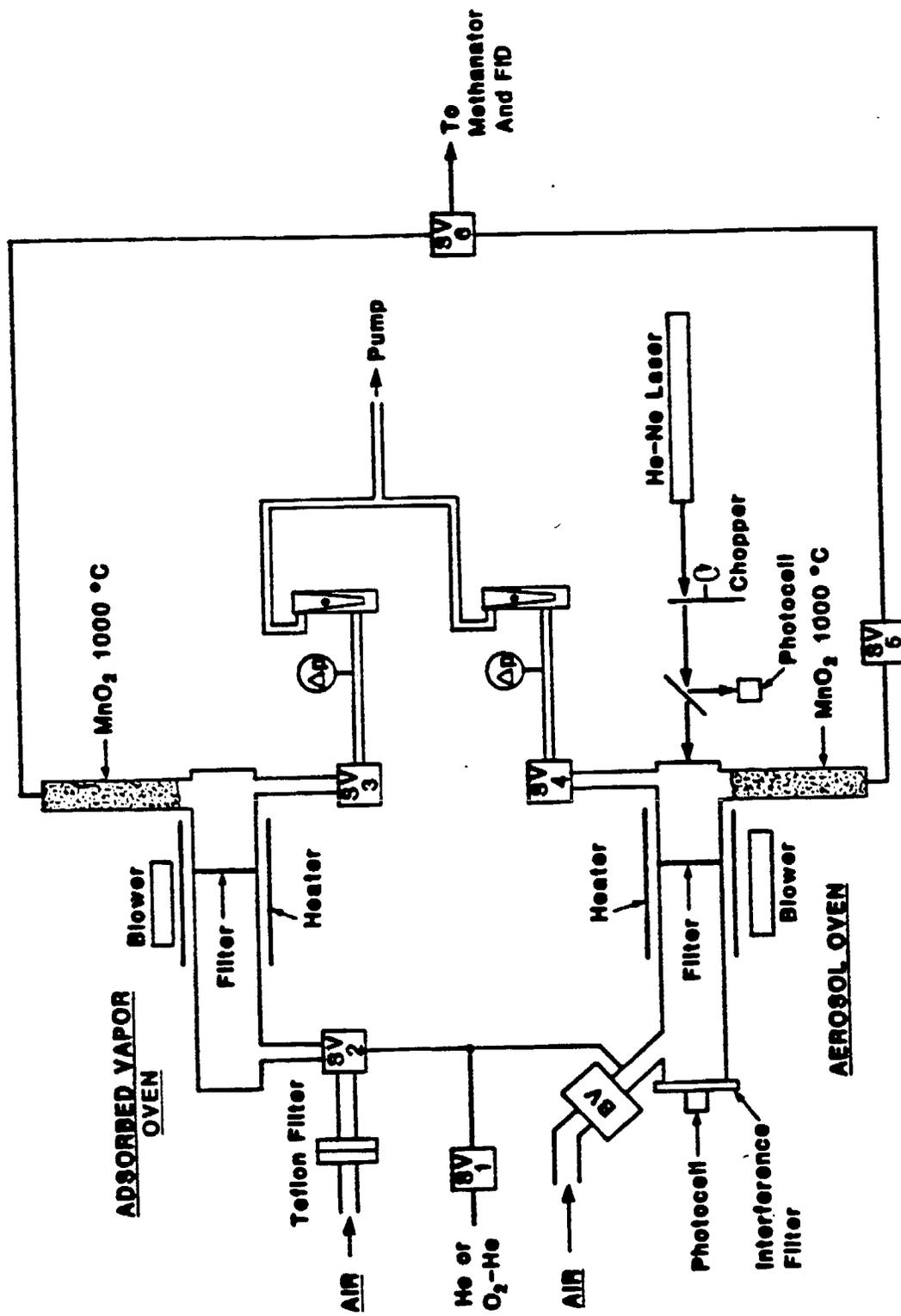


Figure B.1. Schematic of in situ carbon analyzer. BV: ball valve; SV1-SV6 solenoid valves.

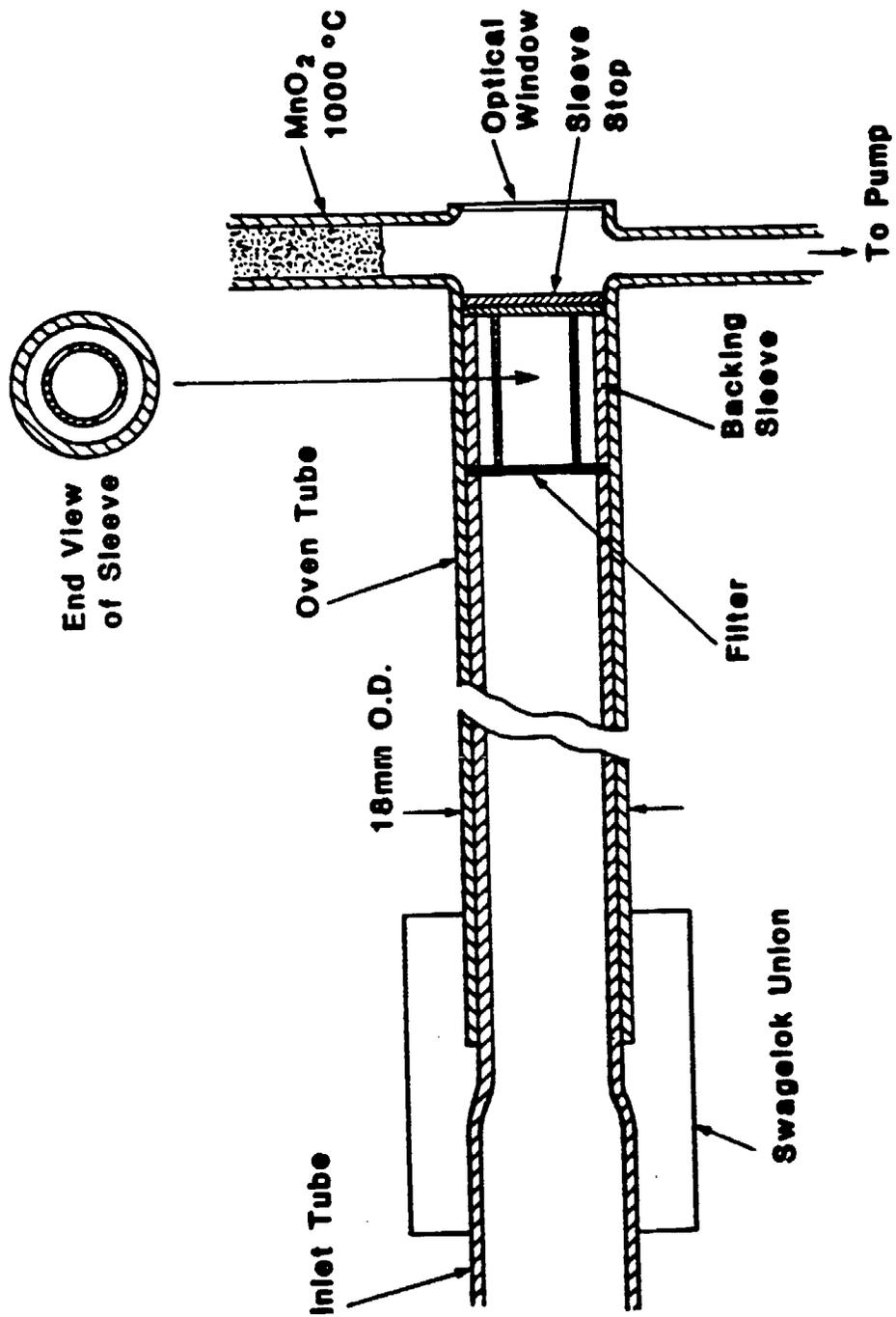


Figure B.2. Filter mounting system for *in situ* carbon analyzer. The backing sleeve provides a support on which the two back-to-back quartz fiber filter disks are mounted.

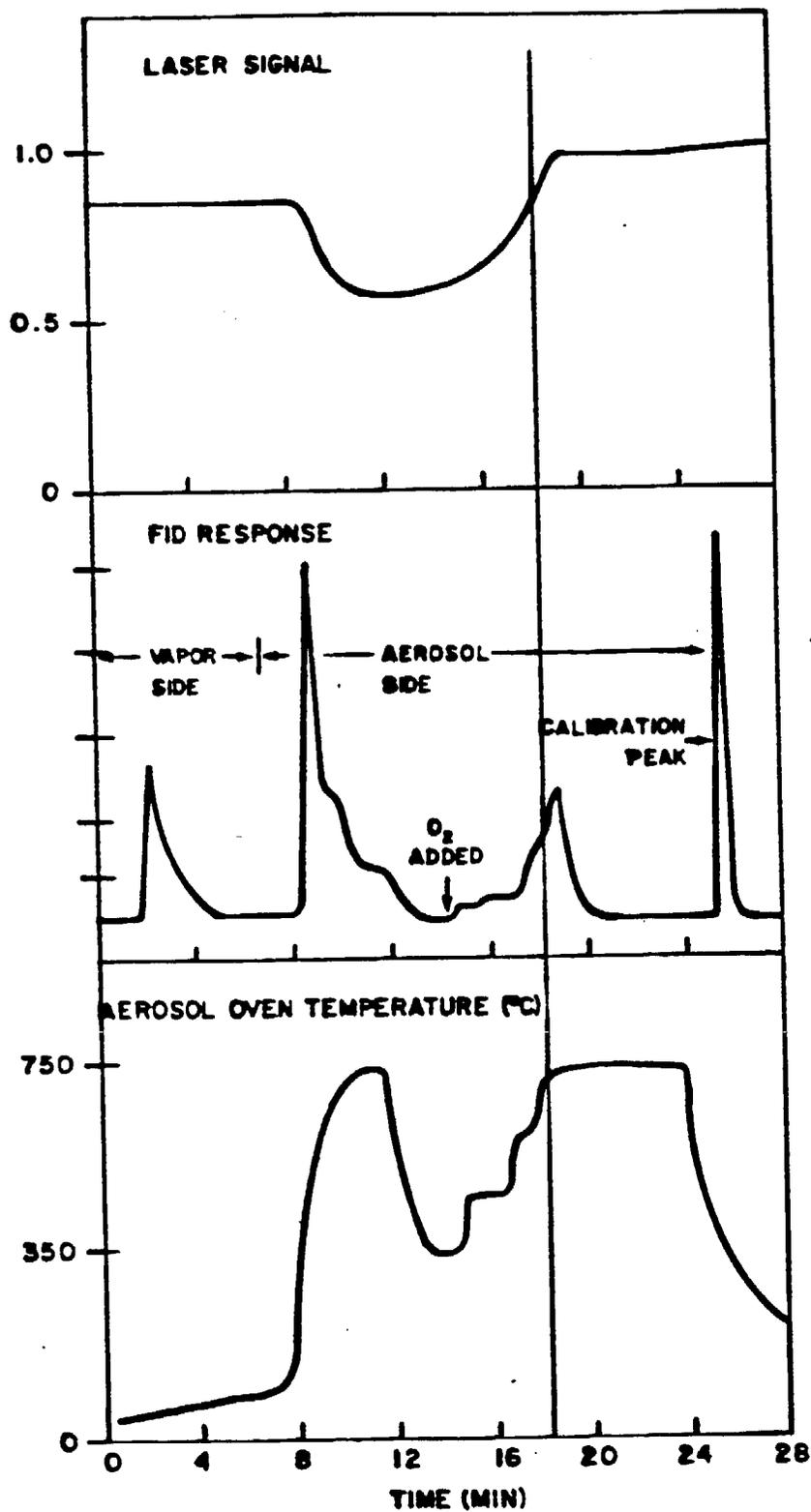


Figure B.3. Typical output for in situ carbon analyzer. (a) Optical transmittance; (b) flame ionization detector; (c) temperature of aerosol-side oven. The vertical line occurring at about 18.5 minutes is the split point between organic and elemental carbon.

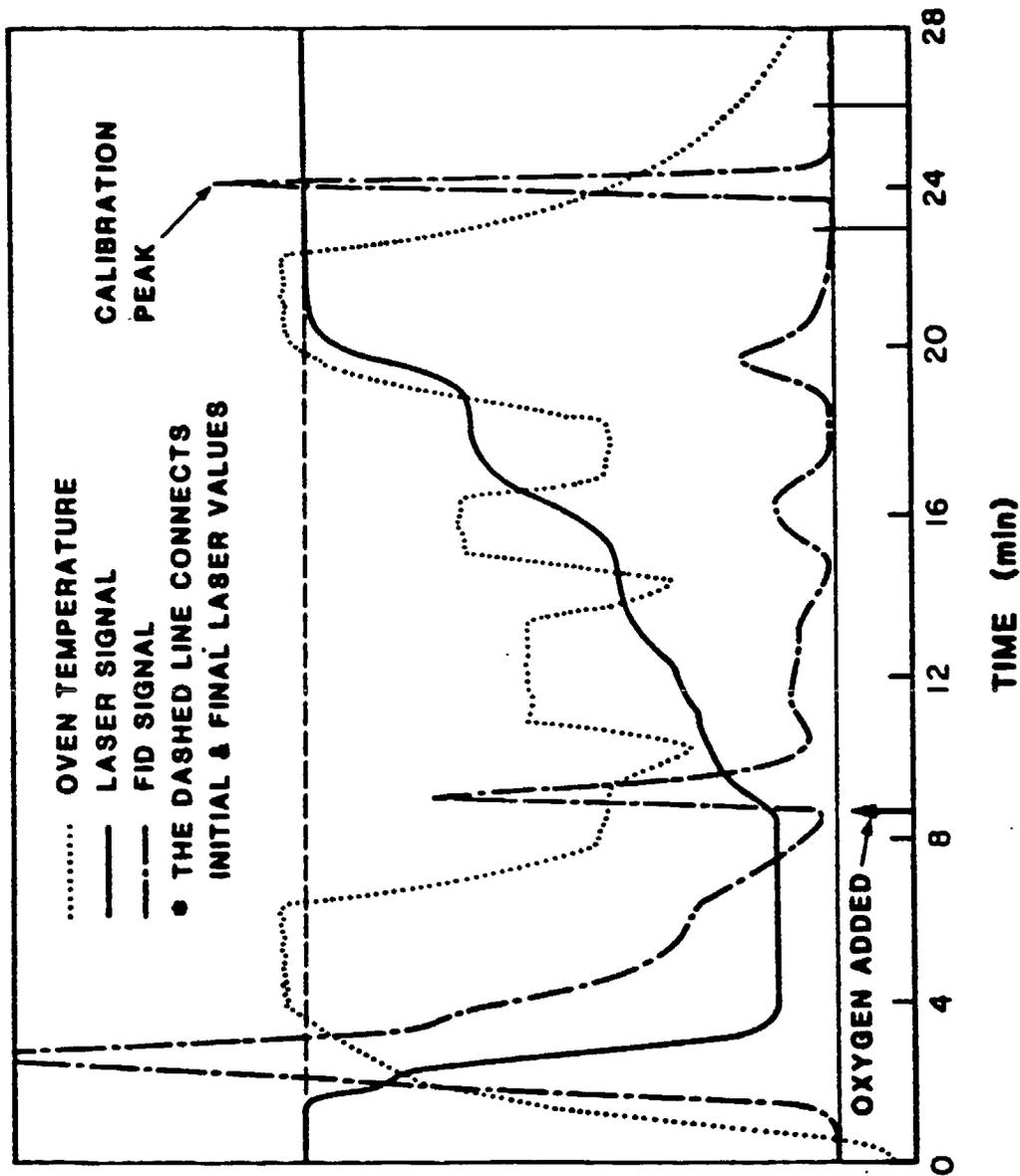


Figure B.4. Typical in situ carbon analyzer output for a sucrose aerosol collection. Optical transmittance, flame ionization detector, and oven temperature. Adsorbed vapor was not measured in this experiment. The dashed line is drawn horizontally from the initial laser transmittance signal.

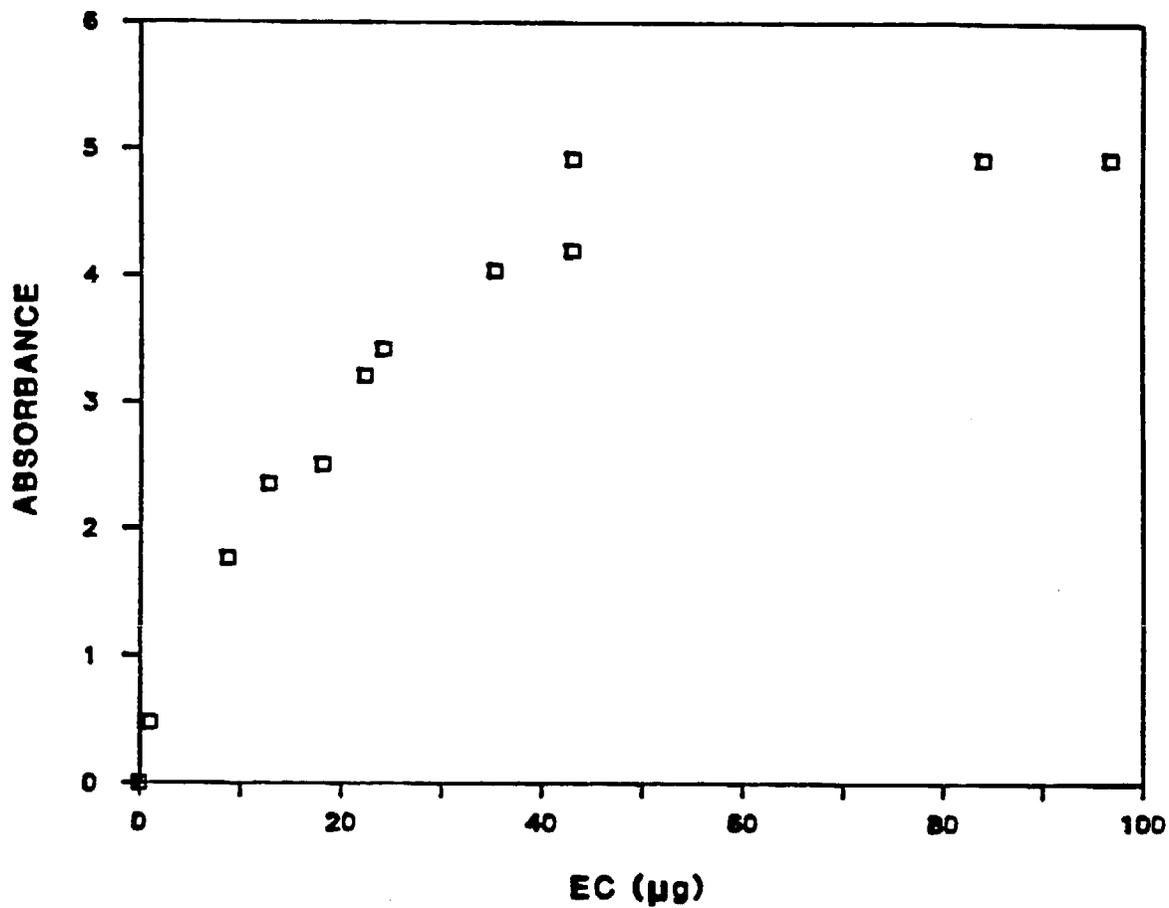


Figure B.5. Comparison of optical absorbance ( $-\ln I/I_0$ ) and elemental carbon loading ( $\mu\text{g}$ ) for the in situ carbon analyzer. The filter area is  $1.77 \text{ cm}^2$ .

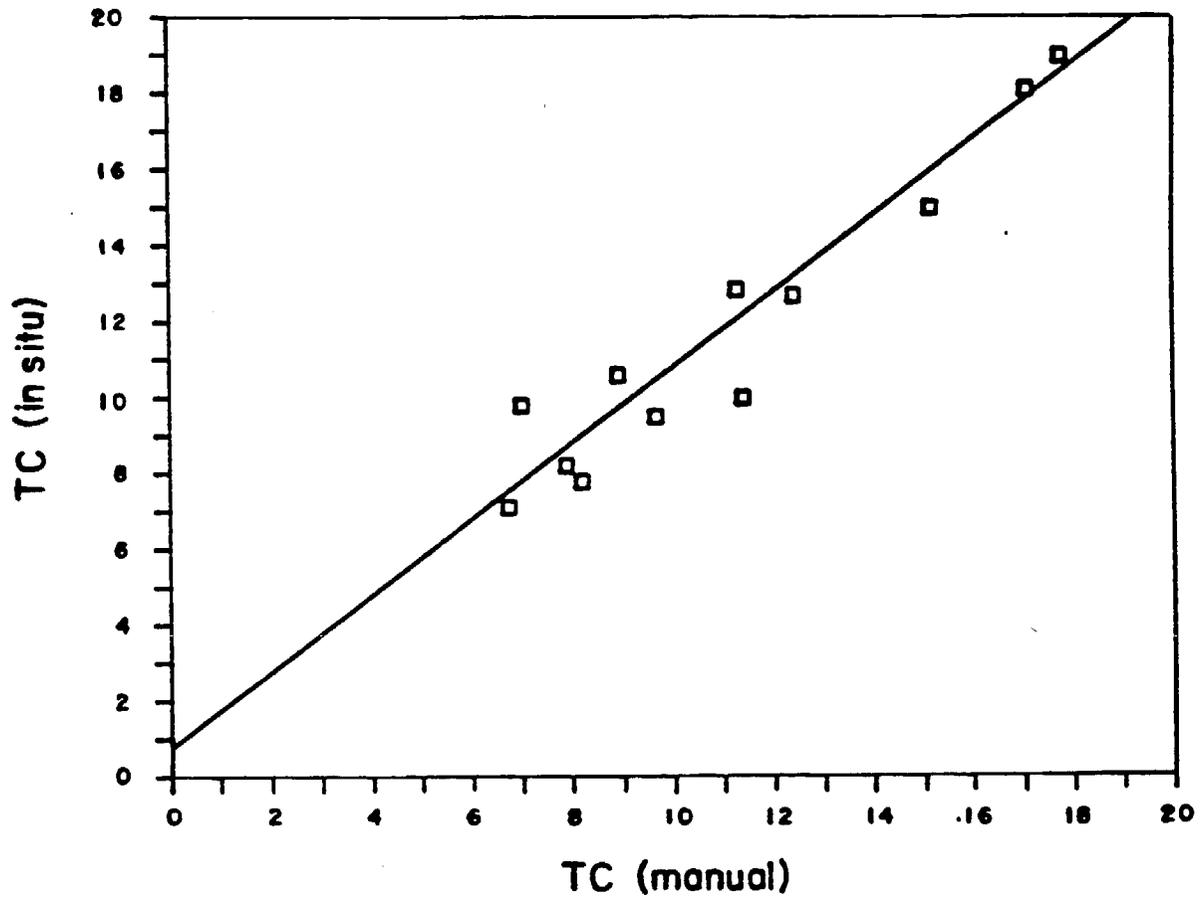


Figure B.6. Comparison of in situ and manual sampler results ( $\mu\text{gC}/\text{m}^3$ ) for total particulate carbon. The solid line is the linear least squares fit of Table 3.

