Chapter 6

Microscale Study

6.1 Introduction

The microscale study utilized mobile platforms to sample for four-week periods at selected locations, then moved to other sites for similar sampling. The objectives for this element were to determine if communities are experiencing localized hot spots not otherwise determined by the fixed site MATES-II monitoring; to confirm hot spot areas indicated by modeling; to respond to public concerns; and to assess the localized representativeness of the monitoring. Two mobile platforms were employed to collect ambient toxics measurements to meet the objectives. Sampling was conducted on a more intensive basis than the MATES-II element, but for only four weeks at a time.

A third mobile platform was used to sample as a microscale site, but limited to only two locations, sampling at each site during each seasonal quarter. This platform represented more of a "hybrid" approach between the MATES-II fixed sites and the microscale sites.

It should be noted that the intent to investigate a number of different sites, ~~given limited~~with available -resources, limited the power of the microscale study to detect localized disparities in air toxic levels. The microscale study should therefore be regarded as more of a "pilot study" than as a study to definitively address possible differences in community air pollutant exposures within the South Coast Air Basin. These factors should be taken into consideration to avoid possible over-interpretation of the results.

6.2 Site Selection Process

For the microscale sites, a multi-step process was used. First, to determine appropriate locations for the mobile platforms, locations of known facilities which emit toxic air contaminants were plotted on maps to determine "clusters" of facilities. Next, aerial photos were used to determine locations where residential areas abutted, and were immediately downwind of these clusters. Seasonal wind patterns were considered such that predominant seasonal flows helped to determine the appropriate season for sampling. Most of the microscale sites were in Los Angeles County where the greatest levels of toxic emissions occur, but at least two microscale locations were selected from each of the other three counties. Of the 14 microscale sites, three (Montclair, Norwalk and Rialto) were selected because of influence and proximity to major mobile sources (e.g. congested freeways).

Two of the microscale sites were semi-fixed. These sites were in Pacoima and Hawthorne and were used to sample for the species of interest for the MATES-II. These two sites were incorporated to study seasonal variability of the pollutants species measured. Table 6-1 lists the addresses and sampling periods of the monitoring sites; Figure 6-1 shows the locations of the sites on a map of the Basin. Appendix VI contains

location maps for each of the sites.

In Table 6-2, the expected winds used for the siting designs, and the actual prevailing winds as measured at the sites are shown. (Because of seasonal variability in prevailing wind directions, neither Hawthorne nor Pacoima were selected based upon expected wind condition.) It can be seen that for the most part, actual wind conditions were close to the expected conditions. Notable exceptions are at Norwalk and Corona, where prevailing winds were almost one quadrant (i.e., 90 degrees) different than expected. Thus at these sites, presumed influences from the facility clusters cannot be assumed. (Note that because the two "hybrid" sites, Hawthorne and Pacoima, were sampled over four seasonal months, there were no expected prevailing conditions; hence, these sites are not included in the table.) Descriptions of wind conditions and accompanying wind "roses," by site, are included in Appendix VI.

Table 6-1
Microscale Monitoring Sites

Abbrev.	Site	Period of Record	Address
Microscale Sites			
AN	Anaheim	12/31/98 – 02/02/99	1316 Paradise Ct., Anaheim 92806
BH	Boyle Heights	09/26/98 – 10/29/99	1100 Spence St., Los Angeles 90023
CO	Corona	10/22/98 – 11/25/98	1080 Pomona Rd., Corona 91720
CM	Costa Mesa	08/15/98 – 09/08/98	2045 Meyer St., Costa Mesa 92627
MO	Montclair	07/02/98 – 08/01/98	5450 Deodar St., Montclair 91763
NO	Norwalk	11/13/98 – 12/16/98	12901 Hoxie Ave., Norwalk 90650
RI	Rialto	03/19/99 – 04/30/99	200 W. Valley Blvd., Rialto 91720
RV	Riverside	03/10/99 – 04/21/99	J. W. North HS 1150 - 3rd. St., Riverside 92507
SP	San Pedro	03/25/99 – 04/27/99	202 S. Palos Verdes St., San Pedro 90731
EM	South El Monte	05/09/99 – 06/11/99	2550 Edwards Ave., So. El Monte 91733
TO	Torrance	07/21/98 – 09/05/98	631 Border Ave., Torrance 90503
VN	Van Nuys	01/09/99 – 02/17/99	16101-1/2 Roscoe Blvd., Van Nuys 91406
Microscale Seasonal Sites			
HA	Hawthorne	05/09/98 – 06/02/98 07/13/98 – 08/13/98 10/07/98 – 11/11/98 01/06/99 – 02/23/99	5234 W. 120th. St., Hawthorne
PA	Pacoima	06/27/98 – 09/14/98 11/18/98 – 12/13/98 01/15/99 – 02/23/99	11251 Glenoaks Blvd., Pacoima 91331

