Figure 2. South-side view of sampling array on downwind side of the conveyor transfer point at the Barstow plant.

of PM_4 and PM_{10} fugitive PM through the arrays were calculated by multiplying the total area of the array by the ambient wind speed and the measured PM_4 and PM_{10} concentrations.

The arrays for the vibrating screens, tertiary crushers, and conveyor transfer points were mounted within 5 ft of the locations of PM entrainment by ambient air. Because of this close spacing of the arrays to the source, the "plume" did not have time to substantially disperse in the horizontal or vertical direction. Accordingly, the dispersing PM was captured from the sources even as the ambient winds shifted direction within an angle of approximately 90°.

Each sampling array had more than 100 sampling points. This substantially exceeds the 30 sampling points specified in EPA Method 5D for testing open-top sources. The area monitored by the sampling array exceeded the area subject to dispersion of the PM on the downwind side of the process unit being tested. Each array consisted of manifolds having equally spaced nozzles for air sampling. The gas transport velocities through all sampling tubes and ductwork were above a minimum of 3200 ft/min to prevent any gravitational settling of dust. The sampling manifolds and ductwork were visually inspected after each test run. Following each set of emission tests, the sampling array piping and flex ducts were disassembled and checked for solids deposits. No deposits were present in any sections of the sampling system. Wind speed data and wind direction data demonstrated that each test run was consistent with study requirements.

Each of the array sampling manifolds was ducted together to yield a single sample gas stream. This gas stream flowed through a round duct 12 in. in diameter with sampling ports for a TECO FRM 2000 (modified for PM_4) sampling head and a PM_{10} sampling head. This duct size was the minimum necessary to accommodate the relatively large inlet heads for the TECO FRM 2000 and the TEOM. The gas velocity through the portion of the duct with the sampling ports for the monitoring instruments was less than 10 mph to be consistent with typical ambient wind velocities.

The actual sample gas flow rates through the sampling arrays provided near-isokinetic sampling velocities in the nozzles of the sampling arrays. The nozzles provided isokinetic sampling velocities equal to or lower than 110% at an average ambient wind speed of 5 mph. At isokinetic sampling rates below 100%, there is a slight bias to higher-than-true PM_4 concentrations because of the inertia of the PM_4 particles; however, this isokinetic effect is small for PM_4 particles because of their extremely low mass. Figures 1–3 show the sampling array arrangements. F1-3

The ambient airflow rate through each array was calculated based on the area of the array and the measured ambient wind speed. The tests were conducted only when the ambient winds were moving across the process being tested and through the downwind array. The adequacy of fugitive dust capture by the array was documented on a continuous basis using visible wind direction indicators and on an intermittent basis using a nephelometer continuous PM concentration analyzer inside and outside of the array.

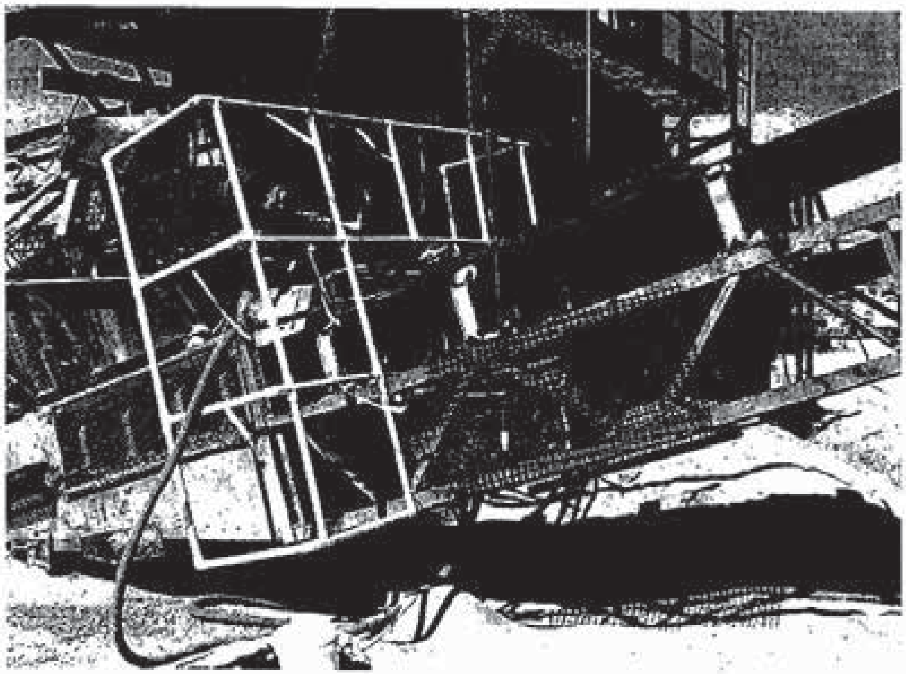

Figure 3. Close-up view of the sampling orifices in the conveyor transfer point array at the Carroll Canyon plant.

As part of this testing program, meteorological monitoring stations were installed to measure the following parameters during the process equipment test programs.

- Average and peak wind speeds
- Wind direction
- Ambient temperature

The sample gas velocities and volumetric flow rates through the main sampling duct during the PM_4 and PM_{10} tests were determined according to the procedures outlined in EPA Reference Method 2.

The authors believe that this fugitive dust capture technique provides the most accurate means possible to quantify fugitive dust emissions without affecting the rate of fugitive dust emissions and without interfering with safe plant operations.

PM_4 Emission Factor Test Program Process Data

During each of the test runs, study participants compiled data concerning the process operating conditions and the characteristics of the materials being handled.

- Crystalline silica content of aggregate being processed through the tested units
- Material moisture content (% wt)
- Material particle size distribution (sieve analyses)
- Material throughput (t/hr)

Ambient PM_4 Crystalline Silica Measurements

The PM_4 crystalline silica ambient concentrations were measured using TECO Model 2000 FRMs adjusted for PM_4 monitoring. Two Model 2000 FRMs were located

Table 1. PM_{10}, PM_4, and PM_4 crystalline silica emission factors at Barstow.

Equipment Tested	Emission Factor	Emission Factor Values (lb/t) of Stone Throughput: Measured Value	Ambient Upwind Equivalent[b]	Emission Factor
Vibrating screen	PM_{10}	0.000167[a,c]	NA[c]	0.000167[a,c]
	PM_4	0.000079[c]	NA[c]	0.000079[c]
	PM_4 crystalline silica	0.000006[c]	NA[c]	0.000006[c]
Crusher	PM_{10}	0.002753	0.000172	0.002581
	PM_4	0.001442	0.000172	0.001270
	PM_4 crystalline silica	0.000111	0.000028	0.000083
Conveyor transfer point	PM_{10}	0.000625	0.000050	0.000575
	PM_4	0.000402	0.000050	0.000352
	PM_4 crystalline silica	0.000035	0.000006	0.000029

Notes: [a]PM_{10} emission factors were calculated based on TEOM data. [b]Ambient levels of PM_4 PM and PM_4 crystalline silica upwind of the units tested were subtracted from the emission factors to account for material not emitted by the source. [c]Ambient levels of PM and crystalline silica upwind of the vibrating screens were not subtracted because the upwind samplers were below the elevation of the screens; therefore, the air quality at this elevation was not necessarily representative of air quality on the inlet side of the screen.

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Table 2. PM_{10}, PM_4, and PM_4 crystalline silica emission factors at Carroll Canyon.

		Emission Factor Values (lb/t) of Stone Throughput		
Equipment Tested	**Emission Factor**	**Measured Value**	**Ambient Upwind Equivalent**	**Emission Factor**
Vibrating screen	PM_{10}	0.000930	0.000100	0.000831
	PM_4	0.000386	0.000029	0.000356
	PM_4 crystalline silica	0.000048	0.000001	0.000046
Crusher	PM_{10}	0.001271	0.000039	0.001232
	PM_4	0.000611	0.000017	0.000593
	PM_4 crystalline silica	0.000099	0.000002	0.000098
Conveyor transfer point	PM_{10}	0.000552	0.000026	0.000525
	PM_4	0.000245	0.000009	0.000236
	PM_4 crystalline silica	0.000031	0.00000	0.000031

Table 3. PM_{10}, PM_4, and PM_4 crystalline silica emission factors at Vernalis.

		Emission Factor Values (lb/t) of Stone Throughput		
Equipment Tested	**Emission Factor**	**Measured Value**	**Ambient Upwind Equivalent**	**Emission Factor**
Vibrating screen	PM_{10}	0.001754	0.000061	0.001693
	PM_4	0.000888	0.000006	0.000882
	PM_4 crystalline silica	0.000083	0.000002	0.000081
Crusher	PM_{10}	0.001767	0.000089	0.001677
	PM_4	0.000788	0.000021	0.000767
	PM_4 crystalline silica	0.000110	0.000001	0.000110
Conveyor transfer point	PM_{10}	0.001193	0.000103	0.001090
	PM_4	0.000476	0.000019	0.000457
	PM_4 crystalline silica	0.000088	0.000003	0.000085

Table 4. Comparison of measured PM_{10} PM emission factors and PM_4 crystalline silica emission factors.

Source	**Plant**	**PM_{10} Emission Factors (lb/t)**	**Crystalline Silica PM_4 Factors (lb/t)**	**Ratio, Percent PM_4 Crystalline Silica to PM_{10}**
Screen	Barstow	0.000167	0.000006	3.59
	Carroll Canyon	0.000831	0.000046	5.54
	Vernalis	0.001693	0.000081	4.78
Crusher	Barstow	0.002581	0.000083	3.21
	Carroll Canyon	0.001232	0.000098	7.95
	Vernalis	0.001677	0.00011	6.56
Conveyor transfer point	Barstow	0.000575	0.000029	5.04
	Carroll Canyon	0.000525	0.000031	5.90
	Vernalis	0.00109	0.000085	7.80

on the downwind side of the facility at a location immediately adjacent to the plant fence line. A single upwind Model 2000 FRM was located on the upwind side of the facility.

These instruments were operated for 24 hr and obtained sample volumes of 16 m^3. R.J. Lee Group, Inc. (RJL) weighed the filter samples using a microbalance and analyzed for crystalline silica using NIOSH Method 7500.

RESULTS

Emission Factor Test Results

The PM_{10}, PM_4, and PM_4 crystalline silica emission factors for the equipment sources measured at the three facilities are presented in Tables 1–3. The emission T1-3 factors presented in the column on the right were calculated by subtracting the measured downwind concentrations from the measured upwind (ambient) concentrations.

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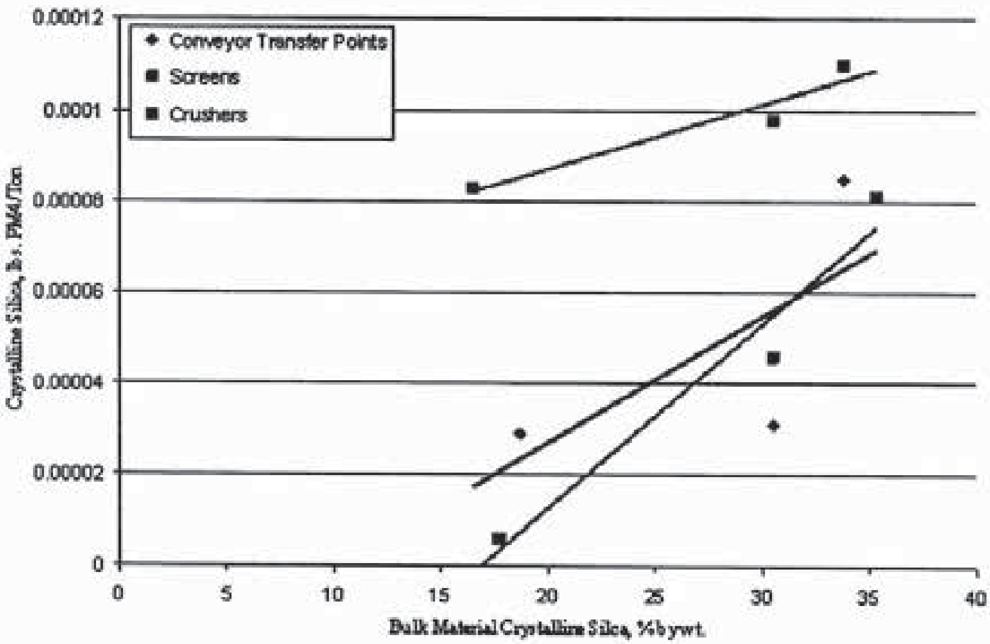

Figure 4. Relationship between bulk material crystalline silica content and the PM_4 crystalline silica emission factor.

T4 As indicated in Table 4, the crystalline silica PM_4 emission factors range from 3.21 to 7.95% of the PM_{10} emission factors. This is a useful ratio because it compares the PM_4 crystalline silica emissions with PM_{10} emissions for which data are often available.

The plant-to-plant differences in PM_4 crystalline silica emission factors are primarily due to the crystalline silica content of the material being handled. As indicated F4 in Figure 4, the bulk material crystalline silica content is responsible for most of the variance in the data. However, it is important to note that because of the small number of test values (three), it is not possible to demonstrate that the relationship between PM_4 crystalline silica emission factors and bulk crystalline silica content is significant at the 90% confidence level.

A less consistent relationship was observed for the conveyor transfer point tests. The reduced emission factor value for the Carroll Canyon plant (30.5% crystalline silica point) is probably due to the high aggregate throughput of this unit. It is theorized that at very high throughputs, some of the stone in the flowing material stream is shielded from attrition and, therefore, does not contribute to emissions. Despite this one test value, there appears to be a relationship between PM_4 crystalline silica emission factors and the crystalline silica content of the bulk material.

An alternative approach for summarizing the PM_4 crystalline silica concentrations is to compile average values for the datasets for the crushers, screens, and con-
T5 veyor transfer points tested. Table 5 includes average values based on the data from the three plants provided in Tables 1–3.

T6 Table 6 summarizes the crystalline silica fraction of the total PM_4. These data demonstrate that the crystalline silica content of the PM_4 material is considerably lower than the crystalline silica content measured in the bulk samples recovered from each unit tested. On the basis of an average of the tests at the three plants, the PM_4 crystalline silica content is 44% of the bulk material crystalline silica content. It is apparent that the crystalline silica content of the rock is not as prone to attrition size reduction as other constituents in the aggregate.

The process equipment PM_4 crystalline silica emission factors summarized in Tables 1–6 are consistent with previously published emission factors for $PM_{2.5}$ and PM_{10} from similar process units. The PM_4 crystalline silica emission factors are intended for use as input data to dispersion models to evaluate annual average PM_4 concentrations at plant fence lines.

Ambient PM_4 Crystalline Silica Concentrations

Ambient concentrations of PM_4 crystalline silica were measured during 3 consecutive 24-hr periods at the

Table 5. Average emission factors from Barstow, Carroll Canyon, and Vernalis: combined dataset.

Source	Analyte	Emissions (lb/t)
Vibrating screen	PM_{10}	0.00090
	PM_4	0.00044
	PM_4 crystalline silica	0.000044
Crusher	PM_{10}	0.00183
	PM_4	0.00088
	PM_4 crystalline silica	0.000097
Conveyor transfer point	PM_{10}	0.00073
	PM_4	0.00035
	PM_4 crystalline silica	0.000048

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Table 6. Crystalline silica fraction of PM_4 PM.

Plant	Source	Crystalline Silica Content (percent weight of total PM_4)	Crystalline Silica Content (percent weight of material samples)
Barstow	Screen	7.5	17.7
	Crusher	6.5	16.5
	Conveyor transfer point	8.3	18.7
	Average	6.9	17.3
Carroll Canyon	Screen	12.5	30.5
	Crusher	15.4	30.4
	Conveyor transfer point	12.8	30.6
	Average	13.6	30.5
Vernalis	Screen	9.6	35.3
	Crusher	21.9	33.9
	Conveyor transfer point	18.4	33.8
	Average	16.6	34.3

Carroll Canyon and Vernalis plants. Two collocated TECO FRM samplers modified for PM_4 crystalline silica measurement operated at a location downwind of the quarry and processing equipment. A single TECO FRM instrument for PM_4 crystalline silica monitoring operated at a location upwind of the entire facility being tested. Meteorological monitoring stations were placed at the upwind and downwind locations. The results of the ambient monitoring tests demonstrated that the plants operated at levels well below
T7-8 the 3-$\mu g/m^3$ REL value. Tables 7 and 8 summarize the results for the Carroll Canyon and Vernalis plants, respectively.

The differences between the upwind and downwind ambient PM_4 crystalline silica concentrations are small. The slightly higher upwind values observed during several of the test days are due to emissions from unpaved roads near the upwind monitoring sites.

Quality Assurance/Quality Control Procedures for PM_4 and PM_{10} Sampling

All of the PM_4 crystalline silica concentration tests conducted with modified Appendix L samplers included quality assurance (QA)/quality control (QC) procedures established by EPA for IO-1.3 (TEOMs) and 40 CFR Part 50, Appendix L (TECO FRM 2000s). The QA/QC data indicated that the TECO PM_4 samplers, the TECO PM_{10} samplers, and the TECO TEOM monitor used for PM_4 and PM_{10} monitoring performed extremely well throughout the three test programs.

All of the PM_4 concentration samplers used for emission factor testing and ambient air monitoring met all of the pre- and post-test requirements concerning filter temperature, ambient temperature, barometric pressure, sample flow, and sample gas stream leak rates.

A TEOM monitor was used during the tests at Barstow for the emission factor tests of the tertiary crusher, the vibrating screen, and the conveyor transfer point. The TEOM monitor satisfied the pre- and post-test QA requirements concerning ambient temperature, barometric pressure, sample flow, and sample gas stream leak rates.