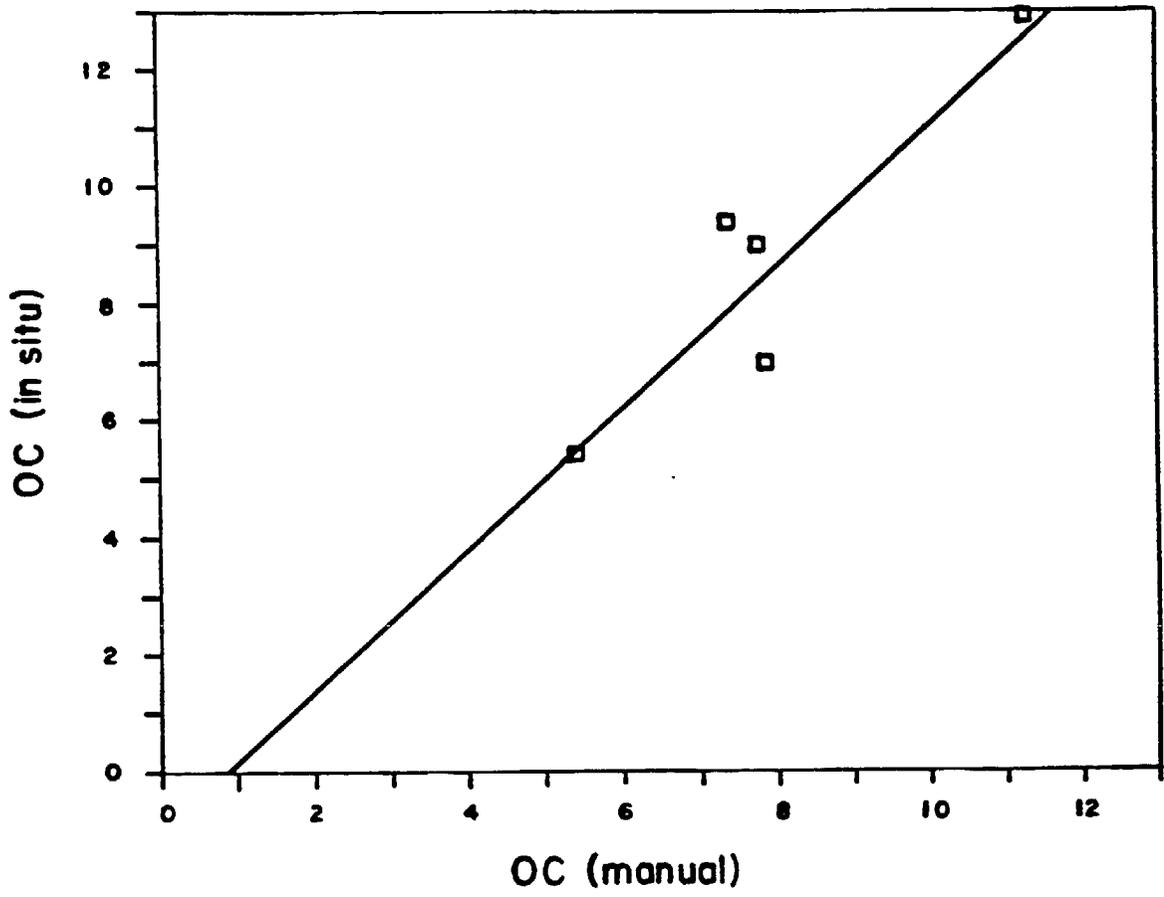


Figure B.7. Comparison of in situ and manual sampler results ( $\mu\text{gC}/\text{m}^3$ ) for particulate organic carbon. The solid line is the linear least squares fit of Table 3.

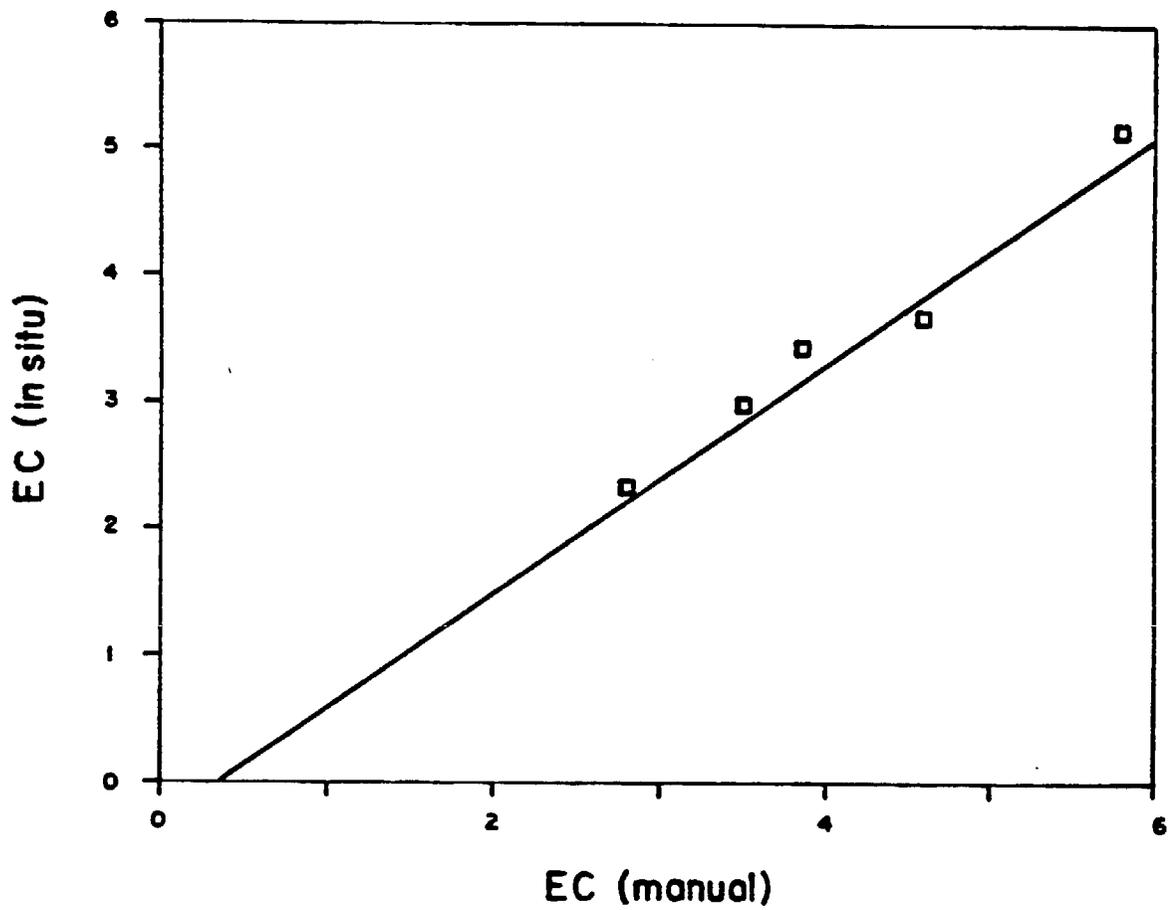


Figure B.8. Comparison of in situ and manual sampler results ( $\mu\text{gC}/\text{m}^3$ ) for elemental carbon. The solid line is the linear least squares fit of Table 3.

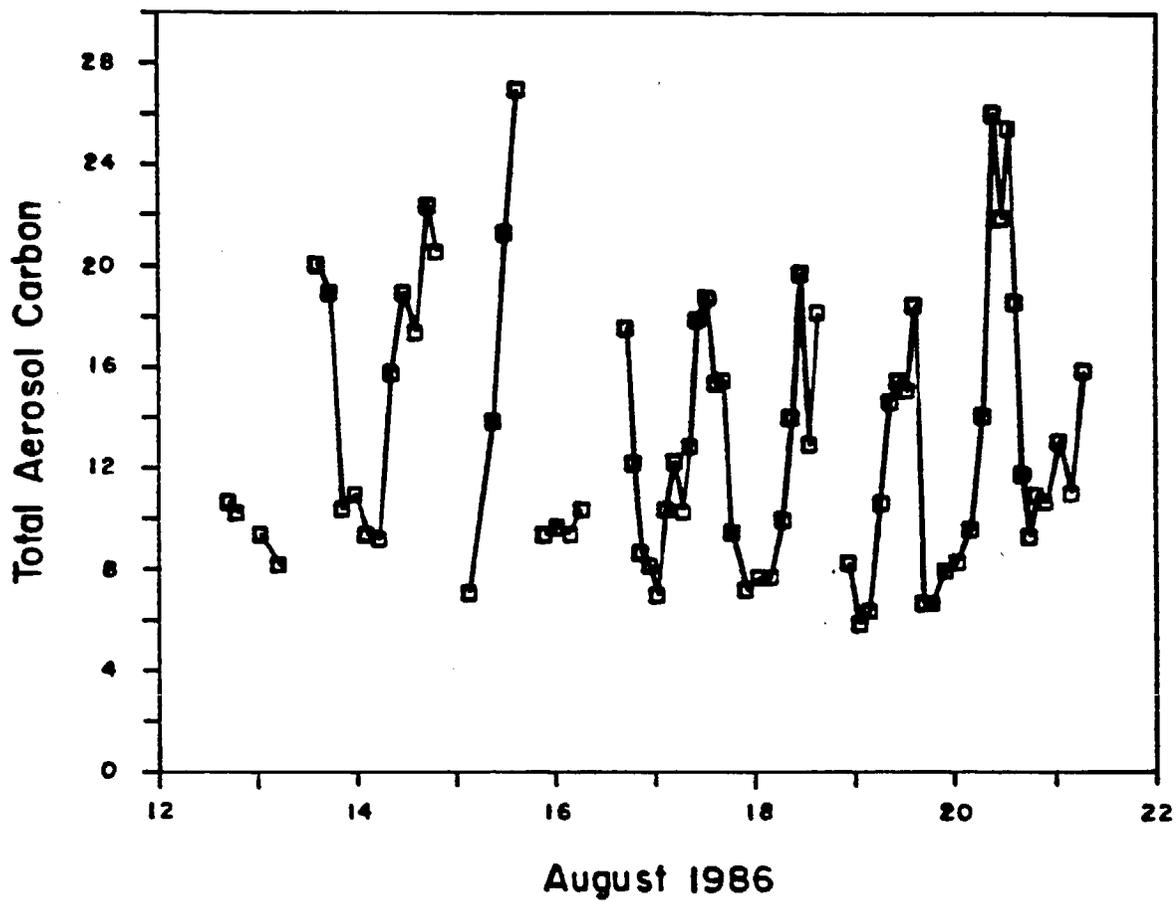


Figure B.9. Total particulate carbon concentrations ( $\mu\text{gC}/\text{m}^3$ ) for particles under  $2.5 \mu\text{m}$  in diameter at Glendora, California, August 12-21, 1986.

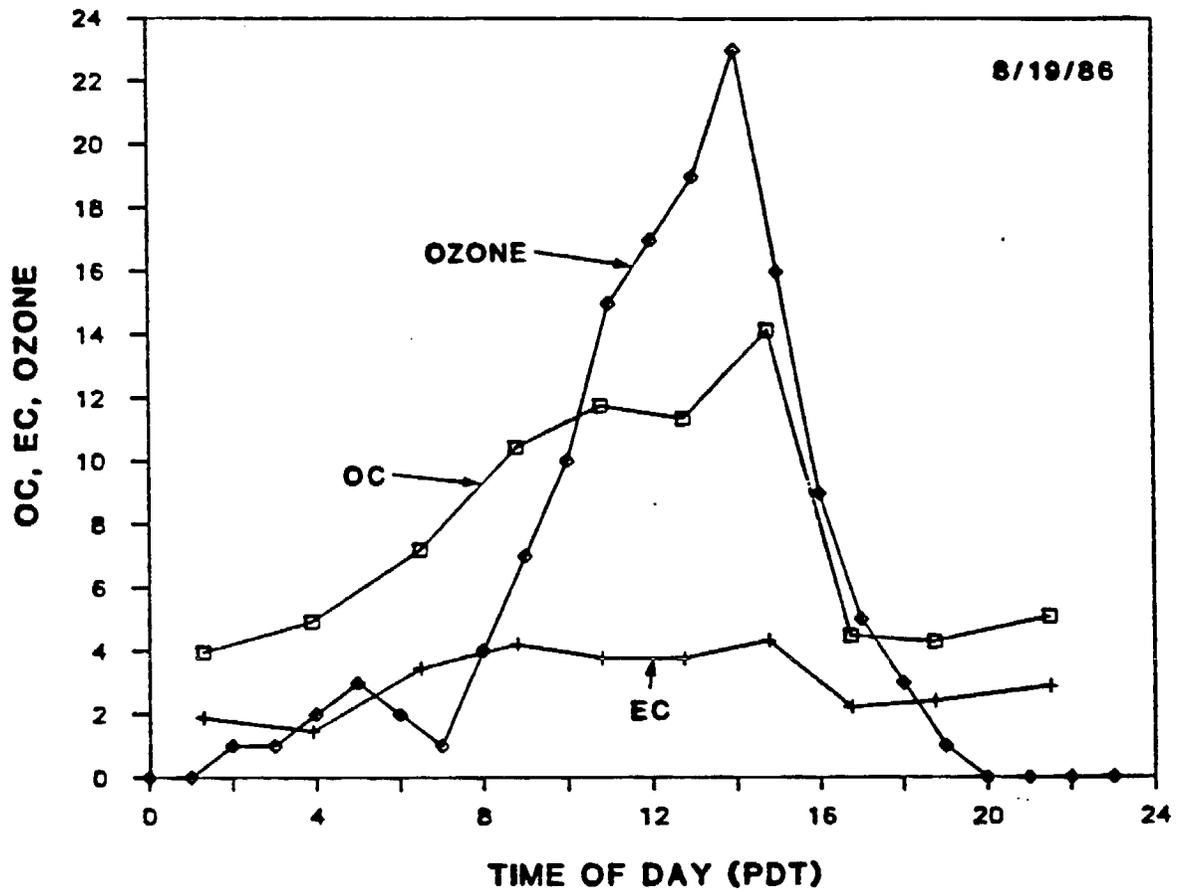


Figure B.10. Concentrations of ozone (pphm), particulate organic carbon ( $\mu\text{gC}/\text{m}^3$ ), and particulate elemental carbon ( $\mu\text{gC}/\text{m}^3$ ) at Glendora, California, August 19, 1986.

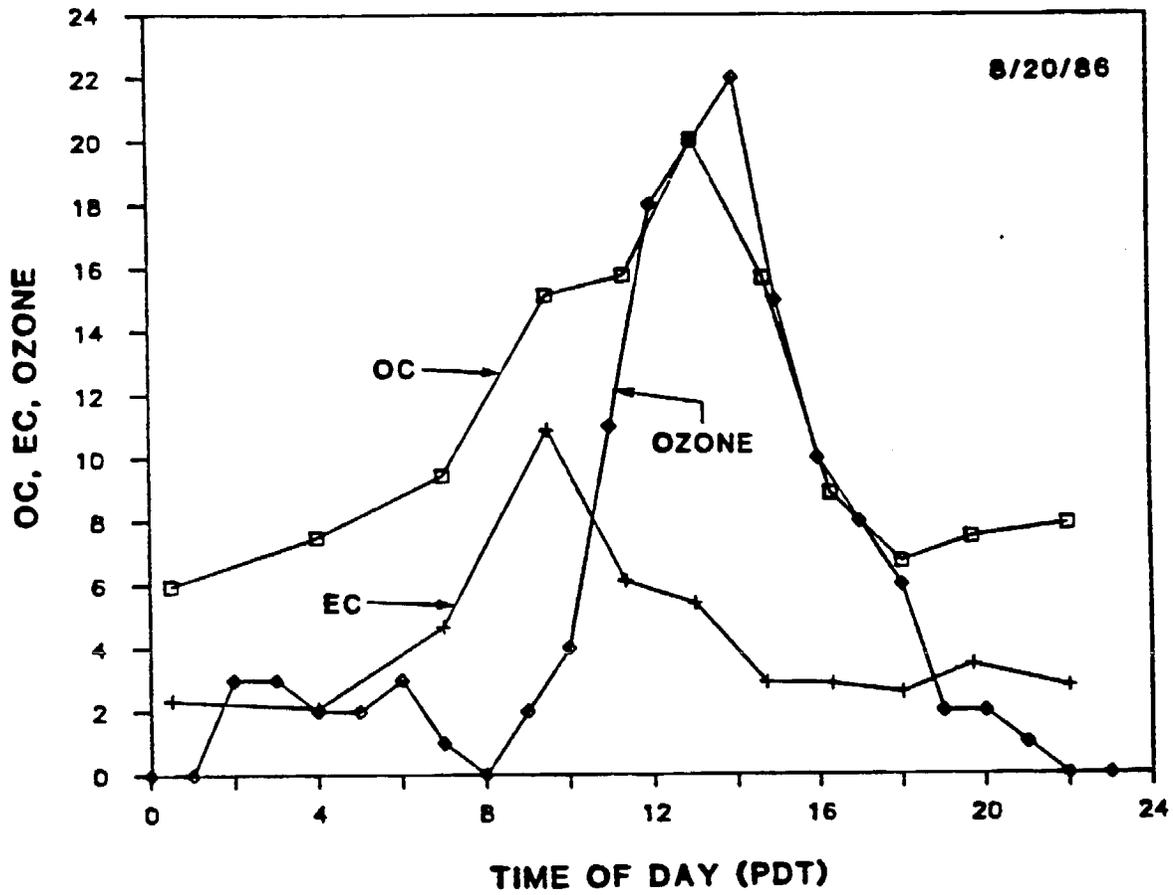


Figure B.11. Concentrations of ozone (pphm), particulate organic carbon ( $\mu\text{gC}/\text{m}^3$ ), and particulate elemental carbon ( $\mu\text{gC}/\text{m}^3$ ) at Glendora, California, August 20, 1986.

## Appendix C

### DATA VALIDATION FOR IN SITU DATA

This document defines specific data validation checks which have been performed on the in situ carbon data collected by the Oregon Graduate Center and suggests others which could be done. Validation codes and comments are included. All measurements are valid (V1) unless otherwise noted. Data which are qualified (Q1) or suspect (S1) were included in the graphs of Appendix D and the table of Appendix E, but suspect data were not used in the data interpretation.

#### Level I Validations:

The individual analyses were all examined for unusual behavior. Throughout each analysis the transmittance of He-Ne laser light through the filter, the oven temperature and the flame ionization detector (FID) signal were all plotted. Through this examination samples with elemental carbon loadings too low to quantitatively determine the organic carbon (OC) - elemental carbon (EC) split and samples which overloaded the FID were identified and these data were removed from the data set. On four fall nights enough water vapor collected on the sampling filters to affect the optical transmittance. A correction was made for this affect. This and all other unusual behavior are reported in the validation comments.

Total carbon (TC), OC and EC concentrations were entered into the spreadsheet individually and the sums (OC+EC) were compared to the entered TC values to check for typographical errors and errors in spreadsheet data manipulations. Graphs of optical absorbance vs elemental carbon loading (ug) prepared for each study month and graphs of the OC-EC split time vs EC loading were used to identify outliers. Monthly graphs of the data were also visually inspected to screen for unusual temporal behavior.

## Level II Validation:

A comparison of OGC and Ford elemental carbon concentrations for summer intensives has been performed (Turpin et al., 1989). Two hour averages of Ford's photoacoustic spectrophone data were compared with 80 minute average concentrations from the OGC carbon analyzer. Care was taken only to include samples with identical midpoints to minimize scatter resulting from the difference in sampling times. The agreement was quite good, and a t-test showed no significant difference between the two sets with 95% confidence intervals. No outliers were observed.

Comparisons with other elemental carbon and particulate total carbon (corrected for adsorption) data sets should be performed although it should be remembered that large disagreement between methods exists as evidenced in the Carbonaceous Species Method Comparison Study. A plot of EC vs CO would also be a useful check because EC and CO are both primary combustion products.

LEVEL I VALIDATION

Date	Start	Through	Code	Comments
19-June	18:23	19:44	S1(OC,EC)	OC/EC split suspect
30-June	15:19	17:40	S1(OC,EC)	outlier, split vs EC
30-June	18:19	20:40	S1(OC,EC)	outlier, split vs EC
4-July	21:24	23:45	S1(OC,EC)	outlier, split vs EC
5-July	00:24	02:45	S1(OC,EC)	outlier, split vs EC
5-July	03:24	05:45	S1(OC,EC)	outlier, split vs EC
19-July	06:32	11:52	S1(O,E,TC)	very brief signal overload possible
16-July	22:21	23:42	S1(OC,EC)	uncertainty in split due to low loading
17-Jul	00:21	07:42	I1(OC,EC)	loading too low to get good OC-EC split
23-Aug	14:19	15:40	S1(OC,EC)	uncert. spl., low load.
25-Aug	04:19	05:40	S1(OC,EC)	outlier, split vs EC uncert. spl., low load.
1-Sept	22:23	23:44	S1(OC,EC)	uncert. spl., low load.
2-Sept	00:23	01:44	S1(OC,EC)	uncert. spl., low load.
2-Sept	02:23	03:44	S1(OC,EC)	uncert. spl., low load.
2-Sept	12:24	13:44	S1(OC,EC)	uncert. spl., low load.
2-Sept	14:23	15:43	S1(OC,EC)	uncert. spl., low load.
8-Nov	04:00	05:21	Q1(OC,EC)	water vapor affected laser, correction made
10-Nov	23:21	00:02	Q1(OC,EC)	water vapor (see above)
16-Nov	05:50	09:21	S1(OC,EC)	heavy loading, OC/EC split inaccurate
18-Nov	02:24	03:45	Q1(OC,EC)	water vapor (see above)
2-Dec	20:19	3-Dec 13:43	Q1(OC,EC)	water vapor (see above)
3-Dec	18:19	5-Dec 21:41	S1(O,E,TC)	adsorbed vapor estimate is high (by < 10%) therefore total OC fine, but particulate OC (OC-ads.vap) is low
8-Dec	00:35	09:41	S1(O,E,TC)	ads. vap. (see above)

Appendix D

GRAPHS OF PARTICULATE ORGANIC AND ELEMENTAL CARBON  
FOR SEVERAL MULTI-DAY PERIODS

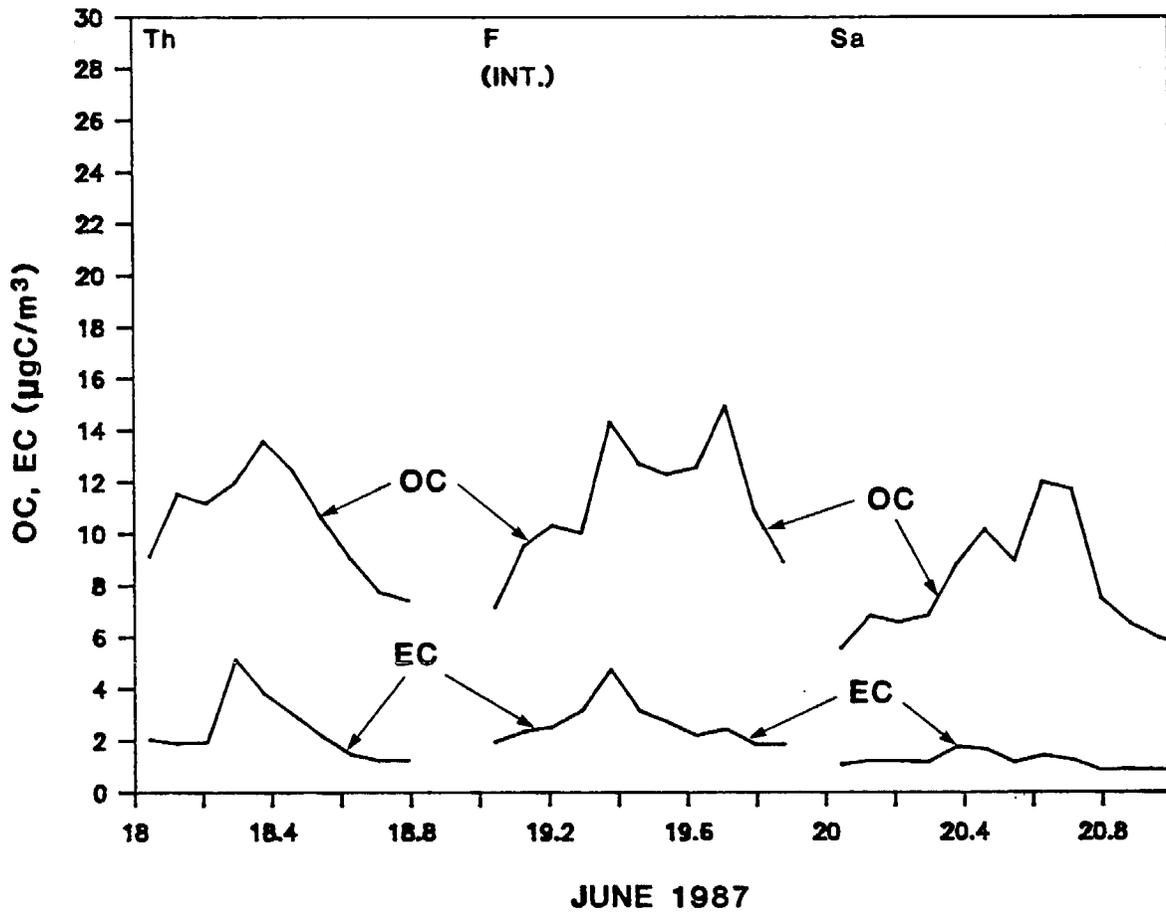


Figure D.1. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Claremont, California, June 18 - 20, 1987. June 19 was an intensive study day (INT).