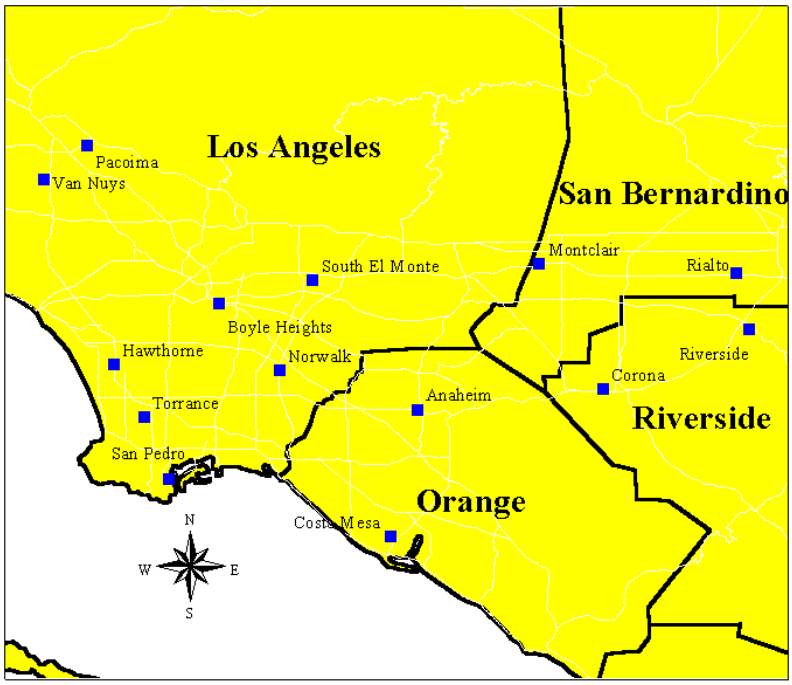

Figure 6-1
Location of Microscale Sites

Table 6-2

Comparison of Expected Versus Actual Prevailing Winds at the Microscale Sites

Microscale Site	Expected Wind Direction	Actual Prevailing Wind
Boyle Heights	WSW	WSW
Torrance	NW	W
Van Nuys	NNW	N
Norwalk	WNW	N
Montclair	W	W
Costa Mesa	SW	WSW
Anaheim	NE	NNW & WSW
Corona	N	WNW
Riverside	NW	W
Rialto	WSW	WSW
San Pedro	NW	WNW
South El Monte	WSW	WNW

6.3 Analytical Approach

The microscale program employed mobile platforms at 14 communities for more intensive sampling, but for a more limited period of sampling, than occurred at the 10 fixed sites. Typical sampling periods were four to five weeks, with two to three samples per week. This differed from the fixed site schedule of one sample every sixth day for a full year. At the outset, the microscale samples were collected to optimize field efficiency, irrespective of the fixed site schedule. It was noted by the ATSTRG that a better approach would be to have as many samples coincide with the fixed site schedule to gain a greater number of comparative samples. Thus, for the first six months of the study, two to three samples collected at a microscale site were taken on the same days as fixed site sampling. For the latter six months, the number of coincidental samples increased to five. (Because microscale samples were only analyzed by the AQMD laboratory, and because some differences in analytical results occurred between AQMD and ARB laboratories, for purposes of comparisons between microscale and fixed sites, only those samples analyzed in the AQMD laboratory were used.) Laboratory analytical techniques followed the same procedures as described for the MATES-II fixed sites, except that VOC samples were collected in 8-hour increments over the course of one day, from 0000-0800, 0801-1600, and 1600-2400. At the fixed sites, one 24-hour integrated sample for VOCs was collected.

6.4 Monitoring Results and Findings

As shown previously in the discussion on the MATES-II sites, there are strong seasonal variations in toxic concentration levels and associated carcinogenic risks. This presents a

significant limitation in estimating annualized risk conditions with only a one-month period of sampling at the microscale sites. If there were no seasonal differences, then limited sampling could be used to reasonably approximate an annual condition. With strong seasonality, the ability to estimate annual conditions is predicated on statistical analyses to determined confidences in such estimates. These confidences are improved somewhat where coincident sampling dates occur. When sampling occurs on different dates, changes in meteorology or emissions on a day sampled at a microscale site as compared to a different day sampled at a fixed site, add another level of complexity which cannot be fully accounted for. Given these uncertainties, certain types of limited analyses can at least yield insights and dimensions which can add useful information to that obtained from the fixed site network. The most useful information is obtained by comparing a microscale site to its geographically closest fixed site during the period when the microscale site was operating. That way, comparisons are made for the same seasonal time frame without extrapolating to an annual condition. It also means that, where seasonal variability is large, one microscale site cannot be compared to another microscale site. It is the microscale-fixed site pairings that are most useful.

6.4.1 Microscale-Fixed Site Comparisons

To evaluate the data collected for each microscale site and its paired fixed site, statistical analyses were conducted and summaries were compiled. These are presented in Appendix VI, where complete descriptions for each of the microscale sites are presented, along with details about the data collected, the emissions inventories compiled, and the modeling conducted.

Table 6-3 summarizes the results of the paired analyses, which depict those comparisons in which the microscale sites are statistically greater than the paired fixed site. (Since the purpose of the microscale program is to focus on localized "hot spots," those situations where the fixed sites are statistically greater than the microscale sites are not shown.) As can be seen in this table, there are relatively few cases where the microscale sites are statistically greater than its corresponding fixed site. Most of these differences are with regard to the carbonyls, including formaldehyde, acetaldehyde, acetone, and methyl-ethyl-ketone (MEK). The latter two are not considered carcinogens. At 7 of the 13 paired sites, at least one of these compounds is statistically greater at the microscale sites. We believe this observation may be an artifact of the difference in sampling times. At the fixed sites, one 24-hour sample was collected on each sampling day, while at the microscale sites, three 8-hour samples were collected on each sampling day, with the results averaged to represent 24 hours. Experts on sampling carbonyls have suggested that reactions can take place over 24 hours which can reduce the level of some compounds by the time the laboratory analyses are conducted. Thus there may be a bias in favor of lowered measurements at the fixed sites, resulting in the higher number of significant differences for these compounds. Further, formaldehyde and acetaldehyde are more commonly associated with mobile sources, not stationary sources. With no significant differences observed for either benzene or 1,3 butadiene (key mobile source-related compounds) at any of the 13 paired sites, it is more likely that methodological differences are accounting for these results.