SUMMARY

PM_4 crystalline silica emission factors measured using an Appendix L-based filter sampler ranged from 0.000006 to 0.000110 lb/t of stone processed in vibrating screens, tertiary crushers, and conveyor transfer points. The measured PM_4 crystalline silica emissions ranged from 3.21 to 7.95% of the simultaneously measured PM_{10} emission factors. The PM_4 crystalline silica emissions measured in this study appeared to be related to the crystalline silica content of the mineral being handled. The concentration of crystalline silica in PM_4 PM averaged 44% of the crystalline silica content of the bulk mineral.

Ambient concentrations of PM_4 crystalline silica were measured upwind and downwind of the facilities during the emission factor test programs. The measured ambient concentrations of PM_4 crystalline silica ranged from below the detectable limit of 0.3 $\mu g/m^3$ to 2.8 $\mu g/m^3$. These concentrations are well below the California REL of 3 $\mu g/m^3$.

Table 7. Plant upwind-downwind ambient monitoring at Carroll Canyon.

	PM_4 Crystalline Silica ($\mu g/m^3$)		
Date	Upwind	Downwind (primary)	Downwind (collocated)
September 17	1.3	1.1	1.0
September 18	1.4	0.7	0.8
September 19	0.6	0.5	0.4

Table 8. Plant upwind-downwind ambient monitoring at Vernalis.

	PM_4 Crystalline Silica ($\mu g/m^3$)		
Date	Upwind	Downwind (primary)	Downwind (collocated)
September 24	0.8	0.6	0.9
September 25	2.8	0.9	0.8
September 26	2.5	0.0	1.2

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Attachment 3. Sampling and Analysis of Samples Collected in the Citiies of Duarte and Azusa Follow-up #4

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Sampling and Analysis of Samples Collected in the Cities of Duarte and Azusa

Follow-up #4

November 2008

MA #2008-03

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Executive Summary

Purpose

In a letter dated April 12, 2005, the city of Duarte requested the AQMD to examine potential air quality impacts of quarry operations in the area. Specifically, the city requested that the AQMD conduct particle matter (PM) sampling in the community. The AQMD worked with the city to identify a suitable sampling location and deployed a PM_{10} sampler at Royal Oaks Elementary in Duarte beginning in August 2005. In October 2005, a $PM_{2.5}$ sampler was added at the school and fallout samples were collected at various locations in the community. The AQMD held a town hall meeting on September 21, 2005 to inform the public of the air monitoring program and to hear community concerns. Comments were made that elevated levels of crystalline silica may occur from the quarry activities and are a potential health concern. Subsequent to the meeting, the AQMD initiated air monitoring for crystalline silica. This fourth report details findings for the first three quarters of 2008 and for the entire duration of sampling starting in August 2005 and ending on September 9th 2008. The sampling at Royal Oaks Elementary has established baseline levels of PM_{10}, $PM_{2.5}$, and crystalline silica which may be used to compare future samples.

Sampling

Sampling at Royal Oaks Elementary located in Duarte began in August 2005 with federal reference method (FRM) sampling of PM_{10}. A $PM_{2.5}$ FRM sampler was then added in October 2005. Due to concerns about crystalline silica, an additional PM sampler specific to crystalline silica, was added on May 23, 2006. From the beginning of sampling, a meteorological system has measured and recorded wind speed and direction at the site. The PM and meteorological data are used for comparison to AQMD's air monitoring station (AMS) data collected in Azusa, immediately east of the quarrying and materials handling facility, and to air quality standards established by both the state of California and U.S. EPA.

Key Findings

- The state 24-hour standard for PM_{10} is $50\mu g/m^3$. This standard was exceeded on two sampling days in Duarte and ten sampling days in Azusa during the period of January to September 9th 2008. Average 24-hour PM_{10} concentrations were $28\mu g/m^3$ in Duarte and $35\mu g/m^3$ in Azusa when same sampling dates are compared.

- The federal 24-hour standard for $PM_{2.5}$ is set at $35\mu g/m^3$. This standard was exceeded on two days in Duarte and one day in Azusa during this reporting period. The federal level was exceeded in Duarte on July 5th with a measured value of $60\mu g/m^3$, likely as a result of 4th of July fireworks activities; no sample was recovered from Azusa on this day. The other day in Duarte exceeding the federal standard occurred on Feb 18th 2008 with a value of 35.3µg/m^3, the same day as Azusa (36.5µg/m^3). $PM_{2.5}$ averaged 14.6µg/m^3 in Duarte compared to 14.4µg/m^3 at the Azusa AMS when same sampling days were compared for the first three quarters of 2008.

- Crystalline silica results show that for the duration of the study, no samples exceeded the non-cancer chronic reference exposure level of 3µg/m^3 as PM_4 established by the State of California. The maximum 24-hour reported value for crystalline silica was 1.3µg/m^3, with an average of 0.5µg/m^3.

- Wind direction at Duarte and AQMD's Azusa air monitoring station (AMS) demonstrates a great deal of similarity for months where data is available. Wind speeds at the Azusa AMS are typically higher than those measured in Duarte.

1.0 INTRODUCTION

This is the fourth and final follow-up to AQMD's report on particulate matter (PM) monitoring conducted at Royal Oaks Elementary School, located in Duarte, California (SCAQMD, 2006). New sampling results in this report cover the first, second, and third quarters of 2008 (January to September 9th 2008). Details regarding background, project discussion, and sampler siting protocols are provided in the 2006 report[1]. For this monitoring period, 76 samples were collected for PM_{10}, 76 samples for $PM_{2.5}$ mass determination and 33 PM_4 samples were collected to determine ambient crystalline silica concentrations. Twenty one of the crystalline silica samples had concentrations greater than the detection limit of $0.4\mu g/m^3$.

2.0 Crystalline Silica

Silica refers to silicon dioxide (SiO2), which occurs naturally in crystalline and amorphous forms. It is exposure to respirable crystalline silica that has been determined to have health impacts. Crystalline silica is the crystalline form of silicon dioxide and is naturally occurring; the most common form of crystalline silica is quartz. Exposure to crystalline silica may result from activities that involve the suspension of respirable crystalline silica into the air; such activities might include mining, quarry work, rock drilling, stonecutting, and abrasive blasting.

Atmospheric sampling for respirable crystalline silica is based on sampling particulate matter with an aerodynamic diameter of 4 micro-meters or less (PM_4). A PM_4 sampler was deployed in May 2006 at Royal Oaks Elementary. This sampler was replaced with a higher flow rate PM_4 sampler at the beginning of January 2007. Samples for PM_{10}, $PM_{2.5}$, and PM_4 are all collected over a one-day, 24-hour period, from midnight to midnight.

There is very little information on ambient levels of PM_4 crystalline silica. In a document dated 1996, U.S. EPA estimated background levels of crystalline silica at $3\mu g/m^3$ of PM_{15}, but has no estimates for PM_4 crystalline silica. An upper bound estimate of 10% for silica in PM_{10} in metropolitan areas was also given, but it was noted that this upper bound is uncertain. Crystalline silica is listed as a Proposition 65 cancer-causing compound by the State of California and has set a non-cancer chronic reference exposure level (REL) of $3\mu g/m^3$ as PM_4. Chronic exposure refers to exposure of 8 years or longer and is not based on a specific sampling period. The National Institute of Occupational Safety and Health (NIOSH) has set a recommended exposure limit of $50\mu g/m^3$ PM_4 averaged over a work shift of 8 to 10 hours.

3.0 ANALYSIS

Analysis for PM mass is conducted in accordance with established U.S. EPA and AQMD methods. The determination of crystalline silica follows AQMD's method. All samples are accompanied with a completed Sample Analysis Request – Chain of Custody Form upon receipt by the AQMD Laboratory. Specific details regarding sampling and analysis protocols can be found in the 2006 AQMD report.

4.0 RESULTS

PM Sampling

Results of PM_{10} sampling for the first, second and third quarters in Duarte and Azusa for 2008 are listed in Appendix A and plotted in Figure 1. PM_{10} data collected since the start of the study are shown in Figure 2 and Appendix D. Results of $PM_{2.5}$ sampling for the first, second, and third quarters in Duarte and Azusa for 2008 are listed in Appendix B and plotted in Figure 3. Data for all $PM_{2.5}$ samples collected since the beginning of the monitoring program are shown in Figure 4 and in Appendix E. All results are based on samples being taken every sixth day for a 24-hour sampling period.

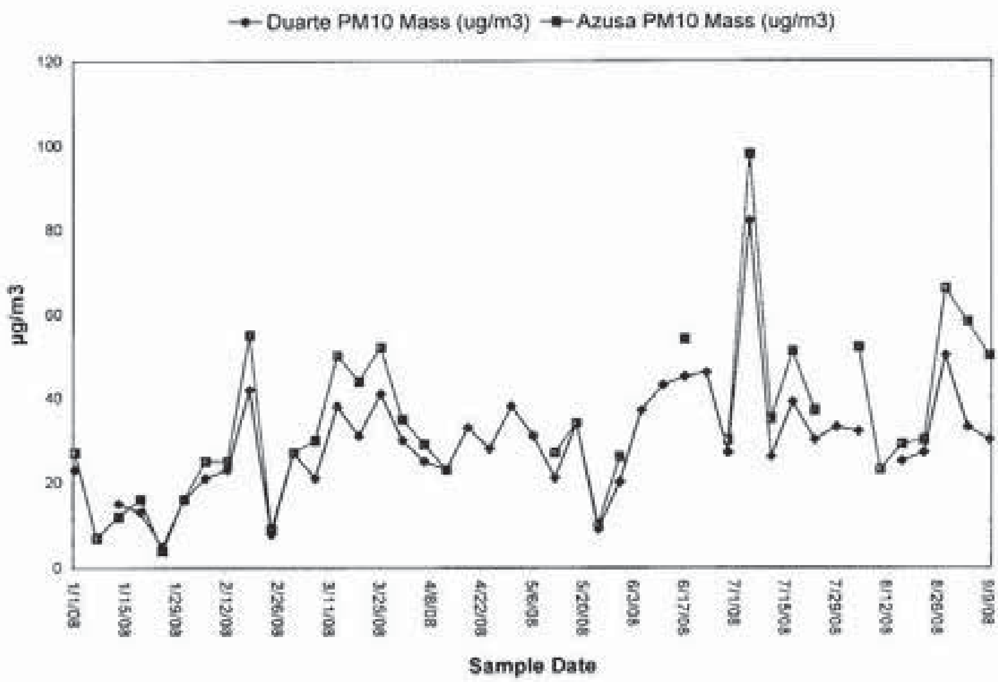

Figure 1. First Three Quarters of 2008 PM_{10} Mass at Duarte and Azusa

For the three quarter period of 2008, the 24-hour PM_{10} data collected at Duarte track well with data collected in Azusa. All sampled PM_{10} concentrations at Duarte and Azusa are below the federal 24-hour standard of 150µg/m^3. The state 24-hour PM_{10} standard of 50µg/m^3 set by the California Air Resources Board was exceeded on two days in Duarte and ten days in Azusa. On the July 5th 2008 sample day, both Duarte (82µg/m^3) and Azusa (98µg/m^3) largely exceeded the state PM_{10} standard; likely a result of Fourth of July fireworks. The average PM_{10} mass concentration during this three quarter period when comparing the same sample days was 28µg/m^3 in Duarte and 35µg/m^3 Azusa.

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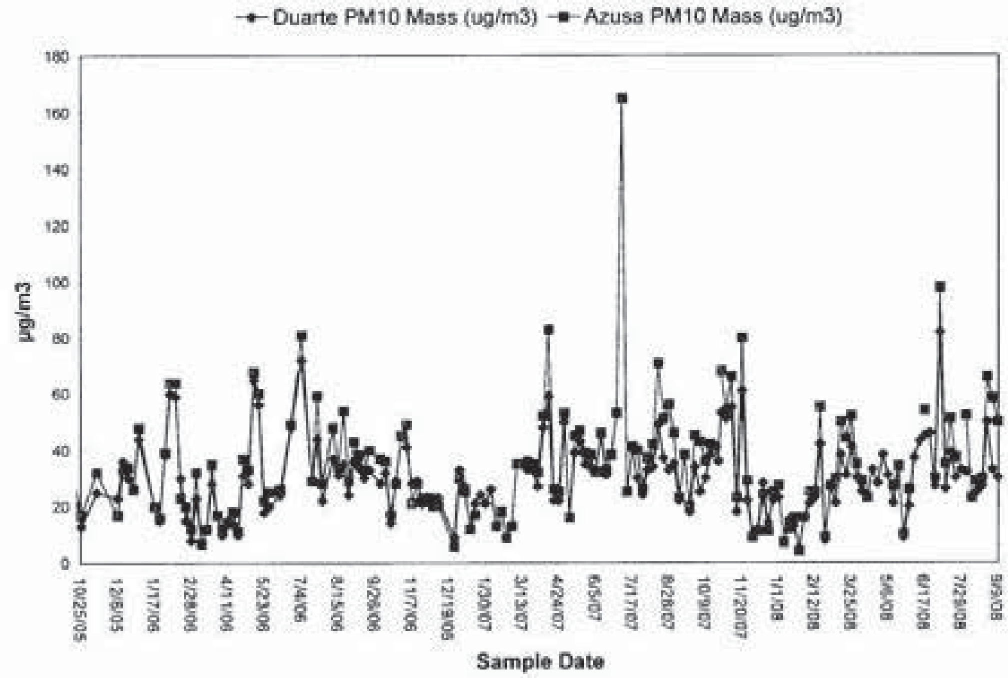


Figure 2. PM_{10} Data at Duarte and Azusa Since Study Inception

$PM_{2.5}$ concentrations at the two sites also track each other very well. The federal 24-hour standard for $PM_{2.5}$ is established at 35µg/m^3. This standard was exceeded on two days in Duarte and one day in Azusa during this reporting period. One day the federal level was exceeded in Duarte occurred on July 5th likely as a result of 4th of July fireworks activities; no sample was recovered from Azusa on this day. The other day in Duarte exceeding the federal standard occurred on Feb 18th 2008, the same day as Azusa. $PM_{2.5}$ averaged 14.6µg/m^3 in Duarte compared to 14.4µg/m^3 at the Azusa AMS when same sampling days were compared.

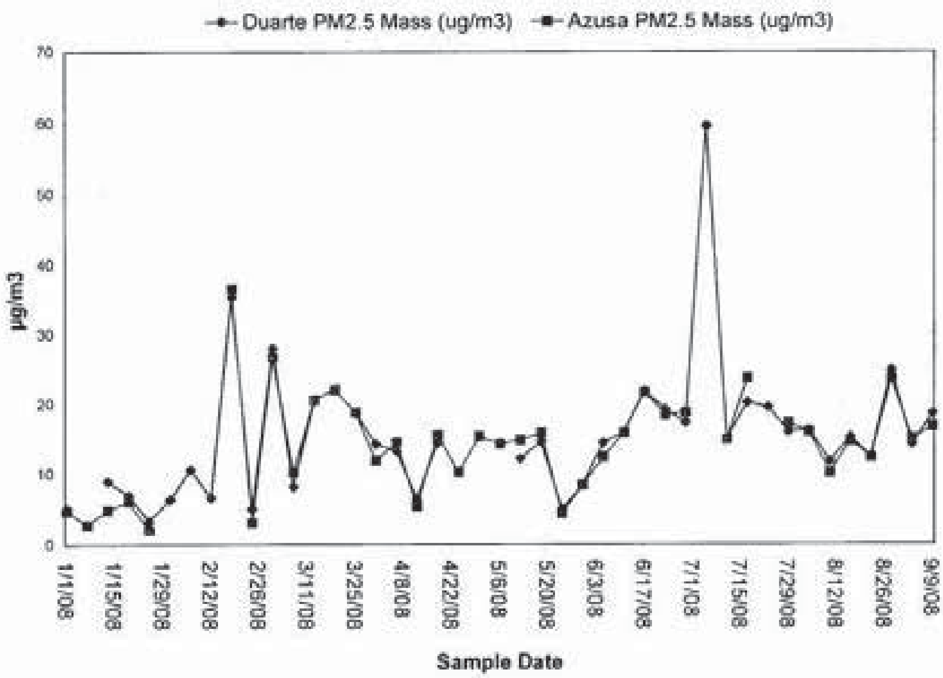


Figure 3. First Three Quarters of 2008 $PM_{2.5}$ Mass at Duarte and Azusa

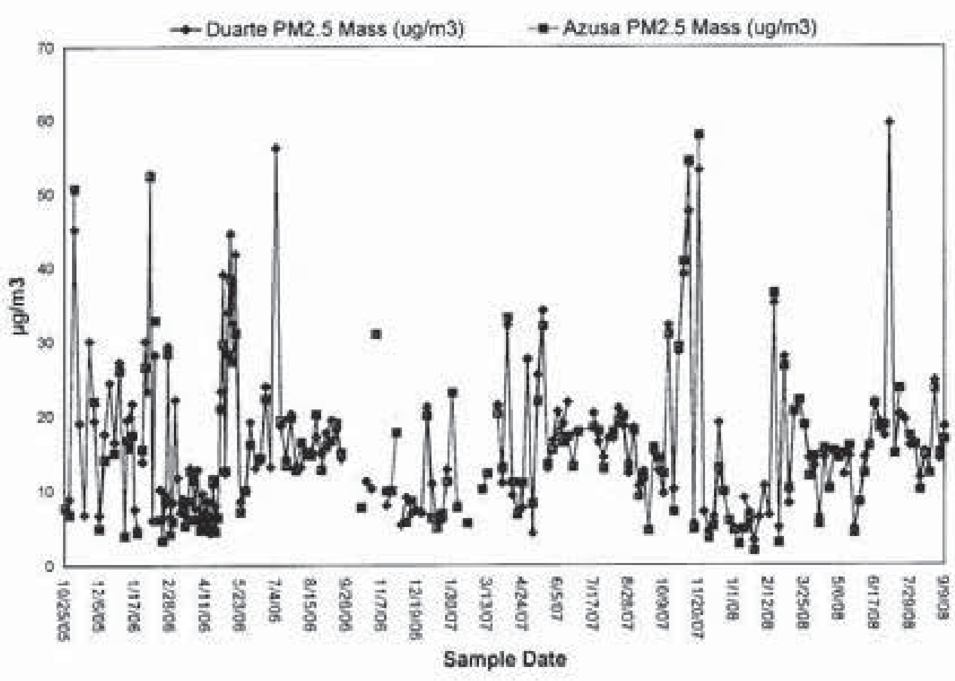


Figure 4. $PM_{2.5}$ Data at Duarte and Azusa Since Study Inception

Crystalline Silica

A crystalline silica non-cancer chronic reference exposure level (REL) of 3µg/m^3 as PM_4 has been set by the State of California. This non-cancer chronic level was not exceeded during the entirety of the study. Likewise, the NIOSH occupational limit of 50µg/m^3, also as PM_4, was not exceeded. For the thirty three samples at or above the non-detection limit of 0.4µg/m^3 PM_4 crystalline silica averaged 0.6µg/m^3 for the period of January 2008 into early September 2008. The average crystalline silica value for the entirety of the study was 0.5µg/m^3 and the highest detected level of crystalline silica was 1.3µg/m^3. Results of crystalline silica sampling in Duarte are shown in Appendix C. Figure 5 presents data in graph form. Data for all samples collected since the start of the study are provided in Figure 6 and in Appendix F. In figures 5 and 6 all data at or below the detection level of 0.4µg/m^3 or 0.3µg/m^3 are plotted at these levels. In Figure 5 the detection limit of crystalline silica from November 2006 through December 2007 was lowered to 0.3µg/m^3 from 0.4µg/m^3.

