7.3 COMPARISONS BETWEEN VEHICLE ACTIVITY AND AMBIENT AIR QUALITY BY DAY-OF-WEEK

Lawrence C. Larsen

7.3.1 Abstract

Measurements of ozone precursors in Los Angeles and Orange Counties demonstrate clear relationships to traffic activity. Hourly profiles for carbon monoxide (CO) and nitrogen oxides (NO_x) respond to the hourly activity of traffic on freeways for each day of the week. The CO and NO_x responses are consistent with expectations based on emissions inventories and the freeway activity profiles. The percent change in CO levels can be used as an approximate surrogate for the percent change in hydrocarbons (VOC or ROG).

According to a recent emissions inventory, light-duty vehicles (LDVs) account for 77% of CO and 39% of NO_x emissions, while heavy-duty trucks (HDTs) account for 4% of CO and 27% of NO_x.

The Weigh-in-Motion data for Los Angeles and Orange Counties (central not peripheral stations) show that the volume of LDVs on freeways is about 90% on Saturday and 78% on Sunday compared to mid-week levels. The corresponding volumes of HDTs are substantially smaller, about 39% on Saturday and 22% on Sunday when compared to mid-week volumes.

Consistent with the activity data and the inventory, the percent decrease in NO_x on weekends is greater than the percent decrease in CO. The air quality data (central not peripheral sites) indicate that CO levels are about 93% on Saturday and 74% on Sunday compared to mid-week levels. The corresponding NO_x levels are substantially less; NOx levels are about 75% on Saturday and 56% on Sunday when compared to mid-week levels.

The behavior of the VOC to NOx ratio was estimated using the behavior of CO as a surrogate for the behavior of VOCs. As estimated, the ratio of VOC to NO_x is approximately 10 to 30% higher on Saturday and 20 to 40% higher on Sunday compared to mid-week levels from midnight to 4 p.m.

An alternative assessment of the VOC to NOx ratio, based on the WIM data, inventory data, and hourly freeway data, is consistent with the preceding estimates. With respect to mid-week levels, this analysis suggests that the VOC to NOx ratio should be approximately 27% greater on Saturday and 37% greater on Sunday. These values fall in the range of the preceding air quality analyses. Although changes in emissions from other sources of VOCs and NO_x also affect ozone precursors on weekends, emissions from on-road mobile sources appear to be a major determinant of the weekend effect.

Evidence from the air quality profiles and the traffic profiles is consistent with Hypothesis 3a. According to this hypothesis, increased traffic overnight (Fri-Sat and Sat-Sun) injects ozone precursors into the air near the surface of the ground. These additional precursors affect the evolution of ozone during the daylight hours on the following day.

The circumstantial evidence from changes in traffic and air quality is consistent with Hypothesis 1, Hypothesis 2, and Hypothesis 3a. The data lack sufficient detail to differentiate between these hypotheses or to support or refute the remaining.

7.3.2 Introduction

Changes in the volume and composition of traffic on weekends compared to weekdays may be the most important factor determining the so-called weekend effect. Emissions of ozone precursors from on-road motor vehicles comprise a large share of the inventories for these pollutants. Therefore, we compare day-of-week profiles for traffic with the corresponding profiles for relevant pollutants. For this purpose, we use the 11 sub-regions of Los Angeles and Orange Counties that were used in Section 7.2.

This section also offers an initial opportunity to consider the relationships between emissions and air quality as these offer insight concerning the causes of causes of the weekend effect.

7.3.3 Methodology

7.3.3.1 Traffic data

For the comparisons between traffic and air quality, we use the traffic data presented in sections 7.1 and 7.2. In particular, the hourly profiles for freeway activity by day of week are the primary data that we compare to air quality.

Weigh-in-Motion data are applied as if their weekday and weekend differences on a 24-hour basis pertain to all hours of the day equally. Until data with greater temporal resolution are available, this type of assumption is required.

In addition to the summaries in sections 7.1 and 7.2, a few new tabular summaries help facilitate comparisons to the air quality data.

7.3.3.2 Air quality data

For this section, we prepared a set of air quality profiles in addition to those presented in Section 5.1. The profiles used here are based on three years of data, 1996 – 1998 for two reasons. First, using three years of data reduces the meteorological variability affecting the hourly averages. Second, traffic data collected in the summer of 1997 are best compared to air quality profiles that represent data centered on 1997.

Air quality profiles were prepared for each subregion (or domain) identified for traffic analysis in section 7.2. Each domain has a profile for CO, NO_x, ozone, and the NO_2 to NO ratio (except Irvine/El Toro, for which NO_x data were not available). To create the NO_2 to NO ratio for an hour of the day, we used the ratio of means rather than the mean of ratios. First, we calculated the mean for NO_2 and the mean for NO for the specified hour using all relevant days. We then divided the NO_2 mean by the NO mean.

The ratio of means is more reliable than the mean of ratios in this case. The mean of ratios would first calculate the NO_2 to NO ratio for the specified hour on each day. Then, the mean of the ratios would represent that hour of the day. The mean of ratios was not used because the results would probably be biased high because of some very low NO concentrations. Very small denominators lead to very large ratios on some days, which then cause the overall average to be overestimated. In addition, some valid NO values may be zero due to rounding and to instrument resolution. The ratio of means avoids problems that arise when attempting to divide by zero to make a daily ratio.

The profiles for CO, NOx, and ozone are presented in original units and as proportions of their respective mid-week levels.

Profiles for the NO_2 to NO ratio do not include the proportional scale with respect to mid-week values; instead, only the original (unitless) scale is provided for each domain. Because the El Toro air quality (Irvine domain) site does not measure nitrogen oxides, Irvine is limited to profiles for traffic and CO.

The proportional, unitless profiles provide the primary basis for comparisons between traffic activity and air quality. This approach allows the relationships between traffic air quality in different domains to be seen with a comparable frame of reference.

7.3.3.3 Comparisons between traffic data and air quality data

A brief emissions inventory is given in Table 7.3.1. This inventory helps us anticipate the probable effects of changes in traffic on air quality. In particular, the inventory helps to limit the potential to overstate the effects of traffic on air quality.

For general comparisons, we merged information from all 11 sub-regions that were identified in Section 7.2. Figure 7.3.1 shows composite profiles for CO expressed as a proportion of midweek CO levels. Figure 7.3.2 and Figure 7.3.4 show comparable graphs for NO_x and for freeway traffic.

The composite profile for traffic in original units is shown in Figure 7.3.5. This figure is scaled to relate to a daily total volume of one million vehicles.

The composite results for the NO_2 to NO ratio are shown in Figure 7.3.3.

Comparisons between traffic and air quality in each of the 11 sub-regions are based on Figure 7.3.6 through Figure 7.2.79.

7.3.4 Results and Discussion

Table 7.3.2 and Table 7.3.3 show aggregate relationships between traffic and air quality during the daylight hours. These summaries reveal a strong effect of the morning commute traffic on air quality in the morning hours.

In addition, Table 7.3.3 shows that the change in air quality is damped. That is, the low points in air quality are higher than the low points in the traffic volume and the high points in air quality are lower than the high points for traffic. This phenomenon probably occurs for more than one reason.

First, the atmosphere acts as a sponge, absorbing emissions for multiple hours to arrive at its present content of a pollutant. Therefore, air quality behaves similar to a moving average that overcuts the valleys and undercuts the peaks.

Second, traffic is not the only source of ozone precursors. The activity of these other sources is unlikely to follow exactly the same profile as traffic activity. Therefore, the profile for the sum of emissions from the multiple sources will not follow any one source but will reflect the sum of the profiles. This aggregate profile should overcut the valleys and undercut the peaks.

The NO2 to NO ratio at Lynwood and at Reseda invite further investigation. The ratio at Lynwood is substantially smaller than the ratio for any other location. Does this indicate a large source of fresh NO emissions throughout the day? At Reseda, the profile on Saturday and Sunday seems to indicate a mid-day increase in fresh NO emissions that does not occur on weekdays, or else, a sudden mid-day decrease on NO_2 that does not occur on weekdays.

An obvious feature of the CO and NO_x profiles is that they are not simply a constant fraction of the mid-week levels. These profiles indicate that both the amount and the timing of ozone precursors is differnet on weekends compared to weekdays.

(more to come)

7.3.5 Conclusion

With respect to ozone, two of the weekend-effect hypotheses focus primarily on emissions during the daylight hours. Hypothesis #1 (hydrocarbon-limited conditions) focuses on the aggregate difference between emissions on weekdays compared to weekends. Hypothesis #2 (timing of emissions), on the other hand, focuses on when emissions occur as well as how much they differ on weekdays compared to weekends.

Both of these hypotheses are consistent with the relationship between the amount and timing of traffic and the amount and timing of ambient levels of CO (VOC surrogate) and NO_x.

The remaining hypotheses involve emissions outside of daylight hours or carryover of ozone and precursors overnight.

(more to come)

7.3.6 Recommendations

When more detailed data are available, reanalyze the relationships between traffic and air quality.

(more to come)

7.3.7 References

Sillman, S. (1999) “The relation between ozone, NO_x, and hydrocarbons in urban and polluted rural environments,” Atmospheric Environment, **33:** 1821-1845.

Table 7.3.1 Brief emission inventories for the South Coast Air Basin.

Source Category	Reactive Organic Gases 1995	Reactive Organic Gases 2000	Nitrogen Oxides 1995	Nitrogen Oxides 2000	Carbon Monoxide 1995	Carbon Monoxide 2000
Stationary Sources	275	279	144	118	71	66
Area-Wide Sources	228	200	31	34	716	633
On-Road Mobile Sources:	1031	730	1045	844	9653	6525
Heavy-Duty Trucks	41	36	328	348	431	302
Other Vehicles	990	694	718	496	9223	6223
Other Mobile Sources	108	108	270	268	870	808
Natural Sources	n/a	4	n/a	5	n/a	106
Total	1642	1321	1490	1269	11310	8138
	Percent of total by Year					
Stationary Sources	16.7%	21.1%	9.7%	9.3%	0.6%	0.8%
Area-Wide Sources	13.9%	15.1%	2.1%	2.7%	6.3%	7.8%
On-Road Mobile Sources:	62.8%	55.3%	70.1%	66.5%	85.3%	80.2%
Heavy-Duty Trucks	2.5%	2.7%	22.0%	27.4%	3.8%	3.7%
Other Vehicles	60.3%	52.5%	48.2%	39.1%	81.5%	76.5%
Other Mobile Sources	6.6%	8.2%	18.1%	21.1%	7.7%	9.9%
Natural Sources		0.3%		0.4%		1.3%

Note: Values representing mobile sources are based on EMFAC 2000 (v.199). The heavy-duty truck category includes all trucks weighing 8500 lbs. and up. Other values are based on the CEFS 1996 Base Year Forecast Scenarios for the 2000 Almanac.

Table 7.3.2 Comparison of traffic and air quality during daylight hours (6 a.m. through 8 p.m.) expressed as percent of the midweek (Tue. – Thu.) average.

Parameter	Sun	Mon	Tue	Wed	Thu	Fri	Sat
Traffic	70%	98%	100%	100%	101%	98%	83%
Carbon Monoxide	73%	96%	100%	99%	100%	104%	89%
Nitrogen Oxides	60%	92%	100%	100%	100%	100%	75%

Table 7.3.3 Comparison of traffic and air quality showing that levels of precursors exhibit a "damped" response to changes in traffic volumes.

	Sunday					
	6 - 8 a.m.			12 - 2 p.m.		
Traffic Domain	**Fwy Traffic**	**CO**	**NOx**	**Fwy Traffic**	**CO**	**NOx**
Anaheim	0.26	0.57	0.41	0.96	0.87	0.65
Azusa	0.24	0.70	0.53	0.97	0.79	0.54
Burbank	0.24	0.73	0.50	0.93	0.74	0.55
Hawthorne	0.30	0.60	0.52	0.93	0.88	0.66
Irvine (El Toro)	0.24	0.36	n/a	0.92	0.74	n/a
L.A. - CBD (N. Main)	0.28	0.61	0.46	0.97	0.79	0.54
Lynwood	0.34	0.50	0.46	0.94	0.98	0.76
N. Long Beach	0.24	0.58	0.48	0.78	0.72	0.60
Pico Rivera	0.26	0.69	0.48	0.98	0.80	0.50
Pomona	0.27	0.66	0.51	1.02	0.84	0.59
Reseda	0.27	0.64	0.54	0.98	0.73	0.56
Average	0.27	0.60	0.49	0.94	0.81	0.60

	Saturday					
Traffic Domain	6 - 8 a.m.			12 - 2 p.m.		
(A.Q. Site if different)	**Fwy Traffic**	**CO**	**NOx**	**Fwy Traffic**	**CO**	**NOx**
Anaheim	0.50	0.76	0.68	1.05	0.95	0.81
Azusa	0.43	0.91	0.81	1.05	0.98	0.75
Burbank	0.44	0.89	0.75	1.04	0.89	0.74
Hawthorne	0.49	0.72	0.68	1.03	0.96	0.78
Irvine (El Toro)	0.44	0.66	n/a	1.05	1.06	n/a
L.A. - CBD (N. Main)	0.51	0.82	0.72	1.05	0.98	0.75
Lynwood	0.56	0.71	0.70	1.06	1.22	0.91
N. Long Beach	0.43	0.77	0.66	0.90	0.93	0.71
Pico Rivera	0.52	0.87	0.75	1.06	0.95	0.68
Pomona	0.46	0.86	0.77	1.09	0.98	0.77
Reseda	0.46	0.82	0.71	1.06	0.86	0.71
Average	0.48	0.80	0.72	1.04	0.98	0.76

Figure 7.3.1 Hourly values of CO by day-of-week expressed as a percent of the midweek hourly value; composite of results for 11 sub-regions of the South Coast Air Basin

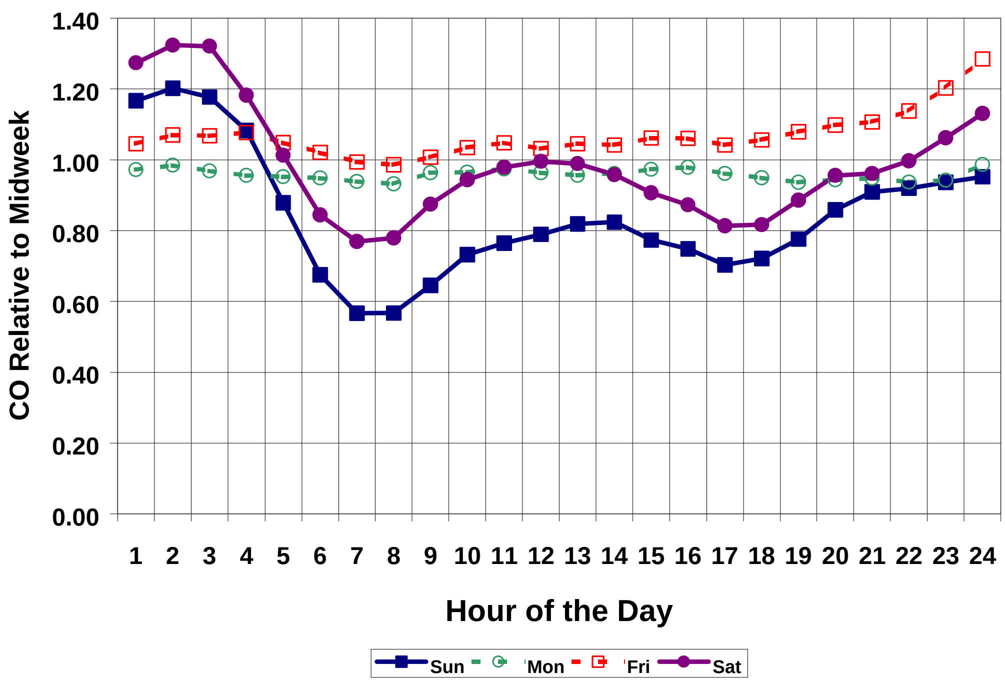

Figure 7.3.2 Hourly values of NO_x by day-of-week expressed as a percent of the midweek hourly value; composite of 11 sub-regions of the South Coast Air Basin

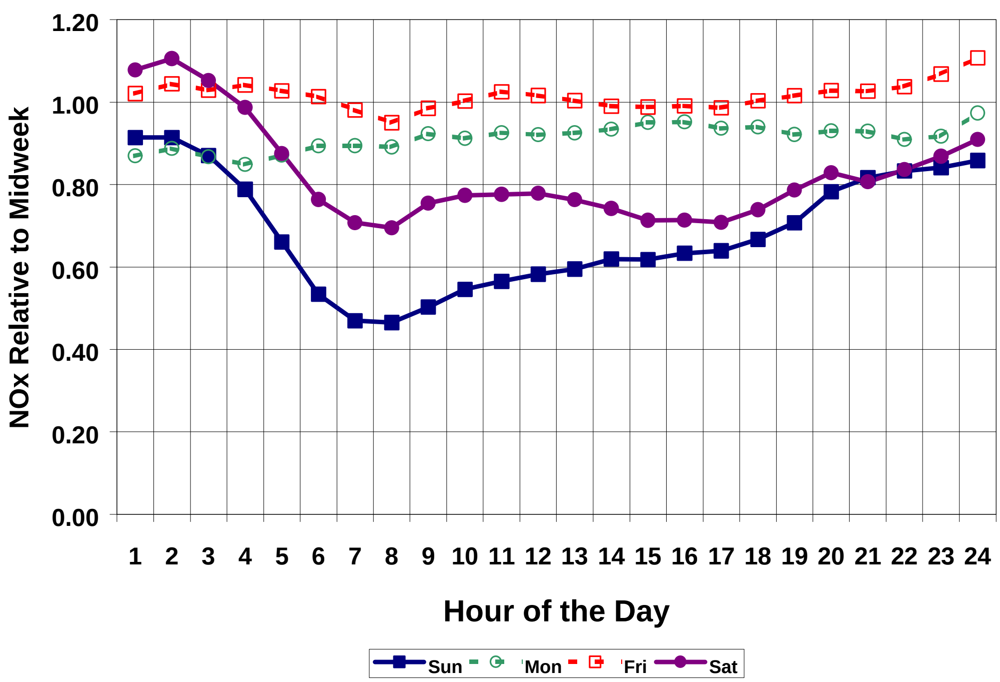

Figure 7.3.3 Pseudo "VOC/NOx" ratio by day-of-week expressed as percent of the midweek value; composite of 11 sub-regions of the South Coast Air Basin

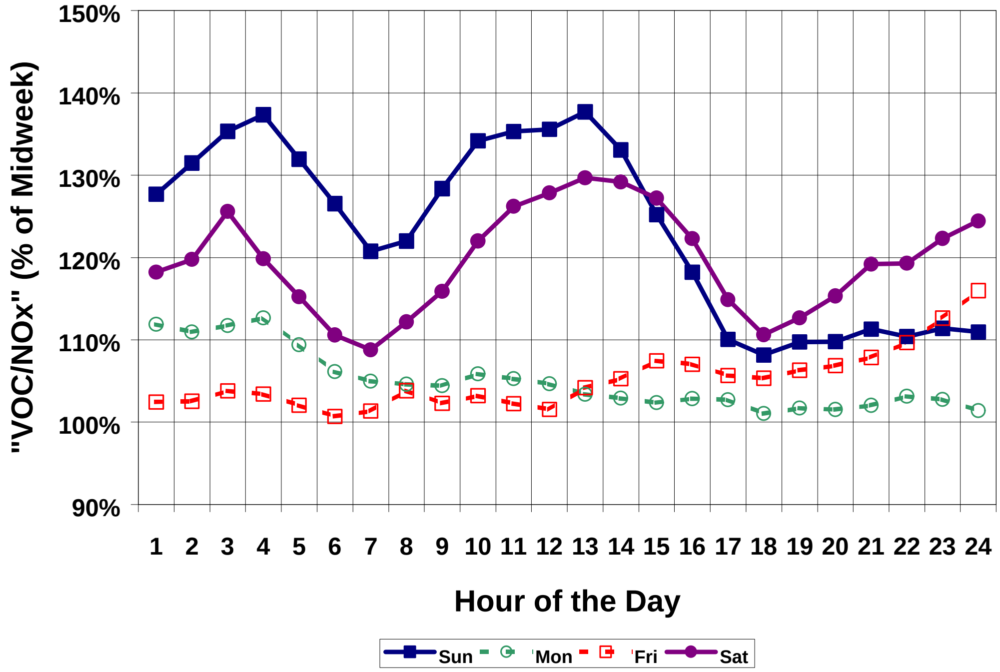

Figure 7.3.4 Freeway traffic by day-of-week expressed as percent of the midweek value; composite of results for 11 sub-regions of the South Coast Air Basin

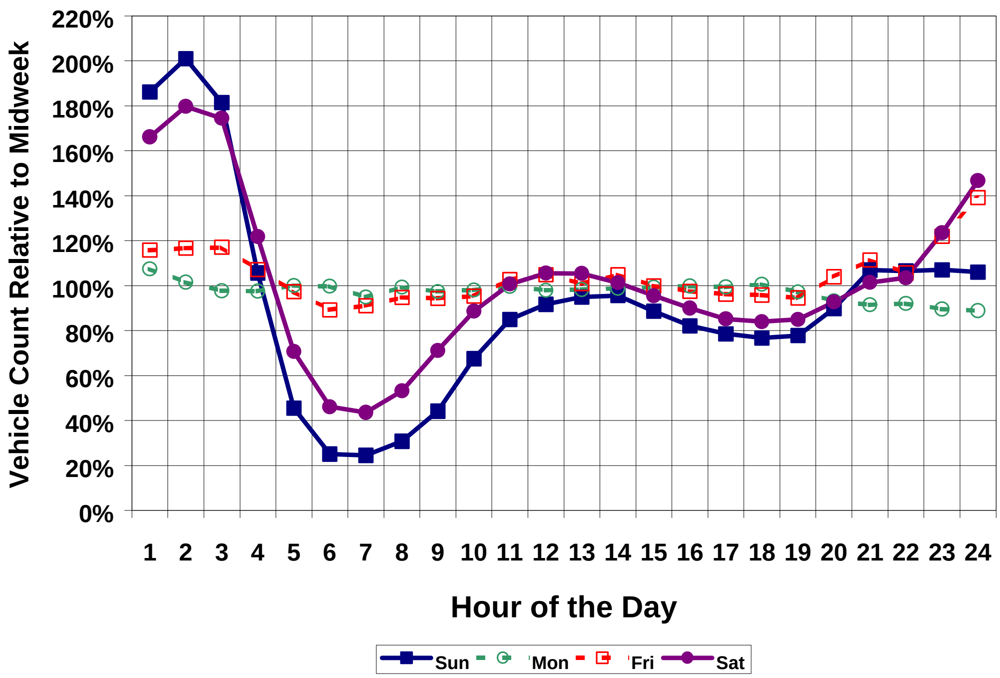

Figure 7.3.5 Freeway traffic by day-of-week normalized to a midweek daily total of one million vehicles; composite of 11 sub-regions of the South Coast Air Basin

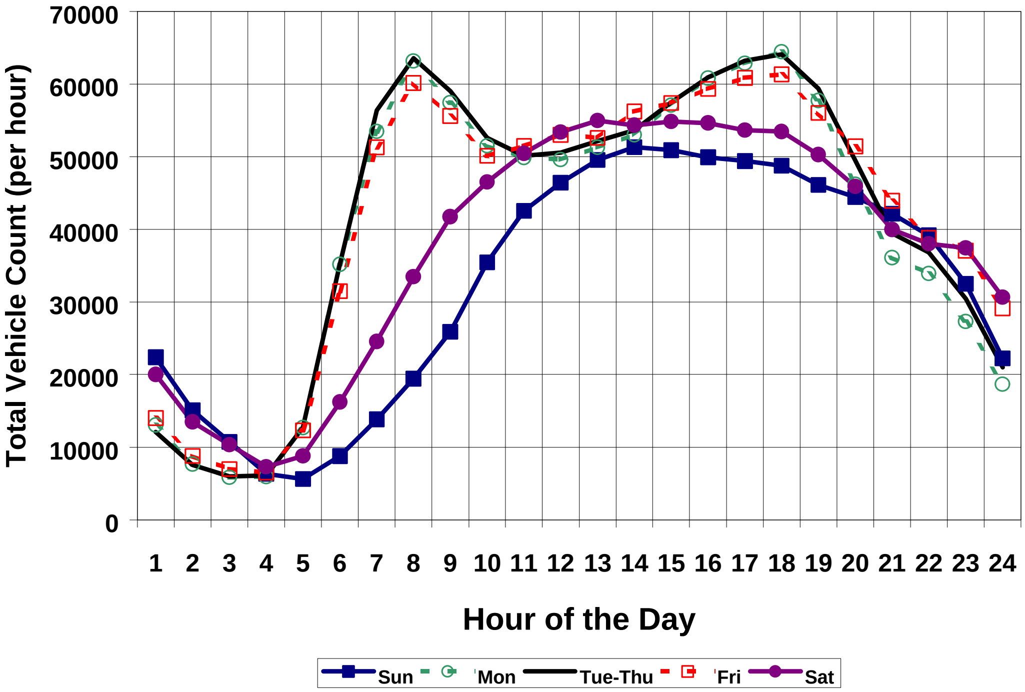

Figure 7.3.6 Carbon monoxide profiles by day of week at Anaheim, based on data for the May – October ozone seasons of 1996-1998.