Table 6-3
Summary of Cases: Microscale Site > Fixed Site with 90% Confidence

Pollutant	Anaheim	Boyle Heights	Costa Mesa	Corona	Hawthorne	Montclair	Norwalk	Pacoima	Rialto	Riverside	San Pedro	Torrance	Van Nuys
Chloromethane [1]													
Chloroethane													
1,3 Butadiene													
1,1 Dichloroethane [1]													
Methylene Chloride	x												
1,1 Dichloroethane													
Chloroform						x							
Ethylene Dichloride													
Benzene													
Carbon Tetrachloride													
Trichloroethene						x	x						
Toluene [1]													
Ethylene Dibromide													
Perchloroethylene													
Ethylbenzene [1]													
(m+p)-Xylene [1]						x							
Styrene [1]	☒			x									
o-Xylene [1]													
p-Dichlorobenzene													
o-Dichlorobenzene [1]													
Formaldehyde *	x		x	x		x					☒		
Acetaldehyde *	x						x				x		
Acetone * [1]	x	x	x	x		x	x				x		
MEK * [1]	x												
Hexavalent Chromium													
Arsenic													
Nickel													
Selenium [1]													
Cadmium													

* Measurement methodological differences may be causing the statistical differences shown for these compounds.
[1] No risk factors established for these pollutants.
x Levels at Microscale site > levels at Fixed Site with 90% confidence.
☒ Subset of x, but with substantially greater concentrations at the microscale site

There is one exception, and that is for formaldehyde at San Pedro. Relatively few samples are available for the paired analyses because the sampling period extended beyond March 1999 when the fixed site network completed one year of sampling. Levels observed at San Pedro not only are statistically higher than its paired site at Wilmington, but the levels measured during this period were considerably higher than at any other fixed site in the network. Examination of the data from all samples for the carbonyls at San Pedro are shown in Table 6-4. What is unusual about the formaldehyde data is that there appears to be decreasing levels over time. If there was a local source, there would likely be significant changes among the three time periods as winds changed from daytime to nighttime flows. Since the within-day levels are reasonably constant, but the changes from the beginning of the sampling period in March to the end of the period in April are very substantial, an extremely close source is suspected. The San Pedro site was located on a vacant lot near an apartment complex, so there are no known nearby sources to account for the observed levels. Initially, it was suspected that modifications made to the platform may have caused "outgassing" of formaldehyde. Building materials and certain adhesives found in carpeting outgass formaldehyde for a limited period of time. However, modifications to the platform in response to meeting city permit criteria involved only electrical modifications which would not be a source of formaldehyde. It is suspected that contamination of the sampling equipment is the cause of this anomaly. Decreasing levels of formaldehyde over time coupled with insensitivity to wind directional changes are not characteristics of local source influences. Also, the relationship between formaldehyde and acetaldehyde, which was shown in the fixed site network to be highly correlated, did not exhibit the same relationship at the San Pedro site. Therefore, we believe these data are not representative of ambient conditions in the Basin, but rather an artifact of sample contamination.

Aside from the carbonyls, it can be seen from Table 6-3 that there are only seven cases of statistical significance for microscale compounds out of a total of 325 possible pairs (24 compounds times 13 paired sites.) For methylene chloride, one case was observed at the Anaheim-Anaheim pair. Because this compound does not show strong seasonal variation (as shown in Figure 3-5) it is reasonable to be able to compare to other fixed sites without introducing distortions that would otherwise occur for compounds which exhibit seasonal variations, such as benzene or 1,3 butadiene. Levels of methylene chloride measured at the Anaheim <u>microscale</u> site were close to levels observed at Huntington Park, Compton, and Burbank. Furthermore, the levels observed at the Anaheim <u>fixed</u> site were the lowest of any of the fixed sites used in the paired analyses. Thus we can conclude that the statistical difference observed was more a result of very low levels at the Anaheim fixed site than as a result of having unusually high levels at the microscale site.

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Table 6-4
Carbonyl Results at San Pedro Site