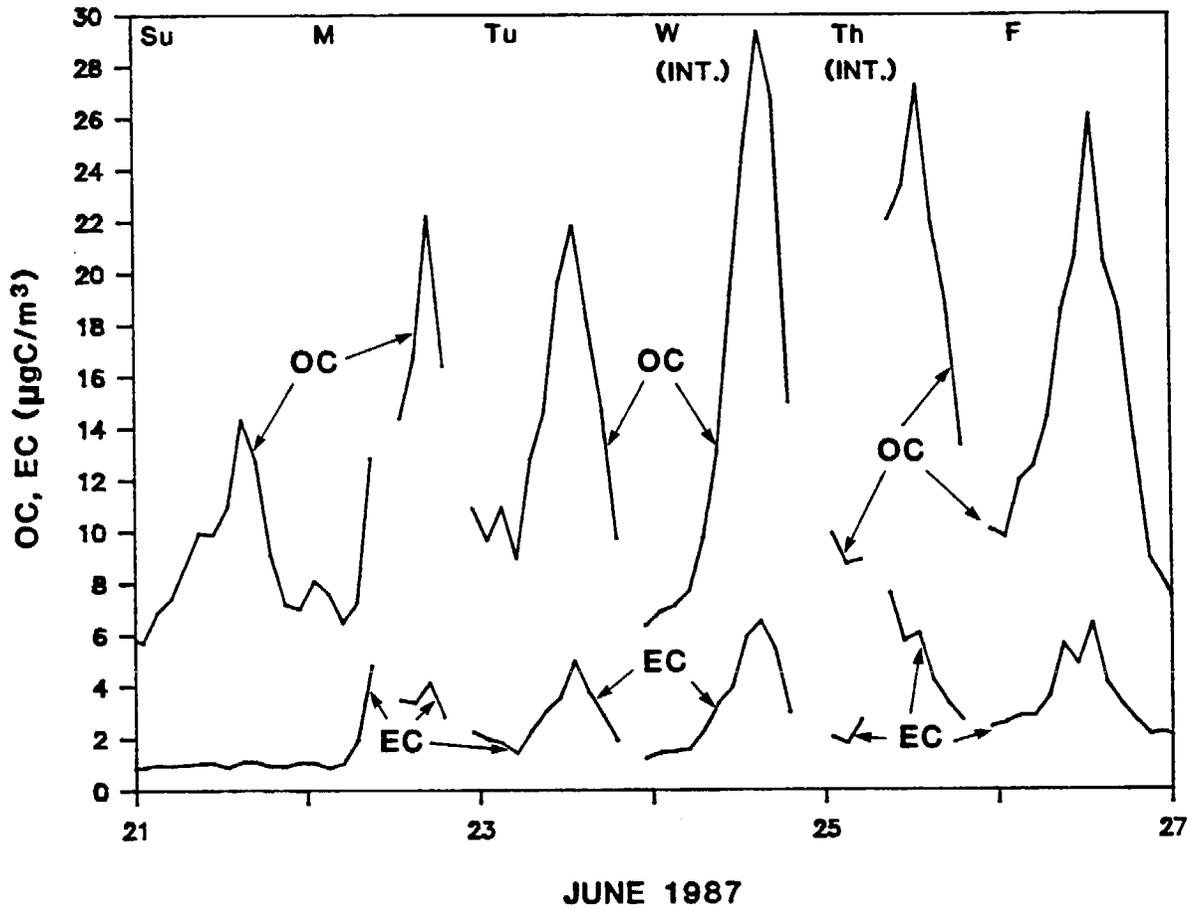


Figure D.2. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Claremont, California, June 21 - 26, 1987. June 24 and 25 were intensive study days (INT).

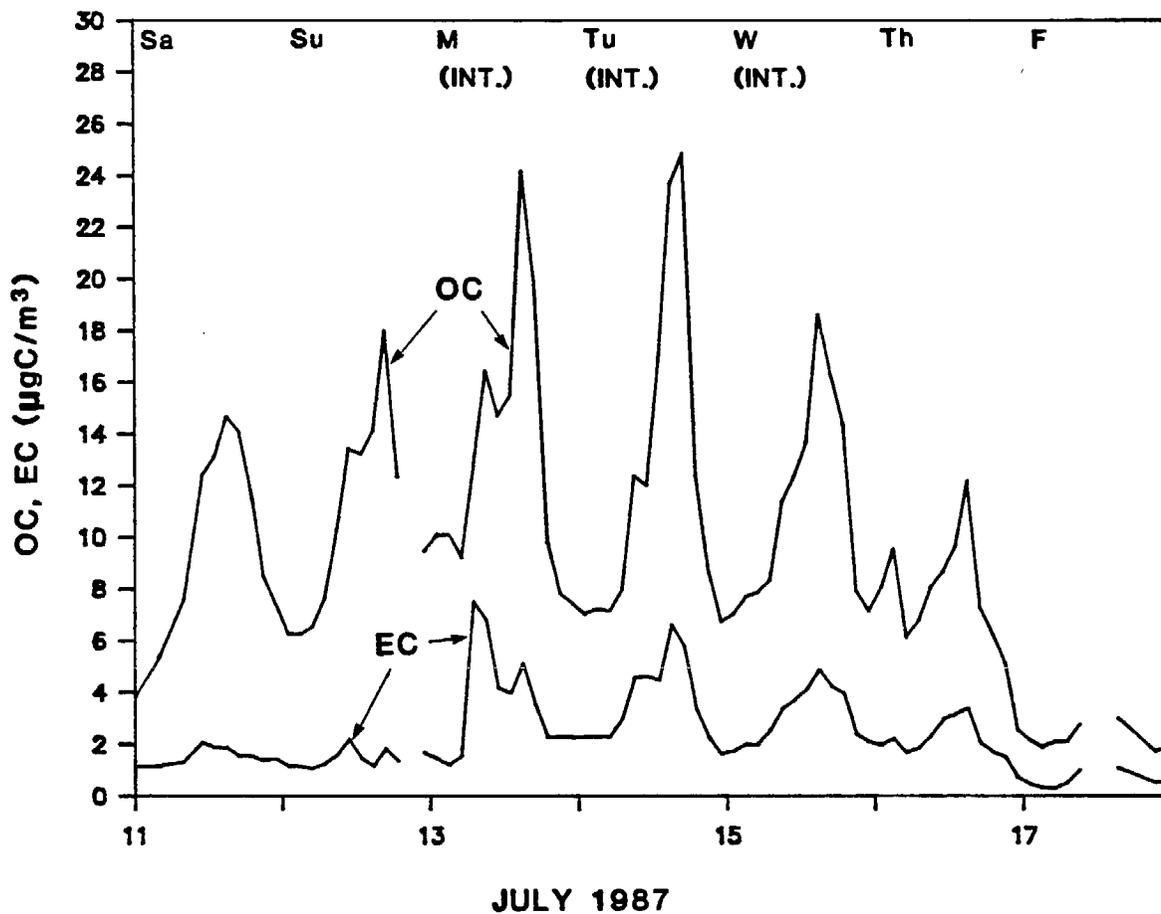


Figure D.3. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Claremont, California, July 11 - 17, 1987. July 13, 14 and 15 were intensive study days (INT).

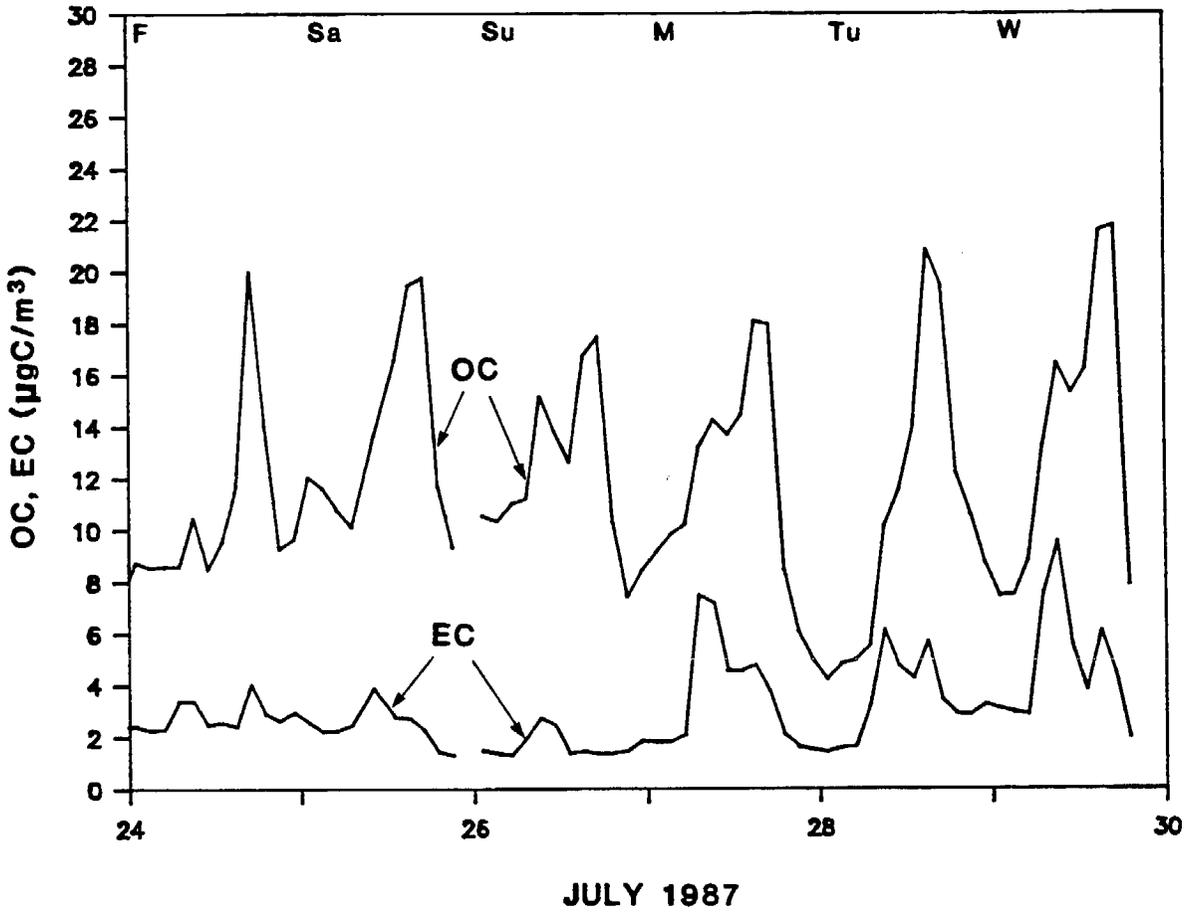


Figure D.4. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Claremont, California, July 24 - 29, 1987.

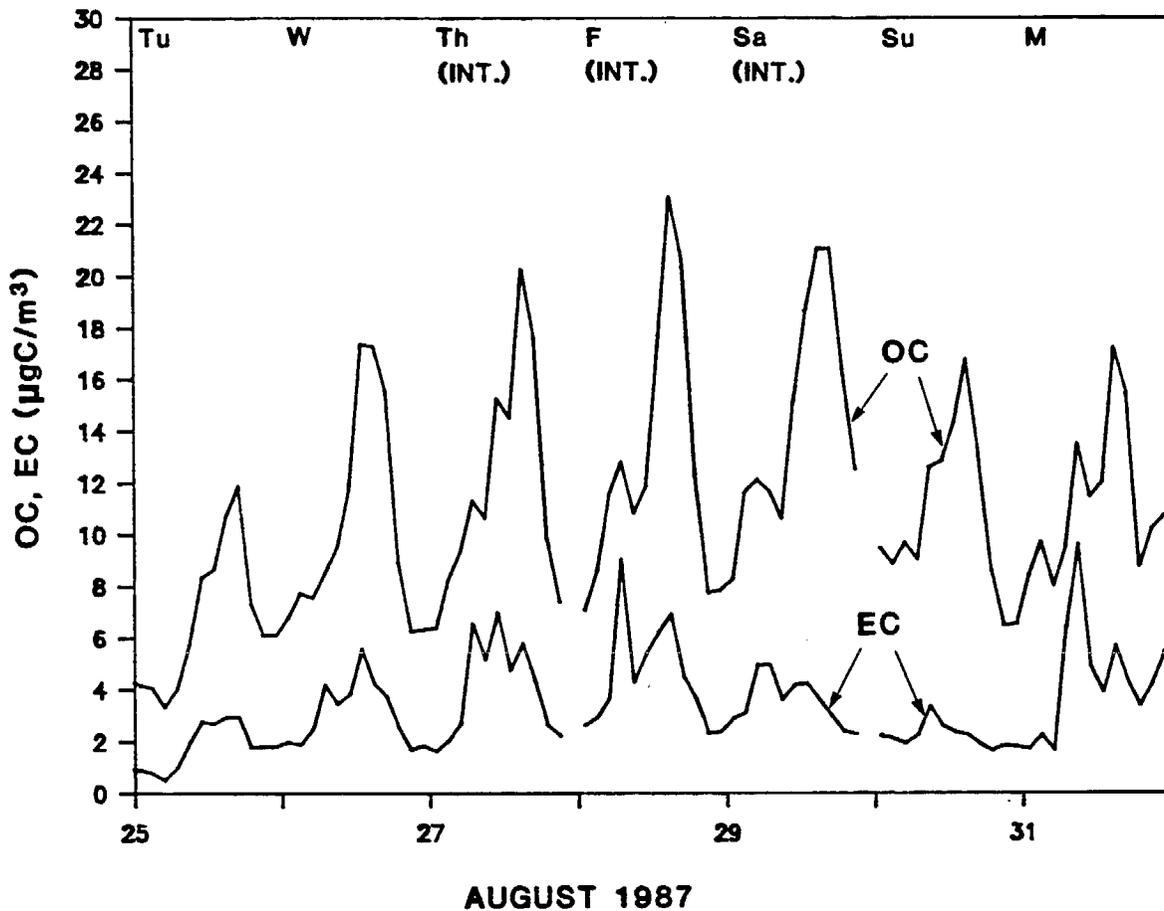


Figure D.5. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Claremont, California, August 25 - 31, 1987. August 27, 28 and 29 were intensive study days (INT).

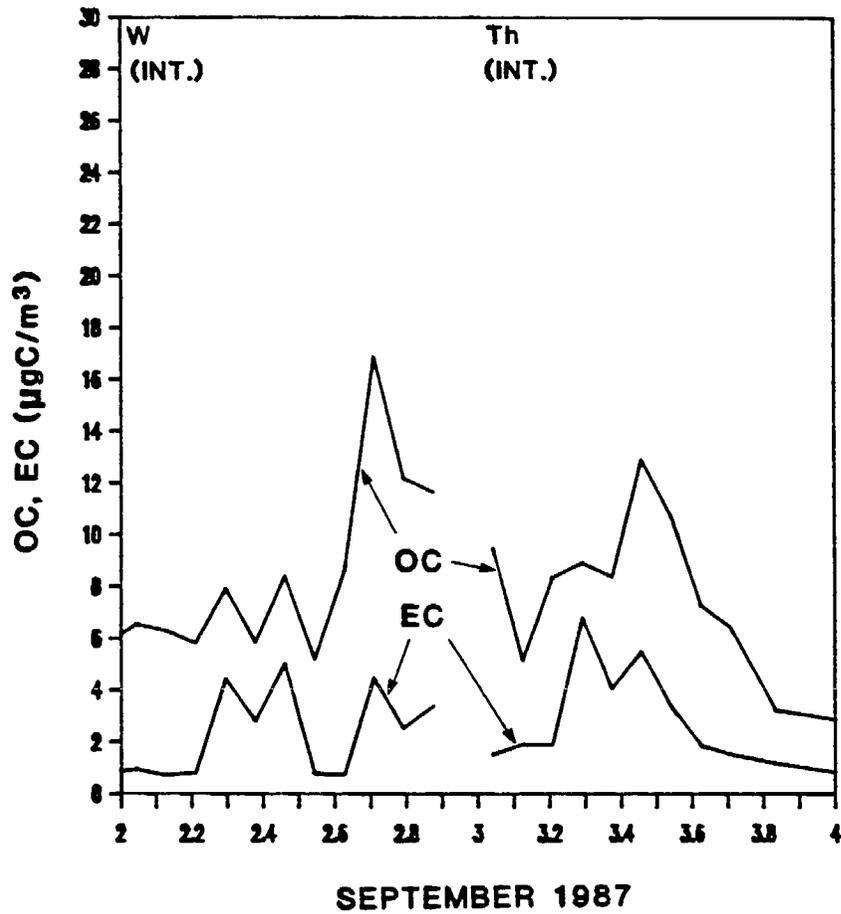


Figure D.6. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Claremont, California, September 2 - 3 1987. September 2 and 3 were intensive study days (INT).

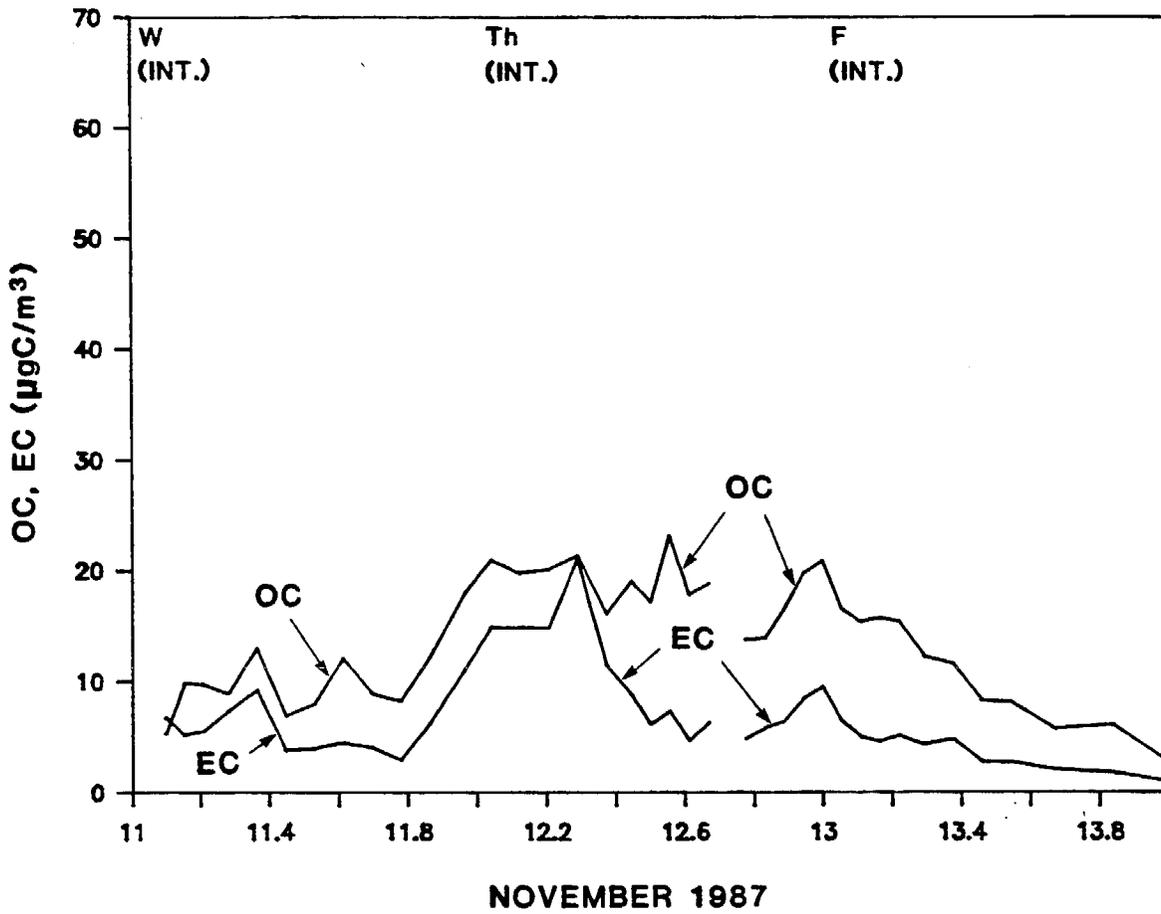


Figure D.7. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Long Beach, California, November 11 - 13, 1987. November 11, 12 and 13 were intensive study days (INT).

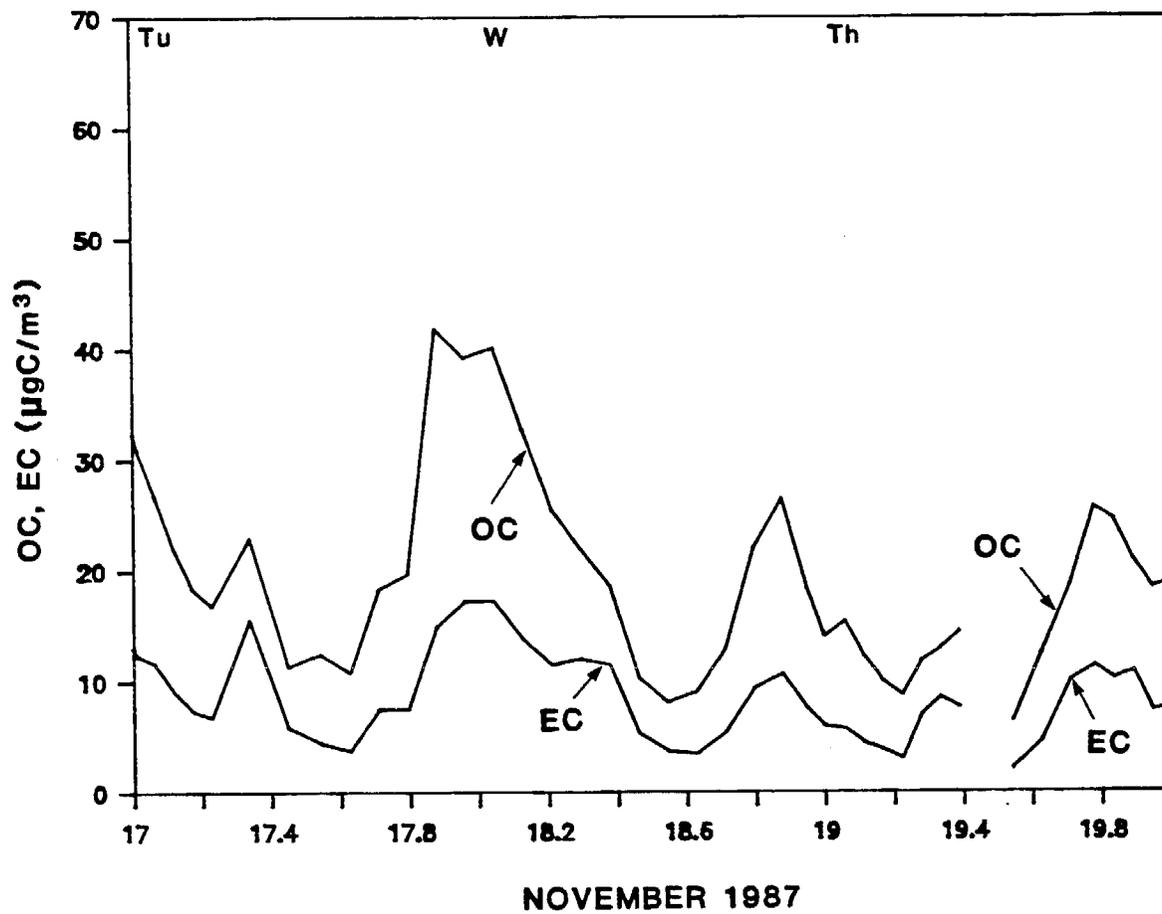


Figure D.8. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Long Beach, California, November 17 - 19, 1987.