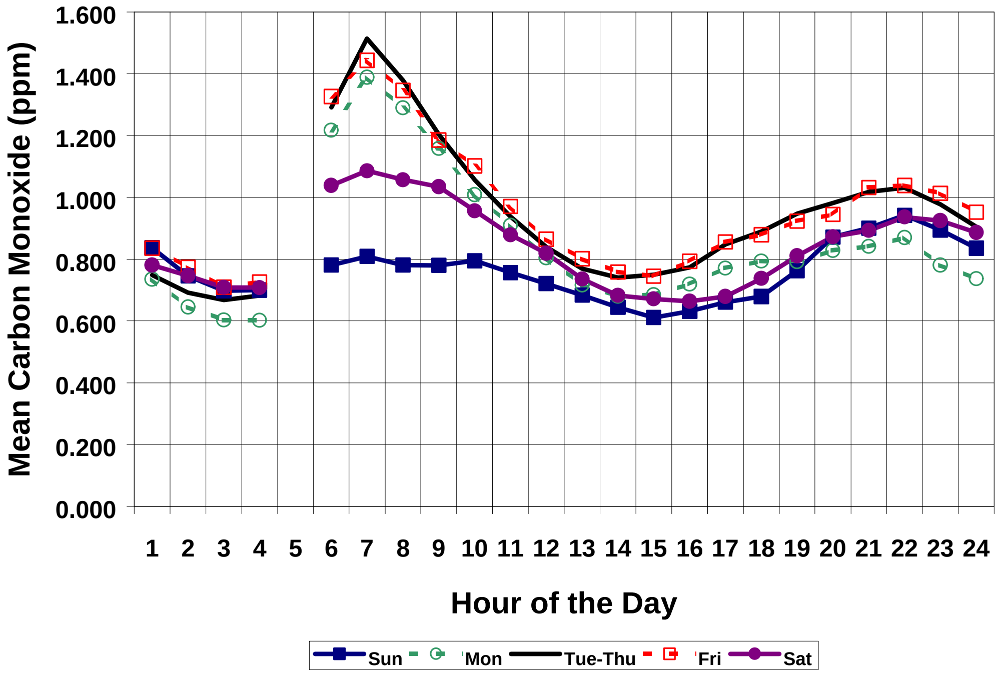

Figure 7.3.7 Carbon monoxide profiles for Anaheim, expressed as a proportion of the midweek values.

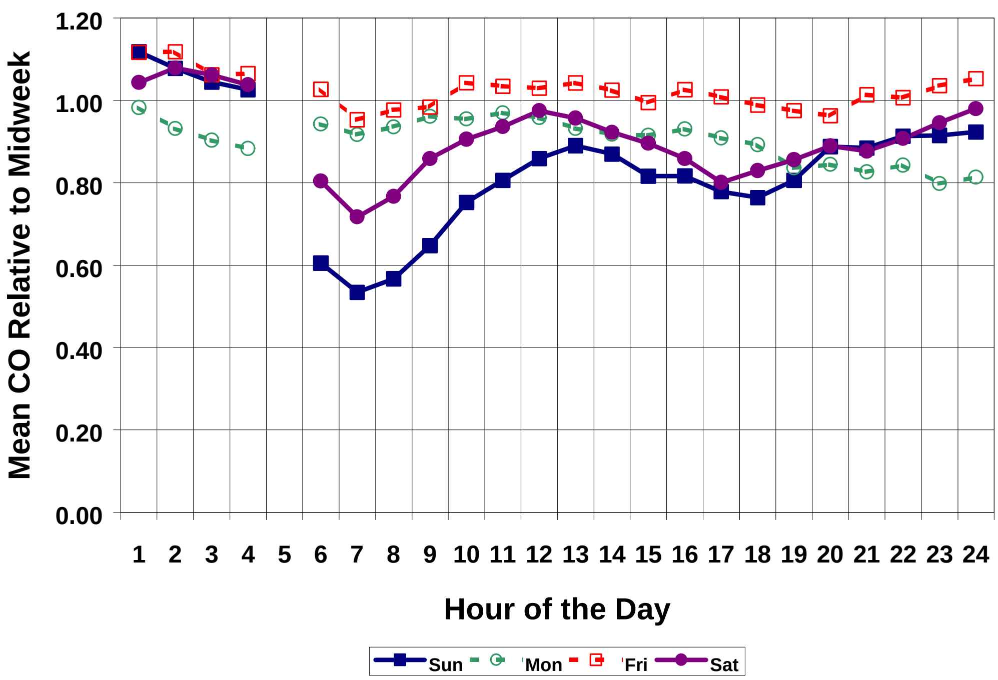

Figure 7.3.8 Nitrogen oxides profiles by day of week at Anaheim, based on data for the May – October ozone seasons of 1996-1998.

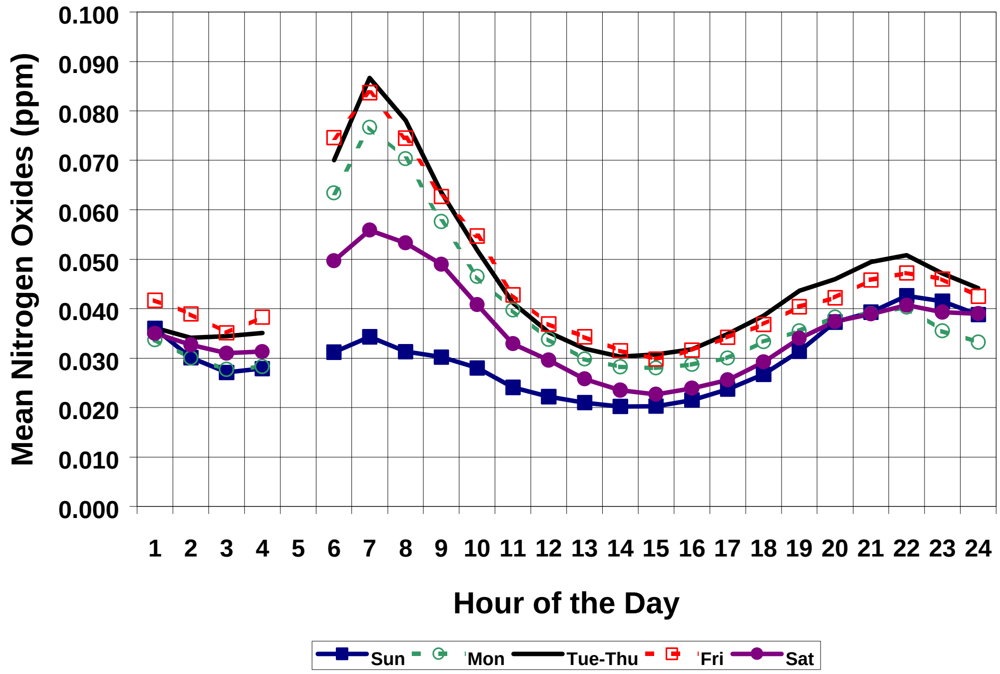

Figure 7.3.9 Nitrogen oxides profiles for Anaheim, expressed as a proportion of the midweek values.

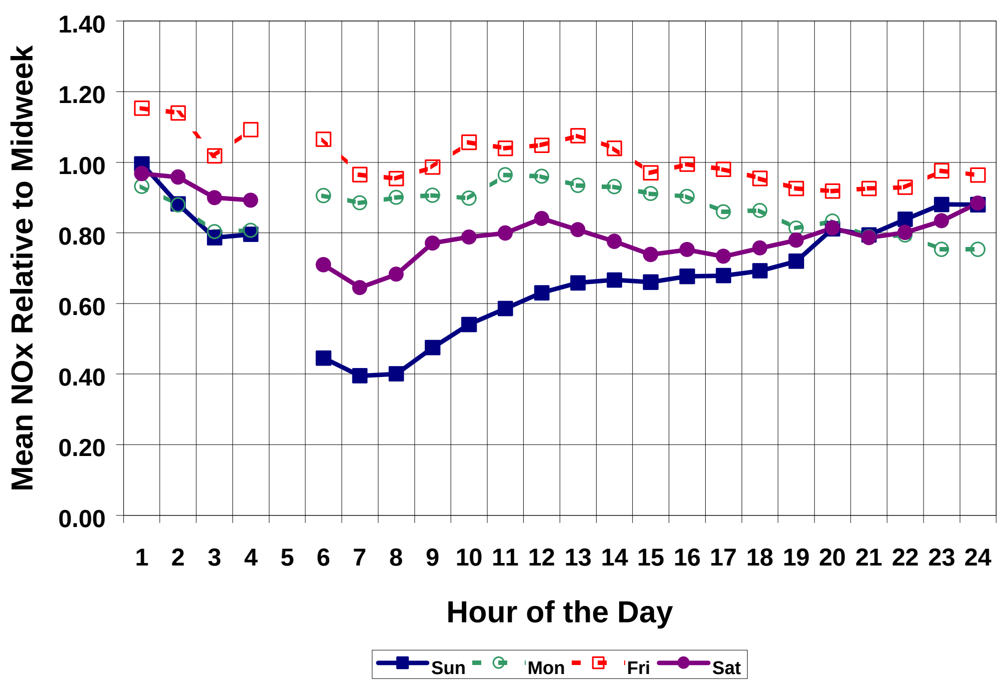

Figure 7.3.10 Ozone profiles by day of week at Anaheim, based on data for the May – October ozone seasons of 1996-1998.

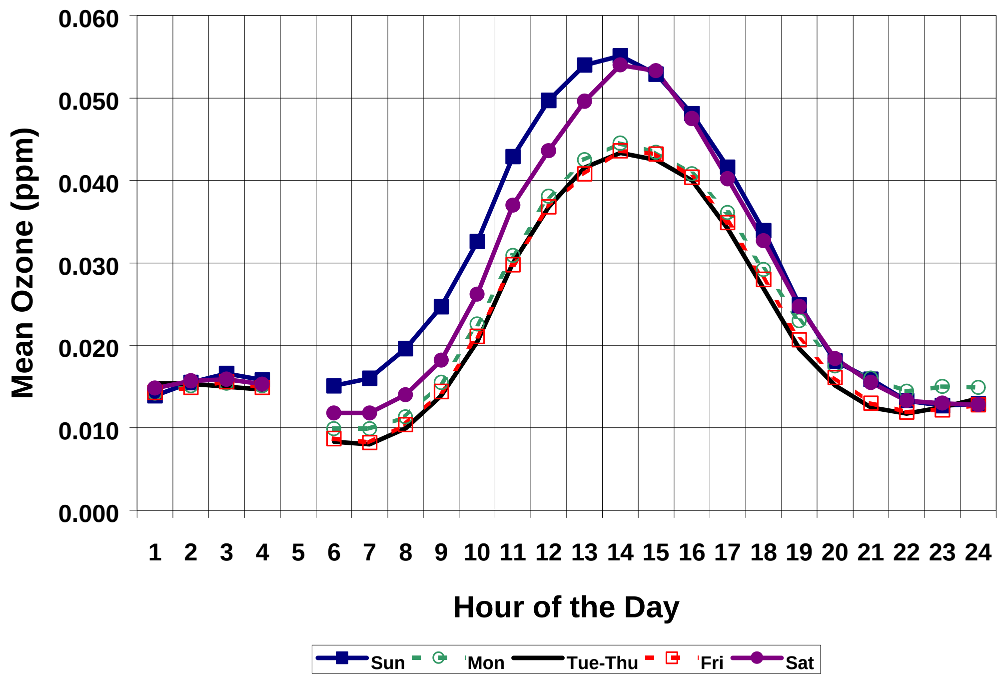

Figure 7.3.11 Ozone profiles for Anaheim, expressed as a proportion of the midweek values.

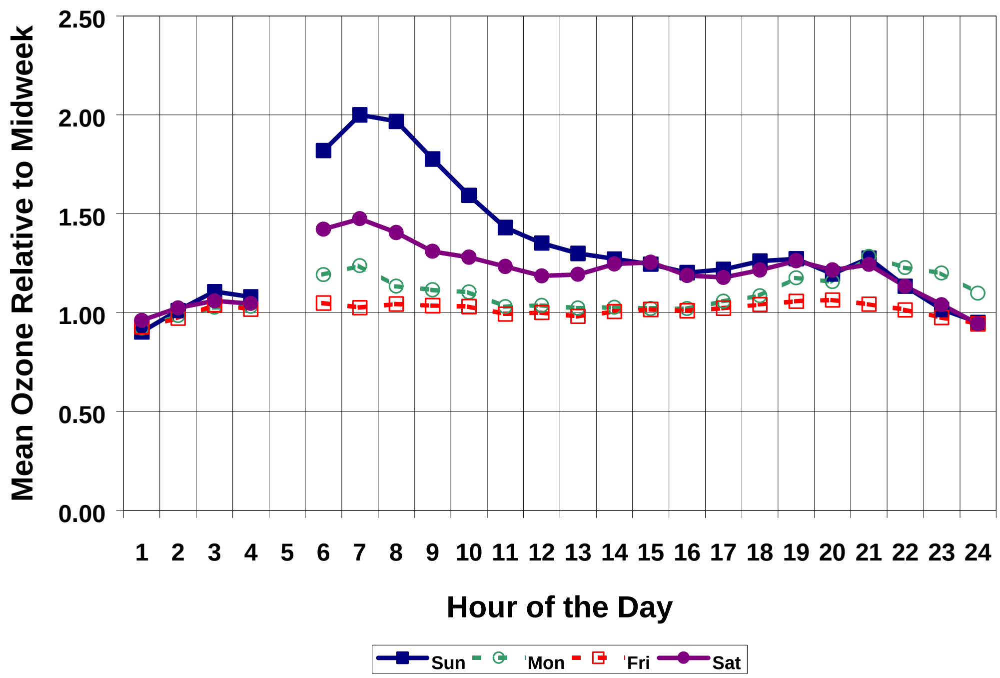

Figure 7.3.12 Carbon monoxide profiles by day of week at Azusa, based on data for the May – October ozone seasons of 1996-1998.

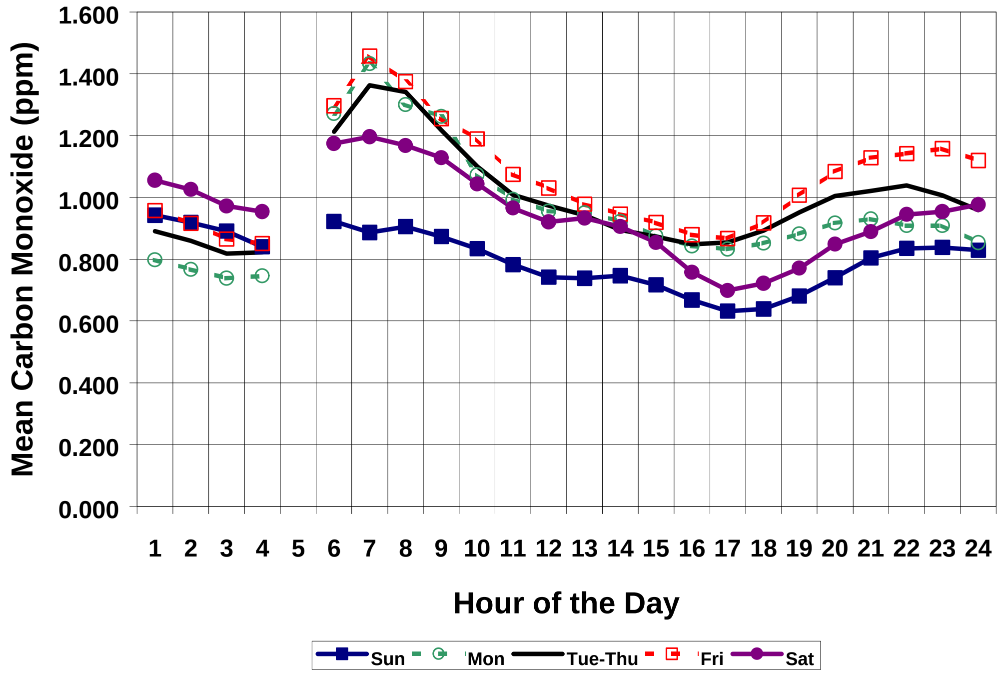

Figure 7.3.13 Carbon monoxide profiles for Azusa, expressed as a proportion of the midweek values.

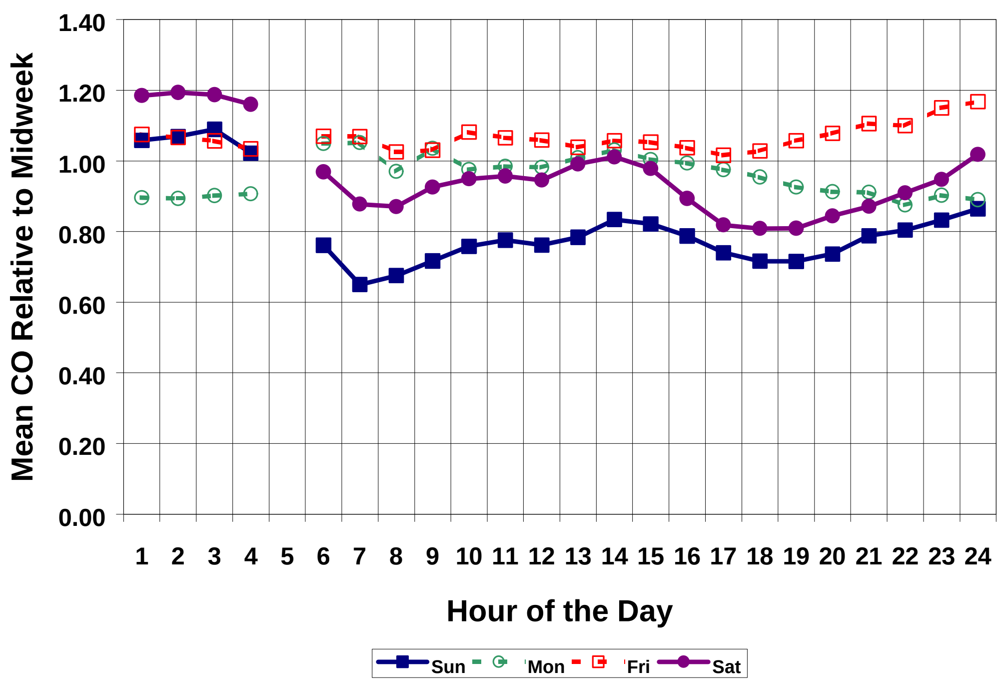

Figure 7.3.14 Nitrogen oxides profiles by day of week at Azusa, based on data for the May – October ozone seasons of 1996-1998.

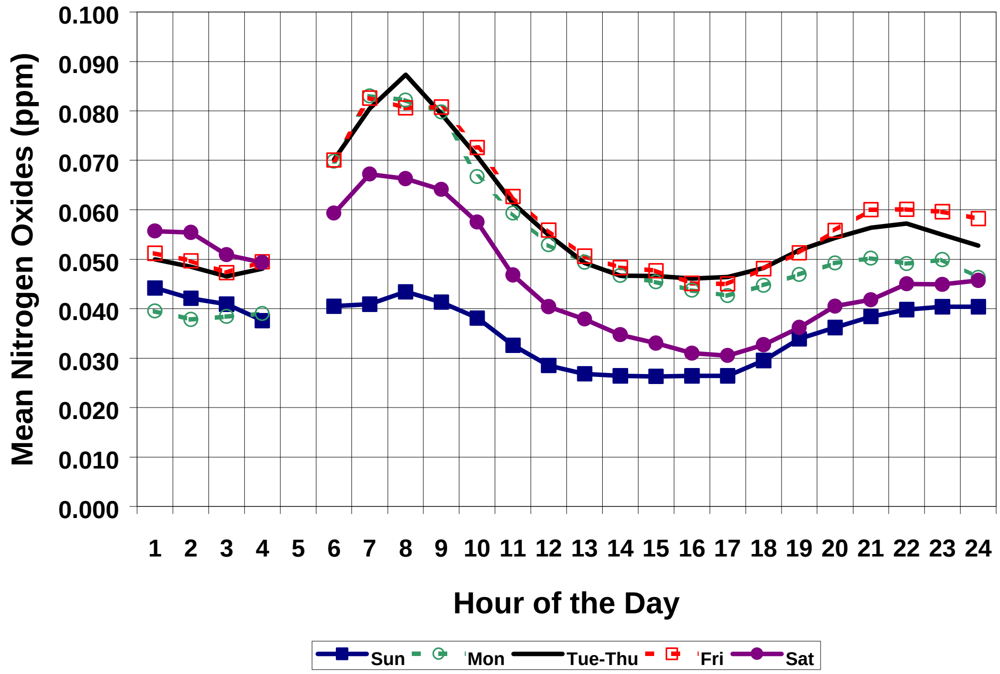

Figure 7.3.15 Nitrogen oxides profiles for Azusa, expressed as a proportion of the midweek values.

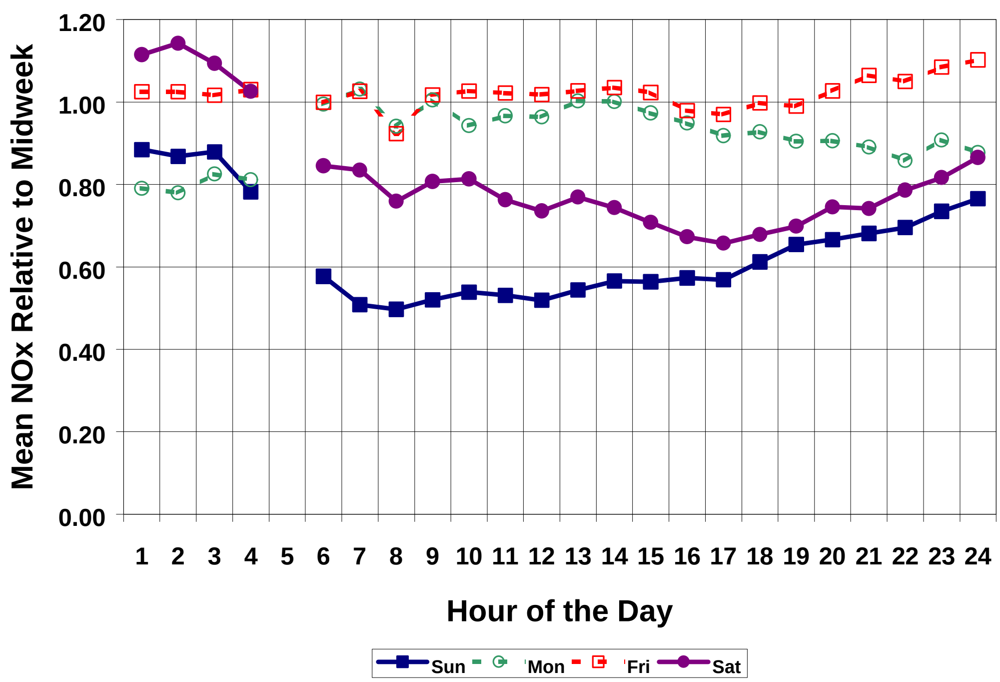

Figure 7.3.16 Ozone profiles by day of week at Azusa, based on data for the May – October ozone seasons of 1996-1998.

