6.0 SOURCE-RECEPTOR RELATIONSHIPS

After optimizing the model parameters to the extent possible, we used STATMOD to assess the contribution of the seventeen zones to the sulfur and nitrate deposition at various receptor locations. To minimize the year to year fluctuations, we performed the simulations for a composite year and for composite seasons. The data files for the composite year were constructed by taking weighted averages of the data for the individual years for the period of interest (1984 through 1989). Similarly, each composite season was constructed by taking weighted averages of the data for that season for the individual years.

The discussion in this section refers to the annual source-receptor relationships. The seasonal relationships are presented in Appendix B. It should also be noted that the source-receptor relationships described here are only for the anthropogenic emissions that were used in our simulations. The contribution of sea-salt or other natural sources, such as wind-blown soil dust, are not included in these results, since their emissions were not available.

The source-receptor relationships described here are presented in two ways: 1) the contribution of each source region to acidic deposition at a receptor, and 2) the zone of influence for a receptor. The zone of influence is a measure of the area around a given receptor location that predominantly influences the estimated deposition at the location. The zone of influence for receptor "j", Z_j, is determined using the following equations:

$$R_{ij} = \frac{\sum_{k=1}^{M} (Q_{ik}\, d_{kj})}{\sum_{k=1}^{M} Q_{ik}} \tag{6-1}$$

$$Z_j = \frac{\sum_{i=1}^{N} (P_{ij}\, R_{ij})}{100} \tag{6-2}$$

where,

R_{ij} = weighted source-receptor distance
M = Number of emission sources within a source region "i"
N = Number of source regions

Q_{ik} = Source strength of source "k" in a given source region "i"
P_{ij} = Percentage contribution to deposition at receptor "j" from source region "i"
d_{kj} = Distance of source "k", within a given source region "i", to receptor "j"

Table 6-1 shows the zone of influence for dry, wet, and total deposition of sulfur and nitrogen for all the receptor locations. Receptors with a low value of the zone of influence are affected primarily by local sources, while long-range transport is a factor for receptors with a large value of the zone of influence. We will discuss Table 6-1 later below in conjunction with the discussion of the contribution of source regions.

Source-receptor contributions are traditionally presented in a tabular format. However, we have chosen to use pie-charts to show the contribution of each source region to acidic deposition at selected receptor locations. This format allows the reader to quickly determine the important source regions that influence a given receptor. We selected the following ten receptors from various urban, rural, and remote regions of the state to create a representative sample for our analysis: Bakersfield, Santa Barbara, Yosemite, Pasadena, Sacramento, San Jose, Sequoia, S. Lake Tahoe, Montague, and Escondido.

Figure 6-1 shows the contributions of the various source regions (Figure 4-3) to annual total sulfur (SO_2 + sulfate) dry deposition at the ten receptor locations. The estimated dry deposition of total sulfur at these receptors ranges from 0.14 kgS/ha/yr at a remote site (Montague) to 2.14 kgS/ha/yr at an urban location (Pasadena). It is interesting to note that these values are an order of magnitude lower than sulfur depositions estimated in rural and urban locations in the eastern United States (e.g., UAPSP, 1992).

We see from Table 6-1 and Figure 6-1 that the contribution of local sources dominates the total sulfur dry deposition at receptors located in urban regions or close to large sources. This is expected because sulfur dry deposition in these regions is dominated by locally emitted SO_2. For example, 80 percent of the total sulfur dry deposition at Bakersfield can be attributed to Zone 9 (the Lower San Joaquin Valley). The zone of influence for sulfur dry deposition at Bakersfield is only 58 km. Similarly, the San Francisco Bay Area contributes almost 90 percent of the anthropogenic total sulfur dry deposition at San Jose, which has a zone of influence of 74 km. The Sacramento receptor is influenced by several source regions in its immediate vicinity, such as the San Francisco Bay Area, the Lower Sacramento Valley, and the Upper San Joaquin Valley. The zone of influence for total sulfur dry deposition in Sacramento is 88 km.

For remote receptors, such as Yosemite, we see some evidence of long-range transport. The largest contributors to the annual total sulfur dry deposition at Yosemite, which has a

TABLE 6-1

Zones of Influence for the Composite Year (km)

SITE	NOX			SOX		
	DRY	WET	TOTAL	DRY	WET	TOTAL
Bethel Island	151.2	162.1	152.1	86.8	131.0	98.8
Gasquet	380.0	404.0	389.4	288.5	502.8	465.7
S. Lake Tahoe	258.2	265.9	259.2	221.9	292.6	254.1
Eureka	237.3	265.5	242.6	81.9	174.4	131.4
Bakersfield	142.0	160.9	142.8	58.3	125.4	64.2
L. Isabella	186.2	186.2	186.2	145.0	161.3	149.5
Lakeport	202.6	208.2	203.5	166.2	233.8	199.4
San Rafael	95.8	110.1	98.3	41.8	74.6	54.7
Yosemite	247.9	256.2	249.9	197.6	251.7	231.4
Mammoth	290.3	295.5	291.2	244.7	292.9	270.8
Salinas II	179.1	192.7	180.2	130.6	160.3	139.1
Napa	119.9	132.6	121.5	58.4	102.8	72.7
Norden	250.6	258.9	252.9	214.9	290.6	266.4
Anaheim	69.1	91.5	70.0	40.1	85.9	44.3
Quincy	275.9	286.3	277.3	238.3	322.6	277.8
Sacramento	146.2	170.9	149.1	88.0	140.3	107.1
Victorville	124.2	127.8	124.4	48.9	101.7	53.6
San Bernardino	103.4	111.2	104.0	90.9	103.8	94.3
Nipomo	221.4	224.9	221.7	120.0	163.2	133.1
Santa Barbara	175.4	179.5	175.9	101.4	136.2	112.5
San Jose	121.4	148.2	123.3	74.3	104.3	82.8
Montague	317.7	340.9	319.3	239.5	402.6	293.2
Sequoia	247.6	249.5	248.0	197.3	224.4	214.1
Lindcove	224.6	230.7	225.0	157.3	182.9	163.4
San Nicolas Isl.	214.4	212.6	214.3	186.2	209.5	191.7
Berkeley	72.1	96.5	75.0	7.1	38.3	11.0
Reseda	89.9	99.3	90.7	80.8	129.7	90.9
Lynwood	59.0	80.6	60.3	25.4	84.7	31.1
Pasadena	69.5	81.5	70.7	61.8	109.7	72.4
Mt. Wilson	81.6	88.0	82.7	78.4	117.9	93.4
Tanbark Flats	89.7	96.0	90.6	78.9	100.1	86.9
Escondido	169.0	172.2	169.3	139.5	165.2	148.7

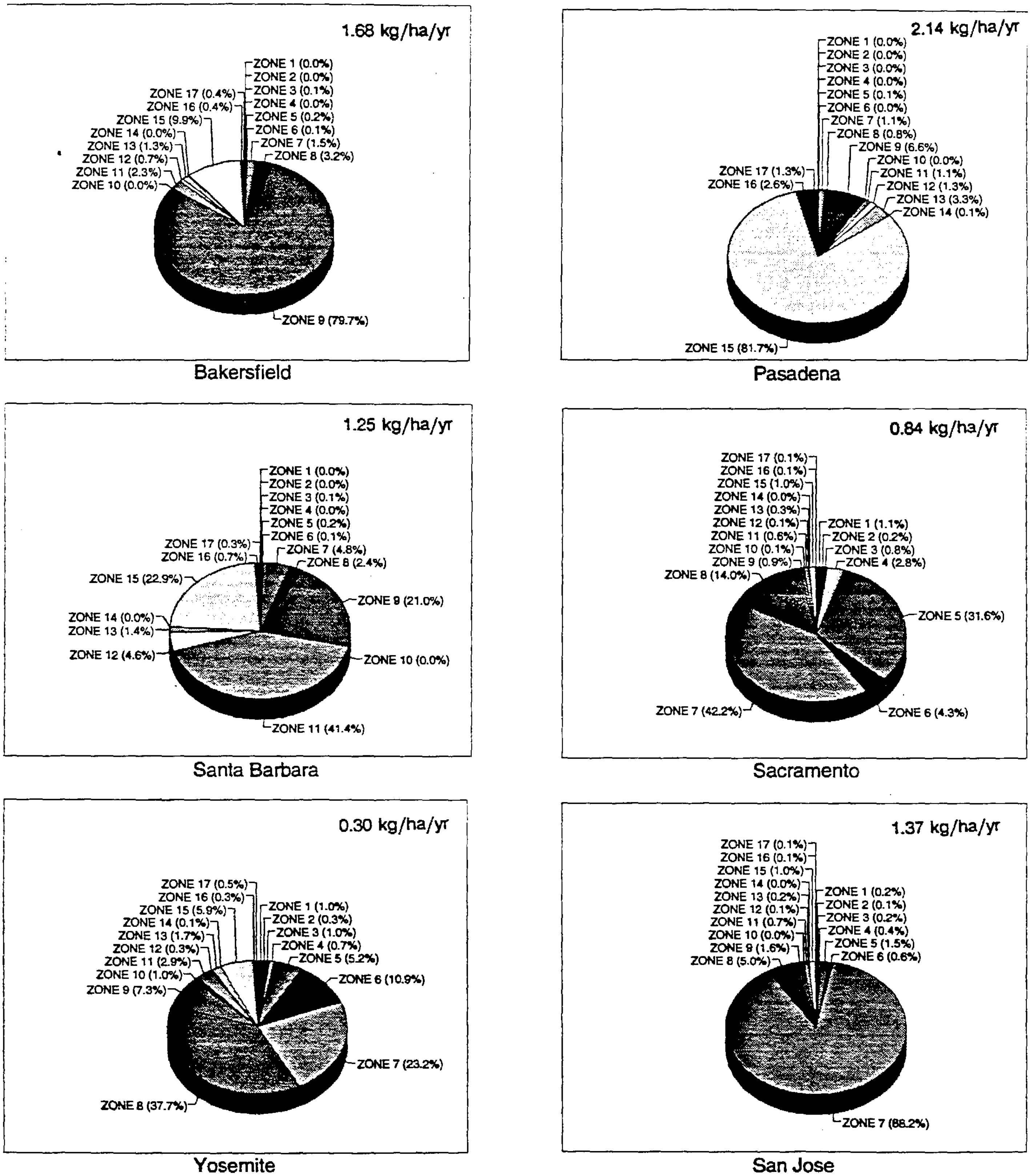
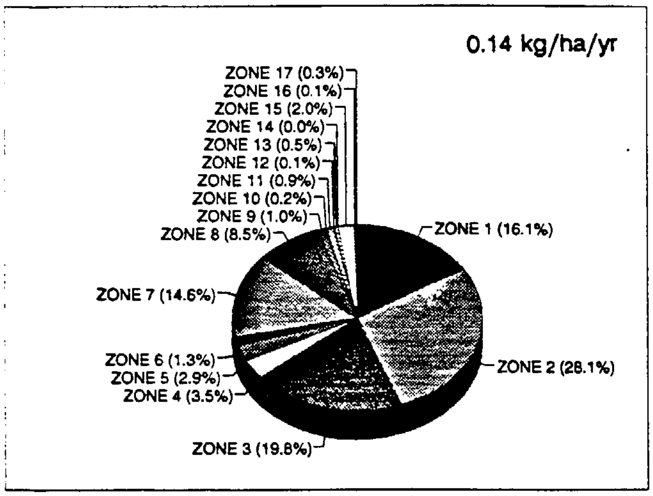
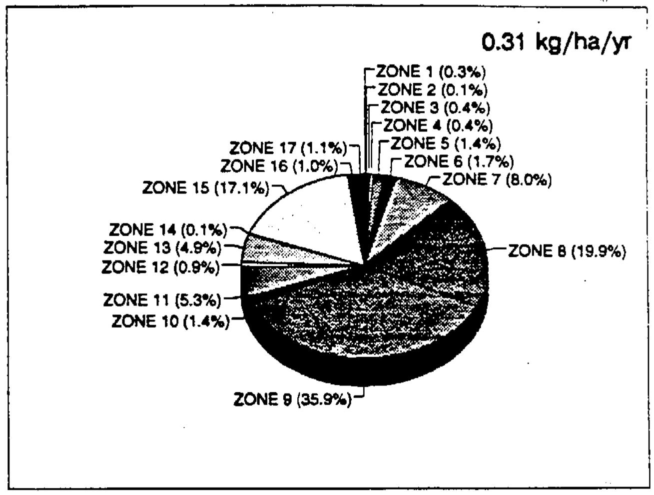


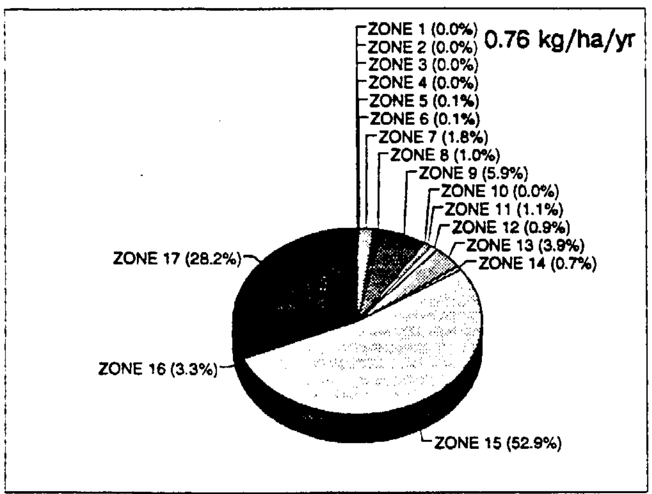
FIGURE 6-1. Contribution (%) of the 17 Source Regions to Annual Total Sulfur (SO_2 + Sulfate) Dry Deposition at Various Receptor Locations



Montague



Sequoia



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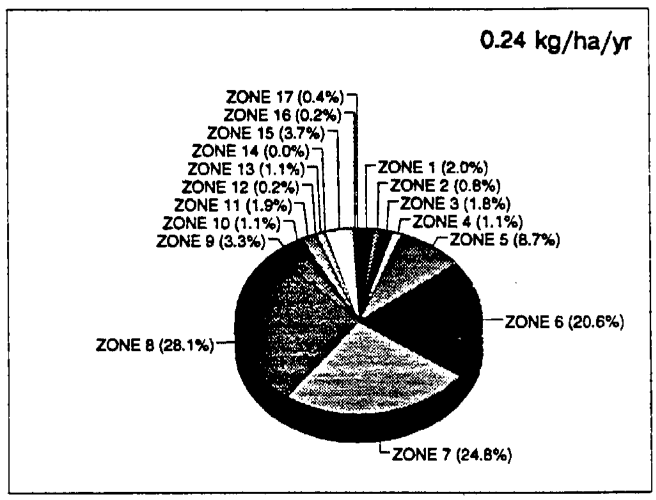


S. Lake Tahoe

FIGURE 6-1. (Cont'd) Contribution (%) of the 17 Source Regions to Annual Total Sulfur (SO_2 + Sulfate) Dry Deposition at Various Receptor Locations

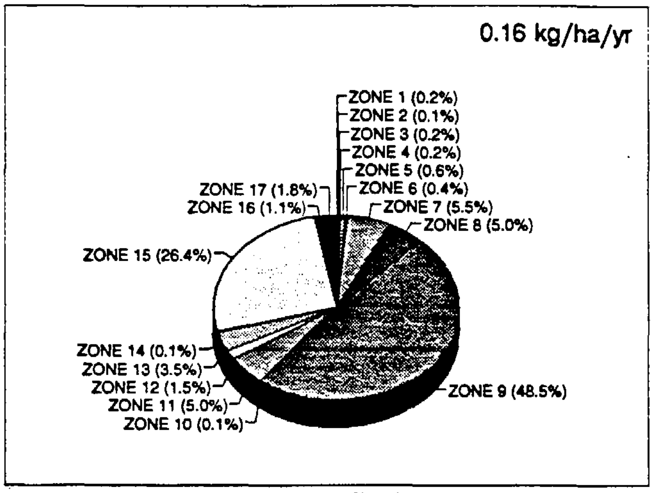
zone of influence of about 200 km, are the Upper San Joaquin Valley (38%) and the San Francisco Bay Area (23%). Similarly, Montague, which is located near the northern part of the state, and is far away from the major California source regions, has a zone of influence for total sulfur dry deposition of 240 km, and is influenced primarily by the Northeast Plateau (28%), the Upper Sacramento Valley (30%), the North Coast and Lake County (16%), and the San Francisco Bay Area (15%).

The source region contributions to annual total sulfur wet deposition at the ten receptor locations are shown in Figure 6-2. We see that sulfur wet deposition, even at receptors in the vicinity of large sources, has a long-range transport component. For example, the local contribution to total sulfur wet deposition at the Bakersfield location is 50 percent (as compared to 80 percent for sulfur dry deposition), and 25 percent of the wet deposition can be attributed to the South Coast Air Basin. The zone of influence for sulfur wet deposition in Bakersfield (see Table 6-1) is more than two times the zone of influence for dry deposition.

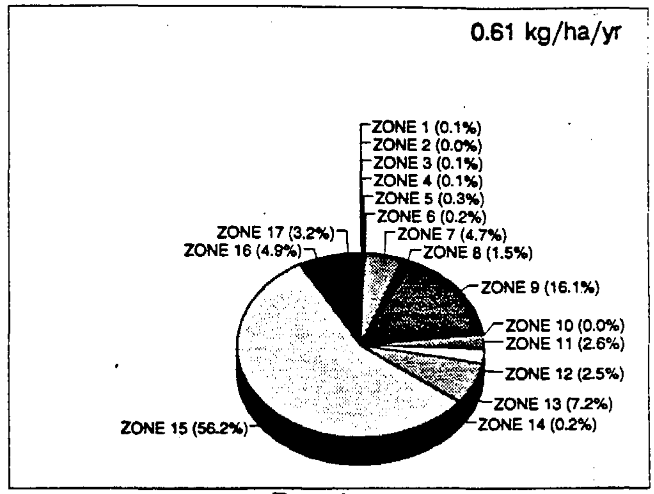
This distinction between dry and wet sulfur deposition is also apparent for a remote receptor such as Montague, where the zone of influence for sulfur wet deposition is 400 km (as compared to 240 km for sulfur dry deposition). Even a distant source region, such as the South Coast Air Basin, is estimated to contribute over 10 percent of the sulfur wet deposited at Montague. These results are consistent with studies performed in eastern North America under the National Acid Precipitation Assessment Program (NAPAP), in which SO_2 emissions in the midwestern United States have been found to make a significant contribution to the sulfur wet deposited at distant receptors (>1,000 km) in the northeastern United States and Canada. An explanation for the differences in the scales of dry and wet sulfur deposition is provided below.

The primary reason for the difference between dry and wet deposition of sulfur is that dry deposition of sulfur is dominated by SO_2 dry deposition and is thus a local phenomenon. On the other hand, a large fraction of the sulfur that is wet deposited can be attributed to the sulfate formed by the oxidation of SO_2 to sulfate in the gas-phase or in clouds. The gas-phase oxidation is a slow process, and the aqueous-phase oxidation is limited by the availability of the oxidant. Thus, we can expect that a large fraction of the sulfur in rain has been transported over long distances.

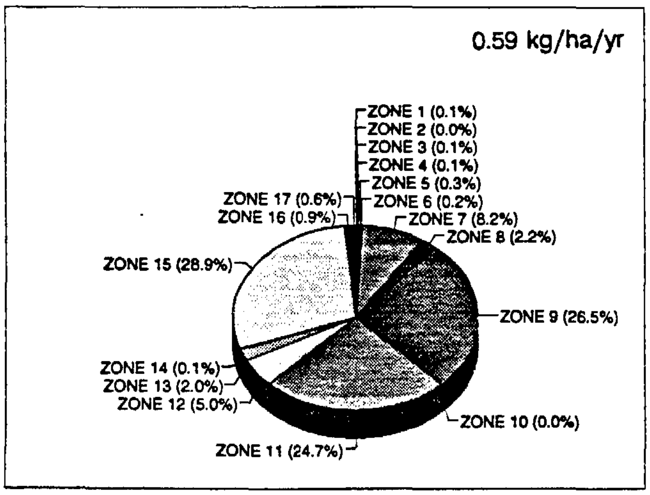
We also see from Figures 6-1 and 6-2 that the annual total sulfur dry deposition is generally much larger than the wet deposition, particularly at receptors influenced by local sources. In some cases, the dry deposition is more than an order of magnitude larger than the wet deposition (e.g., Bakersfield). However, there are a few receptors, such as Yosemite, where



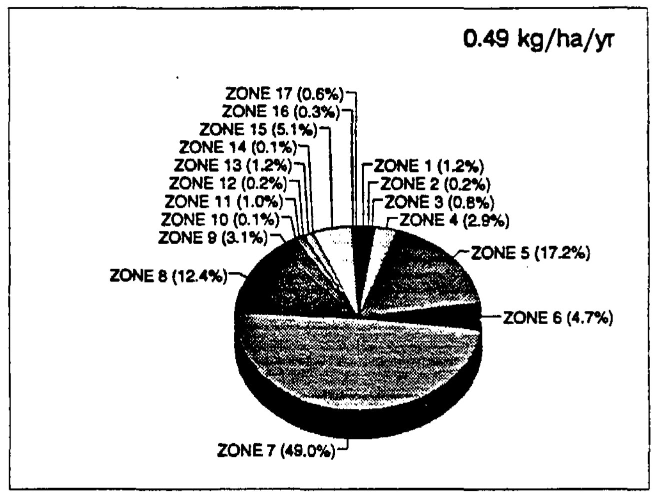
Bakersfield



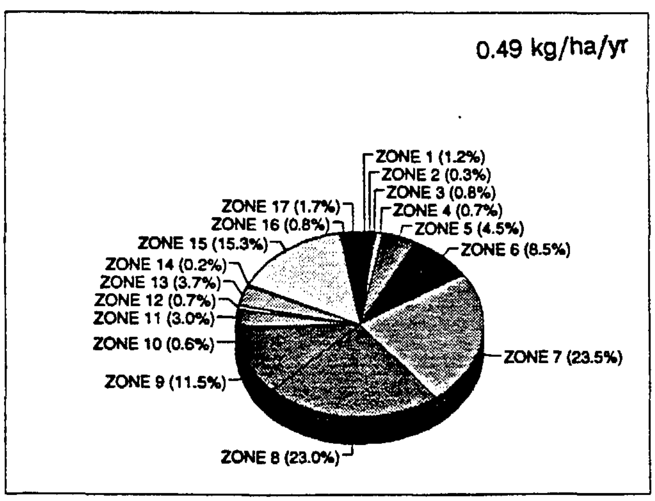
Pasadena



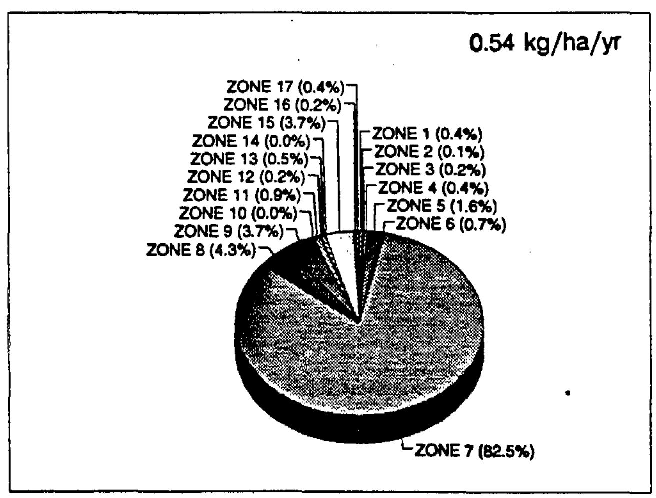
Santa Barbara



Sacramento

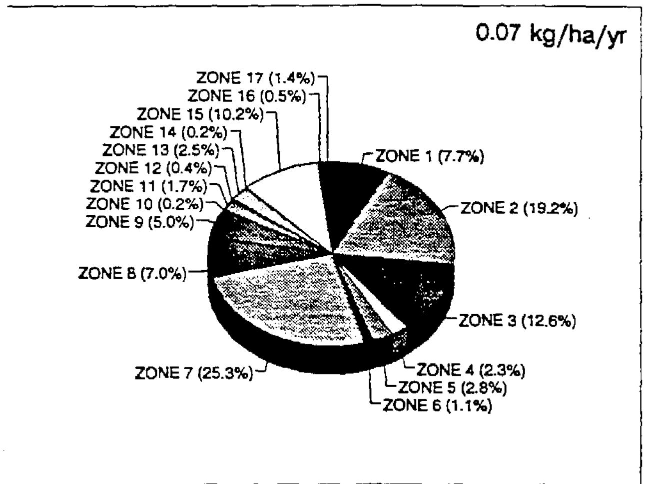


Yosemite

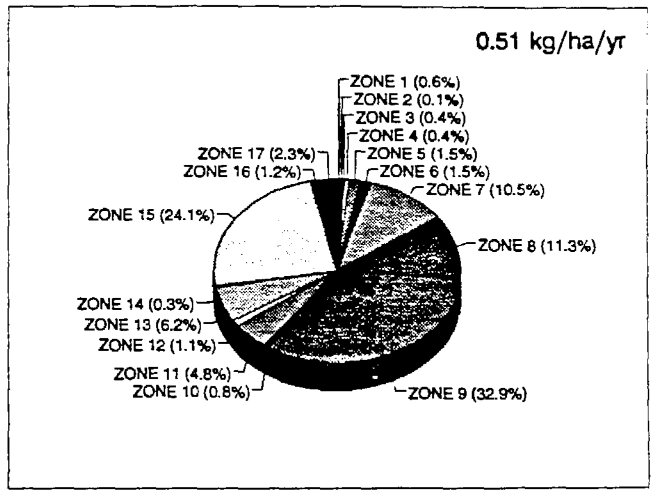


San Jose

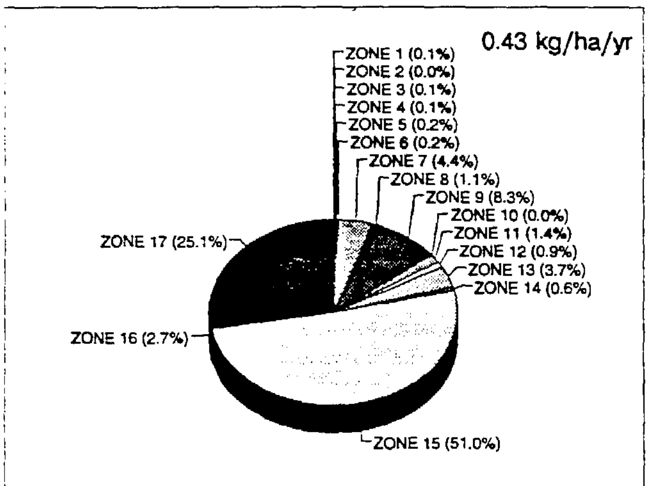
FIGURE 6-2. Contribution (%) of the 17 Source Regions to Annual Total Sulfur (SO_2 + Sulfate) Wet Deposition at Various Receptor Locations



Montague



Sequoia



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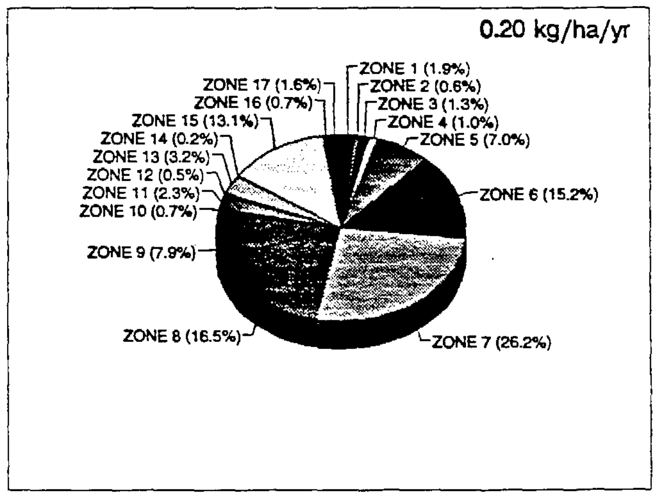


S. Lake Tahoe

FIGURE 6-2. (Cont'd) Contribution (%) of the 17 Source Regions to Annual Total Sulfur (SO_2 + Sulfate) Wet Deposition at Various Receptor Locations

the dry and wet deposition of sulfur are comparable, or the wet deposition is larger than the dry deposition. There are several factors that contribute to these regional differences. First, as discussed above, sulfur wet deposition has a long-range transport component, while dry deposition tends to be a local phenomenon. Thus, we expect dry deposition to be more important than wet deposition near source regions, and vice-versa. Second, some of the remote receptors, such as Yosemite, generally experience larger rainfall amounts than other parts of the state. This distinction is particularly important for the current study, since the period between 1984 and 1989 was a period of drought for much of the state of California. In spite of these considerations, it is reasonable to conclude that dry deposition of sulfur is generally larger than wet deposition in most of the state.

For completeness, we have also presented the source contributions to total (dry + wet) annual deposition of total sulfur at the 10 receptors in Figure 6-3. This figure reinforces the conclusions derived from the dry and wet deposition results.

The results for the total nitrogen (NO_x + nitrate) deposition are somewhat different from the sulfur results. Figure 6-4 shows the contribution of the various source regions to nitrogen dry deposition at the 10 receptors. It is clear that long-range transport is a factor in nitrogen dry deposition, even at receptors (such as Bakersfield), that are located close to high NO_x sources. The reason for this is that nitrogen dry deposition is dominated by dry deposition of nitrate, since NO_x is not dry deposited efficiently. Thus, significant dry deposition of nitrogen compounds can only occur after the NO_x has been converted to nitrate. For example, we see from Figure 6-4 that the estimated contribution of the South Coast Air Basin to nitrate dry deposition at the Bakersfield receptor is only 6 percent smaller than that from the Lower San Joaquin Valley.

These results are consistent with the zones of influence shown in Table 6-1. The zones of influence for dry deposition of nitrate are always larger than the zones of influence for sulfur dry deposition, indicating that nitrate dry deposition has a more regional nature than sulfur dry deposition.

Figure 6-5 shows that the nitrate wet deposition source contributions are generally similar to the sulfate wet deposition source contributions, shown in Figure 6-2. This is also evident when we compare the zones of influence (Table 6-1) for the wet deposition of the two species.

The source contributions to total (dry + wet) deposition of nitrate are shown in Figure 6-6.

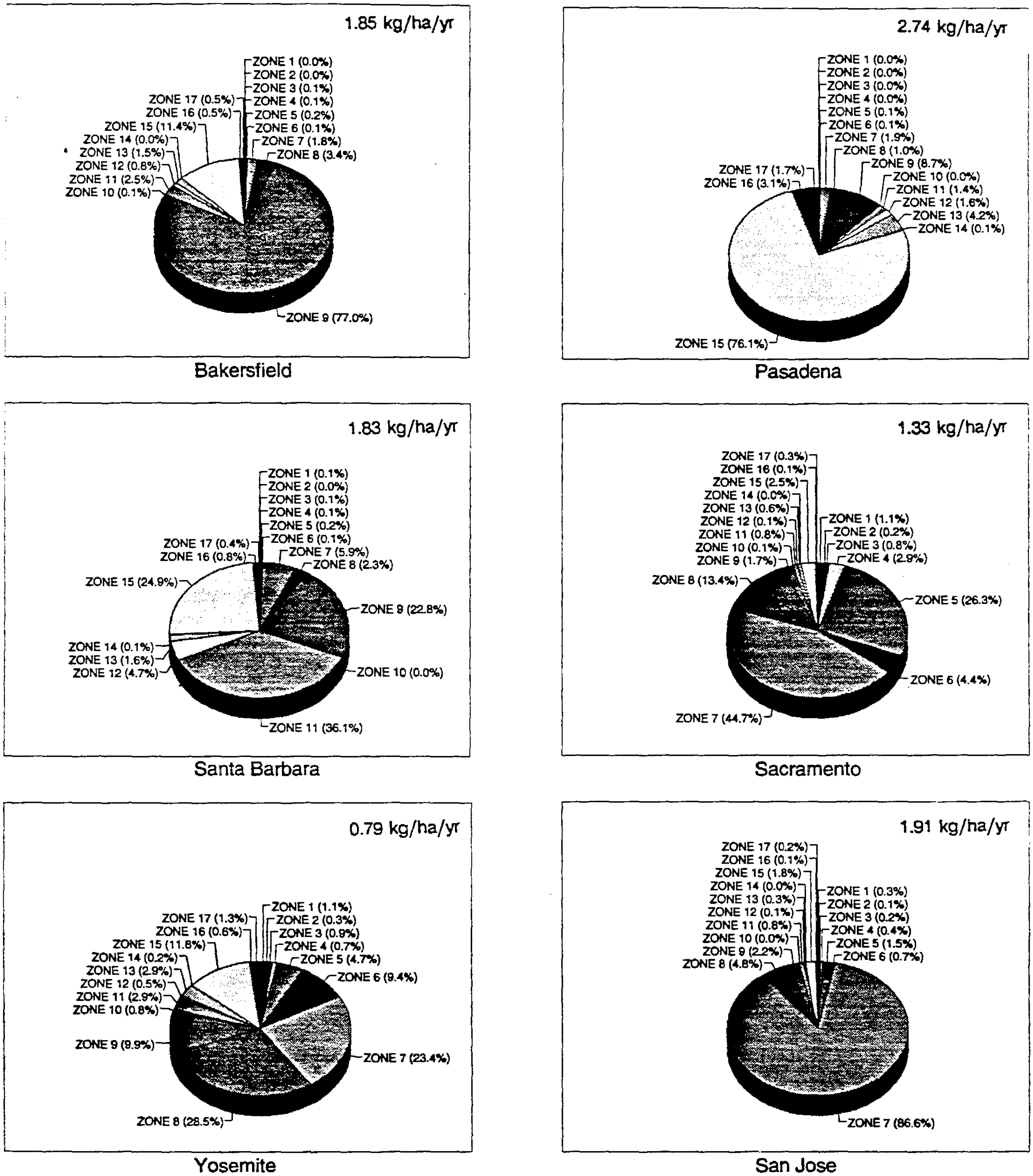
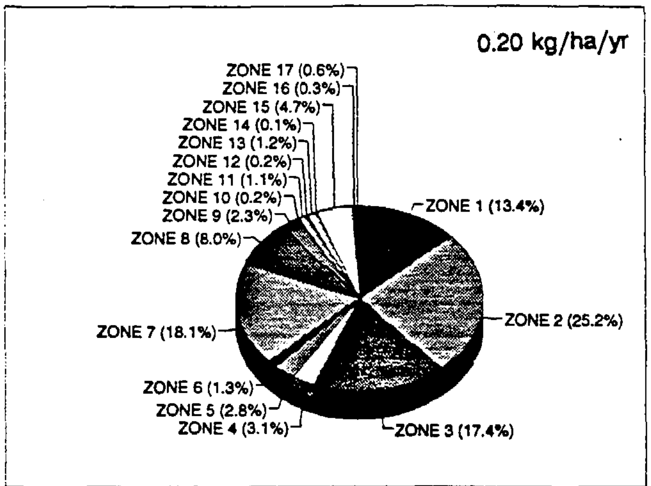
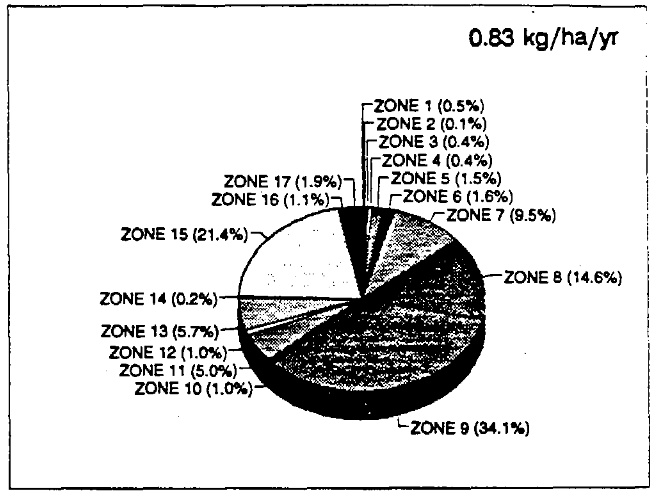


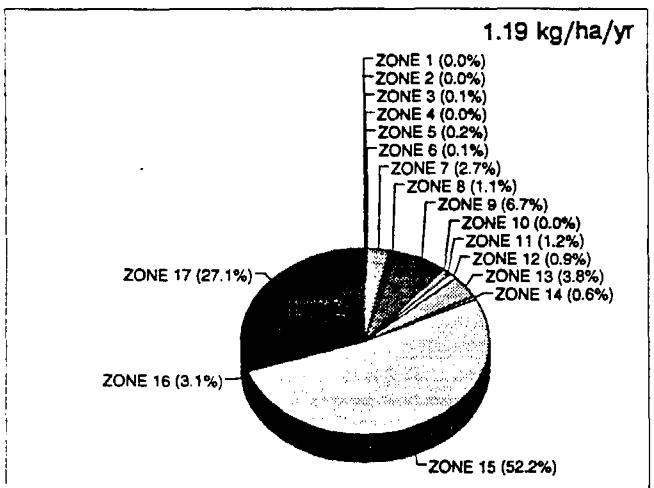
FIGURE 6-3. Contribution (%) of the 17 Source Regions to Annual Total Sulfur Deposition at Various Receptor Locations