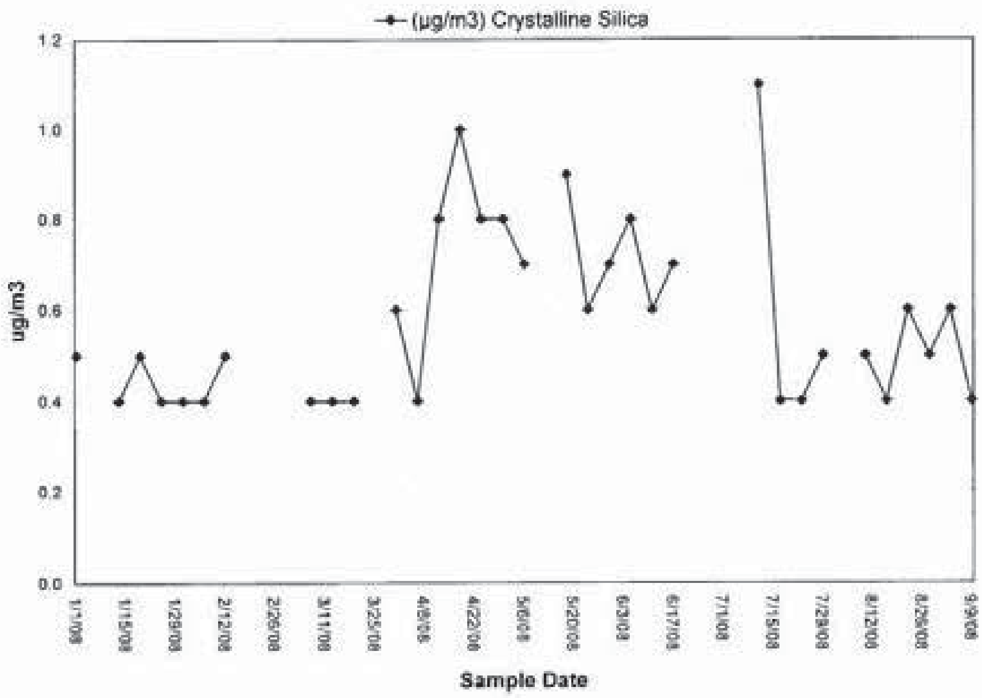


Figure 5. PM_4 Crystalline Silica First Three Quarters 2008

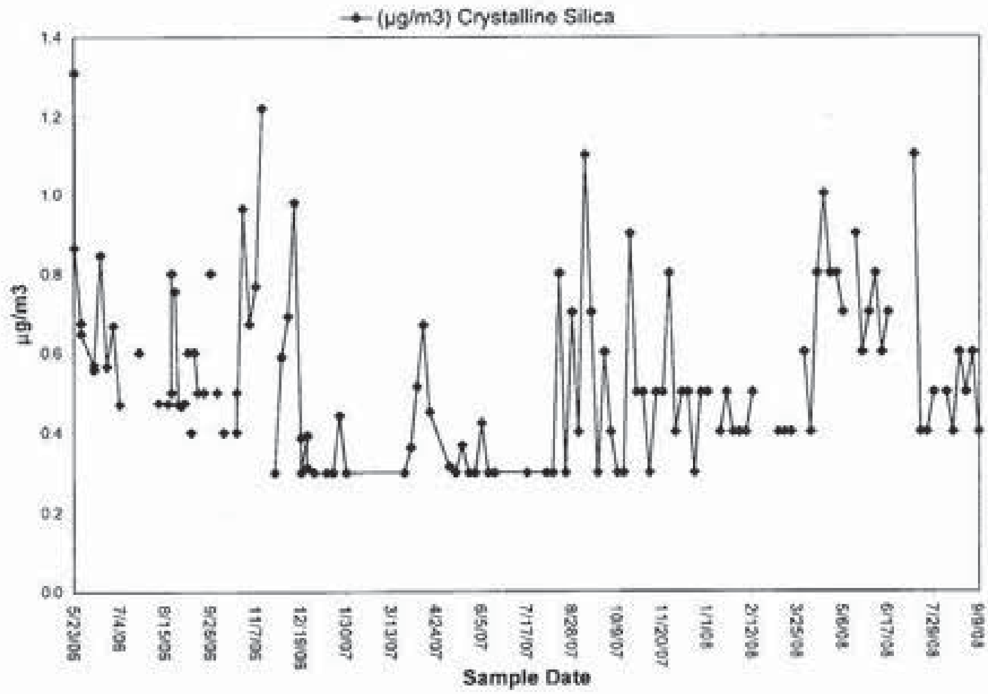


Figure 6. PM_4 Crystalline Silica Data Since Study Inception

<u>Wind Speed and Direction</u>

Wind speed and direction data collected at Royal Oaks Elementary School are averaged on an hourly basis. The information is collected for a month and is then graphically displayed in a "wind rose". Wind roses provide both wind speed and direction information in a fashion that allows for comparison to other monitored locations. For this study, consistent with the PM data, comparison is made to AQMD's Azusa AMS. Sample wind roses for the first three quarters of 2008 are shown in Appendix G. For this reporting period, winds at Duarte and Azusa showed similar patterns when comparable data is available. The wind direction was similar at both sites and as before the wind speed was consistently higher at the Azusa AMS as compared to the Duarte site. Unfortunately for much of the sampling period the wind speed and direction data are not available for the Duarte site. This occurred due to a data logger failure. However, from the data that are available (as shown in Appendix G) as well as historic data, wind patterns are similar at both monitoring sites.

5.0 SUMMARY

For this reporting period of the first three quarters in 2008 and duration of the study; the PM_{10} and $PM_{2.5}$ measurements show similar patterns and concentrations at Duarte and Azusa. PM_{10} concentrations at Duarte and Azusa are below the federal 24-hour standard for PM_{10} of 150µg/m^3. During the first three quarters of 2008, the PM_{10} levels did exceed the state standard of 50µg/m^3 on two days at Duarte and ten days at the Azusa AMS. The federal standard for $PM_{2.5}$ established at 35µg/m^3 was exceeded on two days in Duarte and one day in Azusa during this reporting period. No crystalline silica samples exceeded the REL set by the state and averaged 0.6µg/m^3. All samples were collected over a one day, 24-hour period.

For the duration of the study from August 2005 to September 9th 2008, a total of 319 PM_{10}, 330 $PM_{2.5}$, and 120 PM_4 crystalline silica samples were analyzed. PM_{10} concentrations during the study were all below the federal 24-hour standard of 150µg/m^3. The 24-hr PM_{10} state standard was exceeded five times at Duarte and thirty four times at Azusa. Crystalline silica averaged 0.5µg/m^3 and had a maximum measured value of 1.3µg/m^3 for the duration of the study.

Key Findings

- The state 24-hour standard for PM_{10} is 50µg/m^3. This standard was exceeded on two sampling days in Duarte and ten sampling days in Azusa during the period of January to September 9th 2008. Average 24-hour PM_{10} concentrations were 28µg/m^3 in Duarte and 35µg/m^3 in Azusa when same sampling dates are compared.

- The federal 24-hour standard for $PM_{2.5}$ is set at 35µg/m^3. This standard was exceeded on two days in Duarte and one day in Azusa during this reporting period. The federal level was exceeded in Duarte on July 5th with a measured value of 60µg/m^3, likely as a result of 4th of July fireworks activities; no sample was recovered from Azusa on this day. The other day in Duarte exceeding the federal standard occurred on Feb 18th 2008 with a value of 35.3µg/m^3, the same day as Azusa (36.5µg/m^3). $PM_{2.5}$ averaged 14.6µg/m^3 in Duarte compared to 14.4µg/m^3 at the Azusa AMS when same sampling days were compared for the first three quarters of 2008.

- Crystalline silica results show that for the duration of the study, no samples exceeded the non-cancer chronic reference exposure level of 3µg/m^3 as PM_4 established by the State of California. The maximum 24-hour reported value for crystalline silica was 1.3µg/m^3, with an average of 0.5µg/m^3.

- Wind direction at Duarte and AQMD's Azusa air monitoring station (AMS) demonstrates a great deal of similarity for months where data is available. Wind speeds at the Azusa AMS are typically higher than those measured in Duarte.

6.0 CONCLUDING REMARK

In response to a letter from the City of Duarte requesting AQMD to determine potential impacts of quarrying operations in the area, the AQMD has been monitoring particulate matter (PM) at Royal Oaks Elementary School in Duarte since August 2005. In May 2006 sampling for crystalline silica began. The intent of the sampling was to establish a baseline for ambient PM and crystalline silica concentrations, the baseline was to be established over a one year period.

As of September 9th 2008, all sampling ended at Royal Oaks Elementary due to the need for equipment to be used to address concerns in other communities. Data collected up to this point can be used as a baseline measurement should sampling need to be resumed at Royal Oaks Elementary. The AQMD is committed to working with the city and community of Duarte to resume sampling if determined necessary as a result of expanded quarrying activities or other circumstances.

7.0 REFERENCES

1). "Sampling and Analysis of Samples Collected in the Cities of Duarte and Azusa", December 2006.

APPENDIX A

PM$_{10}$ First Second and Third Quarters of 2008 Data for Duarte and Azusa AMS

All Samples

Sample Date	PM10 (μg/m³) Duarte	PM10 (μg/m3) Azusa
1/1/2008	23	27
1/7/2008	No Sample	7
1/13/2008	15	12
1/19/2008	13	16
1/25/2008	5	4
1/31/2008	16	16
2/6/2008	21	25
2/12/2008	23	25
2/18/2008	42	55
2/24/2008	8	9
3/1/2008	27	27
3/7/2008	21	30
3/13/2008	38	50
3/19/2008	31	44
3/25/2008	41	52
3/31/2008	30	35
4/6/2008	25	29
4/12/2008	23	23
4/18/2008	33	No Sample
4/24/2008	28	No Sample
4/30/2008	38	No Sample
5/6/2008	31	No Sample
5/12/2008	21	27
5/18/2008	34	34
5/24/2008	9	10
5/30/2008	20	26
6/5/2008	37	No Sample
6/11/2008	43	No Sample
6/17/2008	45	54
6/23/2008	46	No Sample
6/29/2008	27	30
7/5/2008	82	98
7/11/2008	26	35
7/17/2008	39	51
7/23/2008	30	37
7/29/2008	33	No Sample
8/4/2008	32	52
8/10/2008	No Sample	23
8/16/2008	25	29
8/22/2008	27	30
8/28/2008	50	66
9/3/2008	33	58
9/9/2008	30	50
Average	30	34

Same Day Samples

Sample Date	PM10 (μg/m³) Duarte	PM10 (μg/m3) Azusa
1/1/2008	23	27
1/7/2008	No Sample	
1/13/2008	15	12
1/19/2008	13	16
1/25/2008	5	4
1/31/2008	16	16
2/6/2008	21	25
2/12/2008	23	25
2/18/2008	42	55
2/24/2008	8	9
3/1/2008	27	27
3/7/2008	21	30
3/13/2008	38	50
3/19/2008	31	44
3/25/2008	41	52
3/31/2008	30	35
4/6/2008	25	29
4/12/2008	23	23
4/18/2008		No Sample
4/24/2008		No Sample
4/30/2008		No Sample
5/6/2008		No Sample
5/12/2008	21	27
5/18/2008	34	34
5/24/2008	9	10
5/30/2008	20	26
6/5/2008		No Sample
6/11/2008		No Sample
6/17/2008	45	54
6/23/2008		No Sample
6/29/2008	27	30
7/5/2008	82	98
7/11/2008	26	35
7/17/2008	39	51
7/23/2008	30	37
7/29/2008		No Sample
8/4/2008	32	52
8/10/2008	No Sample	
8/16/2008	25	29
8/22/2008	27	30
8/28/2008	50	66
9/3/2008	33	58
9/9/2008	30	50
Average	28	35

APPENDIX B

PM$_{2.5}$ First Second and Third Quarters of 2008 Data for Duarte and Azusa AMS

All Samples

Sample Date	PM2.5 (µg/m^3) Duarte	PM2.5 (µg/m3) Azusa
1/1/2008	5.1	4.7
1/7/2008	No Sample	2.8
1/13/2008	9.0	4.9
1/19/2008	7.0	6.1
1/25/2008	3.3	2.0
1/31/2008	6.4	No Sample
2/6/2008	10.6	No Sample
2/12/2008	6.7	No Sample
2/18/2008	35.3	36.5
2/24/2008	5.1	3.0
3/1/2008	28.0	26.7
3/7/2008	8.3	10.3
3/13/2008	20.4	20.6
3/19/2008	No Sample	22.1
3/25/2008	18.8	18.8
3/31/2008	14.3	11.9
4/6/2008	13.3	14.6
4/12/2008	6.5	5.5
4/18/2008	14.4	15.5
4/24/2008	No Sample	10.3
4/30/2008	No Sample	15.3
5/6/2008	No Sample	14.3
5/12/2008	12.2	14.9
5/18/2008	14.6	15.9
5/24/2008	5.0	4.3
5/30/2008	8.4	8.4
6/5/2008	14.4	12.4
6/11/2008	16.0	15.9
6/17/2008	21.9	21.7
6/23/2008	19.2	18.3
6/29/2008	17.3	18.8
7/5/2008	59.5	No Sample
7/11/2008	15.0	14.9
7/17/2008	20.2	23.6
7/23/2008	19.5	No Sample
7/29/2008	16.0	17.3
8/4/2008	16.3	16.1
8/10/2008	11.8	10.1
8/16/2008	15.2	14.8
8/22/2008	12.5	12.3
8/28/2008	24.8	23.6
9/3/2008	14.2	15.1
9/9/2008	18.6	16.7
Average	15.4	14.2

Same Day Samples

Sample Date	PM2.5 (µg/m^3) Duarte	PM2.5 (µg/m3) Azusa
1/1/2008	5.1	4.7
1/7/2008	No Sample	
1/13/2008	9.0	4.9
1/19/2008	7.0	6.1
1/25/2008	3.3	2.0
1/31/2008		No Sample
2/6/2008		No Sample
2/12/2008		No Sample
2/18/2008	35.3	36.5
2/24/2008	5.1	3.0
3/1/2008	28.0	26.7
3/7/2008	8.3	10.3
3/13/2008	20.4	20.6
3/19/2008	No Sample	
3/25/2008	18.8	18.8
3/31/2008	14.3	11.9
4/6/2008	13.3	14.6
4/12/2008	6.5	5.5
4/18/2008	14.4	15.5
4/24/2008	No Sample	
4/30/2008	No Sample	
5/6/2008	No Sample	
5/12/2008	12.2	14.9
5/18/2008	14.6	15.9
5/24/2008	5.0	4.3
5/30/2008	8.4	8.4
6/5/2008	14.4	12.4
6/11/2008	16.0	15.9
6/17/2008	21.9	21.7
6/23/2008	19.2	18.3
6/29/2008	17.3	18.8
7/5/2008		No Sample
7/11/2008	15.0	14.9
7/17/2008	20.2	23.6
7/23/2008		No Sample
7/29/2008	16.0	17.3
8/4/2008	16.3	16.1
8/10/2008	11.8	10.1
8/16/2008	15.2	14.8
8/22/2008	12.5	12.3
8/28/2008	24.8	23.6
9/3/2008	14.2	15.1
9/9/2008	18.6	16.7
Average	14.6	14.4

APPENDIX C

PM$_4$ Crystalline Silica Data for First Three Quarters of 2008

	(μg/m^3)
Sample Date	Crystalline Silica
1/1/2008	0.5
1/7/2008	No Sample
1/13/2008	0.4
1/19/2008	0.5
1/25/2008	0.4
1/31/2008	0.4
2/6/2008	0.4
2/12/2008	0.5
2/18/2008	No Sample
2/24/2008	No Sample
3/1/2008	No Sample
3/7/2008	0.4
3/13/2008	0.4
3/19/2008	0.4
3/25/2008	No Sample
3/31/2008	0.6
4/6/2008	0.4
4/12/2008	0.8
4/18/2008	1
4/24/2008	0.8
4/30/2008	0.8
5/6/2008	0.7
5/12/2008	No Sample
5/18/2008	0.9
5/24/2008	0.6
5/30/2008	0.7
6/5/2008	0.8
6/11/2008	0.6
6/17/2008	0.7
6/23/2008	No Sample
6/29/2008	No Sample
7/5/2008	No Sample
7/11/2008	1.1
7/17/2008	0.4
7/23/2008	0.4
7/29/2008	0.5
8/4/2008	No Sample
8/10/2008	0.5
8/16/2008	0.4
8/22/2008	0.6
8/28/2008	0.5
9/3/2008	0.6
9/9/2008	0.4
Average	0.6