Date Field		see below		Formaldehyde		Acetaldehyde		Acetone		MEK	
	Station	Interval	Cartridge	(ppbv)	MDL	(ppbv)	MDL	(ppbv)	MDL	(ppbv)	MDL
3/25/99	San Pedro	8A	826A	32.0	0.1	6.6	0.1	16.3	0.1	1.1	0.1
3/25/99	San Pedro	8B	827A	33.9	0.1	5.2	0.1	10.8	0.1	0.8	0.1
3/25/99	San Pedro	8C	828A	36.0	0.1	6.7	0.1	16.0	0.1	1.2	0.1
3/28/99	San Pedro	8A	845A	36.6	0.1	8.8	0.1	20.1	0.1	1.7	0.1
3/28/99	San Pedro	8B	846A	34.0	0.1	5.3	0.1	10.3	0.1	1.2	0.1
3/28/99	San Pedro	8C	847A	35.2	0.1	6.0	0.1	12.9	0.1	1.1	0.1
4/3/99	San Pedro	8A	862A	22.2	0.1	4.6	0.1	11.2	0.1	0.7	0.1
4/3/99	San Pedro	8B	863A	20.6	0.1	3.5	0.1	6.5	0.1	0.6	0.1
4/3/99	San Pedro	8C	864A	13.8	0.1	2.5	0.1	4.1	0.1	0.4	0.1
4/6/99	San Pedro	8A	857A	17.1	0.1	3.6	0.1	7.7	0.1	0.6	0.1
4/6/99	San Pedro	8B	858A	20.0	0.1	3.5	0.1	7.1	0.1	0.7	0.1
4/6/99	San Pedro	8C	859A	17.8	0.1	3.3	0.1	6.2	0.1	0.5	0.1
4/9/99	San Pedro	8A	855A	11.3	0.1	2.4	0.1	4.6	0.1	0.4	0.1
4/9/99	San Pedro	8B	884A	11.4	0.1	2.5	0.1	4.8	0.1	0.4	0.1
4/9/99	San Pedro	8C	885A	12.1	0.1	2.7	0.1	4.5	0.1	0.4	0.1
4/12/99	San Pedro	8A	873A	14.9	0.1	3.9	0.1	8.6	0.1	0.6	0.1
4/12/99	San Pedro	8B	874A	14.3	0.1	3.0	0.1	5.9	0.1	0.5	0.1
4/12/99	San Pedro	8C	875A	14.0	0.1	2.9	0.1	5.9	0.1	0.5	0.1
4/15/99	San Pedro	8A	887A	17.7	0.1	5.6	0.1	11.3	0.1	1.4	0.1
4/15/99	San Pedro	8B	888A	19.3	0.1	8.4	0.1	12.9	0.1	3.6	0.1
4/15/99	San Pedro	8C	889A	13.6	0.1	5.1	0.1	10.0	0.1	1.4	0.1
4/18/99	San Pedro	8A	890A	14.0	0.1	6.7	0.1	14.5	0.1	1.6	0.1
4/18/99	San Pedro	8B	891A	17.4	0.1	8.1	0.1	13.7	0.1	2.5	0.1
4/18/99	San Pedro	8C	892A	12.5	0.1	4.9	0.1	10.4	0.1	1.3	0.1
4/21/99	San Pedro	8A	893A	NS	0.1	NS	0.1	NS	0.1	NS	0.1
4/21/99	San Pedro	8B	894A	NS	0.1	NS	0.1	NS	0.1	NS	0.1
4/21/99	San Pedro	8C	895A	7.6	0.1	2.0	0.1	3.9	0.1	0.6	0.1
4/24/99	San Pedro	8A	896A	6.5	0.1	2.0	0.1	3.6	0.1	0.4	0.1
4/24/99	San Pedro	8B	897A	6.5	0.1	1.8	0.1	2.9	0.1	0.5	0.1
4/24/99	San Pedro	8C	908A	6.6	0.1	2.0	0.1	3.5	0.1	0.5	0.1
4/27/99	San Pedro	8A	910A	6.6	0.1	2.0	0.1	4.1	0.1	0.7	0.1
4/27/99	San Pedro	8B	911A	8.1	0.1	2.9	0.1	5.4	0.1	0.9	0.1
4/27/99	San Pedro	8C	912A	6.1	0.1	1.7	0.1	3.2	0.1	0.5	0.1

Interval = 8-hour, A=0000 to 0800; B=0800 to 1600 and C=1600 to 2400 hours

One statistical difference was observed for chloroform at the Montclair site. Chloroform measurements here were just slightly above the minimum detection limit of the instrument (0.05 ppb). The levels at Montclair were 0.06 ppb. The statistical inference is associated with the measurement detection limit, since the paired site at Fontana did not have any samples above the detection limit, and hence the Fontana site had no statistical variability. Levels at Montclair are consistent with levels measured at other fixed sites, and hence there is no unusually elevated level of chloroform at the Montclair site.

Trichloroethene (TCE) was found to be significantly higher at two sites, Montclair and Norwalk. Interestingly, these sites were selected because of their proximity to mobile sources, yet TCE is not associated with mobile source emissions. Examination of the data reveal a similar situation to that described above for chloroform: levels at these two microscale sites were barely above detection limits (0.07 ppb and 0.06 ppb, respectively) while their corresponding fixed sites did not exceed detection limits. Comparing to other fixed sites, the levels observed at these microscale sites were lower than those observed at other fixed sites. Hence, no unusually high levels of TCE are evident. Another compound found significantly higher at Montclair, as compared to the Fontana fixed site, is (m+p)-xylene. This compound is not considered an air toxic, and is primarily associated with mobile source emissions. Because mobile source emissions tend to have substantial seasonal variation, it is directly comparable to other fixed sites. The proximity of the Montclair site to the I-10 Freeway is likely the factor accounting for the statistical significance.

Lastly, styrene is statistically higher at Anaheim and Corona. Styrene ~~also is~~ has not currently been assigned ~~considered to be~~ a carcinogenic risk factor, although it has been associated with certain acute health effects. The levels at Anaheim are the highest (5.04 ppb) observed at any of the sites, either microscale or fixed. Additional analysis reveals the existence of three localized sources of styrene in the vicinity of the monitoring site, outside the prescribed wedge (see Section 6.5), contributing to elevated levels there. (See Figure 6-2) At Corona, though statistically higher, the measured levels (1.39 ppb) are not unusual compared to other fixed sites.

Discussions and general observations regarding each of the pairs are as follows:

1) Anaheim (micro) - Anaheim (fixed): Microscale site has localized influence from three sources of styrene emissions, which happened to be outside of the prescribed wedge (as shown in Figure 6-2~~1~~), and exhibits higher influence from mobile sources than is observed at the fixed site.

2) Boyle Heights (micro) - Huntington Park (fixed): No significant differences observed for any compounds except for acetone, not considered to be an air toxic. Huntington Park has greater mobile source influence.

3) Corona (micro) - Rubidoux (fixed): Corona may have higher levels of carbonyls (formaldehyde), but in general, mobile source influences are about the same at both sites. Higher levels of styrene observed at Corona, but not unusually high.