Montague



Sequoia



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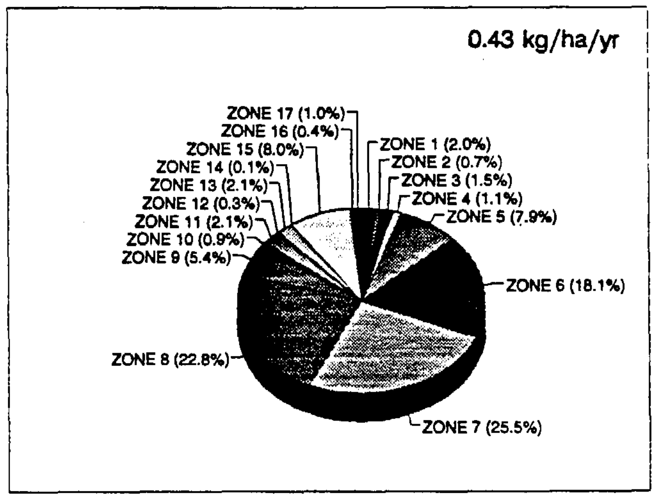


S. Lake Tahoe

FIGURE 6-3. (Cont'd) Contribution (%) of the 17 Source Regions to Annual Total Sulfur Deposition at Various Receptor Locations

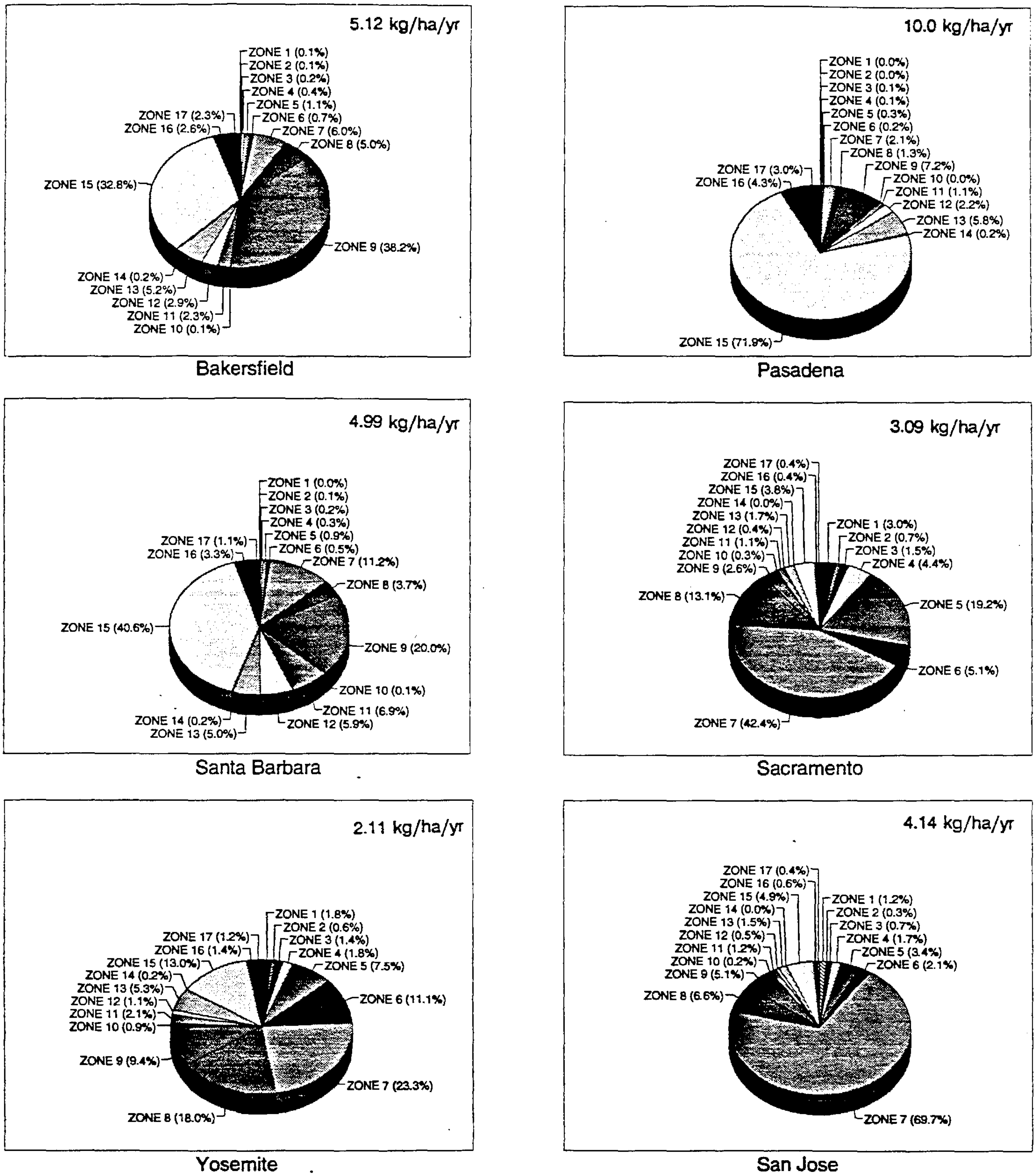
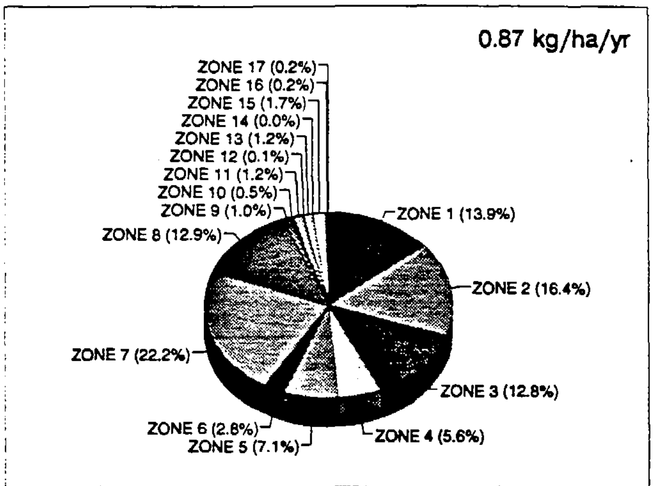
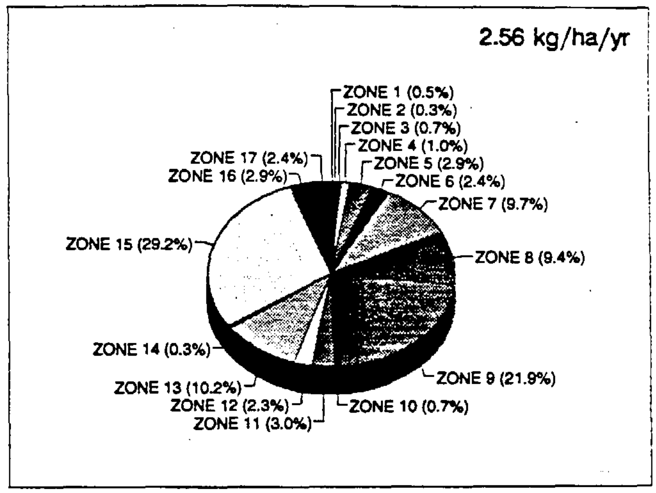


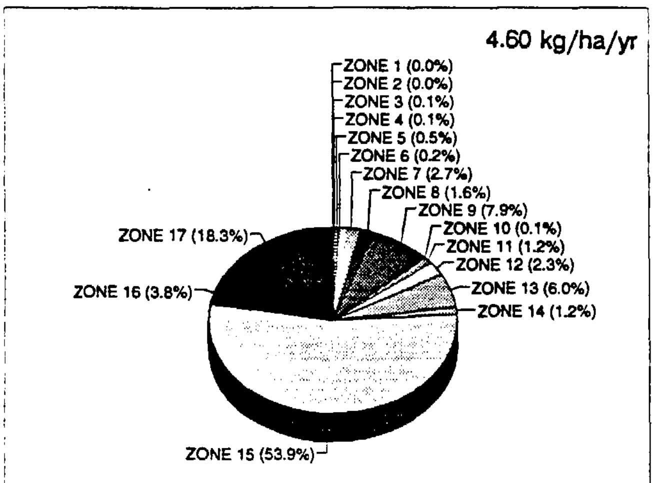
FIGURE 6-4. Contribution (%) of the 17 Source Regions to Annual Total Nitrogen (NO_x + Nitrate) Dry Deposition at Various Receptor Locations



Montague



Sequoia



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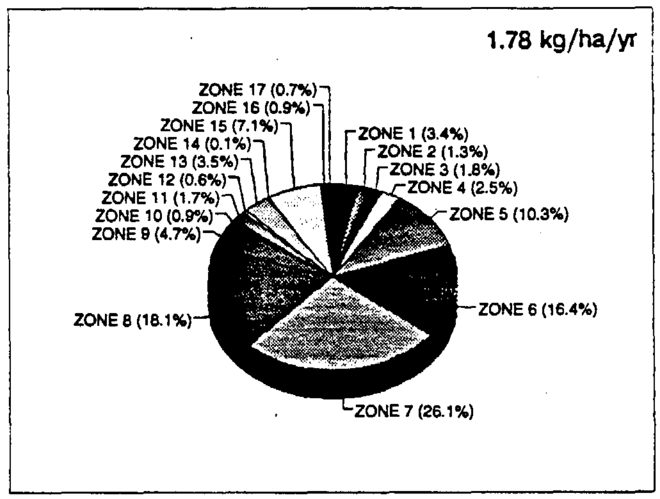


S. Lake Tahoe

FIGURE 6-4. (Cont'd) **Contribution (%) of the 17 Source Regions to Annual Total Nitrogen (NO_x + Nitrate) Dry Deposition at Various Receptor Locations**

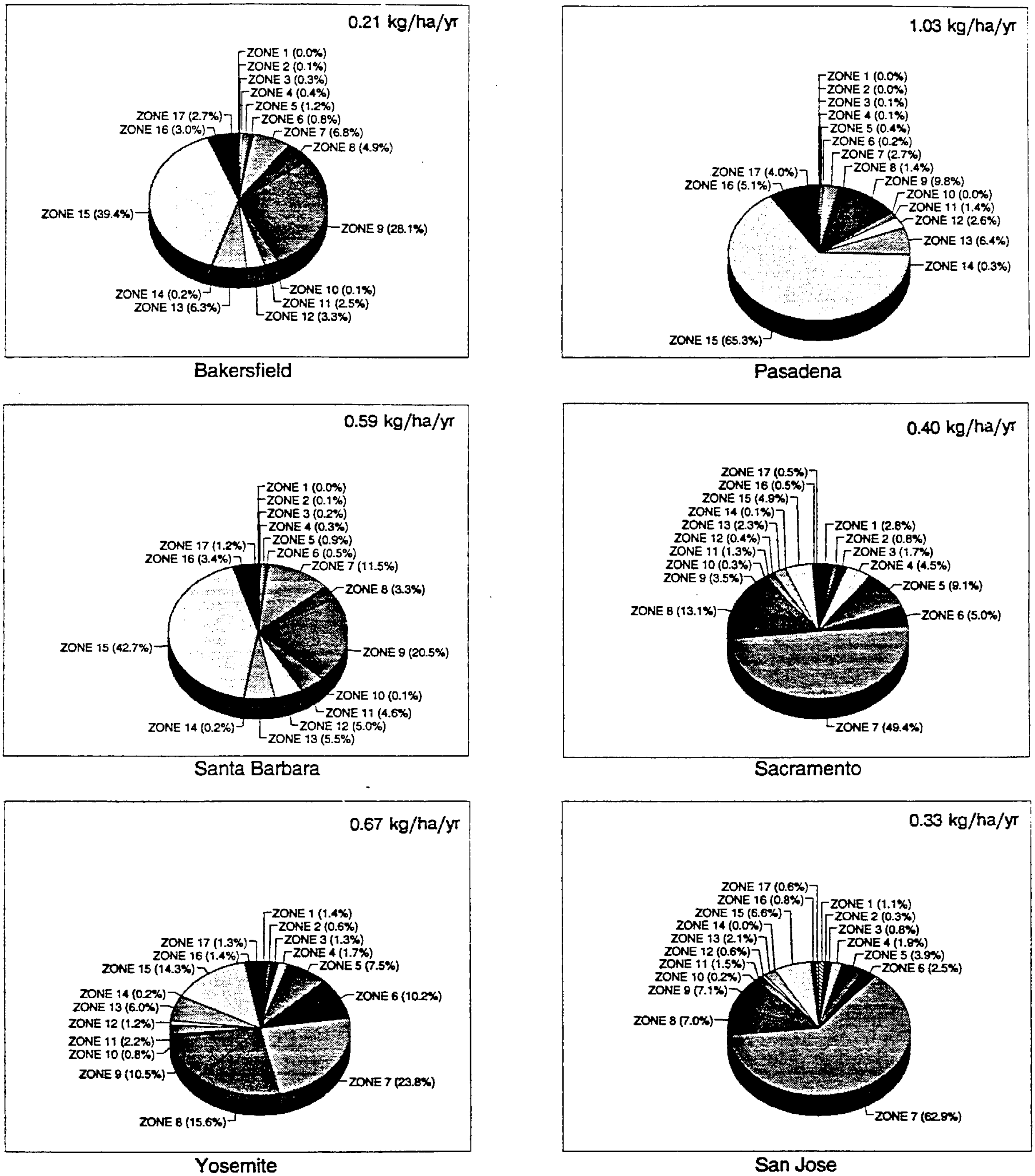
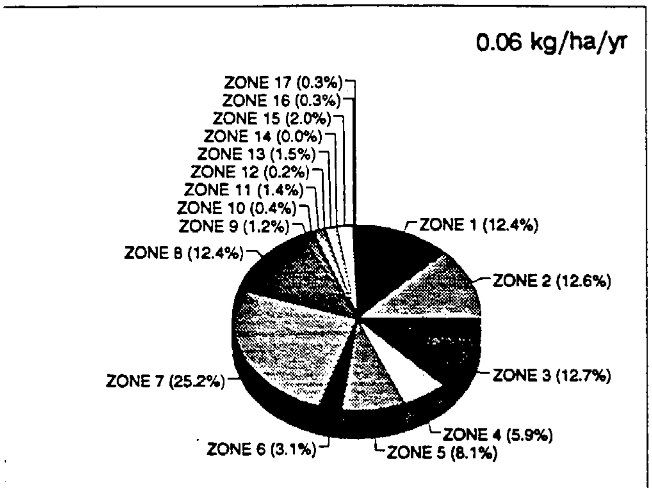
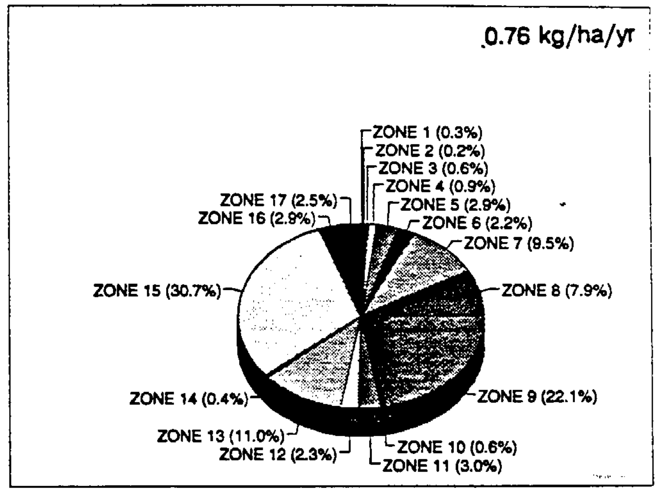


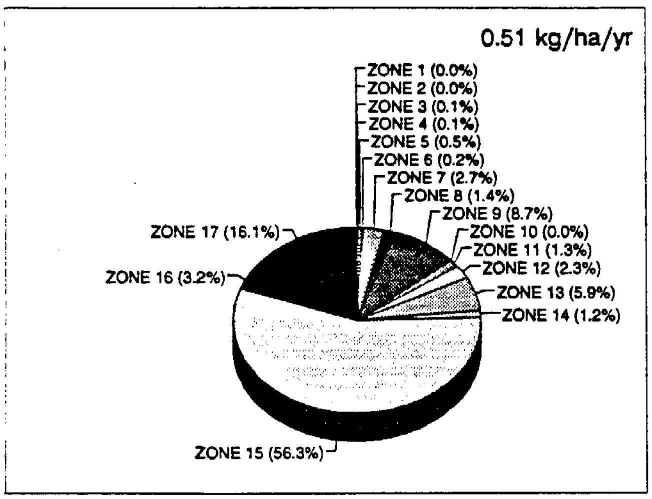
FIGURE 6-5. Contribution (%) of the 17 Source Regions to Annual Total Nitrogen (NO_x + Nitrate) Wet Deposition at Various Receptor Locations



Montague



Sequoia



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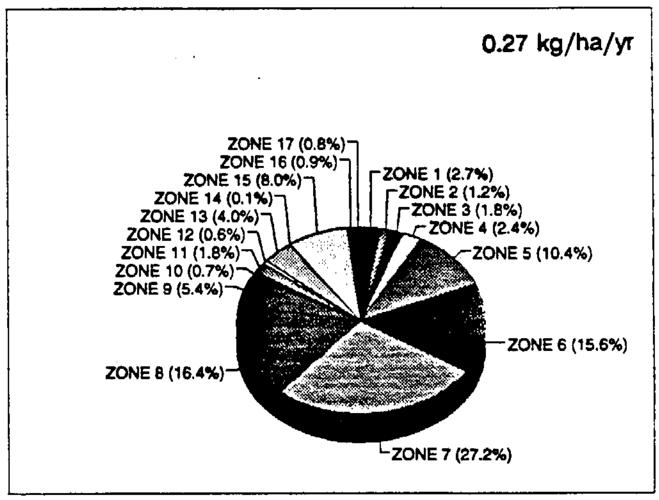


S. Lake Tahoe

FIGURE 6-5. (Cont'd) **Contribution (%) of the 17 Source Regions to Annual Total Nitrogen (NO_x + Nitrate) Wet Deposition at Various Receptor Locations**

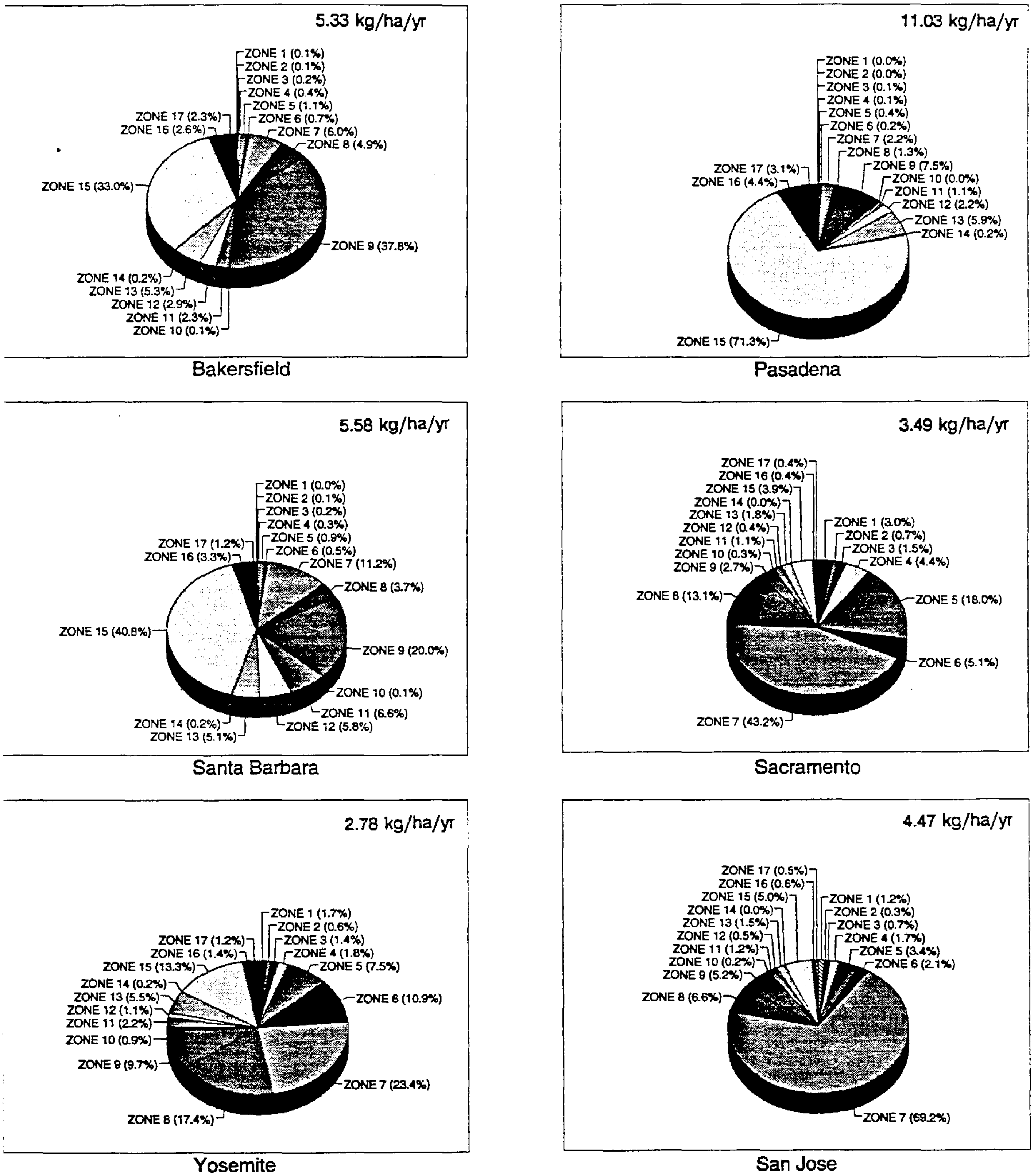


FIGURE 6-6. Contribution (%) of the 17 Source Regions to Annual Total Nitrogen Deposition at Various Receptor Locations

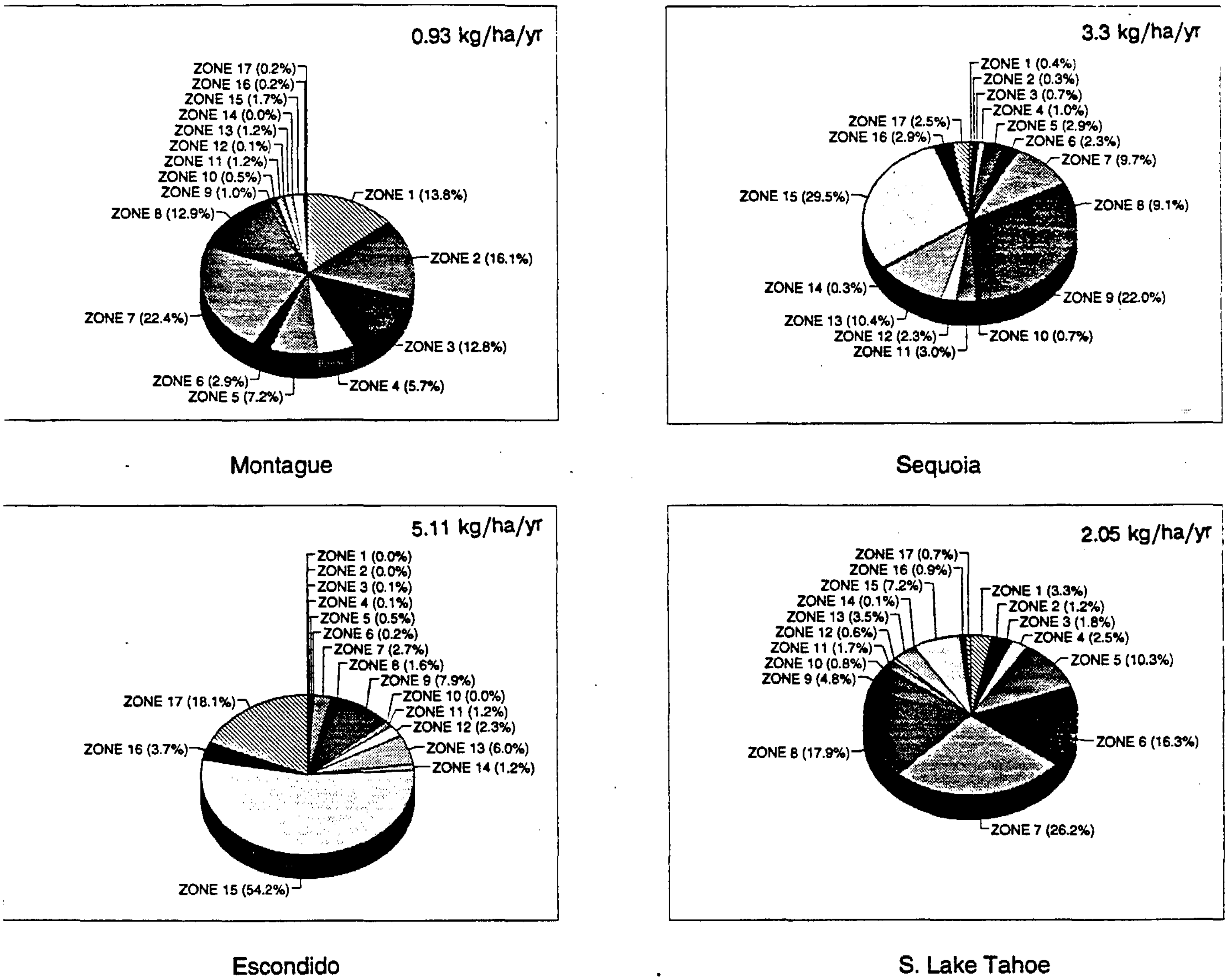


FIGURE 6-6. (Cont'd) Contribution (%) of the 17 Source Regions to Annual Total Nitrogen Deposition at Various Receptor Locations

We see from Figures 6-3 and 6-6 that nitrate deposition is generally 2 to 5 times larger than sulfur deposition when the deposition is expressed in mass units, and 5 to 11 times larger when the deposition is expressed in molar units. For example, the total sulfur deposition at Pasadena is 2.74 kgS/ha/yr or 0.09 kmolesS/ha/yr, while the total nitrogen deposition is 11.0 kgN/ha/yr or 0.79 kmolesN/ha/yr. These results are consistent with the fact that NO_x emissions in California are about 8.5 times higher than SO_x emissions on a molar basis. (See Figures 4-1 and 4-2.)

7.0 SENSITIVITY STUDIES

One of the tasks of this study was to conduct an uncertainty analysis of the model parameters, and to conduct sensitivity studies to examine the effect of emission changes on the source-receptor relationships. Uncertainty analysis is an important component of model application, since it allows us to diagnose the performance of the model, and to understand how the model responds to changes in the input parameters. The following sections describe the results of the sensitivity studies.

7.1 Uncertainty Analysis of Model Parameters

Section 5.1 discussed the various model parameters and the values that were used in our simulations. Although the governing processes are reasonably well understood, all the parameters have uncertainties associated with them. Thus, it is useful to determine the sensitivity of the model to changes in these parameters within their expected range of values.

Because it would not be practical to examine the sensitivity of the model to all its parameters, we decided to focus our analysis on only a few important parameters. These parameters are the mixing height, the duration of dry and wet periods, the gas-phase oxidation rates of SO_2 and NO_x for dry and wet conditions, the SO_2 oxidation rate in non-precipitating clouds, and the concentration of the aqueous-phase SO_2 oxidant, H_2O_2.

Note that some of the above parameters are correlated with one another. For example, we expect the gas-phase oxidation rates of SO_2 and NO_x to show a similar variation, since both depend on the concentration of the OH radical (although NO_x can also be converted to nitrate via an alternative pathway). Similarly, the gas-phase oxidation rates under wet conditions can be expected to have the same variation as those under dry conditions. We also expect some correlation between the H_2O_2 concentration and the OH concentration. Thus, the sensitivity studies were performed using the following five primary parameters:

- mixing height, z_i;
- duration of dry periods, τ_d;
- duration of wet periods, τ_w;
- gas-phase SO_2 oxidation rate under dry conditions, k_{dSO2}; and
- SO_2 oxidation rate in non-precipitating clouds, k_d'.

Based on our discussion above, the following four secondary parameters were changed proportionally to the changes in the value of k_{dSO2}:

- gas-phase SO_2 oxidation rate under wet conditions, k_{wSO2};
- gas-phase NO_x oxidation rate under dry conditions, k_{dNOx};
- gas-phase NO_x oxidation rate under wet conditions, k_{wNOx}; and
- aqueous-phase SO_2 oxidant concentration, χ_o.

Even with five primary variables, we would require thousands of sensitivity runs to account for all the possible combinations of parameters that would be generated by varying the parameters within their range of expected values. Thus, it was necessary to use an objective scheme with which a large but finite number of sensitivity studies could be constructed that would be a representative sample of the infinite combinations of the parameters. The technique that we employed is referred to as Latin Hypercube Sampling (LHS) and is described briefly below.

7.1.1 The Latin Hypercube Sampling (LHS) Technique

Latin Hypercube Sampling is a constrained sampling scheme that is a practical alternative to the conventional but cumbersome Monte Carlo sampling technique. We used an LHS package that was originally developed at Sandia National Laboratories (Iman and Shortencarier, 1984), and subsequently adapted and improved by Analytic and Computational Research, Inc. (ACRI), one of ENSR's subcontractors on this ARB study.

Before describing how LHS works, it is useful to discuss the problem we were attempting to solve with LHS, and to introduce the appropriate terminology. The situation can be described as follows – there is a variable of interest, Y, that is a function of other variables, referred to as X_1, X_2, ... , X_n. In our case, the function represents the semi-empirical model, STATMOD, the variables X_1 to X_n represent the model parameters, and Y is a vector of values (e.g., sulfur deposition, nitrate deposition, etc.) that represents the output of the model.

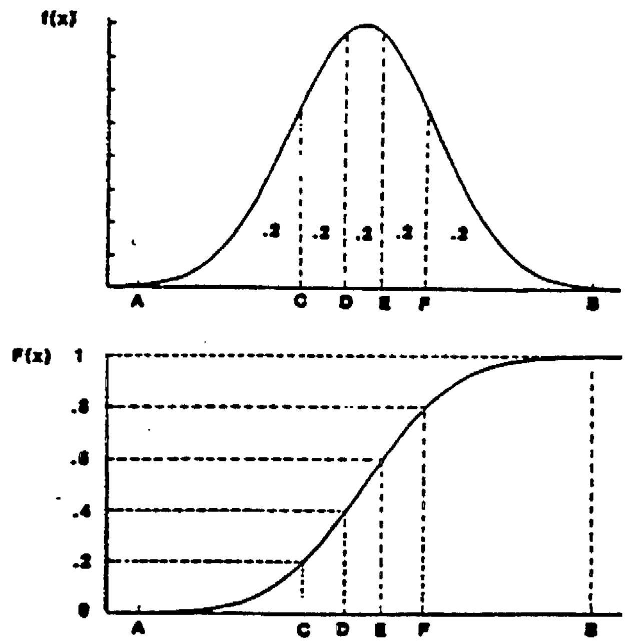
We want to determine how Y varies when the X's vary according to some assumed joint probability distribution. This question is answered by repeated applications of the model, i.e., STATMOD, for different sets of input parameters, i.e., X's. The selection of X's is done by the Latin Hypercube Sampling technique. For "k" applications of the model, the LHS scheme selects "k" different variables from each of the "n" variables X_1, X_2, ... , X_n in the following manner. The range of each variable is divided into "k" non-overlapping intervals on the basis of equal probability. One value from each interval is selected at random with respect to the probability density in the interval. The "k" values thus obtained for X_1 are paired in a random manner (equally likely combinations) with the "k" values of X_2. These "k" pairs are then combined in a random manner with the "k" values of X_3 to form "k" triplets and so on, until "k" n-tuplets are formed. This is the Latin hypercube sample. It is convenient to think of the LHS, or a random sample of size "k", as forming a "k" x "n" matrix of input parameters where the ith row contains specific values of each of the "n" input variables to be used on the ith run of the model.

To illustrate the concept and to clarify how the intervals are determined in the LHS, we will present a simple example, in which the dependent variable, Y, is a function of only two independent variables, X_1 and X_2. X_1 is assumed to have a normal distribution, shown in Figure 7-1, and X_2 is assumed to have a uniform distribution, shown in Figure 7-2. If we want to generate an LHS of size 5 (i.e., 5 sets of input variables), then both the distributions shown in Figures 7-1 and 7-2 must be divided into five equal probability sections so that the probability for X_1 being in any of these sections is equal to 20 percent (100/5). The results of the divisions are shown in the two figures for both the probability density function and the cumulative distribution function (cdf).

The next step in obtaining the LHS is to pick specific values of X_1 and X_2 in each of the five intervals. This selection should be done in a random manner with respect to the density of each interval; that is, the selection should reflect the height of the density in each interval. For example, in the A-C interval of Figure 7-1, values close to C will have a higher probability of selection than will values close to A.

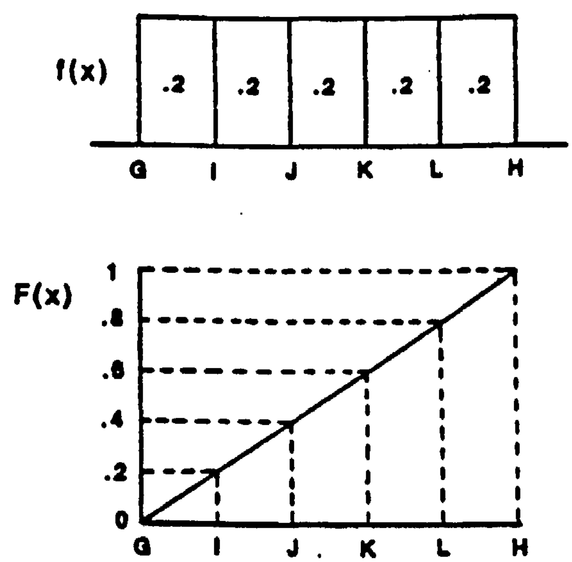
Next, the selected values of X_1 and X_2, one from each section, are paired to form the required five input vectors. This pairing is done by a random permutation of the two sets of sections and by pairing the values of X_1 and X_2 in the resulting permuted sets. For example, if the randomly permuted set for X_1 is (3,1,5,2,4) where the numbers represent the 5 sections, and the corresponding set for X_2 is (2,4,1,3,5), then the first parameter set would use the 3rd interval for X_1 and the 2nd interval for X_2, the second set would use the 1st interval for X_1 and the 4th interval for X_2, and so on.

Figure 7-3 provides a graphical representation of the five sets of (X_1, X_2) pairs that are constructed for this specific example. Note that all of the intervals for X_1 and X_2 have been sampled using this procedure. In general, a set of "k" LHS points in "n-dimensional" Euclidean space contains one point in each of the "k" intervals for each of the "n" variables.



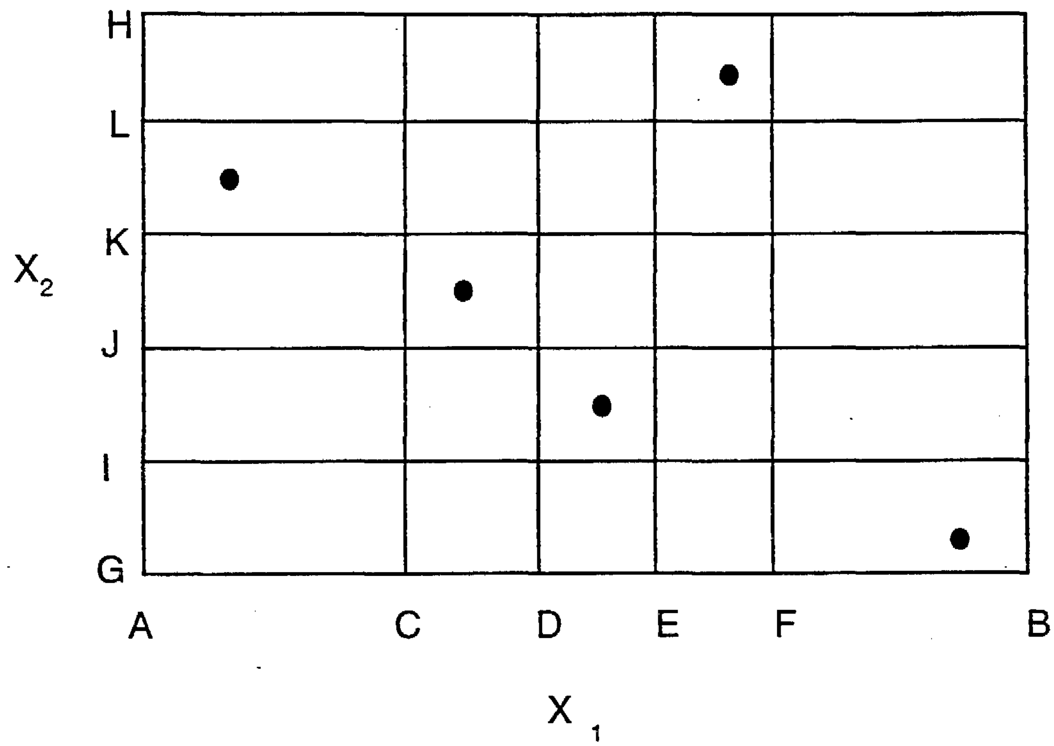
Source: Iman and Shortencarier, 1984

FIGURE 7-1. Intervals Used with an LHS of Size n = 5 in Terms of the Density Function and Cumulative Distribution Function for a Normal Random Variable



Source: Iman and Shortencarier, 1984

FIGURE 7-2. Intervals Used with an LHS of Size n = 5 in Terms of the Density Function and Cumulative Distribution Function for a Uniform Random Variable



Source: Iman and Shortencarier, 1984

FIGURE 7-3. A Two-Dimensional Representation of One Possible LHS of Size 5 Utilizing X_1 and X_2

7.1.2 Results from Application of LHS

To generate the Latin hypercube samples, it was necessary to specify the assumed probability distribution of the model parameters, and to provide other information to the LHS program, such as the number of samples desired, and the sample size.