APPENDIX D

PM10 Data for Duarte and Azusa Since Study Inception

	PM_{10} ug/m3	PM_{10} ug/m3
Sample Date	Duarte	Azusa
8/20/2005	21	43
8/26/2005	42	64
8/30/2005	46	63
9/1/2005	47	65
9/7/2005	43	52
9/13/2005	36	34
9/19/2005	53	53
10/7/2005	41	43
10/13/2005	24	38
10/19/2005	22	26
10/25/2005	13	17
11/12/2005	25	32
12/6/2005	23	17
12/12/2005	36	33
12/18/2005	30	34
12/24/2005	27	26
12/30/2005	44	48
1/17/2006	20	20
1/23/2006	15	16
1/29/2006	38	39
2/4/2006	60	64
2/10/2006	59	64
2/16/2006	30	23
2/22/2006	15	20
2/28/2006	8	12
3/6/2006	23	32
3/12/2006	7	7
3/18/2006	12	12
3/24/2006	28	35
3/30/2006	17	17
4/5/2006	10	12
4/11/2006	15	14
4/17/2006	14	18
4/23/2006	10	11
4/29/2006	31	37
5/5/2006	28	33
5/11/2006	65	68
5/17/2006	56	60
5/23/2006	18	22
5/29/2006	20	25
6/10/2006	24	26
6/22/2006	48	49
7/4/2006	72	81
7/16/2006	29	29
7/22/2006	44	59

	PM_{10} ug/m3	PM_{10} ug/m3
Sample Date	Duarte	Azusa
7/28/2006	22	28
8/9/2006	37	48
8/15/2006	31	34
8/21/2006	35	54
8/27/2006	24	29
9/2/2006	36	43
9/8/2006	34	38
9/14/2006	30	33
9/20/2006	33	40
10/2/2006	28	37
10/8/2006	32	36
10/14/2006	14	17
10/20/2006	29	28
10/26/2006	45	45
11/1/2006	41	49
11/7/2006	28	21
11/13/2006	29	28
11/19/2006	21	23
11/25/2006	22	23
12/1/2006	23	20
12/7/2006	23	20
12/25/2006	9	6
12/31/2006	33	30
1/6/2007	27	25
1/12/2007	12	12
1/18/2007	21	17
1/24/2007	24	No Sample
1/30/2007	21	No Sample
2/5/2007	26	No Sample
2/11/2007	13	13
2/17/2007	No Sample	18
2/23/2007	No Sample	9
3/1/2007	No Sample	13
3/7/2007	No Sample	35
3/13/2007	No Sample	35
3/19/2007	33	36
3/25/2007	33	35
3/31/2007	27	32
4/6/2007	48	52
4/12/2007	59	83
4/18/2007	22	26
4/24/2007	22	25
4/30/2007	50	53
5/6/2007	16	16
5/12/2007	39	45

PM$_{10}$ Data for Duarte and Azusa Since Study Inception (cont)

	PM$_{10}$ ug/m3	PM$_{10}$ ug/m3
Sample Date	Duarte	Azusa
5/18/2007	43	47
5/24/2007	35	39
5/30/2007	34	38
6/5/2007	33	32
6/11/2007	45	46
6/17/2007	31	33
6/23/2007	No Sample	38
6/29/2007	No Sample	53
7/5/2007	No Sample	165
7/11/2007	No Sample	25
7/17/2007	40	41
7/23/2007	30	40
7/29/2007	24	26
8/4/2007	33	37
8/10/2007	34	42
8/16/2007	49	71
8/22/2007	37	51
8/28/2007	33	56
9/3/2007	35	46
9/9/2007	22	23
9/15/2007	No Sample	38
9/21/2007	18	20
9/27/2007	34	45
10/3/2007	25	43
10/9/2007	30	36
10/15/2007	38	42
10/21/2007	41	No Sample
10/24/2007	36	No Sample
10/27/2007	53	68
11/2/2007	51	54
11/8/2007	55	66
11/14/2007	18	23
11/20/2007	61	80
11/26/2007	22	29
12/2/2007	10	9
12/8/2007	12	11
12/14/2007	28	24
12/20/2007	14	11
12/26/2007	22	25
1/1/2008	23	27
1/7/2008	No Sample	7
1/13/2008	15	12

	PM$_{10}$ ug/m3	PM$_{10}$ ug/m3
Sample Date	Duarte	Azusa
1/19/2008	13	16
1/25/2008	5	4
1/31/2008	16	16
2/6/2008	21	25
2/12/2008	23	25
2/18/2008	42	55
2/24/2008	8	9
3/1/2008	27	27
3/7/2008	21	30
3/13/2008	38	50
3/19/2008	31	44
3/25/2008	41	52
3/31/2008	30	35
4/6/2008	25	29
4/12/2008	23	23
4/18/2008	33	No Sample
4/24/2008	28	No Sample
4/30/2008	38	No Sample
5/6/2008	31	No Sample
5/12/2008	21	27
5/18/2008	34	34
5/24/2008	9	10
5/30/2008	20	26
6/5/2008	37	No Sample
6/11/2008	43	No Sample
6/17/2008	45	54
6/23/2008	46	No Sample
6/29/2008	27	30
7/5/2008	82	98
7/11/2008	26	35
7/17/2008	39	51
7/23/2008	30	37
7/29/2008	33	No Sample
8/4/2008	32	52
8/10/2008	No Sample	23
8/16/2008	25	29
8/22/2008	27	30
8/28/2008	50	66
9/3/2008	33	58
9/9/2008	30	50
Average	31	36

APPENDIX E

PM$_{2.5}$ Data for Duarte and Azusa Since Study Inception

Sample Date	PM$_{2.5}$ µg/m^3 Duarte	PM$_{2.5}$ µg/m^3 Azusa
10/25/05	7.6	7.7
10/31/05	8.9	6.8
11/6/05	45.2	50.8
11/12/05	19.1	No Sample
11/18/05	6.8	No Sample
11/24/05	30.1	No Sample
11/30/05	19.4	22
12/6/05	6.7	4.9
12/12/05	17.6	14.2
12/18/05	24.5	No Sample
12/24/05	16.5	15
12/30/05	27.3	26.2
1/5/06	4.2	4
1/8/06	19.5	16.8
1/11/06	19.8	15.8
1/14/06	21.7	17.4
1/17/06	7.5	No Sample
1/20/06	4.9	4.3
1/23/06		No Sample
1/26/06	13.9	15.5
1/29/06	30.1	26.6
2/1/06	23.4	No Sample
2/4/06	52.7	52.4
2/7/06	6	No Sample
2/10/06	28.3	32.8
2/13/06		No Sample
2/16/06	10.2	6.1
2/19/06	6.4	3.3
2/22/06	8.2	9.2
2/25/06	29.4	28.4
2/28/06	6.5	4.2
3/3/06	8.4	5.8
3/6/06	22.2	No Sample
3/9/06	11.8	No Sample
3/12/06	7.1	No Sample
3/15/06	9	8.3
3/18/06	6.8	5.4
3/21/06	6.1	8.6
3/24/06	13.1	12.7
3/27/06	11.9	11.4
3/30/06	7.7	6.1
4/2/06	12.9	No Sample
4/5/06	6.4	4.7
4/8/06	9.6	6.7
4/11/06	7.1	5
4/14/06	8.6	6.5
4/17/06	4.3	5
4/20/06	10.7	11.6
4/23/06	7.9	4.5
4/26/06	6.4	6.4
4/29/06	23.4	21
5/2/06	39.1	29.7
5/5/06	12.4	12.7
5/8/06	34	28.4
5/11/06	44.6	38.5
5/14/06	32.5	27.4
5/17/06	41.9	31.2
5/23/06	8.5	7.1
5/29/06	10.2	10
6/4/06	19.2	16.1
6/10/06	13.1	No Sample
6/16/06	14.2	14.4
6/22/06	24	22.3
6/28/06	13.2	No Sample
7/4/06	56.2	No Sample
7/10/06	18.7	19.4
7/16/06	14.3	13.4
7/22/06	20.3	19.8
7/28/06	13.3	12.8
8/3/06	13.2	16.4
8/9/06	15.3	14.8
8/15/06	15.2	14.7
8/21/06	17.2	20.2
8/27/06	15	12.9
9/2/06	17.8	15.9
9/8/06	19.5	16.7
9/14/06	18.2	19.1
9/20/06	14.3	15
10/2/06	No Sample	No Sample
10/8/06	No Sample	No Sample
10/14/06	No Sample	7.8
10/20/06	11.3	No Sample
10/26/06	10.3	No Sample
11/1/06	No Sample	31.1
11/7/06	No Sample	No Sample
11/13/06	8	9.9
11/19/06	10.1	10
11/25/06	No Sample	17.8
12/1/06	5.5	No Sample
12/7/06	9.1	5.8
12/13/06	7	8.6
12/19/06	7.4	No Sample
12/25/06	7	No Sample
12/31/06	21.2	20
1/6/07	10.9	6.3
1/12/07	5.9	5.1

$PM_{2.5}$ Data for Duarte and Azusa Since Study Inception (cont)

	$PM_{2.5}$ µg/m^3	$PM_{2.5}$ µg/m^3
Sample Date	Duarte	Azusa
1/18/07	6.2	6.8
1/24/07	12.9	11.3
1/30/07	No Sample	23.2
2/5/07	No Sample	7.8
2/11/07	No Sample	No Sample
2/17/07	No Sample	5.6
2/23/07	No Sample	No Sample
3/1/07	No Sample	No Sample
3/7/07	No Sample	10.2
3/13/07	No Sample	12.3
3/19/07	No Sample	No Sample
3/25/07	21.5	20.3
3/31/07	11.0	13.0
4/6/07	32.2	33.3
4/12/07	9.4	11.1
4/18/07	7.2	6.8
4/24/07	7.7	11.1
4/30/07	27.6	No Sample
5/6/07	4.3	8.3
5/12/07	25.6	22.0
5/18/07	34.2	32.2
5/24/07	13.0	13.6
5/30/07	16.7	15.5
6/5/07	20.6	17.9
6/11/07	19.0	16.4
6/17/07	21.9	17.2
6/23/07	No Sample	13.2
6/29/07	No Sample	17.9
7/17/07	20.4	18.5
7/23/07	16.5	17.9
7/29/07	14.5	13.0
8/4/07	17.0	No Sample
8/10/07	16.9	18.0
8/16/07	21.0	19.4
8/22/07	18.7	20.0
8/28/07	12.4	13.3
9/3/07	18.4	18.0
9/9/07	10.6	9.2
9/15/07	12.7	11.8
9/21/07	4.7	4.6
9/27/07	15.2	15.7
10/3/07	12.7	14.3
10/9/07	9.6	12.3
10/15/07	32.3	31.0
10/21/07	10.2	7.2
10/27/07	28.7	29.4

	$PM_{2.5}$ µg/m^3	$PM_{2.5}$ µg/m^3
Sample Date	Duarte	Azusa
11/2/07	39.1	40.8
11/8/07	47.7	54.3
11/14/07	5.6	4.9
11/20/07	53.2	58.0
11/26/07	7.1	No Sample
12/2/07	4.6	3.7
12/8/07	6.5	5.3
12/14/07	19.1	13.0
12/20/07	9.8	9.8
12/26/07	6.0	6.0
1/1/08	5.06	4.67
1/7/08	No Sample	2.75
1/13/08	8.98	4.88
1/19/08	7.03	6.13
1/25/08	3.31	2.00
1/31/08	6.40	No Sample
2/6/08	10.64	No Sample
2/12/08	6.70	No Sample
2/18/08	35.31	36.49
2/24/08	5.06	3.04
3/1/08	28.00	26.71
3/7/08	8.26	10.30
3/13/08	20.44	20.64
3/19/08	No Sample	22.10
3/25/08	18.80	18.81
3/31/08	14.34	11.93
4/6/08	13.31	14.55
4/12/08	6.50	5.46
4/18/08	14.45	15.52
4/24/08	No Sample	10.26
4/30/08	No Sample	15.34
5/6/08	No Sample	14.30
5/12/08	12.18	14.89
5/18/08	14.63	15.89
5/24/08	4.95	4.34
5/30/08	8.35	8.42
6/5/08	14.45	12.38
6/11/08	16.00	15.90
6/17/08	21.85	21.69
6/23/08	19.17	18.35
6/29/08	17.31	18.77
7/5/08	59.50	No Sample
7/11/08	15.02	14.93
7/17/08	20.20	23.64
7/23/08	19.45	No Sample
7/29/08	15.98	17.26

$PM_{2.5}$ Data for Duarte and Azusa Since Study Inception (cont)

	$PM_{2.5}$ µg/m^3	$PM_{2.5}$ µg/m^3
Sample Date	**Duarte**	**Azusa**
8/4/08	16.3	16.1
8/10/08	11.8	10.1
8/16/08	15.2	14.8
8/22/08	12.5	12.3
8/28/08	24.8	23.6
9/3/08	14.2	15.1
9/9/08	18.6	16.7
Average	16.3	15.4

APPENDIX F

PM_4 Crystalline Silica Data Since Study Inception

Sample Date	Crystalline Silica (µg/m³)
5/23/2006	1.1
5/29/2006	0.7
6/10/2006	0.6
6/16/2006	0.8
6/22/2006	0.6
6/28/2006	0.7
7/4/2006	0.5
7/10/2006	N.D.
7/22/2006	0.6
7/28/2006	N.D.
8/3/2006	N.D.
8/6/2006	N.D.
8/9/2006	0.5
8/12/2006	N.D.
8/15/2006	invalid
8/18/2006	0.5
8/21/2006	0.5
8/24/2006	0.8
8/27/2006	0.5
8/30/2006	0.5
9/2/2006	0.5
9/5/2006	0.6
9/8/2006	N.D.
9/11/2006	N.D.
9/14/2006	0.5
9/20/2006	0.5
9/26/2006	0.4
10/2/2006	0.5
10/8/2006	0.4
10/14/2006	N.D.
10/20/2006	0.5
10/26/2006	1.0
11/1/2006	0.7
11/7/2006	0.8
11/13/2006	1.2
11/19/2006	N.D.
11/25/2006	N.D.
N.D. = Not Detected	

Note: As of 1/1/07 detection limit was reduced from 0.5 to 0.3 µg/m³.

Sample Date	Crystalline Silica (µg/m³)
12/1/2006	0.6
12/7/2006	0.7
12/13/2006	0.9
12/19/2006	N.D.
12/25/2006	N.D.
1/6/2007	no sample
1/12/2007	0.3
1/18/2007	0.3
1/24/2007	0.4
1/30/2007	N.D.
2/5/2007	no sample
2/11/2007	no sample
2/17/2007	no sample
2/23/2007	no sample
3/1/2007	no sample
3/7/2007	no sample
3/13/2007	no sample
3/19/2007	no sample
3/25/2007	N.D.
3/31/2007	0.4
4/6/2007	0.5
4/12/2007	0.7
4/18/2007	0.4
4/24/2007	no sample
4/30/2007	no sample
5/6/2007	0.3
5/12/2007	0.3
5/18/2007	0.4
5/24/2007	0.3
5/30/2007	N.D.
6/5/2007	0.4
6/11/2007	N.D.
6/17/2007	N.D.
6/23/2007	no sample
6/29/2007	no sample

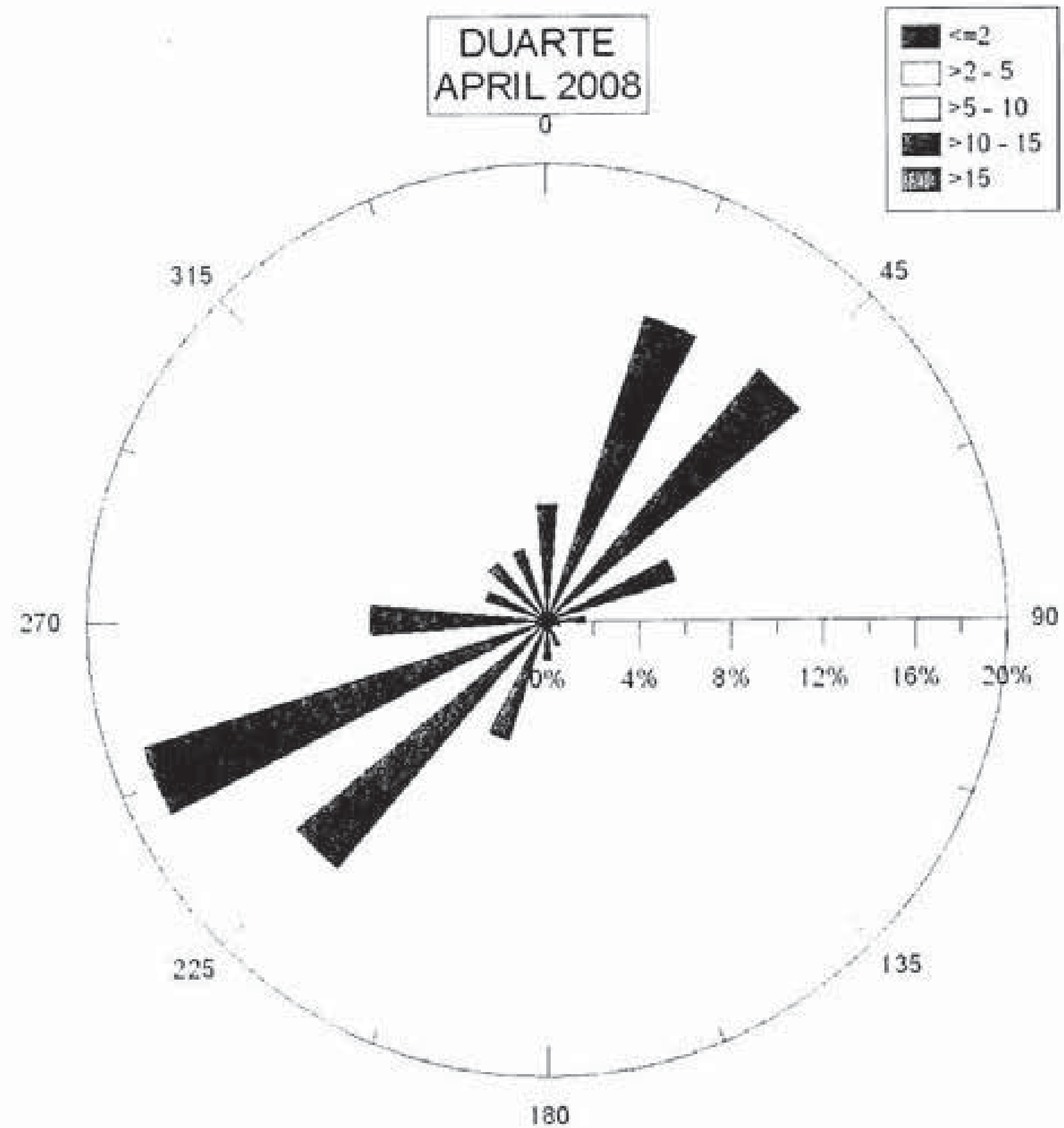
*For average calculation, 1/2 of detection limit was substituted for N.D.