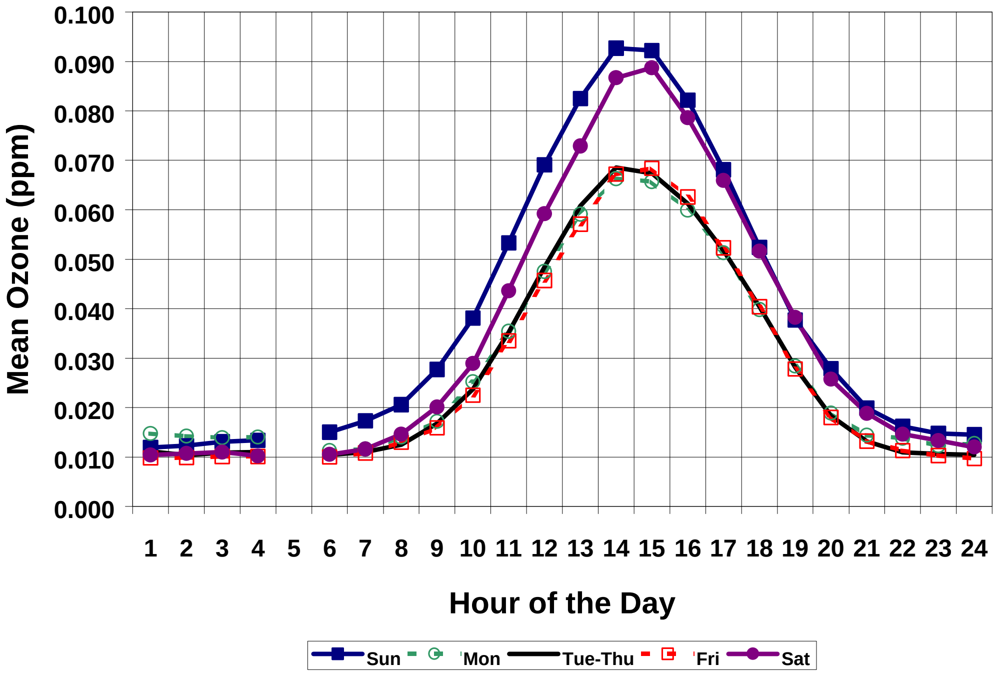

Figure 7.3.17 Ozone profiles for Azusa, expressed as a proportion of the midweek values.

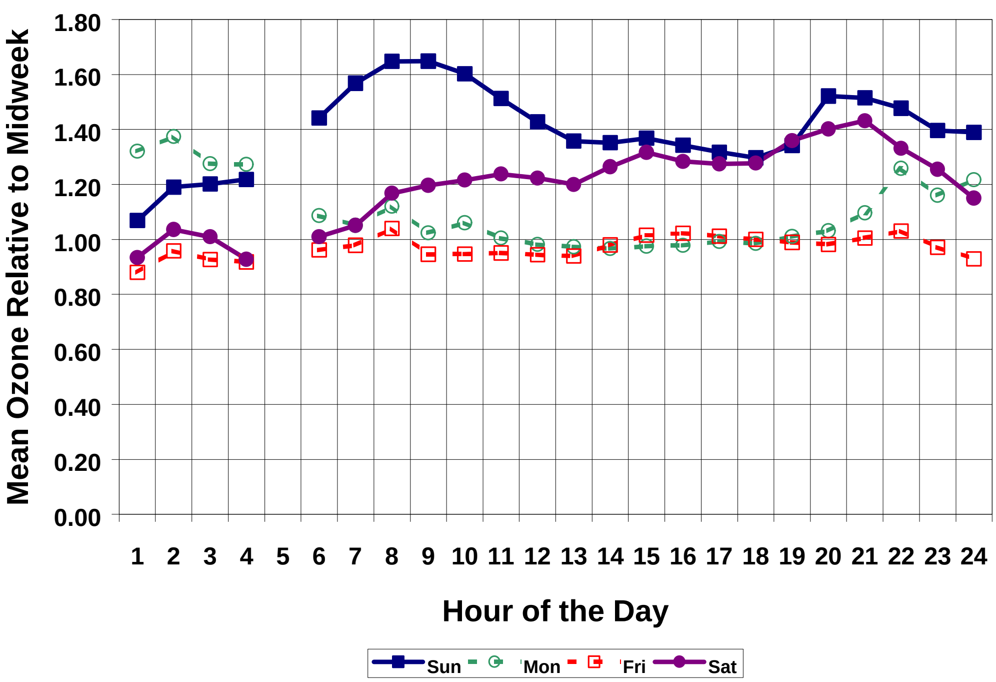

Figure 7.3.18 Carbon monoxide profiles by day of week at Burbank, based on data for the May – October ozone seasons of 1996-1998.

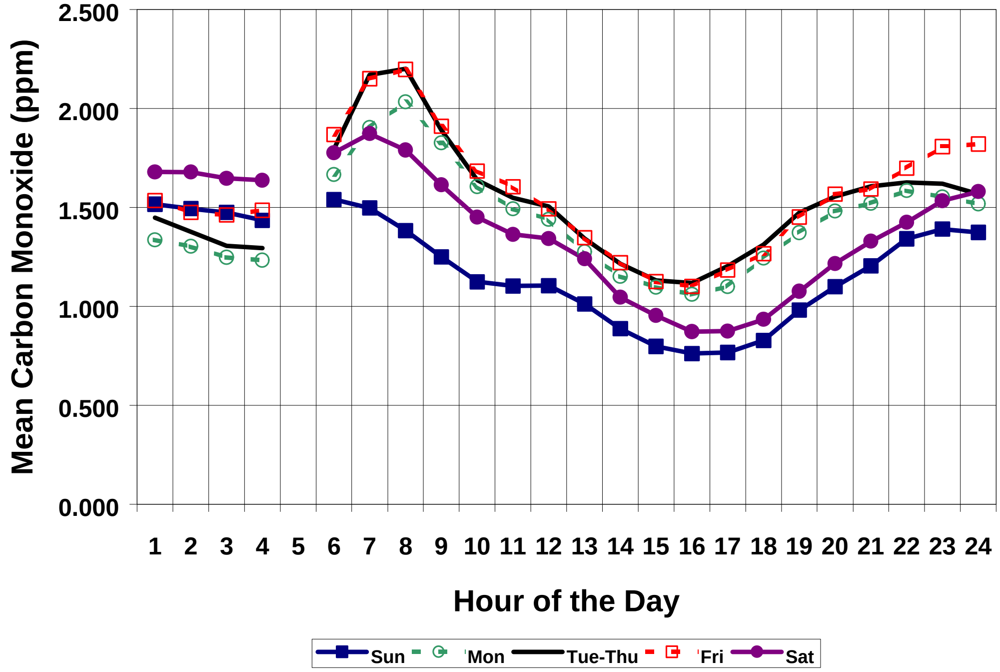

Figure 7.3.19 Carbon monoxide profiles for Burbank, expressed as a proportion of the midweek values.

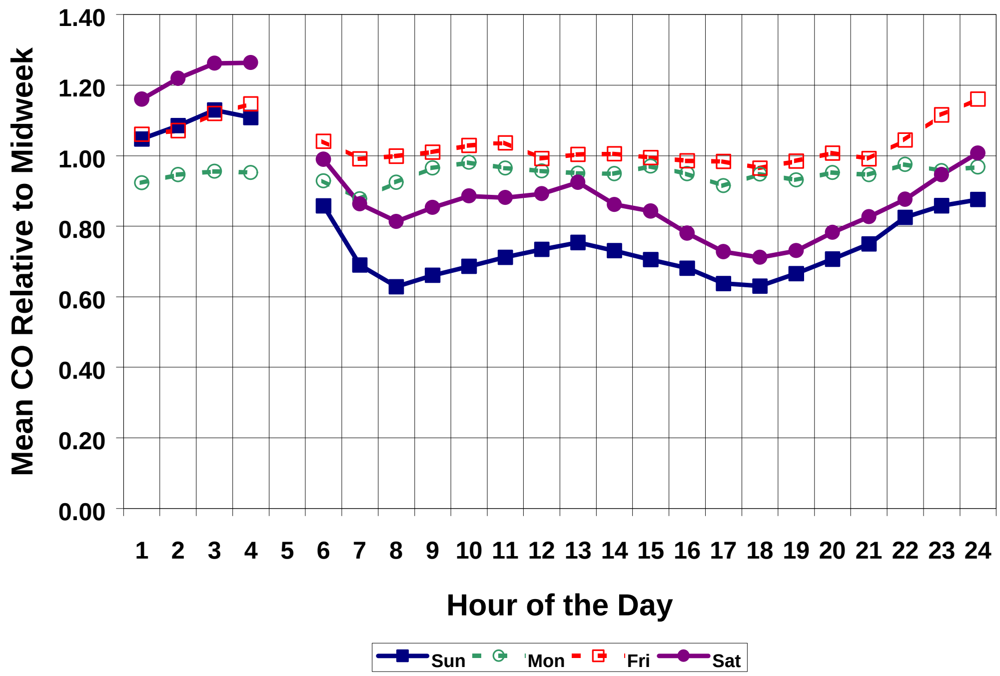

Figure 7.3.20 Nitrogen oxides profiles by day of week at Burbank, based on data for the May – October ozone seasons of 1996-1998.

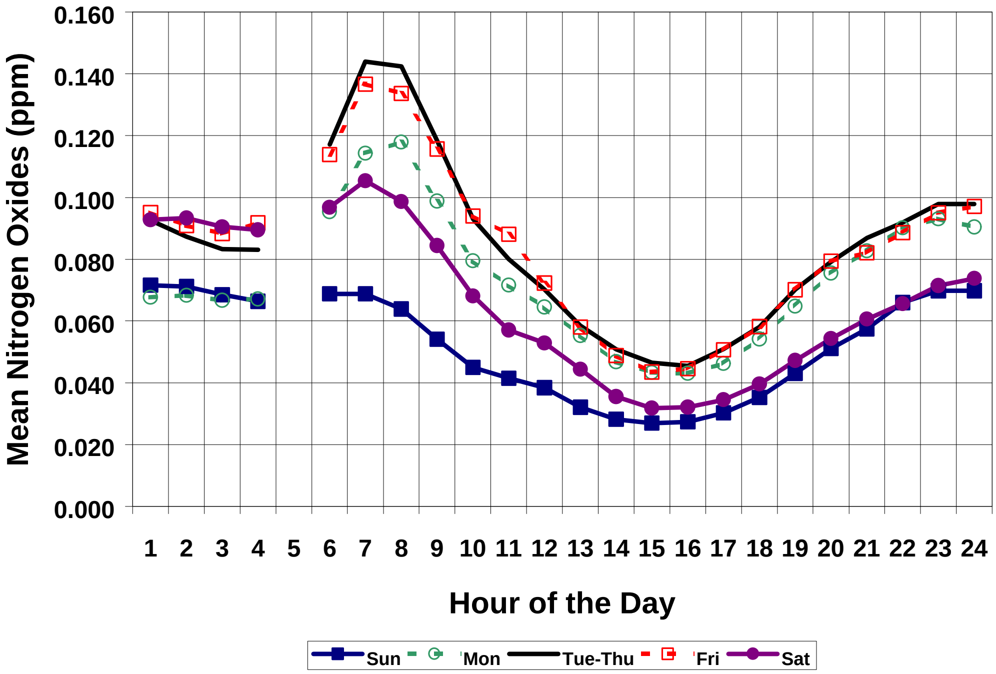

Figure 7.3.21 Nitrogen oxides profiles for Burbank, expressed as a proportion of the midweek values.

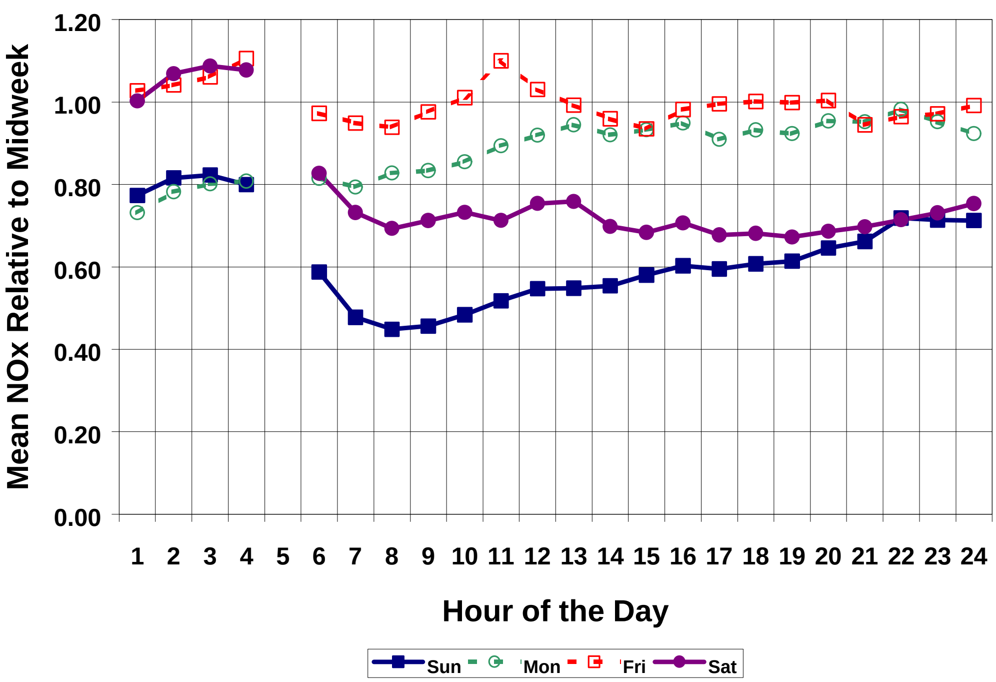

Figure 7.3.22 Ozone profiles by day of week at Burbank, based on data for the May – October ozone seasons of 1996-1998.

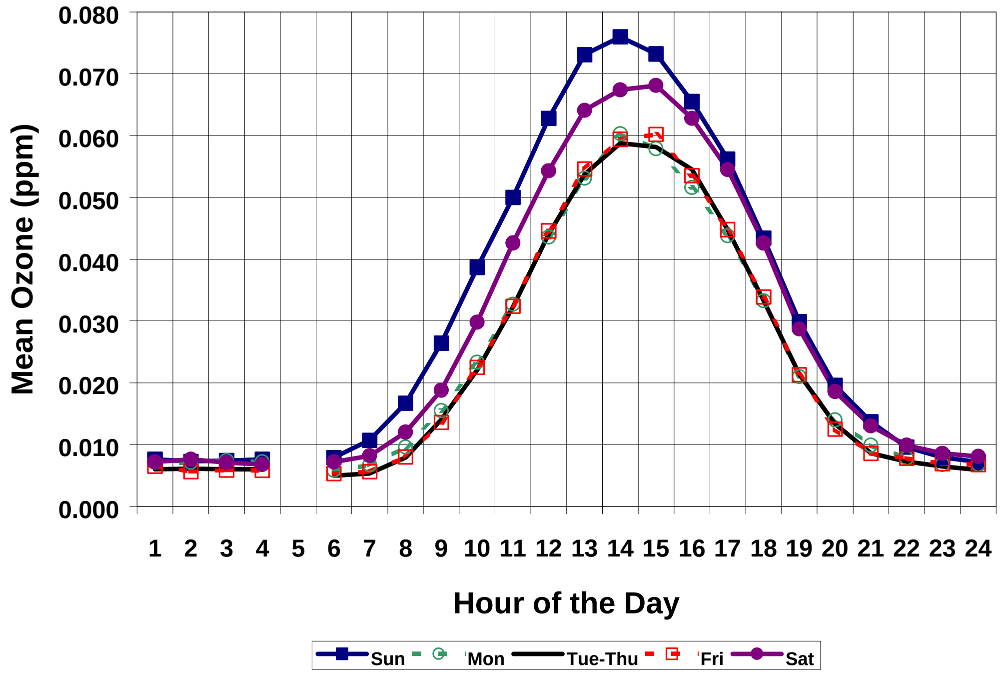

Figure 7.3.23 Ozone profiles for Burbank, expressed as a proportion of the midweek values.

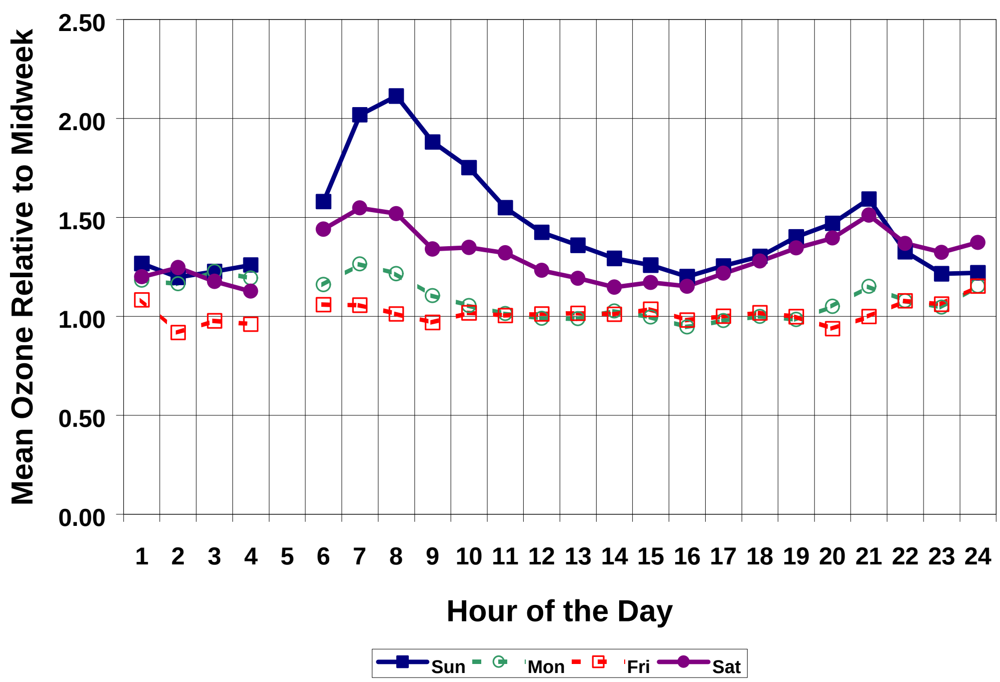

Figure 7.3.24 Carbon monoxide profiles by day of week at Hawthorne, based on data for the May – October ozone seasons of 1996-1998.

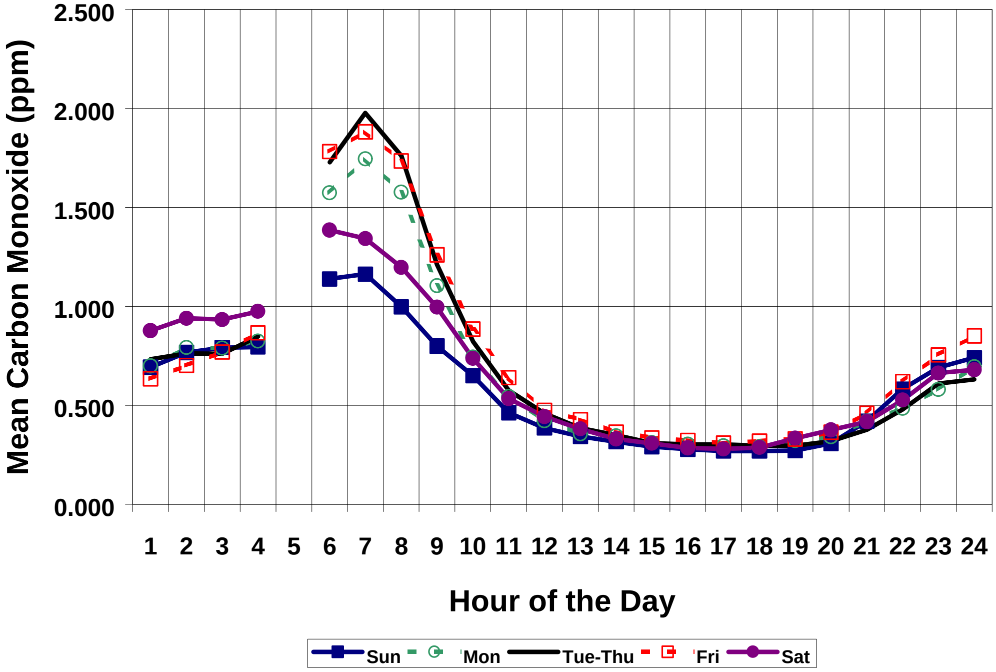

Figure 7.3.25 Carbon monoxide profiles for Hawthorne, expressed as a proportion of the midweek values.

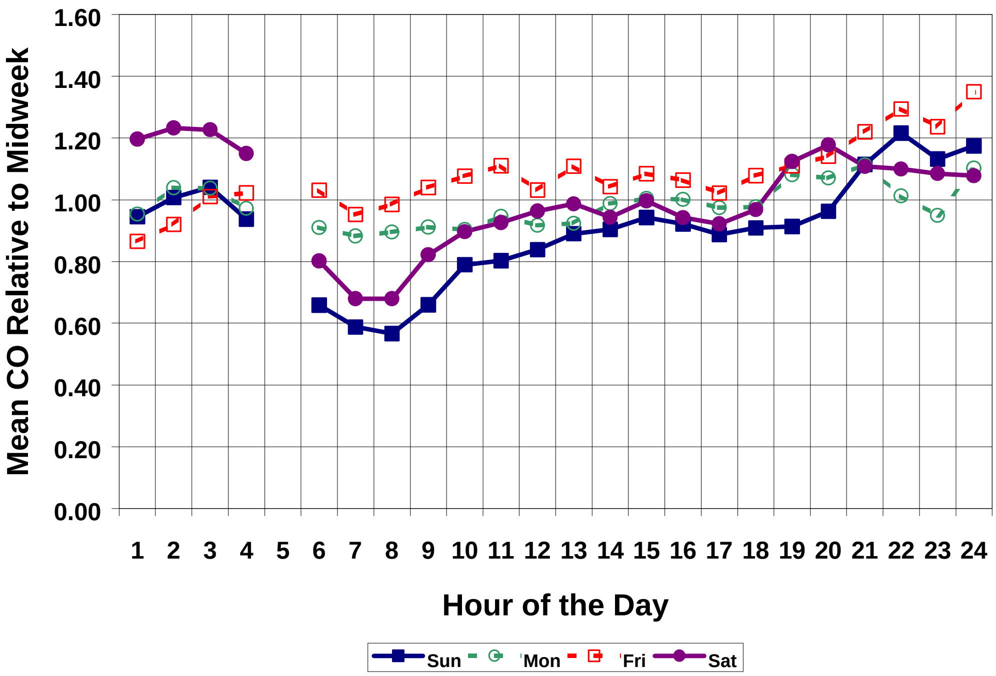

Figure 7.3.26 Nitrogen oxides profiles by day of week at Hawthorne, based on data for the May – October ozone seasons of 1996-1998.

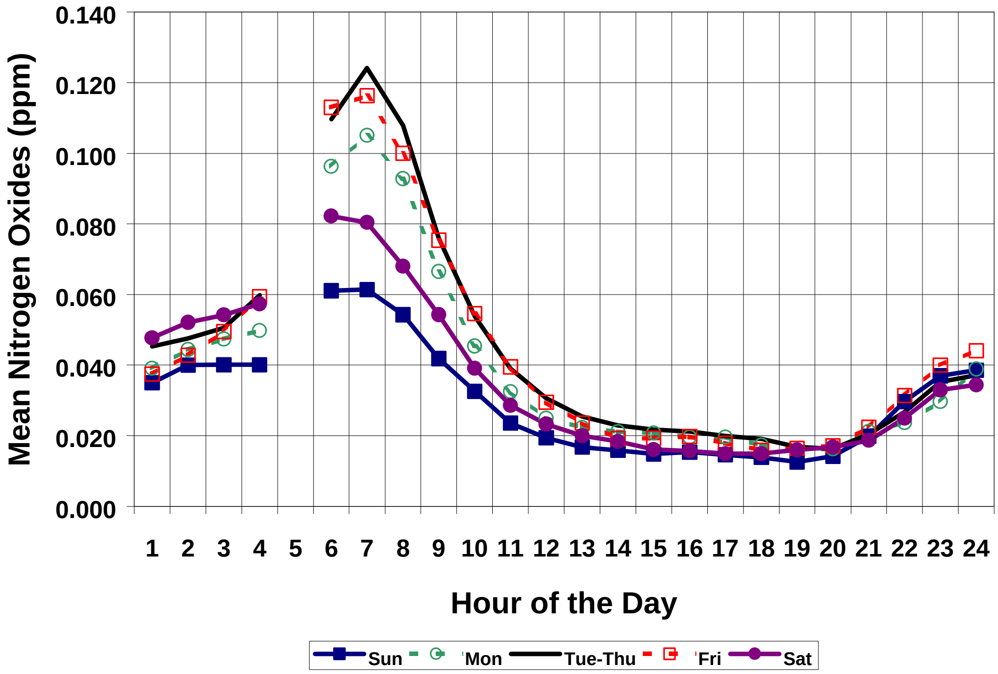

Figure 7.3.27 Nitrogen oxides profiles for Hawthorne, expressed as a proportion of the midweek values.