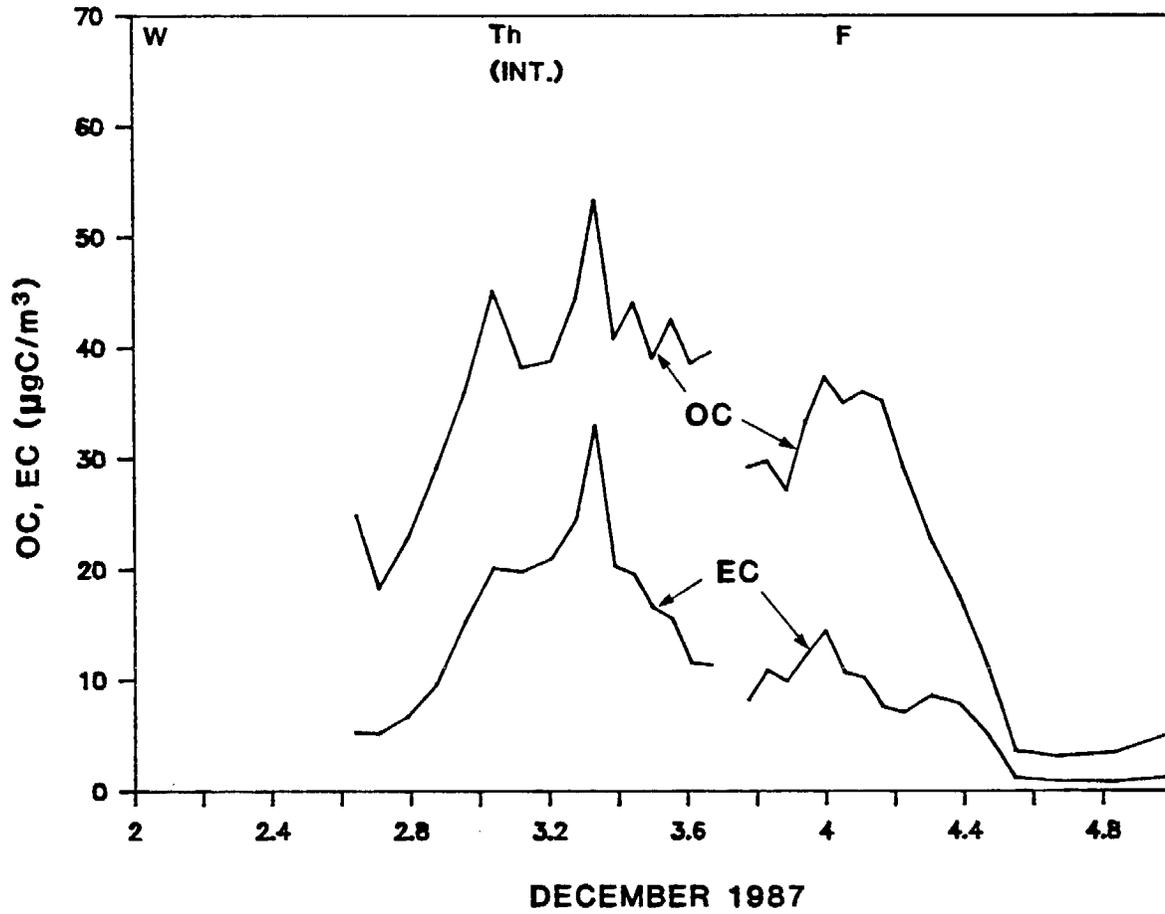


Figure D.9. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Long Beach, California, December 2 - 4, 1987. December 3 was an intensive study day (INT).

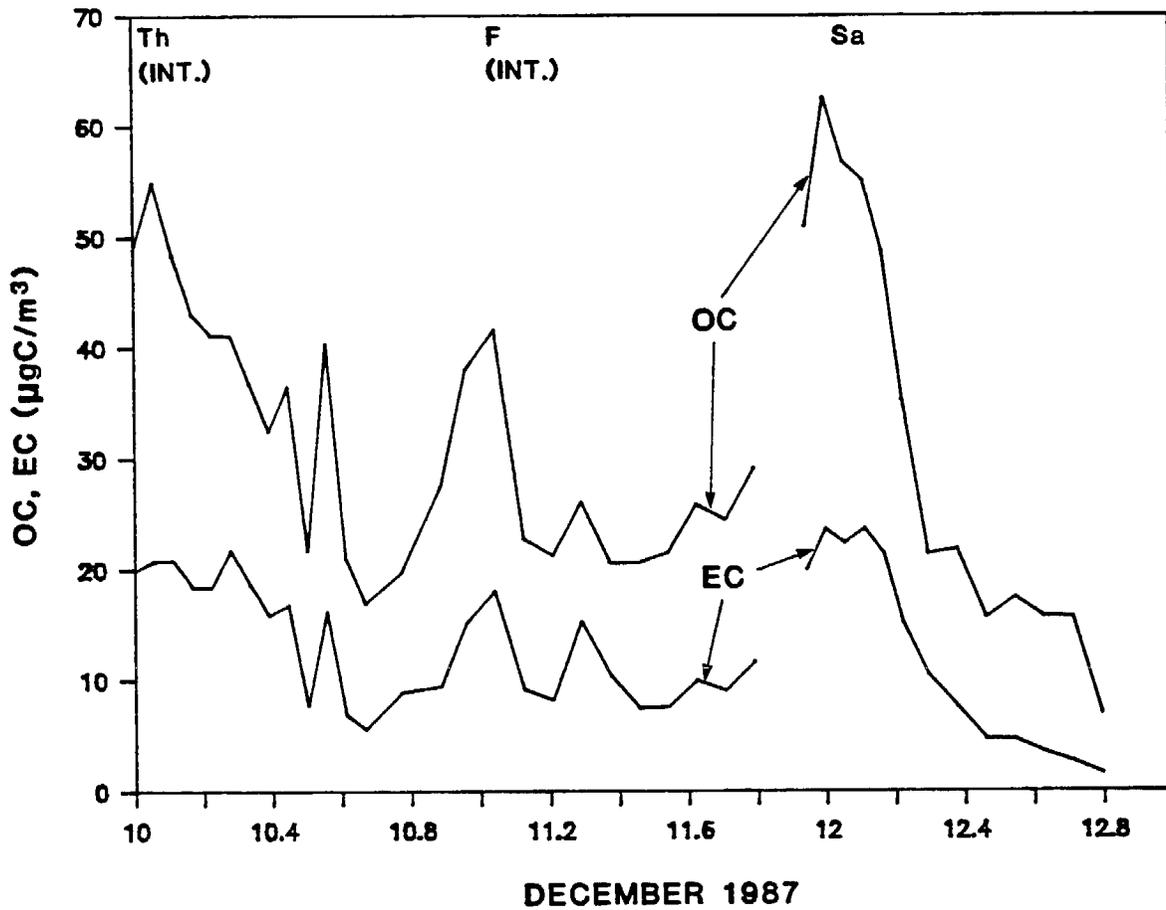


Figure D.10. Concentrations ( $\mu\text{gC}/\text{m}^3$ ) of particulate organic (OC) and elemental carbon (EC) at Long Beach, California, December 10 - 12, 1987. December 10 and 11 were intensive study days (INT).

Appendix E

IN SITU CARBON ANALYZER DATA

PROGRAM NAME: SCAQS - JUNE DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJUN.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR		TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON	
			(ugC/m3)	error	(ugC/m3)	error	(ugC/m3)	error	(ugC/m3)	error
10-Jun	22:19	01:39	3.3	0.3	7.4	0.3	5.4	0.7	2.0	0.3
11-Jun	02:18	05:38	3.2	0.3	9.6	0.3	7.8	0.9	1.9	0.3
11-Jun	06:17	09:37	3.6	0.3	13.3	0.4	10.0	1.1	3.3	0.3
11-Jun	18:21	19:41	6.8	0.3	15.2	0.5	12.6	1.6	2.6	0.3
11-Jun	20:20	21:40	5.7	0.3	10.3	0.4	8.5	1.2	1.8	0.3
11-Jun	22:19	23:39	4.7	0.3	8.1	0.3	6.5	0.9	1.7	0.3
12-Jun	00:20	08:26	1.9	0.3	8.0	0.3	5.7	0.6	2.3	0.3
12-Jun	09:05	09:35	9.7	0.3	13.6	0.6	11.2	1.8	2.5	0.3
12-Jun	12:20	13:40	7.2	0.3	22.9	0.7	18.6	2.2	4.3	0.3
12-Jun	14:19	15:39	8.2	0.3	27.9	0.8	23.4	2.7	4.4	0.3
12-Jun	16:18	17:38	7.2	0.3	18.4	0.6	15.7	1.9	2.7	0.3
12-Jun	18:17	19:37	6.4	0.3	16.0	0.5	13.8	1.7	2.3	0.3
12-Jun	20:16	21:36	5.4	0.3	13.1	0.4	10.8	1.4	2.2	0.3
12-Jun	22:15	23:35	5.6	0.3	9.5	0.4	7.6	1.1	1.9	0.3
13-Jun	00:14	01:34	5.6	0.3	9.4	0.4	7.1	1.1	2.3	0.3
13-Jun	02:13	03:33	4.4	0.3	10.3	0.3	8.1	1.1	2.2	0.3
13-Jun	04:12	05:32	4.0	0.3	9.6	0.3	7.6	1.0	2.0	0.3
13-Jun	06:11	07:31	4.6	0.3	11.4	0.4	9.2	1.2	2.2	0.3
13-Jun	08:10	09:30	5.7	0.3	14.3	0.5	12.1	1.5	2.2	0.3
13-Jun	10:09	11:29	6.1	0.3	17.0	0.5	14.7	1.8	2.3	0.3
13-Jun	12:08	13:28	7.0	0.3	21.0	0.6	18.7	2.2	2.4	0.3
13-Jun	14:07	15:27	7.1	0.3	24.1	0.7	21.5	2.4	2.6	0.3
13-Jun	16:06	17:26	6.8	0.3	20.5	0.6	18.5	2.1	2.0	0.3
13-Jun	18:05	19:25	6.0	0.3	15.4	0.5	13.9	1.7	1.5	0.3
13-Jun	22:22	23:43	4.2	0.3	11.6	0.4	9.5	1.2	2.1	0.3
14-Jun	00:22	01:43	3.6	0.3	17.8	0.5	13.1	1.4	4.7	0.3

PROGRAM NAME: SCAQS - JUNE DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJUN.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ugC/m3)	error	TOTAL CARBON (ugC/m3)			PARTICULATE		
					error	error	error	ORGANIC CARBON (ugC/m3)	CARBON error	ELEMENTAL CARBON (ugC/m3)
14-Jun	02:22	03:43	3.3	0.3	21.1	0.5	15.1	1.6	6.0	0.4
14-Jun	04:22	05:43	3.5	0.3	14.3	0.4	10.9	1.2	3.3	0.3
14-Jun	06:22	07:43	4.1	0.3	12.6	0.4	10.7	1.2	1.9	0.3
14-Jun	08:22	09:43	4.4	0.3	13.5	0.4	11.9	1.4	1.6	0.3
14-Jun	10:22	11:43	5.4	0.3	14.9	0.5	13.4	1.6	1.5	0.3
14-Jun	12:22	13:43	5.4	0.3	14.2	0.4	13.1	1.6	1.0	0.3
14-Jun	14:22	15:43	5.2	0.3	13.4	0.4	12.5	1.5	0.9	0.3
14-Jun	16:22	17:43	5.1	0.3	11.6	0.4	10.9	1.4	0.8	0.3
14-Jun	18:22	19:43	4.4	0.3	8.6	0.3	7.8	1.0	0.8	0.3
15-Jun	00:22	01:43	2.7	0.3	4.3	0.3	3.7	0.5	0.6	0.3
15-Jun	02:22	03:43	2.7	0.3	4.5	0.3	3.9	0.6	0.6	0.3
15-Jun	04:22	05:43	2.6	0.3	4.7	0.3	3.9	0.6	0.8	0.3
15-Jun	06:22	07:43	3.2	0.3	6.2	0.3	4.6	0.7	1.6	0.3
15-Jun	08:22	09:43	4.2	0.3	9.6	0.3	7.3	1.0	2.2	0.3
15-Jun	10:22	11:43	4.0	0.3	8.2	0.3	6.6	0.9	1.6	0.3
15-Jun	12:22	13:43	4.4	0.3	11.1	0.4	9.0	1.1	2.1	0.3
15-Jun	14:22	15:43	5.0	0.3	12.8	0.4	11.1	1.4	1.7	0.3
15-Jun	16:22	17:43	4.8	0.3	9.6	0.3	8.3	1.1	1.3	0.3
15-Jun	18:22	19:43	3.9	0.3	5.7	0.3	4.7	0.7	0.9	0.3
15-Jun	23:56	03:16	2.0	0.3	4.8	0.3	3.6	0.5	1.2	0.3
16-Jun	03:55	07:15	2.2	0.3	6.6	0.3	4.9	0.6	1.8	0.3
16-Jun	07:54	11:14	3.7	0.3	14.2	0.4	10.2	1.2	4.0	0.3
16-Jun	12:16	13:37	5.3	0.3	10.3	0.4	8.3	1.1	2.0	0.3
16-Jun	14:16	15:37	6.3	0.3	17.5	0.5	14.2	1.7	3.3	0.3
16-Jun	16:16	17:37	6.4	0.3	16.4	0.5	14.2	1.7	2.2	0.3
16-Jun	18:16	19:37	5.1	0.3	10.2	0.4	8.6	1.2	1.6	0.3

PROGRAM NAME:  
 ORGANIZATION:  
 SITE NAME:  
 SAMPLER:  
 ANALYSIS:  
 FILE NAME:  
 DATA:  
 UNITS:

SCAQS - JUNE DATA  
 OREGON GRADUATE CENTER - HUNTZICKER  
 CLAREMONT  
 IN-SITU CARBON ANALYZER  
 IN-SITU CARBON ANALYZER  
 OGCJUN.WK  
 PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ugC/m3)	error	TOTAL CARBON (ugC/m3)			PARTICULATE (ugC/m3)			ELEMENTAL CARBON (ugC/m3)		
					8.3	0.3	error	6.6	0.9	error	1.7	0.3	error
16-Jun	22:19	23:40	4.3	0.3	8.3	0.3	6.6	0.9	1.7	0.3	1.7	0.3	0.3
17-Jun	00:19	01:40	4.2	0.3	11.5	0.4	9.5	1.2	1.9	0.3	1.9	0.3	0.3
17-Jun	02:19	03:40	4.2	0.3	10.8	0.3	9.1	1.1	1.7	0.3	1.7	0.3	0.3
17-Jun	04:19	05:40	3.9	0.3	8.5	0.3	7.3	0.9	1.2	0.3	1.2	0.3	0.3
17-Jun	06:19	07:40	4.4	0.3	15.7	0.5	10.0	1.2	5.7	0.4	5.7	0.4	0.4
17-Jun	08:19	09:40	6.3	0.3	19.6	0.6	14.6	1.8	5.0	0.3	5.0	0.3	0.3
17-Jun	10:19	11:40	5.8	0.3	13.0	0.4	10.5	1.4	2.5	0.3	2.5	0.3	0.3
17-Jun	12:19	13:40	5.9	0.3	14.7	0.5	12.3	1.5	2.4	0.3	2.4	0.3	0.3
17-Jun	14:19	15:40	5.0	0.3	10.2	0.4	8.8	1.2	1.4	0.3	1.4	0.3	0.3
17-Jun	16:19	17:40	4.2	0.3	8.1	0.3	7.1	1.0	1.1	0.3	1.1	0.3	0.3
17-Jun	18:19	19:40	5.6	0.3	12.0	0.4	10.3	1.3	1.7	0.3	1.7	0.3	0.3
17-Jun	20:19	21:40	5.2	0.3	8.7	0.3	7.1	1.0	1.6	0.3	1.6	0.3	0.3
18-Jun	00:23	01:44	4.2	0.3	11.2	0.4	9.1	1.1	2.1	0.3	2.1	0.3	0.3
18-Jun	02:23	03:44	4.3	0.3	13.5	0.4	11.6	1.3	1.9	0.3	1.9	0.3	0.3
18-Jun	04:23	05:44	4.0	0.3	13.2	0.4	11.2	1.3	2.0	0.3	2.0	0.3	0.3
18-Jun	06:23	07:44	5.0	0.3	17.2	0.5	12.0	1.4	5.2	0.4	5.2	0.4	0.4
18-Jun	08:23	09:44	6.2	0.3	17.4	0.5	13.6	1.7	3.8	0.3	3.8	0.3	0.3
18-Jun	10:23	11:44	5.8	0.3	15.5	0.5	12.5	1.5	3.0	0.3	3.0	0.3	0.3
18-Jun	12:23	13:44	5.0	0.3	12.8	0.4	10.6	1.3	2.2	0.3	2.2	0.3	0.3
18-Jun	14:23	15:44	4.8	0.3	10.5	0.4	9.1	1.2	1.5	0.3	1.5	0.3	0.3
18-Jun	16:23	17:44	4.5	0.3	9.0	0.3	7.7	1.0	1.2	0.3	1.2	0.3	0.3
18-Jun	18:23	19:44	4.3	0.3	8.6	0.3	7.4	1.0	1.2	0.3	1.2	0.3	0.3
19-Jun	00:23	01:44	4.3	0.3	9.1	0.3	7.2	1.0	2.0	0.3	2.0	0.3	0.3
19-Jun	02:23	03:44	4.2	0.3	11.9	0.4	9.5	1.2	2.4	0.3	2.4	0.3	0.3
19-Jun	04:23	05:44	4.1	0.3	12.9	0.4	10.3	1.2	2.5	0.3	2.5	0.3	0.3
19-Jun	06:23	07:44	5.0	0.3	13.2	0.4	10.0	1.3	3.2	0.3	3.2	0.3	0.3

PROGRAM NAME: SCAQS - JUNE DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJUN.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ugC/m3)	error	TOTAL CARBON			PARTICULATE		
					(ugC/m3)	error	error	ORGANIC CARBON (ugC/m3)	error	ELEMENTAL CARBON (ugC/m3)
19-Jun	08:23	09:44	6.6	0.3	19.1	0.6	14.3	1.8	4.8	0.3
19-Jun	10:23	11:44	6.5	0.3	15.9	0.5	12.7	1.6	3.1	0.3
19-Jun	12:23	13:44	5.8	0.3	15.0	0.5	12.3	1.5	2.7	0.3
19-Jun	14:23	15:44	6.1	0.3	14.8	0.5	12.6	1.6	2.2	0.3
19-Jun	16:23	17:44	6.5	0.3	17.4	0.5	15.0	1.8	2.5	0.3
19-Jun	18:23	19:44	5.3	0.3	12.8	0.4	10.9	1.4	1.9	0.3
19-Jun	20:24	21:45	4.9	0.3	10.7	0.4	8.9	1.2	1.8	0.3
20-Jun	00:26	01:47	3.7	0.3	6.6	0.3	5.6	0.8	1.1	0.3
20-Jun	02:26	03:47	3.7	0.3	8.1	0.3	6.9	0.9	1.2	0.3
20-Jun	04:26	05:47	3.6	0.3	7.8	0.3	6.6	0.9	1.2	0.3
20-Jun	06:26	07:47	3.7	0.3	8.0	0.3	6.8	0.9	1.2	0.3
20-Jun	08:26	09:47	4.2	0.3	10.6	0.3	8.8	1.1	1.8	0.3
20-Jun	10:26	11:47	4.4	0.3	11.8	0.4	10.2	1.2	1.7	0.3
20-Jun	12:26	13:47	4.4	0.3	10.1	0.3	9.0	1.1	1.1	0.3
20-Jun	14:26	15:47	4.7	0.3	13.4	0.4	12.0	1.4	1.4	0.3
20-Jun	16:26	17:47	4.6	0.3	13.0	0.4	11.7	1.4	1.3	0.3
20-Jun	18:26	19:47	4.0	0.3	8.3	0.3	7.5	1.0	0.8	0.3
20-Jun	20:26	21:47	3.7	0.3	7.4	0.3	6.5	0.9	0.9	0.3
20-Jun	22:26	23:47	3.3	0.3	6.8	0.3	5.9	0.8	0.9	0.3
21-Jun	00:26	01:47	3.2	0.3	6.6	0.3	5.7	0.7	0.9	0.3
21-Jun	02:26	03:47	3.5	0.3	7.9	0.3	6.9	0.9	1.0	0.3
21-Jun	04:26	05:47	3.4	0.3	8.4	0.3	7.4	0.9	1.0	0.3
21-Jun	08:20	09:41	3.8	0.3	11.0	0.3	10.0	1.2	1.0	0.3
21-Jun	10:20	11:41	3.9	0.3	10.9	0.3	9.9	1.2	1.1	0.3
21-Jun	12:20	13:41	4.2	0.3	11.8	0.4	11.0	1.3	0.9	0.3