We assumed that all the parameters of interest were log-normally distributed. For a log-normal distribution, the program requires the 0.001 quantile value and the 0.999 quantile value (which can be loosely interpreted as the minimum and maximum expected values) of the parameter. Table 7-1 shows the mean or base case value (used in the annual model simulations described in Sections 5 and 6) and the range over which each parameter was varied. The selected ranges represent our "best guess" of the parameter uncertainties.

TABLE 7-1

Range of Variation of the Five Primary Parameters

Parameter	Base Case Value	Range of Variation
z_i (m)	600	400 to 800
τ_d (hr)	100	80 to 120
τ_w (hr)	10	5 to 15
k_{dSO2} (%/hr)	1	0.5 to 1.5
k_d' (%/hr)	2	1 to 3

We used the LHS model to construct 100 sets of the five primary parameters. After the sets were constructed, we applied STATMOD 100 times for sulfur and nitrogen. To eliminate the influence of year-to-year variations in model inputs (e.g., upper air winds), we performed the simulations for a composite year.

The outputs from these simulations were used to perform a statistical analysis of the estimated ambient concentrations of sulfate and nitrate aerosol and sulfur and nitrate concentrations in rain at each receptor site. A similar analysis was performed for the contribution of each of the seventeen zones to the deposition of acidic species at various receptors.

The results of this statistical analysis for sulfur concentrations in rain are presented in Table 7-2. The estimated sulfur concentrations in rain appear to be relatively insensitive to changes in the input parameters. The standard deviation is less than 10 percent for all the receptors, indicating that no substantial changes in the estimated sulfur concentrations in rain can be expected by adjusting the input parameters.

Because of this relative insensitivity, we see that even the maximum values of sulfur concentrations in rain, shown in Table 7-2, tend to be lower than the observed concentrations, reinforcing our conclusion that the primary reason for the model underestimating sulfur concentrations in rain is due to emissions that are unaccounted for in the ARB anthropogenic emission inventory.

Table 7-3, which shows the summary of the uncertainty analysis for ambient sulfate concentrations, shows that the estimated ambient sulfate concentration is more sensitive to changes in the input parameters than sulfur in rain. However, the standard deviation of the estimated values is still small (less than 15%) for all the receptors. The maximum concentrations shown in Table 7-3 are again much lower than the measured concentrations presented in Section 5.

The nitrate concentrations in both rain and air (Tables 7-4 and 7-5, respectively) are more sensitive to the input parameters. For many of the receptors, the maximum estimated concentrations are about two times larger than the minimum estimated concentrations. The sensitivity is more pronounced for receptors located in urban areas, such as southern California, that are directly affected by local sources.

A possible explanation for the higher sensitivity of nitrate as compared to sulfur is that SO_2 is readily dry deposited, and both primary (SO_2) and secondary (SO_4) sulfur are scavenged efficiently by rain. On the other hand, NO_x has a low dry deposition velocity and is not readily scavenged by rain. Thus, NO_x is primarily removed from the atmosphere after it has been oxidized to nitrate, suggesting that the rate of conversion of NO_x to nitrate is an important parameter.

Table 7-6 provides the summary statistics of the sensitivity analysis for the contribution of the 17 source regions to the total sulfur deposition at the ten receptors discussed in Section 6. As shown in Table 7-6, the relative contributions of the 17 zones to total sulfur deposition at these receptors are not sensitive to the changes in STATMOD parameters. For all 10 receptors, the major contributing source regions and their relative ranks remain the same, regardless of the parameter set used. The same is true for total nitrate deposition, as shown

TABLE 7-2

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) of Parameter Uncertainty Study Results for Annually Averaged Sulfur Concentrations in Rain

Site	max (mg/l)	min (mg/l)	avg (mg/l)	sd (mg/l)
Bethel Island	0.150	0.106	0.130	0.008
Gasquet	0.029	0.020	0.025	0.002
S. Lake Tahoe	0.062	0.044	0.055	0.003
Eureka	0.096	0.055	0.079	0.010
Bakersfield	0.170	0.113	0.139	0.011
L. Isabella	0.121	0.088	0.110	0.007
Lakeport	0.079	0.058	0.072	0.003
San Rafael	0.274	0.168	0.230	0.021
Yosemite	0.072	0.051	0.064	0.003
Mammoth	0.058	0.040	0.052	0.003
Salinas II	0.173	0.127	0.150	0.008
Napa	0.212	0.128	0.165	0.016
Norden	0.061	0.044	0.055	0.003
Anaheim	0.308	0.184	0.238	0.025
Quincy	0.055	0.039	0.049	0.003
Sacramento	0.151	0.116	0.136	0.006
Victorville	0.264	0.157	0.217	0.021
San Bernardino	0.230	0.145	0.188	0.018
Nipomo	0.172	0.116	0.142	0.010
Santa Barbara	0.223	0.159	0.192	0.012
San Jose	0.259	0.197	0.235	0.011
Montague	0.038	0.027	0.034	0.002
Sequoia	0.078	0.057	0.070	0.004
Lindcove	0.096	0.074	0.088	0.004
San Nicolas Isl.	0.130	0.093	0.117	0.008
Berkeley	0.498	0.352	0.433	0.031
Reseda	0.200	0.143	0.169	0.011
Lynwood	0.278	0.188	0.232	0.019
Pasadena	0.214	0.146	0.182	0.013
Mt. Wilson	0.201	0.142	0.171	0.011
Tanbark Flats	0.223	0.151	0.184	0.014
Escondido	0.168	0.115	0.152	0.011

TABLE 7-3

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) of Parameter Uncertainty Study Results for Annually Averaged Ambient Sulfate Concentrations

Site	max (ug/m3)	min (ug/m3)	avg (ug/m3)	sd (ug/m3)
Bethel Island	0.720	0.433	0.542	0.057
Gasquet	0.324	0.216	0.261	0.023
S. Lake Tahoe	0.571	0.354	0.444	0.045
Eureka	0.500	0.322	0.394	0.037
Bakersfield	0.985	0.570	0.716	0.078
L. Isabella	0.749	0.424	0.560	0.063
Lakeport	0.641	0.385	0.490	0.052
San Rafael	1.220	0.687	0.860	0.094
Yosemite	0.626	0.383	0.482	0.051
Mammoth	0.590	0.364	0.457	0.047
Salinas II	0.917	0.550	0.697	0.077
Napa	0.884	0.523	0.649	0.068
Norden	0.555	0.345	0.432	0.044
Anaheim	1.517	0.844	1.054	0.115
Quincy	0.539	0.337	0.420	0.042
Sacramento	0.787	0.475	0.596	0.063
Victorville	0.986	0.559	0.709	0.079
San Bernardino	0.895	0.497	0.644	0.074
Nipomo	0.936	0.553	0.705	0.079
Santa Barbara	1.017	0.588	0.751	0.085
San Jose	1.001	0.592	0.742	0.080
Montague	0.385	0.252	0.307	0.028
Sequoia	0.665	0.394	0.508	0.054
Lindcove	0.686	0.404	0.522	0.057
San Nicolas Isl.	0.839	0.488	0.629	0.071
Berkeley	3.681	1.994	2.512	0.273
Reseda	1.140	0.644	0.812	0.092
Lynwood	1.862	1.025	1.287	0.140
Pasadena	1.200	0.672	0.845	0.095
Mt. Wilson	1.086	0.608	0.770	0.088
Tanbark Flats	1.007	0.559	0.713	0.081
Escondido	0.851	0.483	0.632	0.071

TABLE 7-4

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) of Parameter Uncertainty Study Results for Annually Averaged Nitrate Concentrations in Rain

Site	max (mg/l)	min (mg/l)	avg (mg/l)	sd (mg/l)
Bethel Island	0.163	0.095	0.130	0.011
Gasquet	0.049	0.036	0.043	0.002
S. Lake Tahoe	0.110	0.072	0.092	0.006
Eureka	0.075	0.052	0.064	0.004
Bakersfield	0.259	0.147	0.208	0.018
L. Isabella	0.223	0.135	0.182	0.014
Lakeport	0.119	0.077	0.098	0.007
San Rafael	0.221	0.119	0.173	0.017
Yosemite	0.128	0.082	0.107	0.008
Mammoth	0.116	0.075	0.098	0.007
Salinas II	0.198	0.117	0.159	0.013
Napa	0.179	0.101	0.142	0.013
Norden	0.110	0.072	0.092	0.006
Anaheim	0.436	0.209	0.332	0.039
Quincy	0.091	0.061	0.077	0.005
Sacramento	0.160	0.094	0.128	0.011
Victorville	0.324	0.172	0.255	0.025
San Bernardino	0.359	0.183	0.279	0.030
Nipomo	0.227	0.137	0.186	0.015
Santa Barbara	0.279	0.155	0.223	0.020
San Jose	0.200	0.112	0.158	0.015
Montague	0.060	0.043	0.052	0.003
Sequoia	0.153	0.098	0.129	0.009
Lindcove	0.167	0.107	0.139	0.010
San Nicolas Isl.	0.234	0.138	0.190	0.016
Berkeley	0.244	0.126	0.188	0.020
Reseda	0.421	0.205	0.322	0.037
Lynwood	0.467	0.219	0.353	0.044
Pasadena	0.457	0.216	0.346	0.042
Mt. Wilson	0.432	0.208	0.330	0.039
Tanbark Flats	0.392	0.193	0.302	0.034
Escondido	0.264	0.148	0.210	0.019

TABLE 7-5

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) of Parameter Uncertainty Study Results for Annually Averaged Ambient Nitrate Concentrations

Site	max (ug/m3)	min (ug/m3)	avg (ug/m3)	sd (ug/m3)
Bethel Island	5.306	2.987	4.170	0.459
Gasquet	1.005	0.849	0.950	0.028
S. Lake Tahoe	3.246	2.276	2.827	0.186
Eureka	2.071	1.424	1.779	0.124
Bakersfield	8.783	4.938	6.978	0.763
L. Isabella	7.313	4.478	6.056	0.560
Lakeport	3.701	2.355	3.088	0.264
San Rafael	7.549	3.878	5.710	0.731
Yosemite	3.818	2.710	3.356	0.212
Mammoth	3.297	2.590	3.052	0.132
Salinas II	6.524	3.823	5.244	0.533
Napa	5.975	3.212	4.603	0.549
Norden	3.289	2.264	2.842	0.198
Anaheim	15.570	7.056	11.224	1.709
Quincy	2.617	1.878	2.306	0.142
Sacramento	5.222	2.978	4.134	0.444
Victorville	11.280	5.778	8.607	1.100
San Bernardino	12.620	6.156	9.412	1.294
Nipomo	7.587	4.617	6.273	0.588
Santa Barbara	9.587	5.238	7.535	0.867
San Jose	6.661	3.584	5.129	0.610
Montague	1.475	1.106	1.318	0.070
Sequoia	4.640	3.359	4.150	0.247
Lindcove	5.189	3.569	4.527	0.315
San Nicolas Isl.	7.806	4.592	6.348	0.638
Berkeley	8.364	4.079	6.167	0.855
Reseda	15.010	6.953	10.929	1.615
Lynwood	16.760	7.379	11.921	1.883
Pasadena	16.370	7.279	11.705	1.825
Mt. Wilson	15.440	7.001	11.142	1.693
Tanbark Flats	13.930	6.507	10.187	1.488
Escondido	8.914	4.893	7.009	0.800

TABLE 7-6

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) for Source Region Contributions (%) to Annually Averaged Total Sulfur Deposition at Selected Receptor Locations

	BAKERSFIELD				YOSEMITE			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	0.07	0.03	0.06	0.00	1.42	1.14	1.32	0.04
2	0.02	0.02	0.02	0.00	0.32	0.27	0.30	0.00
3	0.08	0.05	0.07	0.00	0.90	0.85	0.87	0.00
4	0.09	0.06	0.06	0.00	0.80	0.72	0.75	0.00
5	0.33	0.25	0.30	0.01	5.40	4.93	5.10	0.08
6	0.24	0.16	0.22	0.00	13.94	11.79	12.50	0.37
7	2.54	1.56	2.15	0.17	25.01	23.36	24.25	0.29
8	3.34	2.89	3.14	0.09	29.81	24.12	26.31	1.04
9	79.98	72.96	75.64	1.27	9.34	7.75	8.73	0.29
10	0.07	0.06	0.07	0.00	0.99	0.84	0.89	0.03
11	2.80	2.52	2.70	0.05	2.83	2.72	2.77	0.02
12	1.13	0.95	1.06	0.04	0.70	0.52	0.63	0.03
13	1.69	1.40	1.58	0.06	3.11	2.40	2.85	0.13
14	0.04	0.02	0.03	0.00	0.16	0.11	0.14	0.01
15	13.13	9.35	11.69	0.65	12.05	8.38	10.62	0.71
16	0.57	0.43	0.51	0.03	0.64	0.47	0.58	0.03
17	0.83	0.50	0.70	0.06	1.60	1.10	1.41	0.10

	SACRAMENTO				SANTA BARBARA			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	1.45	1.14	1.33	0.06	0.09	0.06	0.08	0.00
2	0.22	0.18	0.21	0.00	0.02	0.02	0.02	0.00
3	0.80	0.72	0.77	0.02	0.07	0.05	0.07	0.00
4	3.00	2.78	2.87	0.05	0.08	0.06	0.06	0.00
5	30.27	24.81	26.71	0.89	0.31	0.24	0.28	0.01
6	5.29	4.93	5.09	0.06	0.21	0.13	0.19	0.00
7	45.85	41.11	43.71	0.78	7.29	5.28	6.58	0.36
8	14.34	13.09	13.75	0.25	2.26	1.91	2.11	0.07
9	1.69	0.98	1.42	0.14	22.42	20.25	20.99	0.35
10	0.11	0.09	0.10	0.00	0.04	0.04	0.04	0.00
11	0.75	0.58	0.69	0.03	41.08	33.98	36.68	1.21
12	0.15	0.09	0.13	0.01	6.40	5.83	6.14	0.11
13	0.67	0.37	0.56	0.06	1.60	1.34	1.50	0.04
14	0.04	0.02	0.03	0.00	0.05	0.03	0.05	0.00
15	2.70	1.40	2.18	0.25	25.13	22.10	23.94	0.52
16	0.14	0.08	0.12	0.01	0.86	0.69	0.80	0.03
17	0.38	0.20	0.31	0.04	0.52	0.36	0.47	0.03

TABLE 7-6 (Cont'd)

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) for Source Region Contributions (%) to Annually Averaged Total Sulfur Deposition at Selected Receptor Locations

	SAN JOSE				PASADENA			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	0.39	0.25	0.34	0.02	0.05	0.02	0.03	0.00
2	0.07	0.05	0.06	0.00	0.02	0.00	0.01	0.00
3	0.23	0.19	0.21	0.00	0.05	0.03	0.04	0.00
4	0.41	0.34	0.38	0.00	0.06	0.02	0.05	0.00
5	1.65	1.54	1.58	0.01	0.16	0.11	0.15	0.01
6	0.87	0.74	0.82	0.01	0.12	0.06	0.09	0.00
7	90.77	83.05	86.73	1.27	2.52	1.46	2.12	0.18
8	5.39	4.81	5.10	0.10	1.00	0.73	0.90	0.06
9	2.11	1.30	1.81	0.15	8.82	7.02	8.16	0.31
10	0.05	0.04	0.05	0.00	0.02	0.02	0.02	0.00
11	0.76	0.62	0.71	0.03	1.59	1.27	1.48	0.06
12	0.12	0.07	0.10	0.01	2.19	1.95	2.08	0.04
13	0.31	0.19	0.27	0.02	3.92	3.51	3.74	0.07
14	0.01	0.01	0.01	0.00	0.09	0.06	0.08	0.01
15	1.89	0.96	1.53	0.17	79.73	72.55	75.67	1.32
16	0.12	0.07	0.10	0.01	3.42	3.06	3.24	0.06
17	0.24	0.12	0.20	0.02	2.36	1.75	2.14	0.11

TABLE 7-6 (Cont'd)

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) for Source Region Contributions (%) to Annually Averaged Total Sulfur Deposition at Selected Receptor Locations

	S. LAKE TAHOE				MONTAGUE			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	2.09	1.74	1.94	0.06	14.25	12.64	13.33	0.34
2	0.74	0.66	0.70	0.01	29.81	23.12	25.36	1.20
3	1.65	1.50	1.55	0.03	19.95	16.32	17.60	0.66
4	1.13	1.04	1.08	0.01	3.32	2.97	3.12	0.08
5	8.73	7.60	7.98	0.20	2.94	2.67	2.84	0.05
6	20.75	17.08	18.29	0.63	1.33	1.19	1.26	0.02
7	26.46	23.83	25.39	0.44	19.98	14.14	17.99	1.03
8	25.55	21.61	23.00	0.73	8.48	7.21	7.90	0.26
9	5.90	4.17	5.29	0.32	2.74	1.59	2.29	0.23
10	1.10	0.88	0.95	0.04	0.19	0.17	0.19	0.00
11	2.13	1.91	2.06	0.04	1.27	0.90	1.14	0.06
12	0.38	0.26	0.34	0.02	0.22	0.13	0.18	0.02
13	2.31	1.60	2.06	0.13	1.36	0.81	1.16	0.11
14	0.14	0.09	0.12	0.01	0.10	0.06	0.08	0.01
15	9.24	5.82	7.90	0.69	5.71	3.20	4.66	0.53
16	0.49	0.33	0.43	0.03	0.29	0.18	0.25	0.02
17	1.09	0.69	0.94	0.08	0.76	0.44	0.64	0.07

	SEQUOIA				ESCONDIDO			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	0.49	0.36	0.45	0.03	0.06	0.03	0.04	0.00
2	0.15	0.11	0.13	0.00	0.02	0.01	0.02	0.00
3	0.44	0.40	0.42	0.01	0.07	0.04	0.06	0.00
4	0.43	0.39	0.42	0.00	0.06	0.05	0.06	0.00
5	1.49	1.40	1.45	0.01	0.19	0.14	0.18	0.01
6	1.63	1.53	1.57	0.01	0.10	0.07	0.10	0.00
7	10.03	8.41	9.44	0.27	3.18	1.98	2.75	0.20
8	16.94	13.51	14.86	0.63	1.19	0.90	1.06	0.05
9	36.74	32.70	34.10	0.69	7.58	5.81	6.81	0.28
10	1.23	0.96	1.05	0.05	0.02	0.02	0.02	0.00
11	5.13	4.87	4.97	0.04	1.35	1.05	1.22	0.05
12	1.03	0.91	0.99	0.02	0.99	0.85	0.91	0.02
13	5.86	5.41	5.68	0.08	4.15	3.76	3.88	0.08
14	0.25	0.19	0.23	0.01	0.71	0.64	0.66	0.01
15	22.69	18.48	21.27	0.76	53.48	50.62	52.01	0.54
16	1.18	1.02	1.12	0.03	3.44	3.00	3.17	0.09
17	2.02	1.53	1.84	0.09	29.66	25.50	27.05	0.62

in Table 7-7. This result is encouraging, because it suggests that the source-receptor relationships derived in Section 6 are not very sensitive to the model parameters.

7.2 Emission Scenario Studies

We examined the effect of five different emission control scenarios on acidic deposition in California. The first scenario corresponded to a 50 percent reduction in the emissions of both SO_x and NO_x across the entire state. The other four scenarios corresponded to 50 percent reductions of SO_x and NO_x emissions in individual source regions. The four source regions selected for the latter analysis are the South Coast Air Basin, the Lower San Joaquin Valley, the San Francisco Bay Area and the Upper South Central Coast.

Tables 7-8 through 7-10 show the impact of these emission reductions on the dry, wet, and total deposition of sulfur, respectively. We see from Table 7-8 that a 50 percent reduction in SO_x emissions across the state results in an approximately 50 percent or slightly larger reduction in sulfur dry deposition at most receptors. However, there are two receptors where the sulfur dry deposition is reduced by over 60 percent (Nipomo and Santa Barbara). Conversely, Table 7-9 shows that there are several receptors where sulfur wet deposition is reduced by less than 50 percent in response to the statewide reduction in SO_2 emissions.

This non-linear response can be explained by considering the non-linear treatment of the aqueous-phase chemistry and scavenging of SO_2 (see Section 3 for a discussion on the model formulation). The model assumes that the wet scavenging of SO_2 by precipitating clouds and the aqueous-phase oxidation of SO_2 in non-precipitating clouds is controlled by the concentration of the aqueous-phase oxidant, H_2O_2. When SO_2 emissions are reduced by 50 percent, it is likely that a larger proportion of SO_2 is scavenged and converted to sulfate in the near-source regions, because the extent to which the system is oxidant-limited is reduced. In other words, some receptors will experience lower sulfur concentrations than they would in a completely linear model, since proportionately more of the sulfur has been scavenged before it arrives at the receptor. Thus, the reduction in dry deposition at these receptors would be more than 50 percent. Other receptors will see higher sulfur concentrations in rain than in the linear system, because the wet scavenging of SO_2 is more efficient at the lower SO_2 levels. Thus, these receptors would not experience the full impact of the 50 percent reduction in emissions.

TABLE 7-7

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) for Source Region Contributions (%) to Annually Averaged Total Nitrate Deposition at Selected Receptor Locations

	BAKERSFIELD				YOSEMITE			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	0.12	0.02	0.06	0.02	2.06	1.43	1.73	0.14
2	0.13	0.06	0.09	0.01	0.67	0.58	0.63	0.02
3	0.29	0.20	0.24	0.02	1.45	1.28	1.38	0.04
4	0.46	0.28	0.38	0.05	1.83	1.64	1.76	0.04
5	1.12	0.99	1.07	0.03	8.51	6.45	7.51	0.44
6	0.79	0.58	0.71	0.04	12.73	9.19	10.89	0.77
7	7.04	4.95	6.04	0.44	23.87	22.07	23.29	0.37
8	5.17	4.57	4.94	0.12	20.97	14.51	17.50	1.41
9	42.55	35.28	38.00	1.38	10.27	8.69	9.62	0.34
10	0.12	0.11	0.12	0.00	1.04	0.75	0.89	0.06
11	2.41	2.07	2.27	0.06	2.29	1.98	2.16	0.06
12	2.97	2.72	2.90	0.04	1.40	0.87	1.13	0.11
13	5.37	4.90	5.23	0.08	6.38	4.41	5.44	0.43
14	0.23	0.12	0.17	0.02	0.25	0.09	0.16	0.03
15	34.02	30.78	32.90	0.60	17.43	9.51	13.30	1.71
16	2.75	2.39	2.60	0.07	1.78	1.03	1.39	0.16
17	2.76	1.83	2.30	0.21	1.79	0.77	1.23	0.22

	SACRAMENTO				SANTA BARBARA			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	3.40	2.53	2.98	0.20	0.09	0.01	0.04	0.01
2	0.76	0.65	0.72	0.02	0.10	0.03	0.07	0.01
3	1.56	1.38	1.52	0.03	0.25	0.15	0.20	0.02
4	4.71	3.94	4.39	0.16	0.37	0.20	0.28	0.05
5	21.37	16.42	18.14	0.82	0.98	0.80	0.89	0.04
6	5.53	4.53	5.05	0.21	0.64	0.40	0.51	0.06
7	44.93	39.04	43.00	1.09	12.82	9.53	11.24	0.71
8	14.04	11.80	13.08	0.45	3.83	3.45	3.66	0.09
9	3.60	1.86	2.70	0.39	21.18	18.93	20.04	0.49
10	0.33	0.29	0.32	0.01	0.07	0.07	0.07	0.00
11	1.16	0.98	1.09	0.04	7.59	6.22	6.69	0.23
12	0.54	0.21	0.36	0.07	6.43	5.40	5.86	0.22
13	2.56	1.12	1.79	0.32	5.08	4.96	5.05	0.02
14	0.09	0.02	0.05	0.02	0.25	0.13	0.19	0.03
15	6.31	2.15	3.98	0.93	41.65	39.28	40.75	0.46
16	0.67	0.24	0.43	0.09	3.53	3.07	3.32	0.10
17	0.68	0.19	0.40	0.11	1.37	0.93	1.15	0.10

TABLE 7-7 (Cont'd)

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) for Source Region Contributions (%) to Annually Averaged Total Nitrate Deposition at Selected Receptor Locations

	SAN JOSE				PASADENA			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	1.53	0.82	1.16	0.14	0.02	0.00	0.00	0.00
2	0.36	0.25	0.30	0.02	0.04	0.01	0.02	0.00
3	0.75	0.65	0.72	0.01	0.11	0.05	0.08	0.01
4	1.72	1.54	1.67	0.03	0.15	0.06	0.10	0.01
5	3.63	3.02	3.39	0.11	0.43	0.28	0.35	0.04
6	2.12	1.90	2.08	0.03	0.26	0.13	0.18	0.01
7	75.87	62.88	69.27	2.49	2.93	1.47	2.17	0.32
8	7.06	5.93	6.60	0.23	1.54	1.10	1.34	0.09
9	6.30	4.01	5.20	0.50	7.82	6.77	7.44	0.19
10	0.21	0.18	0.19	0.01	0.04	0.03	0.04	0.00
11	1.24	1.09	1.19	0.03	1.19	1.00	1.12	0.04
12	0.68	0.33	0.50	0.08	2.29	2.08	2.22	0.03
13	1.92	1.13	1.53	0.17	6.03	5.57	5.85	0.09
14	0.05	0.01	0.03	0.01	0.27	0.18	0.23	0.02
15	7.47	3.01	5.06	0.99	74.19	69.50	71.40	0.87
16	0.93	0.40	0.65	0.12	4.50	4.09	4.37	0.07
17	0.76	0.25	0.47	0.12	3.38	2.71	3.10	0.14

TABLE 7-7 (Cont'd)

Summary Statistics (Maximum, Minimum, Average, and Standard Deviation) for Source Region Contributions (%) to Annually Averaged Total Nitrate Deposition at Selected Receptor Locations

	S. LAKE TAHOE				MONTAGUE			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	3.68	2.90	3.30	0.17	15.06	11.95	13.73	0.65
2	1.31	1.13	1.24	0.03	19.84	13.30	16.23	1.38
3	2.01	1.64	1.84	0.08	15.50	10.45	12.86	1.10
4	2.55	2.35	2.48	0.04	6.47	4.70	5.65	0.37
5	11.86	8.79	10.32	0.66	7.33	6.57	7.15	0.15
6	19.30	13.74	16.37	1.22	2.99	2.57	2.85	0.07
7	26.54	24.89	26.08	0.34	26.56	17.42	22.32	2.03
8	20.41	15.41	17.91	1.09	13.12	11.94	12.80	0.24
9	5.91	3.65	4.79	0.49	1.76	0.48	1.03	0.28
10	0.99	0.71	0.84	0.06	0.48	0.43	0.46	0.01
11	1.70	1.60	1.68	0.03	1.42	0.97	1.22	0.10
12	0.86	0.39	0.60	0.10	0.29	0.06	0.15	0.05
13	4.62	2.51	3.54	0.46	2.08	0.62	1.25	0.33
14	0.17	0.05	0.10	0.03	0.06	0.01	0.03	0.01
15	10.88	4.40	7.29	1.41	3.47	0.65	1.78	0.62
16	1.24	0.55	0.86	0.15	0.47	0.11	0.26	0.08
17	1.22	0.41	0.75	0.18	0.47	0.08	0.23	0.09

	SEQUOIA				ESCONDIDO			
Zone	Max	Min	Avg	SD	Max	Min	Avg	SD
1	0.64	0.32	0.45	0.05	0.01	0.00	0.00	0.00
2	0.32	0.22	0.26	0.01	0.06	0.02	0.03	0.00
3	0.69	0.65	0.67	0.01	0.16	0.08	0.11	0.02
4	1.04	0.88	0.97	0.03	0.18	0.06	0.12	0.01
5	2.95	2.86	2.92	0.01	0.61	0.38	0.49	0.05
6	2.49	2.18	2.35	0.07	0.33	0.15	0.25	0.03
7	10.50	8.77	9.69	0.39	3.93	1.77	2.73	0.45
8	10.75	7.80	9.13	0.64	1.99	1.29	1.62	0.15
9	25.07	19.27	22.02	1.23	8.74	6.96	7.91	0.40
10	0.86	0.59	0.70	0.06	0.05	0.04	0.05	0.00
11	3.31	2.67	2.99	0.14	1.37	1.07	1.23	0.07
12	2.39	2.18	2.30	0.05	2.36	2.21	2.30	0.03
13	10.43	10.24	10.38	0.04	6.48	5.59	6.00	0.19
14	0.46	0.25	0.35	0.04	1.22	1.15	1.20	0.01
15	31.98	26.56	29.48	1.17	54.76	52.75	54.08	0.38
16	3.09	2.65	2.89	0.09	4.07	3.42	3.71	0.14
17	3.07	1.91	2.46	0.25	19.90	16.73	18.18	0.69

TABLE 7-8

Response of Annual Sulfur Dry Deposition to Changes in SO_x Emissions

RECEPTOR	Change (%) in dry sulfur deposition					
	Base Case Value (kg/ha/yr)	(a)	(b)	(c)	(d)	(e)
Bethel Island	0.77	-51.04	-0.78	-0.78	-35.75	-0.52
Gasquet	0.09	-50.46	-1.27	-0.58	-9.49	-0.58
S. Lake Tahoe	0.24	-50.85	-2.12	-1.69	-12.71	-1.27
Eureka	0.44	-50.90	-0.23	-0.23	-3.62	-0.23
Bakersfield	1.68	-50.83	-4.76	-39.88	-0.60	-0.60
L. Isabella	0.57	-52.54	-12.78	-26.62	-1.23	-1.93
Lakeport	0.34	-51.18	-0.59	-0.30	-34.32	-0.30
San Rafael	2.13	-50.70	-0.47	-0.47	-48.83	-0.47
Yosemite	0.30	-51.35	-3.04	-3.72	-11.82	-1.35
Mammoth	0.22	-51.83	-5.05	-5.96	-8.72	-1.83
Salinas II	0.77	-51.10	-1.30	-2.33	-40.08	-1.04
Napa	1.31	-50.53	0.00	0.00	-45.88	0.00
Norden	0.23	-50.85	-1.28	-1.28	-13.68	-0.85
Anaheim	3.70	-50.27	-45.14	-1.35	-0.27	-0.27
Quincy	0.20	-50.74	-0.99	-0.50	-17.82	-0.50
Sacramento	0.84	-50.83	-0.48	-0.36	-21.67	-0.24
Victorville	2.13	-50.70	-11.27	-1.41	0.00	0.00
San Bernardino	1.20	-51.42	-29.67	-2.50	-0.83	-0.83
Nipomo	0.91	-63.18	-6.39	-8.71	-5.84	-25.03
Santa Barbara	1.25	-61.36	-12.00	-11.20	-2.40	-21.04
San Jose	1.37	-51.02	-0.73	-1.46	-44.89	-0.73
Montague	0.14	-50.44	-0.74	-0.74	-7.35	-0.74
Sequoia	0.31	-52.40	-8.95	-18.53	-4.15	-2.56
Lindcove	0.42	-52.26	-7.60	-23.52	-3.33	-2.14
San Nicolas Isl.	0.59	-54.27	-31.06	-6.83	-2.73	-5.80
Berkeley	14.10	-50.14	0.00	0.00	-49.79	0.00
Reseda	1.68	-50.95	-37.50	-5.36	-1.19	-1.19
Lynwood	5.48	-50.18	-46.72	-1.09	-0.18	-0.18
Pasadena	2.14	-50.93	-41.12	-3.27	-0.93	-0.93
Mt. Wilson	1.63	-50.92	-38.04	-4.29	-0.61	-0.61
Tanbark Flats	1.54	-50.91	-37.01	-1.95	0.00	0.00
Escondido	0.76	-51.83	-27.62	-3.01	-0.92	-0.52

(a) 50% reduction throughout California
(b) 50% reduction in the Western Part of the South Coast Air Basin
(c) 50% reduction in the Lower San Joaquin Valley
(d) 50% reduction in the San Francisco Bay Area
(e) 50% reduction in the Upper South Central Coast

TABLE 7-9

Response of Annual Sulfur Wet Deposition to Changes in SO_x Emissions

RECEPTOR	Change (%) in wet sulfur deposition					
	Base Case Value (kg/ha/yr)	(a)	(b)	(c)	(d)	(e)
Bethel Island	0.29	-42.66	-2.80	-1.75	-22.73	-0.70
Gasquet	0.41	-50.12	-6.05	-2.91	-15.25	-0.97
S. Lake Tahoe	0.20	-50.20	-6.09	-3.55	-12.69	-1.02
Eureka	0.51	-51.47	-2.16	-1.18	-6.88	-0.39
Bakersfield	0.16	-37.42	-13.50	-9.82	-2.45	-2.45
L. Isabella	0.22	-49.77	-14.16	-21.00	-2.74	-2.28
Lakeport	0.33	-50.61	-3.68	-1.84	-31.60	-0.61
San Rafael	1.37	-41.24	-1.46	-0.73	-35.77	0.00
Yosemite	0.49	-50.61	-7.49	-5.67	-11.94	-1.62
Mammoth	0.26	-50.39	-9.69	-7.75	-8.91	-1.55
Salinas II	0.31	-49.35	-3.57	-3.90	-34.74	-0.97
Napa	0.62	-29.97	-1.92	-1.28	-20.83	-0.48
Norden	0.50	-50.30	-5.63	-3.42	-14.29	-1.01
Anaheim	0.38	-28.04	-11.38	-4.76	-1.85	-0.79
Quincy	0.18	-50.06	-5.06	-2.81	-18.54	-0.56
Sacramento	0.49	-46.91	-2.47	-1.44	-25.31	-0.41
Victorville	0.21	-35.12	-18.54	-3.90	-0.98	-0.98
San Bernardino	0.43	-41.07	-16.24	-3.48	-0.70	-0.70
Nipomo	0.39	-51.92	-9.21	-11.25	-8.18	-3.32
Santa Barbara	0.59	-51.11	-14.99	-13.46	-4.09	-3.24
San Jose	0.54	-46.40	-1.85	-1.85	-37.52	-0.55
Montague	0.07	-50.00	-4.95	-2.40	-12.46	-0.75
Sequoia	0.51	-51.17	-11.87	-16.73	-5.25	-2.33
Lindcove	0.13	-51.13	-9.77	-21.05	-3.76	-1.50
San Nicolas Isl.	0.18	-52.15	-25.97	-8.29	-4.42	-5.52
Berkeley	2.02	-44.06	-0.50	-0.50	-40.59	0.00
Reseda	0.44	-40.50	-13.50	-10.98	-3.20	-1.83
Lynwood	0.58	-39.18	-22.34	-5.67	-2.06	-1.03
Pasadena	0.61	-41.42	-18.81	-8.09	-2.31	-1.16
Mt. Wilson	1.00	-40.60	-15.50	-8.90	-2.10	-1.20
Tanbark Flats	0.94	-36.67	-13.75	-4.58	-1.17	-0.96
Escondido	0.43	-51.99	-26.70	-4.22	-2.34	-0.70

(a) 50% reduction throughout California
(b) 50% reduction in the Western Part of the South Coast Air Basin
(c) 50% reduction in the Lower San Joaquin Valley
(d) 50% reduction in the San Francisco Bay Area
(e) 50% reduction in the Upper South Central Coast

TABLE 7-10

Response of Annual Total Sulfur Deposition to Changes in SO_x Emissions

RECEPTOR	Change (%) in total sulfur deposition					
	Base Case Value (kg/ha/yr)	(a)	(b)	(c)	(d)	(e)
Bethel Island	1.06	-48.87	-1.89	-0.94	-32.36	-0.94
Gasquet	0.50	-50.20	-5.40	-2.60	-14.40	-1.00
S. Lake Tahoe	0.43	-50.58	-3.93	-2.77	-12.93	-0.92
Eureka	0.95	-51.21	-1.26	-0.63	-5.36	-0.32
Bakersfield	1.85	-49.84	-5.95	-37.30	-1.08	-1.62
L. Isabella	0.79	-51.65	-13.16	-25.06	-1.65	-2.03
Lakeport	0.67	-50.98	-2.26	-1.35	-33.08	-0.60
San Rafael	3.50	-46.86	-0.57	-0.57	-43.71	-0.29
Yosemite	0.79	-50.82	-5.70	-4.94	-11.79	-1.39
Mammoth	0.48	-51.05	-7.77	-6.93	-8.82	-1.68
Salinas II	1.08	-50.65	-1.85	-2.78	-38.52	-0.93
Napa	1.94	-43.81	-1.03	-0.52	-38.14	-0.52
Norden	0.73	-50.48	-4.38	-2.60	-14.23	-0.96
Anaheim	4.08	-48.28	-42.16	-1.72	-0.49	-0.25
Quincy	0.38	-50.66	-3.15	-1.84	-18.37	-0.79
Sacramento	1.33	-49.55	-1.50	-0.75	-23.31	-0.75
Victorville	2.34	-49.57	-12.39	-1.71	-0.43	-0.43
San Bernardino	1.63	-48.71	-25.77	-2.45	-0.61	-0.61
Nipomo	1.30	-59.85	-7.69	-9.23	-6.92	-18.46
Santa Barbara	1.83	-57.92	-13.11	-11.48	-2.73	-15.30
San Jose	1.91	-49.69	-1.05	-1.05	-42.93	-0.52
Montague	0.20	-50.00	-1.98	-0.99	-8.91	-0.50
Sequoia	0.83	-51.63	-10.76	-17.29	-4.72	-2.42
Lindcove	0.55	-51.99	-8.12	-22.92	-3.43	-2.17
San Nicolas Isl.	0.77	-53.85	-29.86	-7.17	-3.13	-5.74
Berkeley	16.10	-49.32	0.00	0.00	-48.57	0.00
Reseda	2.12	-49.06	-32.55	-6.60	-1.42	-1.42
Lynwood	6.06	-49.17	-44.39	-1.49	-0.33	-0.33
Pasadena	2.74	-48.54	-36.13	-4.38	-0.73	-0.73
Mt. Wilson	2.63	-47.15	-29.28	-6.08	-1.14	-0.76
Tanbark Flats	2.48	-45.56	-28.23	-3.23	-0.40	-0.81
Escondido	1.19	-51.76	-27.14	-3.36	-1.68	-0.84

(a) 50% reduction throughout California
(b) 50% reduction in the Western Part of the South Coast Air Basin
(c) 50% reduction in the Lower San Joaquin Valley
(d) 50% reduction in the San Francisco Bay Area
(e) 50% reduction in the Upper South Central Coast

To confirm this explanation, we repeated the simulations using an extremely large value of the oxidant concentration. This effectively makes the system linear, since it is no longer limited by the availability of the oxidant. The results for this oxidant-rich system showed a 50 percent reduction in dry and wet deposition of sulfur at all receptors for a 50 percent reduction in SO_x emissions.