4) Costa Mesa (micro) - Anaheim (fixed): Generally similar, except that the Costa Mesa site has very low levels of benzene and 1,3 butadiene, indicating only small contributions from mobile sources.

5) Hawthorne (micro) - Compton (fixed): Nine compounds significantly higher at the fixed site (Compton) as compared to the microscale site. Both stationary and mobile source influence greater at Compton.

6) Montclair (micro) - Fontana (fixed): Montclair has greater mobile source influence as compared to Fontana, especially for carbonyls (formaldehyde). Chloroform and TCE are significantly higher than Fontana, but levels are just barely above instrument detection limits, and the levels of these two compounds are similar to observed at other fixed sites.

7) Norwalk (micro) - Compton (fixed): TCE and carbonyls higher at Norwalk. Although Norwalk was selected because of its proximity to mobile sources (at the convergence of the 105 and 605 freeways), there are no appreciable differences in observed levels of key mobile source compounds.

8) Pacoima (micro) - Burbank (fixed): Very similar, except that Burbank has significantly greater levels of perchloroethylene and formaldehyde.

9) Rialto (micro) - Fontana (fixed): Almost identical. No significant differences observed for any compounds.

10) Riverside (micro) - Rubidoux (fixed): Very similar. No significant differences observed for any compounds, although key mobile source compounds tend to be higher at Rubidoux.

11) San Pedro (micro) - Wilmington (fixed): This pair had a very limited number of comparative samples. Very high levels of formaldehyde were observed at San Pedro. (See earlier discussion.)

12) Torrance (micro) - Compton (fixed): Compton shows greater influence from mobile sources. Levels of mobile source emissions, mainly benzene and 1,3 butadiene, are especially low at Torrance.

13) Van Nuys (micro) - Burbank (fixed): Very similar. No significant differences observed for any compounds, although Burbank shows greater mobile source influence.

(Note: There is no comparison made for the South El Monte microscale site since that sampling did not occur until after the fixed site network had completed its one full year of sampling, and therefore there were no comparative sites available. However, as shown in

the next section, the relationship between mobile and stationary sources at South El Monte is similar to other microscale sites.)

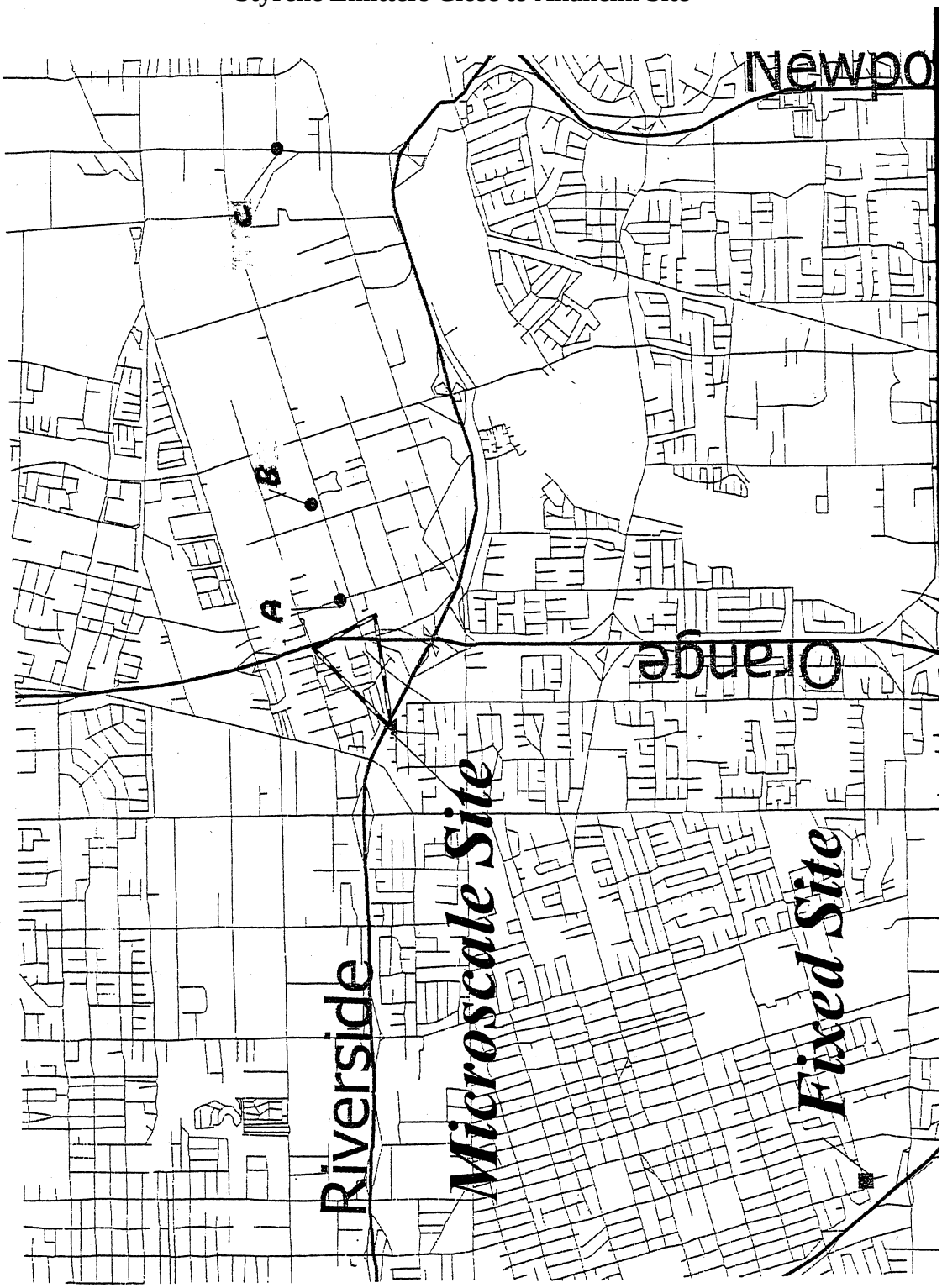
6.4.2 Mobile/Stationary Source Influences