PROGRAM NAME: SCAQS - JUNE DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJUN.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC MEETER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ugC/m3)	error	PARTICULATE			TOTAL CARBON (ugC/m3)	error	ORGANIC CARBON (ugC/m3)	error	ELEMENTAL CARBON (ugC/m3)	error
					ADSORBED VAPOR	ORGANIC CARBON	ELEMENTAL CARBON						
21-Jun	14:20	15:41	4.4	0.3	15.5	0.4	14.4	1.6	1.1	0.3	1.1	0.3	
21-Jun	16:20	17:41	4.4	0.3	13.8	0.4	12.7	1.4	1.1	0.3	1.1	0.3	
21-Jun	18:20	19:41	3.9	0.3	10.0	0.3	9.1	1.1	0.9	0.3	0.9	0.3	
21-Jun	20:20	21:41	3.5	0.3	8.1	0.3	7.2	0.9	0.9	0.3	0.9	0.3	
21-Jun	22:20	23:41	3.3	0.3	8.1	0.3	7.0	0.9	1.1	0.3	1.1	0.3	
22-Jun	00:20	01:41	3.4	0.3	9.2	0.3	8.1	1.0	1.1	0.3	1.1	0.3	
22-Jun	02:20	03:41	3.1	0.3	8.5	0.3	7.6	0.9	0.8	0.3	0.8	0.3	
22-Jun	04:20	05:41	2.9	0.3	7.5	0.3	6.5	0.8	1.0	0.3	1.0	0.3	
22-Jun	06:20	07:41	3.6	0.3	9.2	0.3	7.3	0.9	1.9	0.3	1.9	0.3	
22-Jun	08:20	09:41	4.9	0.3	17.7	0.5	12.8	1.5	4.8	0.3	4.8	0.3	
22-Jun	12:20	13:41	5.5	0.3	17.9	0.5	14.4	1.7	3.5	0.3	3.5	0.3	
22-Jun	14:20	15:41	5.6	0.3	20.1	0.6	16.7	1.9	3.4	0.3	3.4	0.3	
22-Jun	16:20	17:41	7.0	0.3	26.4	0.8	22.2	2.5	4.2	0.3	4.2	0.3	
22-Jun	18:20	19:41	6.1	0.3	19.2	0.6	16.4	1.9	2.8	0.3	2.8	0.3	
22-Jun	22:25	23:46	4.7	0.3	13.1	0.4	10.9	1.3	2.2	0.3	2.2	0.3	
23-Jun	00:25	01:46	4.3	0.3	11.6	0.4	9.6	1.2	2.0	0.3	2.0	0.3	
23-Jun	02:25	03:46	4.0	0.3	12.7	0.4	10.9	1.3	1.8	0.3	1.8	0.3	
23-Jun	04:25	05:46	3.5	0.3	10.4	0.3	9.0	1.1	1.4	0.3	1.4	0.3	
23-Jun	06:25	07:46	4.6	0.3	15.1	0.4	12.8	1.5	2.3	0.3	2.3	0.3	
23-Jun	08:25	09:46	5.9	0.3	17.7	0.5	14.7	1.7	3.0	0.3	3.0	0.3	
23-Jun	10:25	11:46	6.2	0.3	23.2	0.7	19.6	2.2	3.6	0.3	3.6	0.3	
23-Jun	12:25	13:46	6.6	0.3	26.9	0.8	21.9	2.4	5.0	0.3	5.0	0.3	
23-Jun	14:25	15:46	6.5	0.3	22.0	0.6	18.2	2.1	3.8	0.3	3.8	0.3	
23-Jun	16:25	17:46	6.1	0.3	17.5	0.5	14.7	1.7	2.9	0.3	2.9	0.3	
23-Jun	18:25	19:46	4.9	0.3	11.6	0.4	9.7	1.2	1.9	0.3	1.9	0.3	
23-Jun	22:21	23:42	3.5	0.3	7.6	0.3	6.4	0.8	1.2	0.3	1.2	0.3	

PROGRAM NAME: SCAQS - JUNE DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJUN.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC MEYER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR		TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON	
			(ugC/m3)	error	(ugC/m3)	error	(ugC/m3)	error	(ugC/m3)	error
24-Jun	00:21	01:42	3.3	0.3	8.3	0.3	6.9	0.9	1.5	0.3
24-Jun	02:21	03:42	3.2	0.3	8.6	0.3	7.1	0.9	1.5	0.3
24-Jun	04:21	05:42	3.1	0.3	9.3	0.3	7.7	0.9	1.6	0.3
24-Jun	06:21	07:42	4.0	0.3	12.0	0.4	9.7	1.2	2.3	0.3
24-Jun	08:21	09:42	5.6	0.3	16.5	0.5	13.1	1.6	3.3	0.3
24-Jun	10:21	11:42	6.3	0.3	23.1	0.7	19.1	2.1	4.0	0.3
24-Jun	12:21	13:42	7.1	0.3	30.7	0.8	24.8	2.7	5.9	0.4
24-Jun	14:21	15:42	7.7	0.3	35.9	1.0	29.4	3.1	6.5	0.5
24-Jun	16:21	17:42	8.0	0.3	32.2	0.9	26.8	2.9	5.5	0.4
24-Jun	18:21	19:42	6.2	0.3	18.0	0.5	15.0	1.8	3.0	0.3
25-Jun	00:22	01:43	4.1	0.3	12.0	0.4	9.9	1.2	2.0	0.3
25-Jun	02:22	03:43	3.8	0.3	10.5	0.3	8.7	1.1	1.8	0.3
25-Jun	04:22	05:43	4.2	0.3	11.6	0.4	8.9	1.1	2.7	0.3
25-Jun	08:21	09:42	7.5	0.3	29.7	0.8	22.1	2.5	7.6	0.5
25-Jun	10:21	11:42	7.9	0.3	29.1	0.8	23.4	2.6	5.7	0.4
25-Jun	12:21	13:42	7.8	0.3	33.4	0.9	27.3	3.0	6.1	0.4
25-Jun	14:21	15:42	7.4	0.3	26.1	0.8	21.9	2.5	4.2	0.3
25-Jun	16:21	17:42	7.1	0.3	22.1	0.7	18.7	2.2	3.4	0.3
25-Jun	18:21	19:42	5.9	0.3	16.0	0.5	13.3	1.6	2.7	0.3
25-Jun	22:22	23:43	4.9	0.3	12.5	0.4	10.1	1.3	2.4	0.3
26-Jun	00:22	01:43	4.5	0.3	12.4	0.4	9.8	1.2	2.6	0.3
26-Jun	02:22	03:43	4.3	0.3	14.8	0.4	12.0	1.4	2.9	0.3
26-Jun	04:22	05:43	4.2	0.3	15.4	0.4	12.5	1.4	2.8	0.3
26-Jun	06:22	07:43	5.3	0.3	18.1	0.5	14.4	1.7	3.6	0.3
26-Jun	08:22	09:43	7.2	0.3	24.2	0.7	18.6	2.2	5.6	0.4
26-Jun	10:22	11:43	7.4	0.3	25.5	0.7	20.7	2.4	4.8	0.3

PROGRAM NAME: SCAQS - JUNE DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJUN.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ugC/m3) error	TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON		
				(ugC/m3)	error	ORGANIC CARBON (ugC/m3)	error	(ugC/m3)	error	
26-Jun	12:22	13:43	7.8	0.3	32.6	0.9	26.1	2.9	6.4	0.4
26-Jun	14:22	15:43	7.3	0.3	24.5	0.7	20.4	2.3	4.1	0.3
26-Jun	16:22	17:43	6.8	0.3	21.8	0.6	18.5	2.1	3.3	0.3
26-Jun	18:22	19:43	6.1	0.3	16.2	0.5	13.5	1.7	2.7	0.3
26-Jun	20:22	21:43	5.0	0.3	11.0	0.4	8.9	1.2	2.1	0.3
26-Jun	22:22	23:43	4.2	0.3	10.2	0.3	8.0	1.0	2.2	0.3
27-Jun	00:22	01:43	3.9	0.3	8.8	0.3	6.9	0.9	1.9	0.3
27-Jun	02:22	03:43	3.5	0.3	8.7	0.3	7.0	0.9	1.7	0.3
27-Jun	04:22	05:43	3.4	0.3	9.3	0.3	7.2	0.9	2.0	0.3
27-Jun	06:22	07:43	4.7	0.3	11.5	0.4	8.8	1.1	2.6	0.3
27-Jun	08:22	09:43	6.2	0.3	16.4	0.5	13.3	1.6	3.2	0.3
27-Jun	10:22	11:43	6.7	0.3	19.8	0.6	16.8	2.0	3.0	0.3
27-Jun	12:22	13:43	6.7	0.3	22.5	0.7	19.6	2.2	2.9	0.3
27-Jun	14:22	15:43	6.3	0.3	22.7	0.7	20.4	2.2	2.3	0.3
27-Jun	16:22	17:43	6.1	0.3	22.6	0.6	20.5	2.2	2.1	0.3
27-Jun	18:22	19:43	5.2	0.3	14.1	0.4	12.5	1.5	1.6	0.3
27-Jun	20:22	21:43	4.4	0.3	9.6	0.3	8.4	1.1	1.1	0.3
28-Jun	00:21	01:42	3.3	0.3	10.1	0.3	8.5	1.0	1.7	0.3
28-Jun	02:21	03:42	3.0	0.3	9.1	0.3	7.7	0.9	1.4	0.3
28-Jun	04:21	05:42	3.1	0.3	10.1	0.3	8.8	1.0	1.3	0.3
28-Jun	06:21	07:42	3.7	0.3	10.3	0.3	8.9	1.1	1.4	0.3
28-Jun	08:21	09:42	4.8	0.3	13.7	0.4	12.1	1.4	1.5	0.3
28-Jun	10:24	12:45	3.8	0.3	16.0	0.4	14.1	1.5	1.8	0.3
28-Jun	13:24	15:45	3.6	0.3	14.7	0.4	13.4	1.4	1.4	0.3
28-Jun	16:24	18:45	3.7	0.3	14.9	0.4	13.6	1.5	1.3	0.3
28-Jun	19:24	21:45	3.2	0.3	8.8	0.3	7.8	0.9	1.0	0.3

PROGRAM NAME: SCAQS - JUNE DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJUN.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR		TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON	
			(ugC/m3)	error	(ugC/m3)	error	ORGANIC CARBON (ugC/m3)	error	(ugC/m3)	error
29-Jun	00:20	05:41	1.7	0.3	7.3	0.3	6.0	0.6	1.4	0.3
29-Jun	06:20	11:41	2.3	0.3	11.7	0.3	8.9	0.9	2.9	0.3
29-Jun	18:20	23:41	2.1	0.3	7.8	0.3	5.9	0.7	1.9	0.3
30-Jun	00:20	05:41	1.6	0.3	5.8	0.3	4.4	0.5	1.4	0.3
30-Jun	06:22	08:21	2.8	0.3	8.6	0.3	7.0	0.8	1.6	0.3
30-Jun	15:19	17:40	4.3	0.3	19.1	0.5	16.1	1.7	3.0	0.3
30-Jun	18:19	20:40	3.8	0.3	13.0	0.4	10.7	1.2	2.3	0.3
30-Jun	21:19	23:40	2.7	0.3	7.0	0.3	5.4	0.7	1.6	0.3

PROGRAM NAME:  
 ORGANIZATION:  
 SITE NAME:  
 SAMPLER:  
 ANALYSIS:  
 FILE NAME:  
 DATA:  
 UNITS:

SCAQS - JULY DATA  
 OREGON GRADUATE CENTER - HUNTZICKER  
 CLAREMONT  
 IN-SITU CARBON ANALYZER  
 IN-SITU CARBON ANALYZER  
 OGCJLY.WK  
 PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)	error	ORGANIC CARBON (ug/m3)	error	PARTICULATE CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
01-Jul	00:19	02:40	2.3	0.3	6.9	0.3	5.5	0.7	1.4	0.3	1.4	0.3
01-Jul	03:19	05:40	2.4	0.3	9.3	0.3	7.4	0.8	2.0	0.3	2.0	0.3
01-Jul	06:22	07:43	3.9	0.3	13.6	0.4	8.8	1.1	4.8	0.3	4.8	0.3
01-Jul	08:22	09:43	5.1	0.3	15.3	0.5	11.3	1.4	4.0	0.3	4.0	0.3
01-Jul	10:22	11:43	5.0	0.3	13.1	0.4	10.9	1.3	2.2	0.3	2.2	0.3
01-Jul	12:22	13:43	5.0	0.3	15.4	0.5	12.8	1.5	2.6	0.3	2.6	0.3
01-Jul	14:22	15:43	5.3	0.3	17.7	0.5	14.7	1.7	3.0	0.3	3.0	0.3
01-Jul	16:22	17:43	5.6	0.3	19.2	0.6	16.1	1.8	3.1	0.3	3.1	0.3
01-Jul	18:22	19:43	5.1	0.3	12.7	0.4	10.6	1.3	2.0	0.3	2.0	0.3
01-Jul	21:57	00:05	2.9	0.3	8.8	0.3	6.8	0.8	2.0	0.3	2.0	0.3
02-Jul	00:44	02:52	2.5	0.3	7.8	0.3	6.0	0.7	1.8	0.3	1.8	0.3
02-Jul	03:31	05:39	2.4	0.3	8.8	0.3	7.0	0.8	1.9	0.3	1.9	0.3
02-Jul	06:21	07:42	3.7	0.3	12.3	0.4	9.8	1.1	2.5	0.3	2.5	0.3
02-Jul	08:21	09:42	5.7	0.3	18.6	0.5	13.8	1.6	4.8	0.3	4.8	0.3
02-Jul	10:21	11:42	6.2	0.3	20.0	0.6	16.4	1.9	3.6	0.3	3.6	0.3
02-Jul	12:21	13:42	5.9	0.3	18.4	0.5	14.6	1.7	3.8	0.3	3.8	0.3
02-Jul	14:21	15:42	6.1	0.3	20.9	0.6	17.7	2.0	3.2	0.3	3.2	0.3
02-Jul	16:21	17:42	6.2	0.3	21.5	0.6	18.1	2.0	3.4	0.3	3.4	0.3
02-Jul	18:21	19:42	5.7	0.3	14.7	0.5	12.1	1.5	2.6	0.3	2.6	0.3
02-Jul	20:21	21:42	4.6	0.3	12.0	0.4	9.7	1.2	2.3	0.3	2.3	0.3
02-Jul	22:24	01:04	2.7	0.3	9.1	0.3	7.1	0.8	1.9	0.3	1.9	0.3
03-Jul	01:43	04:23	2.4	0.3	9.3	0.3	7.3	0.8	2.1	0.3	2.1	0.3
03-Jul	05:02	07:42	2.7	0.3	11.4	0.3	8.8	1.0	2.6	0.3	2.6	0.3
03-Jul	08:24	09:45	5.7	0.3	17.9	0.5	14.1	1.7	3.8	0.3	3.8	0.3
03-Jul	10:24	11:45	6.2	0.3	18.8	0.6	15.5	1.8	3.3	0.3	3.3	0.3
03-Jul	12:24	13:45	6.1	0.3	19.3	0.6	16.1	1.9	3.2	0.3	3.2	0.3

PROGRAM NAME: SCAQS - JULY DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJLY.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)	error	ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
03-Jul	14:24	15:45	5.8	0.3	18.1	0.5	15.7	1.8	2.5	0.3
04-Jul	12:24	13:45	4.9	0.3	12.1	0.4	10.9	1.3	1.2	0.3
04-Jul	15:24	17:45	3.8	0.3	12.5	0.4	11.4	1.3	1.1	0.3
04-Jul	18:24	20:45	3.9	0.3	12.0	0.4	10.6	1.2	1.3	0.3
04-Jul	21:24	23:45	3.5	0.3	12.6	0.4	10.7	1.2	1.8	0.3
05-Jul	00:24	02:45	2.9	0.3	11.2	0.3	9.5	1.0	1.8	0.3
05-Jul	03:24	05:45	2.7	0.3	11.2	0.3	9.9	1.1	1.3	0.3
05-Jul	06:24	08:45	3.2	0.3	11.5	0.3	10.1	1.1	1.4	0.3
05-Jul	09:24	11:45	3.9	0.3	12.2	0.4	11.1	1.3	1.1	0.3
05-Jul	12:24	14:45	3.5	0.3	10.8	0.3	9.9	1.1	0.9	0.3
05-Jul	15:24	17:45	3.6	0.3	11.6	0.3	10.8	1.2	0.8	0.3
05-Jul	18:24	20:45	3.1	0.3	8.1	0.3	7.3	0.9	0.8	0.3
05-Jul	21:22	01:42	2.6	0.3	7.2	0.3	6.0	0.7	1.2	0.3
06-Jul	02:21	05:41	2.2	0.3	5.9	0.3	5.1	0.6	0.8	0.3
06-Jul	06:20	09:40	2.2	0.3	6.8	0.3	5.5	0.7	1.3	0.3
06-Jul	10:19	13:39	3.1	0.3	11.6	0.3	9.7	1.1	1.9	0.3
06-Jul	14:18	17:38	3.0	0.3	13.6	0.4	11.4	1.2	2.2	0.3
06-Jul	18:17	21:37	3.2	0.3	11.6	0.3	10.0	1.1	2.1	0.3
07-Jul	00:20	03:41	2.5	0.3	12.4	0.3	9.6	1.1	2.4	0.3
07-Jul	04:20	07:41	2.5	0.3	11.8	0.3	9.6	1.0	2.1	0.3
07-Jul	08:23	09:44	5.3	0.3	18.0	0.5	14.8	1.7	3.1	0.3
07-Jul	10:23	11:44	6.2	0.3	18.1	0.5	14.6	1.7	3.5	0.3
07-Jul	12:23	13:44	5.8	0.3	16.5	0.5	13.9	1.7	2.6	0.3
07-Jul	14:23	15:44	5.7	0.3	15.9	0.5	13.5	1.6	2.4	0.3
07-Jul	16:23	17:44	6.2	0.3	20.1	0.6	17.2	2.0	3.0	0.3
07-Jul	18:26	21:46	3.4	0.3	11.7	0.3	9.4	1.1	2.3	0.3

PROGRAM NAME: SCAQS - JULY DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJLY.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)	error	ORGANIC CARBON (ug/m3)	error	PARTICULATE CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
07-Jul	22:25	01:45	2.5	0.3	7.0	0.3	5.6	0.7	1.4	0.3	0.3	0.3
08-Jul	02:24	05:44	2.4	0.3	9.0	0.3	7.1	0.8	1.9	0.3	0.3	0.3
08-Jul	06:23	09:43	3.1	0.3	13.3	0.4	10.4	1.1	2.9	0.3	0.3	0.3
08-Jul	10:52	12:12	5.8	0.3	19.1	0.6	16.3	1.9	2.8	0.3	0.3	0.3
08-Jul	12:51	14:11	5.6	0.3	17.9	0.5	15.0	1.7	3.0	0.3	0.3	0.3
08-Jul	14:50	16:10	5.5	0.3	17.9	0.5	15.2	1.7	2.7	0.3	0.3	0.3
08-Jul	16:49	18:09	4.9	0.3	13.6	0.4	11.8	1.4	1.9	0.3	0.3	0.3
08-Jul	18:48	20:08	3.7	0.3	8.4	0.3	7.2	0.9	1.1	0.3	0.3	0.3
08-Jul	22:20	01:41	2.2	0.3	6.1	0.3	4.9	0.6	1.1	0.3	0.3	0.3
09-Jul	02:20	05:41	2.2	0.3	6.8	0.3	5.7	0.7	1.1	0.3	0.3	0.3
09-Jul	06:20	09:41	2.2	0.3	6.9	0.3	5.0	0.6	1.8	0.3	0.3	0.3
09-Jul	10:24	11:45	4.0	0.3	11.7	0.4	9.3	1.1	2.5	0.3	0.3	0.3
09-Jul	12:24	13:45	4.8	0.3	14.2	0.4	12.3	1.4	1.9	0.3	0.3	0.3
09-Jul	14:24	15:45	4.7	0.3	13.5	0.4	11.3	1.4	2.2	0.3	0.3	0.3
09-Jul	16:24	17:45	4.8	0.3	12.3	0.4	10.4	1.3	1.9	0.3	0.3	0.3
09-Jul	18:27	21:48	2.2	0.3	6.6	0.3	5.4	0.6	1.2	0.3	0.3	0.3
09-Jul	22:27	01:48	1.7	0.3	4.5	0.3	3.7	0.5	0.8	0.3	0.3	0.3
10-Jul	02:27	05:48	1.7	0.3	4.5	0.3	3.7	0.5	0.8	0.3	0.3	0.3
10-Jul	06:27	09:48	1.7	0.3	5.4	0.3	4.4	0.5	1.0	0.3	0.3	0.3
10-Jul	10:27	13:48	2.3	0.3	9.2	0.3	7.3	0.8	1.9	0.3	0.3	0.3
10-Jul	14:27	17:48	2.9	0.3	12.5	0.3	10.0	1.1	2.5	0.3	0.3	0.3
10-Jul	22:23	01:43	1.8	0.3	5.0	0.3	3.8	0.5	1.1	0.3	0.3	0.3
11-Jul	02:22	05:42	1.9	0.3	6.5	0.3	5.4	0.6	1.1	0.3	0.3	0.3
11-Jul	06:21	09:41	2.3	0.3	8.9	0.3	7.6	0.8	1.3	0.3	0.3	0.3
11-Jul	10:23	11:43	4.6	0.3	14.5	0.4	12.4	1.4	2.1	0.3	0.3	0.3
11-Jul	12:22	13:42	5.3	0.3	15.0	0.5	13.1	1.6	1.9	0.3	0.3	0.3

PROGRAM NAME: SCAQS - JULY DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJLY.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)	error	ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
11-Jul	14:21	15:41	5.2	0.3	16.5	0.5	14.7	1.7	1.9	0.3
11-Jul	16:20	17:40	5.3	0.3	15.6	0.5	14.1	1.6	1.6	0.3
11-Jul	18:19	19:39	5.1	0.3	13.3	0.4	11.7	1.4	1.6	0.3
11-Jul	20:18	21:38	4.3	0.3	9.9	0.3	8.5	1.1	1.4	0.3
11-Jul	22:17	23:37	3.6	0.3	8.8	0.3	7.4	0.9	1.5	0.3
12-Jul	00:16	01:36	3.1	0.3	7.5	0.3	6.3	0.8	1.2	0.3
12-Jul	02:15	03:35	2.9	0.3	7.4	0.3	6.2	0.8	1.1	0.3
12-Jul	04:14	05:34	2.9	0.3	7.6	0.3	6.6	0.8	1.0	0.3
12-Jul	06:13	07:33	3.4	0.3	8.9	0.3	7.6	0.9	1.3	0.3
12-Jul	08:12	09:32	5.0	0.3	11.9	0.4	10.3	1.3	1.6	0.3
12-Jul	10:11	11:31	5.9	0.3	15.6	0.5	13.5	1.6	2.2	0.3
12-Jul	12:10	13:30	5.8	0.3	14.7	0.5	13.2	1.6	1.5	0.3
12-Jul	14:09	15:29	5.3	0.3	15.3	0.5	14.2	1.6	1.1	0.3
12-Jul	16:08	17:28	6.0	0.3	19.8	0.6	18.0	2.0	1.8	0.3
12-Jul	18:07	19:27	5.3	0.3	13.7	0.4	12.3	1.5	1.4	0.3
12-Jul	22:21	23:42	4.3	0.3	11.2	0.4	9.5	1.2	1.7	0.3
13-Jul	00:21	01:42	4.2	0.3	11.5	0.4	10.1	1.2	1.5	0.3
13-Jul	02:21	03:42	4.1	0.3	11.3	0.4	10.1	1.2	1.2	0.3
13-Jul	04:21	05:42	3.9	0.3	10.8	0.3	9.2	1.1	1.5	0.3
13-Jul	06:21	07:42	4.8	0.3	20.3	0.6	12.8	1.5	7.5	0.5
13-Jul	08:21	09:42	6.8	0.3	23.3	0.7	16.5	2.0	6.8	0.5
13-Jul	10:21	11:42	6.6	0.3	18.9	0.6	14.7	1.8	4.2	0.3
13-Jul	12:21	13:42	6.2	0.3	19.5	0.6	15.5	1.8	4.0	0.3
13-Jul	14:21	15:42	7.7	0.3	29.3	0.8	24.2	2.7	5.1	0.4
13-Jul	16:21	17:42	7.4	0.3	23.3	0.7	19.7	2.3	3.5	0.3