The corresponding results for the response of nitrate deposition to changes in NO_x emissions are shown in Tables 7-11 through 7-13. We see that a 50 percent reduction of NO_x emissions across the state results in a more or less 50 percent reduction in dry, wet, and total nitrogen deposition at all sites. These results are consistent with the linear formulation of the model for nitrogen species.

As expected, a reduction of the SO_x and NO_x emissions by 50 percent in individual source regions does not influence all receptors equally. Larger reductions are estimated at receptors that are directly influenced by these source regions as compared to receptors that do not receive large contributions from these sources. The results are slightly different for sulfur and nitrogen, particularly at receptors located close to the source regions where emissions were reduced in our simulations. For example, if SO_x emissions in the western part of the South Coast Air Basin are reduced by 50 percent, then the model estimates a 41 percent reduction in sulfur dry deposition, an 18 percent reduction in sulfur wet deposition, and a 36 percent reduction in the total sulfur deposition at a local receptor, such as Pasadena. On the other hand, a 50 percent reduction of NO_x emissions in the same source region results in a 36 percent reduction in the nitrate dry deposition, a 33 percent reduction in the nitrate wet deposition, and a 35 percent change in the total nitrate deposition at Pasadena. The differences in the results for sulfur and nitrogen can be attributed to the differences in their scales for dry deposition, and the fact that wet scavenging of sulfur in near-source regions is limited by the availability of oxidants.

As pointed out earlier in Section 6, nitrate deposition is three to four times larger than sulfur deposition in most of California. Furthermore, our comparison of model results with the CADMP data suggests that sulfur deposition in some parts of California is influenced by non-anthropogenic sources. Thus, it is likely that control of NO_x emissions will lead to larger reductions in acid deposition in California as compared to SO_x control.

TABLE 7-11

Response of Annual Nitrogen Dry Deposition to Changes in NO_x Emissions

RECEPTOR	Change (%) in dry nitrogen deposition					
	Base Case Value (kg/ha/yr)	(a)	(b)	(c)	(d)	(e)
Bethel Island	2.87	-50.17	-2.79	-2.09	-25.78	-0.70
Gasquet	0.61	-50.08	-0.82	-0.49	-13.18	-0.82
S. Lake Tahoe	1.78	-50.11	-3.93	-2.81	-12.92	-1.12
Eureka	1.22	-50.16	-0.82	-0.82	-12.30	-0.82
Bakersfield	5.12	-50.00	-16.41	-19.14	-2.93	-1.17
L. Isabella	3.81	-50.13	-19.42	-12.34	-2.10	-1.31
Lakeport	1.95	-50.00	-1.54	-1.03	-27.18	-0.51
San Rafael	4.34	-50.00	-1.15	-0.92	-40.09	-0.23
Yosemite	2.11	-49.76	-6.64	-4.74	-11.85	-0.95
Mammoth	1.87	-50.05	-9.09	-6.42	-8.56	-1.07
Salinas II	3.58	-50.00	-4.19	-4.19	-29.89	-0.84
Napa	3.30	-50.00	-1.52	-1.21	-35.76	-0.30
Norden	1.80	-50.06	-2.78	-1.67	-16.11	-0.56
Anaheim	10.70	-50.09	-37.57	-2.80	-0.93	-0.93
Quincy	1.45	-49.86	-1.38	-0.69	-17.93	-0.69
Sacramento	3.09	-50.16	-1.94	-1.29	-21.36	-0.65
Victorville	5.83	-49.91	-25.56	-3.77	-0.51	-0.69
San Bernardino	6.84	-50.00	-25.73	-2.63	-0.44	-0.58
Nipomo	3.99	-49.87	-14.54	-9.52	-10.28	-5.01
Santa Barbara	4.99	-50.10	-20.24	-10.02	-5.61	-3.61
San Jose	4.14	-50.00	-2.42	-2.42	-34.78	-0.48
Montague	0.87	-50.06	-0.92	-0.58	-11.10	-0.69
Sequoia	2.56	-50.00	-14.84	-10.94	-5.08	-1.56
Lindcove	2.87	-50.17	-14.29	-12.89	-4.88	-1.74
San Nicolas Isl.	3.98	-50.00	-25.63	-6.53	-4.27	-3.52
Berkeley	5.68	-50.00	-1.23	-0.88	-41.37	-0.35
Reseda	8.44	-50.00	-32.94	-4.86	-2.01	-0.71
Lynwood	12.10	-50.00	-38.51	-2.48	-1.65	-0.83
Pasadena	10.00	-49.90	-35.90	-3.50	-0.90	-0.40
Mt. Wilson	8.57	-49.94	-33.49	-4.32	-0.93	-0.58
Tanbark Flats	7.62	-50.00	-30.31	-3.15	-0.92	-0.52
Escondido	4.60	-50.00	-26.96	-3.91	-1.30	-0.43

(a) 50% reduction throughout California
(b) 50% reduction in the Western Part of the South Coast Air Basin
(c) 50% reduction in the Lower San Joaquin Valley
(d) 50% reduction in the San Francisco Bay Area
(e) 50% reduction in the Upper South Central Coast

TABLE 7-12

Response of Annual Nitrogen Wet Deposition to Changes in NO_x Emissions

RECEPTOR	Change (%) in wet nitrogen deposition					
	Base Case Value (kg/ha/yr)	(a)	(b)	(c)	(d)	(e)
Bethel Island	0.25	-50.00	-3.17	-2.78	-25.79	-0.79
Gasquet	0.39	-50.13	-1.02	-0.51	-14.58	-0.77
S. Lake Tahoe	0.27	-49.81	-3.72	-2.60	-13.38	-0.74
Eureka	0.28	-50.18	-1.07	-0.71	-13.88	-0.71
Bakersfield	0.21	-50.00	-19.81	-14.15	-3.30	-1.42
L. Isabella	0.30	-50.00	-20.00	-11.67	-2.00	-1.00
Lakeport	0.37	-50.00	-1.61	-1.08	-28.49	-0.81
San Rafael	0.92	-50.00	-1.74	-1.30	-38.61	-0.54
Yosemite	0.67	-50.00	-7.14	-5.36	-11.90	-1.19
Mammoth	0.38	-50.00	-9.69	-6.54	-8.38	-1.05
Salinas II	0.30	-50.17	-5.08	-5.08	-28.47	-1.02
Napa	0.47	-50.00	-1.91	-1.48	-34.75	-0.64
Norden	0.68	-50.00	-2.92	-2.05	-16.81	-0.73
Anaheim	0.48	-50.00	-32.99	-4.36	-1.66	-0.62
Quincy	0.22	-49.77	-1.86	-1.40	-19.07	-0.47
Sacramento	0.40	-49.88	-2.49	-1.75	-24.69	-0.75
Victorville	0.24	-49.79	-26.75	-4.12	-0.41	-0.82
San Bernardino	0.57	-50.00	-27.99	-3.35	-0.53	-0.70
Nipomo	0.44	-50.11	-15.58	-10.16	-10.38	-3.84
Santa Barbara	0.59	-49.92	-21.32	-10.32	-5.75	-2.37
San Jose	0.33	-49.85	-3.34	-3.65	-31.31	-0.61
Montague	0.06	-50.08	-1.08	-0.62	-12.67	-0.77
Sequoia	0.76	-50.07	-15.37	-11.04	-4.86	-1.58
Lindcove	0.17	-50.00	-15.12	-12.21	-4.65	-1.74
San Nicolas Isl.	0.25	-50.20	-26.10	-7.23	-4.42	-3.61
Berkeley	0.78	-49.94	-1.68	-1.29	-38.19	-0.39
Reseda	0.76	-50.07	-30.60	-5.96	-2.38	-0.93
Lynwood	0.80	-50.00	-32.96	-4.48	-1.87	-0.62
Pasadena	1.03	-50.10	-32.82	-5.05	-1.94	-0.97
Mt. Wilson	1.73	-50.12	-31.79	-5.20	-1.16	-1.16
Tanbark Flats	1.36	-49.85	-31.18	-3.68	-0.74	-0.74
Escondido	0.51	-50.00	-28.26	-4.35	-1.38	-0.79

(a) 50% reduction throughout California
(b) 50% reduction in the Western Part of the South Coast Air Basin
(c) 50% reduction in the Lower San Joaquin Valley
(d) 50% reduction in the San Francisco Bay Area
(e) 50% reduction in the Upper South Central Coast

TABLE 7-13

Response of Annual Total Nitrogen Deposition to Changes in NO_x Emissions

RECEPTOR	Change (%) in total nitrogen deposition					
	Base Case Value (kg/ha/yr)	(a)	(b)	(c)	(d)	(e)
Bethel Island	3.12	-50.00	-2.88	-2.24	-25.64	-0.64
Gasquet	1.00	-50.00	-0.90	-0.60	-13.73	-0.80
S. Lake Tahoe	2.05	-50.24	-3.90	-2.44	-13.17	-0.98
Eureka	1.50	-50.13	-1.33	-0.67	-12.67	-0.67
Bakersfield	5.33	-49.91	-16.51	-18.95	-3.00	-1.13
L. Isabella	4.11	-50.12	-19.46	-12.17	-2.19	-1.22
Lakeport	2.32	-50.00	-1.29	-0.86	-27.59	-0.43
San Rafael	5.27	-50.09	-1.52	-1.14	-39.85	-0.57
Yosemite	2.78	-50.00	-6.47	-4.68	-11.51	-1.08
Mammoth	2.25	-49.78	-9.33	-6.22	-8.44	-1.33
Salinas II	3.88	-50.00	-4.38	-4.38	-29.90	-1.03
Napa	3.78	-50.00	-1.85	-1.32	-35.71	-0.53
Norden	2.48	-50.00	-2.42	-1.61	-16.13	-0.81
Anaheim	11.20	-50.18	-37.41	-3.57	-1.79	-0.89
Quincy	1.67	-50.00	-1.80	-1.20	-18.56	-0.60
Sacramento	3.49	-50.14	-2.01	-1.43	-21.49	-0.57
Victorville	6.07	-49.92	-25.54	-3.62	-0.49	-0.66
San Bernardino	7.41	-49.93	-25.91	-2.83	-0.54	-0.54
Nipomo	4.43	-49.89	-14.45	-9.48	-10.38	-4.74
Santa Barbara	5.58	-50.00	-20.43	-10.04	-5.73	-3.41
San Jose	4.47	-49.89	-2.46	-2.46	-34.68	-0.45
Montague	0.93	-49.95	-0.86	-0.43	-11.19	-0.54
Sequoia	3.32	-50.00	-14.76	-11.14	-4.82	-1.51
Lindcove	3.04	-50.00	-14.47	-12.83	-4.61	-1.64
San Nicolas Isl.	4.23	-50.12	-25.77	-6.62	-4.26	-3.55
Berkeley	6.45	-49.92	-1.09	-0.78	-40.93	-0.31
Reseda	9.20	-50.00	-32.83	-5.00	-2.17	-0.76
Lynwood	12.90	-50.00	-38.14	-3.10	-1.55	-0.78
Pasadena	11.00	-49.82	-35.36	-3.64	-0.91	0.00
Mt. Wilson	10.30	-50.00	-33.30	-4.47	-0.97	-0.97
Tanbark Flats	8.99	-50.06	-30.59	-3.23	-1.00	-0.67
Escondido	5.11	-49.90	-27.01	-3.91	-1.37	-0.59

(a) 50% reduction throughout California
(b) 50% reduction in the Western Part of the South Coast Air Basin
(c) 50% reduction in the Lower San Joaquin Valley
(d) 50% reduction in the San Francisco Bay Area
(e) 50% reduction in the Upper South Central Coast

8.0 CONCLUSIONS

8.1 Summary

In this study, we used a semi-empirical modeling approach to evaluate long-term regional source-receptor relationships (SRRs) for atmospheric acidity and acidic deposition in California. The model that was used in the study is a semi-empirical statistical acid deposition model, referred to as STATMOD, that has been developed and refined at ENSR over the last 10 years. STATMOD is based on the premise that long term (annual or seasonal) averages of concentration and deposition of a pollutant are insensitive to short term fluctuations of the governing processes such as meteorology and chemistry. This assumption allows us to base model estimates on the statistics of the governing processes.

Part of the study involved the database management of the California Acid Deposition Monitoring Program (CADMP) dry and wet deposition databases. The primary goals of the CADMP data management task were to perform a limited validation of the databases, to incorporate the data into a Database Management System (DBMS) in a form suitable for distribution to other users, and to develop programs to generate temporally averaged concentrations for specified averaging periods.

STATMOD was used to compute annually and seasonally averaged dry and wet depositions of anthropogenically emitted sulfur and nitrogen oxides and their oxidation products. The CADMP database was used to evaluate and calibrate the model parameters. The model was then used to compute source-receptor relationships for selected receptor locations. These relationships are presented as:

- plots showing the relative contribution of the various source regions in California to acid deposition at a receptor; and
- zones of influence for each receptor — the zone of influence is a measure of the area around a given receptor location that predominantly influences the estimated deposition at the location.

The simulations were performed by dividing California into 17 meteorological zones. The upper air annual and seasonal wind roses for these zones were prepared by processing:

- upper air data at 6 locations in and around California [obtained from the National Climatic Data Center (NCDC)];
- upper air data at Fresno (obtained from the ARB); and
- historical summaries of California upper air data.

Annual and seasonal precipitation amounts for the 17 meteorological zones were determined by using the "Kriging" technique (Venkatram, 1988) to interpolate precipitation measurements in the CADMP database.

The ARB summaries of county-resolved NO_x and SO_x emissions were used to prepare the emission files for our simulations. Emission-weighted locations for each county were determined by using available gridded inventories for the San Joaquin Valley and the South Coast Air Basin for counties in these regions, or by locating the emissions at urban centers for other counties.

The CADMP data was used to prepare annually and seasonally averaged precipiation chemistry and air quality databases.

Annual and seasonal files for the upper air winds, emissions, precipitation chemistry, and air quality were prepared for the individual years of interest (1984 through 1989) as well as for a composite year. The individual year files were used in the evaluation and calibration of the model, while the composite year files were used for deriving the source-receptor relationships, and for performing the sensitivity studies.

We also performed an uncertainty analysis of the derived source-receptor relationships, based on the uncertainty of the model parameters. The Latin Hypercube Sampling (LHS) technique was used to construct parameter sets for these sensitivity studies. Finally, we conducted emission scenario simulations to determine the impact of SO_2 and NO_x emission controls on acidic deposition at sensitive receptor locations.

8.2 Conclusions and Recommendations

8.2.1 Model Evaluation Results

Our evaluation of the performance of the model with the CADMP data showed that the model performed well in estimating nitrate concentrations in rain and air. However, the model consistently underestimated sulfate concentrations in rain and air at several receptors. Total sulfur (SO_2 + sulfate) concentrations were also underestimated, suggesting that the SO_2 emissions used in the simulations were either inaccurate or incomplete.

Assuming that there were no major inaccuracies in the anthropogenic SO_2 emissions, the results indicated that sources not included in the inventory (e.g., natural sources such as sea-salt, or wind blown soil dust) influenced the observed concentrations at some of the receptors where the model underestimated sulfur concentrations.

To test this theory, we first subtracted the sea-salt contribution from the observed sulfur concentrations in rain. The sea-salt contribution was estimated by using the observed sodium and magnesium concentrations and the chemical composition of sea water. This correction resulted in some improvement in the performance of the model, particularly at coastal receptors. However, there were still some receptors where the model underestimated the observed sulfur concentrations.

We performed a regression analysis of the residual of the seasonally averaged observed and estimated sulfur concentrations in rain against observed calcium concentrations for those receptors where the model performed poorly. The analysis showed that the residuals and observed calcium concentrations were highly correlated and that model performance could be improved by estimating the contribution of wind blown soil dust to sulfur concentrations in rain, and SO_2 and sulfate concentrations in air.

In conclusion, we are satisfied with the performance of the model for nitrate. We suspect that better results for sulfate can be obtained by accounting for the role of non-anthropogenic sources of sulfate. This can be accomplished by performing a detailed receptor modeling study with accurate source profiles for wind blown soil dust or other possible sources of natural sulfate. We recommend that such a study be performed to confirm this hypothesis.

8.2.2 Source-Receptor Relationships

After we were reasonably certain that the model performance could not be improved further without conducting detailed receptor modeling studies to determine the role of non-anthropogenic sources on sulfur deposition, we conducted the composite year simulations to derive the source-receptor relationships.

We found that sulfur dry and wet deposition levels were usually an order of magnitude lower than sulfur depositions estimated in rural and urban locations in the eastern United States.

These results are consistent with the relative SO_2 emission levels in the western and eastern United States.

The contribution of local sources dominated the total sulfur (SO_2 + sulfate) dry deposition at receptors located in urban regions or close to large sources. This is expected because sulfur dry deposition in these regions is dominated by locally emitted SO_2. The zone of influence for total sulfur dry deposition at these receptors was usually less than 100 km, i.e., dry sulfur deposition at these receptors could be attributed mainly to sources that were less than 100 km away from the receptors.

On the other hand, at remote receptors, such as Yosemite, we saw some evidence of long-range transport in the dry deposition of sulfur. Yosemite had a zone of influence for sulfur dry deposition of 200 km and the largest contributors to the annual total sulfur dry deposition at Yosemite were the Upper San Joaquin Valley and the San Francisco Bay Area.

Long-range transport played a larger role in total sulfur wet deposition as compared to dry deposition, even at receptors in the vicinity of large sources. The zone of influence for sulfur wet deposition was higher than that for sulfur dry deposition at all receptors. At some receptors, the wet deposition zone of influence was more than twice the dry deposition zone of influence. These results are consistent with our understanding that sulfur dry deposition is a more local phenomenon than wet deposition, since the former is largely associated with local emissions of SO_2, while the latter is also influenced by sulfate formed by the oxidation of SO_2.

The annual total sulfur dry deposition is larger than the sulfur wet deposition at receptors located near large source regions. In some cases, such as Bakersfield, the dry deposition is more than an order of magnitude larger than the wet deposition. At remote receptors, the dry and wet deposition of sulfur are comparable, or the wet deposition is larger than the dry deposition. The possible reasons for these regional differences are discussed in Section 6.

In conclusion, sulfur dry deposition tends to be a local phenomenon, while sulfur wet deposition is influenced by long-range transport. Sulfur dry deposition is generally larger than sulfur wet deposition in most of California, except at some remote receptors. Levels of sulfur deposition in California are much lower than those in the eastern United States.

We found that long-range transport was a factor in nitrogen dry deposition, even at receptors that were located close to high NO_x sources. The zones of influence for dry deposition of nitrate were always larger than the zones of influence for sulfur dry deposition, indicating that nitrate dry deposition has a more regional nature than sulfur dry deposition. The reason for this is that nitrogen dry deposition is dominated by dry deposition of nitrate, since NO_x is not dry deposited efficiently. Thus, significant dry deposition of nitrogen oxides can only occur after the NO_x has been converted to nitrate.

The source contributions to nitrate wet deposition were generally similar to the sulfate wet deposition source contributions. The zones of influence for the wet deposition of the sulfur and nitrate were also comparable.

The total (dry + wet) nitrogen deposition was larger than the total sulfur deposition by a factor of 2 to 5 (in mass units), and a factor of 5 to 11 (in molar units) at most receptor locations. The higher ratios are for receptors close to source regions, while the lower ratios are at remote receptors. These results are consistent with the relative NO_x and SO_x emission rates in California.

In conclusion, nitrate dry deposition has a long-range transport component even at receptors located close to major NO_x sources. The source-receptor relationships for nitrate wet deposition are similar to those for sulfur wet deposition, in terms of the relative contributions of source regions and the zones of influence. The total nitrate deposition is larger than the total sulfur deposition at most receptor locations.

8.2.3 Sensitivity Studies

Sensitivity studies with the model parameters showed that estimated sulfur concentrations in rain were relatively insensitive to changes in the parameters. The standard deviation was less than 10 percent for all the receptors, indicating that no substantial changes in the estimated sulfur concentrations in rain could be expected by adjusting the input parameters.

The estimated ambient sulfate concentrations were more sensitive to changes in the model parameters than sulfur in rain. However, the standard deviation of the estimated values was still small (less than 15%) for all the receptors.

Nitrate concentrations in both rain and air were more sensitive to the model parameters. For many of the receptors, the maximum estimated concentrations were about two times larger than the minimum estimated concentrations. The sensitivity was more pronounced for receptors located in urban areas, such as Southern California, that were directly affected by local sources.

The uncertainty analysis yielded the encouraging result that the source receptor relationships for the total deposition of sulfur and nitrate were not very sensitive to the model parameters. The major contributing source regions and their relative ranks remained the same for the 10 receptors selected for the analysis, regardless of the parameter set used.

In conclusion, the uncertainty analysis results show that the source-receptor relationships derived in this study are not very sensitive to large changes in model parameter values.

The results of the emission control scenario studies showed that a 50 percent reduction in statewide SO_x emissions did not always result in a 50 percent reduction in the dry, wet, or total sulfur deposition. On the other hand, the response to a 50 percent reduction in NO_x emissions across the entire state was linear. These results are consistent with the formulation of the model.

Emission controls in individual source regions showed that larger reductions were estimated at receptors that were directly influenced by these source regions as compared to receptors that did not receive large contributions from these sources. The results were slightly different for sulfur and nitrogen, particularly at receptors located close to the source regions where emissions were reduced in our simulations. The differences in the results for sulfur and nitrogen can be attributed to the differences in their scales for dry deposition, and the fact that wet scavenging of sulfur is limited by the availability of oxidants.

In conclusion, sulfur deposition does not always respond linearly to changes in SO_x emissions. The effects of controlling emissions in individual source regions were consistent with the source-receptor relationships, i.e., the largest changes in deposition were seen at those receptors that received the largest contribution from the source region being controlled.

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APPENDIX A

ANNUAL AVERAGES FOR DRY AND WET DEPOSITION DATA BY SITE AND YEAR

RAIN WEIGHTED AVERAGE READINGS (in mg/l)
for Wet data from
06/01/84 to 12/31/84

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	07/03/84 To 01/02/85	26	10	7	0.05	4.87	243		5.53	0.0	5.8	0.111	0.027	0.100	0.023	0.262	0.20	0.47	0.31
0800652	07/03/84 To 01/02/85	26	16	7	1.67	43.53	2119	5.26	5.41	11.6	11.0	1.151	0.077	0.144	0.150	-0.024	2.26	0.08	0.46
0900684	07/03/84 To 01/02/85	25	14	7	0.27	7.36	515	5.06	5.24	4.9	4.7	0.068	0.105	0.126	0.028	0.001	0.15	0.35	0.29
1200519	07/03/84 To 01/02/85	26	15	7	0.86	22.52	1574	5.13	5.23	13.0	13.0	1.340	0.079	0.157	0.165	0.001	2.49	0.12	0.58
1500203	07/03/84 To 01/02/85	25	9	7	0.00	2.27	157		5.17	0.0	11.8	0.143	0.058	0.275	0.036	0.544	0.22	1.20	1.20
1700713	07/03/84 To 01/02/85	26	17	7	0.45	12.85	942	5.14	5.29	6.0	6.1	0.178	0.051	0.103	0.033	0.058	0.30	0.43	0.31
2100451	07/03/84 To 01/02/85	26	15	7	0.62	18.78	1240	4.84	5.03	11.5	11.5	0.731	0.052	0.145	0.098	0.093	1.19	0.59	0.70
2200745	07/03/84 To 01/02/85	26	15	7	0.67	17.71	1213	5.12	5.37	3.3	4.8	0.088	0.045	0.151	0.029	0.162	0.15	0.56	0.30
2600784	07/17/84 To 01/08/85	25	21	7	0.96	23.99	243	5.55	5.53	2.1	2.6	0.053	0.020	0.092	0.018	0.066	0.11	0.30	0.19
2700544	07/03/84 To 01/02/85	26	14	7	0.25	6.56	457	5.50	5.51	8.6	9.0	0.766	0.048	0.161	0.102	0.208	1.45	0.39	0.49
3400282	07/03/84 To 01/02/85	26	13	7	0.13	8.51	578		5.36	0.0	6.8	0.147	0.020	0.088	0.030	0.260	0.24	0.57	0.36
3600190	07/03/84 To 01/02/85	26	10	7	0.00	4.52	300		5.14	0.0	11.9	0.273	0.109	0.607	0.056	0.627	0.28	2.40	0.79
3600194	07/03/84 To 01/02/85	26	12	7	0.00	5.30	352		5.23	0.0	9.6	0.311	0.058	0.179	0.026	0.568	0.33	1.49	0.64
4000834	07/03/84 To 01/08/85	27	11	7	0.24	7.90	489	5.02	5.12	7.7	7.9	0.459	0.029	0.122	0.066	0.109	0.81	0.41	0.47
4200379	07/03/84 To 01/04/85	26	14	7	0.29	7.56	496	4.83	4.76	11.1	16.5	0.721	0.048	0.174	0.105	0.062	1.31	0.82	0.64
4300382	07/03/84 To 01/02/85	26	12	7	0.25	6.45	423	5.15	5.40	8.2	8.0	0.583	0.046	0.151	0.085	0.113	1.03	0.33	0.45
5400570	07/03/84 To 01/02/85	26	13	7	0.38	11.86	737	4.98	5.06	7.6	7.3	0.374	0.057	0.096	0.019	0.381	0.40	1.53	0.47
5400575	07/03/84 To 10/23/84	15	4	7	0.06	5.01	627	5.26	5.09	8.2	7.5	0.463	0.025	0.533	0.059	0.093	0.32	0.66	1.12
5600432	07/03/84 To 01/01/85	25	11	7	0.00	7.05	486		5.14	0.0	9.7	0.868	0.051	0.057	0.069	0.057	1.32	0.52	0.46
6000341	07/03/84 To 01/02/85	25	14	7	0.46	11.50	842	5.08	5.11	8.5	8.8	0.485	0.038	0.141	0.071	0.045	0.84	0.46	0.49
7000074	07/03/84 To 01/02/85	26	10	7	0.00	6.35	421		4.63	0.0	17.6	0.611	0.056	0.172	0.057	0.383	0.78	1.71	1.16
7000084	07/03/84 To 01/02/85	26	12	7	0.00	7.22	479		4.78	0.0	15.0	0.676	0.056	0.123	0.062	0.371	1.07	1.37	1.12
7000088	07/03/84 To 01/01/85	37	19	5	0.01	10.46	466		4.73	0.0	14.0	0.568	0.057	0.144	0.054	0.415	0.78	1.68	0.83
7000579	07/03/84 To 01/02/85	26	11	7	0.00	8.20	544		4.85	0.0	13.3	0.518	0.080	0.131	0.058	0.344	0.78	1.36	1.02
7000584	07/03/84 To 01/01/85	25	11	7	0.04	16.24	1052		4.96	0.0	7.2	0.229	0.075	0.040	0.014	0.196	0.25	0.91	0.43
7000598	07/03/84 To 01/02/85	26	13	7	0.00	17.07	1132		5.07	0.0	8.2	0.254	0.042	0.065	0.017	0.288	0.35	1.16	0.48
8000115	07/03/84 To 01/08/85	27	14	7	0.00	8.57	545		5.36	0.0	11.8	0.536	0.071	0.617	0.087	0.211	0.78	0.93	0.66

RAIN WEIGHTED AVERAGE READINGS (in mg/l)
for Wet data from
01/01/85 to 12/31/85

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/02/85 To 01/07/86	53	22	7	0.06	8.29	272		5.65	0.0	8.3	0.322	0.048	0.135	0.059	0.534	0.55	1.08	0.51
0800652	01/02/85 To 01/07/86	51	32	7	1.09	55.47	1879	5.14	5.35	8.7	7.6	0.802	0.070	0.104	0.105	-0.007	1.39	0.12	0.36
0900684	01/02/85 To 01/07/86	53	26	7	0.27	15.67	390	5.21	5.26	4.1	4.8	0.091	0.026	0.109	0.020	0.099	0.15	0.47	0.25
1200519	01/02/85 To 01/07/86	53	31	7	0.49	25.95	821	5.35	5.26	15.0	13.3	1.484	0.149	0.166	0.189	0.000	2.73	0.16	0.68
1500203	01/02/85 To 01/07/86	53	19	7	0.05	4.60	139	5.51	5.38	10.6	12.2	0.290	0.116	0.314	0.042	0.732	0.30	1.14	1.34
1500245	02/07/85 To 01/07/86	47	16	7	0.17	8.07	234	5.26	5.48	4.7	4.3	0.207	0.027	0.116	0.027	0.077	0.29	0.36	0.26
1700713	01/02/85 To 01/08/86	53	24	7	0.38	20.15	656	5.47	5.54	4.4	4.0	0.213	0.028	0.064	0.025	0.075	0.37	0.26	0.17
2100451	01/02/85 To 01/07/86	53	21	7	0.53	28.24	885	5.00	5.10	10.3	9.9	0.634	0.038	0.100	0.089	0.140	1.17	0.50	0.58
2200745	01/02/85 To 01/07/86	52	26	7	0.67	34.80	712	5.18	5.42	4.0	5.4	0.177	0.078	0.170	0.039	0.156	0.29	0.66	0.35
2600784	01/08/85 To 01/07/86	51	28	7	0.86	43.88	282	5.40	5.48	3.5	3.5	0.064	0.016	0.056	0.011	0.074	0.06	0.29	0.15
2700544	01/02/85 To 01/07/86	53	25	7	0.20	11.38	376	5.33	5.48	7.8	7.7	0.608	0.040	0.110	0.078	0.189	1.09	0.34	0.40
2800783	07/02/85 To 01/07/86	27	9	7	0.36	9.75	553	5.02	5.14	8.3	8.2	0.442	0.032	0.050	0.059	0.183	0.73	0.62	0.44
2900793	07/02/85 To 01/07/86	27	19	7	0.98	26.37	1071	5.22	5.34	3.7	3.5	0.124	0.031	0.055	0.012	0.042	0.13	0.28	0.14
3000194	07/02/85 To 01/07/86	27	6	7	0.16	4.27	249		5.14	0.0	8.6	0.476	0.054	0.122	0.062	0.218	0.85	0.60	0.54
3200816	07/02/85 To 01/07/86	26	12	7	0.31	15.66	949	5.99	5.22	4.8	4.0	0.073	0.029	0.042	0.012	0.063	0.14	0.28	0.15
3400282	01/02/85 To 01/07/86	53	21	7	0.23	14.74	386		5.31	0.0	9.2	0.314	0.058	0.105	0.049	0.582	0.59	1.05	0.57
3600190	01/02/85 To 01/02/86	52	11	7	0.00	2.68	89		5.61	0.0	8.6	0.185	0.055	0.601	0.044	0.255	0.24	1.37	0.56
3600194	01/02/85 To 01/07/86	53	22	7	0.06	9.20	286		5.35	0.0	12.8	0.369	0.039	0.310	0.051	0.841	0.52	1.82	0.88
4000834	01/08/85 To 01/07/86	52	19	7	0.18	10.91	351	5.28	5.35	10.0	10.4	0.897	0.053	0.102	0.128	0.165	1.62	0.31	0.57
4200379	01/04/85 To 01/07/86	53	20	7	0.22	11.44	346	4.97	4.89	9.9	12.9	0.562	0.039	0.106	0.078	0.148	1.00	1.01	0.58
4300382	01/02/85 To 01/07/86	53	23	7	0.19	10.13	324	5.19	5.34	9.9	8.8	0.496	0.051	0.213	0.077	0.265	0.89	0.64	0.66
4700870	07/02/85 To 01/07/86	27	18	7	0.21	5.81	328	5.16	5.25	4.8	5.7	0.077	0.025	0.058	0.014	0.191	0.12	0.44	0.27
5400570	01/02/85 To 01/07/86	60	30	6	0.29	23.52	659	5.11	5.17	7.3	6.8	0.197	0.047	0.092	0.021	0.255	0.29	0.88	0.36
5400571	07/02/85 To 01/07/86	36	18	5	0.52	21.06	1012	5.08	5.13	4.9	5.1	0.086	0.031	0.069	0.013	0.121	0.13	0.47	0.24
5400575	05/07/85 To 10/07/85	23	9	5	0.11	2.76	200	4.87	4.91	11.9	12.4	0.165	0.088	0.224	0.027	0.610	0.27	1.47	0.76
5400578	07/02/85 To 01/07/86	27	14	7	0.11	6.50	401	5.86	5.47	3.1	9.7	0.225	0.063	0.240	0.032	0.654	0.26	1.52	0.63
5600432	01/01/85 To 01/07/86	53	20	7	0.09	5.99	178		5.28	0.0	15.6	1.586	0.092	0.176	0.190	0.033	2.44	0.31	0.67
6000341	01/02/85 To 01/07/86	53	25	7	0.25	18.30	617	4.97	5.07	10.5	10.2	0.760	0.063	0.123	0.104	0.104	1.32	0.50	0.54
7000074	01/02/85 To 01/07/86	53	19	7	0.09	7.18	227		4.69	0.0	17.3	0.458	0.050	0.137	0.059	0.396	0.78	1.80	1.03
7000084	01/02/85 To 01/07/86	53	16	7	0.10	10.47	346		4.65	0.0	17.5	0.719	0.055	0.156	0.084	0.307	1.16	1.15	1.32
7000088	01/01/85 To 01/07/86	58	23	6	0.08	8.73	254		4.56	0.0	17.6	0.462	0.045	0.183	0.058	0.297	0.77	1.69	1.05
7000579	01/02/85 To 01/07/86	53	18	7	0.04	8.78	285		4.73	0.0	14.9	0.523	0.043	0.139	0.064	0.385	0.78	1.27	1.03
7000584	01/01/85 To 01/07/86	53	18	7	0.20	17.05	572		4.98	0.0	7.1	0.219	0.032	0.098	0.026	0.064	0.30	0.62	0.41
7000598	01/02/85 To 01/07/86	53	23	7	0.17	15.27	498		4.69	0.0	14.1	0.435	0.039	0.189	0.057	0.225	0.66	1.49	0.75
8000115	01/08/85 To 01/07/86	51	22	7	0.01	10.85	351	4.67	4.99	0.0	15.0	1.332	0.082	0.185	0.141	0.107	2.04	0.65	0.85