Although the cancer risks at the microscale sites are not being estimated due to the limited nature of the sampling, the risk factors can be used to determine the relative importance, on a risk-weighted basis, of mobile versus stationary sources at each of the microscale sites. Using benzene, 1,3 butadiene, and 50% of the carbonyls as indicators of mobile source influences, and all other compounds as indicators of stationary source emissions, the relative risk-weighted importance of each source group is shown in Figure 6-3 for all 14 microscale sites*. There are some important caveats with this analysis. Since mobile source compounds vary substantially by season, whereas the stationary source compounds tend to be more seasonally invariant, those microscale sites sampled during the fall and winter months should show greater mobile source influences than would be expected on an annual basis. Conversely, those sites sampled during the spring and summer months would tend to show less mobile source influence than would be expected annually. Figure 6-3 is therefore arranged such that the first group of sites are those sampled in the fall/winter months; the second group in the spring/summer months; and the third group representing all seasons at Hawthorne and Pacoima.

In general, it can be seen that the mobile source influences are indeed greater at those sites sampled in the fall/winter months as compared to those sampled in the spring/summer months. In all but two cases (Torrance and Cost Mesa), all microscale sites show greater mobile source influence than from stationary sources. (The evaluation for San Pedro is not considered part of this statement because of the concerns about the local influence from the monitoring platform, as described previously.) Thus the efforts to locate monitors in neighborhood areas expected to have substantial stationary source influences from toxic emissions did not reveal such influences. (The two sites shown to have dominant fractions from stationary sources were not so much from elevated levels of compounds emitted from such sources, but rather from a noticeable lack of emissions from mobile sources.)

*Elemental carbon was not measured at microscale sites; hence contributions from diesel particulates cannot be estimated for these sites.

Figure 6-2
Styrene Emitters Close to Anaheim Site



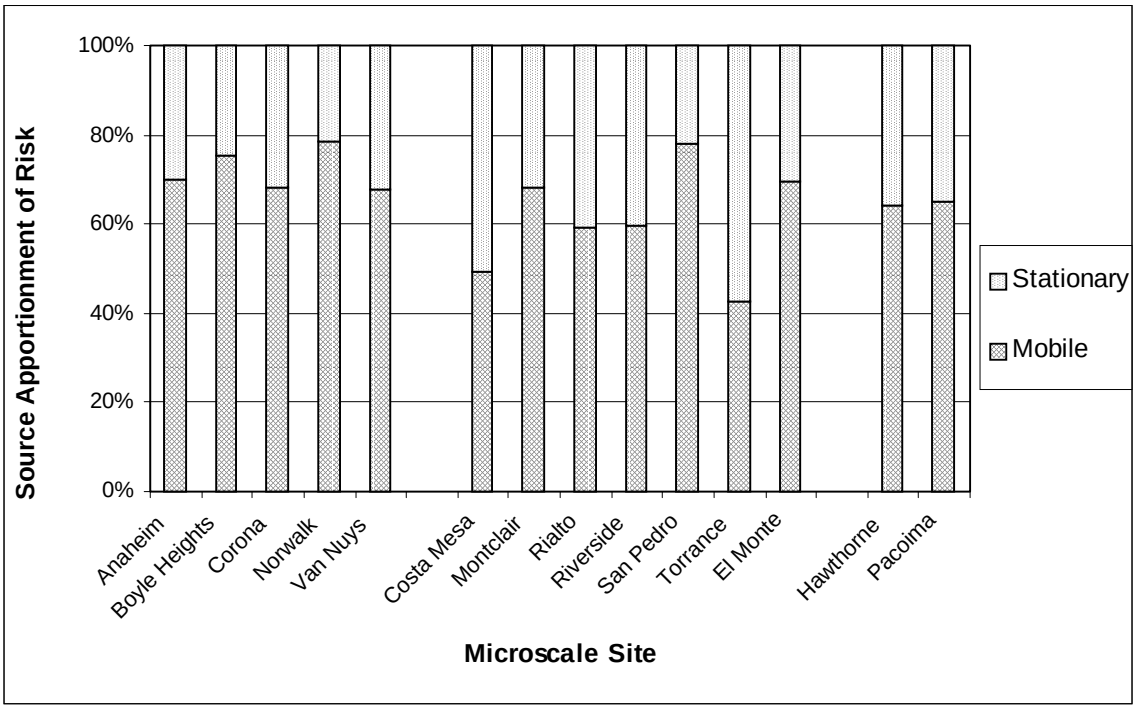


Figure 6-3. Relative Influence of Mobile and Stationary Sources at Microscale Sites, On a Risk-Weighted Basis, Excluding Diesel Particulates

6.5 Emissions Inventory

The purpose of the microscale emissions inventory effort was three-fold: 1) to inform the air monitoring staff about the possible presence of any unusual compounds so that specialized instrumentation could be included in the air monitoring station; 2) to correct for inconsistencies after the regional modeling effort is completed; and 3) to conduct microscale air dispersion modeling to determine the local impact of the emission sources.