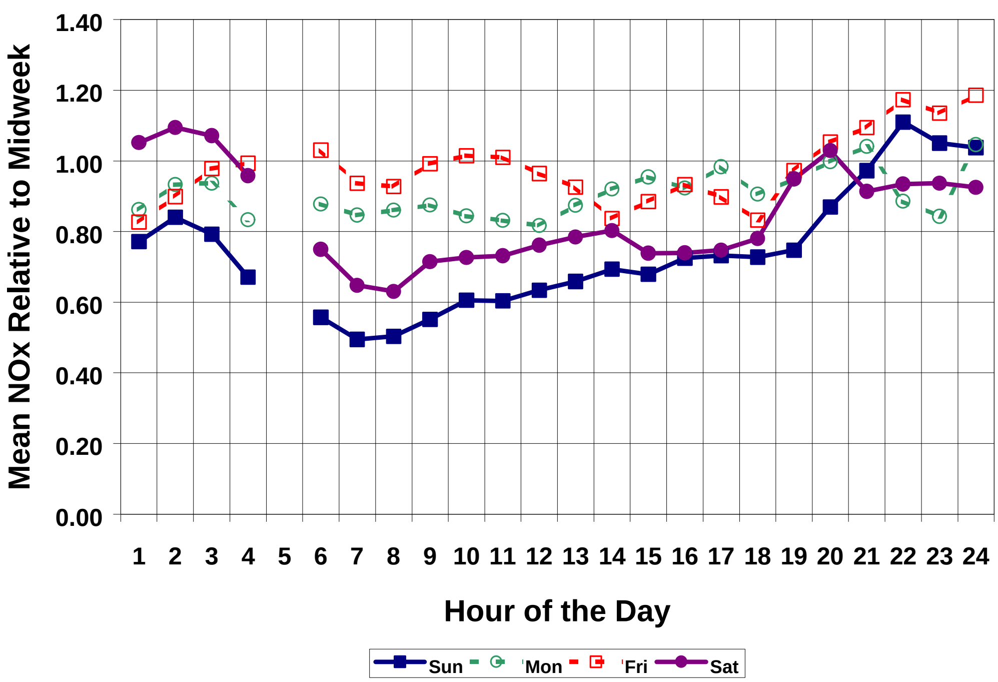

Figure 7.3.28 Ozone profiles by day of week at Hawthorne, based on data for the May – October ozone seasons of 1996-1998.

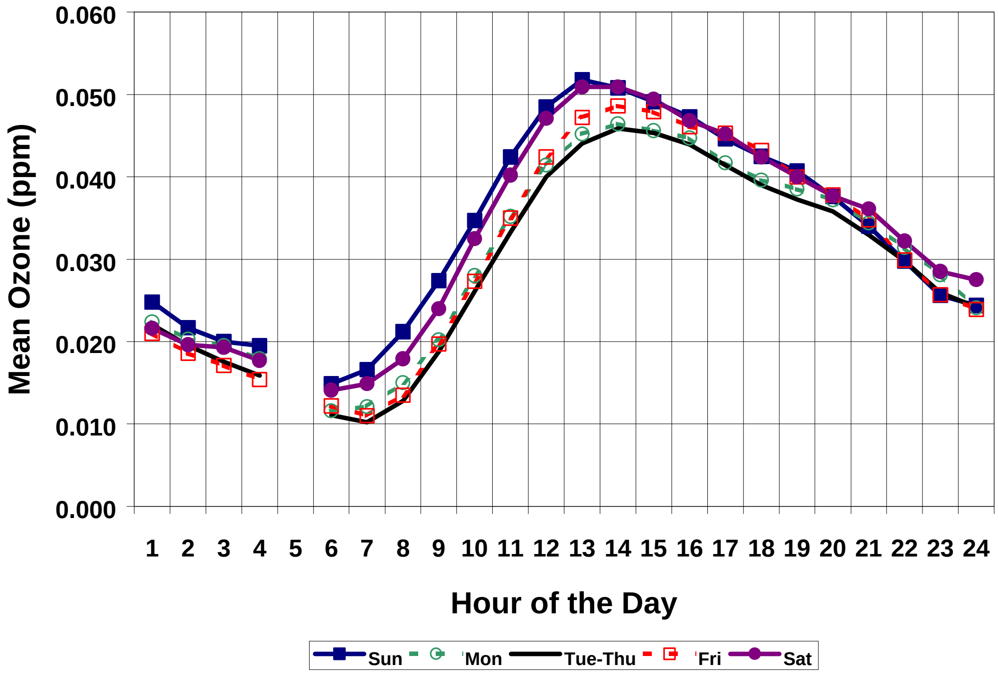

Figure 7.3.29 Ozone profiles for Hawthorne, expressed as a proportion of the midweek values.

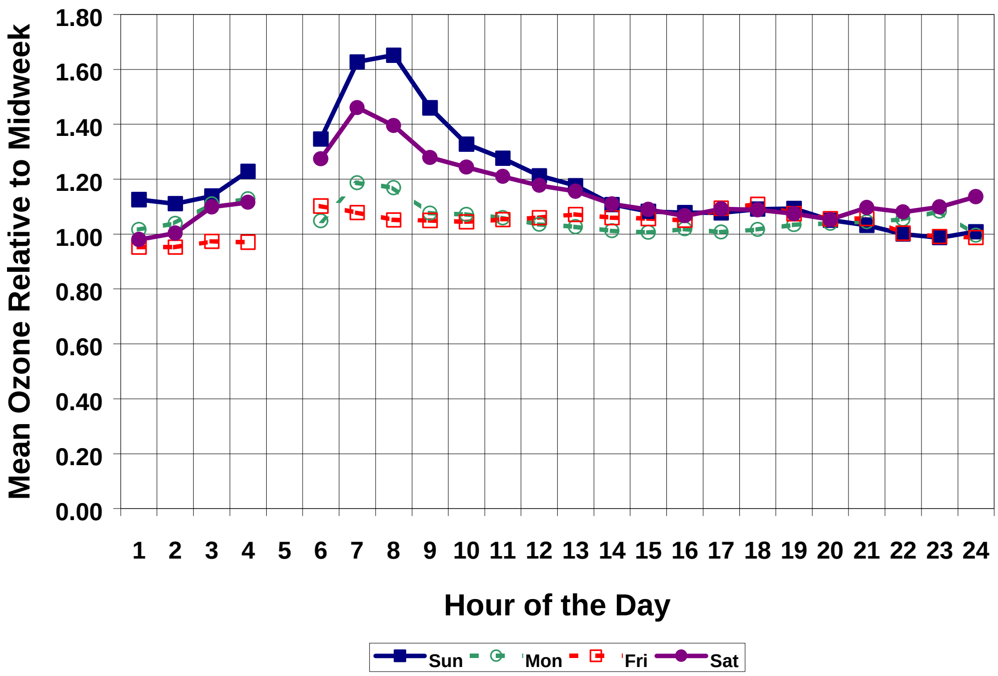

Figure 7.3.30 Carbon monoxide profiles by day of week at Irvine (El Toro), based on data for the May – October ozone seasons of 1996-1998.

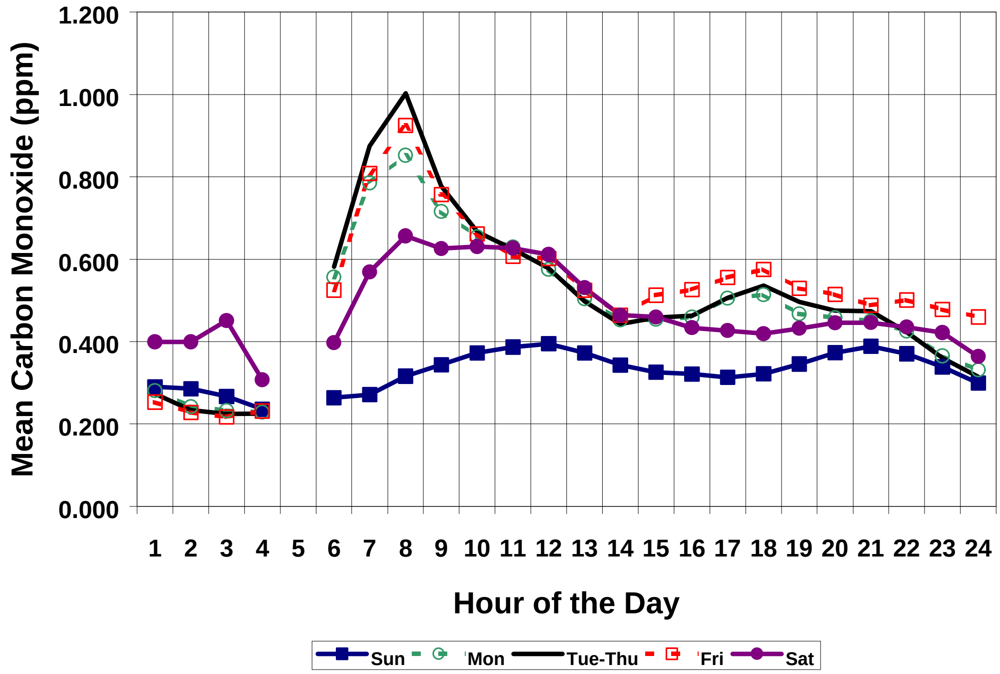

Figure 7.3.31 Carbon monoxide profiles for Irvine (El Toro), expressed as a proportion of the midweek values.

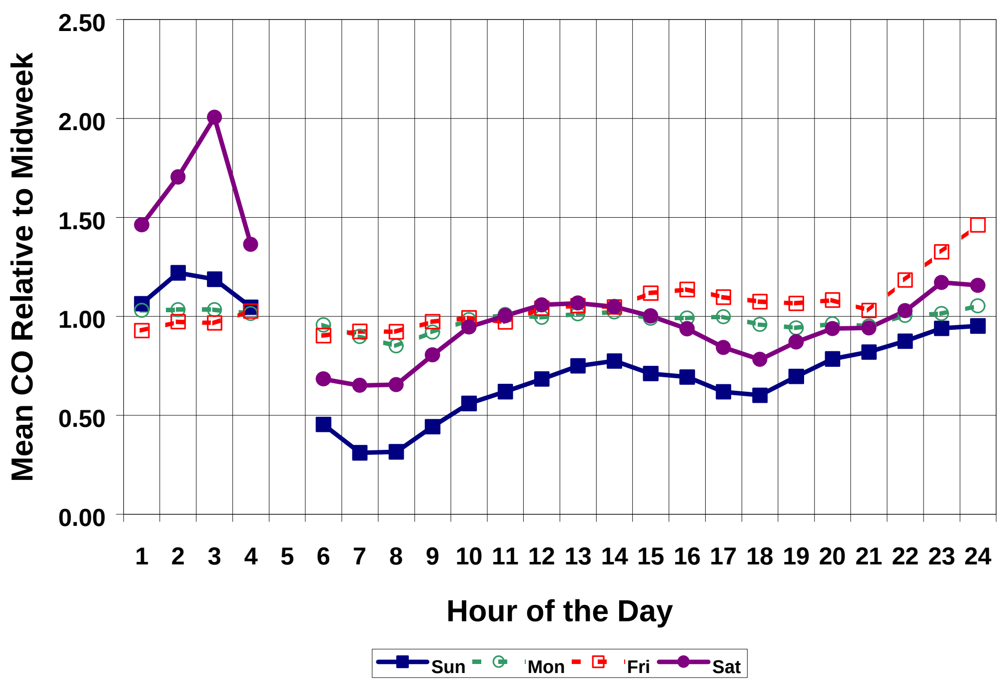

Figure 7.3.32 Ozone profiles by day of week at Irvine (El Toro), based on data for the May – October ozone seasons of 1996-1998.

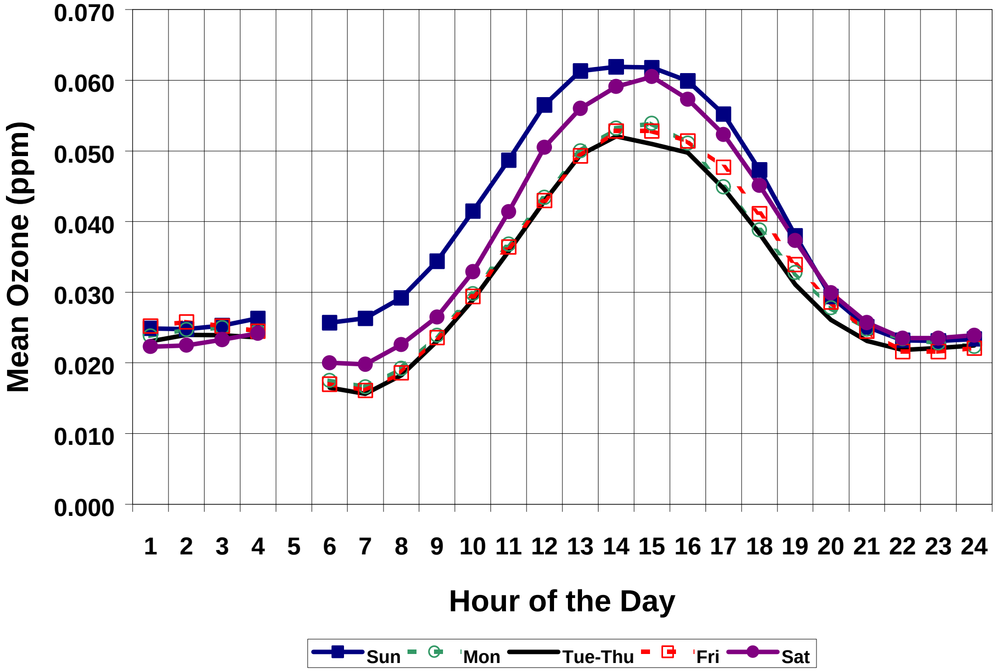

Figure 7.3.33 Ozone profiles for Irvine (El Toro), expressed as a proportion of the midweek values.

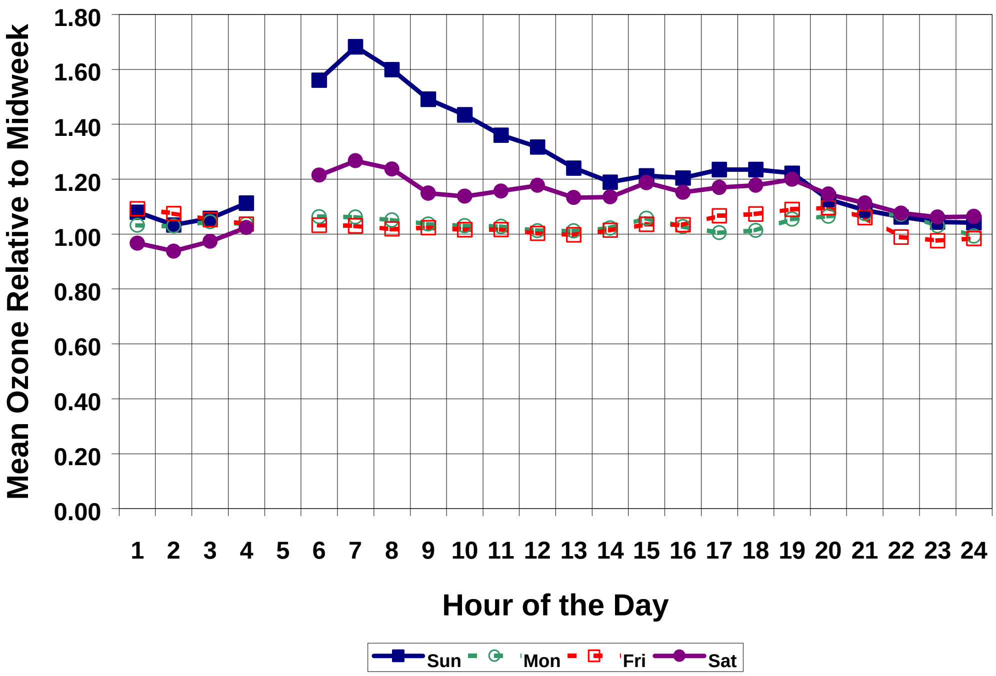

Figure 7.3.34 Carbon monoxide profiles by day of week at L.A. – N. Main, based on data for the May – October ozone seasons of 1996-1998.

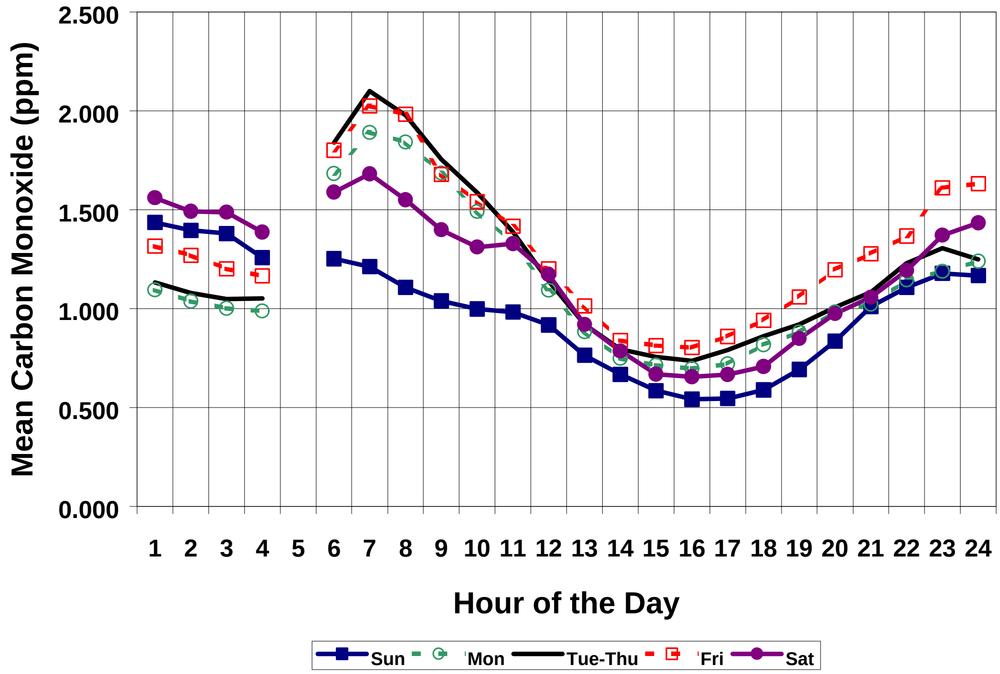

Figure 7.3.35 Carbon monoxide profiles for L.A. – N. Main, expressed as a proportion of the midweek values.

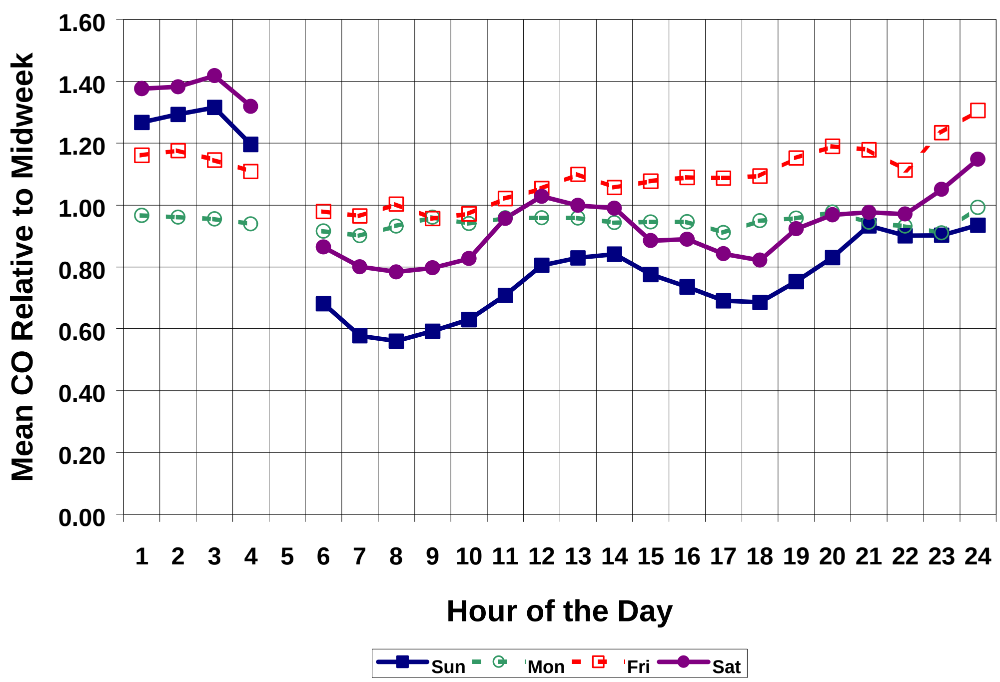

Figure 7.3.36 Nitrogen oxides profiles by day of week at L.A. – N. Main, based on data for the May – October ozone seasons of 1996-1998.

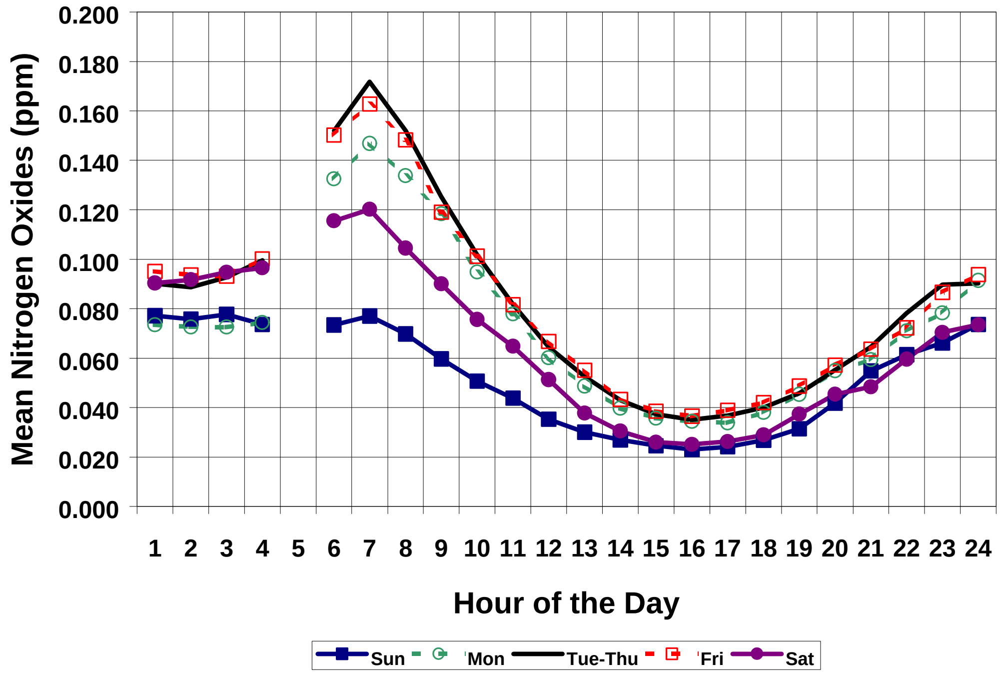

Figure 7.3.37 Nitrogen oxides profiles for L.A. – N. Main, expressed as a proportion of the midweek values.