RAIN WEIGHTED AVERAGE READINGS (in mg/l)
for Wet data from
01/01/86 to 12/31/86

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/07/86 To 01/06/87	51	22	7	0.20	11.83	389	7.42	5.58	0.3	8.5	0.478	0.037	0.098	0.065	0.434	0.82	0.71	0.48
0800652	01/07/86 To 01/01/87	50	35	7	1.98	99.00	2982	5.04	5.32	7.8	8.3	0.808	0.034	0.057	0.104	0.037	1.51	0.10	0.34
0900684	01/07/86 To 01/06/87	51	25	7	0.42	21.29	672	5.24	5.33	3.9	3.9	0.073	0.026	0.070	0.012	0.091	0.11	0.31	0.20
1200519	01/07/86 To 01/06/87	52	34	7	0.75	42.39	1371	5.41	5.36	11.2	10.6	1.127	0.054	0.081	0.144	0.042	2.11	0.13	0.46
1500203	01/07/86 To 01/06/87	52	11	7	0.11	6.30	180	5.26	5.34	8.6	8.5	0.166	0.030	0.176	0.028	0.523	0.26	0.93	0.95
1500245	01/07/86 To 01/06/87	52	15	7	0.23	12.02	322	5.31	5.25	5.6	5.9	0.134	0.037	0.141	0.026	0.180	0.19	0.72	0.37
1700713	01/08/86 To 01/06/87	52	26	7	0.71	37.36	1021	5.40	5.53	6.1	5.9	0.451	0.052	0.038	0.058	0.135	0.78	0.23	0.28
2100451	01/07/86 To 01/06/87	52	26	7	0.91	47.43	1192	5.05	5.31	12.6	9.0	0.912	0.037	0.056	0.107	0.089	1.59	0.26	0.48
2200745	01/07/86 To 01/06/87	53	25	7	0.77	54.74	1035	5.20	5.42	3.5	3.1	0.088	0.014	0.021	0.012	0.069	0.14	0.28	0.14
2600784	01/07/86 To 01/06/87	49	18	7	0.97	47.67	211	5.70	5.76	1.3	1.4	0.015	0.005	0.014	0.002	0.018	0.03	0.10	0.06
2700544	01/07/86 To 01/07/87	52	26	7	0.25	13.15	483	5.44	5.46	8.6	9.2	0.792	0.040	0.078	0.113	0.182	1.61	0.33	0.45
2800783	01/07/86 To 01/06/87	52	25	7	0.63	32.98	1001	5.13	5.17	9.5	9.3	0.675	0.033	0.042	0.090	0.127	1.20	0.37	0.52
2900793	01/07/86 To 01/06/87	50	30	7	1.39	69.66	1808	5.22	5.37	3.3	3.3	0.086	0.023	0.036	0.011	0.065	0.15	0.22	0.14
3000194	01/07/86 To 01/06/87	52	15	7	0.31	16.26	518		5.20	0.0	9.0	0.423	0.028	0.084	0.055	0.298	0.79	0.59	0.58
3200816	01/07/86 To 01/06/87	51	31	7	0.95	51.42	1488	5.09	5.31	4.6	4.1	0.129	0.043	0.050	0.017	0.067	0.24	0.26	0.18
3400282	01/07/86 To 01/07/87	52	22	7	0.40	20.85	665		5.47	0.0	7.5	0.296	0.022	0.060	0.042	0.437	0.52	0.70	0.45
3600190	01/02/86 To 01/28/86	4	2	7	0.00	0.17	74		6.12	0.0	37.4	0.317	0.229	5.790	0.137	0.328	0.39	2.56	2.87
3600194	01/07/86 To 01/06/87	52	16	7	0.25	13.18	435		5.41	0.0	10.0	0.304	0.031	0.264	0.049	0.580	0.54	1.23	0.61
3600199	01/28/86 To 01/06/87	49	15	7	0.16	8.28	271		5.08	0.0	12.2	0.095	0.029	0.579	0.041	0.446	0.17	1.43	0.85
4000834	01/07/86 To 01/06/87	52	14	7	0.25	15.04	484	5.20	5.24	8.7	8.9	0.805	0.037	0.091	0.094	0.097	1.33	0.39	0.46
4200379	01/07/86 To 01/06/87	52	14	7	0.26	17.26	558	4.82	4.89	11.2	12.5	0.828	0.044	0.080	0.120	0.092	1.53	0.78	0.55
4300382	01/07/86 To 01/06/87	52	23	7	0.27	14.00	457	5.29	5.37	12.6	12.0	1.070	0.056	0.158	0.142	0.211	2.05	0.45	0.73
4700870	01/07/86 To 01/06/87	52	36	7	0.28	14.33	426	5.11	5.33	3.5	3.6	0.027	0.017	0.049	0.010	0.123	0.07	0.34	0.19
5400570	01/07/86 To 01/06/87	54	21	7	0.49	26.30	775	5.17	5.23	5.0	6.1	0.172	0.031	0.066	0.030	0.276	0.29	0.68	0.31
5400571	01/07/86 To 01/06/87	60	26	6	0.84	52.68	924	5.19	5.32	4.4	4.7	0.107	0.013	0.034	0.013	0.205	0.18	0.46	0.22
5400575	05/30/86 To 10/07/86	17	10	6	0.27	5.51	524	4.94	5.16	9.2	7.9	0.058	0.031	0.172	0.016	0.354	0.16	0.89	0.44
5400578	01/07/86 To 01/06/87	52	15	7	0.25	13.16	418	5.51	5.47	6.8	7.2	0.198	0.053	0.084	0.030	0.472	0.33	1.01	0.40
5600432	01/07/86 To 01/06/87	51	12	7	0.16	8.47	310		5.29	0.0	12.9	1.334	0.053	0.122	0.147	0.083	2.41	0.23	0.61
6000341	01/07/86 To 01/06/87	52	28	7	0.35	27.86	982	5.01	5.10	10.6	10.2	0.782	0.049	0.071	0.103	0.092	1.38	0.40	0.52
7000074	01/07/86 To 01/06/87	52	13	7	0.31	16.09	516	7.35	4.84	0.1	11.5	0.274	0.019	0.092	0.042	0.275	0.48	1.14	0.67
7000084	01/07/86 To 01/06/87	52	14	7	0.31	15.94	525		4.80	0.0	15.0	0.608	0.029	0.082	0.080	0.311	1.11	0.83	1.12
7000088	01/07/86 To 01/06/87	52	13	7	0.27	22.66	754		4.80	0.0	13.3	0.388	0.036	0.105	0.060	0.259	0.69	1.15	0.76
7000579	01/07/86 To 01/06/87	52	15	7	0.37	19.38	642		4.85	0.0	13.1	0.449	0.028	0.077	0.062	0.320	0.82	0.89	0.87
7000584	01/07/86 To 01/06/87	52	15	7	0.55	28.70	1048		5.09	0.0	5.6	0.165	0.010	0.036	0.021	0.091	0.29	0.35	0.30
7000598	01/07/86 To 01/06/87	52	17	7	0.27	27.83	917		4.94	0.0	8.4	0.281	0.015	0.047	0.040	0.127	0.49	0.63	0.40
8000115	01/07/86 To 01/06/87	52	14	7	0.22	16.63	486	5.26	5.22	7.6	10.5	0.804	0.072	0.167	0.100	0.160	1.38	0.45	0.51

RAIN WEIGHTED AVERAGE READINGS (in mg/l)
for Wet data from
01/01/87 to 12/31/87

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/06/87 To 01/05/88	52	20	7	0.23	12.13	388	5.74	5.78	7.3	6.5	0.139	0.019	0.136	0.023	0.540	0.25	0.64	0.38
0800652	01/01/87 To 01/07/88	51	30	7	1.40	71.51	2352	5.10	5.38	7.7	7.3	0.677	0.030	0.090	0.083	0.057	1.28	0.13	0.28
0900684	01/06/87 To 01/06/88	51	30	7	0.29	15.18	454	5.00	5.11	6.3	6.2	0.101	0.049	0.097	0.018	0.155	0.14	0.59	0.36
1200519	01/06/87 To 01/05/88	52	31	7	0.60	35.54	1154	5.39	5.40	13.1	12.3	1.303	0.072	0.125	0.160	0.073	2.45	0.16	0.53
1500203	01/06/87 To 01/05/88	52	22	7	0.11	6.24	216	5.15	5.17	14.4	17.0	0.249	0.052	0.279	0.047	1.246	0.39	2.71	1.67
1500245	01/06/87 To 01/05/88	52	24	7	0.18	9.81	292	5.18	5.16	6.2	6.0	0.090	0.034	0.124	0.019	0.220	0.16	0.81	0.42
1700713	01/06/87 To 01/05/88	53	24	7	0.51	27.86	820	5.45	5.52	4.8	4.5	0.160	0.014	0.046	0.022	0.187	0.30	0.40	0.21
2100451	01/06/87 To 01/05/88	54	24	7	0.57	32.12	883	5.07	5.05	12.8	12.6	0.796	0.038	0.114	0.101	0.278	1.49	0.62	0.81
2200745	01/06/87 To 01/05/88	51	28	7	0.36	30.79	1063	4.97	5.25	7.0	5.9	0.081	0.063	0.073	0.016	0.241	0.16	0.76	0.36
2600784	01/06/87 To 10/06/87	36	18	8	0.44	15.95	226	5.32	5.17	4.5	5.0	0.057	0.024	0.112	0.012	0.150	0.09	0.46	0.33
2700544	01/07/87 To 01/05/88	52	24	7	0.16	11.49	389	5.44	5.59	7.0	8.6	0.656	0.037	0.086	0.093	0.265	1.23	0.46	0.45
2800783	01/06/87 To 01/05/88	52	22	7	0.49	25.54	827	5.03	5.05	8.2	8.2	0.318	0.021	0.059	0.041	0.187	0.60	0.65	0.52
2900793	01/06/87 To 01/05/88	51	35	7	0.92	49.03	1207	5.12	5.26	4.4	3.9	0.074	0.014	0.064	0.009	0.113	0.12	0.33	0.16
3000194	01/06/87 To 01/05/88	52	24	7	0.12	6.44	198		4.98	0.0	14.1	0.481	0.161	0.231	0.079	0.545	1.12	1.26	1.05
3200816	01/06/87 To 10/14/87	38	14	7	0.40	15.25	641	5.39	5.26	6.5	4.4	0.084	0.020	0.073	0.015	0.103	0.16	0.38	0.22
3400282	01/07/87 To 01/05/88	52	23	7	0.33	17.32	550		5.50	0.0	6.9	0.126	0.014	0.081	0.020	0.499	0.25	0.87	0.42
3600194	01/06/87 To 01/05/88	52	14	7	0.14	7.71	245		5.25	0.0	13.7	0.255	0.038	0.400	0.063	0.935	0.51	1.80	0.87
3600199	01/06/87 To 01/05/88	52	25	7	0.10	5.09	169		5.30	0.0	9.1	0.122	0.055	0.596	0.048	0.414	0.23	1.12	0.73
4000834	01/06/87 To 01/05/88	52	23	7	0.27	13.97	466	5.16	5.23	7.7	8.0	0.411	0.024	0.110	0.058	0.209	0.75	0.50	0.47
4200379	01/06/87 To 01/05/88	52	21	7	0.27	14.15	444	4.85	4.90	10.4	10.9	0.381	0.029	0.094	0.090	0.245	0.68	1.13	0.51
4300382	01/06/87 To 01/05/88	52	20	7	0.18	9.41	299	5.54	5.48	8.7	8.7	0.553	0.024	0.144	0.077	0.293	1.07	0.52	0.58
4700870	01/06/87 To 01/05/88	52	30	7	0.17	8.69	256	5.06	5.26	4.7	4.3	0.050	0.017	0.081	0.026	0.131	0.09	0.48	0.25
5400570	01/06/87 To 01/05/88	53	27	7	0.38	19.96	629	5.20	5.34	7.0	7.6	0.075	0.027	0.123	0.016	0.545	0.14	1.36	0.46
5400571	01/06/87 To 01/05/88	53	30	7	0.61	33.50	966	5.19	5.30	4.6	4.7	0.029	0.016	0.096	0.007	0.241	0.07	0.61	0.23
5400575	06/17/87 To 10/13/87	20	7	6	0.05	1.02	78	4.65	4.96	29.9	22.8	0.264	0.167	0.521	0.061	1.334	0.46	3.02	1.93
5400578	01/06/87 To 01/05/88	53	23	7	0.19	10.22	322	5.26	5.50	9.7	9.9	0.168	0.048	0.173	0.028	0.833	0.29	1.64	0.62
5600432	01/06/87 To 01/05/88	52	23	7	0.13	9.52	314		5.35	0.0	15.2	1.586	0.070	0.260	0.181	0.091	3.05	0.38	0.54
6000341	01/06/87 To 01/05/88	44	19	8	0.44	22.33	856	5.06	5.12	6.7	8.1	0.399	0.030	0.127	0.053	0.160	0.75	0.55	0.41
7000074	01/06/87 To 01/05/88	52	21	7	0.23	12.76	417		4.94	0.0	12.0	0.164	0.021	0.170	0.031	0.396	0.34	1.49	0.77
7000084	01/06/87 To 01/05/88	52	19	7	0.16	8.21	268		4.88	0.0	15.2	0.568	0.046	0.201	0.077	0.553	1.17	1.20	1.30
7000088	01/06/87 To 01/05/88	52	23	7	0.24	12.49	404		4.90	0.0	13.3	0.276	0.031	0.226	0.053	0.540	0.58	1.72	1.00
7000579	01/06/87 To 01/05/88	51	21	7	0.18	9.61	320		4.83	0.0	16.3	0.407	0.032	0.175	0.062	0.663	0.79	1.87	1.17
7000584	01/06/87 To 01/05/88	52	25	7	0.47	24.77	806		5.02	0.0	8.1	0.145	0.045	0.077	0.028	0.189	0.34	0.83	0.45
7000598	01/06/87 To 01/05/88	52	27	7	0.30	16.14	550		4.99	0.0	10.2	0.247	0.016	0.139	0.038	0.338	0.51	1.22	0.57
8000115	01/06/87 To 01/05/88	52	28	7	0.21	11.08	359	4.99	5.02	13.7	14.3	0.994	0.059	0.230	0.129	0.302	1.88	0.94	0.84

RAIN WEIGHTED AVERAGE READINGS (in mg/l)
for Wet data from
01/01/88 to 12/31/88

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/05/88 To 01/03/89	52	19	7	0.13	6.61	210	5.39	5.46	9.0	8.9	0.307	0.033	0.172	0.047	0.533	0.53	0.87	0.62
0800652	01/07/88 To 01/03/89	52	33	7	1.41	73.11	2299	5.16	5.35	9.0	9.5	0.988	0.042	0.114	0.117	0.043	1.67	0.13	0.39
0900684	01/06/88 To 01/03/89	52	26	7	0.19	10.14	275	5.03	5.14	6.2	6.2	0.182	0.045	0.114	0.016	0.116	0.25	0.45	0.29
1200519	01/05/88 To 12/20/88	50	31	7	0.46	26.02	898	5.27	5.30	12.8	12.4	1.240	0.076	0.160	0.150	0.070	2.19	0.20	0.68
1500203	01/05/88 To 01/03/89	51	16	7	0.07	4.04	136	5.44	5.65	11.4	13.8	0.430	0.086	0.508	0.074	0.775	0.53	1.22	1.97
1500245	01/05/88 To 01/03/89	52	16	7	0.16	8.42	259	5.16	5.15	7.2	7.4	0.115	0.034	0.183	0.025	0.258	0.17	0.94	0.55
1700713	01/05/88 To 01/03/89	52	22	7	0.29	14.89	489	5.20	5.39	5.2	5.2	0.258	0.018	0.083	0.034	0.108	0.45	0.31	0.28
2100451	01/05/88 To 01/03/89	52	19	7	0.32	16.53	546	5.15	5.18	14.5	13.2	1.099	0.050	0.164	0.128	0.215	1.93	0.60	0.84
2200745	01/05/88 To 11/08/88	44	15	7	0.33	14.40	518	5.07	5.29	5.3	4.7	0.048	0.016	0.106	0.028	0.153	0.03	0.46	0.24
2200746	11/09/88 To 01/04/89	8	6	7	0.48	7.71	1581	5.12	5.30	3.2	3.4	0.069	0.020	0.054	0.013	0.064	0.13	0.23	0.12
2700544	01/05/88 To 01/03/89	53	19	7	0.14	7.64	260	5.31	5.39	7.8	9.0	0.610	0.027	0.141	0.073	0.259	1.11	0.48	0.57
2800783	01/05/88 To 01/03/89	52	21	7	0.30	15.46	499	4.88	4.98	11.0	11.4	0.580	0.030	0.124	0.073	0.225	0.92	0.71	0.75
2900793	01/05/88 To 01/03/89	52	32	7	0.84	43.94	1041	5.18	5.27	4.2	4.0	0.062	0.013	0.075	0.011	0.066	0.10	0.26	0.19
3000194	01/05/88 To 01/03/89	52	15	7	0.18	9.99	322		5.06	0.0	13.8	0.773	0.077	0.233	0.120	0.371	1.82	0.92	0.89
3400282	01/05/88 To 12/13/88	47	16	7	0.17	8.06	283	6.23	5.64	2.6	7.3	0.133	0.024	0.132	0.020	0.534	0.20	0.80	0.52
3400305	12/16/88 To 01/03/89	3	3	6	0.98	2.94	1649	5.31	5.40	10.3	10.1	0.488	0.084	0.094	0.047	0.569	0.68	1.14	0.74
3600194	01/05/88 To 01/04/89	52	17	7	0.19	10.07	317		5.54	0.0	11.0	0.284	0.029	0.240	0.041	0.701	0.48	1.28	0.78
3600199	01/05/88 To 01/03/89	52	15	7	0.07	3.61	115		5.32	0.0	13.3	0.324	0.032	0.638	0.050	0.598	0.29	2.25	0.85
4000834	01/05/88 To 01/03/89	52	15	7	0.29	15.08	489	5.07	5.15	10.5	10.8	0.809	0.044	0.143	0.097	0.154	1.43	0.54	0.55
4200379	01/05/88 To 01/03/89	52	13	7	0.25	12.86	403	4.86	5.02	14.1	15.3	1.153	0.054	0.172	0.150	0.142	2.24	0.73	0.70
4300382	01/05/88 To 01/03/89	52	18	7	0.18	9.23	298	5.42	5.56	9.5	9.6	0.657	0.033	0.221	0.084	0.304	1.13	0.53	0.62
4700870	01/05/88 To 01/03/89	52	27	7	0.21	10.79	337	5.24	5.38	3.6	3.7	0.028	0.012	0.109	0.014	0.122	0.04	0.37	0.21
5400570	01/05/88 To 01/03/89	52	20	7	0.30	15.52	525	5.26	5.29	7.9	6.4	0.152	0.025	0.227	0.031	0.325	0.21	0.73	0.45
5400571	01/05/88 To 01/03/89	52	22	7	0.48	25.73	531	5.17	5.39	4.2	4.2	0.061	0.017	0.140	0.015	0.166	0.06	0.41	0.29
5400575	06/09/88 To 10/04/88	17	8	7	0.07	3.35	329	4.90	5.01	10.8	11.1	0.071	0.049	0.197	0.020	0.668	0.17	1.36	0.90
5400578	01/05/88 To 01/03/89	52	14	7	0.20	10.57	328	5.45	5.59	7.0	6.5	0.111	0.038	0.178	0.022	0.518	0.16	0.84	0.45
5600432	01/05/88 To 12/27/88	51	14	7	0.07	3.45	101		5.32	0.0	104.3	13.540	0.535	1.384	1.704	0.121	27.44	0.56	4.31
6000341	01/05/88 To 01/03/89	40	17	9	0.36	14.47	563	5.01	5.09	12.2	12.8	0.976	0.045	0.205	0.110	0.147	1.57	0.54	0.76
7000074	01/05/88 To 01/03/89	52	15	7	0.24	12.41	395		4.89	0.0	15.3	0.711	0.040	0.186	0.091	0.333	1.25	1.05	0.93
7000084	01/05/88 To 01/03/89	52	14	7	0.21	10.71	361		4.88	0.0	16.2	0.790	0.054	0.194	0.101	0.369	1.58	0.75	1.20
7000088	01/05/88 To 01/03/89	52	18	7	0.22	14.88	480		4.92	0.0	15.7	0.650	0.038	0.171	0.096	0.381	1.45	1.09	1.16
7000579	01/05/88 To 01/03/89	52	13	7	0.22	12.02	382		4.97	0.0	14.6	0.691	0.034	0.238	0.089	0.494	1.44	0.87	1.04
7000584	01/05/88 To 01/03/89	52	18	7	0.39	31.53	1047		5.08	0.0	8.0	0.235	0.022	0.222	0.032	0.168	0.39	0.60	0.46
7000598	01/05/88 To 01/03/89	52	20	7	0.50	26.25	865		4.94	0.0	10.6	0.289	0.021	0.155	0.050	0.261	0.49	1.02	0.57
8000115	01/05/88 To 01/03/89	52	16	7	0.20	10.49	351	5.25	5.12	14.3	15.4	1.353	0.069	0.212	0.166	0.234	2.75	0.62	0.76

RAIN WEIGHTED AVERAGE READINGS (in mg/l)
for Wet data from
01/01/89 to 12/31/89

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/03/89 To 01/02/90	52	20	7	0.20	10.52	327	5.10	5.37	6.9	7.0	0.100	0.032	0.136	0.029	0.378	0.24	0.79	0.55
0800652	01/03/89 To 01/02/90	49	35	7	1.30	63.69	2154	5.21	5.22	5.4	5.7	0.383	0.041	0.069	0.037	-0.006	0.69	0.15	0.25
0900684	01/03/89 To 01/02/90	52	28	7	0.38	19.55	579	5.06	5.24	5.4	5.0	0.077	0.031	0.082	0.016	0.105	0.15	0.48	0.25
1500203	01/03/89 To 01/02/90	52	11	7	0.06	3.19	98	5.37	5.52	17.7	17.4	0.297	0.088	0.505	0.064	1.234	0.52	1.86	2.24
1500245	01/03/89 To 01/02/90	49	13	7	0.11	5.34	199	5.40	5.25	3.9	4.6	0.081	0.033	0.117	0.022	0.049	0.19	0.33	0.30
1700713	01/03/89 To 02/28/89	8	7	7	0.25	1.96	382	5.04	5.14	6.9	6.6	0.186	0.032	0.073	0.024	0.267	0.37	0.63	0.41
2200746	01/04/89 To 01/03/90	52	23	7	0.45	23.64	729	5.05	5.23	5.7	5.1	0.062	0.028	0.085	0.016	0.164	0.14	0.61	0.28
2800783	01/03/89 To 01/02/90	52	24	7	0.34	17.75	573	5.01	5.06	7.7	8.1	0.266	0.035	0.097	0.035	0.176	0.51	0.63	0.64
2900793	01/03/89 To 01/02/90	52	31	7	1.22	63.62	1542	5.08	5.21	4.7	4.4	0.060	0.021	0.059	0.013	0.061	0.13	0.38	0.22
3000194	01/03/89 To 01/03/90	52	13	7	0.07	3.77	114		4.61	0.0	23.2	0.857	0.064	0.279	0.107	0.702	1.11	1.74	1.35
3200821	01/24/89 To 01/02/90	49	27	7	0.59	37.92	1271	5.19	5.26	4.8	4.8	0.065	0.039	0.083	0.017	0.115	0.17	0.48	0.25
3400305	01/03/89 To 01/02/90	52	24	7	0.30	15.57	491	5.36	5.35	8.2	7.9	0.126	0.041	0.095	0.024	0.521	0.26	0.99	0.66
3600194	01/04/89 To 01/03/90	52	12	7	0.12	6.24	180		5.88	0.0	12.0	0.157	0.047	0.191	0.030	0.877	0.30	1.56	0.78
4200379	01/03/89 To 01/02/90	52	12	7	0.10	5.41	149	4.98	4.92	8.6	9.0	0.393	0.068	0.099	0.040	0.135	0.55	0.82	0.48
4300382	01/03/89 To 01/02/90	52	18	7	0.14	7.32	237	5.30	5.49	7.7	6.9	0.331	0.038	0.104	0.038	0.257	0.60	0.46	0.56
4700870	01/03/89 To 01/02/90	52	35	7	0.27	14.16	444	5.25	5.36	3.6	3.7	0.026	0.027	0.062	0.014	0.099	0.09	0.39	0.11
5400570	01/03/89 To 01/02/90	52	22	7	0.26	13.28	444	5.30	5.51	7.6	6.9	0.101	0.040	0.096	0.023	0.439	0.24	0.99	0.47
5400571	01/03/89 To 01/02/90	52	22	7	0.42	22.03	595	5.17	5.38	4.5	4.5	0.063	0.040	0.063	0.014	0.182	0.16	0.52	0.29
5400575	05/18/89 To 10/24/89	22	9	7	0.18	4.00	323	4.97	5.18	6.4	6.3	0.073	0.026	0.106	0.024	0.201	0.12	0.73	0.37
6000341	01/03/89 To 01/03/90	25	14	7	0.60	15.00	1005	4.99	5.09	7.3	7.6	0.333	0.033	0.100	0.041	0.090	0.57	0.47	0.49
7000074	01/03/89 To 01/03/90	51	12	7	0.08	4.13	145		4.79	0.0	14.5	0.235	0.048	0.173	0.045	0.417	0.36	1.72	0.93
7000084	01/03/89 To 01/03/90	52	14	7	0.08	4.40	150		4.78	0.0	17.1	0.449	0.055	0.192	0.064	0.560	0.81	1.23	1.62
7000088	01/03/89 To 01/02/90	52	14	7	0.12	6.26	206		4.69	0.0	17.6	0.242	0.034	0.174	0.043	0.533	0.40	2.01	1.12
7000579	01/03/89 To 01/02/90	52	14	7	0.09	4.86	153		4.71	0.0	18.2	0.265	0.035	0.199	0.052	0.688	0.46	1.81	1.25
7000584	01/03/89 To 01/02/90	52	13	7	0.26	13.41	478		5.00	0.0	7.1	0.094	0.027	0.064	0.018	0.112	0.18	0.66	0.35
7000598	01/03/89 To 01/03/90	52	13	7	0.21	11.76	391		4.81	0.0	12.2	0.225	0.035	0.127	0.042	0.288	0.40	1.41	0.72
8000115	01/03/89 To 01/02/90	52	15	7	0.09	4.95	154	5.46	5.03	12.8	15.0	0.955	0.092	0.208	0.090	0.369	1.57	1.21	1.08

RAIN WEIGHTED AVERAGE READINGS (in mg/l)
for Wet data from
01/01/90 to 08/01/90

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/02/90 To 07/03/90	26	11	7	0.22	5.66	354	5.62	5.56	6.5	6.0	0.127	0.014	0.191	0.035	0.324	0.25	0.44	0.47
0800652	01/02/90 To 07/03/90	26	18	7	1.94	50.33	3252	5.21	5.27	6.8	8.0	0.672	0.033	0.155	0.073	-0.006	1.20	0.05	0.30
0900684	01/02/90 To 07/03/90	26	19	7	0.25	6.50	359	5.02	5.16	7.3	7.0	0.145	0.030	0.182	0.039	0.178	0.16	0.89	0.41
1500203	01/02/90 To 07/03/90	26	10	7	0.10	2.60	156	5.87	5.78	11.9	12.3	0.251	0.057	0.273	0.067	0.900	0.40	1.53	1.43
1500245	01/02/90 To 07/05/90	24	10	8	0.12	2.98	196	5.46	5.37	5.9	6.4	0.186	0.035	0.281	0.062	0.132	0.24	0.64	0.53
2200746	01/03/90 To 07/05/90	25	16	7	4.32	**.**	667	6.19	6.27	0.5	0.6	0.010	0.003	0.012	0.003	0.027	0.01	0.09	0.03
2800783	01/02/90 To 07/03/90	26	12	7	0.50	13.06	838	5.00	5.02	9.5	9.8	0.493	0.026	0.182	0.069	0.123	0.70	0.50	0.69
2900793	01/02/90 To 07/03/90	26	22	7	1.12	29.22	1324	5.07	5.19	4.5	4.5	0.057	0.011	0.111	0.021	0.035	0.08	0.39	0.15
3000194	01/03/90 To 07/02/90	26	10	7	0.20	5.74	383		5.12	0.0	11.0	0.535	0.047	0.159	0.073	0.223	0.90	0.61	0.69
3200821	01/02/90 To 07/03/90	26	14	7	0.66	18.09	1164	5.06	5.09	5.0	4.9	0.042	0.019	0.122	0.030	0.016	0.06	0.27	0.07
3400305	01/02/90 To 07/03/90	26	13	7	0.46	11.84	751	5.98	5.87	6.6	6.2	0.107	0.024	0.112	0.025	0.500	0.16	0.59	0.45
3600194	01/03/90 To 07/03/90	26	15	7	0.25	6.99	455		5.76	0.0	17.2	0.535	0.051	0.312	0.084	1.258	0.88	2.22	1.33
4200379	01/02/90 To 07/03/90	26	9	7	0.25	6.44	394	5.08	5.12	9.6	10.6	0.829	0.040	0.169	0.089	0.057	1.40	0.31	0.54
4300382	01/02/90 To 07/03/90	26	9	7	0.23	6.08	358	5.46	5.44	6.9	6.8	0.365	0.023	0.147	0.042	0.211	0.65	0.31	0.48
4700870	01/02/90 To 07/03/90	26	19	7	0.33	8.57	550	5.58	5.44	3.2	3.3	0.031	0.030	0.112	0.022	0.089	0.04	0.33	0.13
5400570	01/02/90 To 07/03/90	26	15	7	0.45	11.60	762	5.56	5.58	9.8	9.2	0.138	0.027	0.191	0.047	0.691	0.15	1.81	0.66
5400571	01/02/90 To 07/03/90	26	15	7	0.63	16.67	889	5.27	5.45	6.3	6.0	0.095	0.014	0.122	0.026	0.332	0.08	0.88	0.40
6000341	01/03/90 To 07/03/90	26	16	7	0.57	14.73	967	4.98	5.02	12.4	11.9	0.617	0.028	0.206	0.077	0.082	1.08	0.38	0.63
7000074	01/03/90 To 06/26/90	25	11	7	0.19	5.31	350		5.11	0.0	11.5	0.561	0.028	0.220	0.069	0.214	0.96	0.62	0.72
7000084	01/03/90 To 07/02/90	26	13	7	0.24	6.25	412		4.92	0.0	15.0	0.644	0.037	0.274	0.102	0.371	1.17	0.74	1.39
7000087	06/26/90 To 07/02/90	1	0	6	0.00	0.00	0			0.0	0.0	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00
7000088	01/02/90 To 07/03/90	26	12	7	0.36	9.59	645		4.89	0.0	14.3	0.521	0.055	0.294	0.107	0.343	0.87	1.30	1.06
7000579	01/02/90 To 07/03/90	24	11	8	0.24	9.90	694		4.87	0.0	12.1	0.402	0.025	0.259	0.074	0.366	0.65	0.98	0.92
7000584	01/02/90 To 07/03/90	26	13	7	0.54	14.19	969		5.06	0.0	7.9	0.215	0.009	0.171	0.054	0.160	0.32	0.61	0.55
7000598	01/03/90 To 07/03/90	26	16	7	0.07	12.60	835		4.93	0.0	11.2	0.417	0.022	0.185	0.069	0.269	0.66	1.11	0.66
8000115	01/02/90 To 07/03/90	26	14	7	0.26	6.64	452	5.45	5.25	11.9	12.9	0.945	0.043	0.293	0.123	0.261	1.66	0.78	1.00

RAIN WEIGHTED AVERAGE READINGS (in Micro Moles)
for Wet data from
06/01/84 to 12/31/84

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	07/03/84 To 01/02/85	26	10	7	0.05	4.87	243		5.53	0.0	5.8	4.846	0.695	2.494	0.953	14.543	5.76	7.57	3.21
0800652	07/03/84 To 01/02/85	26	16	7	1.67	43.53	2119	5.26	5.41	11.6	11.0	50.053	1.971	3.582	6.184	-1.318	63.73	1.24	4.79
0900684	07/03/84 To 01/02/85	25	14	7	0.27	7.36	515	5.06	5.24	4.9	4.7	2.972	2.695	3.135	1.168	0.080	4.34	5.58	2.98
1200519	07/03/84 To 01/02/85	26	15	7	0.86	22.52	1574	5.13	5.23	13.0	13.0	58.296	2.010	3.923	6.770	0.037	70.25	1.88	6.03
1500203	07/03/84 To 01/02/85	25	9	7	0.00	2.27	157		5.17	0.0	11.8	6.241	1.481	6.859	1.491	30.129	6.10	19.40	12.50
1700713	07/03/84 To 01/02/85	26	17	7	0.45	12.85	942	5.14	5.29	6.0	6.1	7.728	1.309	2.557	1.346	3.191	8.60	6.94	3.21
2100451	07/03/84 To 01/02/85	26	15	7	0.62	18.78	1240	4.84	5.03	11.5	11.5	31.813	1.339	3.607	4.019	5.135	33.71	9.50	7.30
2200745	07/03/84 To 01/02/85	26	15	7	0.67	17.71	1213	5.12	5.37	3.3	4.8	3.843	1.144	3.759	1.190	8.953	4.26	9.02	3.09
2600784	07/17/84 To 01/08/85	25	21	7	0.96	23.99	243	5.55	5.53	2.1	2.6	2.290	0.507	2.297	0.735	3.642	3.06	4.86	1.96
2700544	07/03/84 To 01/02/85	26	14	7	0.25	6.56	457	5.50	5.51	8.6	9.0	33.335	1.218	4.027	4.189	11.521	41.04	6.28	5.11
3400282	07/03/84 To 01/02/85	26	13	7	0.13	8.51	578		5.36	0.0	6.8	6.379	0.510	2.199	1.240	14.429	6.80	9.13	3.74
3600190	07/03/84 To 01/02/85	26	10	7	0.00	4.52	300		5.14	0.0	11.9	11.893	2.776	15.150	2.287	34.765	7.93	38.68	8.24
3600194	07/03/84 To 01/02/85	26	12	7	0.00	5.30	352		5.23	0.0	9.6	13.524	1.480	4.476	1.063	31.487	9.36	24.05	6.71
4000834	07/03/84 To 01/08/85	27	11	7	0.24	7.90	489	5.02	5.12	7.7	7.9	19.961	0.751	3.042	2.707	6.064	22.92	6.66	4.86
4200379	07/03/84 To 01/04/85	26	14	7	0.29	7.56	496	4.83	4.76	11.1	16.5	31.379	1.228	4.350	4.328	3.444	36.91	13.19	6.67
4300382	07/03/84 To 01/02/85	26	12	7	0.25	6.45	423	5.15	5.40	8.2	8.0	25.379	1.184	3.762	3.514	6.289	28.99	5.29	4.65
5400570	07/03/84 To 01/02/85	26	13	7	0.38	11.86	737	4.98	5.06	7.6	7.3	16.267	1.456	2.402	0.797	21.138	11.41	24.69	4.89
5400575	07/03/84 To 10/23/84	15	4	7	0.06	5.01	627	5.26	5.09	8.2	7.5	20.134	0.632	13.302	2.412	5.154	9.00	10.71	11.63
5600432	07/03/84 To 01/01/85	25	11	7	0.00	7.05	486		5.14	0.0	9.7	37.755	1.293	1.416	2.835	3.183	37.17	8.40	4.76
6000341	07/03/84 To 01/02/85	25	14	7	0.46	11.50	842	5.08	5.11	8.5	8.8	21.084	0.960	3.522	2.909	2.469	23.65	7.48	5.12
7000074	07/03/84 To 01/02/85	26	10	7	0.00	6.35	421		4.63	0.0	17.6	26.575	1.435	4.304	2.346	21.255	21.97	27.50	12.03
7000084	07/03/84 To 01/02/85	26	12	7	0.00	7.22	479		4.78	0.0	15.0	29.401	1.431	3.058	2.565	20.588	30.28	22.10	11.66
7000088	07/03/84 To 01/01/85	37	19	5	0.01	10.46	466		4.73	0.0	14.0	24.712	1.455	3.604	2.229	23.005	22.10	27.11	8.62
7000579	07/03/84 To 01/02/85	26	11	7	0.00	8.20	544		4.85	0.0	13.3	22.544	2.058	3.272	2.372	19.053	21.91	22.00	10.59
7000584	07/03/84 To 01/01/85	25	11	7	0.04	16.24	1052		4.96	0.0	7.2	9.963	1.918	1.008	0.574	10.875	7.08	14.62	4.52
7000598	07/03/84 To 01/02/85	26	13	7	0.00	17.07	1132		5.07	0.0	8.2	11.066	1.079	1.616	0.681	15.963	10.00	18.75	5.01
8000115	07/03/84 To 01/08/85	27	14	7	0.00	8.57	545		5.36	0.0	11.8	23.302	1.804	15.393	3.581	11.700	21.95	14.95	6.86

RAIN WEIGHTED AVERAGE READINGS (in Micro Moles)
for Wet data from
01/01/85 to 12/31/85

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/02/85 To 01/07/86	53	22	7	0.06	8.29	272		5.65	0.0	8.3	14.015	1.230	3.368	2.408	29.601	15.45	17.46	5.32
0800652	01/02/85 To 01/07/86	51	32	7	1.09	55.47	1879	5.14	5.35	8.7	7.6	34.876	1.797	2.592	4.328	-0.415	39.31	1.87	3.70
0900684	01/02/85 To 01/07/86	53	26	7	0.27	15.67	390	5.21	5.26	4.1	4.8	3.971	0.652	2.712	0.814	5.499	4.26	7.59	2.55
1200519	01/02/85 To 01/07/86	53	31	7	0.49	25.95	821	5.35	5.26	15.0	13.3	64.530	3.802	4.146	7.775	0.004	76.96	2.66	7.03
1500203	01/02/85 To 01/07/86	53	19	7	0.05	4.60	139	5.51	5.38	10.6	12.2	12.608	2.978	7.828	1.747	40.570	8.54	18.44	13.99
1500245	02/07/85 To 01/07/86	47	16	7	0.17	8.07	234	5.26	5.48	4.7	4.3	8.982	0.686	2.905	1.108	4.244	8.10	5.85	2.66
1700713	01/02/85 To 01/08/86	53	24	7	0.38	20.15	656	5.47	5.54	4.4	4.0	9.257	0.725	1.605	1.015	4.144	10.35	4.21	1.81
2100451	01/02/85 To 01/07/86	53	21	7	0.53	28.24	885	5.00	5.10	10.3	9.9	27.599	0.960	2.493	3.658	7.740	33.11	8.01	6.01
2200745	01/02/85 To 01/07/86	52	26	7	0.67	34.80	712	5.18	5.42	4.0	5.4	7.717	1.998	4.244	1.598	8.635	8.11	10.58	3.68
2600784	01/08/85 To 01/07/86	51	28	7	0.86	43.88	282	5.40	5.48	3.5	3.5	2.784	0.405	1.395	0.453	4.100	1.77	4.72	1.52
2700544	01/02/85 To 01/07/86	53	25	7	0.20	11.38	376	5.33	5.48	7.8	7.7	26.468	1.028	2.757	3.217	10.484	30.61	5.48	4.21
2800783	07/02/85 To 01/07/86	27	9	7	0.36	9.75	553	5.02	5.14	8.3	8.2	19.243	0.810	1.257	2.409	10.171	20.62	9.98	4.61
2900793	07/02/85 To 01/07/86	27	19	7	0.98	26.37	1071	5.22	5.34	3.7	3.5	5.405	0.803	1.363	0.487	2.353	3.68	4.59	1.50
3000194	07/02/85 To 01/07/86	27	6	7	0.16	4.27	249		5.14	0.0	8.6	20.710	1.380	3.043	2.554	12.060	23.85	9.67	5.62
3200816	07/02/85 To 01/07/86	26	12	7	0.31	15.66	949	5.99	5.22	4.8	4.0	3.157	0.749	1.055	0.510	3.514	3.82	4.53	1.57
3400282	01/02/85 To 01/07/86	53	21	7	0.23	14.74	386		5.31	0.0	9.2	13.657	1.475	2.610	2.010	32.248	16.54	16.98	5.94
3600190	01/02/85 To 01/02/86	52	11	7	0.00	2.68	89		5.61	0.0	8.6	8.049	1.395	15.002	1.791	14.116	6.64	22.04	5.86
3600194	01/02/85 To 01/07/86	53	22	7	0.06	9.20	286		5.35	0.0	12.8	16.052	0.986	7.740	2.101	46.605	14.67	29.36	9.13
4000834	01/08/85 To 01/07/86	52	19	7	0.18	10.91	351	5.28	5.35	10.0	10.4	39.006	1.366	2.546	5.256	9.154	45.76	4.97	5.91
4200379	01/04/85 To 01/07/86	53	20	7	0.22	11.44	346	4.97	4.89	9.9	12.9	24.461	1.004	2.633	3.214	8.222	28.18	16.32	6.01
4300382	01/02/85 To 01/07/86	53	23	7	0.19	10.13	324	5.19	5.34	9.9	8.8	21.575	1.302	5.317	3.156	14.699	25.22	10.37	6.89
4700870	07/02/85 To 01/07/86	27	18	7	0.21	5.81	328	5.16	5.25	4.8	5.7	3.369	0.632	1.442	0.579	10.569	3.52	7.06	2.81
5400570	01/02/85 To 01/07/86	60	30	6	0.29	23.52	659	5.11	5.17	7.3	6.8	8.584	1.208	2.287	0.852	14.154	8.14	14.20	3.77
5400571	07/02/85 To 01/07/86	36	18	5	0.52	21.06	1012	5.08	5.13	4.9	5.1	3.722	0.805	1.725	0.553	6.699	3.81	7.65	2.47
5400575	05/07/85 To 10/07/85	23	9	5	0.11	2.76	200	4.87	4.91	11.9	12.4	7.195	2.238	5.581	1.100	33.840	7.66	23.75	7.87
5400578	07/02/85 To 01/07/86	27	14	7	0.11	6.50	401	5.86	5.47	3.1	9.7	9.784	1.618	5.982	1.316	36.240	7.26	24.51	6.55
5600432	01/01/85 To 01/07/86	53	20	7	0.09	5.99	178		5.28	0.0	15.6	69.007	2.350	4.395	7.806	1.810	68.86	4.97	6.93
6000341	01/02/85 To 01/07/86	53	25	7	0.25	18.30	617	4.97	5.07	10.5	10.2	33.058	1.622	3.071	4.258	5.767	37.17	8.01	5.62
7000074	01/02/85 To 01/07/86	53	19	7	0.09	7.18	227		4.69	0.0	17.3	19.921	1.286	3.408	2.409	21.947	21.89	28.99	10.69
7000084	01/02/85 To 01/07/86	53	16	7	0.10	10.47	346		4.65	0.0	17.5	31.278	1.407	3.881	3.441	17.015	32.81	18.61	13.75
7000088	01/01/85 To 01/07/86	58	23	6	0.08	8.73	254		4.56	0.0	17.6	20.111	1.150	4.571	2.390	16.464	21.84	27.31	10.97
7000579	01/02/85 To 01/07/86	53	18	7	0.04	8.78	285		4.73	0.0	14.9	22.769	1.090	3.464	2.626	21.335	22.12	20.49	10.69
7000584	01/01/85 To 01/07/86	53	18	7	0.20	17.05	572		4.98	0.0	7.1	9.537	0.812	2.436	1.053	3.526	8.37	10.01	4.27
7000598	01/02/85 To 01/07/86	53	23	7	0.17	15.27	498		4.69	0.0	14.1	18.924	1.004	4.709	2.365	12.473	18.51	24.01	7.81
8000115	01/08/85 To 01/07/86	51	22	7	0.01	10.85	351	4.67	4.99	0.0	15.0	57.959	2.101	4.626	5.788	5.945	57.61	10.41	8.89