PM$_4$ Crystalline Silica Data Since Study Inception (cont)

Sample Date	Crystalline Silica (µg/m^3)
7/17/2007	0.3
8/4/2007	0.3
8/10/2007	0.3
8/16/2007	0.8
8/22/2007	0.3
8/28/2007	0.7
9/3/2007	0.4
9/9/2007	1.1
9/15/2007	0.7
9/21/2007	0.3
9/27/2007	0.6
10/3/2007	0.4
10/9/2007	0.3
10/15/2007	0.3
10/21/2007	0.9
10/27/2007	0.5
11/2/2007	0.5
11/8/2007	0.3
11/14/2007	0.5
11/20/2007	0.5
11/26/2007	0.8
12/2/2007	0.4
12/8/2007	0.5
12/14/2007	0.5
12/20/2007	0.4
12/26/2007	0.5
1/1/2008	0.5
1/7/2008	No Sample
1/13/2008	0.4
1/19/2008	0.5
1/25/2008	0.4
1/31/2008	0.4
2/6/2008	0.4
2/12/2008	0.5
2/18/2008	No Sample

Sample Date	Crystalline Silica (µg/m^3)
2/24/2008	No Sample
3/1/2008	No Sample
3/7/2008	0.4
3/13/2008	0.4
3/19/2008	0.4
3/25/2008	No Sample
3/31/2008	0.6
4/6/2008	0.4
4/12/2008	0.8
4/18/2008	1
4/24/2008	0.8
4/30/2008	0.8
5/6/2008	0.7
5/12/2008	No Sample
5/18/2008	0.9
5/24/2008	0.6
5/30/2008	0.7
6/5/2008	0.8
6/11/2008	0.6
6/17/2008	0.7
6/23/2008	No Sample
6/29/2008	No Sample
7/5/2008	No Sample
7/11/2008	1.1
7/17/2008	0.4
7/23/2008	0.4
7/29/2008	0.5
8/4/2008	No Sample
8/10/2008	0.5
8/16/2008	0.4
8/22/2008	0.6
8/28/2008	0.5
9/3/2008	0.6
9/9/2008	0.4
Average	0.5

APPENDIX G


DUARTE
APRIL 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
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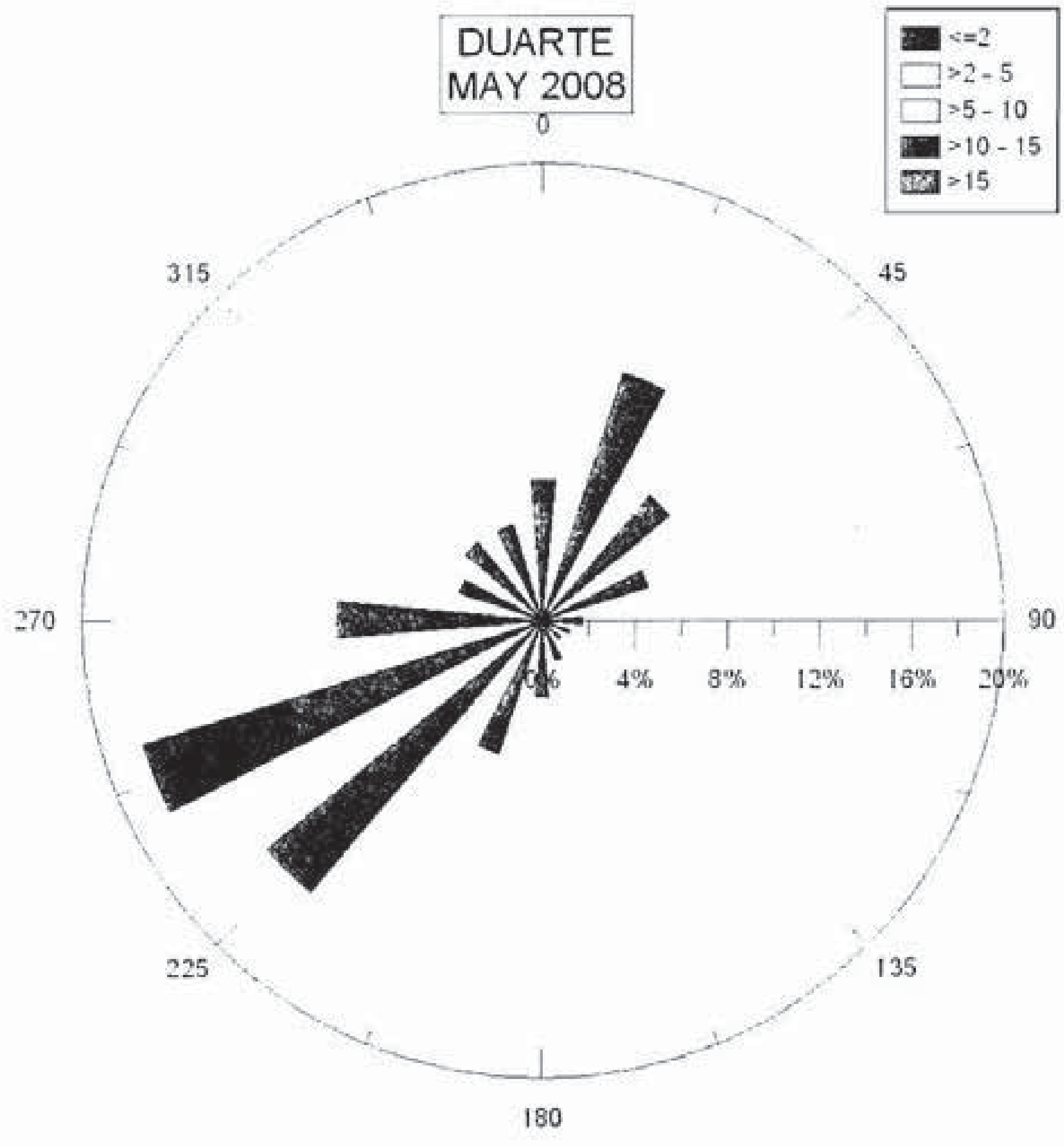
90
135
180
225
270
315
0%
4%
8%
12%
16%
20%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MAY 2008
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>5 - 10
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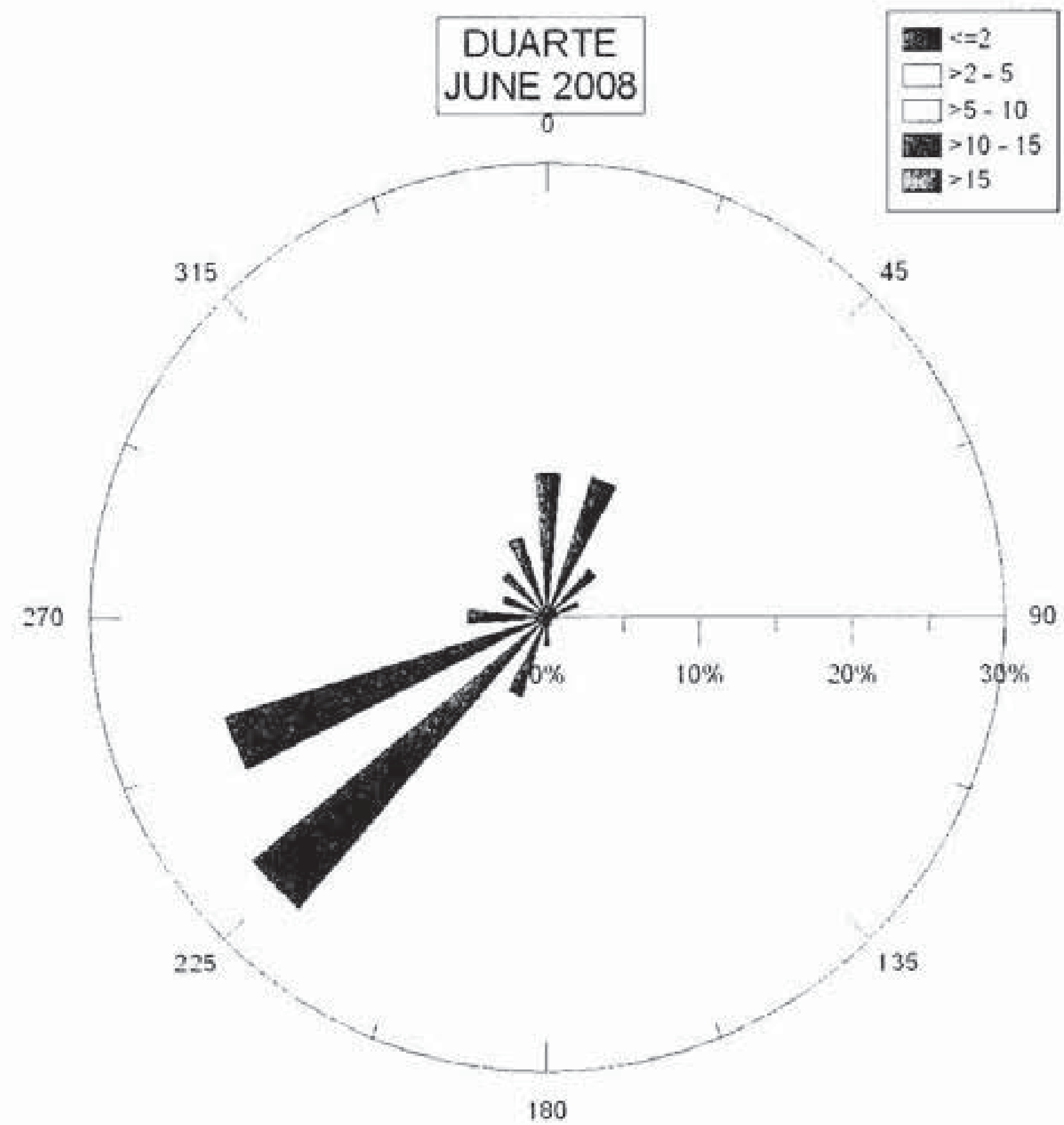
8%
12%
16%
20%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JUNE 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
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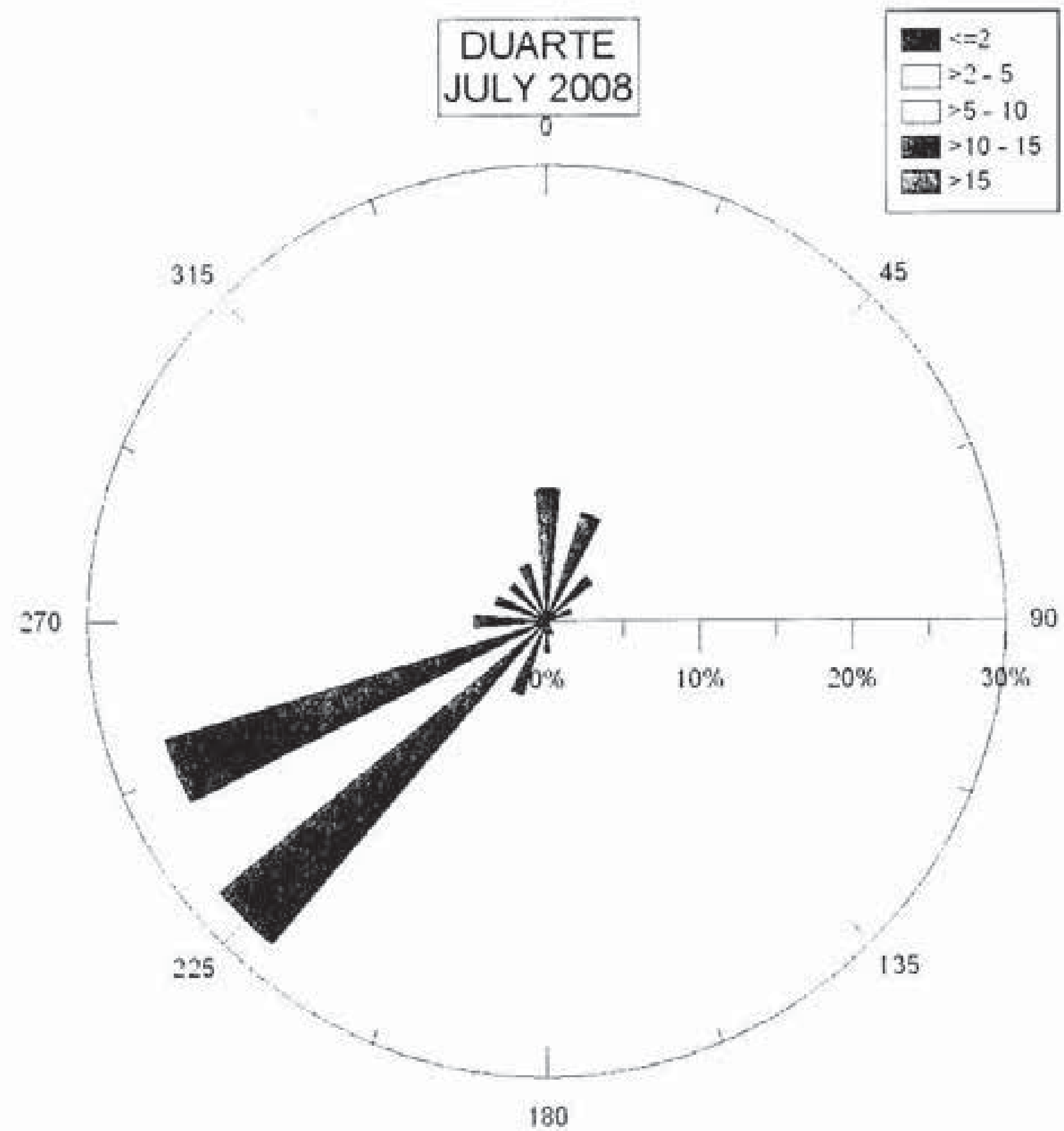
45
90
135
180
225
270
315
0%
10%
20%
30%