PROGRAM NAME: SCAQS - JULY DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJLY.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)		PARTICULATE ORGANIC CARBON (ug/m3)		ELEMENTAL CARBON (ug/m3)	
					error	error	error	error	error	error
13-Jul	18:21	19:42	5.7	0.3	12.0	0.4	9.8	1.3	2.3	0.3
13-Jul	20:21	21:42	5.0	0.3	10.1	0.4	7.8	1.1	2.3	0.3
13-Jul	22:21	23:42	4.4	0.3	9.7	0.3	7.4	1.0	2.3	0.3
14-Jul	00:21	01:42	4.3	0.3	9.3	0.3	7.0	1.0	2.3	0.3
14-Jul	02:21	03:42	4.0	0.3	9.6	0.3	7.3	0.9	2.3	0.3
14-Jul	04:21	05:42	3.7	0.3	9.4	0.3	7.1	0.9	2.3	0.3
14-Jul	06:21	07:42	4.9	0.3	11.0	0.4	8.0	1.1	3.0	0.3
14-Jul	08:21	09:42	6.7	0.3	17.0	0.5	12.4	1.6	4.6	0.3
14-Jul	10:21	11:42	6.9	0.3	16.6	0.5	12.0	1.6	4.7	0.3
14-Jul	12:21	13:42	7.2	0.3	21.3	0.6	16.8	2.0	4.5	0.3
14-Jul	14:21	15:42	8.3	0.3	30.3	0.9	23.7	2.7	6.6	0.5
14-Jul	16:21	17:42	8.8	0.3	30.7	0.9	24.9	2.8	5.8	0.4
14-Jul	18:21	19:42	7.1	0.3	15.7	0.5	12.4	1.6	3.4	0.3
14-Jul	20:21	21:42	4.8	0.3	10.9	0.4	8.6	1.1	2.3	0.3
14-Jul	22:21	23:42	3.8	0.3	8.3	0.3	6.7	0.9	1.6	0.3
15-Jul	00:21	01:42	3.6	0.3	8.8	0.3	7.0	0.9	1.7	0.3
15-Jul	02:21	03:42	3.6	0.3	9.7	0.3	7.7	1.0	2.0	0.3
15-Jul	04:21	05:42	3.5	0.3	9.9	0.3	7.9	1.0	2.0	0.3
15-Jul	06:21	07:42	4.3	0.3	10.9	0.3	8.4	1.1	2.5	0.3
15-Jul	08:21	09:42	5.1	0.3	14.7	0.5	11.4	1.4	3.4	0.3
15-Jul	10:21	11:42	5.9	0.3	16.1	0.5	12.4	1.5	3.7	0.3
15-Jul	12:21	13:42	6.3	0.3	17.8	0.5	13.7	1.7	4.2	0.3
15-Jul	14:21	15:42	6.9	0.3	23.5	0.7	18.6	2.2	4.9	0.3
15-Jul	16:21	17:42	7.0	0.3	20.5	0.6	16.3	2.0	4.2	0.3
15-Jul	18:21	19:42	6.3	0.3	18.3	0.6	14.4	1.7	4.0	0.3
15-Jul	20:21	21:42	4.8	0.3	10.3	0.3	7.9	1.1	2.4	0.3

PROGRAM NAME: SCAQS - JULY DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJLY.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC MEETER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON			PARTICULATE			ELEMENTAL CARBON		
					(ug/m3)	error	(ug/m3)	ORGANIC CARBON (ug/m3)	error	(ug/m3)	error	(ug/m3)	error
15-Jul	22:21	23:42	3.9	0.3	9.2	0.3	7.1	0.9	2.1	0.3			
16-Jul	00:21	01:42	3.7	0.3	10.0	0.3	8.1	1.0	2.0	0.3			
16-Jul	02:21	03:42	3.8	0.3	11.8	0.4	9.6	1.1	2.2	0.3			
16-Jul	04:21	05:42	3.5	0.3	7.8	0.3	6.1	0.8	1.6	0.3			
16-Jul	06:21	07:42	3.3	0.3	8.7	0.3	6.8	0.9	1.9	0.3			
16-Jul	08:21	09:42	4.3	0.3	10.4	0.3	8.1	1.0	2.3	0.3			
16-Jul	10:21	11:42	4.7	0.3	11.7	0.4	8.7	1.1	3.0	0.3			
16-Jul	12:21	13:42	4.9	0.3	12.8	0.4	9.7	1.2	3.2	0.3			
16-Jul	14:21	15:42	4.7	0.3	15.6	0.5	12.2	1.4	3.4	0.3			
16-Jul	16:21	17:42	3.9	0.3	9.3	0.3	7.3	0.9	2.1	0.3			
16-Jul	18:21	19:42	3.5	0.3	7.9	0.3	6.2	0.8	1.7	0.3			
16-Jul	20:21	21:42	3.2	0.3	6.6	0.3	5.1	0.7	1.5	0.3			
16-Jul	22:21	23:42	2.7	0.3	3.3	0.3	2.6	0.4	0.7	0.3			
17-Jul	00:21	01:42	2.5	0.3	2.6	0.3	2.2	0.4	0.4	0.3			
17-Jul	02:21	03:42	2.3	0.3	2.2	0.3	1.9	0.4	0.3	0.3			
17-Jul	04:21	05:42	2.2	0.3	2.4	0.3	2.1	0.4	0.3	0.3			
17-Jul	06:21	07:42	2.1	0.3	2.6	0.3	2.1	0.4	0.5	0.3			
17-Jul	08:21	09:42	2.4	0.3	3.7	0.3	2.8	0.4	1.0	0.3			
17-Jul	12:39	17:59	1.7	0.3	4.1	0.3	3.0	0.4	1.1	0.3			
17-Jul	18:38	23:58	1.3	0.3	2.2	0.3	1.7	0.3	0.5	0.3			
18-Jul	00:37	05:57	1.2	0.3	2.6	0.3	2.1	0.3	0.5	0.3			
18-Jul	06:36	11:56	1.4	0.3	2.6	0.3	2.0	0.3	0.5	0.3			
18-Jul	12:35	17:55	2.0	0.3	8.0	0.3	7.0	0.8	1.0	0.3			
18-Jul	18:34	23:54	1.9	0.3	7.6	0.3	5.9	0.7	1.7	0.3			
19-Jul	00:33	05:53	1.7	0.3	7.6	0.3	6.3	0.7	1.3	0.3			
19-Jul	06:32	11:52	2.4	0.3	11.2	0.3	9.2	1.0	2.0	0.3			

PROGRAM NAME: SCAQS - JULY DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJLY.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)	error	ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
19-Jul	12:31	17:51	2.0	0.3	7.0	0.3	6.3	0.7	0.7	0.3
19-Jul	18:30	23:50	2.2	0.3	8.7	0.3	7.2	0.8	1.5	0.3
20-Jul	02:21	03:42	3.7	0.3	9.2	0.3	8.2	1.0	1.0	0.3
20-Jul	04:21	05:42	3.6	0.3	9.3	0.3	7.9	1.0	1.3	0.3
20-Jul	06:21	07:42	3.5	0.3	10.3	0.3	8.5	1.0	1.9	0.3
20-Jul	08:21	09:42	4.3	0.3	16.6	0.5	10.7	1.3	5.9	0.4
20-Jul	10:21	11:42	5.1	0.3	13.8	0.4	9.6	1.2	4.2	0.3
20-Jul	12:21	13:42	4.6	0.3	13.5	0.4	10.4	1.3	3.1	0.3
20-Jul	14:21	15:42	4.6	0.3	15.2	0.4	11.1	1.3	4.0	0.3
20-Jul	16:21	17:42	4.5	0.3	14.2	0.4	10.7	1.3	3.5	0.3
20-Jul	18:21	19:42	4.4	0.3	10.7	0.3	8.6	1.1	2.2	0.3
20-Jul	20:21	21:42	3.5	0.3	6.7	0.3	5.5	0.8	1.2	0.3
20-Jul	22:24	01:44	1.9	0.3	6.0	0.3	4.4	0.5	1.6	0.3
21-Jul	02:23	05:43	1.8	0.3	5.5	0.3	3.8	0.5	1.7	0.3
21-Jul	06:29	07:49	2.9	0.3	7.2	0.3	5.5	0.7	1.7	0.3
21-Jul	08:28	09:48	3.1	0.3	4.7	0.3	4.0	0.6	0.8	0.3
21-Jul	10:27	11:47	3.3	0.3	5.5	0.3	4.4	0.6	1.2	0.3
21-Jul	12:26	13:46	3.4	0.3	7.7	0.3	6.1	0.8	1.6	0.3
21-Jul	14:25	15:45	3.5	0.3	7.6	0.3	6.4	0.8	1.2	0.3
21-Jul	16:27	19:47	6.1	0.3	17.7	0.5	14.5	1.7	3.3	0.3
21-Jul	22:22	01:43	1.8	0.3	4.7	0.3	3.5	0.4	1.2	0.3
22-Jul	02:22	05:43	1.8	0.3	5.8	0.3	4.6	0.5	1.2	0.3
22-Jul	06:22	09:43	2.4	0.3	8.5	0.3	5.1	0.6	3.4	0.3
22-Jul	10:22	13:43	2.7	0.3	8.8	0.3	6.3	0.8	2.5	0.3
22-Jul	14:22	17:43	3.5	0.3	14.1	0.4	10.8	1.2	3.3	0.3
22-Jul	18:22	21:43	2.7	0.3	7.1	0.3	5.3	0.7	1.7	0.3

PROGRAM NAME: SCAQS - JULY DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJLY.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	----- PARTICULATE -----			ELEMENTAL CARBON (ug/m3)	error
					TOTAL CARBON (ug/m3)	ORGANIC CARBON (ug/m3)	ELEMENTAL CARBON (ug/m3)		
22-Jul	22:22	01:43	2.3	0.3	6.1	4.3	1.8	0.6	0.3
23-Jul	02:22	05:43	2.2	0.3	8.2	5.7	2.5	0.7	0.3
23-Jul	10:20	11:41	5.1	0.3	9.6	6.8	2.8	1.0	0.3
23-Jul	12:20	13:41	5.8	0.3	11.9	9.2	2.7	1.3	0.3
23-Jul	14:20	15:41	5.7	0.3	12.4	10.0	2.4	1.3	0.3
23-Jul	16:20	17:41	6.5	0.3	16.3	13.5	2.8	1.7	0.3
23-Jul	18:20	19:41	6.0	0.3	11.8	9.4	2.4	1.3	0.3
23-Jul	20:20	21:41	4.8	0.3	8.9	6.9	2.0	1.0	0.3
23-Jul	22:20	23:41	4.6	0.3	9.9	7.4	2.4	1.0	0.3
24-Jul	00:20	01:41	4.5	0.3	11.2	8.8	2.4	1.1	0.3
24-Jul	02:20	03:41	4.7	0.3	10.8	8.5	2.3	1.1	0.3
24-Jul	04:20	05:41	4.6	0.3	10.9	8.6	2.3	1.1	0.3
24-Jul	06:20	07:41	4.5	0.3	12.0	8.6	3.4	1.1	0.3
24-Jul	08:20	09:41	6.0	0.3	13.9	10.5	3.4	1.4	0.3
24-Jul	10:20	11:41	5.4	0.3	10.9	8.5	2.5	1.2	0.3
24-Jul	12:20	13:41	5.5	0.3	12.1	9.6	2.6	1.3	0.3
24-Jul	14:20	15:41	6.0	0.3	14.1	11.7	2.4	1.5	0.3
24-Jul	16:20	17:41	7.5	0.3	24.1	20.0	4.0	2.3	0.3
24-Jul	18:20	19:41	6.7	0.3	16.9	14.0	2.9	1.8	0.3
24-Jul	20:20	21:41	5.6	0.3	11.9	9.3	2.6	1.3	0.3
24-Jul	22:20	23:41	5.1	0.3	12.6	9.7	3.0	1.2	0.3
25-Jul	00:20	01:41	5.3	0.3	14.7	12.1	2.6	1.5	0.3
25-Jul	02:20	03:41	4.9	0.3	13.8	11.6	2.2	1.4	0.3
25-Jul	04:20	05:41	4.8	0.3	13.0	10.8	2.2	1.3	0.3
25-Jul	06:20	07:41	4.8	0.3	12.6	10.1	2.5	1.3	0.3
25-Jul	08:24	11:41	4.2	0.3	17.5	13.6	3.9	1.5	0.3

PROGRAM NAME:  
 ORGANIZATION:  
 SITE NAME:  
 SAMPLER:  
 ANALYSIS:  
 FILE NAME:  
 DATA:  
 UNITS:

SCAQ5 - JULY DATA  
 OREGON GRADUATE CENTER - HUNTZICKER  
 CLAREMONT  
 IN-SITU CARBON ANALYZER  
 IN-SITU CARBON ANALYZER  
 OGCJLY.WK  
 PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	-----PARTICULATE-----			-----ELEMENTAL CARBON-----		
					TOTAL CARBON (ug/m3)	error	ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
25-Jul	12:23	13:44	6.7	0.3	19.3	0.6	16.6	2.0	2.8	0.3
25-Jul	14:23	15:44	7.0	0.3	22.2	0.7	19.5	2.2	2.7	0.3
25-Jul	16:23	17:44	7.3	0.3	22.1	0.7	19.8	2.3	2.3	0.3
25-Jul	18:23	19:44	6.0	0.3	13.1	0.4	11.7	1.5	1.4	0.3
25-Jul	20:23	21:44	4.9	0.3	10.6	0.4	9.3	1.2	1.3	0.3
26-Jul	00:33	01:54	5.3	0.3	12.1	0.4	10.6	1.3	1.5	0.3
26-Jul	02:33	03:54	5.4	0.3	11.7	0.4	10.3	1.3	1.4	0.3
26-Jul	04:33	05:54	5.4	0.3	12.3	0.4	11.0	1.4	1.3	0.3
26-Jul	06:33	07:54	5.9	0.3	13.2	0.4	11.2	1.4	2.0	0.3
26-Jul	08:33	09:54	7.0	0.3	18.0	0.6	15.2	1.9	2.8	0.3
26-Jul	10:33	11:54	6.9	0.3	16.3	0.5	13.8	1.7	2.5	0.3
26-Jul	12:33	13:54	6.1	0.3	14.0	0.5	12.6	1.6	1.4	0.3
26-Jul	14:33	15:54	6.6	0.3	18.2	0.6	16.8	2.0	1.5	0.3
26-Jul	16:33	17:54	7.6	0.3	18.9	0.6	17.5	2.1	1.4	0.3
26-Jul	18:33	19:54	6.5	0.3	11.7	0.4	10.3	1.4	1.4	0.3
26-Jul	20:33	21:54	5.3	0.3	8.9	0.3	7.4	1.1	1.5	0.3
26-Jul	22:33	23:54	5.5	0.3	10.3	0.4	8.4	1.2	1.9	0.3
27-Jul	00:33	01:54	5.3	0.3	11.0	0.4	9.1	1.2	1.8	0.3
27-Jul	02:33	03:54	5.5	0.3	11.6	0.4	9.8	1.3	1.8	0.3
27-Jul	04:33	05:54	5.3	0.3	12.3	0.4	10.2	1.3	2.1	0.3
27-Jul	06:33	07:54	6.3	0.3	20.7	0.6	13.2	1.6	7.5	0.5
27-Jul	08:33	09:54	7.7	0.3	21.5	0.7	14.3	1.8	7.2	0.5
27-Jul	10:33	11:54	7.8	0.3	18.3	0.6	13.7	1.8	4.6	0.3
27-Jul	12:34	13:39	8.3	0.3	19.0	0.6	14.5	1.9	4.6	0.3
27-Jul	14:21	15:42	8.0	0.3	22.9	0.7	18.1	2.2	4.8	0.3
27-Jul	16:21	17:42	8.3	0.3	21.8	0.7	18.0	2.2	3.8	0.3

PROGRAM NAME: SCAQS - JULY DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCJLY.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)	error	PARTICULATE ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
27-Jul	18:21	19:42	6.4	0.3	10.6	0.4	8.5	1.3	2.1	0.3
27-Jul	20:21	21:42	5.2	0.3	7.7	0.3	6.1	1.0	1.6	0.3
27-Jul	22:21	23:42	4.4	0.3	6.5	0.3	5.0	0.8	1.5	0.3
28-Jul	00:21	01:42	4.0	0.3	5.6	0.3	4.2	0.7	1.4	0.3
28-Jul	02:21	03:42	3.9	0.3	6.4	0.3	4.8	0.7	1.6	0.3
28-Jul	04:21	05:42	4.0	0.3	6.6	0.3	5.0	0.8	1.7	0.3
28-Jul	06:21	07:42	5.6	0.3	8.8	0.3	5.5	0.9	3.2	0.3
28-Jul	08:21	09:42	7.1	0.3	16.3	0.5	10.2	1.5	6.1	0.4
28-Jul	10:21	11:42	7.4	0.3	16.3	0.5	11.5	1.6	4.7	0.3
28-Jul	12:21	13:42	7.1	0.3	18.3	0.6	14.0	1.8	4.3	0.3
28-Jul	14:21	15:42	8.0	0.3	26.6	0.8	20.9	2.4	5.7	0.4
28-Jul	16:21	17:42	7.8	0.3	22.9	0.7	19.5	2.3	3.4	0.3
28-Jul	18:21	19:42	6.6	0.3	15.1	0.5	12.2	1.6	2.9	0.3
28-Jul	20:21	21:42	6.1	0.3	13.5	0.4	10.6	1.4	2.9	0.3
28-Jul	22:21	23:42	5.4	0.3	12.0	0.4	8.7	1.2	3.3	0.3
29-Jul	00:21	01:42	5.0	0.3	10.6	0.4	7.4	1.0	3.1	0.3
29-Jul	02:21	03:42	4.6	0.3	10.5	0.3	7.5	1.0	3.0	0.3
29-Jul	04:21	05:42	4.7	0.3	11.7	0.4	8.9	1.1	2.9	0.3
29-Jul	06:21	07:42	6.1	0.3	20.8	0.6	13.3	1.6	7.6	0.5
29-Jul	08:21	09:42	8.1	0.3	26.0	0.8	16.5	2.1	9.6	0.7
29-Jul	10:21	11:42	8.1	0.3	20.9	0.7	15.3	2.0	5.6	0.4
29-Jul	12:21	13:42	7.4	0.3	20.1	0.6	16.3	2.0	3.8	0.3
29-Jul	14:21	15:42	8.4	0.3	27.7	0.8	21.6	2.5	6.1	0.4
29-Jul	16:21	17:42	8.5	0.3	26.3	0.8	21.8	2.6	4.5	0.3
29-Jul	18:21	19:42	5.7	0.3	9.9	0.4	7.9	1.1	2.0	0.3

PROGRAM NAME: SCAQS - AUGUST & SEPTEMBER DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCAUG.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR			TOTAL CARBON			PARTICULATE		
			(ug/m3)	error		(ug/m3)	error		ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)
17-Aug	14:22	15:43	5.8	0.3	19.9	0.6	17.2	1.9	2.7	0.3	
17-Aug	18:20	19:41	5.2	0.3	14.6	0.5	12.3	1.5	2.2	0.3	
17-Aug	20:20	21:41	4.3	0.3	11.2	0.4	9.2	1.1	2.0	0.3	
17-Aug	22:20	23:41	3.7	0.3	9.7	0.3	7.9	1.0	1.8	0.3	
18-Aug	00:20	01:41	3.2	0.3	10.3	0.3	8.6	1.0	1.6	0.3	
18-Aug	02:20	03:41	3.0	0.3	8.5	0.3	7.0	0.8	1.5	0.3	
18-Aug	04:20	05:41	3.3	0.3	8.2	0.3	6.7	0.8	1.5	0.3	
18-Aug	06:20	07:41	3.4	0.3	10.4	0.3	7.8	0.9	2.5	0.3	
18-Aug	08:20	09:41	4.5	0.3	12.7	0.4	9.4	1.2	3.3	0.3	
18-Aug	10:20	11:41	5.9	0.3	14.9	0.5	12.1	1.5	2.8	0.3	
18-Aug	12:20	13:41	5.8	0.3	16.9	0.5	13.9	1.7	3.0	0.3	
18-Aug	14:20	15:41	6.3	0.3	18.3	0.6	15.0	1.8	3.3	0.3	
18-Aug	16:20	17:41	6.7	0.3	20.7	0.6	17.4	2.0	3.2	0.3	
18-Aug	18:20	19:41	6.2	0.3	20.3	0.6	16.8	1.9	3.5	0.3	
18-Aug	20:20	21:41	4.5	0.3	10.1	0.3	8.2	1.1	1.9	0.3	
18-Aug	22:20	23:41	3.8	0.3	7.4	0.3	5.7	0.8	1.8	0.3	
19-Aug	00:20	01:41	3.6	0.3	7.9	0.3	6.0	0.8	2.0	0.3	
19-Aug	02:20	03:41	3.6	0.3	8.4	0.3	6.1	0.8	2.3	0.3	
19-Aug	15:21	15:41	12.0	0.3	15.1	0.7	11.9	2.0	3.1	0.3	
19-Aug	16:47	17:37	9.3	0.3	19.8	0.7	16.1	2.1	3.7	0.3	
19-Aug	18:19	19:40	6.8	0.3	17.5	0.6	14.2	1.8	3.3	0.3	
19-Aug	20:19	21:40	5.7	0.3	13.3	0.4	10.3	1.4	3.0	0.3	
19-Aug	22:19	23:40	4.7	0.3	10.5	0.4	8.0	1.1	2.5	0.3	
20-Aug	00:19	01:40	4.9	0.3	11.7	0.4	9.0	1.2	2.7	0.3	
20-Aug	02:19	03:40	5.0	0.3	14.2	0.4	10.7	1.3	3.4	0.3	
20-Aug	04:19	05:40	4.7	0.3	15.4	0.5	11.9	1.4	3.5	0.3	

PROGRAM NAME: SCAQS - AUGUST & SEPTEMBER DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCAUG.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON	
					(ug/m3)	error	ORGANIC CARBON (ug/m3)	error	(ug/m3)	error
20-Aug	06:19	07:40	5.0	0.3	16.4	0.5	11.9	1.4	4.5	0.3
20-Aug	08:19	09:40	6.6	0.3	21.9	0.6	14.5	1.8	7.5	0.5
20-Aug	10:19	11:40	6.3	0.3	11.9	0.4	9.1	1.3	2.9	0.3
20-Aug	12:19	13:40	5.6	0.3	11.5	0.4	8.8	1.2	2.7	0.3
20-Aug	14:19	15:40	5.8	0.3	11.1	0.4	8.8	1.2	2.3	0.3
20-Aug	16:19	17:40	5.4	0.3	10.4	0.4	8.5	1.2	1.8	0.3
20-Aug	18:19	19:40	5.3	0.3	8.9	0.3	7.2	1.1	1.8	0.3
20-Aug	20:19	21:40	5.4	0.3	12.8	0.4	10.3	1.3	2.4	0.3
20-Aug	22:19	23:40	4.9	0.3	12.5	0.4	9.8	1.2	2.7	0.3
21-Aug	00:19	01:40	4.8	0.3	13.8	0.4	11.0	1.3	2.9	0.3
21-Aug	02:19	03:40	4.5	0.3	13.3	0.4	10.6	1.3	2.7	0.3
21-Aug	04:19	05:40	4.5	0.3	13.0	0.4	10.6	1.3	2.4	0.3
21-Aug	06:19	07:40	4.7	0.3	14.3	0.4	10.0	1.2	4.3	0.3
21-Aug	08:19	09:40	6.9	0.3	22.5	0.7	15.3	1.9	7.2	0.5
21-Aug	10:19	11:40	7.9	0.3	23.2	0.7	18.0	2.2	5.2	0.4
21-Aug	12:19	13:40	6.8	0.3	15.4	0.5	12.0	1.6	3.3	0.3
21-Aug	14:19	15:40	6.5	0.3	15.1	0.5	12.0	1.6	3.1	0.3
21-Aug	16:19	17:40	6.9	0.3	16.6	0.5	13.9	1.8	2.7	0.3
21-Aug	18:19	19:40	6.4	0.3	13.7	0.5	11.1	1.5	2.6	0.3
21-Aug	20:19	21:40	4.8	0.3	8.5	0.3	6.7	1.0	1.8	0.3
21-Aug	22:19	23:40	4.4	0.3	8.8	0.3	6.8	0.9	2.0	0.3
22-Aug	00:19	01:40	4.3	0.3	9.6	0.3	7.2	1.0	2.3	0.3
22-Aug	02:19	03:40	4.3	0.3	10.3	0.3	8.2	1.1	2.1	0.3
22-Aug	04:19	05:40	4.1	0.3	11.1	0.3	8.5	1.1	2.5	0.3
22-Aug	06:19	07:40	4.2	0.3	9.8	0.3	7.7	1.0	2.1	0.3
22-Aug	08:19	09:40	5.5	0.3	10.3	0.4	8.0	1.1	2.3	0.3