RAIN WEIGHTED AVERAGE READINGS (in Micro Moles)
for Wet data from
01/01/86 to 12/31/86

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/07/86 To 01/06/87	51	22	7	0.20	11.83	389	7.42	5.58	0.3	8.5	20.788	0.951	2.453	2.678	24.083	23.26	11.46	5.03
0800652	01/07/86 To 01/01/87	50	35	7	1.98	99.00	2982	5.04	5.32	7.8	8.3	35.152	0.857	1.430	4.259	2.025	42.47	1.57	3.51
0900684	01/07/86 To 01/06/87	51	25	7	0.42	21.29	672	5.24	5.33	3.9	3.9	3.177	0.654	1.736	0.504	5.029	3.12	5.00	2.10
1200519	01/07/86 To 01/06/87	52	34	7	0.75	42.39	1371	5.41	5.36	11.2	10.6	49.036	1.378	2.018	5.911	2.320	59.43	2.09	4.79
1500203	01/07/86 To 01/06/87	52	11	7	0.11	6.30	180	5.26	5.34	8.6	8.5	7.230	0.777	4.382	1.157	29.018	7.23	14.97	9.88
1500245	01/07/86 To 01/06/87	52	15	7	0.23	12.02	322	5.31	5.25	5.6	5.9	5.841	0.938	3.526	1.065	9.978	5.48	11.56	3.86
1700713	01/08/86 To 01/06/87	52	26	7	0.71	37.36	1021	5.40	5.53	6.1	5.9	19.619	1.338	0.947	2.388	7.467	21.88	3.70	2.97
2100451	01/07/86 To 01/06/87	52	26	7	0.91	47.43	1192	5.05	5.31	12.6	9.0	39.652	0.956	1.385	4.420	4.959	44.93	4.21	5.01
2200745	01/07/86 To 01/06/87	53	25	7	0.77	54.74	1035	5.20	5.42	3.5	3.1	3.841	0.349	0.517	0.502	3.804	3.94	4.50	1.46
2600784	01/07/86 To 01/06/87	49	18	7	0.97	47.67	211	5.70	5.76	1.3	1.4	0.639	0.138	0.346	0.066	1.016	0.77	1.54	0.65
2700544	01/07/86 To 01/07/87	52	26	7	0.25	13.15	483	5.44	5.46	8.6	9.2	34.434	1.032	1.952	4.650	10.110	45.51	5.39	4.68
2800783	01/07/86 To 01/06/87	52	25	7	0.63	32.98	1001	5.13	5.17	9.5	9.3	29.369	0.834	1.053	3.692	7.044	33.88	5.99	5.40
2900793	01/07/86 To 01/06/87	50	30	7	1.39	69.66	1808	5.22	5.37	3.3	3.3	3.760	0.598	0.893	0.453	3.630	4.15	3.59	1.49
3000194	01/07/86 To 01/06/87	52	15	7	0.31	16.26	518		5.20	0.0	9.0	18.418	0.718	2.093	2.273	16.496	22.26	9.50	6.06
3200816	01/07/86 To 01/06/87	51	31	7	0.95	51.42	1488	5.09	5.31	4.6	4.1	5.627	1.107	1.247	0.698	3.699	6.67	4.20	1.89
3400282	01/07/86 To 01/07/87	52	22	7	0.40	20.85	665		5.47	0.0	7.5	12.885	0.561	1.503	1.718	24.203	14.71	11.22	4.70
3600190	01/02/86 To 01/28/86	4	2	7	0.00	0.17	74		6.12	0.0	37.4	13.802	5.848	**.***	5.648	18.173	10.96	41.21	29.84
3600194	01/07/86 To 01/06/87	52	16	7	0.25	13.18	435		5.41	0.0	10.0	13.208	0.790	6.590	2.018	32.155	15.21	19.78	6.34
3600199	01/28/86 To 01/06/87	49	15	7	0.16	8.28	271		5.08	0.0	12.2	4.128	0.754	14.449	1.675	24.698	4.69	23.13	8.81
4000834	01/07/86 To 01/06/87	52	14	7	0.25	15.04	484	5.20	5.24	8.7	8.9	35.031	0.935	2.280	3.885	5.397	37.51	6.29	4.75
4200379	01/07/86 To 01/06/87	52	14	7	0.26	17.26	558	4.82	4.89	11.2	12.5	36.010	1.119	2.002	4.924	5.123	43.09	12.58	5.69
4300382	01/07/86 To 01/06/87	52	23	7	0.27	14.00	457	5.29	5.37	12.6	12.0	46.555	1.435	3.932	5.838	11.716	57.92	7.27	7.59
4700870	01/07/86 To 01/06/87	52	36	7	0.28	14.33	426	5.11	5.33	3.5	3.6	1.187	0.424	1.223	0.429	6.838	1.90	5.46	1.98
5400570	01/07/86 To 01/06/87	54	21	7	0.49	26.30	775	5.17	5.23	5.0	6.1	7.490	0.805	1.636	1.233	15.326	8.27	11.03	3.24
5400571	01/07/86 To 01/06/87	60	26	6	0.84	52.68	924	5.19	5.32	4.4	4.7	4.666	0.324	0.846	0.548	11.350	5.14	7.42	2.33
5400575	05/30/86 To 10/07/86	17	10	6	0.27	5.51	524	4.94	5.16	9.2	7.9	2.523	0.805	4.300	0.664	19.640	4.46	14.35	4.62
5400578	01/07/86 To 01/06/87	52	15	7	0.25	13.16	418	5.51	5.47	6.8	7.2	8.618	1.347	2.086	1.246	26.184	9.33	16.37	4.18
5600432	01/07/86 To 01/06/87	51	12	7	0.16	8.47	310		5.29	0.0	12.9	58.029	1.350	3.048	6.064	4.624	67.91	3.71	6.35
6000341	01/07/86 To 01/06/87	52	28	7	0.35	27.86	982	5.01	5.10	10.6	10.2	34.014	1.243	1.769	4.255	5.119	38.93	6.50	5.42
7000074	01/07/86 To 01/06/87	52	13	7	0.31	16.09	516	7.35	4.84	0.1	11.5	11.929	0.474	2.290	1.736	15.239	13.68	18.38	6.99
7000084	01/07/86 To 01/06/87	52	14	7	0.31	15.94	525		4.80	0.0	15.0	26.446	0.748	2.042	3.285	17.214	31.39	13.41	11.68
7000088	01/07/86 To 01/06/87	52	13	7	0.27	22.66	754		4.80	0.0	13.3	16.879	0.913	2.613	2.472	14.355	19.60	18.49	7.91
7000579	01/07/86 To 01/06/87	52	15	7	0.37	19.38	642		4.85	0.0	13.1	19.534	0.712	1.928	2.540	17.749	23.24	14.40	9.09
7000584	01/07/86 To 01/06/87	52	15	7	0.55	28.70	1048		5.09	0.0	5.6	7.167	0.262	0.900	0.876	5.043	8.24	5.57	3.15
7000598	01/07/86 To 01/06/87	52	17	7	0.27	27.83	917		4.94	0.0	8.4	12.225	0.380	1.174	1.642	7.018	13.89	10.14	4.17
8000115	01/07/86 To 01/06/87	52	14	7	0.22	16.63	486	5.26	5.22	7.6	10.5	34.977	1.830	4.156	4.093	8.843	38.93	7.27	5.29

RAIN WEIGHTED AVERAGE READINGS (in Micro Moles)
for Wet data from
01/01/87 to 12/31/87

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/06/87 To 01/05/88	52	20	7	0.23	12.13	388	5.74	5.78	7.3	6.5	6.062	0.486	3.390	0.956	29.917	7.18	10.33	3.91
0800652	01/01/87 To 01/07/88	51	30	7	1.40	71.51	2352	5.10	5.38	7.7	7.3	29.459	0.778	2.255	3.424	3.163	36.07	2.03	2.91
0900684	01/06/87 To 01/06/88	51	30	7	0.29	15.18	454	5.00	5.11	6.3	6.2	4.391	1.247	2.408	0.722	8.599	3.95	9.47	3.70
1200519	01/06/87 To 01/05/88	52	31	7	0.60	35.54	1154	5.39	5.40	13.1	12.3	56.698	1.829	3.120	6.579	4.028	69.10	2.54	5.51
1500203	01/06/87 To 01/05/88	52	22	7	0.11	6.24	216	5.15	5.17	14.4	17.0	10.829	1.318	6.951	1.914	69.051	10.97	43.68	17.40
1500245	01/06/87 To 01/05/88	52	24	7	0.18	9.81	292	5.18	5.16	6.2	6.0	3.896	0.866	3.092	0.780	12.177	4.48	13.09	4.38
1700713	01/06/87 To 01/05/88	53	24	7	0.51	27.86	820	5.45	5.52	4.8	4.5	6.967	0.355	1.144	0.915	10.349	8.40	6.42	2.16
2100451	01/06/87 To 01/05/88	54	24	7	0.57	32.12	883	5.07	5.05	12.8	12.6	34.621	0.979	2.848	4.153	15.424	41.94	9.99	8.44
2200745	01/06/87 To 01/05/88	51	28	7	0.36	30.79	1063	4.97	5.25	7.0	5.9	3.530	1.602	1.832	0.673	13.357	4.62	12.25	3.78
2600784	01/06/87 To 10/06/87	36	18	8	0.44	15.95	226	5.32	5.17	4.5	5.0	2.480	0.607	2.801	0.493	8.298	2.59	7.34	3.44
2700544	01/07/87 To 01/05/88	52	24	7	0.16	11.49	389	5.44	5.59	7.0	8.6	28.536	0.942	2.150	3.834	14.673	34.66	7.48	4.64
2800783	01/06/87 To 01/05/88	52	22	7	0.49	25.54	827	5.03	5.05	8.2	8.2	13.819	0.541	1.467	1.697	10.354	16.91	10.48	5.40
2900793	01/06/87 To 01/05/88	51	35	7	0.92	49.03	1207	5.12	5.26	4.4	3.9	3.216	0.366	1.585	0.390	6.260	3.49	5.31	1.70
3000194	01/06/87 To 01/05/88	52	24	7	0.12	6.44	198		4.98	0.0	14.1	20.905	4.116	5.759	3.259	30.208	31.59	20.27	10.92
3200816	01/06/87 To 10/14/87	38	14	7	0.40	15.25	641	5.39	5.26	6.5	4.4	3.659	0.511	1.831	0.617	5.688	4.38	6.12	2.25
3400282	01/07/87 To 01/05/88	52	23	7	0.33	17.32	550		5.50	0.0	6.9	5.495	0.364	2.028	0.831	27.669	6.95	14.04	4.35
3600194	01/06/87 To 01/05/88	52	14	7	0.14	7.71	245		5.25	0.0	13.7	11.113	0.981	9.978	2.607	51.856	14.31	28.97	9.04
3600199	01/06/87 To 01/05/88	52	25	7	0.10	5.09	169		5.30	0.0	9.1	5.302	1.408	14.871	1.961	22.922	6.51	18.05	7.62
4000834	01/06/87 To 01/05/88	52	23	7	0.27	13.97	466	5.16	5.23	7.7	8.0	17.873	0.615	2.747	2.377	11.613	21.04	8.00	4.87
4200379	01/06/87 To 01/05/88	52	21	7	0.27	14.15	444	4.85	4.90	10.4	10.9	16.585	0.733	2.344	3.690	13.604	19.20	18.27	5.27
4300382	01/06/87 To 01/05/88	52	20	7	0.18	9.41	299	5.54	5.48	8.7	8.7	24.050	0.619	3.584	3.156	16.231	30.30	8.31	5.99
4700870	01/06/87 To 01/05/88	52	30	7	0.17	8.69	256	5.06	5.26	4.7	4.3	2.174	0.423	2.020	1.050	7.280	2.41	7.79	2.58
5400570	01/06/87 To 01/05/88	53	27	7	0.38	19.96	629	5.20	5.34	7.0	7.6	3.243	0.679	3.076	0.671	30.217	4.03	21.97	4.84
5400571	01/06/87 To 01/05/88	53	30	7	0.61	33.50	966	5.19	5.30	4.6	4.7	1.274	0.399	2.403	0.306	13.366	2.02	9.85	2.35
5400575	06/17/87 To 10/13/87	20	7	6	0.05	1.02	78	4.65	4.96	29.9	22.8	11.501	4.270	12.994	2.521	73.959	13.09	48.64	20.14
5400578	01/06/87 To 01/05/88	53	23	7	0.19	10.22	322	5.26	5.50	9.7	9.9	7.308	1.234	4.307	1.150	46.185	8.21	26.45	6.44
5600432	01/06/87 To 01/05/88	52	23	7	0.13	9.52	314		5.35	0.0	15.2	68.976	1.803	6.498	7.450	5.071	86.17	6.11	5.63
6000341	01/06/87 To 01/05/88	44	19	8	0.44	22.33	856	5.06	5.12	6.7	8.1	17.377	0.758	3.174	2.165	8.854	21.02	8.93	4.30
7000074	01/06/87 To 01/05/88	52	21	7	0.23	12.76	417		4.94	0.0	12.0	7.144	0.550	4.233	1.290	21.946	9.58	24.09	8.01
7000084	01/06/87 To 01/05/88	52	19	7	0.16	8.21	268		4.88	0.0	15.2	24.710	1.165	5.023	3.173	30.643	32.96	19.33	13.55
7000088	01/06/87 To 01/05/88	52	23	7	0.24	12.49	404		4.90	0.0	13.3	11.987	0.783	5.636	2.164	29.960	16.28	27.77	10.38
7000579	01/06/87 To 01/05/88	51	21	7	0.18	9.61	320		4.83	0.0	16.3	17.714	0.812	4.365	2.567	36.742	22.32	30.14	12.19
7000584	01/06/87 To 01/05/88	52	25	7	0.47	24.77	806		5.02	0.0	8.1	6.319	1.140	1.923	1.133	10.482	9.70	13.32	4.65
7000598	01/06/87 To 01/05/88	52	27	7	0.30	16.14	550		4.99	0.0	10.2	10.745	0.418	3.474	1.566	18.751	14.38	19.62	5.97
8000115	01/06/87 To 01/05/88	52	28	7	0.21	11.08	359	4.99	5.02	13.7	14.3	43.240	1.501	5.738	5.301	16.720	53.04	15.18	8.75

RAIN WEIGHTED AVERAGE READINGS (in Micro Moles)
for Wet data from
01/01/88 to 12/31/88

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/05/88 To 01/03/89	52	19	7	0.13	6.61	210	5.39	5.46	9.0	8.9	13.347	0.832	4.287	1.942	29.519	15.04	14.02	6.46
0800652	01/07/88 To 01/03/89	52	33	7	1.41	73.11	2299	5.16	5.35	9.0	9.5	42.961	1.067	2.849	4.799	2.357	47.08	2.07	4.04
0900684	01/06/88 To 01/03/89	52	26	7	0.19	10.14	275	5.03	5.14	6.2	6.2	7.897	1.154	2.837	0.664	6.457	7.00	7.19	2.97
1200519	01/05/88 To 12/20/88	50	31	7	0.46	26.02	898	5.27	5.30	12.8	12.4	53.955	1.933	3.994	6.157	3.903	61.84	3.16	7.10
1500203	01/05/88 To 01/03/89	51	16	7	0.07	4.04	136	5.44	5.65	11.4	13.8	18.725	2.200	12.682	3.056	42.963	15.09	19.63	20.47
1500245	01/05/88 To 01/03/89	52	16	7	0.16	8.42	259	5.16	5.15	7.2	7.4	5.009	0.876	4.577	1.034	14.292	4.89	15.18	5.70
1700713	01/05/88 To 01/03/89	52	22	7	0.29	14.89	489	5.20	5.39	5.2	5.2	11.244	0.466	2.077	1.393	6.008	12.78	4.93	2.96
2100451	01/05/88 To 01/03/89	52	19	7	0.32	16.53	546	5.15	5.18	14.5	13.2	47.787	1.290	4.099	5.283	11.920	54.35	9.61	8.70
2200745	01/05/88 To 11/08/88	44	15	7	0.33	14.40	518	5.07	5.29	5.3	4.7	2.106	0.417	2.633	1.164	8.487	0.89	7.43	2.45
2200746	11/09/88 To 01/04/89	8	6	7	0.48	7.71	1581	5.12	5.30	3.2	3.4	3.022	0.517	1.347	0.533	3.545	3.64	3.76	1.28
2700544	01/05/88 To 01/03/89	53	19	7	0.14	7.64	260	5.31	5.39	7.8	9.0	26.524	0.702	3.526	3.017	14.362	31.36	7.79	5.93
2800783	01/05/88 To 01/03/89	52	21	7	0.30	15.46	499	4.88	4.98	11.0	11.4	25.224	0.771	3.093	2.986	12.445	26.04	11.49	7.85
2900793	01/05/88 To 01/03/89	52	32	7	0.84	43.94	1041	5.18	5.27	4.2	4.0	2.692	0.333	1.883	0.442	3.646	2.77	4.19	1.95
3000194	01/05/88 To 01/03/89	52	15	7	0.18	9.99	322		5.06	0.0	13.8	33.644	1.968	5.818	4.931	20.584	51.21	14.79	9.28
3400282	01/05/88 To 12/13/88	47	16	7	0.17	8.06	283	6.23	5.64	2.6	7.3	5.803	0.607	3.292	0.827	29.604	5.57	12.94	5.45
3400305	12/16/88 To 01/03/89	3	3	6	0.98	2.94	1649	5.31	5.40	10.3	10.1	21.210	2.159	2.353	1.950	31.555	19.17	18.37	7.66
3600194	01/05/88 To 01/04/89	52	17	7	0.19	10.07	317		5.54	0.0	11.0	12.373	0.742	5.986	1.684	38.868	13.68	20.63	8.13
3600199	01/05/88 To 01/03/89	52	15	7	0.07	3.61	115		5.32	0.0	13.3	14.091	0.824	15.915	2.061	33.164	8.09	36.34	8.83
4000834	01/05/88 To 01/03/89	52	15	7	0.29	15.08	489	5.07	5.15	10.5	10.8	35.207	1.122	3.559	4.004	8.539	40.35	8.74	5.71
4200379	01/05/88 To 01/03/89	52	13	7	0.25	12.86	403	4.86	5.02	14.1	15.3	50.146	1.377	4.297	6.155	7.861	63.21	11.82	7.31
4300382	01/05/88 To 01/03/89	52	18	7	0.18	9.23	298	5.42	5.56	9.5	9.6	28.571	0.840	5.508	3.473	16.836	31.96	8.61	6.48
4700870	01/05/88 To 01/03/89	52	27	7	0.21	10.79	337	5.24	5.38	3.6	3.7	1.215	0.315	2.710	0.560	6.740	1.06	6.01	2.17
5400570	01/05/88 To 01/03/89	52	20	7	0.30	15.52	525	5.26	5.29	7.9	6.4	6.598	0.650	5.655	1.270	17.990	5.80	11.76	4.68
5400571	01/05/88 To 01/03/89	52	22	7	0.48	25.73	531	5.17	5.39	4.2	4.2	2.672	0.429	3.504	0.607	9.198	1.66	6.57	3.06
5400575	06/09/88 To 10/04/88	17	8	7	0.07	3.35	329	4.90	5.01	10.8	11.1	3.091	1.249	4.911	0.829	37.017	4.77	21.87	9.41
5400578	01/05/88 To 01/03/89	52	14	7	0.20	10.57	328	5.45	5.59	7.0	6.5	4.827	0.977	4.431	0.897	28.717	4.40	13.59	4.64
5600432	01/05/88 To 12/27/88	51	14	7	0.07	3.45	101		5.32	0.0	104.3	**.***	13.691	34.530	70.094	6.704	**.**	8.96	44.86
6000341	01/05/88 To 01/03/89	40	17	9	0.36	14.47	563	5.01	5.09	12.2	12.8	42.440	1.154	5.107	4.542	8.144	44.27	8.77	7.89
7000074	01/05/88 To 01/03/89	52	15	7	0.24	12.41	395		4.89	0.0	15.3	30.927	1.025	4.637	3.738	18.446	35.15	16.89	9.67
7000084	01/05/88 To 01/03/89	52	14	7	0.21	10.71	361		4.88	0.0	16.2	34.359	1.371	4.842	4.165	20.428	44.47	12.13	12.49
7000088	01/05/88 To 01/03/89	52	18	7	0.22	14.88	480		4.92	0.0	15.7	28.274	0.968	4.265	3.937	21.113	40.87	17.54	12.12
7000579	01/05/88 To 01/03/89	52	13	7	0.22	12.02	382		4.97	0.0	14.6	30.073	0.865	5.945	3.641	27.371	40.69	14.09	10.83
7000584	01/05/88 To 01/03/89	52	18	7	0.39	31.53	1047		5.08	0.0	8.0	10.200	0.561	5.528	1.312	9.300	11.03	9.63	4.83
7000598	01/05/88 To 01/03/89	52	20	7	0.50	26.25	865		4.94	0.0	10.6	12.573	0.546	3.867	2.038	14.486	13.79	16.39	5.89
8000115	01/05/88 To 01/03/89	52	16	7	0.20	10.49	351	5.25	5.12	14.3	15.4	58.840	1.768	5.295	6.821	12.968	77.45	9.92	7.92

RAIN WEIGHTED AVERAGE READINGS (in Micro Moles)
for Wet data from
01/01/89 to 12/31/89

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/03/89 To 01/02/90	52	20	7	0.20	10.52	327	5.10	5.37	6.9	7.0	4.353	0.809	3.405	1.194	20.957	6.85	12.74	5.68
0800652	01/03/89 To 01/02/90	49	35	7	1.30	63.69	2154	5.21	5.22	5.4	5.7	16.677	1.047	1.711	1.512	-0.327	19.60	2.46	2.56
0900684	01/03/89 To 01/02/90	52	28	7	0.38	19.55	579	5.06	5.24	5.4	5.0	3.340	0.788	2.035	0.668	5.842	4.28	7.70	2.60
1500203	01/03/89 To 01/02/90	52	11	7	0.06	3.19	98	5.37	5.52	17.7	17.4	12.916	2.241	12.598	2.637	68.397	14.53	30.00	23.27
1500245	01/03/89 To 01/02/90	49	13	7	0.11	5.34	199	5.40	5.25	3.9	4.6	3.505	0.855	2.914	0.893	2.717	5.23	5.30	3.08
1700713	01/03/89 To 02/28/89	8	7	7	0.25	1.96	382	5.04	5.14	6.9	6.6	8.078	0.822	1.823	0.980	14.820	10.55	10.10	4.31
2200746	01/04/89 To 01/03/90	52	23	7	0.45	23.64	729	5.05	5.23	5.7	5.1	2.683	0.709	2.112	0.664	9.097	3.96	9.79	2.93
2800783	01/03/89 To 01/02/90	52	24	7	0.34	17.75	573	5.01	5.06	7.7	8.1	11.579	0.896	2.429	1.446	9.756	14.50	10.09	6.65
2900793	01/03/89 To 01/02/90	52	31	7	1.22	63.62	1542	5.08	5.21	4.7	4.4	2.619	0.540	1.483	0.528	3.354	3.63	6.15	2.25
3000194	01/03/89 To 01/03/90	52	13	7	0.07	3.77	114		4.61	0.0	23.2	37.298	1.636	6.957	4.408	38.892	31.35	28.07	14.09
3200821	01/24/89 To 01/02/90	49	27	7	0.59	37.92	1271	5.19	5.26	4.8	4.8	2.841	1.002	2.078	0.693	6.368	4.67	7.67	2.55
3400305	01/03/89 To 01/02/90	52	24	7	0.30	15.57	491	5.36	5.35	8.2	7.9	5.472	1.039	2.371	0.970	28.897	7.42	16.01	6.92
3600194	01/04/89 To 01/03/90	52	12	7	0.12	6.24	180		5.88	0.0	12.0	6.833	1.211	4.777	1.244	48.605	8.47	25.08	8.13
4200379	01/03/89 To 01/02/90	52	12	7	0.10	5.41	149	4.98	4.92	8.6	9.0	17.101	1.751	2.469	1.636	7.458	15.51	13.26	5.02
4300382	01/03/89 To 01/02/90	52	18	7	0.14	7.32	237	5.30	5.49	7.7	6.9	14.399	0.960	2.584	1.568	14.242	16.93	7.39	5.81
4700870	01/03/89 To 01/02/90	52	35	7	0.27	14.16	444	5.25	5.36	3.6	3.7	1.131	0.694	1.535	0.569	5.468	2.46	6.37	1.19
5400570	01/03/89 To 01/02/90	52	22	7	0.26	13.28	444	5.30	5.51	7.6	6.9	4.397	1.020	2.404	0.934	24.356	6.77	15.91	4.90
5400571	01/03/89 To 01/02/90	52	22	7	0.42	22.03	595	5.17	5.38	4.5	4.5	2.736	1.012	1.578	0.581	10.063	4.40	8.46	2.97
5400575	05/18/89 To 10/24/89	22	9	7	0.18	4.00	323	4.97	5.18	6.4	6.3	3.162	0.672	2.634	0.994	11.132	3.28	11.74	3.81
6000341	01/03/89 To 01/03/90	25	14	7	0.60	15.00	1005	4.99	5.09	7.3	7.6	14.490	0.847	2.501	1.692	4.985	16.13	7.65	5.08
7000074	01/03/89 To 01/03/90	51	12	7	0.08	4.13	145		4.79	0.0	14.5	10.222	1.237	4.321	1.854	23.108	10.21	27.70	9.73
7000084	01/03/89 To 01/03/90	52	14	7	0.08	4.40	150		4.78	0.0	17.1	19.526	1.398	4.790	2.647	31.034	22.87	19.81	16.82
7000088	01/03/89 To 01/02/90	52	14	7	0.12	6.26	206		4.69	0.0	17.6	10.509	0.875	4.347	1.785	29.519	11.40	32.39	11.63
7000579	01/03/89 To 01/02/90	52	14	7	0.09	4.86	153		4.71	0.0	18.2	11.522	0.902	4.973	2.156	38.144	13.01	29.12	13.05
7000584	01/03/89 To 01/02/90	52	13	7	0.26	13.41	478		5.00	0.0	7.1	4.077	0.681	1.602	0.752	6.201	5.10	10.58	3.61
7000598	01/03/89 To 01/03/90	52	13	7	0.21	11.76	391		4.81	0.0	12.2	9.790	0.890	3.179	1.722	15.952	11.27	22.80	7.53
8000115	01/03/89 To 01/02/90	52	15	7	0.09	4.95	154	5.46	5.03	12.8	15.0	41.544	2.352	5.192	3.687	20.460	44.38	19.46	11.25

RAIN WEIGHTED AVERAGE READINGS (in Micro Moles)
for Wet data from
01/01/90 to 08/01/90

STATION	PERIOD	COUNT	WETCNT	TIME	RAIN	TOTAL RAIN	VOL_F	PH_F	PH_L	COND_F	COND_L	NA	K	CA	MG	NH4	CL	NO3	SO4
0700442	01/02/90 To 07/03/90	26	11	7	0.22	5.66	354	5.62	5.56	6.5	6.0	5.509	0.362	4.754	1.423	17.951	7.10	7.03	4.86
0800652	01/02/90 To 07/03/90	26	18	7	1.94	50.33	3252	5.21	5.27	6.8	8.0	29.220	0.842	3.872	3.001	-0.353	33.90	0.86	3.14
0900684	01/02/90 To 07/03/90	26	19	7	0.25	6.50	359	5.02	5.16	7.3	7.0	6.320	0.758	4.531	1.610	9.893	4.51	14.33	4.25
1500203	01/02/90 To 07/03/90	26	10	7	0.10	2.60	156	5.87	5.78	11.9	12.3	10.903	1.452	6.818	2.747	49.881	11.25	24.65	14.90
1500245	01/02/90 To 07/05/90	24	10	8	0.12	2.98	196	5.46	5.37	5.9	6.4	8.097	0.884	7.014	2.542	7.298	6.77	10.36	5.55
2200746	01/03/90 To 07/05/90	25	16	7	4.32	**.**	667	6.19	6.27	0.5	0.6	0.451	0.072	0.303	0.113	1.496	0.41	1.47	0.35
2800783	01/02/90 To 07/03/90	26	12	7	0.50	13.06	838	5.00	5.02	9.5	9.8	21.443	0.664	4.550	2.840	6.824	19.73	8.04	7.16
2900793	01/02/90 To 07/03/90	26	22	7	1.12	29.22	1324	5.07	5.19	4.5	4.5	2.461	0.287	2.769	0.866	1.952	2.13	6.28	1.52
3000194	01/03/90 To 07/02/90	26	10	7	0.20	5.74	383		5.12	0.0	11.0	23.288	1.207	3.971	2.988	12.340	25.41	9.76	7.22
3200821	01/02/90 To 07/03/90	26	14	7	0.66	18.09	1164	5.06	5.09	5.0	4.9	1.840	0.492	3.044	1.217	0.889	1.60	4.35	0.75
3400305	01/02/90 To 07/03/90	26	13	7	0.46	11.84	751	5.98	5.87	6.6	6.2	4.665	0.621	2.791	1.021	27.706	4.60	9.52	4.65
3600194	01/03/90 To 07/03/90	26	15	7	0.25	6.99	455		5.76	0.0	17.2	23.262	1.301	7.789	3.440	69.726	24.82	35.80	13.85
4200379	01/02/90 To 07/03/90	26	9	7	0.25	6.44	394	5.08	5.12	9.6	10.6	36.060	1.026	4.211	3.641	3.150	39.62	5.08	5.62
4300382	01/02/90 To 07/03/90	26	9	7	0.23	6.08	358	5.46	5.44	6.9	6.8	15.876	0.594	3.665	1.731	11.707	18.41	5.06	5.02
4700870	01/02/90 To 07/03/90	26	19	7	0.33	8.57	550	5.58	5.44	3.2	3.3	1.339	0.763	2.800	0.920	4.915	1.12	5.38	1.40
5400570	01/02/90 To 07/03/90	26	15	7	0.45	11.60	762	5.56	5.58	9.8	9.2	6.003	0.700	4.757	1.937	38.323	4.32	29.22	6.92
5400571	01/02/90 To 07/03/90	26	15	7	0.63	16.67	889	5.27	5.45	6.3	6.0	4.138	0.347	3.049	1.072	18.414	2.33	14.22	4.13
6000341	01/03/90 To 07/03/90	26	16	7	0.57	14.73	967	4.98	5.02	12.4	11.9	26.828	0.724	5.142	3.149	4.564	30.42	6.08	6.58
7000074	01/03/90 To 06/26/90	25	11	7	0.19	5.31	350		5.11	0.0	11.5	24.412	0.710	5.492	2.855	11.854	27.04	10.00	7.52
7000084	01/03/90 To 07/02/90	26	13	7	0.24	6.25	412		4.92	0.0	15.0	28.008	0.939	6.830	4.183	20.574	32.99	11.89	14.48
7000087	06/26/90 To 07/02/90	1	0	6	0.00	0.00	0			0.0	0.0	0.000	0.000	0.000	0.000	0.000	0.00	0.00	0.00
7000088	01/02/90 To 07/03/90	26	12	7	0.36	9,59	645		4.89	0.0	14.3	22.655	1.396	7.329	4.398	19.004	24.60	21.01	11.07
7000579	01/02/90 To 07/03/90	24	11	8	0.24	9.90	694		4.87	0.0	12.1	17.503	0.645	6.462	3.058	20.276	18.41	15.86	9.62
7000584	01/02/90 To 07/03/90	26	13	7	0.54	14.19	969		5.06	0.0	7.9	9.347	0.233	4.260	2.236	8.857	8.99	9.80	5.70
7000598	01/03/90 To 07/03/90	26	16	7	0.07	12.60	835		4.93	0.0	11.2	18.153	0.573	4.617	2.824	14.893	18.58	17.95	6.91
8000115	01/02/90 To 07/03/90	26	14	7	0.26	6.64	452	5.45	5.25	11.9	12.9	41.093	1.100	7.323	5.047	14.451	46.75	12.56	10.37

AVERAGE CONCENTRATIONS for Drydep data from 05/01/88 to 12/31/88

File: \cadmp\newdata\cpcon01.DBF Using Filter: (valflags < 304)