DUARTE
JULY 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
0
45
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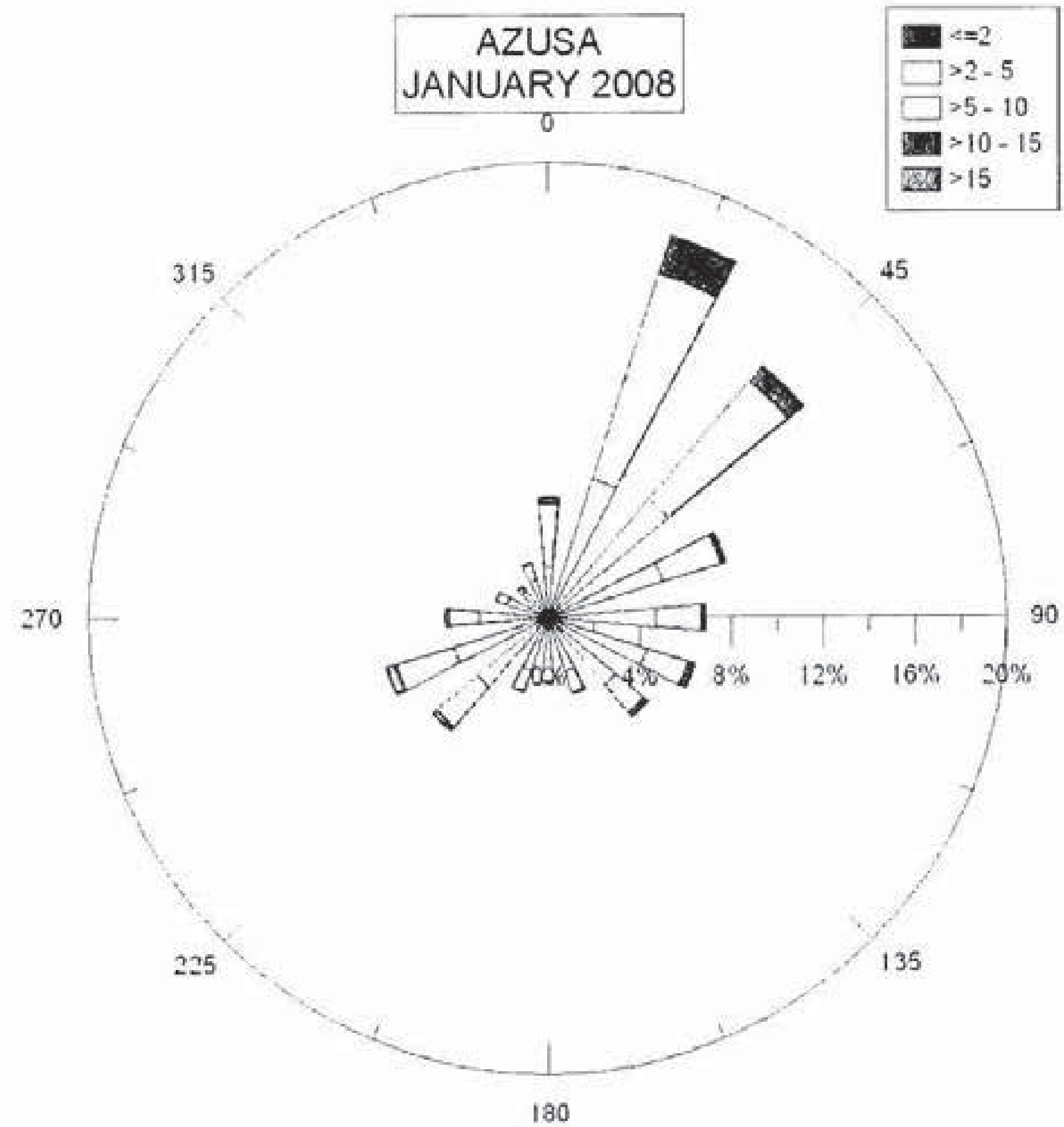
225
270
315
10%
20%
30%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JANUARY 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
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225
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315
0%
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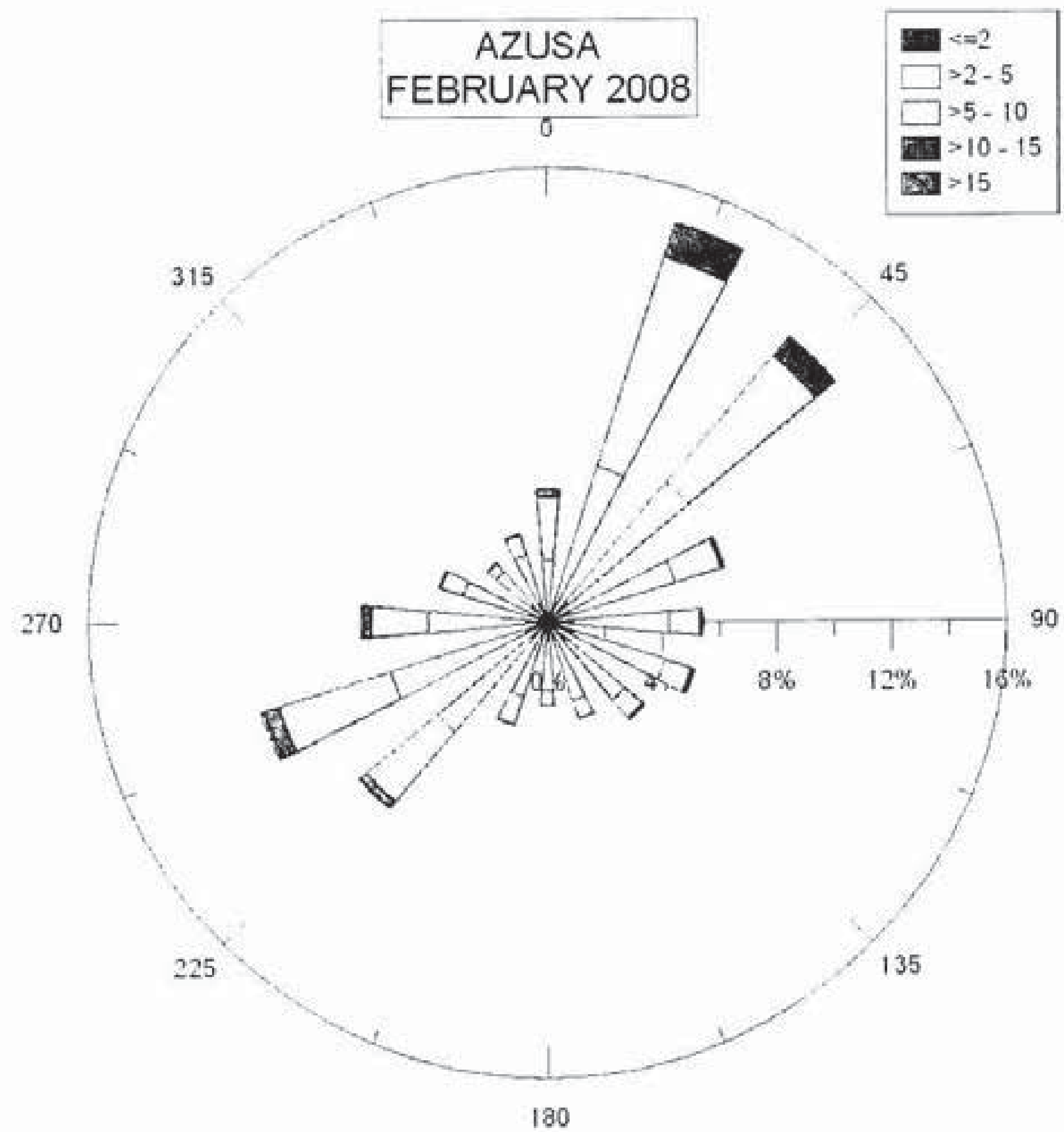
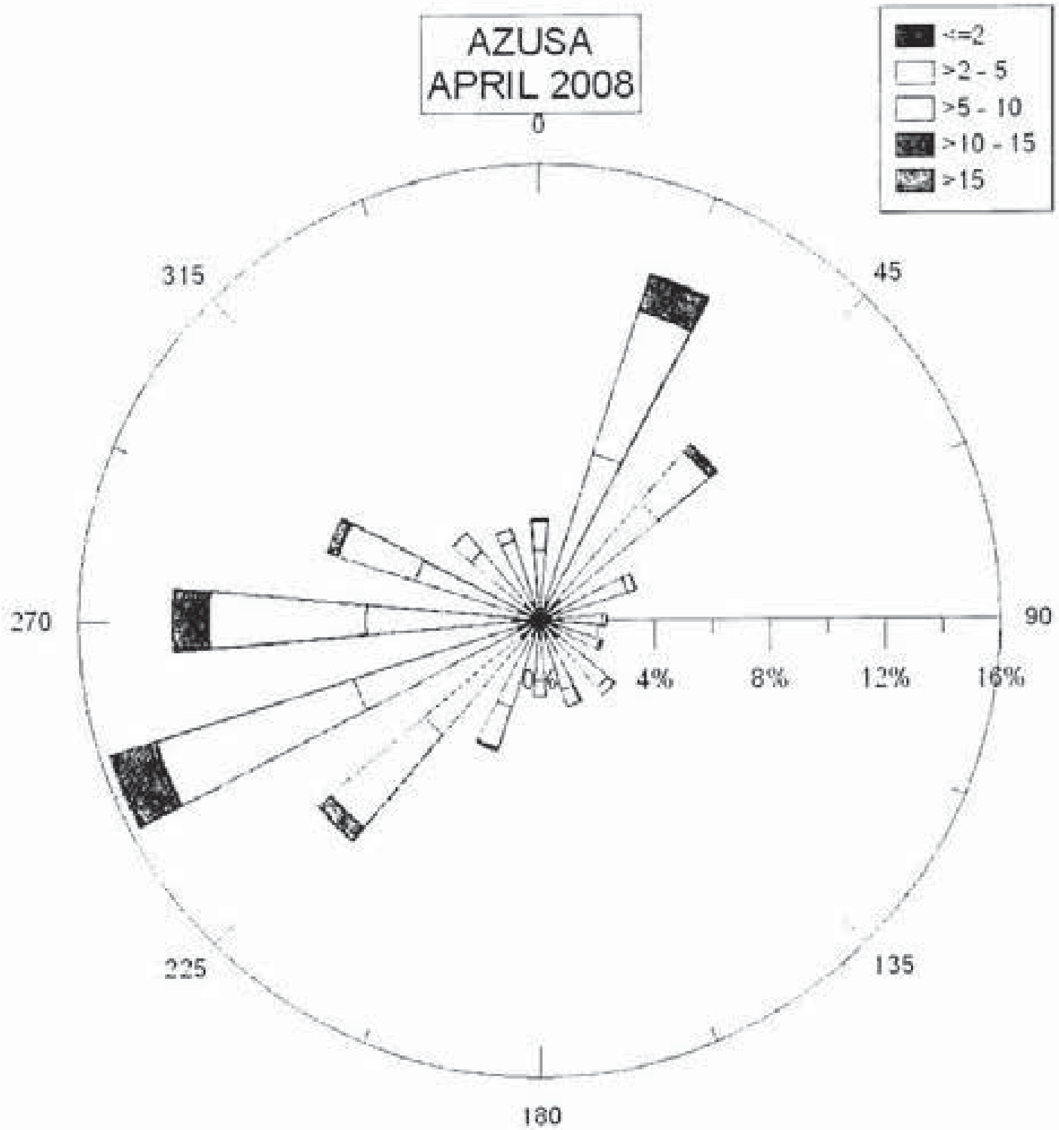
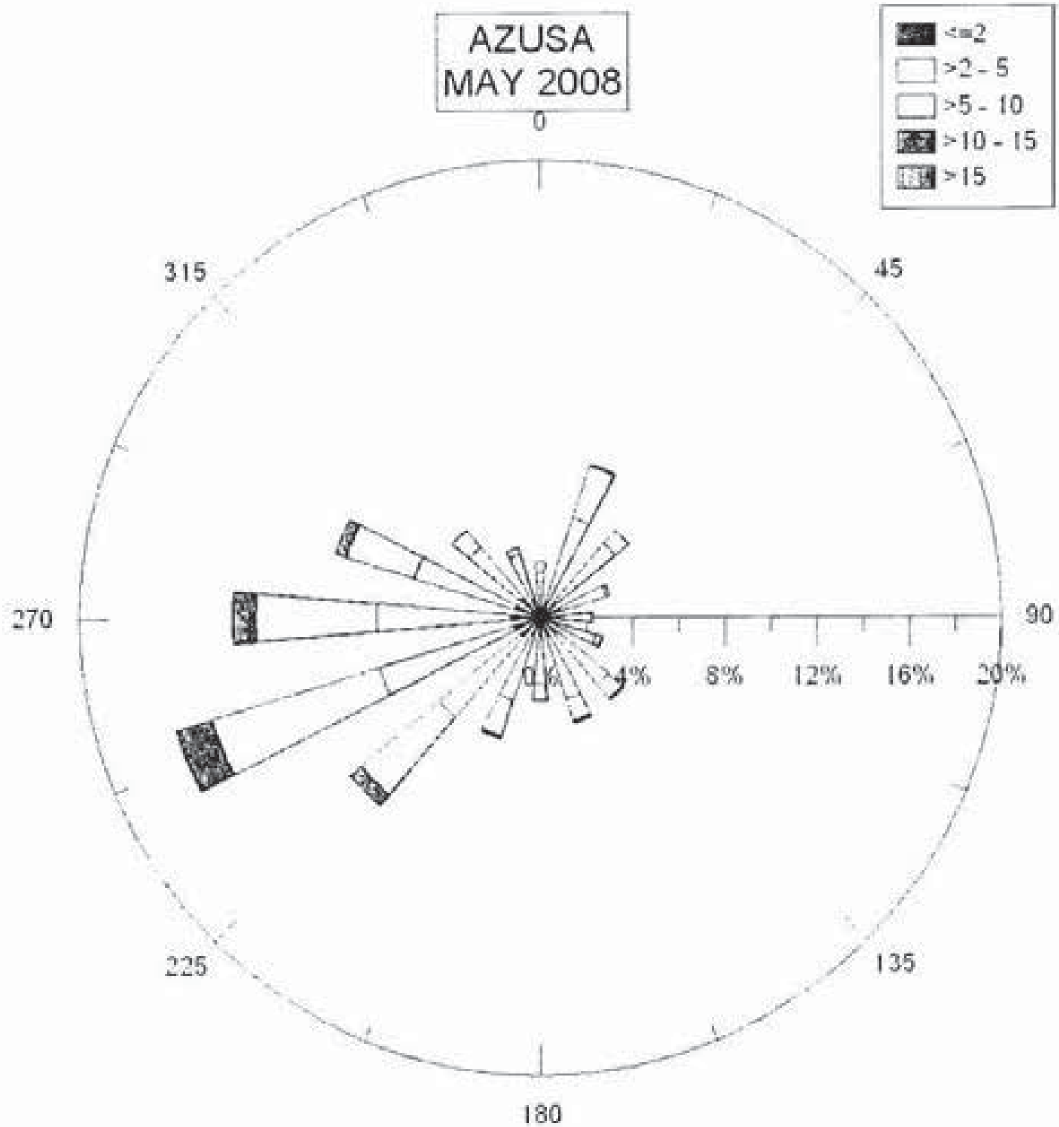
8%
12%
16%
20%

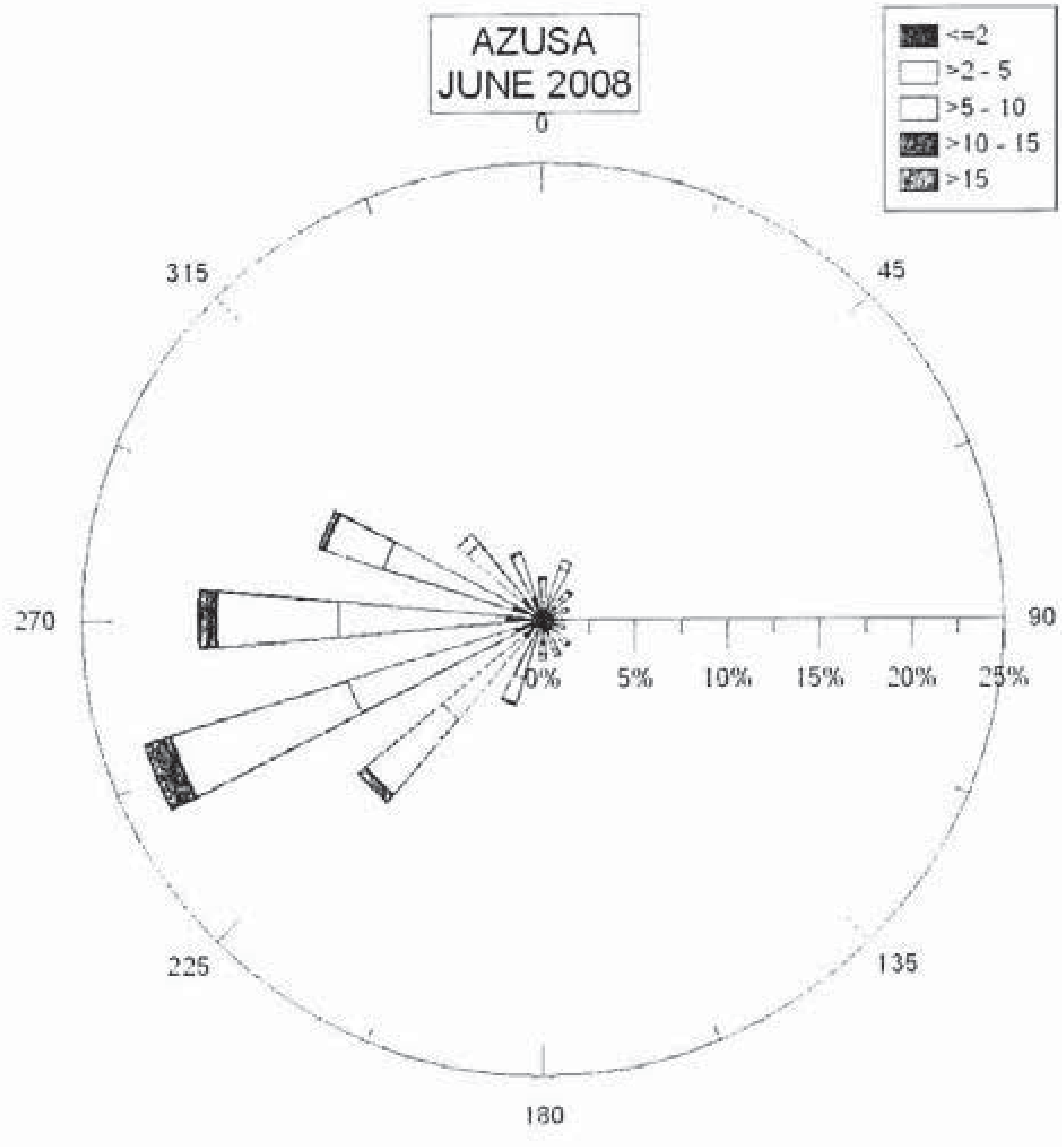


AZUSA
FEBRUARY 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
0
45
90
135
180
225
270
315
8%
12%
16%


AZUSA
APRIL 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
0
45
90
135
180
225
270
315
0%
4%
8%
12%
16%