For each of the fourteen microscale study sites, a wedge of influence was defined as a function of predominant wind direction and frequency. The sources of toxic emissions for non-AB2588 facilities within the wedge were determined utilizing numerous sources of information including District data, personal drive-by, and interviews with the owners/operators of the facilities. Quantification of emissions relied on estimates, facility feedback, District permit data, product information, and Material Safety Data Sheets. For facilities identified as AB2588 sources, District's AB2588 data base was used to generate the most recent emissions inventories.

Table 6-5 presents a summary of toxic emissions for all fourteen sites. Four of the sites (Anaheim, Hawthorne, Norwalk and Riverside) had no identified sources of toxic emissions within the prescribed wedge. Boyle Heights had the most number of sources of emissions identified within the wedge. Appendix VI contains all the emissions inventory information pertaining to the Microscale Study.

Table 6-5
Summary of Microscale Emissions Inventories by Site

Pollutant	Emissions (lbs/year)									
	Boyle Heights	Corona	Costa Mesa	Montclair	Pacoima	Rialto	San Pedro	South El Monte	Torrance	Van Nuys
1,3-Butadiene	--	--	0.70	--	--	--	--	0.01	2.29	--
1,4-Dioxane	--	--	--	--	--	--	--	--	10.48	--
2- butoxyethanol	--	--	--	--	--	--	--	131.04	--	--
Acetaldehyde	0.27	--	--	--	--	--	--	--	--	--
Acetone	116.48	1.25	--	--	61.15	--	--	4630.08	2812.99	--
Acrylonitrile	--	--	0.00	--	--	--	--	--	2.91	--
Aldehydes	--	--	--	--	0.05	--	--	--	--	--
Ammonia	--	--	--	--	124.80	--	--	2.75	--	--
Benzene	0.36	5.85	0.25	8.74	1.84	0.19	0.43	0.01	0.01	5.85
Benzo[a]pyrene	--	0.00	--	--	0.00	0.01	0.01	--	--	--
Cadmium	--	--	--	--	--	--	--	--	0.02	--
Carbon black	0.96	--	--	--	0.06	--	--	--	0.01	--
Chromic acid	--	--	--	--	--	--	--	1.41	--	--
Chromium, hexavalent	0.92	--	--	--	--	--	--	--	0.01	--
Cobalt	--	--	--	--	--	--	--	0.01	--	--
Copper	--	--	--	--	0.01	--	--	--	0.04	--
Cyclohexane	--	--	--	--	--	--	--	778.44	--	--
Dibutyl phthalate	--	--	--	--	22.71	--	--	--	--	--
Diesel, particulate	87.36	--	--	--	--	0.52	--	--	--	--
EGBE	--	--	--	--	--	--	--	148.51	--	--
Ethyl benzene	--	--	--	--	--	--	--	122.30	--	--
Formaldehyde	1.19	0.06	0.00	--	0.00	0.08	0.04	--	691.44	--
Furan	--	0.38	--	--	0.09	0.76	1.12	--	--	--
Glycol ethers	--	15.60	--	--	10.48	--	--	--	76.88	--
Hexamethylene-1,6	--	--	0.05	--	--	--	--	--	--	--
Hexane	--	--	--	--	18.35	--	--	--	2795.52	--
Hydrofluoric acid	--	--	--	--	--	--	--	0.05	--	--
Isopropanol	95.68	--	--	--	200.93	--	--	410.59	480.48	--
Lead	--	--	--	--	0.44	--	--	--	--	--
Manganese	0.78	--	--	--	--	0.64	--	0.01	0.05	--
Methanol	--	--	--	--	79.50	--	--	--	1135.68	--
Methyl ethyl ketone	--	--	194.69	--	253.34	--	--	--	--	--
Methylene chloride	95.68	24.96	--	--	--	--	13.00	--	--	--
Naphthalene	1.86	--	--	--	--	--	--	--	--	--
Nickel	1.13	--	--	--	--	--	--	--	0.00	--
Nickel acetate	--	--	--	--	--	--	--	0.79	--	--
Nitric acid	--	--	--	--	--	--	--	0.79	--	--
PAH	2.04	0.09	--	--	0.02	0.17	--	--	--	--
Perchloroethylene	1787.50	--	--	--	234.00	--	--	0.73	--	--
Phosphoric acid	--	--	--	--	0.42	--	--	0.00	--	--
POM	0.09	--	0.00	--	--	--	--	--	0.00	--
Propylene glycol	--	--	--	--	60.19	--	--	--	--	--
Propylene oxide	--	--	--	--	22.71	--	--	--	0.06	--
Silica	0.64	--	0.00	--	--	0.52	--	--	0.14	--
Silicon	0.05	--	--	--	--	0.04	--	--	--	--
Silver	--	--	--	--	--	--	--	--	0.00	--

Table 6-5 Cont'd.
Summary of Microscale Emissions Inventories by Site

Pollutant	Emissions (lbs/year)									
	Boyle Heights	Corona	Costa Mesa	Montclair	Pacoima	Rialto	San Pedro	South El Monte	Torrance	Van Nuys
Sodium hydroxide	--	--	--	--	--	--	--	18.30	--	--
Styrene	--	--	--	--	--	--	--	0.00	0.16	--
Sulfates	--	--	--	--	--	--	--	11.65	--	--
Sulfuric acid	--	--	--	--	2.50	--	--	41.60	--	--
Toluene	372.69	0.62	--	1.92	410.99	0.43	0.05	227.14	59.40	175.40
Trichloroethane-1,1,2	--	--	--	--	--	--	--	--	366.91	--
Trichloroethylene	--	--	--	--	--	--	--	7.25	--	--
Vinyl acetate	--	--	--	--	--	--	--	0.00	--	--
Xylenes	132.11	1.31	85.28	0.96	139.98	0.21	0.04	1257.98	--	1.31