Report Date: 12/28/92

Part 1 of 2

Period	Count	MagTFC	MagTTC	NaaTFC	NaaTTC	MgaTFC	MgaTTC	KPATFC	KPATTC	CaaTFC	CaaTTC	N4CTFC	N4CTTC	CLITFC	CLITTC
Site: AZ															
D	36	35.6732	79.1242	0.2621	1.1594	0.0445	0.2506	0.0580	0.1970	0.0898	0.8558	3.3901	3.5256	0.0280	0.1777
N	37	25.3458	51.8014	0.2244	1.1291	0.0327	0.1850	0.0593	0.1661	0.0390	0.3316	3.0448	3.8839	0.0813	0.1587
Combined	73	30.4368	65.2648	0.2430	1.1441	0.0384	0.2173	0.0587	0.1813	0.0637	0.5901	3.2099	3.7021	0.0552	0.1682
Site: BA															
D	26	24.5662	50.6505	0.1953	0.5026	0.0548	0.1394	0.1208	0.2577	0.2033	0.5746	2.0255	2.5286	0.1686	0.6070
N	27	31.2212	57.0554	0.2127	0.6023	0.0581	0.1778	0.1683	0.3587	0.1677	0.7116	2.0713	2.4046	0.3016	0.8175
Combined	53	27.8937	53.9864	0.2042	0.5544	0.0565	0.1589	0.1440	0.3092	0.1855	0.6444	2.0497	2.4616	0.2330	0.3614
Site: FR															
D	32	17.3651	32.0588	0.3324	1.2887	0.0421	0.1940	0.0871	0.1897	0.0439	0.3326	0.6869	1.0978	0.1129	1.0234
N	33	15.8508	28.2141	0.3322	1.1454	0.0349	0.1540	0.0927	0.2059	0.0297	0.1848	0.8205	1.1143	0.1540	1.4498
Combined	65	16.5959	30.1069	0.3323	1.2160	0.0385	0.1737	0.0899	0.1979	0.0367	0.2576	0.7558	1.1063	0.1352	0.4292
Site: GA															
D	6	7.3664	14.8772	0.5253	1.2586	0.0597	0.1613	0.0797	0.1491	0.0208	0.0815	0.0729	0.2460	0.0000	0.7996
N	2	7.0395	14.9230	0.4125	1.5847	0.0503	0.1649	0.0704	0.1085	0.0000	0.0485	0.1223	0.1552	0.3086	0.6069
Combined	8	7.2846	14.8887	0.4971	1.3401	0.0573	0.1622	0.0774	0.1389	0.0156	0.0732	0.0852	0.2233	0.0772	0.0239
Site: LA															
D	38	31.6165	69.7755	0.2953	1.4579	0.0421	0.2542	0.0581	0.1918	0.0659	0.6486	3.5139	4.2981	0.0554	0.2369
N	38	31.1484	55.1877	0.3174	1.4677	0.0366	0.2274	0.0652	0.1735	0.0348	0.3437	3.3247	3.9997	0.1220	0.8442
Combined	76	31.3825	62.5843	0.3064	1.4628	0.0394	0.2408	0.0617	0.1827	0.0501	0.4961	3.4193	4.1489	0.0893	0.1273
Site: LB															
D	37	23.2539	47.2941	0.3153	1.5894	0.0447	0.2458	0.0392	0.1771	0.0553	0.5165	2.4900	2.9943	0.1570	0.4923
N	39	22.4296	44.4695	0.2662	1.4785	0.0355	0.2122	0.0779	0.1956	0.0256	0.2944	2.4143	2.8869	0.2981	1.0041
Combined	76	22.8309	45.8436	0.2904	1.5325	0.0399	0.2285	0.0590	0.1866	0.0401	0.4025	2.4516	2.9392	0.2275	0.1463
Site: SA															
D	14	19.4942	37.0756	0.0586	0.3178	0.0106	0.0748	0.1547	0.2476	0.0177	0.1707	1.9125	2.7407	0.3400	0.3397
N	14	26.6233	41.8927	0.0802	0.4681	0.0134	0.0856	0.1870	0.2658	0.0064	0.1321	1.9413	2.1551	0.3664	1.0035
Combined	28	23.0588	39.5733	0.0698	0.3930	0.0120	0.0802	0.1709	0.2567	0.0122	0.1514	1.9274	2.4325	0.3532	0.0695
Site: SE															
D	34	11.4500	22.5821	0.0874	0.2420	0.0171	0.0536	0.0874	0.1470	0.0269	0.1598	0.6492	0.7472	0.3014	0.3127
N	33	21.4073	27.6516	0.0678	0.2310	0.0171	0.0535	0.1304	0.2406	0.0553	0.1473	0.6159	0.6635	0.2100	0.2502
Combined	67	16.3496	25.1571	0.0778	0.2365	0.0171	0.0535	0.1086	0.1938	0.0409	0.1536	0.6331	0.7067	0.2578	0.0426
Site: YO															
D	31	10.4855	17.4863	0.1231	0.1684	0.0203	0.0420	0.0528	0.0943	0.0403	0.1366	0.2515	0.7861	0.3361	0.5381
N	31	13.7669	25.1617	0.0743	0.1462	0.0165	0.0483	0.0897	0.1458	0.0359	0.1079	0.3678	0.4867	0.1402	0.3549
Combined	62	12.0984	21.1869	0.0987	0.1575	0.0184	0.0451	0.0713	0.1196	0.0381	0.1225	0.3107	0.6364	0.2403	0.0573

AVERAGE CONCENTRATIONS for Drydep data from 05/01/88 to 12/31/88

File: \cadmp\newdata\cpcon01.DBF Using Filter: (valflags < 304)
Report Date: 12/28/92
Part 2 of 2

Period	Count	N3ITFC	N3ITTC	S4ITFC	S4ITTC	N3CNFC	HNCNGC	NHCCGC	SOIKGC	NOCEGC	HNDDGC
Site: AZ											
D	36	4.3604	7.0256	6.0504	6.3266	8.0043	12.9880	5.7591	5.9335	49.1642	8.9614
N	37	4.9868	8.7272	4.5318	5.2198	6.4769	2.9984	2.9848	2.9581	64.6006	1.3089
Combined	73	4.6872	7.8884	5.2581	5.7654	7.2536	7.4765	4.3720	4.4719	56.8824	4.9009
Site: BA											
D	26	1.8380	2.0339	2.7462	3.0371	5.0912	6.2821	10.8306	7.1087	19.0401	2.7604
N	27	2.2798	4.1826	2.8275	2.3265	3.6321	2.9860	8.4283	5.3478	36.3876	0.8184
Combined	53	2.0724	3.1715	2.7893	2.6609	4.3617	4.6677	9.6068	6.1720	27.8775	1.7894
Site: FR											
D	32	2.6219	3.6548	1.8613	2.0265	3.8921	3.0488	4.2512	2.7315	29.6644	1.2073
N	33	2.0979	3.2380	1.7003	2.0223	2.9485	0.5176	2.6573	1.4461	35.3518	-0.3073
Combined	65	2.3517	3.4394	1.7783	2.0243	3.3803	1.7631	3.4420	2.0762	32.5970	0.3858
Site: GA											
D	6	0.3132	0.7536	1.2764	1.7915	0.6563	0.5659	0.6587	0.5752	1.2472	0.2265
N	2	0.2422	0.6715	1.9061	1.2612	0.3137	0.1320	0.2489	0.4151	6.4783	0.1036
Combined	8	0.2955	0.7331	1.4338	1.6589	0.5706	0.5039	0.5562	0.5295	2.5550	0.2089
Site: LA											
D	38	4.6502	9.1748	6.0773	8.1673	8.6768	11.7440	7.4629	7.2874	62.6559	7.2024
N	38	4.9706	8.8480	5.0992	6.3993	6.4454	2.5347	4.8233	5.4797	67.6522	0.9201
Combined	76	4.8104	9.0114	5.5883	7.2833	7.5611	7.0685	6.1787	6.3671	65.1541	4.0061
Site: LB											
D	37	2.4500	5.3594	4.9975	6.4978	5.1607	6.0197	4.4809	10.9314	50.9388	3.4839
N	39	2.4683	5.4228	4.5906	5.9000	3.2624	2.3172	3.0794	8.0402	53.6626	1.5451
Combined	76	2.4593	5.3919	4.7913	6.1908	4.1819	4.0856	3.7612	9.4621	52.3189	2.4822
Site: SA											
D	14	4.6345	8.2361	1.4497	1.6045	6.5481	2.7975	9.1237	1.4814	36.3922	0.7686
N	14	5.1423	6.8858	1.4063	1.3977	5.1675	0.3414	8.3013	0.9126	49.9159	0.5497
Combined	28	4.8978	7.5610	1.4272	1.5011	5.8578	1.5695	8.7125	1.1970	43.1540	0.6539
Site: SE											
D	34	0.3870	0.8971	1.6430	1.8671	1.2433	1.9326	2.5474	0.9546	0.0811	1.1700
N	33	0.4363	0.7095	1.6912	1.9369	0.7327	0.6510	1.6721	0.7398	0.2156	0.2157
Combined	67	0.4109	0.8065	1.6664	1.9008	0.9968	1.2918	2.1163	0.8472	0.1473	0.7099
Site: YO											
D	31	0.3770	0.4499	1.0931	1.3661	0.6426	2.1151	1.7463	0.7838	0.0000	1.9109
N	31	0.3288	0.4782	1.1785	1.4618	0.6623	1.0246	1.2298	0.5418	0.0000	0.6883
Combined	62	0.3525	0.4640	1.1365	1.4139	0.6524	1.5698	1.4881	0.6628	0.0000	1.2885

AVERAGE CONCENTRATIONS File: cpcon01.DBF Using Filter:
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Period	Count	MagTFC	MagTTC	NaaTFC	NaaTTC	MgaTFC	MgaTTC	KPATFC	KPATTC	CaaTFC	CaaTTC	N4CTFC	N4CTTC	CLITFC	CLITTC
Site: AZ															
D	43	32.4070	74.6140	0.2769	1.3783	0.0454	0.2550	0.0738	0.2275	0.1161	0.9678	2.4820	3.2042	0.0341	0.1795
N	43	24.8756	52.4471	0.2534	1.3708	0.0378	0.2184	0.0926	0.1855	0.0583	0.4485	2.5151	3.4930	0.0795	0.6057
Combined	86	28.6867	63.6641	0.2651	1.3746	0.0416	0.2367	0.0832	0.2065	0.0872	0.7082	2.4987	3.3486	0.0568	0.3926
Site: BA															
D	43	34.3527	50.1221	0.2829	0.4301	0.0796	0.1222	0.1588	0.2144	0.4795	0.7803	1.6459	1.9664	0.0519	0.0782
N	42	35.7198	60.5225	0.2412	0.4804	0.0792	0.1620	0.1862	0.3002	0.5001	1.0789	1.7565	1.8600	0.0724	0.1289
Combined	85	35.0362	55.3223	0.2621	0.4549	0.0794	0.1418	0.1725	0.2568	0.4898	0.9277	1.7019	1.9132	0.0624	0.0498
Site: FR															
D	41	14.5924	26.9397	0.3540	1.5075	0.0459	0.2083	0.0556	0.1253	0.0590	0.3413	0.5695	0.9872	0.1566	1.0435
N	43	11.2199	23.0189	0.3638	1.8019	0.0449	0.2369	0.0658	0.1343	0.0410	0.2120	0.7329	0.9449	0.2994	2.2844
Combined	84	12.8629	24.9290	0.3590	1.6585	0.0454	0.2230	0.0608	0.1299	0.0498	0.2749	0.6533	0.9655	0.2298	0.5552
Site: GA															
D	29	3.8670	7.9491	0.1895	0.6560	0.0259	0.0927	0.0333	0.0725	0.0284	0.0926	0.1606	0.2213	0.1474	0.5490
N	28	4.7471	7.7183	0.1486	0.5090	0.0226	0.0716	0.0619	0.0917	0.0291	0.0592	0.1795	0.2320	0.0859	0.5068
Combined	57	4.2990	7.8380	0.1690	0.5838	0.0242	0.0824	0.0476	0.0819	0.0288	0.0762	0.1700	0.2268	0.1167	0.0924
Site: LA															
D	43	28.3151	60.9609	0.2875	1.7135	0.0423	0.2774	0.0748	0.1900	0.0935	0.7737	2.6355	3.1318	0.0414	0.3944
N	43	24.2271	48.0494	0.2492	1.6427	0.0346	0.2412	0.0786	0.1796	0.0658	0.3679	2.3609	2.8968	0.0937	1.0041
Combined	86	26.2963	54.5052	0.2683	1.6781	0.0385	0.2593	0.0767	0.1848	0.0796	0.5708	2.4999	3.0143	0.0676	0.1558
Site: LB															
D	40	22.1975	46.3362	0.3219	1.9500	0.0472	0.2709	0.0579	0.1729	0.0685	0.5644	2.2644	2.4344	0.0351	0.7502
N	40	17.7419	34.9525	0.2840	1.8616	0.0359	0.2429	0.0742	0.1566	0.0441	0.2788	1.8607	2.1849	0.2264	1.4074
Combined	80	19.9697	40.6444	0.3029	1.9058	0.0416	0.2569	0.0661	0.1648	0.0563	0.4216	2.0625	2.3097	0.1307	0.1887
Site: SA															
D	41	12.8343	24.9150	0.2660	0.7415	0.0373	0.1145	0.0783	0.1287	0.0622	0.2052	0.8803	0.9699	0.0677	0.4111
N	41	12.9528	25.8184	0.2775	0.9423	0.0364	0.1262	0.0960	0.3699	0.0454	0.1589	0.9277	1.1507	0.0672	0.6442
Combined	82	12.8935	25.3667	0.2718	0.8406	0.0368	0.1203	0.0872	0.2493	0.0538	0.1820	0.9043	1.0591	0.0675	0.0757
Site: SB															
D	27	9.8767	24.2007	0.4851	2.1485	0.0596	0.2602	0.0470	0.1266	0.0447	0.2745	0.9657	0.9002	0.1758	1.0883
N	27	6.4173	20.2848	0.2419	2.1360	0.0308	0.2638	0.0294	0.1276	0.0258	0.1804	0.7567	0.9182	0.1272	1.5301
Combined	54	8.0805	22.2058	0.3635	2.1422	0.0452	0.2620	0.0382	0.1271	0.0353	0.2274	0.8612	0.9094	0.1515	0.1196
Site: SC															
D	26	9.4891	24.4929	0.3110	1.0190	0.0458	0.1540	0.0813	0.1344	0.0751	0.2389	0.6810	0.5275	0.0895	0.3810
N	26	8.6583	17.2846	0.4004	1.3217	0.0526	0.1773	0.0732	0.1245	0.0515	0.1601	0.7664	0.4744	0.1529	0.9428
Combined	52	9.0818	21.0329	0.3539	1.1640	0.0491	0.1652	0.0774	0.1297	0.0635	0.2003	0.7229	0.5014	0.1206	0.0517
Site: SE															
D	39	9.2908	16.5385	0.0793	0.1784	0.0151	0.0379	0.0791	0.1603	0.0606	0.1610	0.5173	0.6175	0.0977	0.0483

N	39	17.6624	23.7712	0.0648	0.1292	0.0125	0.0312	0.1209	0.1544	0.0523	0.1435	0.3867	0.4631	0.0477	0.0441
Combined	78	13.4766	20.1549	0.0721	0.1538	0.0138	0.0346	0.1000	0.1573	0.0565	0.1523	0.4538	0.5424	0.0738	0.0048
Site: YO															
D	35	4.6811	8.4613	0.0652	0.1242	0.0117	0.0260	0.0449	0.0507	0.0408	0.0833	0.2053	0.3019	0.0434	0.0230
N	35	4.4792	7.3716	0.0702	0.1327	0.0121	0.0264	0.0452	0.0838	0.0384	0.0765	0.2590	0.3718	0.0491	0.0322
Combined	70	4.5801	7.9085	0.0677	0.1285	0.0119	0.0262	0.0450	0.0673	0.0396	0.0799	0.2325	0.3368	0.0463	0.0024

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Period	Count	N3ITFC	N3ITTC	S4ITFC	S4ITTC	N3CNFC	HNCNGC	NHCCGC	SOIKGC	NOCEGC	HNDDGC
Site: AZ											
D	43	3.5648	8.3115	4.1051	5.7275	14.0041	14.7397	10.7949	5.0396	68.9082	4.3998
N	43	4.4396	8.6802	3.7462	5.1397	6.8604	1.8066	6.2375	2.0394	71.5513	-0.4098
Combined	86	4.0022	8.4959	3.9256	5.4336	10.4322	8.1971	8.5430	3.5395	70.2142	1.9349
Site: BA											
D	43	3.1282	4.0826	2.7029	3.1176	5.9814	6.2366	16.7580	7.2105	26.8447	3.3876
N	42	3.4619	4.1108	2.7023	2.9939	4.6494	1.6036	14.7110	6.5777	50.5924	0.3722
Combined	85	3.2996	4.0967	2.7026	3.0558	5.3239	3.9795	15.7345	6.8941	38.5682	1.8592
Site: FR											
D	41	1.8953	3.3251	1.6166	2.2806	3.6047	1.9947	5.1665	1.6250	29.2299	0.3987
N	43	1.5570	2.8158	1.4879	2.0875	2.1674	0.3801	2.8650	0.5498	28.5247	-0.3454
Combined	84	1.7218	3.0639	1.5506	2.1816	2.8685	1.1682	3.9877	1.0740	28.8689	0.0169
Site: GA											
D	29	0.1127	0.3327	0.8588	0.9031	0.3245	0.1281	0.8033	0.0586	2.5727	-0.0679
N	28	0.0975	0.2412	0.8157	0.8687	0.2541	0.0487	0.1742	0.1051	4.3159	-0.0994
Combined	57	0.1051	0.2888	0.8373	0.8866	0.2899	0.0891	0.4943	0.0814	3.4284	-0.0836
Site: LA											
D	43	3.6442	8.2213	4.3407	6.6445	10.4035	12.4149	11.2546	5.6607	72.2625	5.8612
N	43	3.7862	8.1045	3.7153	5.2134	5.7815	1.5153	5.5065	2.9386	66.1545	-0.5338
Combined	86	3.7152	8.1629	4.0280	5.9289	8.0640	6.9651	8.4152	4.3328	69.2085	2.6232
Site: LB											
D	40	2.8008	6.4429	4.2101	5.5731	5.8381	5.4388	8.7413	8.2925	53.5938	2.4062
N	40	2.1601	5.2231	3.2355	4.5999	3.6284	0.7728	4.7862	3.5863	43.2942	-0.7426

Combined	80	2.4804	5.8330	3.7228	5.0865	4.7333	3.1058	6.7637	5.9088	48.4440	0.8318
Site: SA											
D	41	1.6002	2.5314	1.3705	1.7768	3.0108	2.2014	12.8653	2.4693	24.3932	0.8097
N	41	1.8490	3.4577	1.4479	1.9591	2.7492	0.7582	10.2254	1.9591	31.3890	-0.2414
Combined	82	1.7246	2.9884	1.4092	1.8667	2.8800	1.4798	11.5453	2.2142	27.8911	0.2842
Site: SB											
D	27	0.5204	2.7841	2.9519	3.8911	1.5979	2.3459	2.5875	0.7407	11.0748	1.2979
N	27	0.4791	2.6255	1.9707	3.1594	1.5136	0.5574	1.3354	0.2058	13.1689	-0.4794
Combined	54	0.4998	2.7018	2.4613	3.5112	1.5557	1.4516	1.9614	0.4732	12.1218	0.4093
Site: SC											
D	26	0.5438	1.6277	1.7068	2.0426	1.7343	3.2860	13.2237	2.9101	17.0278	2.1859
N	26	0.6050	1.4948	1.6669	1.8653	1.2913	0.5142	9.6465	2.4618	22.8022	-0.0351
Combined	52	0.5738	1.5626	1.6873	1.9558	1.5128	1.9001	11.4351	2.6815	19.9150	1.0981
Site: SE											
D	39	0.4030	0.4644	1.3014	1.3905	1.2479	0.9678	1.6545	0.7473	0.0094	0.2530
N	39	0.2839	0.4776	1.1774	1.1863	0.9927	0.3840	1.0303	0.5306	0.1713	-0.3727
Combined	78	0.3460	0.4708	1.2420	1.2912	1.1203	0.6759	1.3424	0.6389	0.0903	-0.0466
Site: YO											
D	35	0.1463	0.2411	0.7941	0.7982	0.4051	0.6239	1.3737	0.3523	0.0000	0.3687
N	35	0.1353	0.2519	0.8662	0.8008	0.4135	0.3235	0.4680	0.2971	0.0208	0.0461
Combined	70	0.1408	0.2465	0.8307	0.7995	0.4093	0.4737	0.9209	0.3247	0.0102	0.2051

APPENDIX B

SEASONAL SOURCE-RECEPTOR RELATIONSHIPS

TABLE B-1. Zones of Influence for the Composite Seasons

SITE	WINTER					
	SOX			NOX		
	DRY	WET	TOTAL	DRY	WET	TOTAL
Bethel Island	76.4	104.4	83.3	137.6	137.5	137.6
Gasquet	292.2	444.2	408.6	403.5	409.7	406.3
S. Lake Tahoe	235.0	284.6	254.1	280.0	282.7	280.5
Eureka	87.6	212.2	135.3	260.2	271.3	262.9
Bakersfield	56.7	110.0	61.2	138.5	149.2	139.2
L. Isabella	140.5	160.4	146.1	187.1	179.2	186.0
Lakeport	150.3	174.2	163.3	195.9	195.0	195.7
San Rafael	40.0	59.4	48.5	93.4	104.6	96.7
Yosemite	200.8	241.5	223.8	253.7	258.0	255.0
Mammoth	247.7	286.3	268.5	297.0	299.6	297.6
Salinas II	114.9	152.0	125.2	181.9	191.2	183.0
Napa	49.3	73.3	57.9	113.5	118.2	114.6
Norden	226.7	269.5	256.2	268.1	269.4	268.6
Anaheim	37.5	75.6	42.4	63.3	78.7	64.7
Quincy	222.1	245.3	233.6	277.2	281.5	278.1
Sacramento	84.5	106.0	92.6	140.2	153.8	142.6
Victorville	47.5	92.8	51.5	123.6	121.3	123.4
San Bernardino	88.9	101.8	92.2	103.4	105.0	103.7
Nipomo	107.8	156.9	123.0	215.6	212.3	215.1
Santa Barbara	93.4	119.1	101.8	167.8	163.3	167.0
San Jose	65.0	93.9	72.8	112.2	132.7	114.5
Montague	261.8	339.4	284.4	362.2	368.0	362.7
Sequoia	186.0	188.5	187.5	243.4	238.6	241.9
Lindcove	151.4	152.1	151.6	223.8	222.4	223.7
San Nicolas Isl.	173.3	195.5	178.3	207.1	196.6	206.1
Berkeley	7.5	25.8	10.6	75.8	94.1	79.3
Reseda	75.3	109.1	84.2	83.8	84.4	83.9
Lynwood	23.5	67.1	29.2	53.1	66.2	54.7
Pasadena	58.2	101.1	69.0	66.0	70.8	66.8
Mt. Wilson	74.4	108.1	88.3	79.9	79.5	79.8
Tanbark Flats	76.6	94.7	83.5	88.2	87.7	88.1
Escondido	138.5	156.6	144.5	175.8	170.4	175.0

SITE	SPRING					
	SOX			NOX		
	DRY	WET	TOTAL	DRY	WET	TOTAL
Bethel Island	93.3	146.6	105.3	164.0	170.6	164.6
Gasquet	273.4	448.5	406.9	366.6	379.3	371.5
S. Lake Tahoe	220.3	284.5	245.3	253.9	257.5	254.4
Eureka	71.4	217.9	116.0	220.7	237.2	223.6
Bakersfield	58.2	126.0	62.9	137.0	149.6	137.7
L. Isabella	144.1	170.1	148.6	182.2	178.2	181.9
Lakeport	163.2	217.5	181.1	199.6	200.3	199.7
San Rafael	43.0	89.8	53.4	99.1	108.2	100.5
Yosemite	199.4	247.7	227.9	247.5	253.5	249.1
Mammoth	249.4	294.0	270.6	289.0	293.0	289.7
Salinas II	140.5	166.9	147.9	186.6	195.1	187.4
Napa	58.1	114.4	71.4	123.8	129.8	124.7
Norden	210.2	271.2	249.7	243.9	247.3	245.0
Anaheim	40.3	94.0	43.1	67.7	82.5	68.3
Quincy	234.0	297.2	266.7	268.5	273.0	269.4
Sacramento	84.3	138.0	98.6	142.7	163.3	145.0
Victorville	49.6	105.1	51.7	122.2	121.3	122.2
San Bernardino	90.0	112.5	93.3	100.7	103.5	100.9
Nipomo	120.9	184.9	134.5	217.4	217.2	217.4
Santa Barbara	101.6	141.5	110.5	171.5	169.7	171.3
San Jose	79.6	109.8	86.7	132.8	153.0	134.5
Montague	220.1	320.1	250.9	298.5	307.6	299.2
Sequoia	189.1	207.0	197.4	237.9	236.8	237.7
Lindcove	154.1	175.9	159.7	217.7	220.1	218.0
San Nicolas Isl.	185.0	213.9	188.3	212.2	203.7	211.8
Berkeley	7.8	38.0	10.7	76.8	94.3	79.0
Reseda	81.0	124.6	85.6	87.3	89.8	87.4
Lynwood	25.6	84.5	29.0	57.5	71.1	58.2
Pasadena	62.0	113.5	68.5	67.4	73.1	67.9
Mt. Wilson	78.3	118.9	88.1	79.1	80.2	79.3
Tanbark Flats	78.1	104.8	84.4	87.1	88.1	87.2
Escondido	137.8	172.8	145.0	165.8	162.2	165.5

TABLE B-1. Zones of Influence for the Composite Seasons (Cont'd)

SITE	FALL					
	SOX			NOX		
	DRY	WET	TOTAL	DRY	WET	TOTAL
Bethel Island	82.7	114.9	89.4	133.6	132.2	133.5
Gasquet	277.8	477.9	430.3	360.0	363.7	361.4
S. Lake Tahoe	220.4	289.0	244.9	249.2	249.9	249.3
Eureka	69.0	146.4	102.2	208.8	215.1	210.0
Bakersfield	55.9	114.5	59.7	135.4	143.0	135.7
L. Isabella	140.8	157.1	143.5	180.7	173.4	180.3
Lakeport	157.2	198.7	174.3	185.2	183.6	185.0
San Rafael	38.9	60.7	45.4	80.1	83.3	80.7
Yosemite	196.4	249.2	225.4	239.1	242.4	239.9
Mammoth	243.7	292.2	267.4	284.2	286.5	284.7
Salinas II	125.3	156.0	132.2	168.5	172.3	168.8
Napa	51.6	81.2	58.8	101.1	101.5	101.2
Norden	212.0	275.8	249.6	240.6	240.5	240.6
Anaheim	38.1	75.8	41.1	63.0	74.5	63.7
Quincy	227.7	286.2	252.1	263.0	265.3	263.4
Sacramento	86.1	118.1	96.4	134.4	144.6	135.7
Victorville	47.8	94.2	50.6	119.4	117.4	119.3
San Bernardino	88.8	95.0	90.1	98.6	99.8	98.7
Nipomo	111.5	151.0	120.0	215.1	210.4	214.7
Santa Barbara	95.1	121.4	101.0	166.2	160.3	165.7
San Jose	70.9	96.3	76.7	108.1	118.8	108.9
Montague	231.1	351.7	264.5	303.6	305.9	303.8
Sequoia	187.1	193.9	190.1	237.5	232.0	236.6
Lindcove	151.8	155.9	152.6	217.7	215.2	217.5
San Nicolas Isl.	176.0	193.2	179.7	202.1	191.4	201.3
Berkeley	6.5	26.0	8.6	60.3	69.3	61.6
Reseda	76.5	111.4	82.9	81.8	80.9	81.7
Lynwood	23.9	70.0	27.4	53.0	62.6	53.7
Pasadena	58.9	98.7	65.3	63.9	66.7	64.1
Mt. Wilson	75.0	104.7	86.0	76.2	75.1	75.9
Tanbark Flats	76.7	88.5	80.6	84.0	83.0	83.8
Escondido	134.3	153.0	140.0	160.3	156.1	159.8

SITE	SUMMER	
	SOX	NOX
	DRY	DRY
Bethel Island	86.0	143.0
Gasquet	268.3	349.6
S. Lake Tahoe	213.9	236.2
Eureka	80.6	228.9
Bakersfield	60.1	141.6
L. Isabella	147.7	184.3
Lakeport	188.3	212.9
San Rafael	43.6	95.4
Yosemite	196.5	235.0
Mammoth	241.7	279.7
Salinas II	129.5	164.5
Napa	75.9	121.8
Norden	207.6	231.7
Anaheim	42.2	70.6
Quincy	259.4	275.3
Sacramento	91.8	148.4
Victorville	50.9	122.5
San Bernardino	91.7	101.2
Nipomo	129.6	223.7
Santa Barbara	107.5	178.1
San Jose	73.6	109.3
Montague	220.7	279.6
Sequoia	202.2	246.0
Lindcove	166.0	226.2
San Nicolas Isl.	193.0	216.3
Berkeley	6.9	66.1
Reseda	84.9	91.6
Lynwood	27.0	60.7
Pasadena	64.6	69.9
Mt. Wilson	81.1	81.0
Tanbark Flats	79.9	88.7
Escondido	134.3	153.1

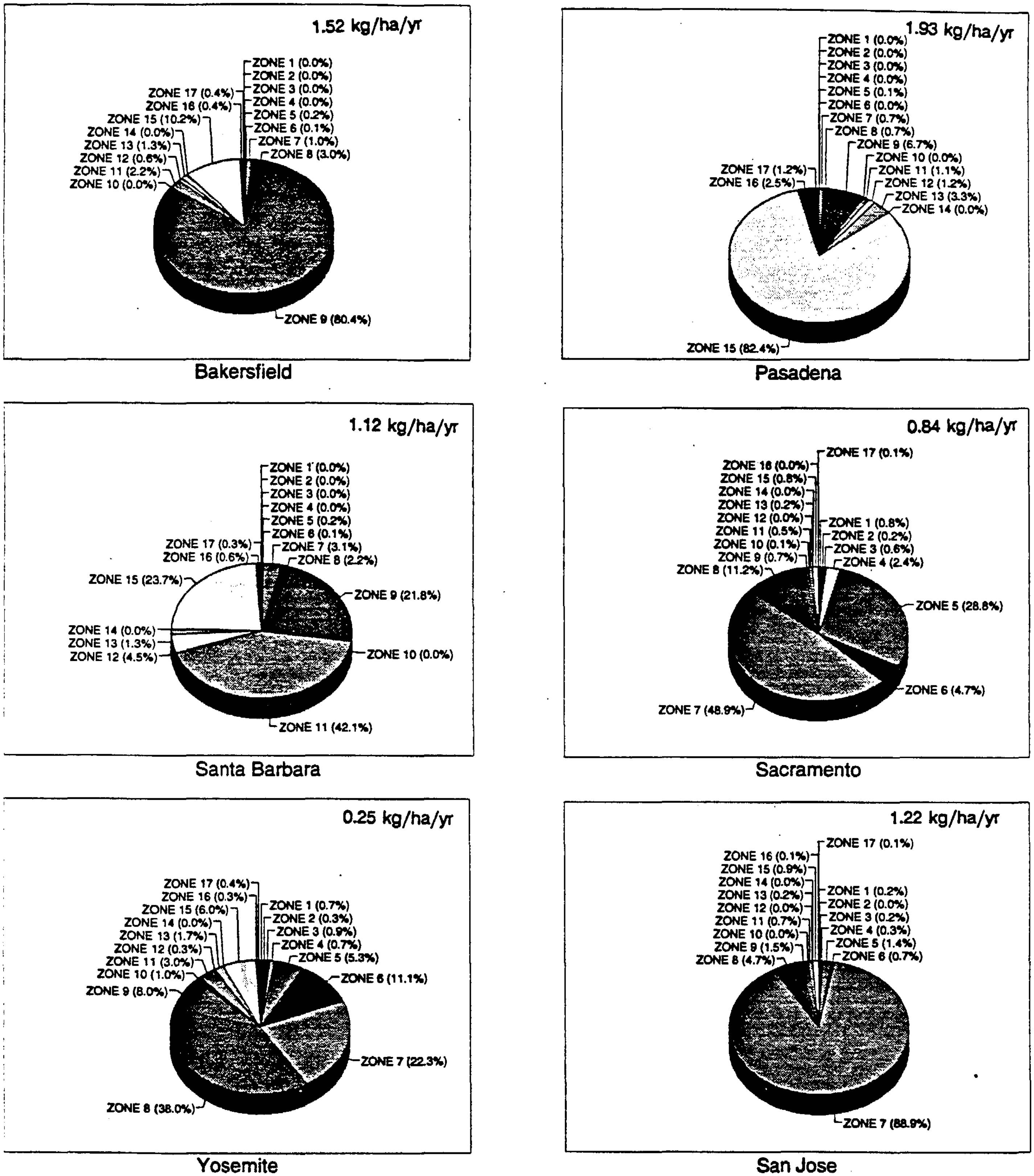


FIGURE B-1: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) dry deposition at various receptor sites during the composite fall season.

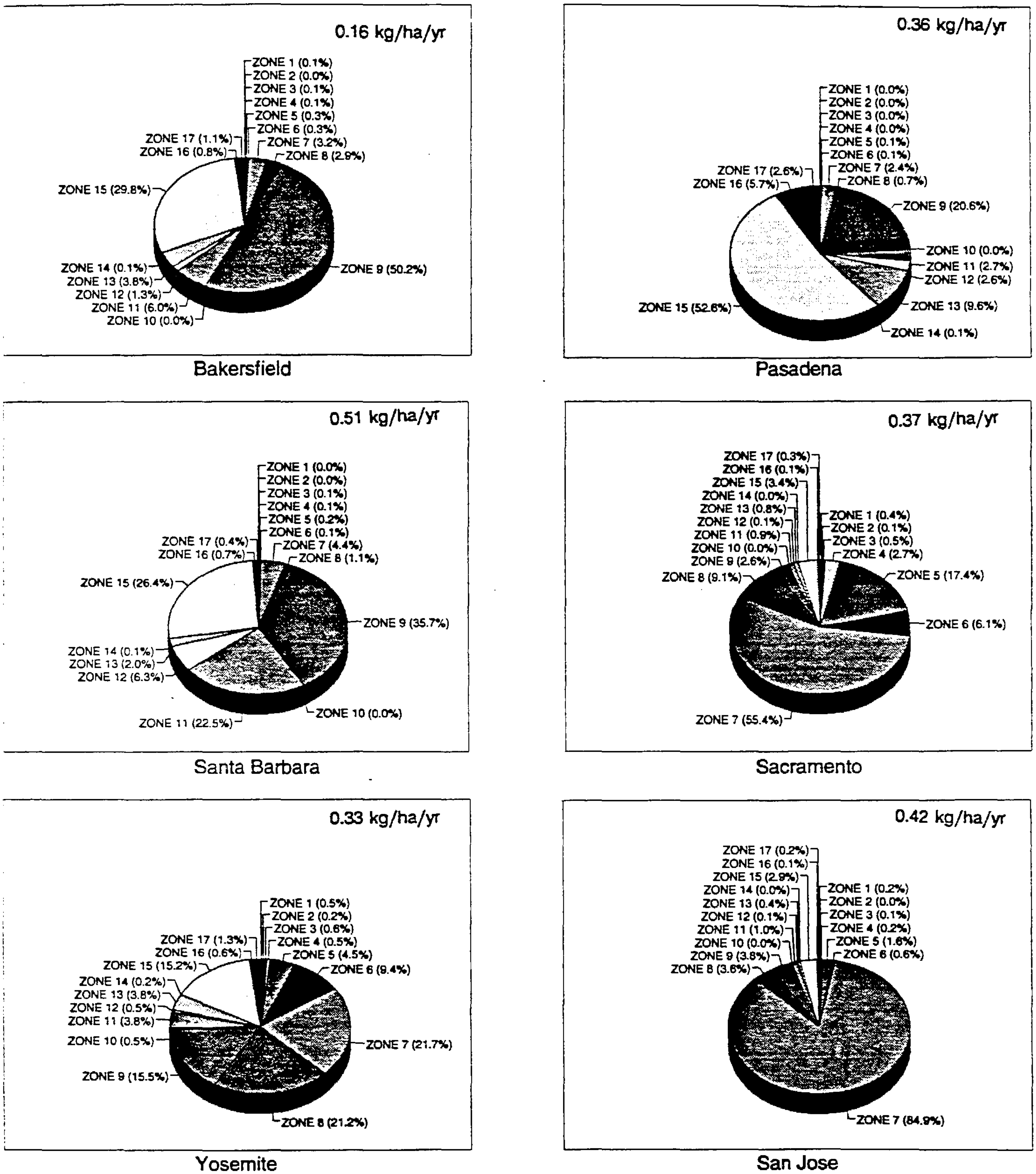


FIGURE B-2: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) wet deposition at various receptor sites during the composite fall season.

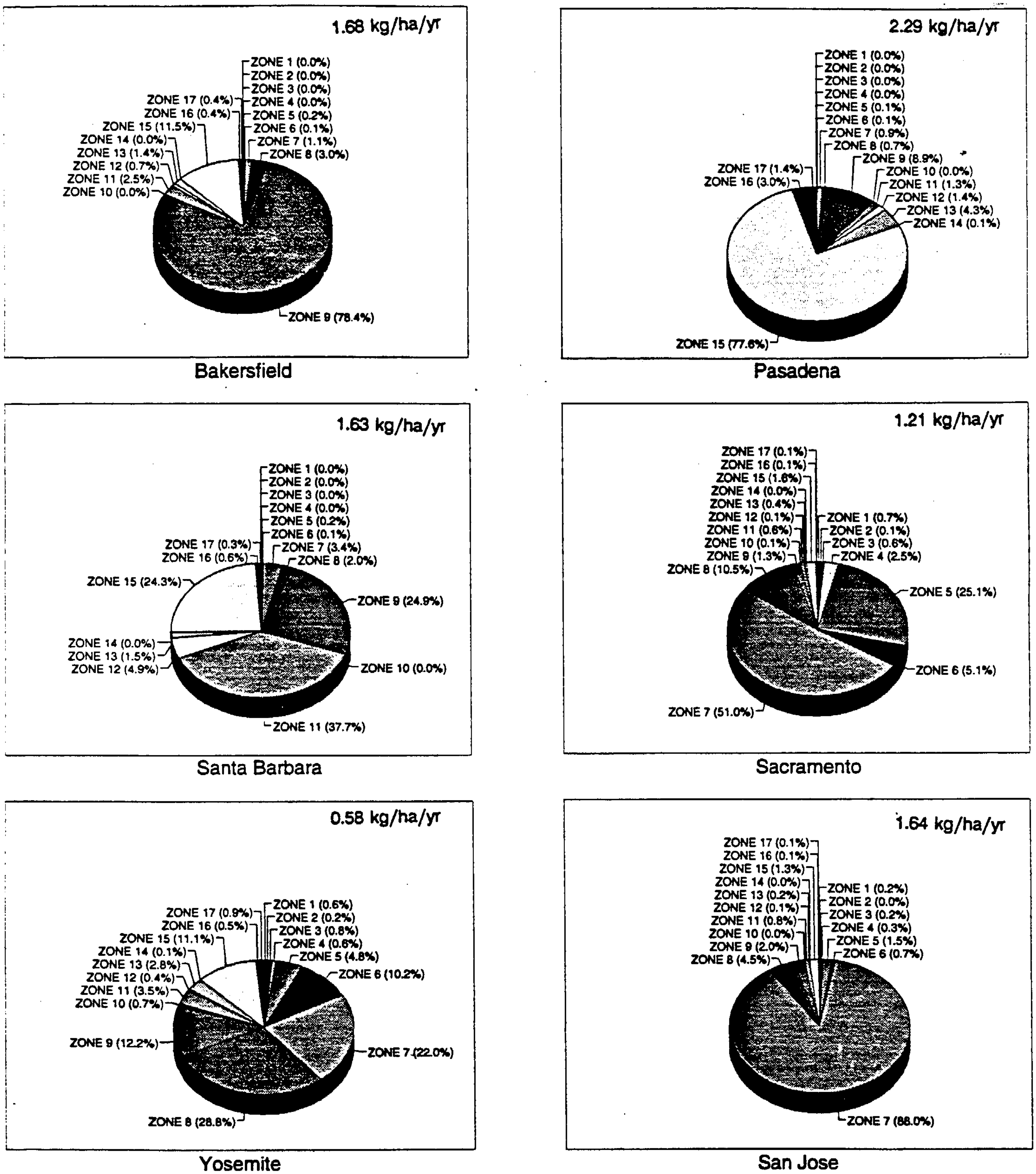


FIGURE B-3: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) deposition at various receptor sites during the composite fall season.