AZUSA
MAY 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
0
45
90
135
180
225
270
315
4%
8%
12%
16%
20%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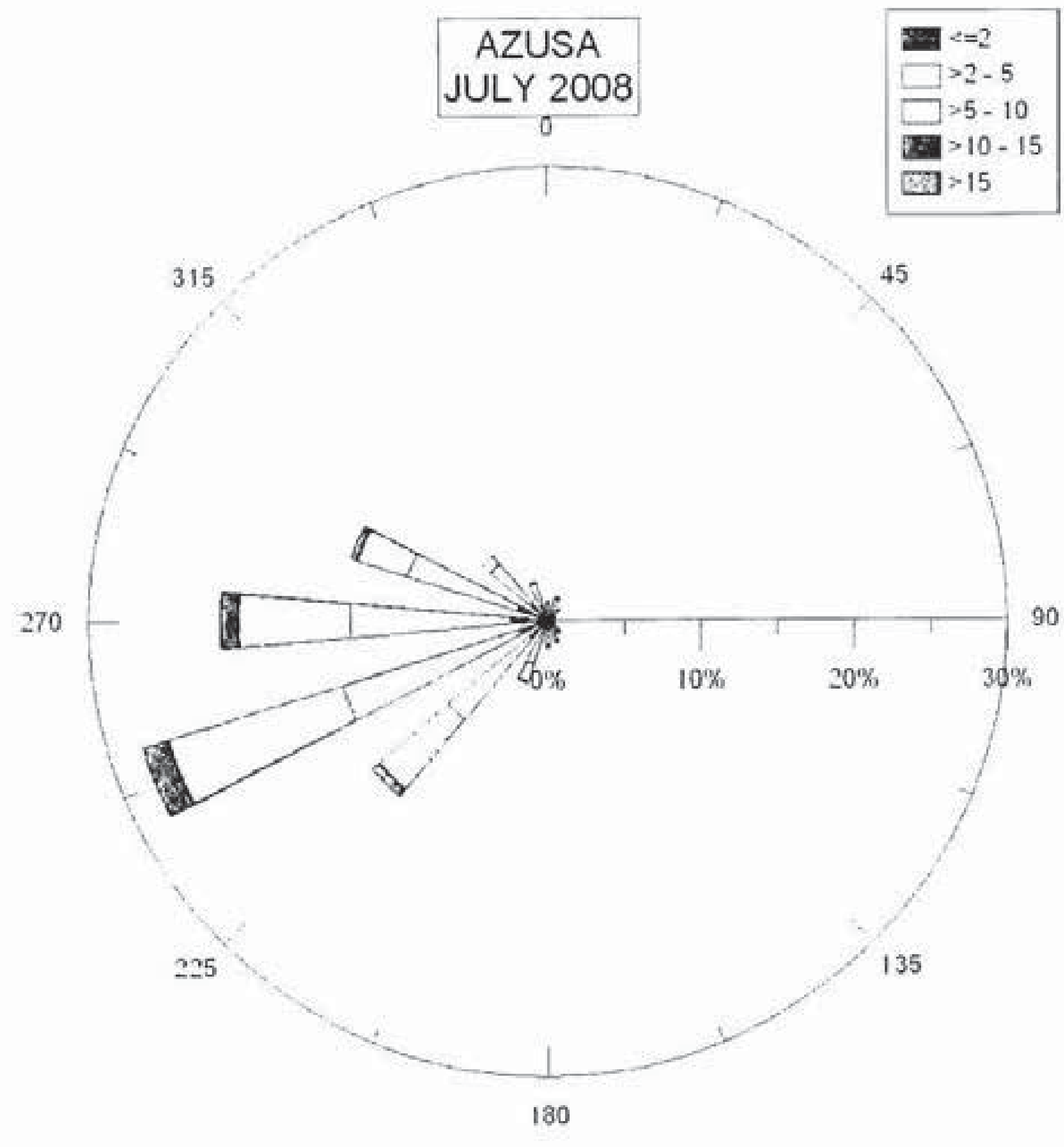
JUNE 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
0
45
90
135
180
225
270
315
0%
5%
10%
15%
20%
25%


AZUSA
JULY 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
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45
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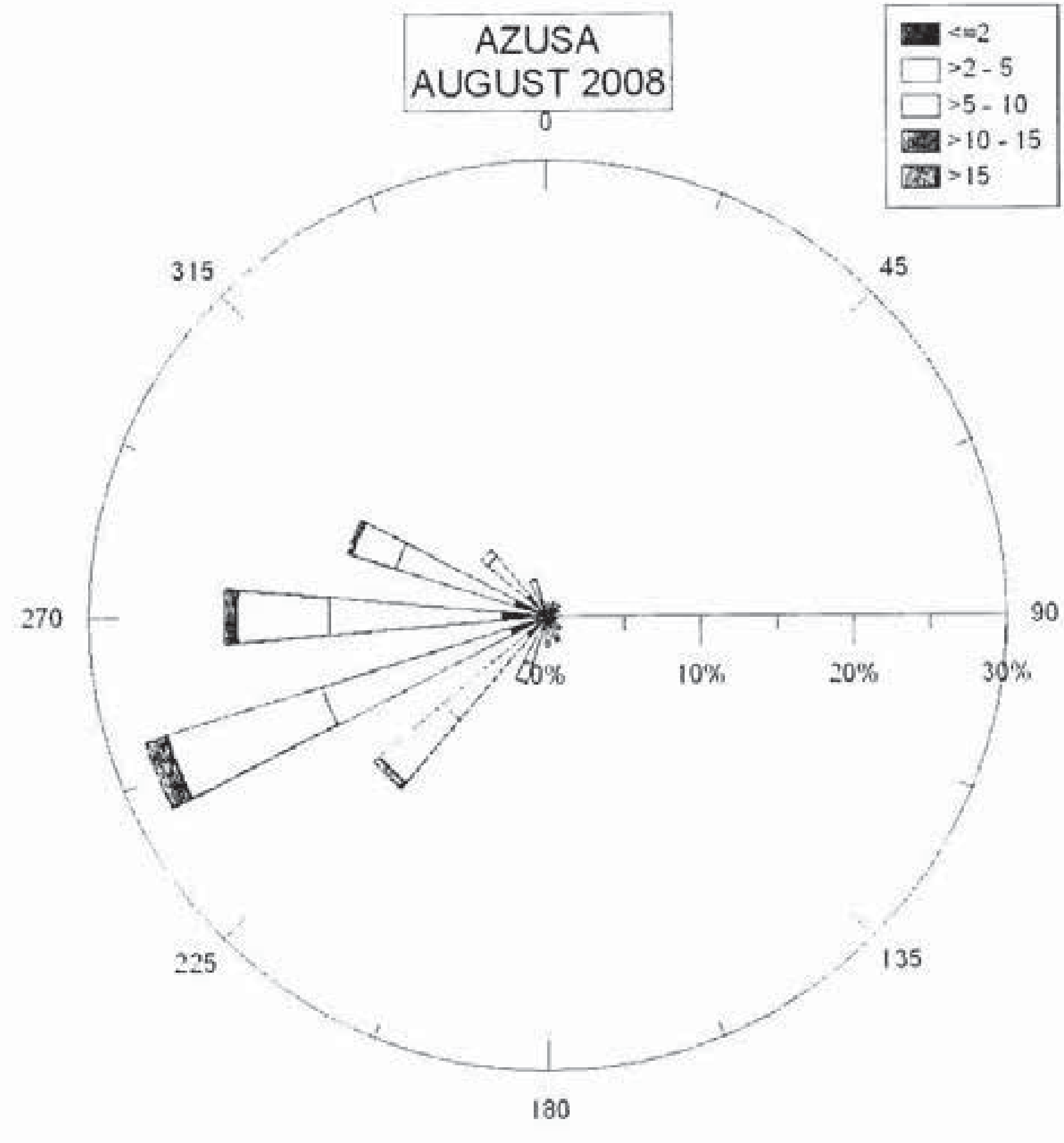
135
180
225
270
315
0%
10%
20%
30%


AZUSA
AUGUST 2008
<=2
>2 - 5
>5 - 10
>10 - 15
>15
0
45
90
135
180
225
270
315
0%
10%
20%
30%

Attachment 4. References

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APPENDIX G

CALINE4 Output Files

CO Hotspots

Mobile-source impacts occur basically on two scales of motion. Regionally, project-related travel will add to regional trip generation and increase the vehicle miles traveled within the local airshed and the SDAB. Locally, project traffic will be added to the City roadway system in the vicinity of the proposed project. If such traffic occurs during periods of poor atmospheric ventilation, is composed of a large number of vehicles "cold-started" and operating at pollution-inefficient speeds, and is operating on roadways already crowded with non-project traffic, there is a potential for the formation of microscale CO "hotspots" in the area immediately around points of congested traffic. Because of continued improvement in vehicular emissions at a rate faster than the rate of vehicle growth and/or congestion, the potential for CO hotspots in the SDAB is steadily decreasing.

Carbon monoxide transport is extremely limited and disperses rapidly with distance from the source. Under certain extreme meteorological conditions, however, CO concentrations near a congested roadway or intersection may reach unhealthy levels, affecting sensitive receptors such as residents, school children, hospital patients, and the elderly. Typically, high CO concentrations are associated with roadways or intersections operating at an unacceptable level of service (LOS). Projects contributing to adverse traffic impacts may result in the formation of CO hotspots. As indicated in the County of San Diego *Guidelines for Determining Significance and Report Format and Content Requirements Air Quality* (County of San Diego 2007), a site-specific CO hotspot analysis should be performed if a proposed development would cause road intersections to operate at or below a LOS E (with intersection peak-hour trips exceeding 3,000).

The project's traffic report evaluated 8 intersections in the project vicinity to assess potential impacts resulting from the proposed project. The results of the traffic analysis show that the following intersections are forecast to be LOS E or worse under existing plus project conditions and would require a CO hotspot analysis per County of San Diego's guidelines.

- Deer Springs Rd. and I-15 NB Ramps
- Deer Springs Rd. and I-15 SB Ramps
- Deer Springs Rd. and Twin Oaks Valley Rd.
- Buena Creek Rd. and Twin Oaks Valley Rd.
- Robelini Drive and South Santa Fe Avenue
- Twin Oaks Valley Rd. and San Marcos Blvd.
- Twin Oaks Valley Rd. and Discover Rd.
- Twin Oaks Valley Rd. and Richmar

The potential impact of the proposed project on local CO levels was assessed at these intersections with the Caltrans CL4 interface based on the CAlifornia LINE Source Dispersion Model (CALINE4), which allows microscale CO concentrations to be estimated along each roadway corridor or near intersections.

The modeling analysis was performed for worst-case wind angle, in which the model selects the wind angles that produce the highest CO concentrations at each of the receptors. The suburban land classification of 100 centimeters was used for the aerodynamic roughness coefficient, which determines the amount of local air turbulence that affects plume spreading. The at-grade option was used in the analysis; for at-grade sections, CALINE4 does not permit the plume to mix below ground level. The calculations assume a mixing height of 1,000 meters, a flat topographical condition between the source and the receptor (link height of 0 meters), and a meteorological condition of little to almost no wind (0.5 meters per second), consistent with EPA guidance. The hourly traffic volume anticipated to travel on each link, in units of vehicles per hour, was based on the proposed project's traffic report (LLG 2016).

The maximum 1-hour CO background concentration of 3.8 ppm, as measured in the Escondido – East Valley Parkway monitoring station 2014 concentrations[1], was assumed in the analysis model. The model provides predicted concentrations in ppm at each of the receptor locations. To estimate an 8-hour average CO concentration, a persistence factor of 0.7, as is recommended for urban locations, was applied to the output values.

The results of the model are shown in Table F-1, CALINE4 Predicted CO Concentrations.

Table F-1
CALINE4 Predicted CO Concentrations

Intersection	Maximum Modeled Impact Year 2020 with Project + Cumulative	
	1 hour (ppm)	*8 hour (ppm)[1]*
Deer Springs Rd. and I-15 NB Ramps	4.3	3.01
Deer Springs Rd. and I-15 SB Ramps	4.8	3.36
Deer Springs Rd. and Twin Oaks Valley Rd.	4.8	3.36
Buena Creek Rd. and Twin Oaks Valley Rd.	4.6	3.22
Robelini Drive and South Santa Fe Avenue	4.3	3.01
Twin Oaks Valley Rd. and San Marcos Blvd.	4.9	3.43
Twin Oaks Valley Rd. and Discover Rd.	4.9	3.43
Twin Oaks Valley Rd. and Richmar	4.4	3.08
Maximum CO Impact	4.9	3.43
County of San Diego Thresholds	*20*	*9*
Threshold Exceeded?	*No*	*No*

Source: CALINE4 (Caltrans 2011).
[1] 8-hour concentrations were obtained by multiplying the 1-hour concentration by a factor of 0.7.

1 CARB. 2014c. *Air Quality Data Statistics.* http://arb.ca.gov/adam.

As shown in Table F-1, maximum CO concentrations predicted for the 1-hour averaging period would be 4.9 ppm, which is below the state 1-hour CO standard of 20 ppm. Maximum predicted 8-hour CO concentrations of 3.43 ppm would be below the state CO standard of 9.0 ppm. As neither the state 1-hour standard nor the 8-hour standard would be equaled or exceeded at any of the intersections studied, potential CO hotspot impacts would be less than significant.

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: BUENA CREEK RD AND TWIN OAKS VALLEY RD
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 0.5 M/S	Z0= 100. CM	ALT= 0.0 (M)
BRG= WORST CASE	VD= 0.0 CM/S	
CLAS= 7 (G)	VS= 0.0 CM/S	
MIXH= 1000. M	AMB= 0.0 PPM	
SIGTH= 5. DEGREES	TEMP= 15.6 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)
A. WBRA	8	-1500	8	-500	AG	0	2.6	0.0	33.0
B. WBTA	8	-500	8	0	AG	0	2.6	0.0	33.0
C. WBLA	8	0	8	500	AG	5	2.6	0.0	33.0
D. WBD	8	500	8	1500	AG	5	2.6	0.0	33.0
E. EBLA	-8	1500	-8	500	AG	669	2.6	0.0	33.0
F. EBTA	-8	500	-8	0	AG	0	2.6	0.0	33.0
G. EBRA	-8	0	-8	-500	AG	260	2.6	0.0	33.0
H. EBD	-8	-500	-8	-1500	AG	929	2.6	0.0	33.0
I. NBLA	1500	8	500	8	AG	210	2.6	0.0	33.0
J. NBTA	500	8	0	8	AG	931	2.6	0.0	33.0
K. NBRA	0	8	-500	8	AG	0	2.6	0.0	33.0
L. NBD	-500	8	-1500	8	AG	1141	2.6	0.0	33.0
M. SBLA	-1500	-8	-500	-8	AG	5	2.6	0.0	33.0
N. SBTA	-500	-8	0	-8	AG	741	2.6	0.0	33.0
O. SBRA	0	-8	500	-8	AG	510	2.6	0.0	33.0
P. SBD	500	-8	1500	-8	AG	1256	2.6	0.0	33.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: BUENA CREEK RD AND TWIN OAKS VALLEY RD
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. NE3	25	25	6.0
2. SE3	25	-25	6.0
3. SW3	-25	-25	6.0
4. NW3	-25	25	6.0
5. NE7	38	38	6.0
6. SE7	38	-38	6.0
7. SW7	-38	-38	6.0
8. NW7	-38	38	6.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. NE3	94.	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. SE3	86.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. SW3	86.	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. NW3	94.	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. NE7	95.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. SE7	86.	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. SW7	85.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. NW7	95.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: BUENA CREEK RD AND TWIN OAKS VALLEY RD
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. NE3	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.2
2. SE3	0.0	0.2	0.0	0.0	0.0	0.0	0.3	0.1
3. SW3	0.0	0.2	0.0	0.0	0.0	0.0	0.3	0.1
4. NW3	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.2
5. NE7	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.2
6. SE7	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.2
7. SW7	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1
8. NW7	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: DEER SPRINGS RD AND I-15 NB RAMPS NP
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 0.5 M/S	Z0= 100. CM	ALT= 0.0 (M)
BRG= WORST CASE	VD= 0.0 CM/S	
CLAS= 7 (G)	VS= 0.0 CM/S	
MIXH= 1000. M	AMB= 0.0 PPM	
SIGTH= 5. DEGREES	TEMP= 15.6 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (FT) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)
A. WBRA	8	-1500	8	-500	AG	30	2.6	0.0	33.0
B. WBTA	8	-500	8	0	AG	599	2.6	0.0	33.0
C. WBLA	8	0	8	500	AG	0	2.6	0.0	33.0
D. WBD	8	500	8	1500	AG	629	2.6	0.0	33.0
E. EBLA	-8	1500	-8	500	AG	958	2.6	0.0	33.0
F. EBTA	-8	500	-8	0	AG	446	2.6	0.0	33.0
G. EBRA	-8	0	-8	-500	AG	0	2.6	0.0	33.0
H. EBD	-8	-500	-8	-1500	AG	1404	2.6	0.0	33.0
I. NBLA	1500	8	500	8	AG	819	2.6	0.0	33.0
J. NBTA	500	8	0	8	AG	10	2.6	0.0	33.0
K. NBRA	0	8	-500	8	AG	500	2.6	0.0	33.0
L. NBD	-500	8	-1500	8	AG	1329	2.6	0.0	33.0
M. SBLA	-1500	-8	-500	-8	AG	0	2.6	0.0	33.0
N. SBTA	-500	-8	0	-8	AG	0	2.6	0.0	33.0
O. SBRA	0	-8	500	-8	AG	0	2.6	0.0	33.0
P. SBD	500	-8	1500	-8	AG	0	2.6	0.0	33.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: DEER SPRINGS RD AND I-15 NB RAMPS NP
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. NE3	25	25	6.0
2. SE3	25	-25	6.0
3. SW3	-25	-25	6.0
4. NW3	-25	25	6.0
5. NE7	38	38	6.0
6. SE7	38	-38	6.0
7. SW7	-38	-38	6.0
8. NW7	-38	38	6.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. NE3	267.	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
2. SE3	183.	0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.2
3. SW3	3.	0.5	0.0	0.0	0.0	0.1	0.1	0.2	0.0	0.0
4. NW3	177.	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2
5. NE7	267.	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
6. SE7	274.	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7. SW7	3.	0.4	0.0	0.0	0.0	0.1	0.1	0.1	0.0	0.0
8. NW7	177.	0.3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.2