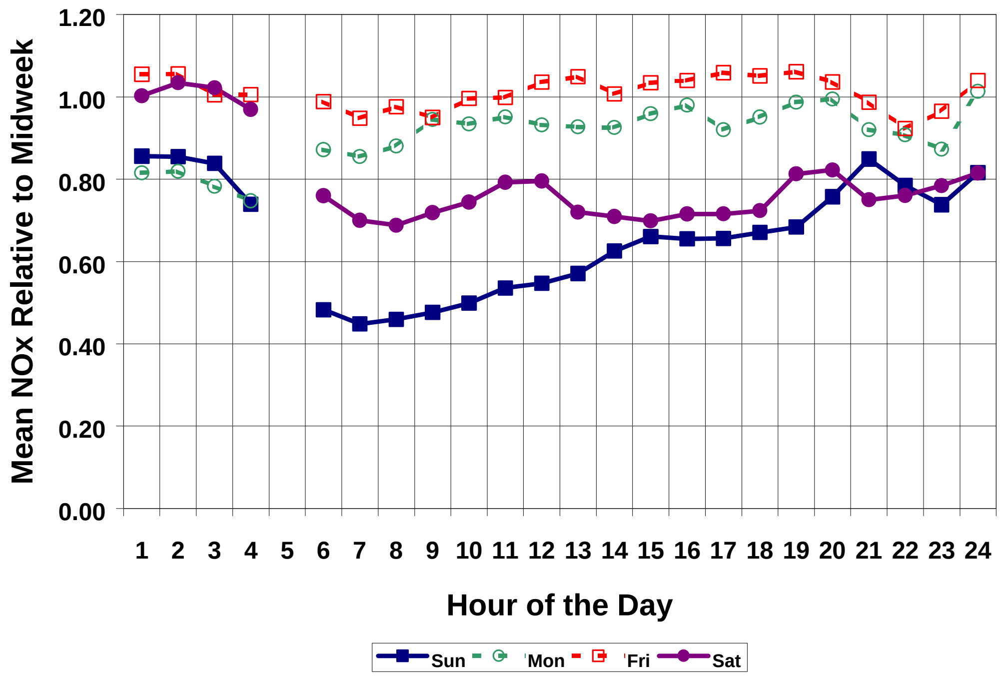

Figure 7.3.38 Ozone profiles by day of week at L.A. – N. Main, based on data for the May – October ozone seasons of 1996-1998.

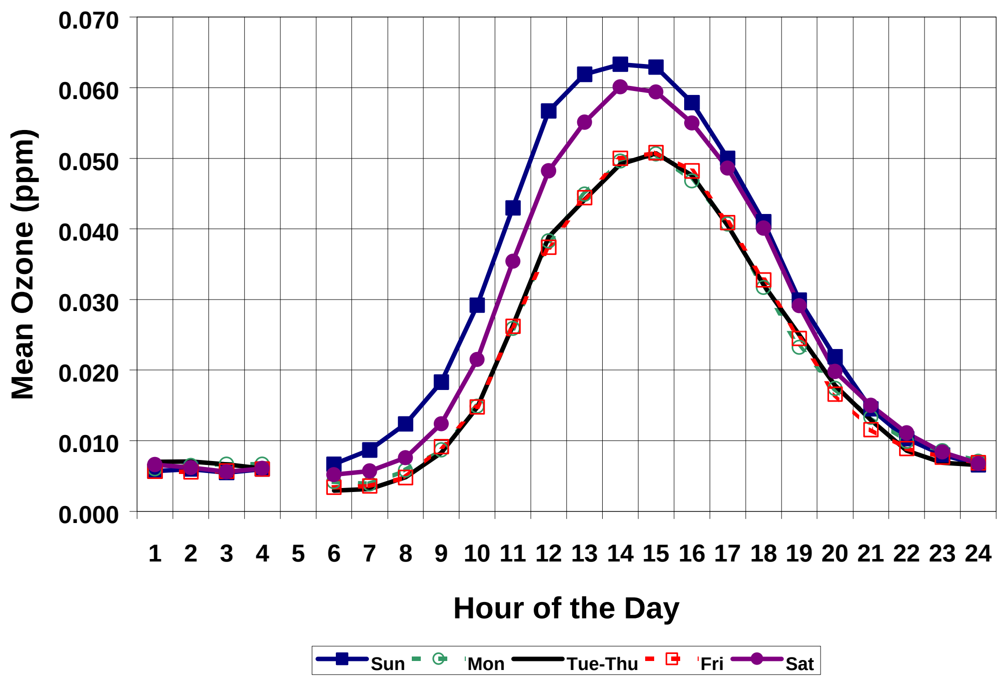

Figure 7.3.39 Ozone profiles for L.A. – N. Main, expressed as a proportion of the midweek values.

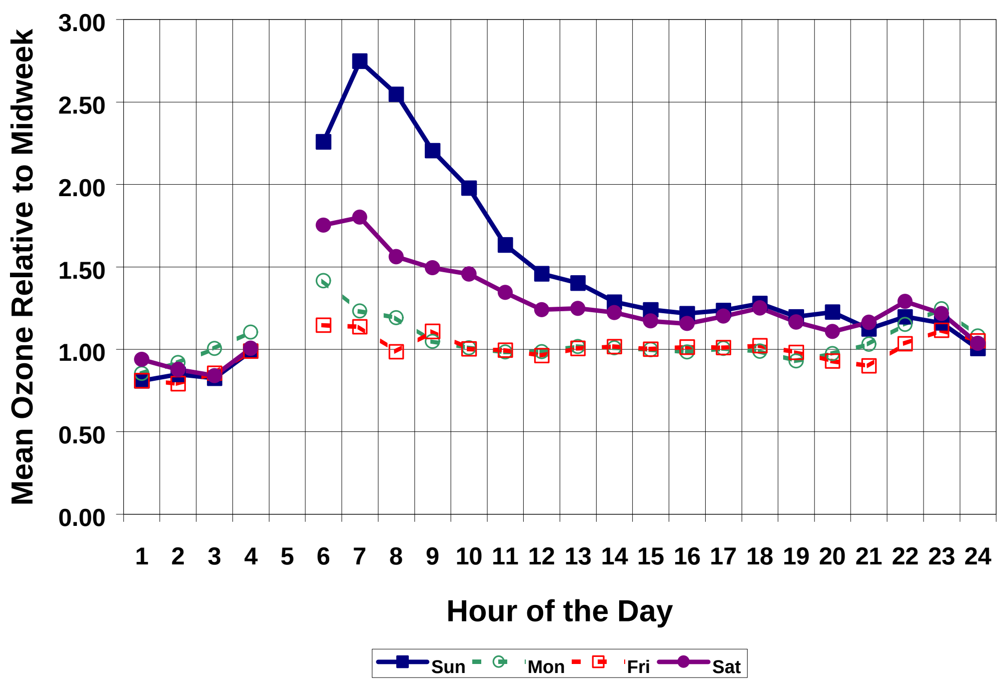

Figure 7.3.40 Carbon monoxide profiles by day of week at Lynwood, based on data for the May – October ozone seasons of 1996-1998.

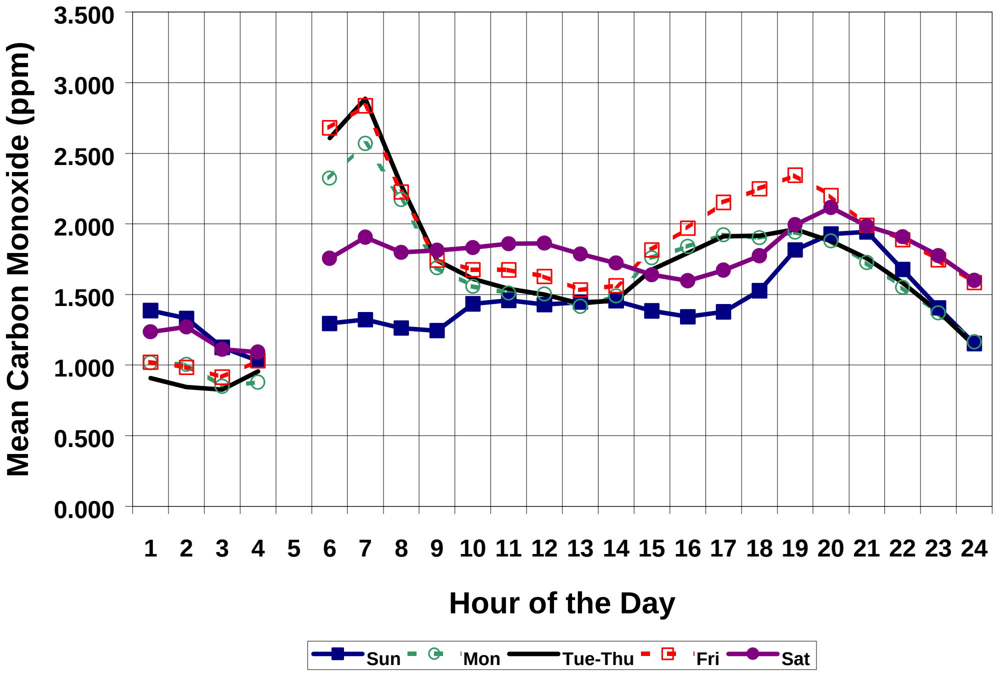

Figure 7.3.41 Carbon monoxide profiles for Lynwood, expressed as a proportion of the midweek values.

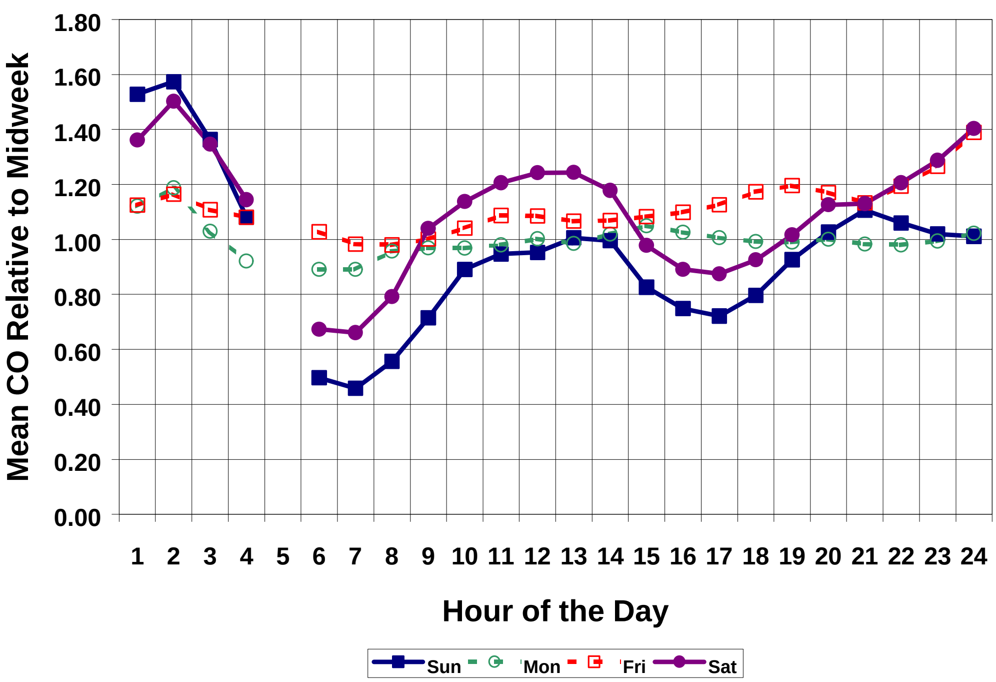

Figure 7.3.42 Nitrogen oxides profiles by day of week at Lynwood, based on data for the May – October ozone seasons of 1996-1998.

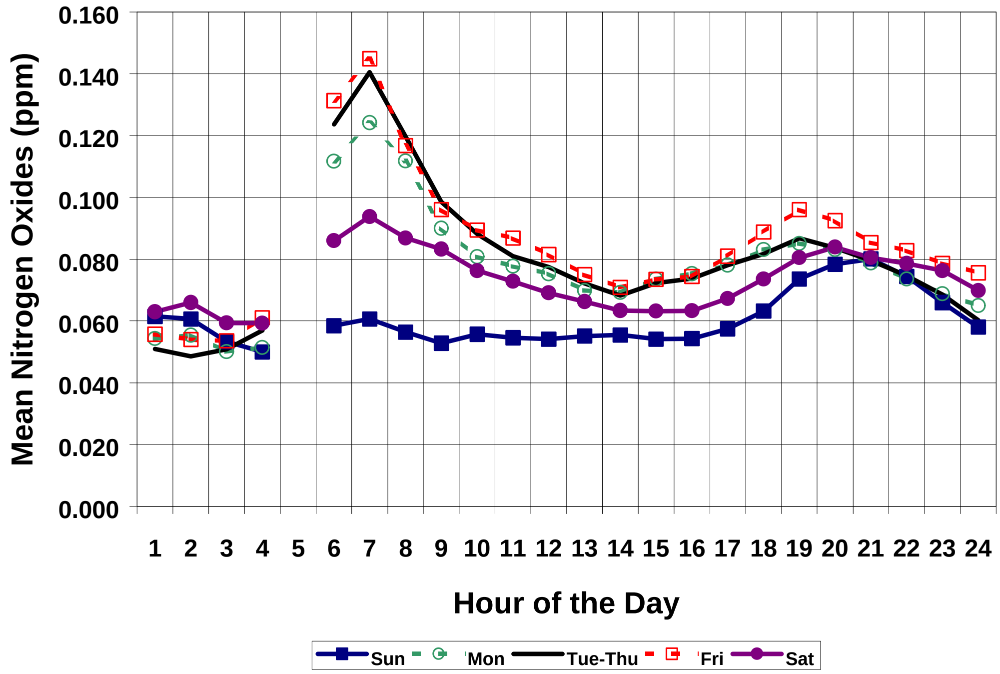

Figure 7.3.43 Nitrogen oxides profiles for Lynwood, expressed as a proportion of the midweek values.

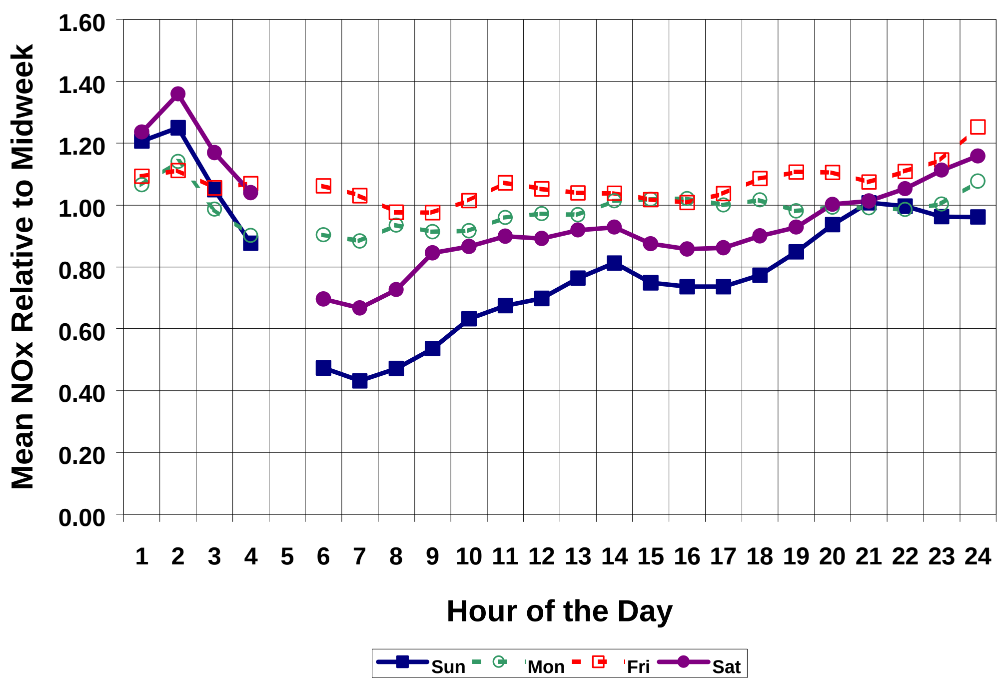

Figure 7.3.44 Ozone profiles by day of week at Lynwood, based on data for the May – October ozone seasons of 1996-1998.

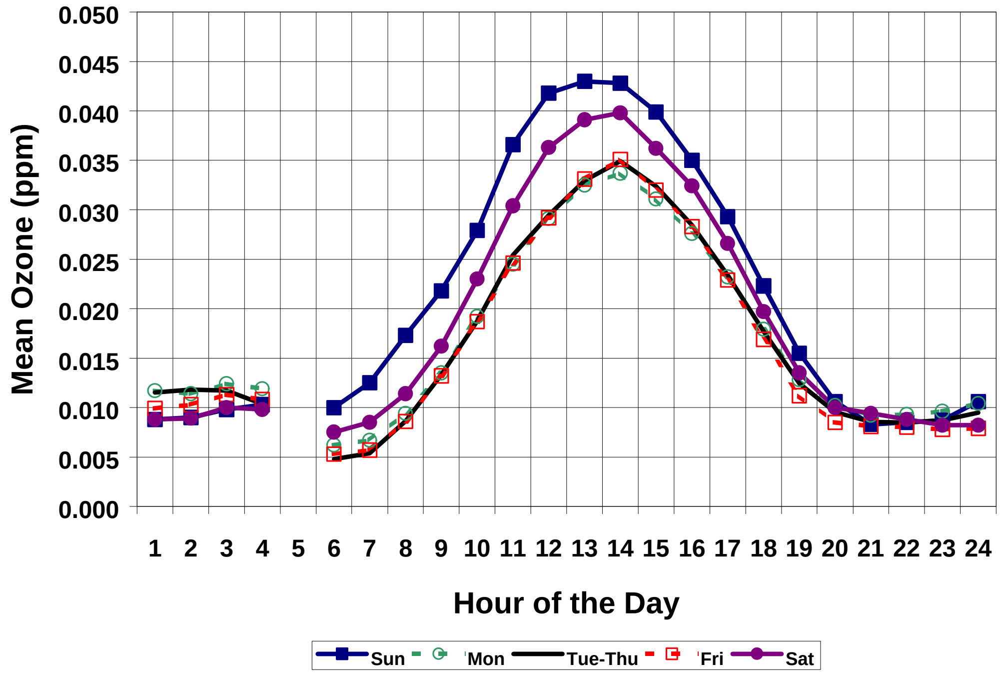

Figure 7.3.45 Ozone profiles for Lynwood, expressed as a proportion of the midweek values.

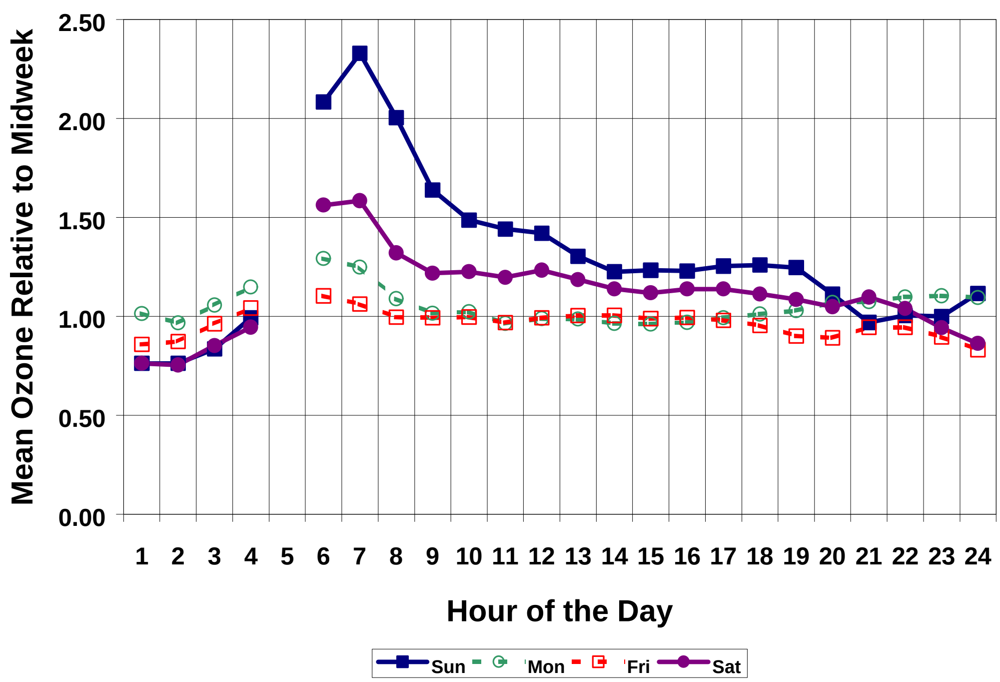

Figure 7.3.46 Carbon monoxide profiles by day of week at N. Long Beach, based on data for the May – October ozone seasons of 1996-1998.

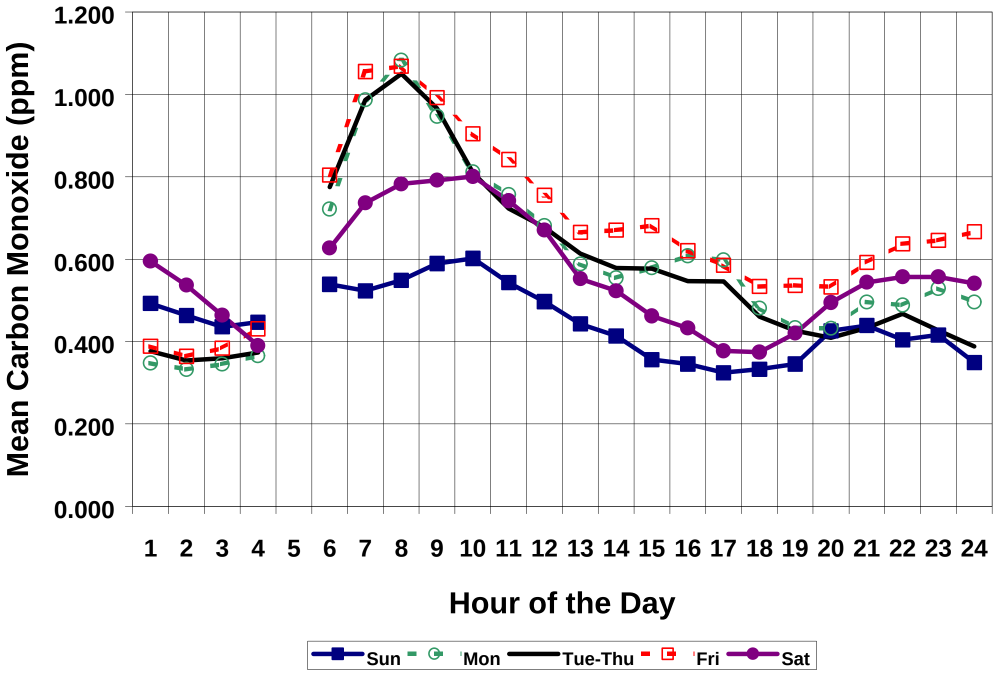

Figure 7.3.47 Carbon monoxide profiles for N. Long Beach, expressed as a proportion of the midweek values.

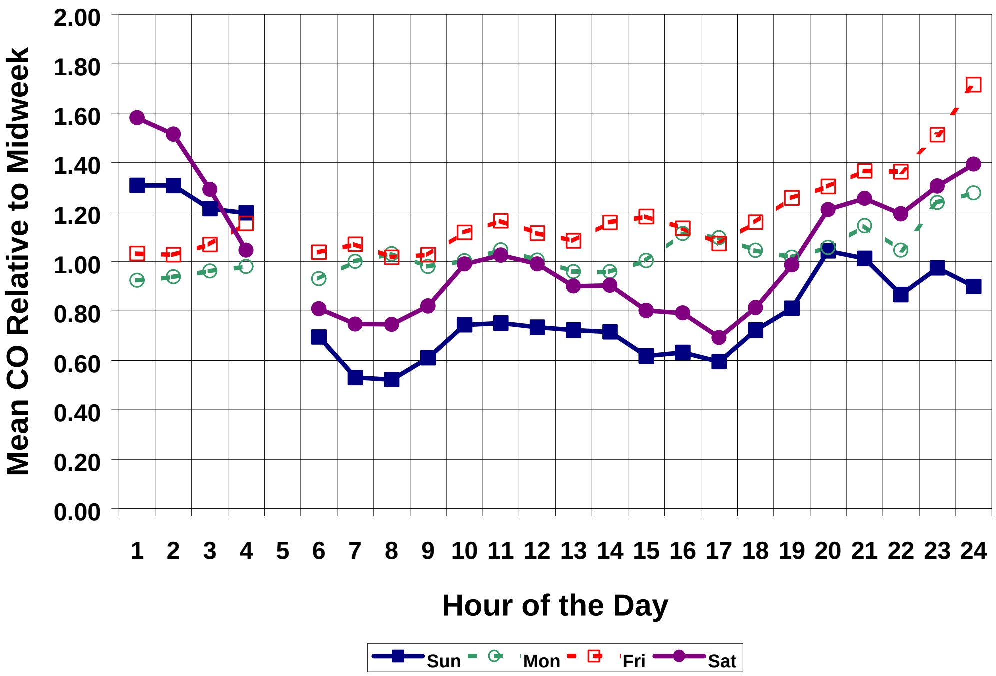

Figure 7.3.48 Nitrogen oxides profiles by day of week at N. Long Beach, based on data for the May – October ozone seasons of 1996-1998.