6.6 Local-Scale Modeling

For purposes of local-scale modeling, the Industrial Source Complex (i.e., ISC3) air quality model is used for the subgrid level modeling presented here. The ISC3 model is included in the U.S. EPA "Guideline on Air Quality Models" (U.S. EPA, 1996a) and has been widely used for regulatory air quality assessment. The model is also recommended by the California Air Pollution Control Officers Association (CAPCOA) for estimating exposure to toxic air contaminants (CAPCOA, 1993). The model is a steady-state Gaussian plume model, which can be used to assess pollutant concentration from a wide variety of sources, associated with an industrial source complex. The model simulates the dispersion of emissions from point, area, and volume sources and can account for building downwash, dry deposition, and decay of chemicals. The short-term version of the model (ISCST3) accepts hourly meteorological data records to define the conditions of plume rise, transport, and diffusion. The model estimates hourly concentrations for each source and receptor combination and calculates averages for various user-selected short-term periods and for annual or longer averaging periods. The model is appropriate for transport distances less than 50 kilometers. The short-term version of the model is applied using hourly meteorological data at the microscale monitoring sites in the Basin. Important model options employed include: urban dispersion parameters (i.e., URBAN) and no calm wind processing (i.e., NOCALM). The URBAN option assumes atmospheric dispersion rates typical of an urban environment. The NOCALM option simulates dispersion even under calm wind conditions by assuming a minimum wind speed of 1 m/s. This is important because winds are often calm or near calm in southern California. All other model options assumed the default values.

Where detailed stack information was not available, for the surveyed sources, facility emissions are simulated using a ground-based volume source treatment in ISCST3. The volume source dimensions for all the sources are assumed to be 15m by 15m horizontal dimensions and 6m vertical dimension. The operating hours per day are unique for each facility but all facilities are assumed to operate 365 days per year.

A cartesian coordinate receptor grid is used to estimate peak concentrations in the local area within and surrounding the facilities modeled. The receptor spacing assumed is 25m with all receptors placed at ground level. The horizontal extent of the modeling domain is such that all the sources are within its boundaries. Each facility is assumed to have a 25m property line from the center of the volume source. In other words, impacts from the facility are estimated at receptors greater than 25m from the center of the source. Flat terrain is assumed, since emissions are treated as a non-buoyant volume source.

ISCST3 is applied with two distinctly different meteorological data sets: one based on the 1981 calendar year and another for the period from April 1998 to March 1999. The District has 1981 meteorological data (i.e., hourly winds, temperature, atmospheric stability, and mixing heights) at 35 sites in the Basin and vicinity. These data are available at the District's web site (www.aqmd.gov/metdata) and are in a format that can be directly read by ISCST3. These data are typically used by permit applicants to satisfy the modeling requirements of Regulations XIII, XIV, XVII, and XX.

Hourly three-dimensional fields of wind and temperature and hourly two-dimensional fields of mixing depth and atmospheric stability were developed for the period from April 1998 to March 1999 for the UAM simulations discussed in Chapter 5. The meteorological model called CALMET was used to develop these fields. These hourly meteorological data are extracted from each grid cell containing the microscale site and reformatted for ISCST3 input. Therefore annual simulations are performed using both the 1981 meteorological data and the 1998/99 meteorological data. Results of both simulations are provided in Table 6-6 and in Appendix VI. Appendix VI contains the complete modeling results and relevant background information for each microscale site including location, emissions, wind data, comparison to fixed sites, and model results for concentration as well as cancer risk.

From Table 6-6, it can be seen that none of the predictions for the monitoring sites exceeded a risk level of 10 in a million. (The highest risk from local influences at a monitoring site is only about 5 in a million at Boyle Heights.) This means that regional conditions overwhelm local influences. The model also shows that significant influences from local sources may occur (e.g., estimated 588 in a million at Boyle Heights), but that rapid decreases in concentrations occur over relatively short distances. In the case of Boyle Heights, the predicted maximum near the source was over 100 times higher than the level at the monitor, less than one mile away. At Torrance, the predicted ~~risk levels were about~~ maxima were approximately 10 times ~~lower at~~ greater than those predicted for the monitor.

Table 6-6
Summary of ISCST3 Predicted Cancer Risks* at the Microscale Sites

Microscale Site	**Predicted Risks Using 1981 Meteorology**		Predicted Risks Using 1981 Meteorology		Pollutants contributing 90% of cancer risk
	At Monitor	Maximum	At Monitor	Maximum	
Anaheim	0.0	0.0	0.0	0.0	No carcinogens emitted
Boyle Heights	4.8	464.0	4.5	588.0	Hexavalent chromium perchloroethylene, diesel PM
Corona	0.5	1.3	0.6	1.7	PAH, benzene
Costa Mesa	0.0	1.1	0.0	1.3	1,3 butadiene
El Monte	0.0	1.9	0.0	2.4	nickel acetate, trichloroethylene
Hawthorne	0.0	0.0	0.0	0.0	No carcinogens emitted
Montclair	0.0	3.2	0.0	2.6	benzene
Norwalk	0.0	0.0	0.0	0.0	No carcinogens emitted
Pacoima	0.1	14.0	0.1	21.0	benzene, PAH, perchloroethylene
Rialto	0.2	2.3	0.1	1.9	PAH, benzo(a)pyrene, diesel PM
Riverside	0.0	0.0	0.0	0.0	No carcinogens emitted
San Pedro	0.0	3.6	0.0	2.4	benzene, PAH,
Torrance	2.6	36.6	3.7	43.9	formaldehyde, trichloroethana
Van Nuys	0.0	1.9	0.0	2.4	benzene

***Per Million**