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: DEER SPRINGS RD AND I-15 NB RAMPS NP
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. NE3	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.0
2. SE3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. SW3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
4. NW3	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
5. NE7	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0
6. SE7	0.0	0.0	0.1	0.2	0.0	0.0	0.0	0.0
7. SW7	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
8. NW7	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: DEER SPRINGS RD AND I-15 SB RAMPS NP
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 0.5 M/S	Z0= 100. CM	ALT= 0.0 (M)
BRG= WORST CASE	VD= 0.0 CM/S	
CLAS= 7 (G)	VS= 0.0 CM/S	
MIXH= 1000. M	AMB= 0.0 PPM	
SIGTH= 5. DEGREES	TEMP= 15.6 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (FT) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)
A. WBRA	8	-1500	8	-500	AG	0	2.6	0.0	33.0
B. WBTA	8	-500	8	0	AG	1188	2.6	0.0	33.0
C. WBLA	8	0	8	500	AG	220	2.6	0.0	33.0
D. WBD	8	500	8	1500	AG	1408	2.6	0.0	33.0
E. EBLA	-8	1500	-8	500	AG	0	2.6	0.0	33.0
F. EBTA	-8	500	-8	0	AG	1514	2.6	0.0	33.0
G. EBRA	-8	0	-8	-500	AG	441	2.6	0.0	33.0
H. EBD	-8	-500	-8	-1500	AG	1955	2.6	0.0	33.0
I. NBLA	1500	8	500	8	AG	0	2.6	0.0	33.0
J. NBTA	500	8	0	8	AG	0	2.6	0.0	33.0
K. NBRA	0	8	-500	8	AG	0	2.6	0.0	33.0
L. NBD	-500	8	-1500	8	AG	0	2.6	0.0	33.0
M. SBLA	-1500	-8	-500	-8	AG	50	2.6	0.0	33.0
N. SBTA	-500	-8	0	-8	AG	5	2.6	0.0	33.0
O. SBRA	0	-8	500	-8	AG	500	2.6	0.0	33.0
P. SBD	500	-8	1500	-8	AG	555	2.6	0.0	33.0

JOB: DEER SPRINGS RD AND I-15 SB RAMPS NP
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. NE3	25	25	6.0
2. SE3	25	-25	6.0
3. SW3	-25	-25	6.0
4. NW3	-25	25	6.0
5. NE7	38	38	6.0
6. SE7	38	-38	6.0
7. SW7	-38	-38	6.0
8. NW7	-38	38	6.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. NE3	184.	1.0	0.0	0.6	0.0	0.0	0.0	0.0	0.1	0.2
2. SE3	184.	1.0	0.0	0.6	0.0	0.0	0.0	0.0	0.1	0.2
3. SW3	4.	1.0	0.0	0.0	0.1	0.2	0.0	0.7	0.0	0.0
4. NW3	4.	1.0	0.0	0.0	0.1	0.2	0.0	0.8	0.0	0.0
5. NE7	185.	0.6	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.2
6. SE7	352.	0.5	0.0	0.0	0.1	0.0	0.0	0.3	0.0	0.0
7. SW7	6.	0.6	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.0
8. NW7	6.	0.6	0.0	0.0	0.0	0.2	0.0	0.4	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: DEER SPRINGS RD AND I-15 SB RAMPS NP
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. NE3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
2. SE3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. SW3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. NW3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. NE7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
6. SE7	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
7. SW7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. NW7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: DEER SPRINGS RD AND TWIN OAKS VALLEY RD
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 0.5 M/S	Z0= 100. CM	ALT= 0.0 (M)
BRG= WORST CASE	VD= 0.0 CM/S	
CLAS= 7 (G)	VS= 0.0 CM/S	
MIXH= 1000. M	AMB= 0.0 PPM	
SIGTH= 5. DEGREES	TEMP= 15.6 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)
A. WBRA	8	-1500	8	-500	AG	0	2.6	0.0	33.0
B. WBTA	8	-500	8	0	AG	0	2.6	0.0	33.0
C. WBLA	8	0	8	500	AG	0	2.6	0.0	33.0
D. WBD	8	500	8	1500	AG	0	2.6	0.0	33.0
E. EBLA	-8	1500	-8	500	AG	61	2.6	0.0	33.0
F. EBTA	-8	500	-8	0	AG	0	2.6	0.0	33.0
G. EBRA	-8	0	-8	-500	AG	304	2.6	0.0	33.0
H. EBD	-8	-500	-8	-1500	AG	365	2.6	0.0	33.0
I. NBLA	1500	8	500	8	AG	131	2.6	0.0	33.0
J. NBTA	500	8	0	8	AG	1529	2.6	0.0	33.0
K. NBRA	0	8	-500	8	AG	0	2.6	0.0	33.0
L. NBD	-500	8	-1500	8	AG	1660	2.6	0.0	33.0
M. SBLA	-1500	-8	-500	-8	AG	0	2.6	0.0	33.0
N. SBTA	-500	-8	0	-8	AG	1017	2.6	0.0	33.0
O. SBRA	0	-8	500	-8	AG	52	2.6	0.0	33.0
P. SBD	500	-8	1500	-8	AG	1069	2.6	0.0	33.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: DEER SPRINGS RD AND TWIN OAKS VALLEY RD
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. NE3	25	25	6.0
2. SE3	25	-25	6.0
3. SW3	-25	-25	6.0
4. NW3	-25	25	6.0
5. NE7	38	38	6.0
6. SE7	38	-38	6.0
7. SW7	-38	-38	6.0
8. NW7	-38	38	6.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. NE3	94.	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. SE3	274.	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. SW3	82.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
4. NW3	94.	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. NE7	96.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. SE7	275.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. SW7	84.	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. NW7	95.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: DEER SPRINGS RD AND TWIN OAKS VALLEY RD
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	*	I	J	K	L	M	N	O	P
	*	CONC/LINK (PPM)							
1. NE3	*	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.2
2. SE3	*	0.0	0.0	0.0	0.2	0.0	0.5	0.0	0.0
3. SW3	*	0.0	0.4	0.0	0.0	0.0	0.1	0.0	0.0
4. NW3	*	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.1
5. NE7	*	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1
6. SE7	*	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0
7. SW7	*	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1
8. NW7	*	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: S SANTA FE AVE ROBELININ DR AM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 0.5 M/S	Z0= 100. CM	ALT= 0.0 (M)
BRG= WORST CASE	VD= 0.0 CM/S	
CLAS= 7 (G)	VS= 0.0 CM/S	
MIXH= 1000. M	AMB= 0.0 PPM	
SIGTH= 5. DEGREES	TEMP= 15.6 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (FT) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)
A. WBRA	8	-1500	8	-500	AG	0	2.6	0.0	33.0
B. WBTA	8	-500	8	0	AG	238	2.6	0.0	33.0
C. WBLA	8	0	8	500	AG	611	2.6	0.0	33.0
D. WBD	8	500	8	1500	AG	849	2.6	0.0	33.0
E. EBLA	-8	1500	-8	500	AG	0	2.6	0.0	33.0
F. EBTA	-8	500	-8	0	AG	344	2.6	0.0	33.0
G. EBRA	-8	0	-8	-500	AG	450	2.6	0.0	33.0
H. EBD	-8	-500	-8	-1500	AG	994	2.6	0.0	33.0
I. NBLA	1500	8	500	8	AG	130	2.6	0.0	33.0
J. NBTA	500	8	0	8	AG	0	2.6	0.0	33.0
K. NBRA	0	8	-500	8	AG	193	2.6	0.0	33.0
L. NBD	-500	8	-1500	8	AG	323	2.6	0.0	33.0
M. SBLA	-1500	-8	-500	-8	AG	0	2.6	0.0	33.0
N. SBTA	-500	-8	0	-8	AG	0	2.6	0.0	33.0
O. SBRA	0	-8	500	-8	AG	0	2.6	0.0	33.0
P. SBD	500	-8	1500	-8	AG	0	2.6	0.0	33.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: S SANTA FE AVE ROBELININ DR AM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. NE3	25	25	6.0
2. SE3	25	-25	6.0
3. SW3	-25	-25	6.0
4. NW3	-25	25	6.0
5. NE7	38	38	6.0
6. SE7	38	-38	6.0
7. SW7	-38	-38	6.0
8. NW7	-38	38	6.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. NE3	356.	0.5	0.0	0.0	0.4	0.1	0.0	0.1	0.0	0.0
2. SE3	356.	0.5	0.0	0.0	0.3	0.1	0.0	0.1	0.0	0.0
3. SW3	4.	0.5	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.0
4. NW3	177.	0.5	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.1
5. NE7	355.	0.3	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0
6. SE7	354.	0.3	0.0	0.0	0.2	0.0	0.0	0.1	0.0	0.0
7. SW7	6.	0.3	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0
8. NW7	6.	0.3	0.0	0.0	0.1	0.1	0.0	0.1	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: S SANTA FE AVE ROBELININ DR AM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. NE3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. SE3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. SW3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. NW3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. NE7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. SE7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. SW7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. NW7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION
PAGE 1

JOB: TWIN OAKS VALLEY RD DISCOVER RD PM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 0.5 M/S	Z0= 100. CM	ALT= 0.0 (M)
BRG= WORST CASE	VD= 0.0 CM/S	
CLAS= 7 (G)	VS= 0.0 CM/S	
MIXH= 1000. M	AMB= 0.0 PPM	
SIGTH= 5. DEGREES	TEMP= 15.6 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)
A. WBRA	8	-1500	8	-500	AG	313	2.6	0.0	33.0
B. WBTA	8	-500	8	0	AG	250	2.6	0.0	33.0
C. WBLA	8	0	8	500	AG	280	2.6	0.0	33.0
D. WBD	8	500	8	1500	AG	843	2.6	0.0	33.0
E. EBLA	-8	1500	-8	500	AG	520	2.6	0.0	33.0
F. EBTA	-8	500	-8	0	AG	320	2.6	0.0	33.0
G. EBRA	-8	0	-8	-500	AG	20	2.6	0.0	33.0
H. EBD	-8	-500	-8	-1500	AG	860	2.6	0.0	33.0
I. NBLA	1500	8	500	8	AG	10	2.6	0.0	33.0
J. NBTA	500	8	0	8	AG	1452	2.6	0.0	33.0
K. NBRA	0	8	-500	8	AG	310	2.6	0.0	33.0
L. NBD	-500	8	-1500	8	AG	1772	2.6	0.0	33.0
M. SBLA	-1500	-8	-500	-8	AG	466	2.6	0.0	33.0
N. SBTA	-500	-8	0	-8	AG	658	2.6	0.0	33.0
O. SBRA	0	-8	500	-8	AG	380	2.6	0.0	33.0
P. SBD	500	-8	1500	-8	AG	1504	2.6	0.0	33.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: TWIN OAKS VALLEY RD DISCOVER RD PM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. NE3	25	25	6.0
2. SE3	25	-25	6.0
3. SW3	-25	-25	6.0
4. NW3	-25	25	6.0
5. NE7	38	38	6.0
6. SE7	38	-38	6.0
7. SW7	-38	-38	6.0
8. NW7	-38	38	6.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. NE3	94.	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. SE3	357.	0.7	0.0	0.0	0.2	0.1	0.1	0.1	0.0	0.0
3. SW3	85.	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. NW3	94.	1.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
5. NE7	96.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. SE7	81.	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. SW7	84.	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. NW7	96.	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOB: TWIN OAKS VALLEY RD DISCOVER RD PM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. NE3	0.0	0.8	0.0	0.0	0.0	0.0	0.1	0.2
2. SE3	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.0
3. SW3	0.0	0.3	0.0	0.0	0.0	0.0	0.2	0.1
4. NW3	0.0	0.7	0.0	0.0	0.0	0.0	0.1	0.2
5. NE7	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.2
6. SE7	0.0	0.3	0.0	0.0	0.0	0.0	0.1	0.0
7. SW7	0.0	0.2	0.0	0.0	0.0	0.0	0.1	0.1
8. NW7	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: TWIN OAKS VALLEY RD RICHMAR AVE AM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 0.5 M/S	Z0= 100. CM	ALT= 0.0 (M)
BRG= WORST CASE	VD= 0.0 CM/S	
CLAS= 7 (G)	VS= 0.0 CM/S	
MIXH= 1000. M	AMB= 0.0 PPM	
SIGTH= 5. DEGREES	TEMP= 15.6 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)
A. WBRA	8	-1500	8	-500	AG	130	2.6	0.0	33.0
B. WBTA	8	-500	8	0	AG	400	2.6	0.0	33.0
C. WBLA	8	0	8	500	AG	280	2.6	0.0	33.0
D. WBD	8	500	8	1500	AG	810	2.6	0.0	33.0
E. EBLA	-8	1500	-8	500	AG	100	2.6	0.0	33.0
F. EBTA	-8	500	-8	0	AG	360	2.6	0.0	33.0
G. EBRA	-8	0	-8	-500	AG	110	2.6	0.0	33.0
H. EBD	-8	-500	-8	-1500	AG	570	2.6	0.0	33.0
I. NBLA	1500	8	500	8	AG	40	2.6	0.0	33.0
J. NBTA	500	8	0	8	AG	399	2.6	0.0	33.0
K. NBRA	0	8	-500	8	AG	115	2.6	0.0	33.0
L. NBD	-500	8	-1500	8	AG	554	2.6	0.0	33.0
M. SBLA	-1500	-8	-500	-8	AG	220	2.6	0.0	33.0
N. SBTA	-500	-8	0	-8	AG	667	2.6	0.0	33.0
O. SBRA	0	-8	500	-8	AG	105	2.6	0.0	33.0
P. SBD	500	-8	1500	-8	AG	992	2.6	0.0	33.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: TWIN OAKS VALLEY RD RICHMAR AVE AM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. NE3	25	25	6.0
2. SE3	25	-25	6.0
3. SW3	-25	-25	6.0
4. NW3	-25	25	6.0
5. NE7	38	38	6.0
6. SE7	38	-38	6.0
7. SW7	-38	-38	6.0
8. NW7	-38	38	6.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. NE3	266.	0.5	0.0	0.0	0.1	0.0	0.0	0.1	0.0	0.0
2. SE3	274.	0.6	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
3. SW3	4.	0.6	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.0
4. NW3	93.	0.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
5. NE7	266.	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. SE7	275.	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
7. SW7	4.	0.4	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
8. NW7	94.	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0

JOB: TWIN OAKS VALLEY RD RICHMAR AVE AM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. NE3	0.0	0.0	0.1	0.1	0.0	0.2	0.0	0.0
2. SE3	0.0	0.0	0.0	0.1	0.0	0.4	0.0	0.0
3. SW3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
4. NW3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.1
5. NE7	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0
6. SE7	0.0	0.0	0.0	0.1	0.0	0.2	0.0	0.0
7. SW7	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
8. NW7	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.1

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: TWIN OAKS VALLEY RD SAN MARCOS BLVD PM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

I. SITE VARIABLES

U= 0.5 M/S	Z0= 100. CM	ALT= 0.0 (M)
BRG= WORST CASE	VD= 0.0 CM/S	
CLAS= 7 (G)	VS= 0.0 CM/S	
MIXH= 1000. M	AMB= 0.0 PPM	
SIGTH= 5. DEGREES	TEMP= 15.6 DEGREE (C)	

II. LINK VARIABLES

LINK DESCRIPTION	LINK COORDINATES (FT) X1	Y1	X2	Y2	TYPE	VPH	EF (G/MI)	H (FT)	W (FT)
A. WBRA	8	-1500	8	-500	AG	5	2.6	0.0	33.0
B. WBTA	8	-500	8	0	AG	10	2.6	0.0	33.0
C. WBLA	8	0	8	500	AG	15	2.6	0.0	33.0
D. WBD	8	500	8	1500	AG	30	2.6	0.0	33.0
E. EBLA	-8	1500	-8	500	AG	217	2.6	0.0	33.0
F. EBTA	-8	500	-8	0	AG	15	2.6	0.0	33.0
G. EBRA	-8	0	-8	-500	AG	144	2.6	0.0	33.0
H. EBD	-8	-500	-8	-1500	AG	376	2.6	0.0	33.0
I. NBLA	1500	8	500	8	AG	193	2.6	0.0	33.0
J. NBTA	500	8	0	8	AG	1582	2.6	0.0	33.0
K. NBRA	0	8	-500	8	AG	30	2.6	0.0	33.0
L. NBD	-500	8	-1500	8	AG	1805	2.6	0.0	33.0
M. SBLA	-1500	-8	-500	-8	AG	70	2.6	0.0	33.0
N. SBTA	-500	-8	0	-8	AG	1449	2.6	0.0	33.0
O. SBRA	0	-8	500	-8	AG	194	2.6	0.0	33.0
P. SBD	500	-8	1500	-8	AG	1713	2.6	0.0	33.0

CALINE4: CALIFORNIA LINE SOURCE DISPERSION MODEL
JUNE 1989 VERSION

JOB: TWIN OAKS VALLEY RD SAN MARCOS BLVD PM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

III. RECEPTOR LOCATIONS

RECEPTOR	COORDINATES (FT) X	Y	Z
1. NE3	25	25	6.0
2. SE3	25	-25	6.0
3. SW3	-25	-25	6.0
4. NW3	-25	25	6.0
5. NE7	38	38	6.0
6. SE7	38	-38	6.0
7. SW7	-38	-38	6.0
8. NW7	-38	38	6.0

IV. MODEL RESULTS (WORST CASE WIND ANGLE)

RECEPTOR	BRG (DEG)	PRED CONC (PPM)	CONC/LINK (PPM) A	B	C	D	E	F	G	H
1. NE3	94.	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2. SE3	274.	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3. SW3	274.	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4. NW3	94.	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
5. NE7	95.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6. SE7	275.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7. SW7	275.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
8. NW7	95.	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

JOB: TWIN OAKS VALLEY RD SAN MARCOS BLVD PM
RUN: (WORST CASE ANGLE)
POLLUTANT: Carbon Monoxide

IV. MODEL RESULTS (WORST CASE WIND ANGLE) (CONT.)

RECEPTOR	CONC/LINK (PPM) I	J	K	L	M	N	O	P
1. NE3	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.2
2. SE3	0.0	0.0	0.0	0.2	0.0	0.7	0.0	0.0
3. SW3	0.0	0.0	0.0	0.2	0.0	0.8	0.0	0.0
4. NW3	0.0	0.7	0.0	0.0	0.0	0.0	0.1	0.2
5. NE7	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.2
6. SE7	0.0	0.0	0.0	0.2	0.0	0.4	0.0	0.0
7. SW7	0.0	0.0	0.0	0.2	0.0	0.3	0.0	0.0
8. NW7	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.2