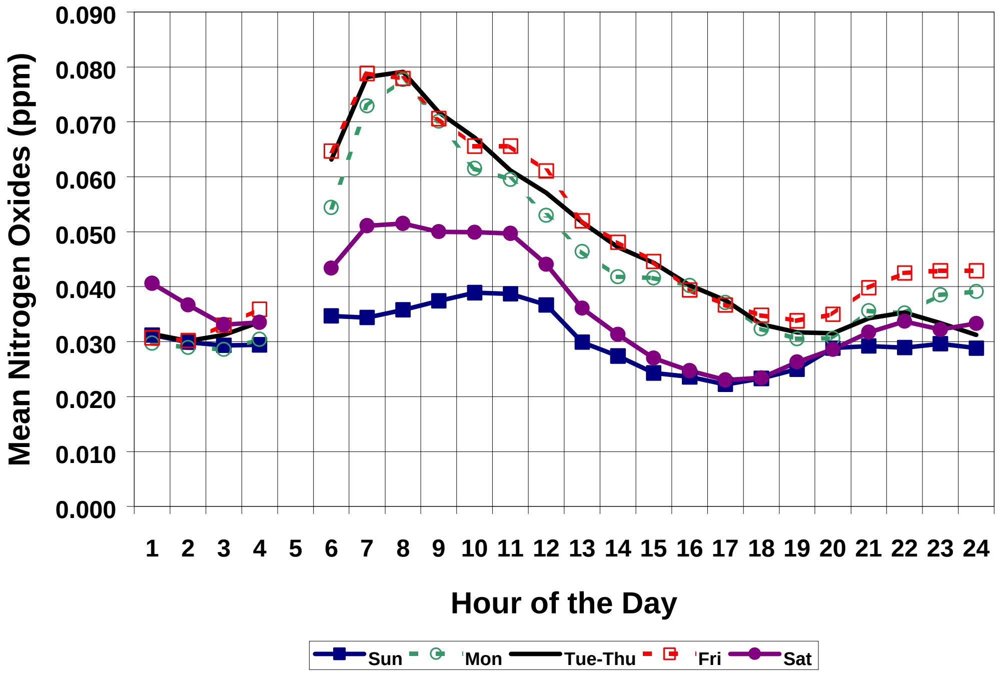

Figure 7.3.49 Nitrogen oxides profiles for N. Long Beach, expressed as a proportion of the midweek values.

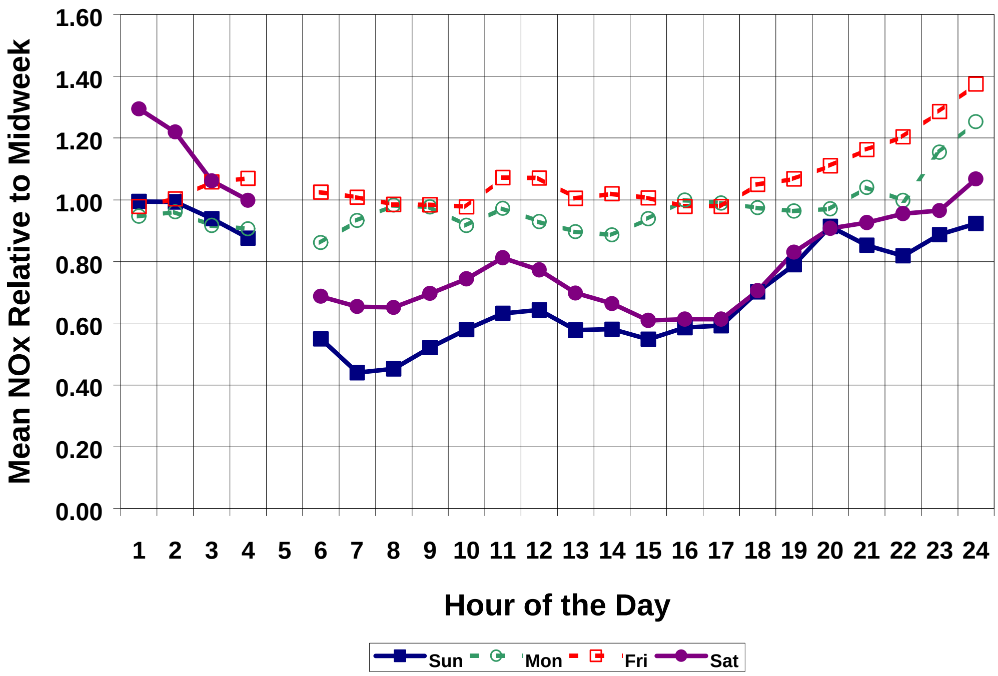

Figure 7.3.50 Ozone profiles by day of week at N. Long Beach, based on data for the May – October ozone seasons of 1996-1998.

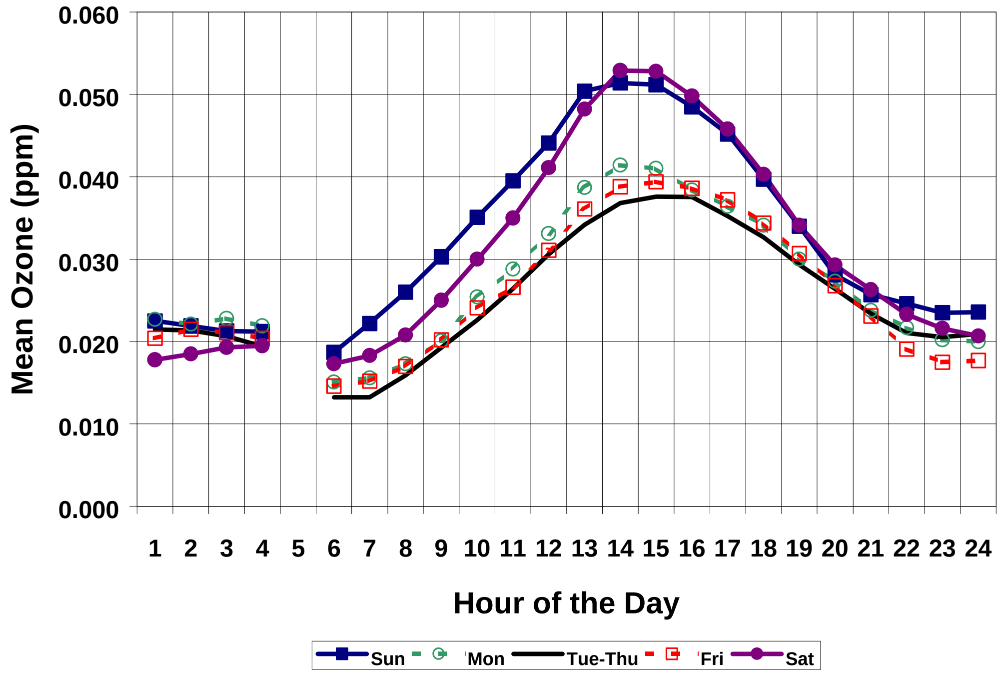

Figure 7.3.51 Ozone profiles for N. Long Beach, expressed as a proportion of the midweek values.

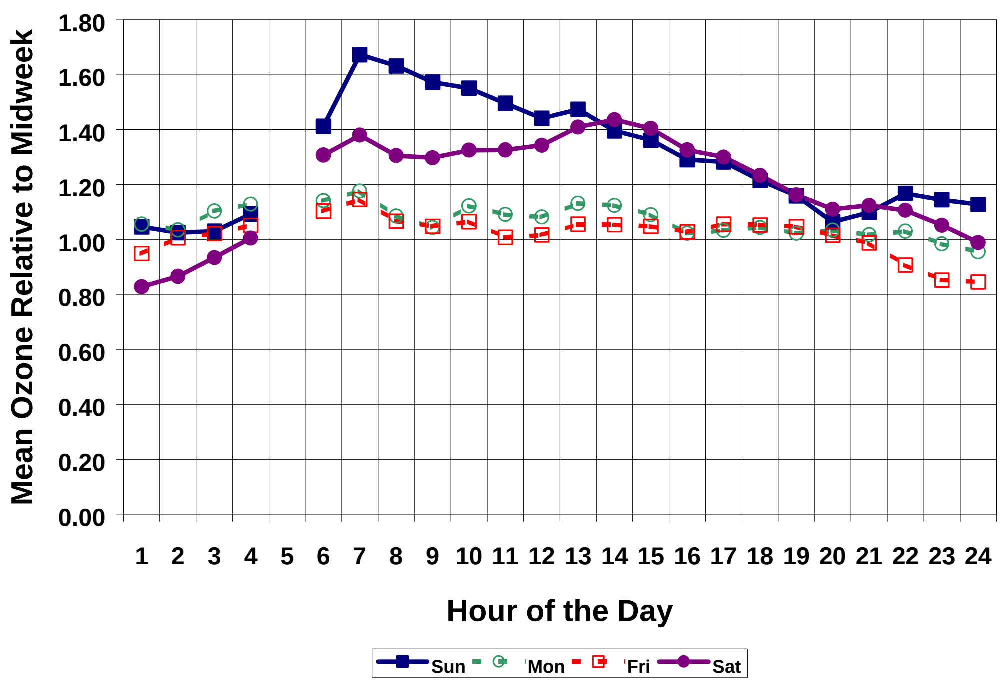

Figure 7.3.52 Carbon monoxide profiles by day of week at Pico Rivera, based on data for the May – October ozone seasons of 1996-1998.

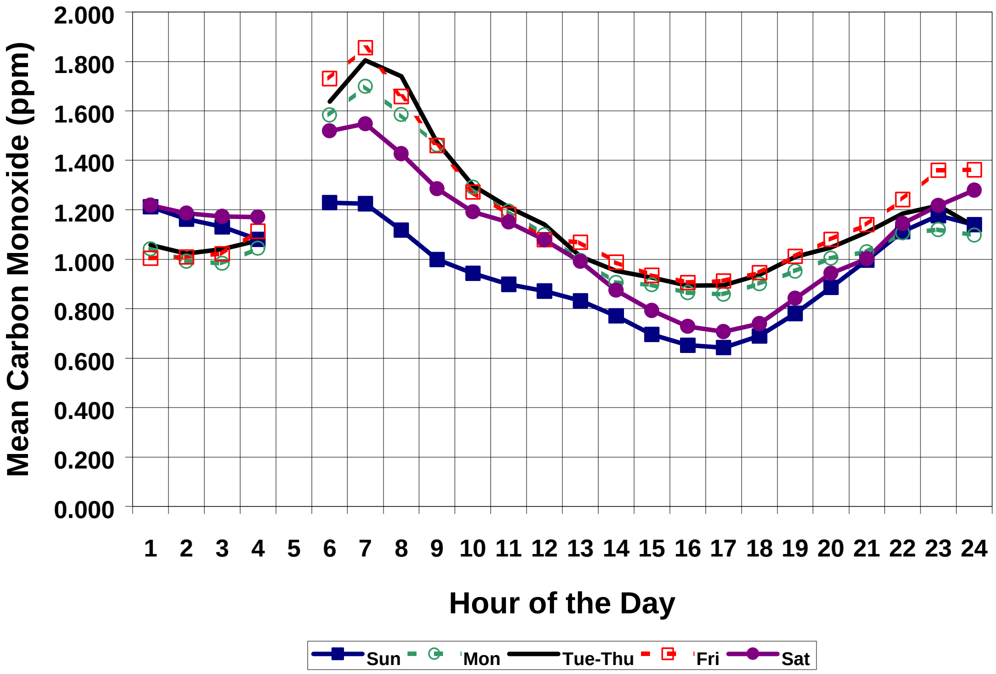

Figure 7.3.53 Carbon monoxide profiles for Pico Rivera, expressed as a proportion of the midweek values.

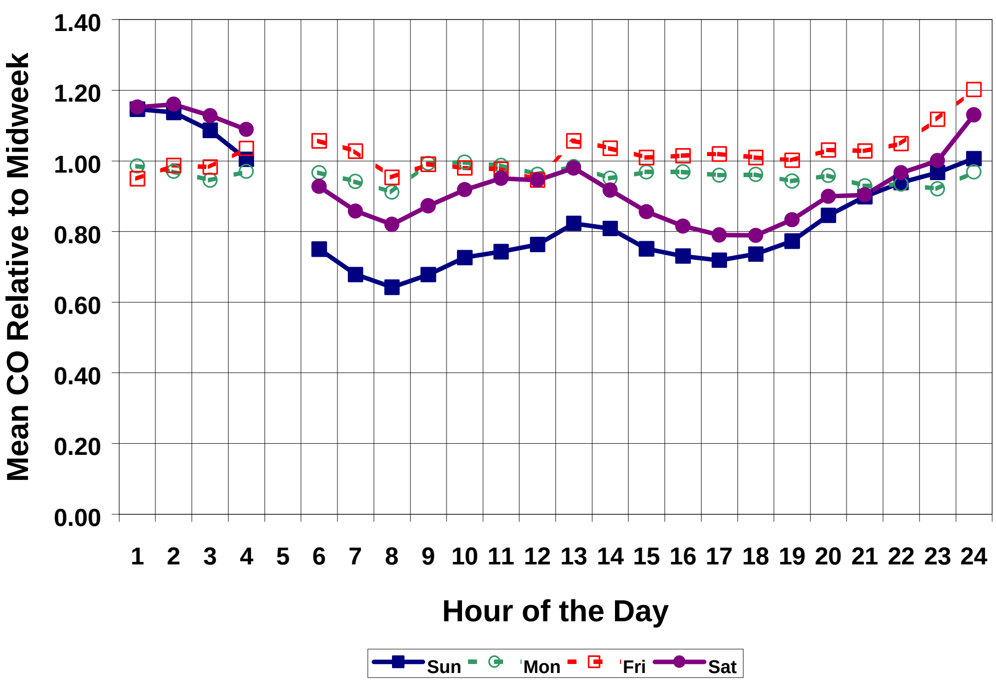

Figure 7.3.54 Nitrogen oxides profiles by day of week at Pico Rivera, based on data for the May – October ozone seasons of 1996-1998.

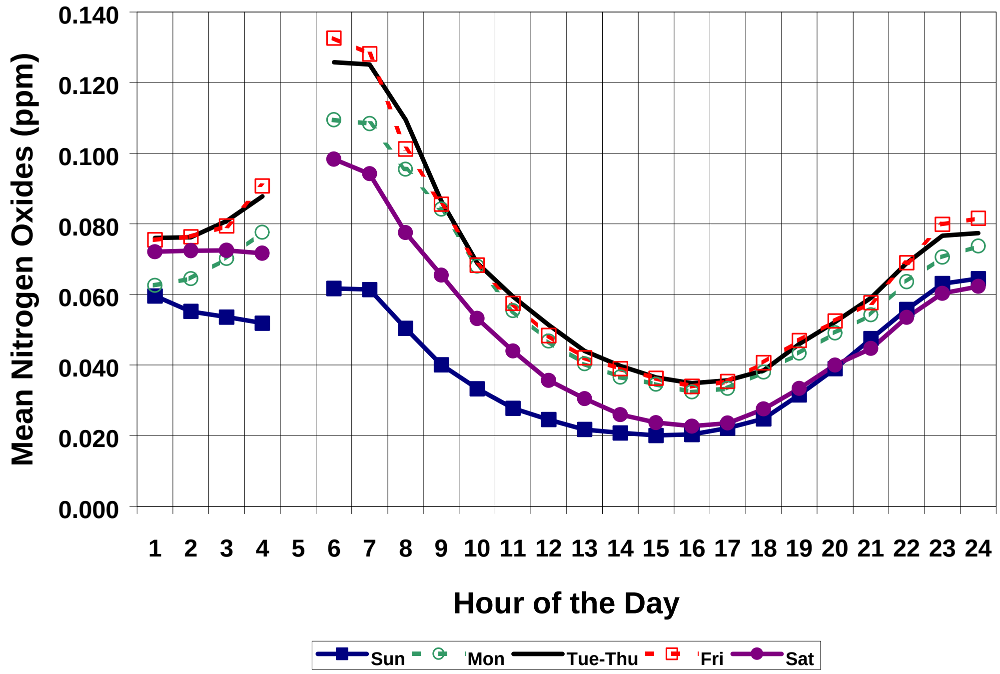

Figure 7.3.55 Nitrogen oxides profiles for Pico Rivera, expressed as a proportion of the midweek values.

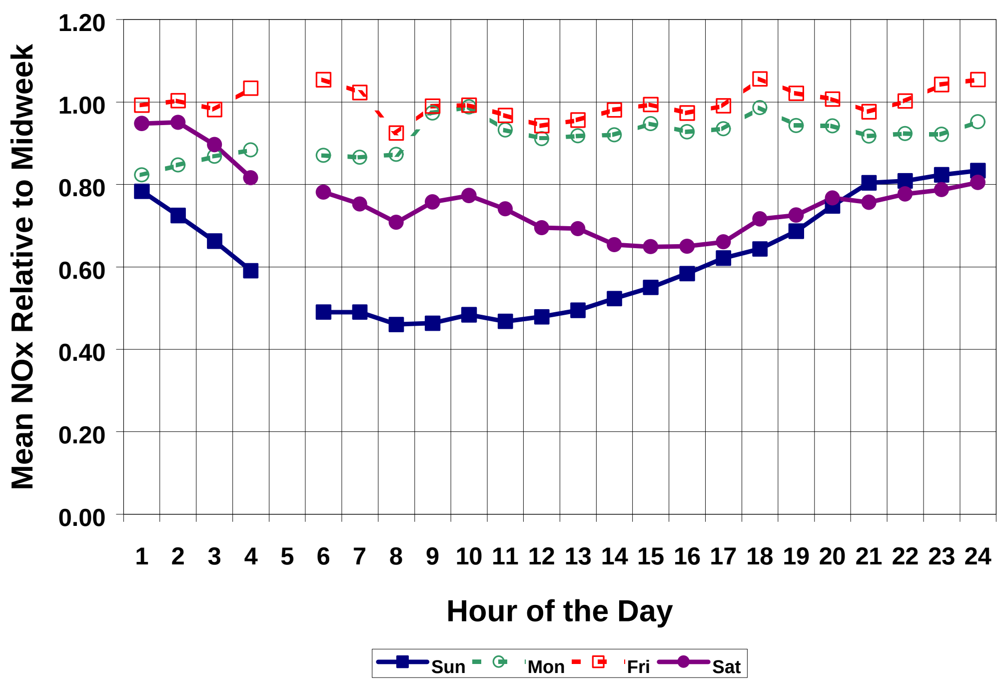

Figure 7.3.56 Ozone profiles by day of week at Pico Rivera, based on data for the May – October ozone seasons of 1996-1998.

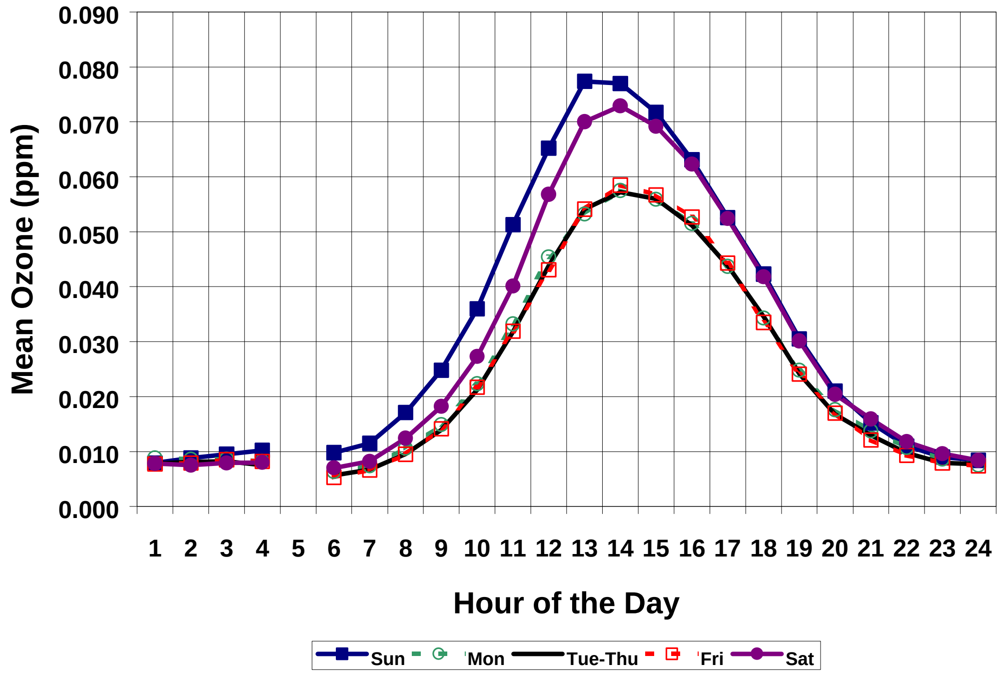

Figure 7.3.57 Ozone profiles for Pico Rivera, expressed as a proportion of the midweek values.

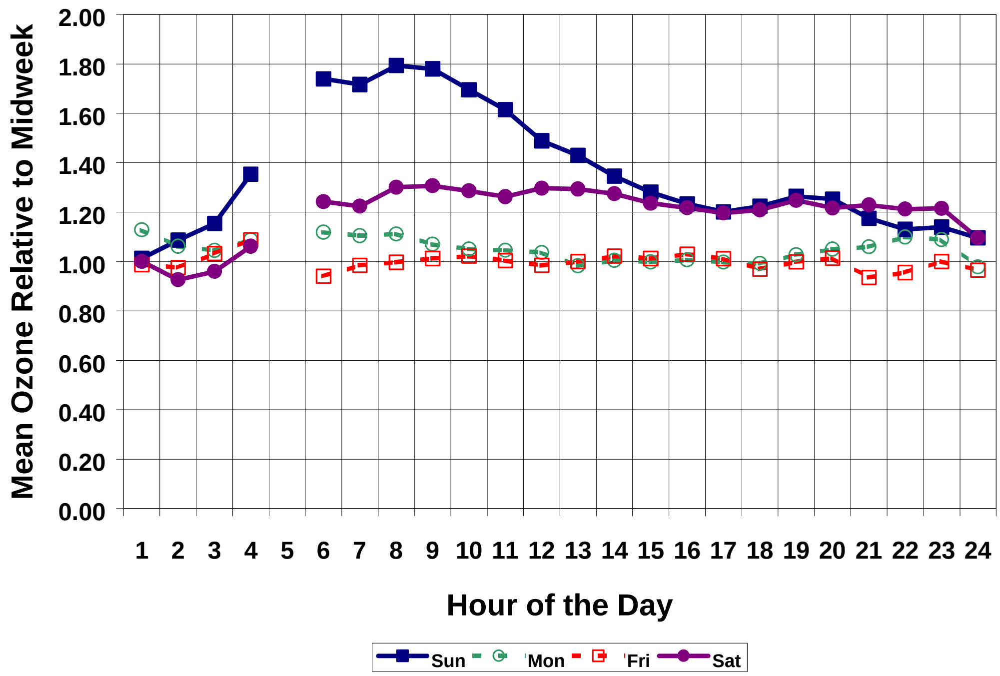

Figure 7.3.58 Carbon monoxide profiles by day of week at Pomona, based on data for the May – October ozone seasons of 1996-1998.