PROGRAM NAME: SCAQS - AUGUST & SEPTEMBER DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCAUG.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)	error	ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
22-Aug	10:19	11:40	6.0	0.3	10.7	0.4	8.9	1.3	1.9	0.3
22-Aug	12:19	13:40	5.6	0.3	11.0	0.4	9.5	1.3	1.5	0.3
22-Aug	14:19	15:40	6.3	0.3	15.5	0.5	13.2	1.6	2.3	0.3
22-Aug	16:19	17:40	6.2	0.3	13.9	0.5	12.2	1.6	1.6	0.3
22-Aug	18:19	19:40	4.8	0.3	6.7	0.3	5.8	0.9	0.9	0.3
22-Aug	20:19	21:40	3.9	0.3	6.3	0.3	5.2	0.8	1.1	0.3
22-Aug	22:19	23:40	3.8	0.3	7.0	0.3	5.7	0.8	1.3	0.3
23-Aug	00:19	01:40	4.0	0.3	8.0	0.3	6.8	0.9	1.3	0.3
23-Aug	02:19	03:40	3.8	0.3	8.7	0.3	7.4	0.9	1.3	0.3
23-Aug	04:19	05:40	4.5	0.3	8.8	0.3	7.7	1.0	1.1	0.3
23-Aug	06:19	07:40	4.2	0.3	8.4	0.3	7.2	1.0	1.2	0.3
23-Aug	08:19	09:40	5.0	0.3	8.1	0.3	6.8	1.0	1.4	0.3
23-Aug	10:19	11:40	5.2	0.3	8.7	0.3	7.5	1.1	1.1	0.3
23-Aug	12:19	13:40	5.5	0.3	10.0	0.4	8.8	1.2	1.2	0.3
23-Aug	14:19	15:40	5.7	0.3	13.4	0.4	12.1	1.5	1.3	0.3
23-Aug	16:19	17:40	5.6	0.3	12.2	0.4	11.1	1.4	1.0	0.3
23-Aug	18:19	19:40	5.6	0.3	12.3	0.4	10.9	1.4	1.5	0.3
23-Aug	20:19	21:40	4.6	0.3	7.7	0.3	6.6	0.9	1.1	0.3
23-Aug	22:19	23:40	3.9	0.3	7.5	0.3	6.2	0.8	1.3	0.3
24-Aug	00:19	01:40	4.1	0.3	9.4	0.3	8.2	1.0	1.2	0.3
24-Aug	02:19	03:40	4.1	0.3	9.9	0.3	8.8	1.1	1.1	0.3
24-Aug	04:19	05:40	3.9	0.3	8.8	0.3	7.6	1.0	1.1	0.3
24-Aug	06:19	07:40	3.8	0.3	10.1	0.3	6.6	0.9	3.5	0.3
24-Aug	08:19	09:40	5.1	0.3	9.7	0.3	7.3	1.0	2.3	0.3
24-Aug	10:19	11:40	5.1	0.3	10.5	0.4	7.9	1.1	2.6	0.3
24-Aug	12:19	13:40	5.2	0.3	11.1	0.4	8.5	1.2	2.6	0.3

PROGRAM NAME: SCAQS - AUGUST & SEPTEMBER DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCAUG.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON (ug/m3)		PARTICULATE ORGANIC CARBON (ug/m3)		ELEMENTAL CARBON (ug/m3)	
					error	error	error	error		
24-Aug	14:19	15:40	5.4	0.3	13.1	0.4	10.6	1.3	2.4	0.3
24-Aug	16:19	17:40	4.7	0.3	8.0	0.3	6.7	1.0	1.4	0.3
24-Aug	18:19	19:40	4.1	0.3	5.9	0.3	4.8	0.8	1.1	0.3
24-Aug	20:19	21:40	3.6	0.3	5.3	0.3	4.4	0.7	0.9	0.3
24-Aug	22:19	23:40	3.2	0.3	5.4	0.3	4.4	0.6	0.9	0.3
25-Aug	00:19	01:40	2.9	0.3	5.1	0.3	4.2	0.6	0.9	0.3
25-Aug	02:19	03:40	2.9	0.3	4.8	0.3	4.1	0.6	0.8	0.3
25-Aug	04:19	05:40	3.0	0.3	3.8	0.3	3.3	0.5	0.5	0.3
25-Aug	06:19	07:40	3.2	0.3	5.0	0.3	4.0	0.6	1.0	0.3
25-Aug	08:19	09:40	3.6	0.3	7.7	0.3	5.7	0.8	2.0	0.3
25-Aug	10:19	11:40	4.8	0.3	11.1	0.4	8.3	1.1	2.8	0.3
25-Aug	12:19	13:40	4.8	0.3	11.4	0.4	8.7	1.1	2.7	0.3
25-Aug	14:19	15:40	5.1	0.3	13.7	0.4	10.8	1.3	3.0	0.3
25-Aug	16:19	17:40	5.6	0.3	14.9	0.5	11.9	1.5	3.0	0.3
25-Aug	18:19	19:40	4.9	0.3	9.1	0.3	7.3	1.0	1.8	0.3
25-Aug	20:19	21:40	4.2	0.3	7.9	0.3	6.1	0.9	1.8	0.3
25-Aug	22:19	23:40	3.7	0.3	7.9	0.3	6.1	0.8	1.8	0.3
26-Aug	00:19	01:40	3.5	0.3	8.8	0.3	6.8	0.9	2.0	0.3
26-Aug	02:19	03:40	3.4	0.3	9.6	0.3	7.7	0.9	1.9	0.3
26-Aug	04:19	05:40	3.5	0.3	10.0	0.3	7.5	0.9	2.5	0.3
26-Aug	06:19	07:40	4.1	0.3	12.7	0.4	8.5	1.1	4.2	0.3
26-Aug	08:19	09:40	5.2	0.3	13.0	0.4	9.5	1.2	3.4	0.3
26-Aug	10:19	11:40	5.7	0.3	15.6	0.5	11.8	1.5	3.8	0.3
26-Aug	12:19	13:40	6.7	0.3	23.0	0.7	17.4	2.0	5.6	0.4
26-Aug	14:19	15:40	6.7	0.3	21.6	0.6	17.3	2.0	4.3	0.3

PROGRAM NAME: SCAQS - AUGUST & SEPTEMBER DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCAUG.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR			TOTAL CARBON			PARTICULATE		
			(ug/m3)	error		(ug/m3)	error		ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)
26-Aug	16:19	17:40	6.5	0.3	19.3	0.6	15.5	1.9	3.7	0.3	
26-Aug	18:19	19:40	5.5	0.3	11.4	0.4	8.9	1.2	2.5	0.3	
26-Aug	20:19	21:40	4.5	0.3	7.9	0.3	6.2	0.9	1.7	0.3	
26-Aug	22:19	23:40	4.3	0.3	8.2	0.3	6.3	0.9	1.9	0.3	
27-Aug	00:19	01:40	4.0	0.3	8.0	0.3	6.4	0.9	1.6	0.3	
27-Aug	02:19	03:40	4.0	0.3	10.3	0.3	8.3	1.0	2.0	0.3	
27-Aug	04:19	05:40	4.0	0.3	12.1	0.4	9.4	1.1	2.7	0.3	
27-Aug	06:19	07:40	4.8	0.3	17.9	0.5	11.3	1.4	6.6	0.5	
27-Aug	08:19	09:40	7.0	0.3	15.8	0.5	10.6	1.5	5.2	0.4	
27-Aug	10:19	11:40	8.1	0.3	22.3	0.7	15.3	2.0	7.0	0.5	
27-Aug	12:19	13:40	7.9	0.3	19.2	0.6	14.5	1.9	4.7	0.3	
27-Aug	14:19	15:40	8.7	0.3	26.1	0.8	20.3	2.4	5.8	0.4	
27-Aug	16:19	17:40	8.3	0.3	22.0	0.7	17.6	2.2	4.3	0.3	
27-Aug	18:19	19:40	6.4	0.3	12.5	0.4	9.8	1.4	2.7	0.3	
27-Aug	20:19	21:40	5.3	0.3	9.6	0.3	7.4	1.1	2.2	0.3	
28-Aug	00:19	01:40	4.7	0.3	9.7	0.3	7.1	1.0	2.6	0.3	
28-Aug	02:19	03:40	4.8	0.3	11.6	0.4	8.6	1.1	3.0	0.3	
28-Aug	04:19	05:40	5.1	0.3	15.3	0.5	11.6	1.4	3.7	0.3	
28-Aug	06:19	07:40	5.8	0.3	21.9	0.6	12.8	1.6	9.0	0.6	
28-Aug	08:19	09:40	7.2	0.3	15.1	0.5	10.8	1.5	4.3	0.3	
28-Aug	10:19	11:40	8.0	0.3	17.3	0.6	11.9	1.7	5.4	0.4	
28-Aug	12:19	13:40	8.8	0.3	23.5	0.7	17.2	2.2	6.2	0.4	
28-Aug	14:19	15:40	9.5	0.3	30.0	0.9	23.1	2.7	6.9	0.5	
28-Aug	16:19	17:40	9.3	0.3	25.1	0.8	20.6	2.5	4.5	0.3	
28-Aug	18:19	19:40	7.3	0.3	16.0	0.5	12.3	1.7	3.7	0.3	
28-Aug	20:19	21:40	5.4	0.3	10.0	0.4	7.7	1.1	2.3	0.3	

PROGRAM NAME: SCAQS - AUGUST & SEPTEMBER DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OCCAUG.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	PARTICULATE			TOTAL CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)	error
					ORGANIC CARBON (ug/m3)	error					
28-Aug	22:19	23:40	5.4	0.3	10.2	0.4	7.9	1.1	2.4	0.3	
29-Aug	00:19	01:40	5.1	0.3	11.2	0.4	8.3	1.1	2.9	0.3	
29-Aug	02:19	03:40	5.4	0.3	14.8	0.5	11.7	1.4	3.1	0.3	
29-Aug	04:19	05:40	5.4	0.3	17.1	0.5	12.1	1.5	5.0	0.3	
29-Aug	06:19	07:40	5.9	0.3	16.7	0.5	11.7	1.5	5.0	0.3	
29-Aug	08:19	09:40	6.9	0.3	14.2	0.5	10.6	1.5	3.6	0.3	
29-Aug	10:19	11:40	7.9	0.3	19.3	0.6	15.2	1.9	4.2	0.3	
29-Aug	12:19	13:40	8.6	0.3	22.9	0.7	18.7	2.3	4.3	0.3	
29-Aug	14:19	15:40	8.3	0.3	24.7	0.7	21.1	2.5	3.6	0.3	
29-Aug	16:19	17:40	8.0	0.3	24.1	0.7	21.1	2.4	3.0	0.3	
29-Aug	18:19	19:40	7.1	0.3	18.8	0.6	16.4	2.0	2.4	0.3	
29-Aug	20:19	21:40	6.5	0.3	14.8	0.5	12.5	1.6	2.3	0.3	
30-Aug	00:19	01:40	5.0	0.3	11.7	0.4	9.5	1.2	2.2	0.3	
30-Aug	02:19	03:40	4.9	0.3	11.0	0.4	8.8	1.2	2.1	0.3	
30-Aug	04:19	05:40	4.9	0.3	11.6	0.4	9.7	1.2	1.9	0.3	
30-Aug	06:19	07:40	5.3	0.3	11.3	0.4	9.0	1.2	2.3	0.3	
30-Aug	08:19	09:40	7.5	0.3	16.0	0.5	12.6	1.7	3.4	0.3	
30-Aug	10:19	11:40	7.6	0.3	15.5	0.5	12.9	1.7	2.6	0.3	
30-Aug	12:19	13:40	7.5	0.3	16.7	0.6	14.3	1.8	2.4	0.3	
30-Aug	14:19	15:40	7.4	0.3	19.0	0.6	16.8	2.0	2.3	0.3	
30-Aug	16:19	17:40	6.8	0.3	15.0	0.5	13.1	1.7	1.9	0.3	
30-Aug	18:19	19:40	5.9	0.3	10.2	0.4	8.6	1.2	1.6	0.3	
30-Aug	20:19	21:40	5.1	0.3	8.3	0.3	6.5	1.0	1.9	0.3	
30-Aug	22:19	23:40	4.9	0.3	8.3	0.3	6.5	1.0	1.8	0.3	
31-Aug	00:19	01:40	5.0	0.3	10.1	0.4	8.4	1.1	1.7	0.3	
31-Aug	02:19	03:40	5.0	0.3	12.0	0.4	9.7	1.2	2.3	0.3	

PROGRAM NAME: SCAQS - AUGUST & SEPTEMBER DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCAUG.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR		TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON	
			(ug/m3)	error	(ug/m3)	error	ORGANIC CARBON (ug/m3)	error	(ug/m3)	error
31-Aug	04:19	05:40	4.9	0.3	9.7	0.3	8.0	1.1	1.7	0.3
31-Aug	06:19	07:40	5.1	0.3	15.9	0.5	9.5	1.2	6.4	0.4
31-Aug	08:19	09:40	7.6	0.3	23.2	0.7	13.5	1.8	9.6	0.7
31-Aug	10:19	11:40	7.8	0.3	16.3	0.6	11.4	1.6	4.9	0.3
31-Aug	12:19	13:40	6.6	0.3	15.9	0.5	12.0	1.6	3.9	0.3
31-Aug	14:19	15:40	8.3	0.3	23.0	0.7	17.2	2.2	5.7	0.4
31-Aug	16:19	17:40	7.7	0.3	19.8	0.6	15.5	2.0	4.3	0.3
31-Aug	18:19	19:40	6.3	0.3	12.1	0.4	8.7	1.3	3.4	0.3
31-Aug	20:19	21:40	6.0	0.3	14.5	0.5	10.2	1.4	4.3	0.3
31-Aug	22:19	23:40	6.0	0.3	16.2	0.5	10.7	1.4	5.5	0.4
01-Sep	00:19	01:40	5.9	0.3	16.3	0.5	11.5	1.5	4.8	0.3
01-Sep	02:19	03:40	5.8	0.3	17.5	0.5	12.1	1.5	5.4	0.4
01-Sep	04:19	05:40	5.6	0.3	15.2	0.5	11.3	1.4	4.0	0.3
01-Sep	06:19	07:40	5.5	0.3	16.8	0.5	10.2	1.3	6.7	0.5
01-Sep	08:19	09:40	7.0	0.3	16.7	0.5	10.0	1.4	6.7	0.5
01-Sep	22:23	23:44	4.6	0.3	6.5	0.3	5.8	0.9	0.8	0.3
02-Sep	00:23	01:44	4.6	0.3	7.5	0.3	6.6	0.9	1.0	0.3
02-Sep	02:23	03:44	4.6	0.3	7.0	0.3	6.3	0.9	0.7	0.3
02-Sep	04:23	05:44	4.2	0.3	6.6	0.3	5.8	0.8	0.8	0.3
02-Sep	06:28	07:44	4.6	0.3	12.4	0.4	7.9	1.1	4.4	0.3
02-Sep	08:26	09:46	5.0	0.3	8.6	0.3	5.8	0.9	2.8	0.3
02-Sep	10:25	11:45	6.9	0.3	13.5	0.5	8.4	1.3	5.0	0.3
02-Sep	12:24	13:44	5.2	0.3	6.0	0.3	5.2	0.9	0.8	0.3
02-Sep	14:23	15:43	7.4	0.3	9.3	0.4	8.6	1.4	0.7	0.3
02-Sep	16:22	17:42	10.2	0.3	21.4	0.7	16.9	2.3	4.5	0.3
02-Sep	18:21	19:41	7.5	0.3	14.7	0.5	12.2	1.7	2.5	0.3

PROGRAM NAME: SCAQS - AUGUST & SEPTEMBER DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: CLAREMONT  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCAUG.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PDT	STOP TIME PDT	ADSORBED VAPOR (ug/m3)	error	TOTAL CARBON			PARTICULATE		
					(ug/m3)	error	(ug/m3)	ORGANIC CARBON (ug/m3)	error	ELEMENTAL CARBON (ug/m3)
02-Sep	20:20	21:40	6.8	0.3	15.0	0.5	11.6	1.6	3.4	0.3
03-Sep	00:19	01:40	5.8	0.3	10.9	0.4	9.5	1.3	1.5	0.3
03-Sep	02:19	03:40	5.6	0.3	7.1	0.3	5.1	0.9	1.9	0.3
03-Sep	04:19	05:40	5.6	0.3	10.2	0.4	8.4	1.2	1.9	0.3
03-Sep	06:19	07:40	6.0	0.3	15.7	0.5	8.9	1.3	6.8	0.5
03-Sep	08:19	09:40	7.1	0.3	12.4	0.5	8.4	1.3	4.1	0.3
03-Sep	10:19	11:40	8.7	0.3	18.4	0.6	12.9	1.8	5.5	0.4
03-Sep	12:19	13:40	8.0	0.3	14.1	0.5	10.7	1.6	3.4	0.3
03-Sep	14:19	15:40	6.7	0.3	9.1	0.4	7.3	1.2	1.9	0.3
03-Sep	16:19	17:40	6.0	0.3	7.9	0.3	6.4	1.1	1.5	0.3
03-Sep	18:22	21:42	2.9	0.3	4.4	0.3	3.2	0.5	1.2	0.3
03-Sep	22:21	01:41	2.3	0.3	3.7	0.3	2.9	0.4	0.8	0.3
04-Sep	02:20	05:40	2.3	0.3	4.3	0.3	3.2	0.5	1.1	0.3

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGCFALL.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR (ugC/m3) error	TOTAL CARBON (ugC/m3) error			PARTICULATE ORGANIC CARBON (ugC/m3) error			ELEMENTAL CARBON (ugC/m3) error		
				14.0	0.4	11.6	1.3	2.4	0.3	14.0	0.3	11.6
06-Nov	18:19	19:40	4.2	0.3	14.0	0.4	11.6	1.3	2.4	0.3		
06-Nov	20:19	21:40	3.3	0.3	11.5	0.3	9.4	1.1	2.0	0.3		
06-Nov	22:19	23:40	3.5	0.3	28.3	0.7	20.8	2.0	7.5	0.5		
07-Nov	00:19	01:40	4.6	0.3	39.7	1.0	27.8	2.7	11.9	0.8		
07-Nov	02:19	03:40	3.8	0.3	40.4	1.0	27.8	2.7	12.6	0.9		
07-Nov	04:19	05:40	3.5	0.3	32.7	0.8	23.0	2.2	9.6	0.7		
07-Nov	06:19	07:40	3.9	0.3	32.8	0.8	21.6	2.1	11.2	0.8		
07-Nov	08:19	09:40	5.2	0.3	21.5	0.6	15.0	1.7	6.4	0.4		
07-Nov	12:00	13:21	6.3	0.3	12.1	0.4	10.1	1.4	1.9	0.3		
07-Nov	14:00	15:21	5.9	0.3	12.4	0.4	10.2	1.4	2.2	0.3		
07-Nov	16:00	17:21	5.0	0.3	9.6	0.3	8.0	1.1	1.6	0.3		
07-Nov	18:00	19:21	5.1	0.3	22.6	0.6	18.6	2.0	3.9	0.3		
07-Nov	20:00	21:21	5.2	0.3	40.7	1.0	30.0	3.0	10.8	0.7		
07-Nov	22:00	23:21	5.8	0.3								
08-Nov	00:00	01:21	5.7	0.3								
08-Nov	02:00	03:21	5.3	0.3	53.7	1.3	38.7	3.7	15.0	1.0		
08-Nov	04:00	05:21	5.1	0.3	50.1	1.2	36.3	3.5	13.8	1.0		
08-Nov	06:00	07:21	4.8	0.3	45.3	1.1	32.5	3.1	12.9	0.9		
08-Nov	08:00	09:21	7.5	0.3	30.1	0.8	23.2	2.6	6.9	0.5		
08-Nov	10:00	11:21	8.8	0.3	31.5	0.9	25.4	2.9	6.1	0.4		
08-Nov	12:00	13:21	8.5	0.3	27.6	0.8	23.0	2.7	4.6	0.3		
08-Nov	14:00	15:21	8.3	0.3	22.2	0.7	19.0	2.3	3.3	0.3		
08-Nov	16:00	17:21	5.5	0.3	11.9	0.4	10.2	1.3	1.7	0.3		
10-Nov	23:21	00:02	8.2	0.3	37.3	1.0	21.8	2.5	15.5	1.1		
11-Nov	00:41	01:22	7.5	0.3	30.6	0.9						
11-Nov	02:01	02:42	12.0	0.3	12.1	0.6	5.3	1.5	6.8	0.5		

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGC FALL.WK  
 DATA: PARTICULATE OC, EC, TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR		TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON	
			(ugC/m3)	error	(ugC/m3)	error	ORGANIC CARBON (ugC/m3)	error	(ugC/m3)	error
11-Nov	03:21	04:02	6.1	0.3	15.1	0.5	9.9	1.4	5.2	0.4
11-Nov	04:41	05:22	5.9	0.3	15.3	0.5	9.7	1.3	5.5	0.4
11-Nov	06:04	07:25	3.9	0.3	16.3	0.5	8.9	1.1	7.4	0.5
11-Nov	08:04	09:25	5.6	0.3	22.4	0.6	13.1	1.6	9.3	0.6
11-Nov	10:04	11:25	5.6	0.3	10.6	0.4	6.9	1.1	3.8	0.3
11-Nov	12:04	13:25	5.7	0.3	12.0	0.4	8.0	1.2	4.0	0.3
11-Nov	14:04	15:25	6.3	0.3	16.6	0.5	12.1	1.6	4.5	0.3
11-Nov	16:04	17:25	5.4	0.3	13.0	0.4	8.9	1.2	4.0	0.3
11-Nov	18:04	19:25	4.8	0.3	11.1	0.4	8.2	1.1	2.9	0.3
11-Nov	20:04	21:25	5.2	0.3	18.5	0.5	12.2	1.5	6.3	0.4
11-Nov	22:50	23:35	7.1	0.3	29.2	0.8	18.1	2.1	11.2	0.8
12-Nov	00:19	01:40	5.7	0.3	35.9	0.9	21.0	2.2	14.9	1.0
12-Nov	02:19	03:40	5.0	0.3	34.6	0.9	19.7	2.1	14.9	1.0
12-Nov	04:19	05:40	4.8	0.3	34.9	0.9	20.1	2.1	14.8	1.0
12-Nov	06:19	07:40	4.9	0.3	42.4	1.0	21.4	2.2	21.0	1.4
12-Nov	08:19	09:40	6.4	0.3	27.5	0.8	16.1	1.9	11.4	0.8
12-Nov	10:22	11:03	10.2	0.3	27.8	0.9	19.1	2.5	8.8	0.6
12-Nov	11:42	12:23	10.2	0.3	23.2	0.8	17.1	2.3	6.1	0.4
12-Nov	13:02	13:43	10.7	0.3	30.5	0.9	23.2	2.9	7.4	0.5
12-Nov	14:22	15:03	9.9	0.3	22.5	0.7	17.8	2.3	4.7	0.3
12-Nov	15:42	16:23	9.9	0.3	25.2	0.8	18.9	2.4	6.3	0.4
12-Nov	18:19	19:00	6.8	0.3	18.6	0.6	13.8	1.7	4.8	0.3
12-Nov	19:39	20:20	6.4	0.3	19.8	0.6	13.9	1.7	5.8	0.4
12-Nov	20:59	21:40	6.0	0.3	23.0	0.7	16.6	1.9	6.4	0.4
12-Nov	22:19	23:00	6.1	0.3	28.2	0.8	19.8	2.2	8.4	0.6
12-Nov	23:39	00:20	5.8	0.3	30.5	0.8	20.9	2.2	9.6	0.7