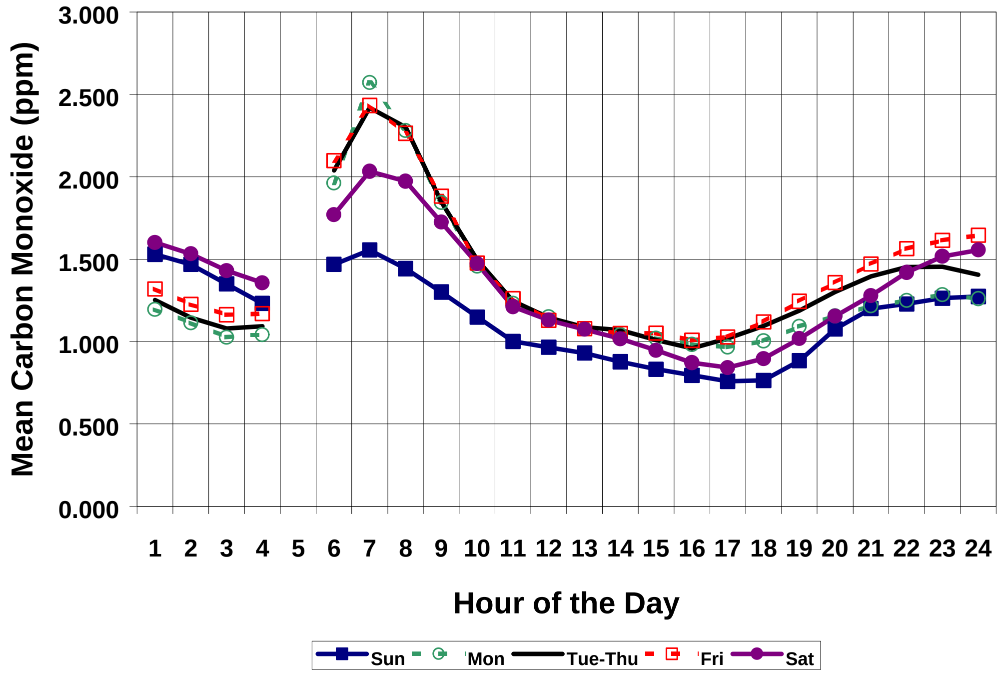

Figure 7.3.59 Carbon monoxide profiles for Pomona, expressed as a proportion of the midweek values.

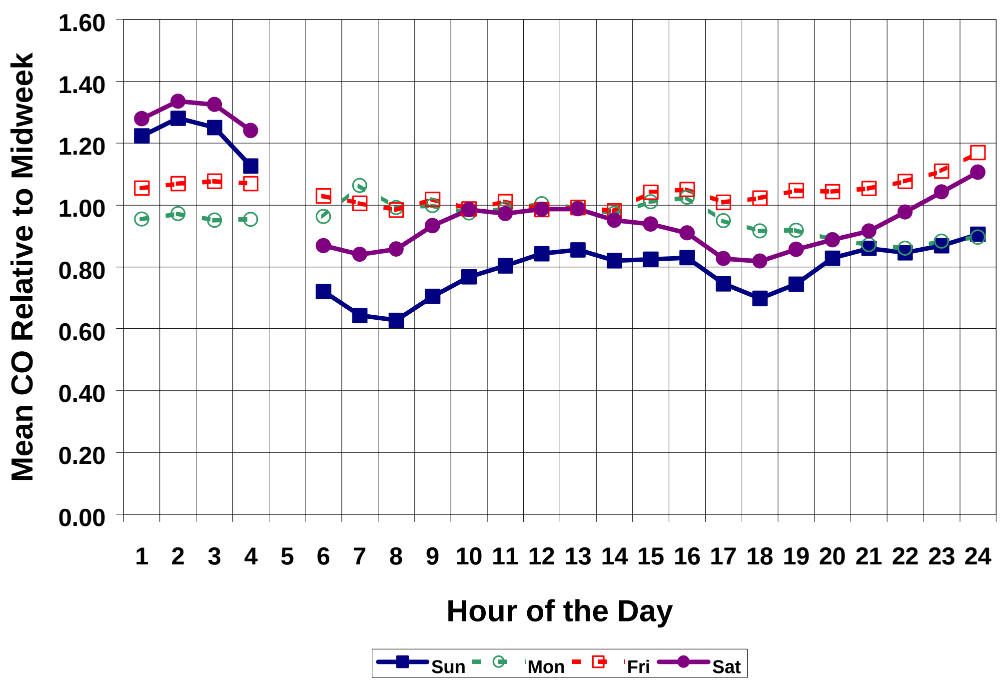

Figure 7.3.60 Nitrogen oxides profiles by day of week at Pomona, based on data for the May – October ozone seasons of 1996-1998.

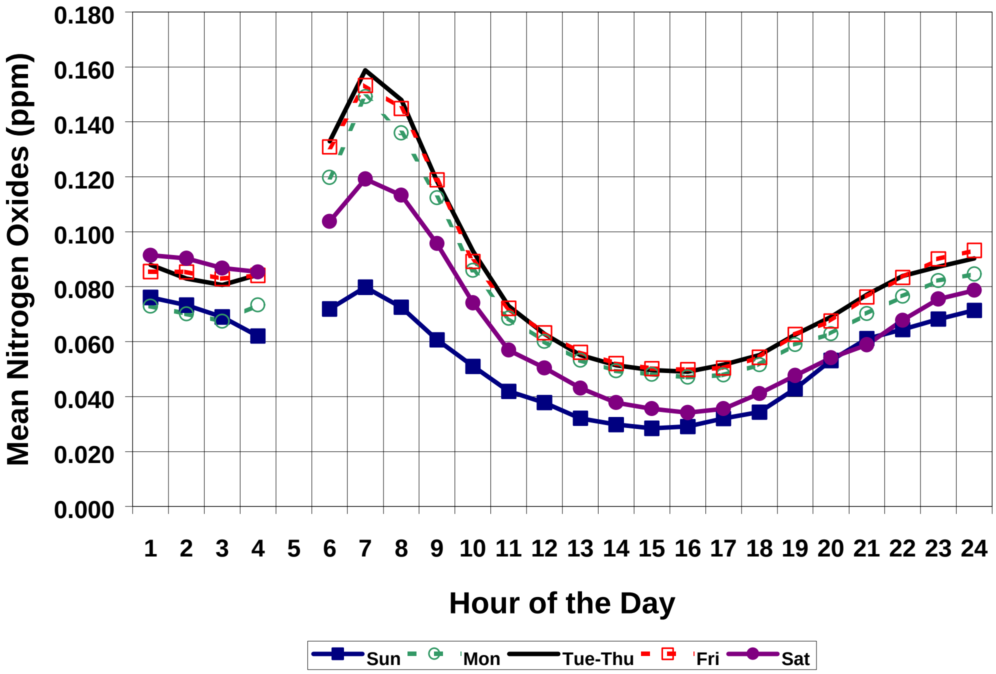

Figure 7.3.61 Nitrogen oxides profiles for Pomona, expressed as a proportion of the midweek values.

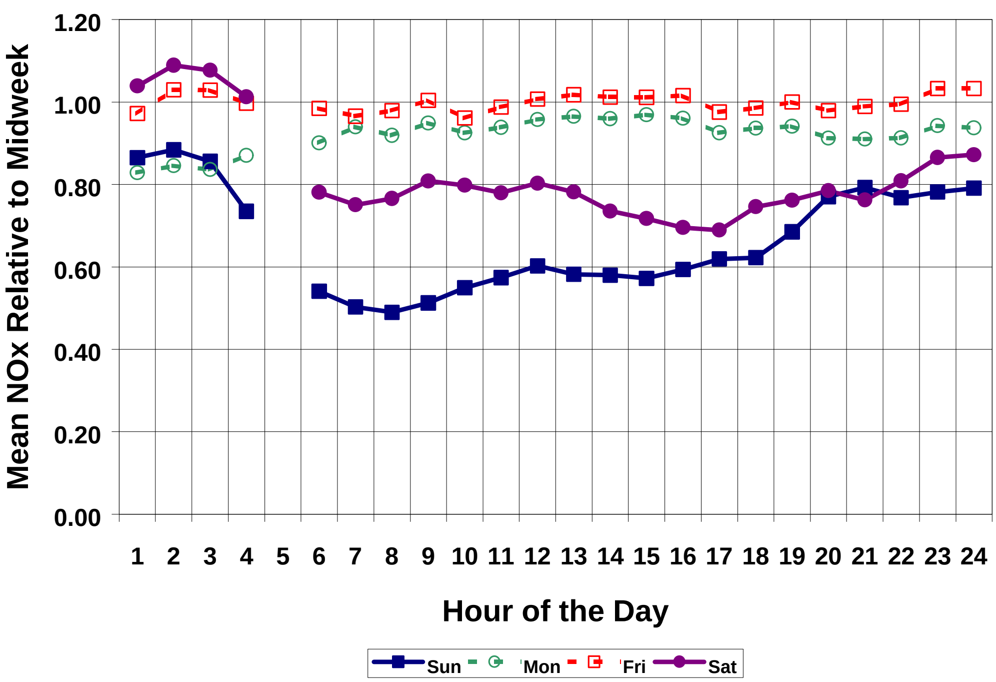

Figure 7.3.62 Ozone profiles by day of week at Pomona, based on data for the May – October ozone seasons of 1996-1998.

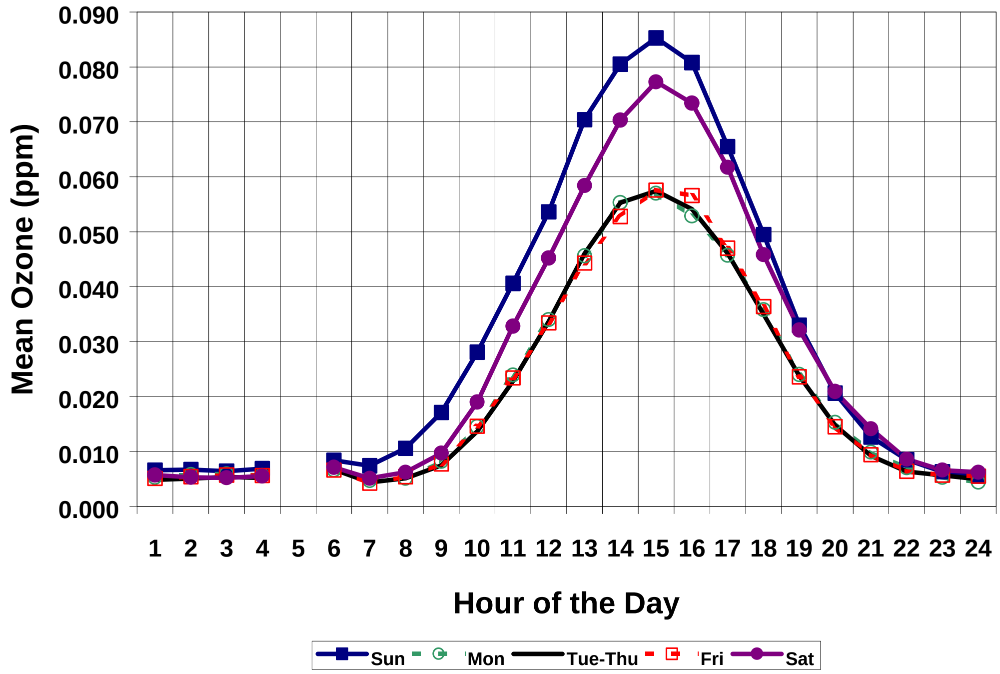

Figure 7.3.63 Ozone profiles for Pomona, expressed as a proportion of the midweek values.

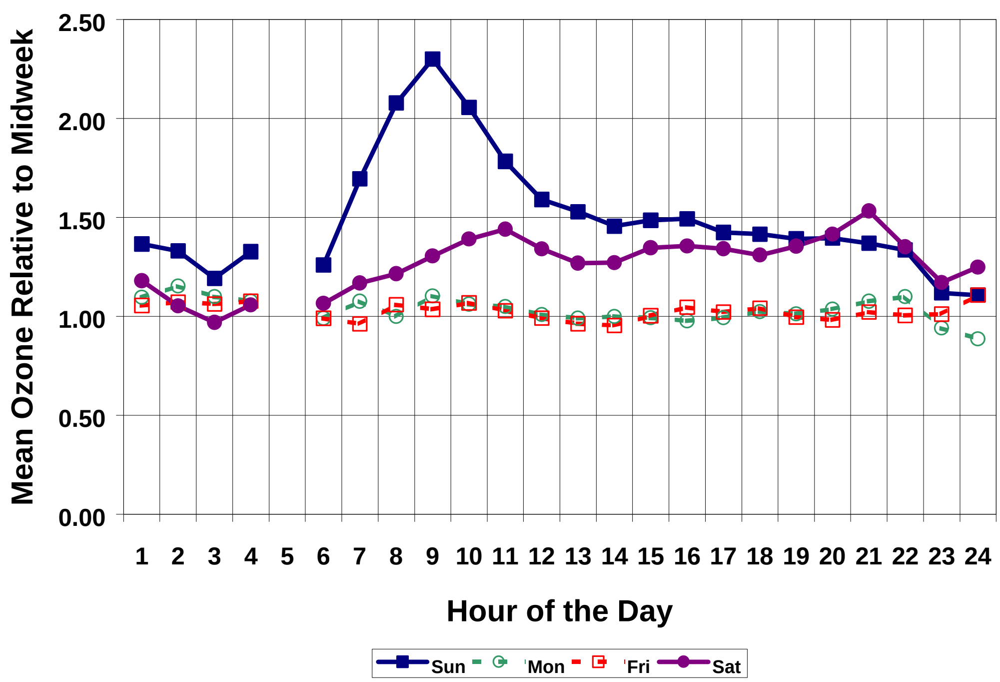

Figure 7.3.64 Carbon monoxide profiles by day of week at Reseda, based on data for the May – October ozone seasons of 1996-1998.

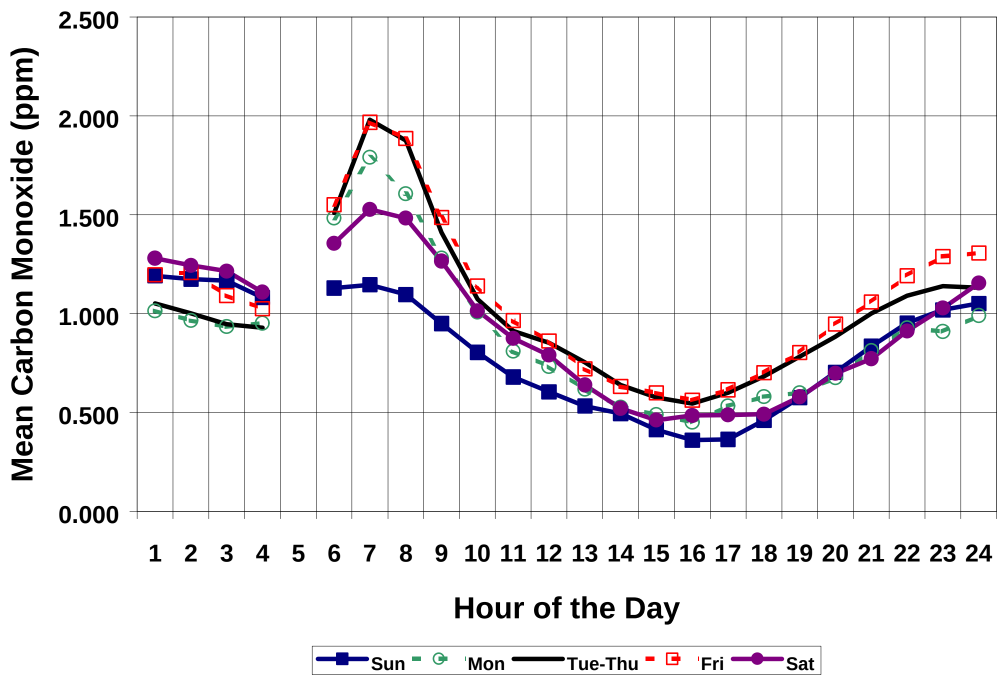

Figure 7.3.65 Carbon monoxide profiles for Reseda, expressed as a proportion of the midweek values.

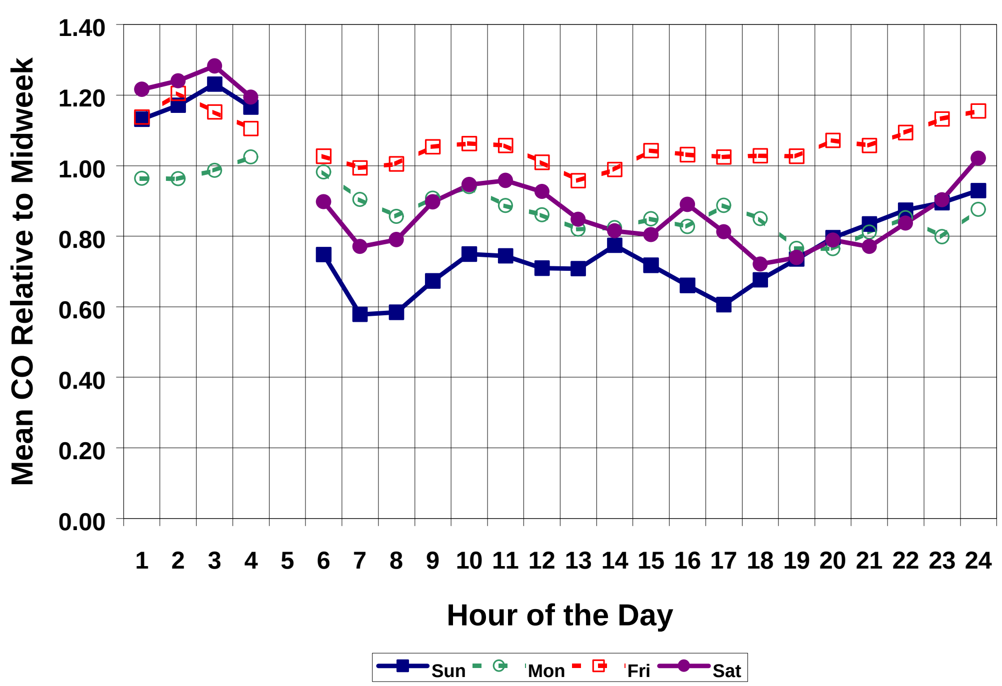

Figure 7.3.66 Nitrogen oxides profiles by day of week at Reseda, based on data for the May – October ozone seasons of 1996-1998.

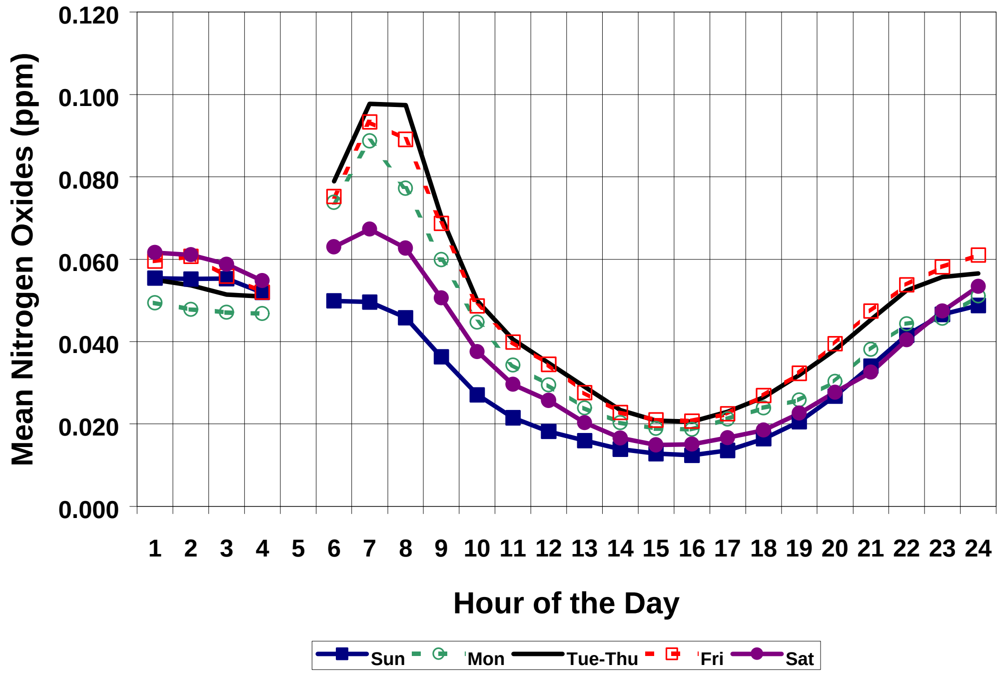

Figure 7.3.67 Nitrogen oxides profiles for Reseda, expressed as a proportion of the midweek values.

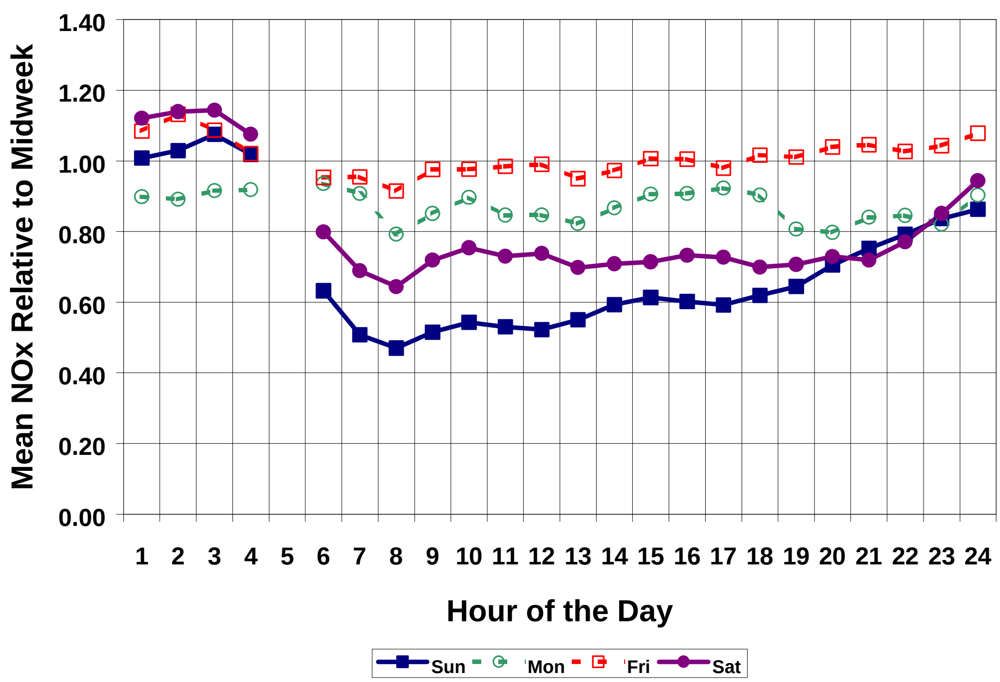

Figure 7.3.68 Ozone profiles by day of week at Reseda, based on data for the May – October ozone seasons of 1996-1998.

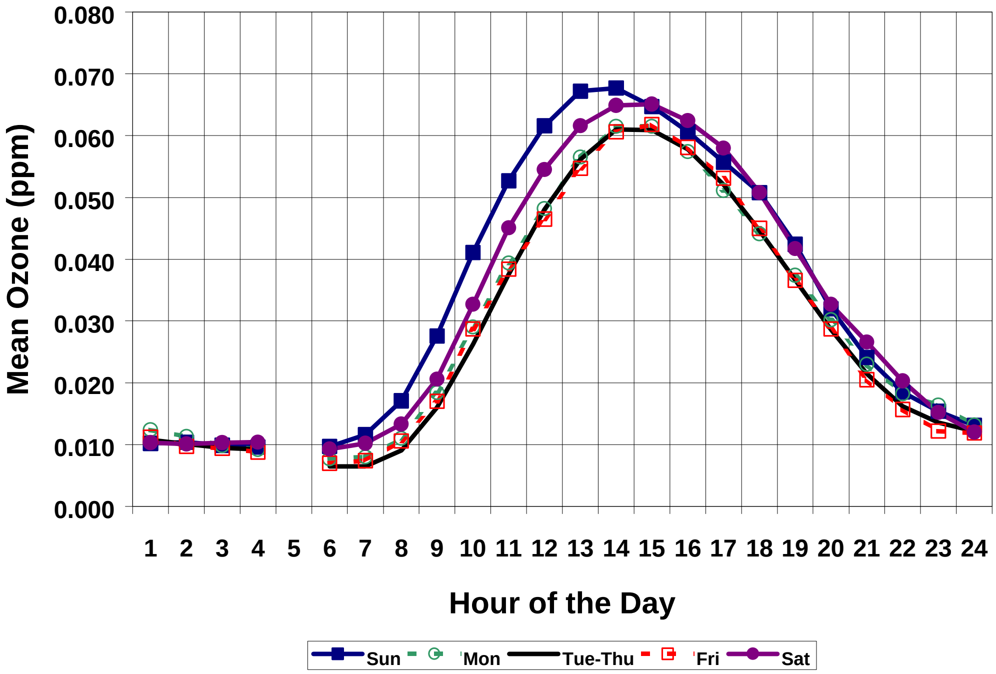

Figure 7.3.69 Ozone profiles for Reseda, expressed as a proportion of the midweek values.