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGFALL.WK  
 DATA: PARTICULATE OC,EC,TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR		TOTAL CARBON		ORGANIC CARBON		PARTICULATE		ELEMENTAL CARBON	
			(ugC/m3)	error	(ugC/m3)	error	(ugC/m3)	error	(ugC/m3)	error	(ugC/m3)	error
13-Nov	00:59	01:40	5.5	0.3	23.0	0.6	16.6	1.9	6.4	0.4		
13-Nov	02:19	03:00	5.3	0.3	20.3	0.6	15.3	1.7	5.0	0.3		
13-Nov	03:39	04:20	5.2	0.3	20.4	0.6	15.8	1.8	4.6	0.3		
13-Nov	04:59	05:40	5.6	0.3	20.6	0.6	15.4	1.8	5.1	0.4		
13-Nov	06:23	07:44	4.5	0.3	16.6	0.5	12.3	1.4	4.3	0.3		
13-Nov	08:23	09:44	4.7	0.3	16.4	0.5	11.6	1.4	4.8	0.3		
13-Nov	10:23	11:44	4.3	0.3	11.0	0.3	8.3	1.1	2.8	0.3		
13-Nov	12:23	13:44	4.7	0.3	10.9	0.4	8.1	1.1	2.8	0.3		
13-Nov	14:26	17:46	2.7	0.3	7.7	0.3	5.7	0.7	2.0	0.3		
13-Nov	18:25	21:45	2.7	0.3	7.9	0.3	6.1	0.7	1.8	0.3		
13-Nov	22:24	01:44	2.1	0.3	3.6	0.3	2.6	0.4	1.0	0.3		
14-Nov	02:23	05:43	1.8	0.3	4.2	0.3	3.0	0.4	1.3	0.3		
14-Nov	06:22	07:39	2.0	0.3	5.4	0.3	4.0	0.5	1.5	0.3		
14-Nov	10:22	13:43	2.2	0.3	6.9	0.3	5.1	0.6	1.9	0.3		
14-Nov	14:22	17:43	1.9	0.3	4.7	0.3	3.5	0.5	1.2	0.3		
14-Nov	18:22	21:43	1.4	0.3	10.4	0.3	7.3	0.7	3.0	0.3		
14-Nov	22:22	01:43	2.2	0.3	23.1	0.6	15.5	1.5	7.6	0.5		
15-Nov	02:22	05:43	2.1	0.3	20.0	0.5	13.7	1.3	6.3	0.4		
15-Nov	06:22	09:43	2.6	0.3	17.6	0.4	11.8	1.2	5.8	0.4		
15-Nov	10:22	13:04	2.2	0.3	6.9	0.3	5.3	0.6	1.5	0.3		
15-Nov	13:43	20:51	1.7	0.3	14.3	0.4	10.1	1.0	4.2	0.3		
15-Nov	01:30	01:01	3.3	0.3								
16-Nov	01:40	05:11	2.8	0.3	34.9	0.8	17.7	1.7	17.2	1.2		
16-Nov	05:50	09:21	2.9	0.3	10.8	0.4	7.4	1.1	3.4	0.3		
16-Nov	10:00	11:40	5.5	0.3	7.9	0.3	5.9	0.9	1.9	0.3		
16-Nov	12:19	13:40	5.2	0.3								

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGC FALL.WK  
 DATA: PARTICULATE OC, EC, TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR (ugC/m3) error	TOTAL CARBON (ugC/m3) error	ORGANIC CARBON (ugC/m3) error	PARTICULATE CARBON (ugC/m3) error	ELEMENTAL CARBON (ugC/m3) error
16-Nov	14:19	15:40	5.2	8.5	0.3	6.4	2.1
16-Nov	16:19	17:40	4.6	9.8	0.3	7.2	2.6
16-Nov	20:20	21:41	5.3	45.6	1.1	32.0	13.6
16-Nov	22:21	23:12	6.3	54.7	1.3	38.5	16.1
16-Nov	23:51	00:31	6.4	43.5	1.1	31.1	12.4
17-Nov	01:10	01:50	6.2	38.4	1.0	26.7	11.7
17-Nov	02:29	03:09	5.7	31.1	0.8	22.0	9.1
17-Nov	03:48	04:28	5.3	25.8	0.7	18.4	7.4
17-Nov	05:07	05:47	4.9	23.6	0.6	16.8	6.8
17-Nov	07:45	08:25	6.6	38.6	1.0	22.9	15.6
17-Nov	09:54	11:39	4.8	17.2	0.5	11.3	5.9
17-Nov	12:18	13:41	4.7	17.0	0.5	12.5	4.5
17-Nov	14:24	15:45	4.4	14.5	0.4	10.8	3.7
17-Nov	16:24	17:45	4.5	25.9	0.7	18.3	7.5
17-Nov	18:24	19:45	4.0	27.2	0.7	19.7	7.5
17-Nov	20:24	21:45	5.4	56.8	1.4	41.9	14.9
17-Nov	22:24	23:45	5.5	56.5	1.4	39.2	17.3
18-Nov	00:24	01:45	5.2	57.5	1.4	40.2	17.3
18-Nov	02:24	03:45	5.0	46.5	1.1	32.7	13.8
18-Nov	04:24	05:45	4.7	36.9	0.9	25.4	11.5
18-Nov	06:24	07:45	5.0	33.9	0.9	21.9	12.0
18-Nov	08:24	09:45	7.2	30.1	0.8	18.6	11.5
18-Nov	10:24	11:45	6.4	15.6	0.5	10.3	5.3
18-Nov	12:24	13:45	5.6	11.7	0.4	8.0	3.7
18-Nov	14:24	15:45	5.5	12.5	0.4	9.1	3.4

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGC FALL.WK  
 DATA: PARTICULATE OC, EC, TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR		TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON	
			(ugC/m3)	error	(ugC/m3)	error	ORGANIC CARBON (ugC/m3)	error	(ugC/m3)	error
18-Nov	16:24	17:45	5.2	0.3	18.3	0.5	13.0	1.5	5.4	0.4
18-Nov	18:24	19:45	5.9	0.3	31.3	0.8	22.0	2.3	9.3	0.6
18-Nov	20:24	21:45	6.3	0.3	37.1	1.0	26.5	2.8	10.7	0.7
18-Nov	22:27	23:07	6.3	0.3	25.8	0.7	18.3	2.1	7.5	0.5
18-Nov	23:46	00:26	5.4	0.3	19.9	0.6	14.0	1.6	5.9	0.4
19-Nov	01:05	01:45	5.4	0.3	21.1	0.6	15.4	1.8	5.7	0.4
19-Nov	02:24	03:04	5.0	0.3	16.7	0.5	12.2	1.4	4.4	0.3
19-Nov	03:43	04:23	4.4	0.3	13.7	0.4	10.0	1.2	3.8	0.3
19-Nov	05:02	05:42	3.8	0.3	11.7	0.4	8.7	1.1	3.0	0.3
19-Nov	06:21	07:01	3.9	0.3	18.8	0.5	11.8	1.3	7.0	0.5
19-Nov	07:40	08:20	4.6	0.3	21.5	0.6	12.9	1.5	8.6	0.6
19-Nov	08:59	09:39	6.4	0.3	22.1	0.6	14.5	1.8	7.6	0.5
19-Nov	12:20	13:41	4.4	0.3	8.5	0.3	6.4	0.9	2.1	0.3
19-Nov	14:20	15:41	5.3	0.3	17.1	0.5	12.6	1.5	4.6	0.3
19-Nov	16:20	17:41	5.5	0.3	28.7	0.8	18.7	2.0	10.1	0.7
19-Nov	18:23	19:04	7.4	0.3	37.1	1.0	25.7	2.8	11.4	0.8
19-Nov	19:43	20:24	6.9	0.3	34.8	0.9	24.6	2.7	10.2	0.7
19-Nov	21:03	21:44	6.2	0.3	31.9	0.8	21.0	2.3	10.9	0.8
19-Nov	22:23	23:04	5.8	0.3	25.7	0.7	18.4	2.0	7.3	0.5
19-Nov	23:43	00:24	5.9	0.3	26.6	0.7	18.9	2.1	7.6	0.5
20-Nov	01:03	01:44	5.6	0.3	25.8	0.7	18.3	2.0	7.5	0.5
20-Nov	02:23	03:04	5.3	0.3	23.6	0.6	16.8	1.9	6.8	0.5
20-Nov	03:43	04:24	4.7	0.3	19.6	0.5	14.1	1.6	5.5	0.4
20-Nov	05:03	05:44	4.4	0.3	18.8	0.5	12.5	1.4	6.3	0.4
20-Nov	06:23	07:04	4.3	0.3	28.1	0.7	16.8	1.8	11.3	0.8
20-Nov	07:43	08:24	5.1	0.3	33.6	0.9	20.4	2.1	13.2	0.9

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGC FALL.WK  
 DATA: PARTICULATE OC, EC, TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR (ugC/m3) error	TOTAL CARBON (ugC/m3) error	PARTICULATE			ELEMENTAL CARBON (ugC/m3) error	
					ORGANIC CARBON (ugC/m3) error	PARTICULATE error	ELEMENTAL CARBON (ugC/m3) error		
02-Dec	15:11	15:36	14.4	30.2	1.0	24.9	3.3	5.3	0.4
02-Dec	16:19	17:40	6.5	23.5	0.7	18.3	2.1	5.2	0.4
02-Dec	18:19	19:40	5.7	29.6	0.8	22.8	2.4	6.8	0.5
02-Dec	20:19	21:40	5.8	38.8	1.0	29.1	2.9	9.7	0.7
02-Dec	22:19	23:40	5.7	51.2	1.3	36.0	3.5	15.3	1.1
03-Dec	00:19	01:40	5.7	65.3	1.6	45.2	4.3	20.2	1.4
03-Dec	02:19	03:40	5.6	57.9	1.4	38.2	3.7	19.8	1.4
03-Dec	04:19	05:40	5.4	59.9	1.4	38.8	3.7	21.0	1.4
03-Dec	06:22	07:03	7.4	69.1	1.7	44.5	4.4	24.6	1.7
03-Dec	07:42	08:23	9.8	86.4	2.1	53.4	5.3	33.0	2.3
03-Dec	09:02	09:43	13.1	61.2	1.7	40.8	4.5	20.3	1.4
03-Dec	10:22	11:03	14.1	63.6	1.7	44.1	4.9	19.5	1.3
03-Dec	11:42	12:23	14.9	55.6	1.6	39.1	4.5	16.5	1.1
03-Dec	13:02	13:43	15.8	58.1	1.7	42.6	4.9	15.5	1.1
03-Dec	14:22	15:03	14.6	50.2	1.5	38.6	4.5	11.6	0.8
03-Dec	15:42	16:23	13.1	50.9	1.4	39.6	4.4	11.3	0.8
03-Dec	18:19	19:00	9.2	37.4	1.0	29.2	3.2	8.2	0.6
03-Dec	19:39	20:20	8.8	40.7	1.1	29.8	3.2	10.9	0.8
03-Dec	20:59	21:40	8.2	37.0	1.0	27.1	3.0	9.9	0.7
03-Dec	22:19	23:00	8.1	45.6	1.2	33.3	3.5	12.3	0.8
03-Dec	23:39	00:20	7.7	51.9	1.3	37.4	3.8	14.5	1.0
04-Dec	00:59	01:40	7.9	45.7	1.2	35.0	3.6	10.7	0.7
04-Dec	02:19	03:00	8.0	46.3	1.2	36.1	3.7	10.2	0.7
04-Dec	03:39	04:20	7.7	42.8	1.1	35.2	3.6	7.6	0.5
04-Dec	04:59	05:56	7.0	36.2	1.0	29.2	3.0	7.0	0.5
04-Dec	06:42	07:59	6.1	31.4	0.8	22.7	2.4	8.6	0.6

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGC FALL.WK  
 DATA: PARTICULATE OC, EC, TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR (ugC/m3) error	TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON		
				(ugC/m3)	error	ORGANIC CARBON (ugC/m3)	error	(ugC/m3)	error	
04-Dec	08:38	09:55	5.7	0.3	25.5	0.7	17.6	2.0	7.9	0.5
04-Dec	10:34	11:51	5.8	0.3	16.5	0.5	11.4	1.5	5.1	0.4
04-Dec	12:30	13:47	5.7	0.3	4.8	0.3	3.6	0.8	1.2	0.3
04-Dec	14:29	17:48	2.6	0.3	3.9	0.3	3.1	0.5	0.8	0.3
04-Dec	18:27	21:46	2.1	0.3	4.2	0.3	3.5	0.5	0.8	0.3
04-Dec	22:25	01:44	2.1	0.3	6.5	0.3	5.2	0.6	1.2	0.3
05-Dec	02:23	05:42	2.1	0.3	12.3	0.3	9.3	1.0	3.0	0.3
05-Dec	06:21	08:12	2.7	0.3	12.4	0.3	8.8	1.0	3.6	0.3
05-Dec	10:20	11:41	3.9	0.3	6.6	0.3	5.2	0.8	1.3	0.3
05-Dec	12:20	13:41	3.3	0.3	4.8	0.3				
05-Dec	14:20	15:41	3.4	0.3	4.5	0.3				
05-Dec	16:20	17:41	3.3	0.3	5.4	0.3	4.6	0.7	0.8	0.3
05-Dec	18:20	19:41	3.6	0.3	24.6	0.6	18.9	1.9	5.8	0.4
05-Dec	20:20	21:41	4.5	0.3	43.0	1.0	31.1	3.0	11.8	0.8
05-Dec	22:23	23:04	7.4	0.3	73.6	1.8	54.6	5.2	19.0	1.3
05-Dec	23:43	00:24	6.8	0.3	48.4	1.2	36.3	3.6	12.1	0.8
06-Dec	01:03	01:44	6.0	0.3	39.7	1.0	30.2	3.0	9.5	0.7
06-Dec	02:23	03:04	5.3	0.3	24.0	0.7	19.2	2.1	4.9	0.3
06-Dec	03:43	04:24	4.7	0.3	17.3	0.5	13.8	1.6	3.5	0.3
06-Dec	05:03	05:44	4.6	0.3	18.3	0.5	14.6	1.6	3.7	0.3
06-Dec	06:23	07:04	4.5	0.3	23.7	0.6	17.7	1.9	6.0	0.4
06-Dec	07:43	08:24	6.2	0.3	25.8	0.7	19.6	2.2	6.2	0.4
06-Dec	09:03	09:44	7.9	0.3	21.3	0.7	17.2	2.1	4.1	0.3
06-Dec	10:26	11:47	5.2	0.3	7.1	0.3	5.7	0.9	1.4	0.3
06-Dec	13:11	15:41	3.3	0.3	3.6	0.3	3.0	0.5	0.6	0.3
06-Dec	16:23	19:44	2.8	0.3	4.7	0.3	3.9	0.6	0.9	0.3

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGC FALL.WK  
 DATA: PARTICULATE OC, EC, TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR (ugC/m3) error	TOTAL CARBON (ugC/m3) error	ORGANIC CARBON (ugC/m3) error	PARTICULATE CARBON (ugC/m3) error	ELEMENTAL CARBON (ugC/m3) error
06-Dec	20:23	23:44	2.5	8.8	0.3	7.5	1.4
07-Dec	00:23	03:44	2.1	6.0	0.3	5.0	1.0
07-Dec	04:23	07:44	2.2	10.6	0.3	7.5	3.0
07-Dec	08:23	11:44	3.8	16.4	0.5	10.9	5.5
08-Dec	00:35	01:53	6.2	51.1	1.3	35.2	15.9
08-Dec	02:32	03:50	5.7	40.9	1.0	27.4	13.5
08-Dec	04:29	05:47	5.1	34.6	0.9	22.6	12.0
08-Dec	06:26	07:44	5.6	40.8	1.0	24.0	16.8
08-Dec	08:23	09:41	7.1	44.6	1.1	26.7	17.9
08-Dec	19:18	20:32	5.5	9.3	0.3	7.3	2.0
08-Dec	21:11	22:25	4.9	32.4	0.8	23.8	8.6
08-Dec	23:04	00:18	4.7	34.2	0.9	24.0	10.3
09-Dec	00:57	02:11	4.5	37.5	0.9	24.9	12.6
09-Dec	02:50	04:04	4.3	37.2	0.9	25.2	12.0
09-Dec	04:43	05:57	4.1	36.0	0.9	23.7	12.2
09-Dec	06:36	07:50	4.4	42.9	1.0	25.2	17.7
09-Dec	08:29	09:43	6.2	41.3	1.1	25.6	15.7
09-Dec	10:25	11:06	8.5	23.9	0.7	17.5	6.4
09-Dec	11:45	12:26	8.3	18.4	0.6	13.9	4.6
09-Dec	14:19	15:40	5.2	21.3	0.6	15.5	5.7
09-Dec	16:19	17:40	5.3	28.6	0.8	20.4	8.2
09-Dec	18:22	19:03	7.2	34.7	0.9	26.4	8.3
09-Dec	19:42	20:23	7.5	45.9	1.2	33.5	12.4
09-Dec	21:02	21:43	8.1	62.7	1.6	46.0	16.7
09-Dec	22:22	23:03	8.0	61.3	1.5	44.7	16.6
09-Dec	23:42	00:23	8.0	68.7	1.7	48.9	19.9

PROGRAM NAME:  
 ORGANIZATION:  
 SITE NAME:  
 SAMPLER:  
 ANALYSIS:  
 FILE NAME:  
 DATA:  
 UNITS:

SCAQ5 - FALL DATA  
 OREGON GRADUATE CENTER - HUNTZICKER  
 LONG BEACH  
 IN-SITU CARBON ANALYZER  
 IN-SITU CARBON ANALYZER  
 OGC FALL.WK  
 PARTICULATE OC, EC, TC (vapor corrected) AND ADSORBED VAPOR  
 MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR (ugC/m3) error	TOTAL CARBON (ugC/m3) error	PARTICULATE ORGANIC CARBON (ugC/m3) error	ELEMENTAL CARBON (ugC/m3) error
10-Dec	01:02	01:43	8.4	75.7	54.9	20.8
10-Dec	02:22	03:03	8.3	69.3	48.4	20.9
10-Dec	03:42	04:23	7.7	61.5	43.1	18.5
10-Dec	05:02	05:43	7.1	59.5	41.1	18.3
10-Dec	06:22	07:03	7.2	62.8	41.1	21.8
10-Dec	07:42	08:23	8.2	55.5	36.7	18.7
10-Dec	09:02	09:43	9.8	48.3	32.5	15.9
10-Dec	10:22	11:03	11.8	53.3	36.5	16.8
10-Dec	11:42	12:23	10.9	29.4	21.7	7.7
10-Dec	13:02	13:43	13.9	56.6	40.4	16.2
10-Dec	14:22	15:03	11.4	27.8	20.9	6.9
10-Dec	15:42	16:23	9.7	22.5	16.9	5.5
10-Dec	17:42	19:22	7.6	28.6	19.7	8.9
10-Dec	20:55	21:38	7.5	37.0	27.5	9.5
10-Dec	22:20	23:41	5.3	53.2	38.0	15.1
11-Dec	00:20	01:41	5.1	59.7	41.6	18.1
11-Dec	02:20	03:41	4.0	32.0	22.8	9.2
11-Dec	04:20	05:41	3.5	29.4	21.3	8.2
11-Dec	06:20	07:41	3.2	41.4	26.1	15.3
11-Dec	08:20	09:41	5.3	31.0	20.6	10.4
11-Dec	10:20	11:41	6.0	28.0	20.6	7.4
11-Dec	12:20	13:41	6.8	29.2	21.6	7.6
11-Dec	14:20	15:41	6.5	35.9	25.9	10.0
11-Dec	16:20	17:41	5.6	33.5	24.5	9.1
11-Dec	18:20	19:41	5.2	40.8	29.1	11.7
11-Dec	22:20	23:01	7.8	70.9	50.9	20.0

PROGRAM NAME: SCAQS - FALL DATA  
 ORGANIZATION: OREGON GRADUATE CENTER - HUNTZICKER  
 SITE NAME: LONG BEACH  
 SAMPLER: IN-SITU CARBON ANALYZER  
 ANALYSIS: IN-SITU CARBON ANALYZER  
 FILE NAME: OGC FALL.WK  
 DATA: PARTICULATE OC, EC, TC (vapor corrected) AND ADSORBED VAPOR  
 UNITS: MICROGRAMS PER CUBIC METER (not standard)

DATE	START TIME PST	STOP TIME PST	ADSORBED VAPOR		TOTAL CARBON		PARTICULATE		ELEMENTAL CARBON	
			(ugC/m3)	error	(ugC/m3)	error	ORGANIC (ugC/m3)	error	(ugC/m3)	error
11-Dec	23:40	00:21	9.8	0.3	86.3	2.1	62.6	6.1	23.6	1.6
12-Dec	01:00	01:41	7.8	0.3	79.1	1.9	56.7	5.4	22.3	1.5
12-Dec	02:20	03:01	7.4	0.3	78.8	1.9	55.1	5.3	23.7	1.6
12-Dec	03:40	04:21	6.9	0.3	70.0	1.7	48.6	4.7	21.4	1.5
12-Dec	05:00	05:41	6.6	0.3	50.3	1.3	35.2	3.5	15.1	1.0
12-Dec	06:25	07:46	4.0	0.3	31.8	0.8	21.3	2.1	10.4	0.7
12-Dec	08:25	09:46	4.8	0.3	29.4	0.8	21.8	2.2	7.6	0.5
12-Dec	10:25	11:46	5.9	0.3	20.2	0.6	15.6	1.8	4.7	0.3
12-Dec	12:25	13:46	5.8	0.3	22.2	0.6	17.5	2.0	4.7	0.3
12-Dec	14:25	15:46	5.4	0.3	19.2	0.6	15.7	1.8	3.5	0.3
12-Dec	16:25	17:46	5.0	0.3	18.4	0.5	15.7	1.7	2.7	0.3
12-Dec	18:25	19:46	2.7	0.3	8.5	0.3	7.0	0.8	1.6	0.3
12-Dec	22:19	23:40	1.6	0.3	5.7	0.3				
13-Dec	00:19	01:40	1.2	0.3	4.1	0.3				
13-Dec	02:19	03:40	0.8	0.3	2.9	0.3				
13-Dec	04:19	05:40	0.7	0.3	2.9	0.3				
13-Dec	06:19	07:40	0.7	0.3	3.2	0.3				
13-Dec	08:19	09:40	0.7	0.3	4.4	0.3				