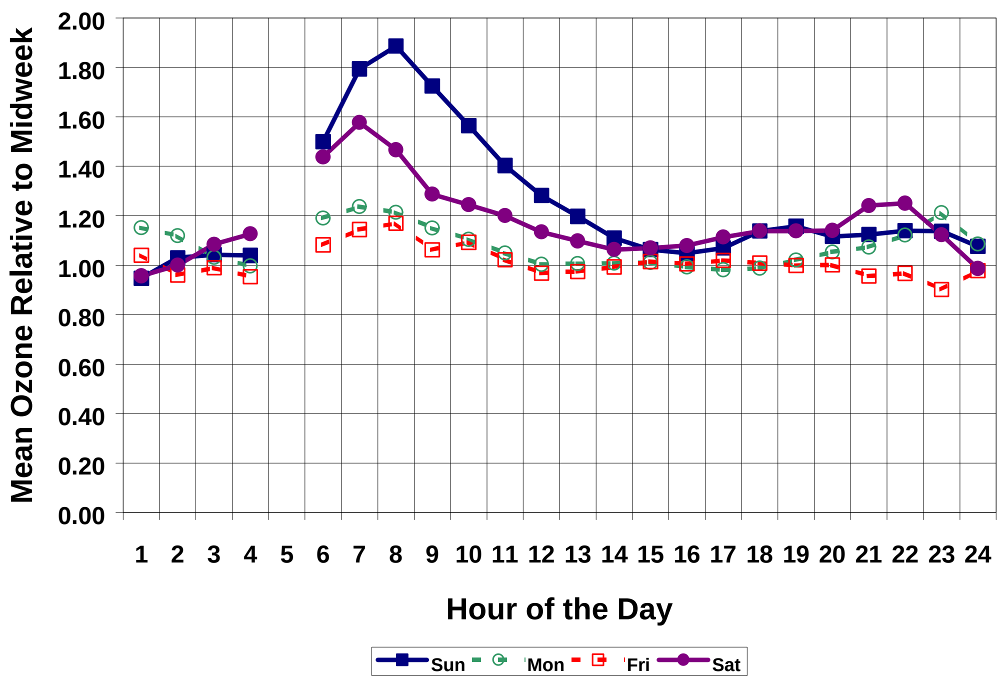

Figure 7.3.70 Profiles for NO_2:NO by day of week at Anaheim, based on data for the May – October ozone seasons of 1996-1998.

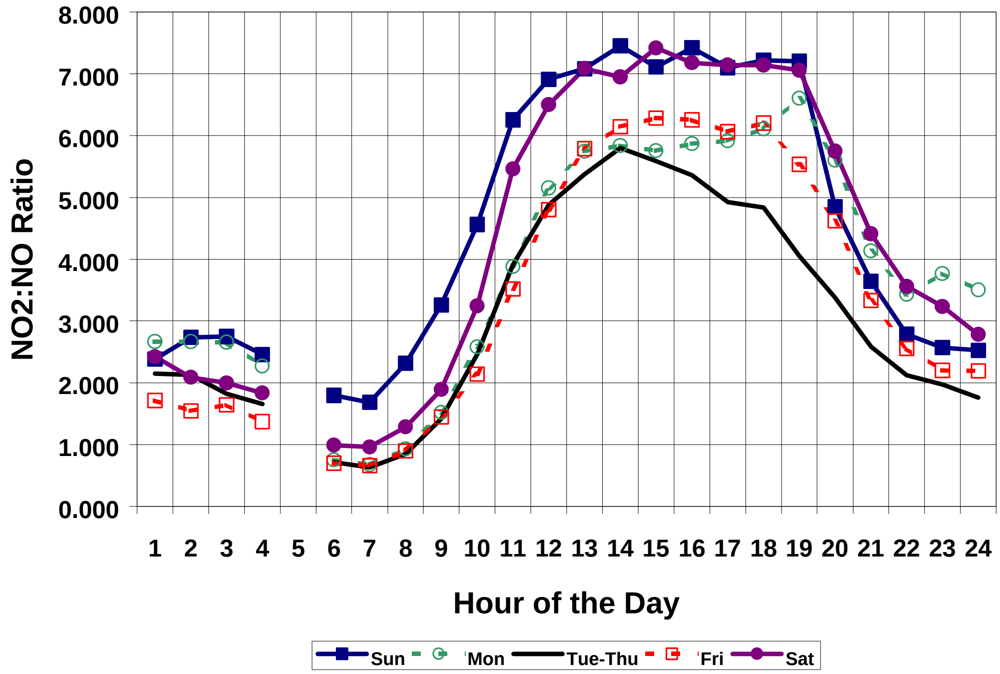

Figure 7.3.71 Profiles for NO_2:NO by day of week at Azusa, based on data for the May – October ozone seasons of 1996-1998.

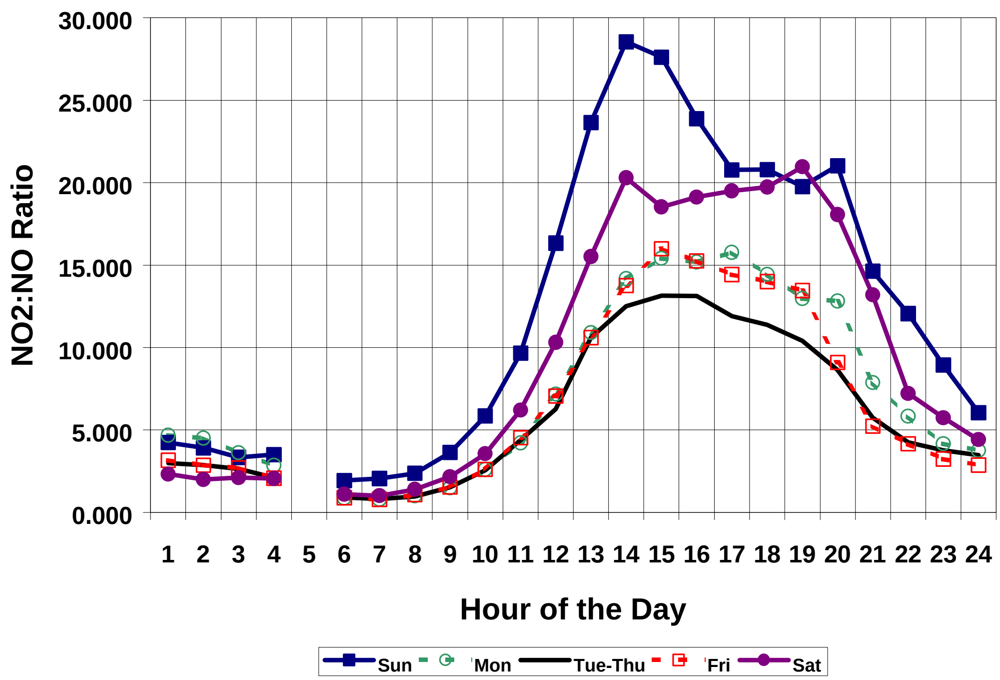

Figure 7.3.72 Profiles for NO_2:NO by day of week at Burbank, based on data for the May – October ozone seasons of 1996-1998.

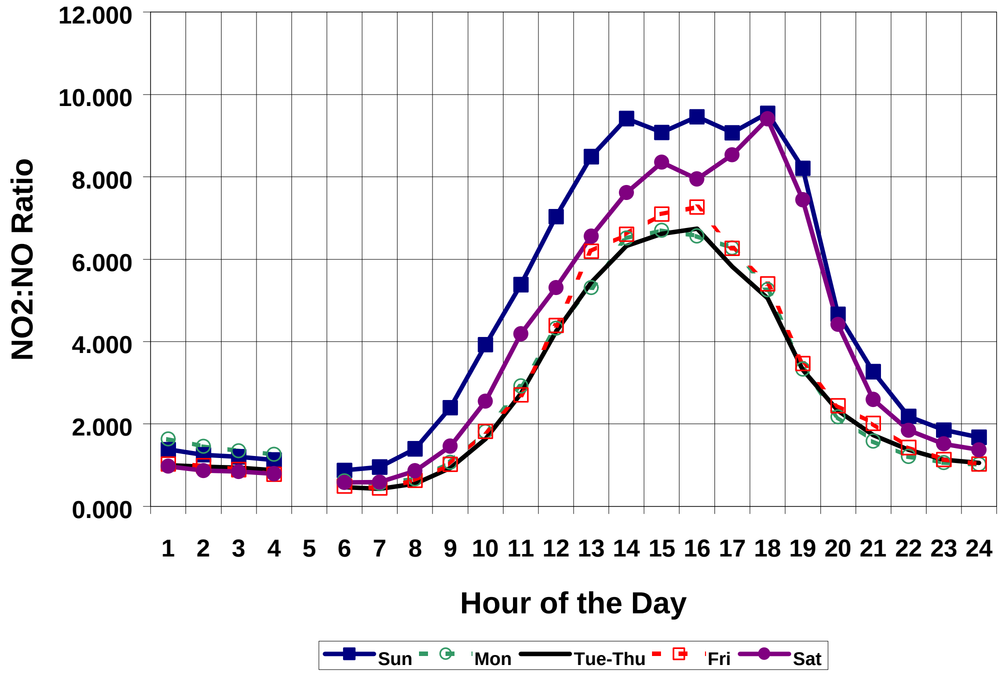

Figure 7.3.73 Profiles for NO_2:NO by day of week at Hawthorne, based on data for the May – October ozone seasons of 1996-1998.

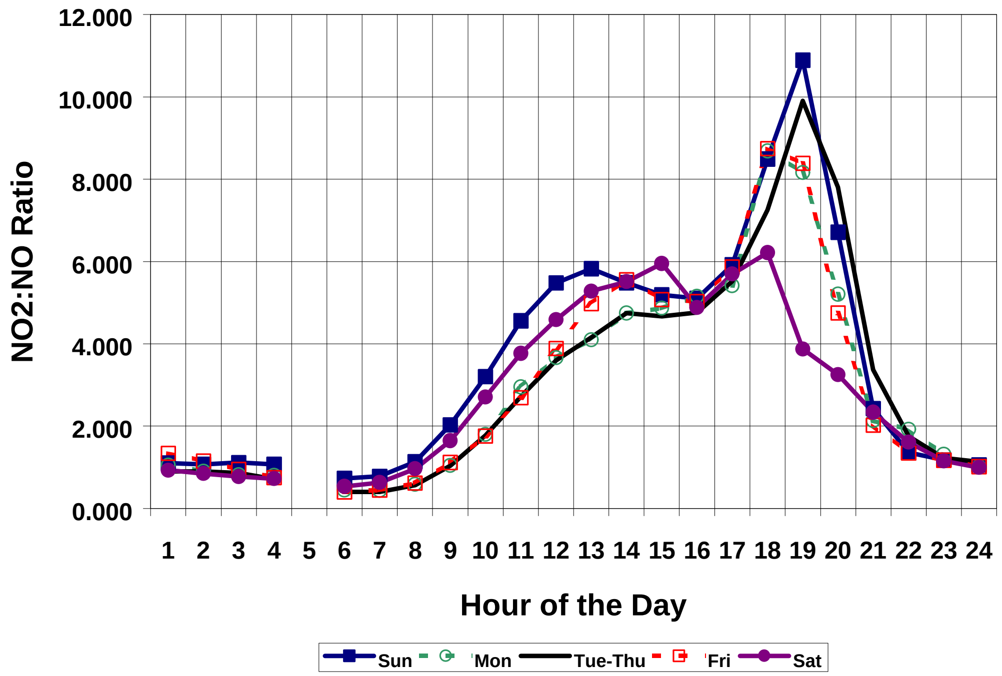

Figure 7.3.74 Profiles for NO_2:NO by day of week at L.A.-N. Main, based on data for the May – October ozone seasons of 1996-1998.

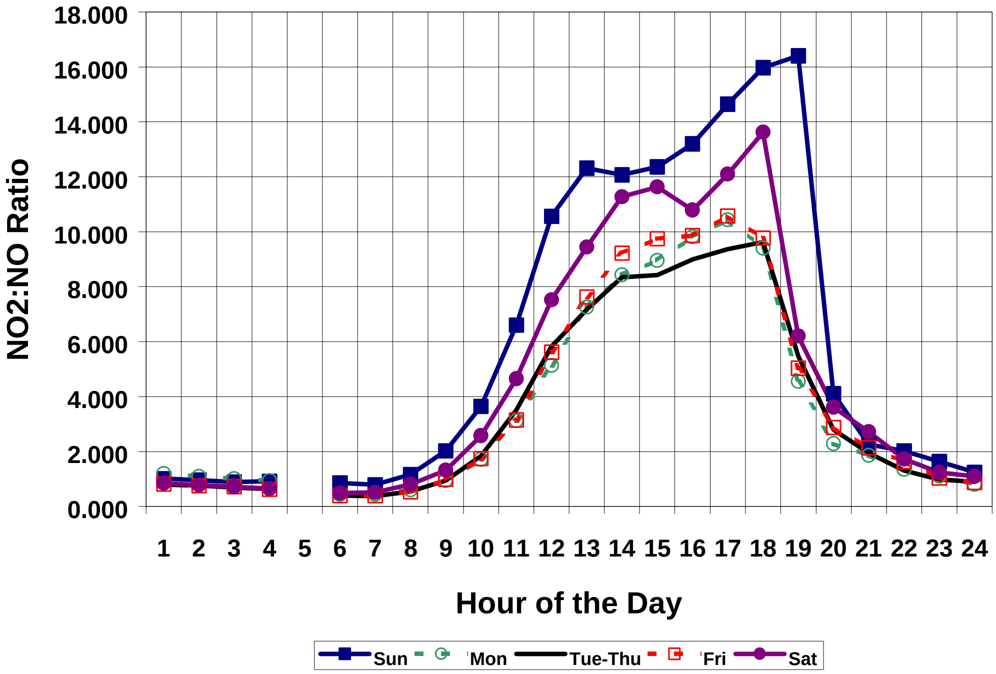

Figure 7.3.75 Profiles for NO_2:NO by day of week at Lynwood, based on data for the May – October ozone seasons of 1996-1998.

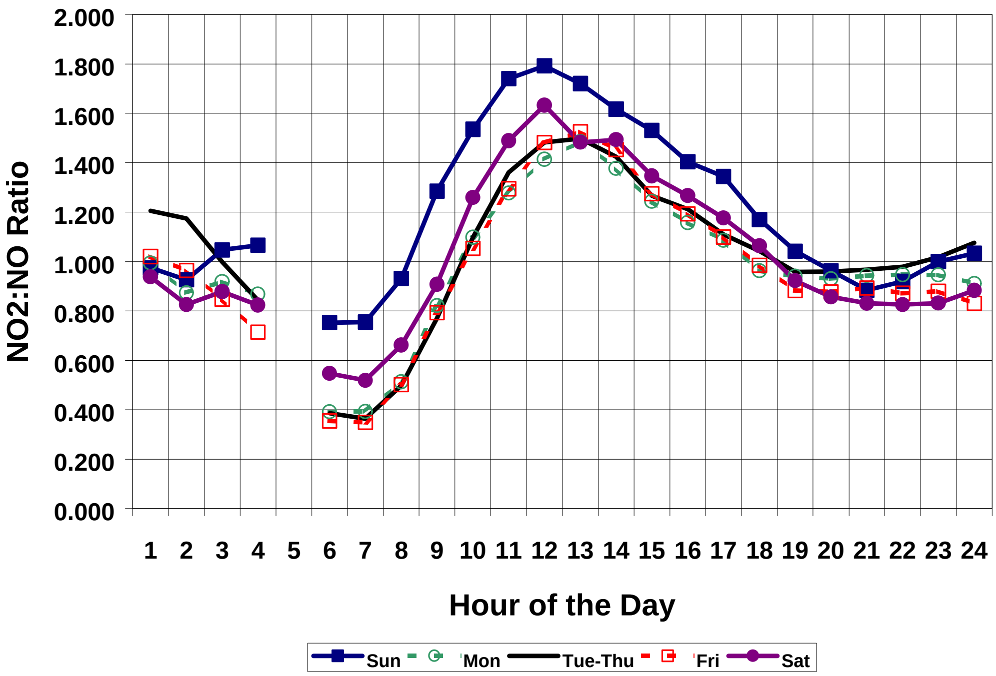

Figure 7.3.76 Profiles for NO_2:NO by day of week at N. Long Beach, based on data for the May – October ozone seasons of 1996-1998.

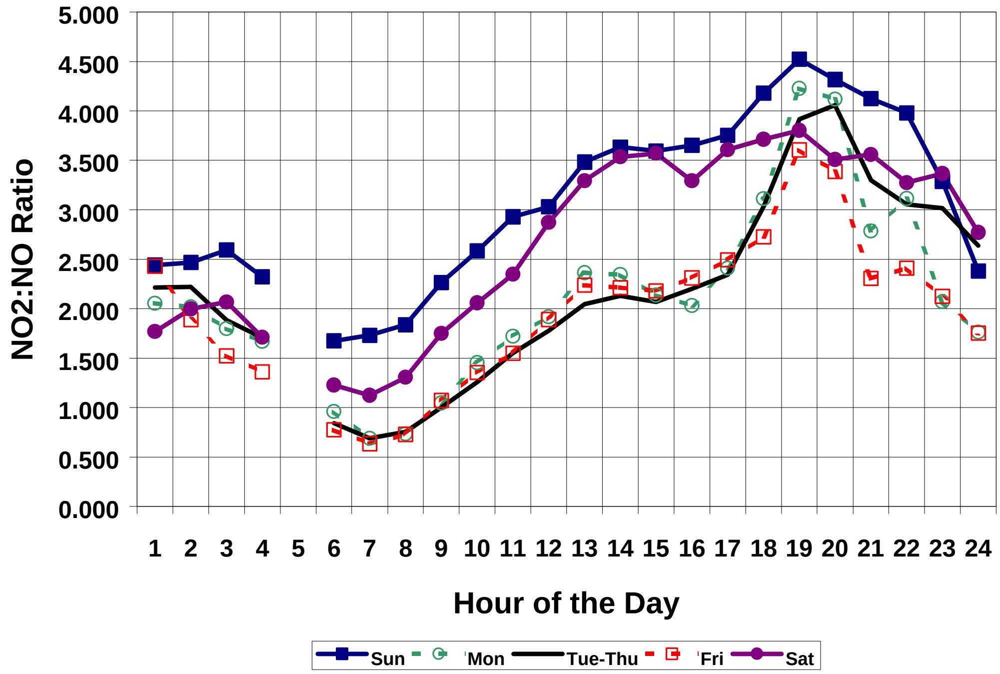

Figure 7.3.77 Profiles for NO_2:NO by day of week at Pico Rivera, based on data for the May – October ozone seasons of 1996-1998.

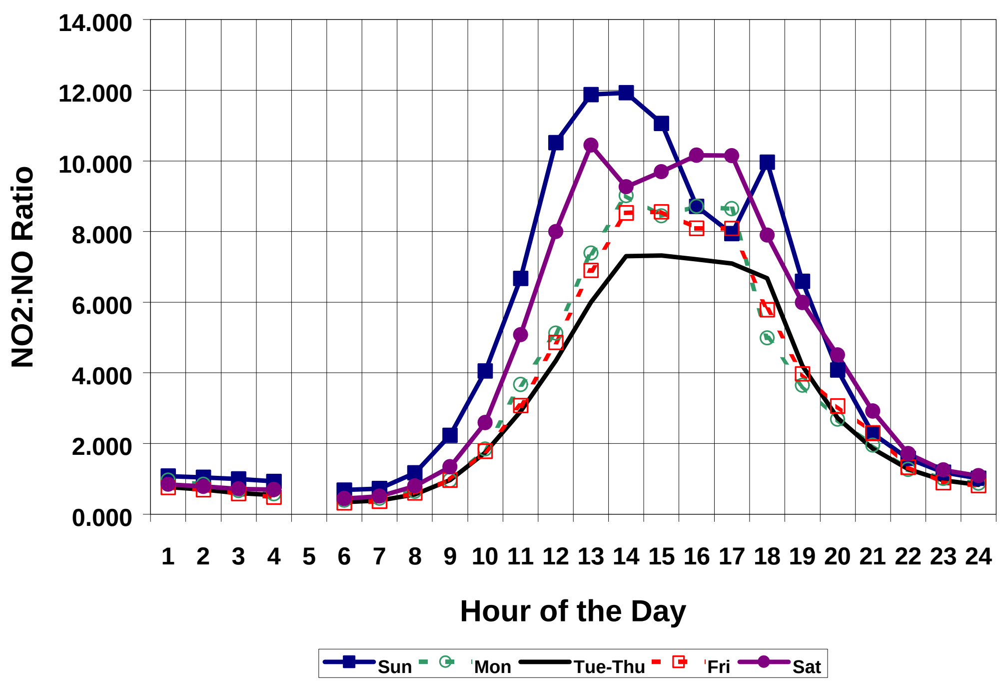

Figure 7.3.78 Profiles for NO_2:NO by day of week at Pomona, based on data for the May – October ozone seasons of 1996-1998.

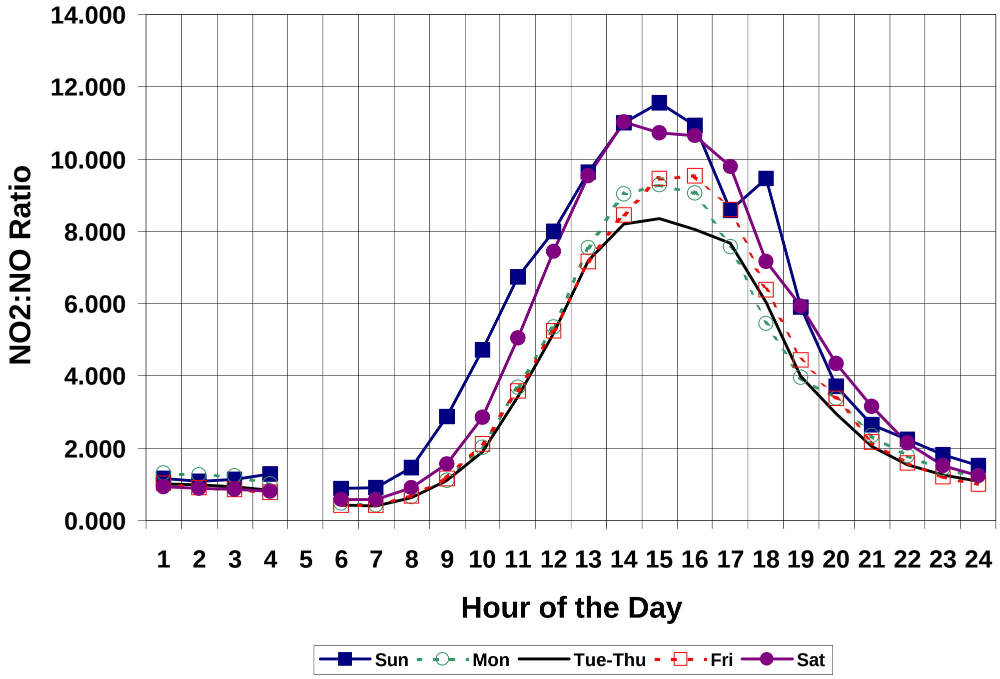

Figure 7.3.79 Profiles for NO_2:NO by day of week at Reseda, based on data for the May – October ozone seasons of 1996-1998.