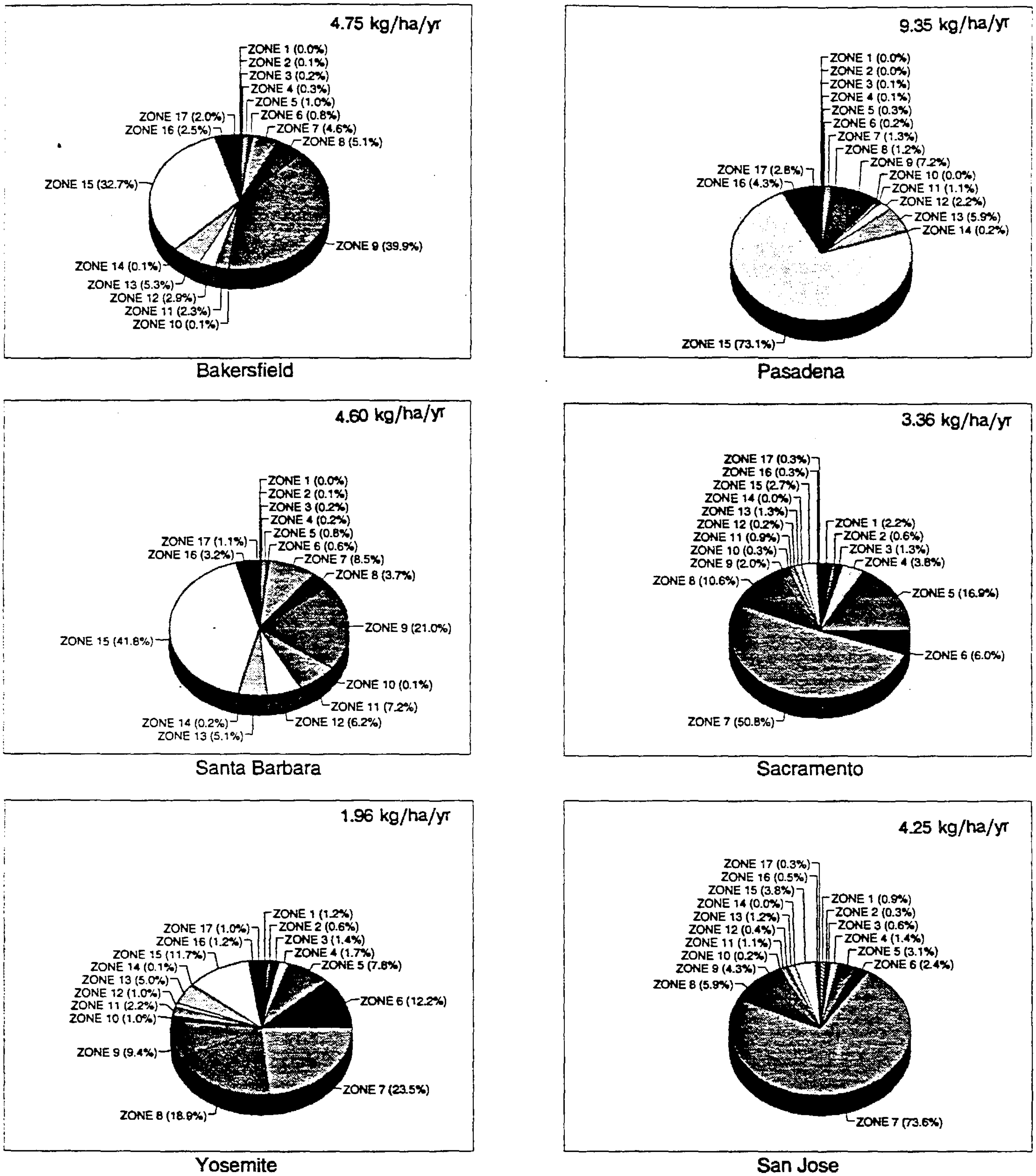


FIGURE B-4: **Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) dry deposition at various receptor sites during the composite fall season.**

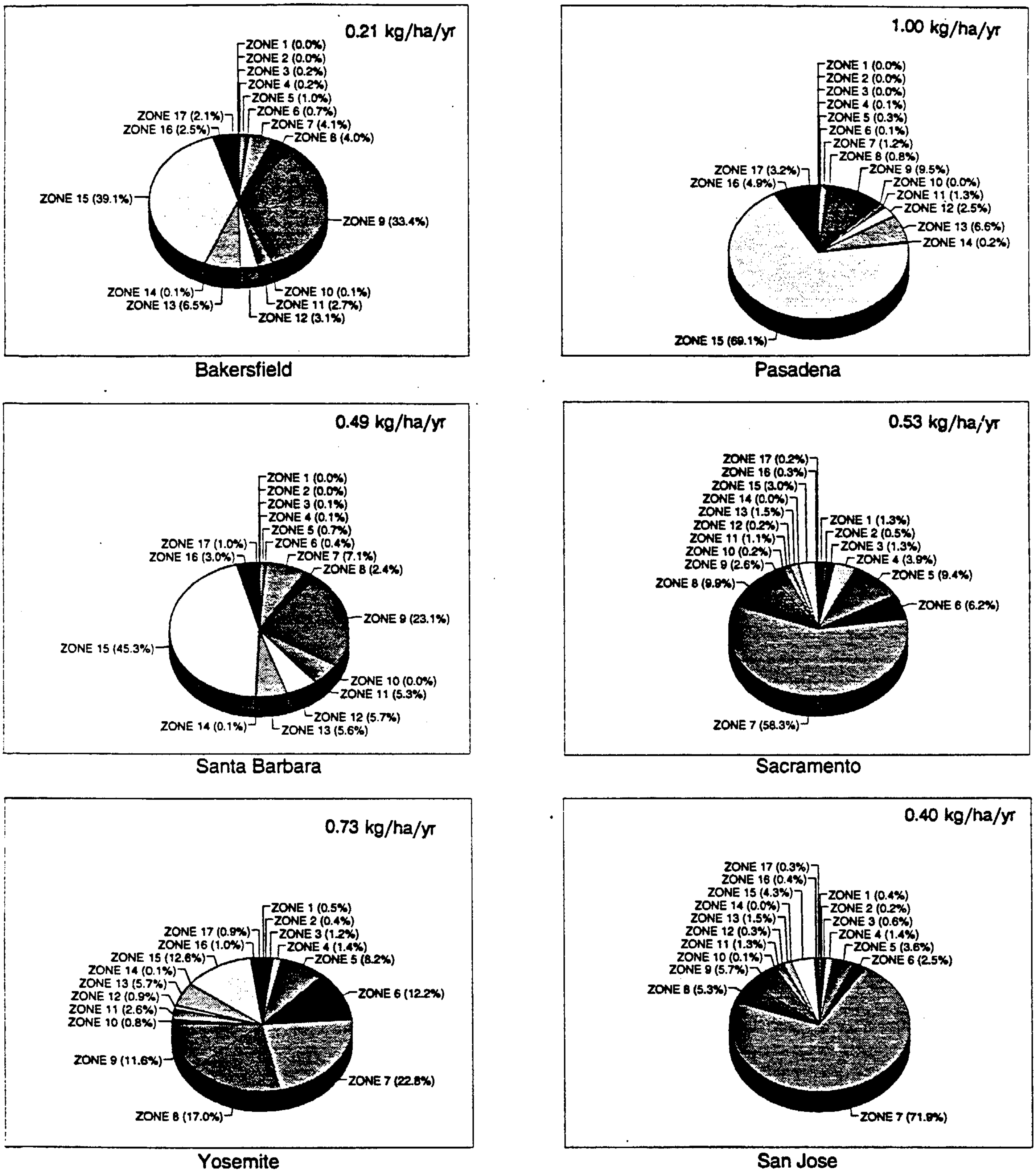


FIGURE B-5: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) wet deposition at various receptor sites during the composite fall season.

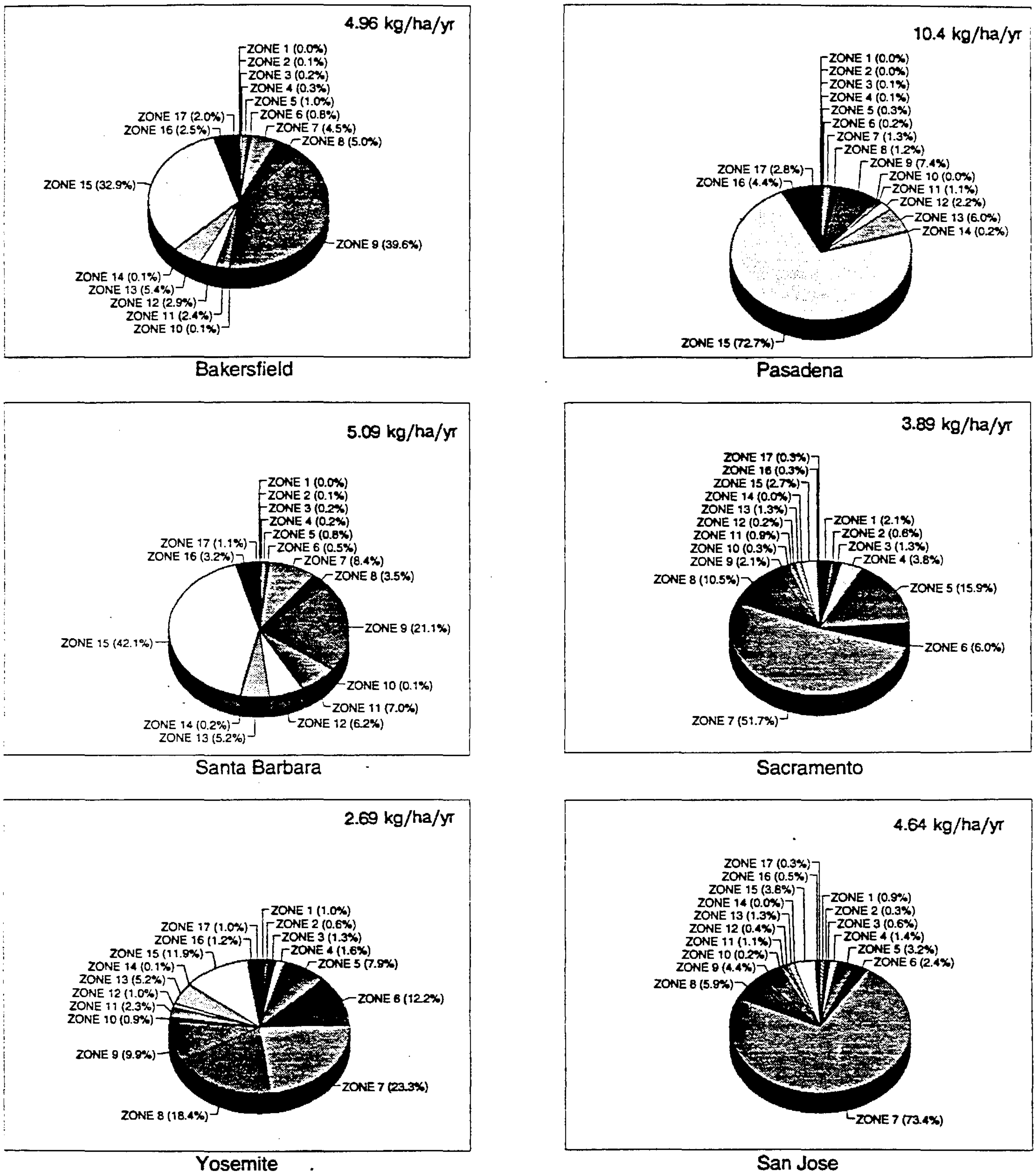


FIGURE B-6: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) deposition at various receptor sites during the composite fall season.

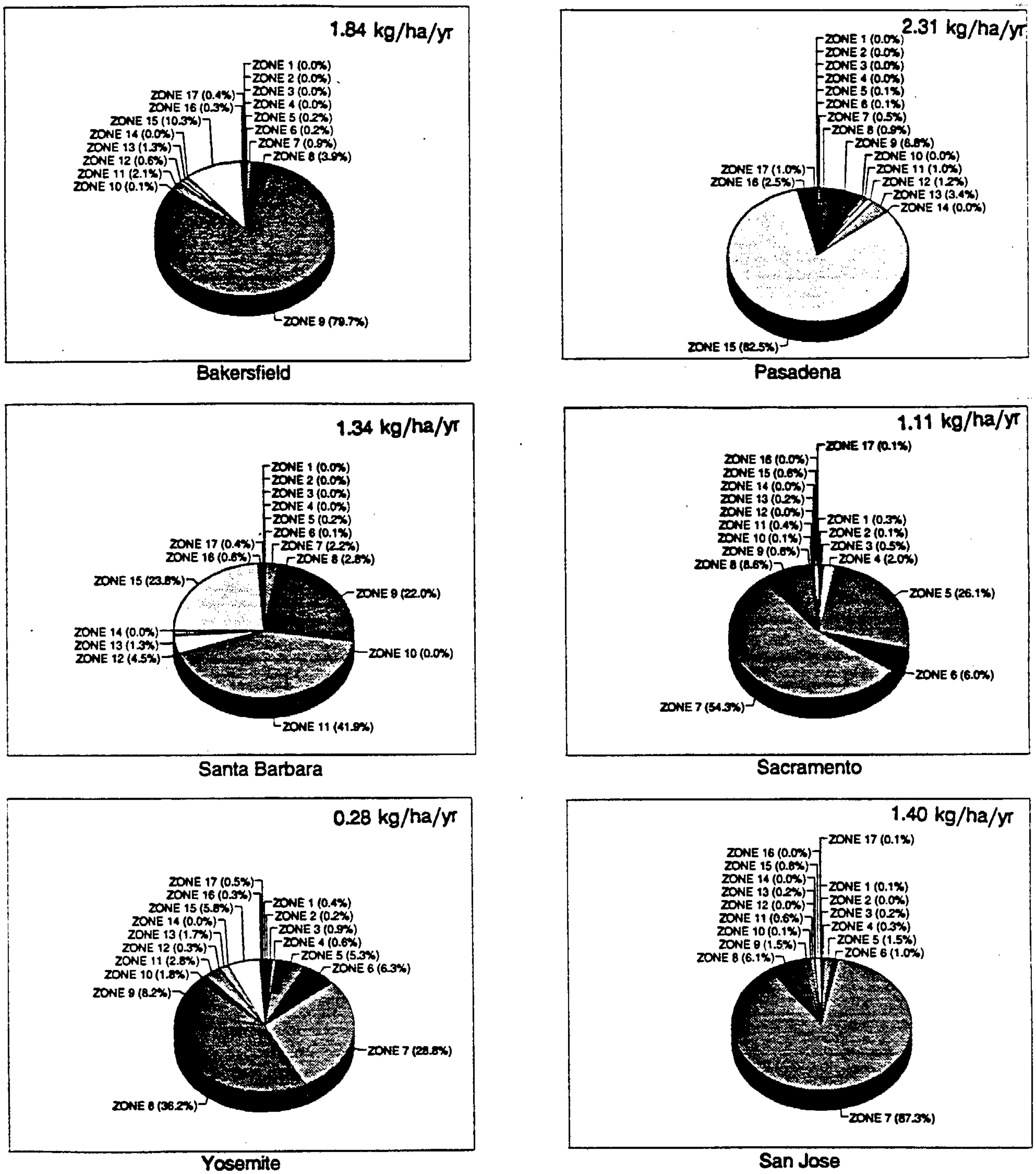


FIGURE B-7: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) dry deposition at various receptor sites during the composite winter season.

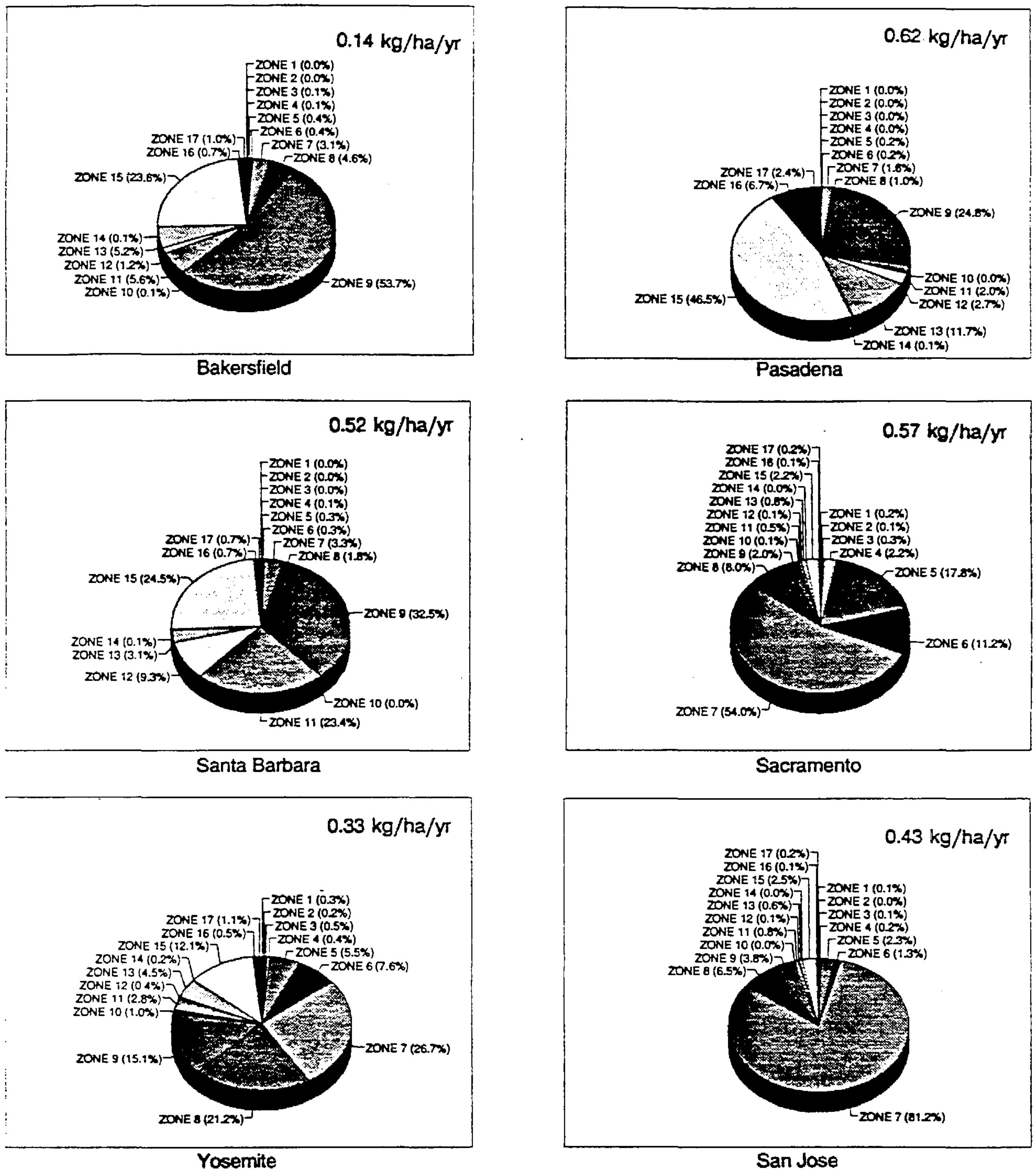
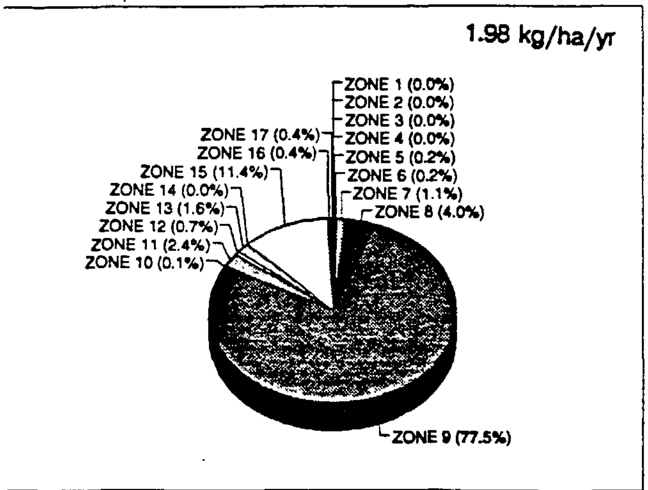
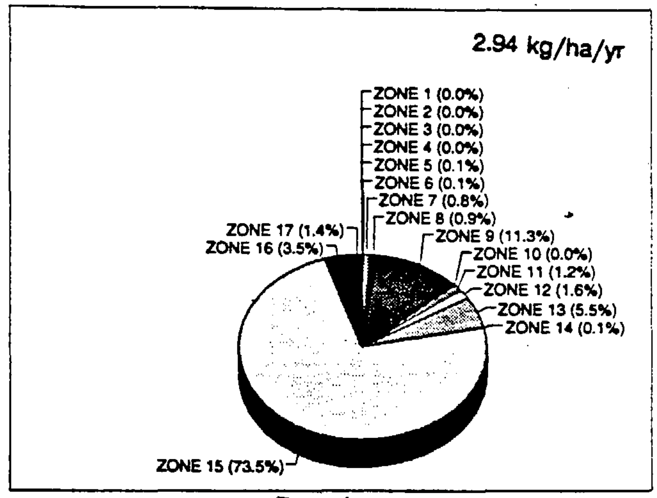


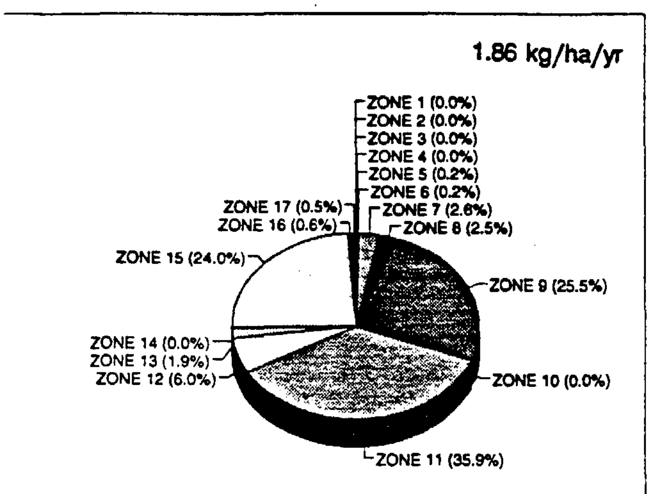
FIGURE B-8: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) wet deposition at various receptor sites during the composite winter season.



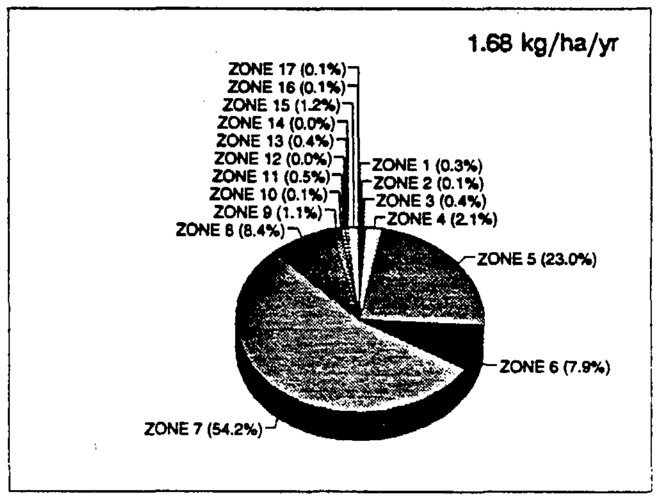
Bakersfield



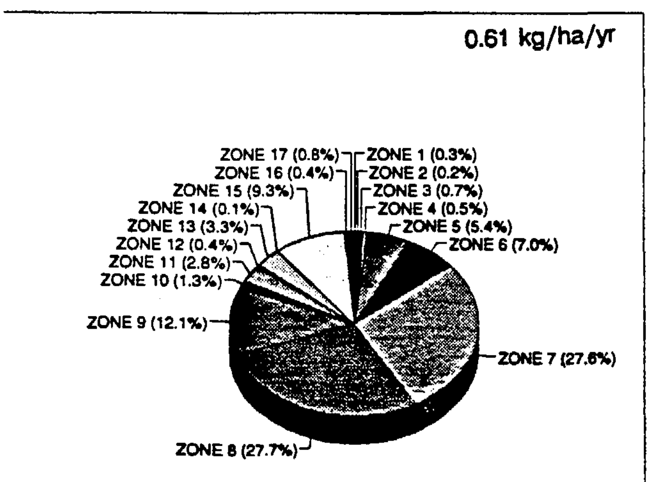
Pasadena



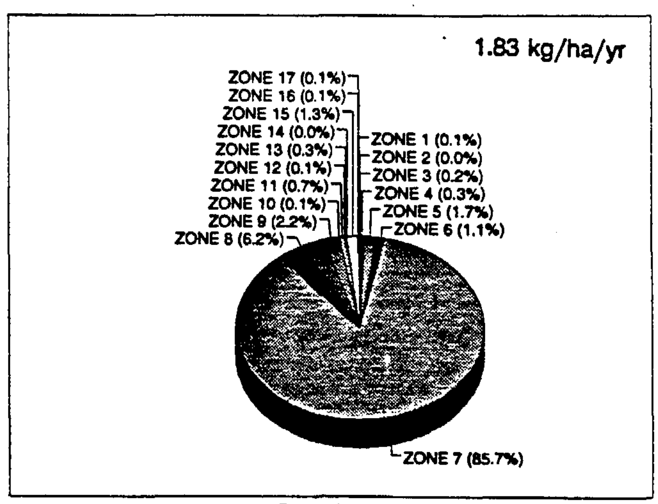
Santa Barbara



Sacramento



Yosemite



San Jose

FIGURE B-9: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) deposition at various receptor sites during the composite winter season.

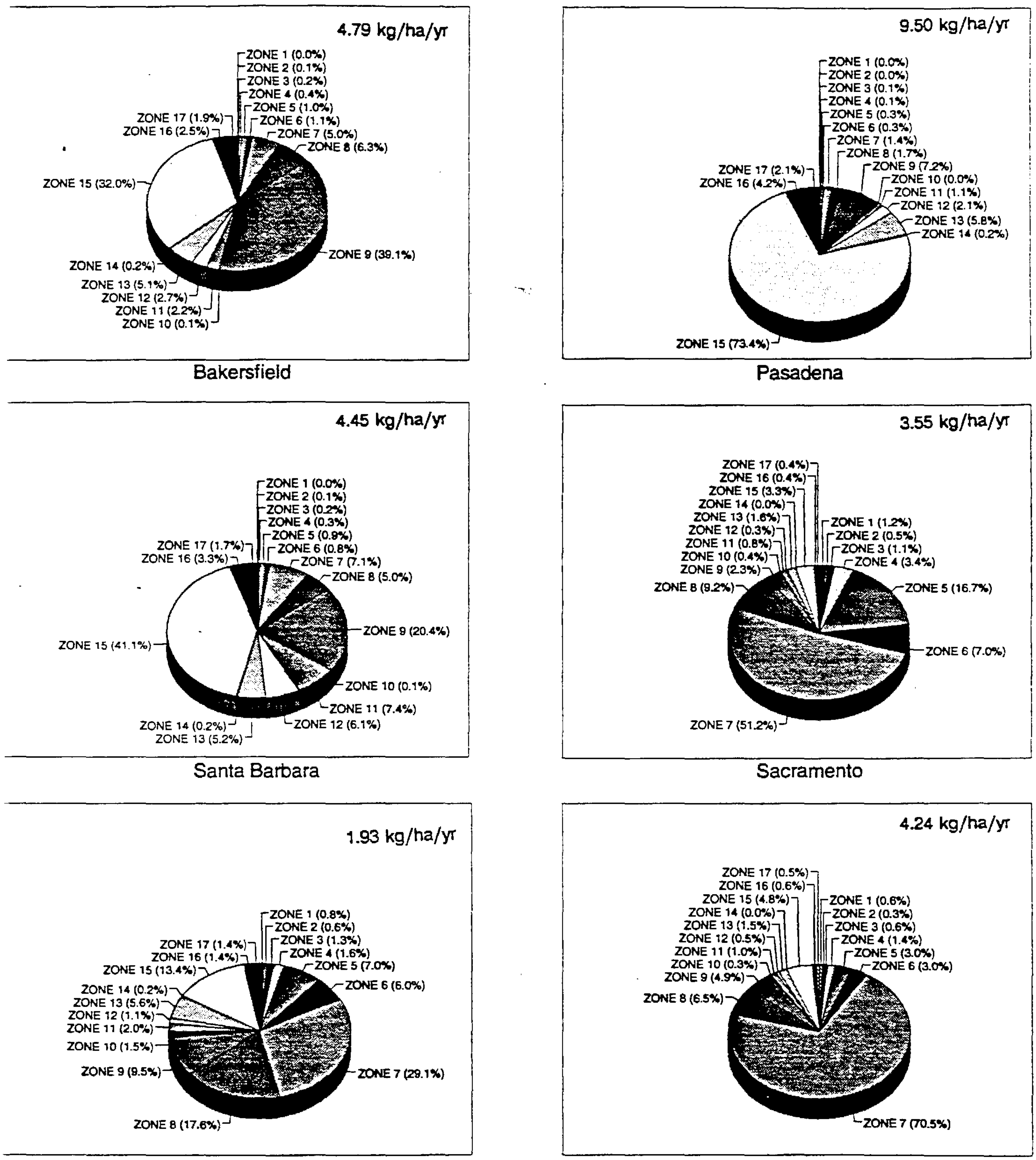


FIGURE B-10: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) dry deposition at various receptor sites during the composite winter season.

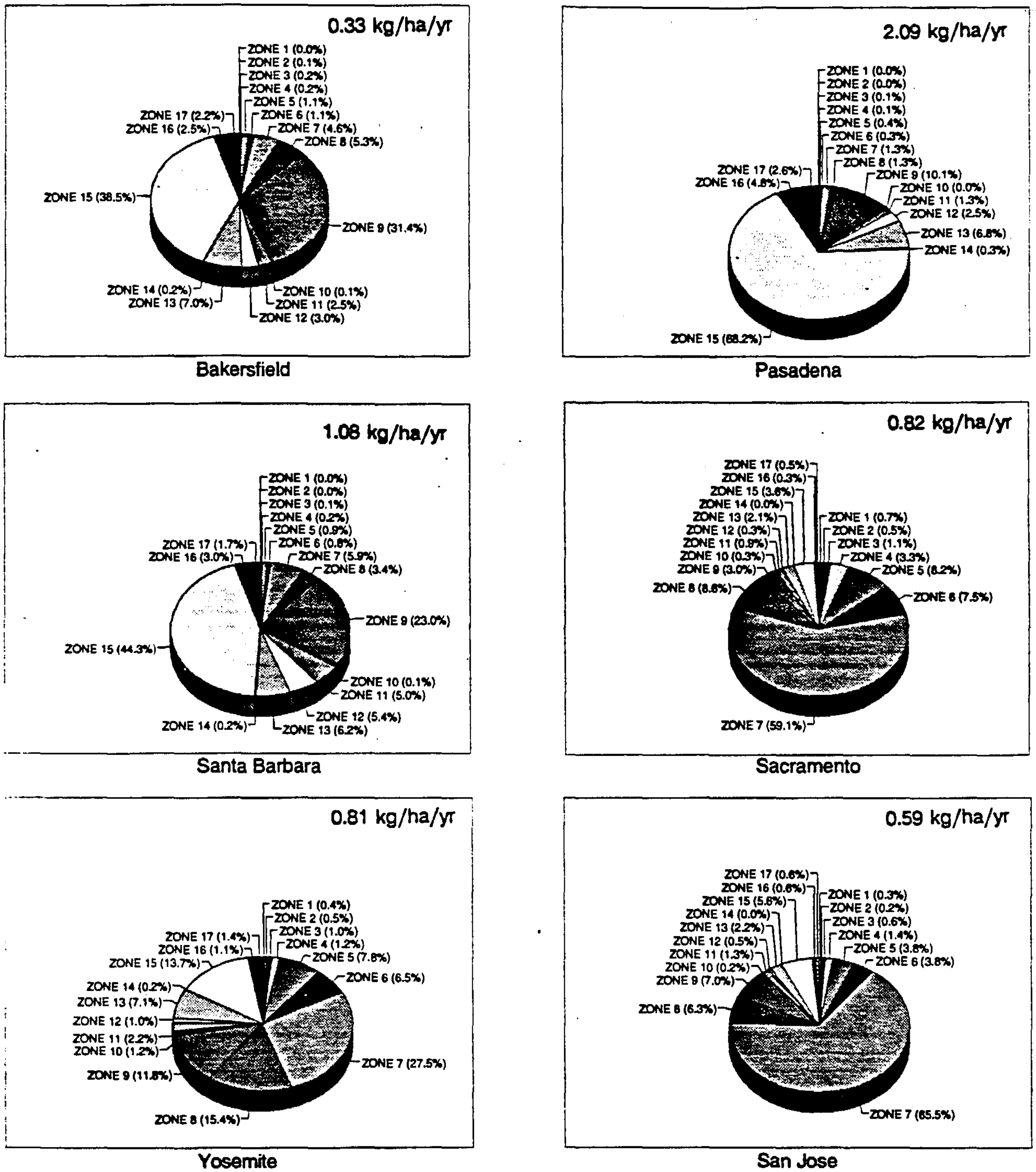


FIGURE B-11: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) wet deposition at various receptor sites during the composite winter season.

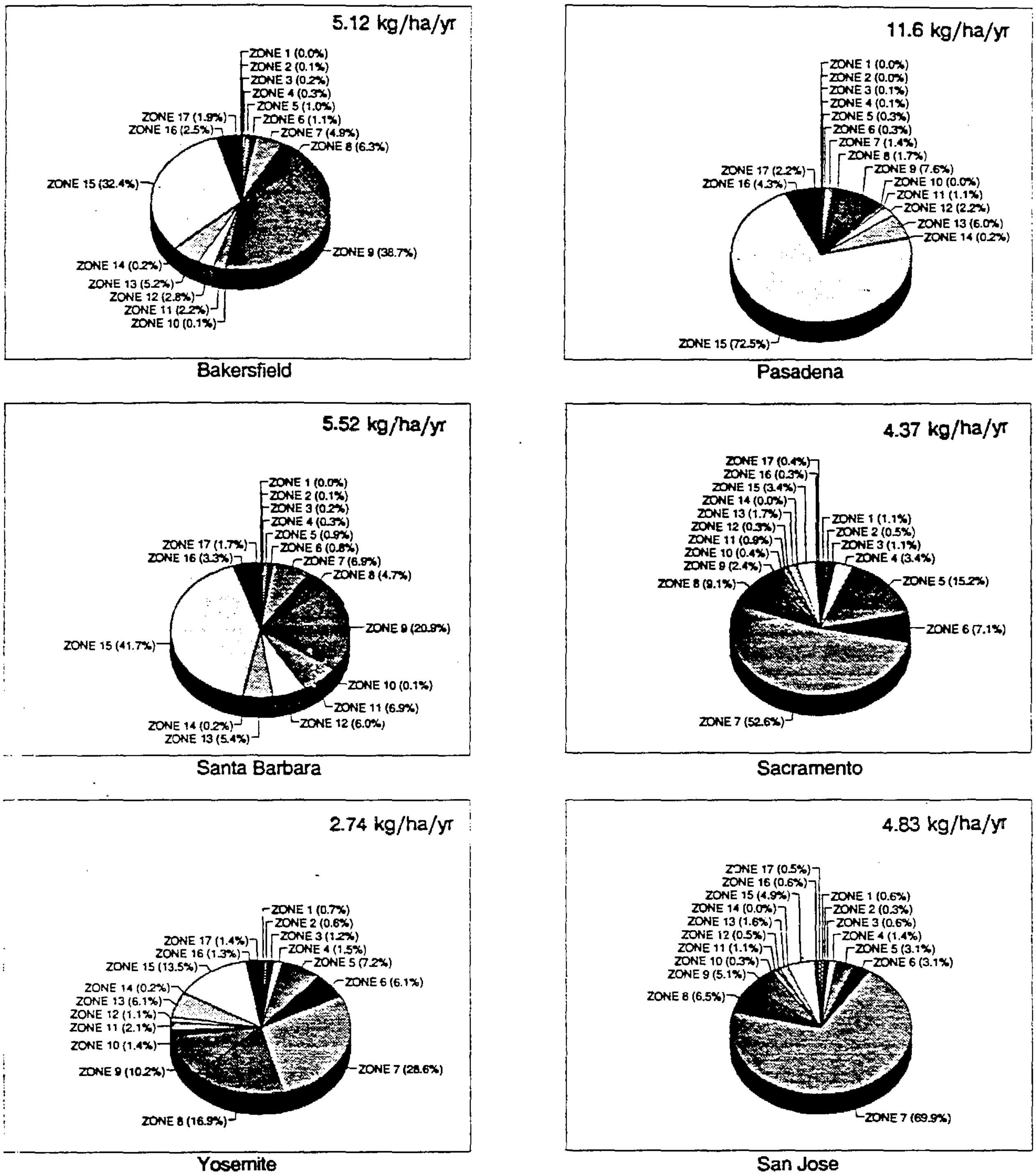


FIGURE B-12: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) deposition at various receptor sites during the composite winter season.

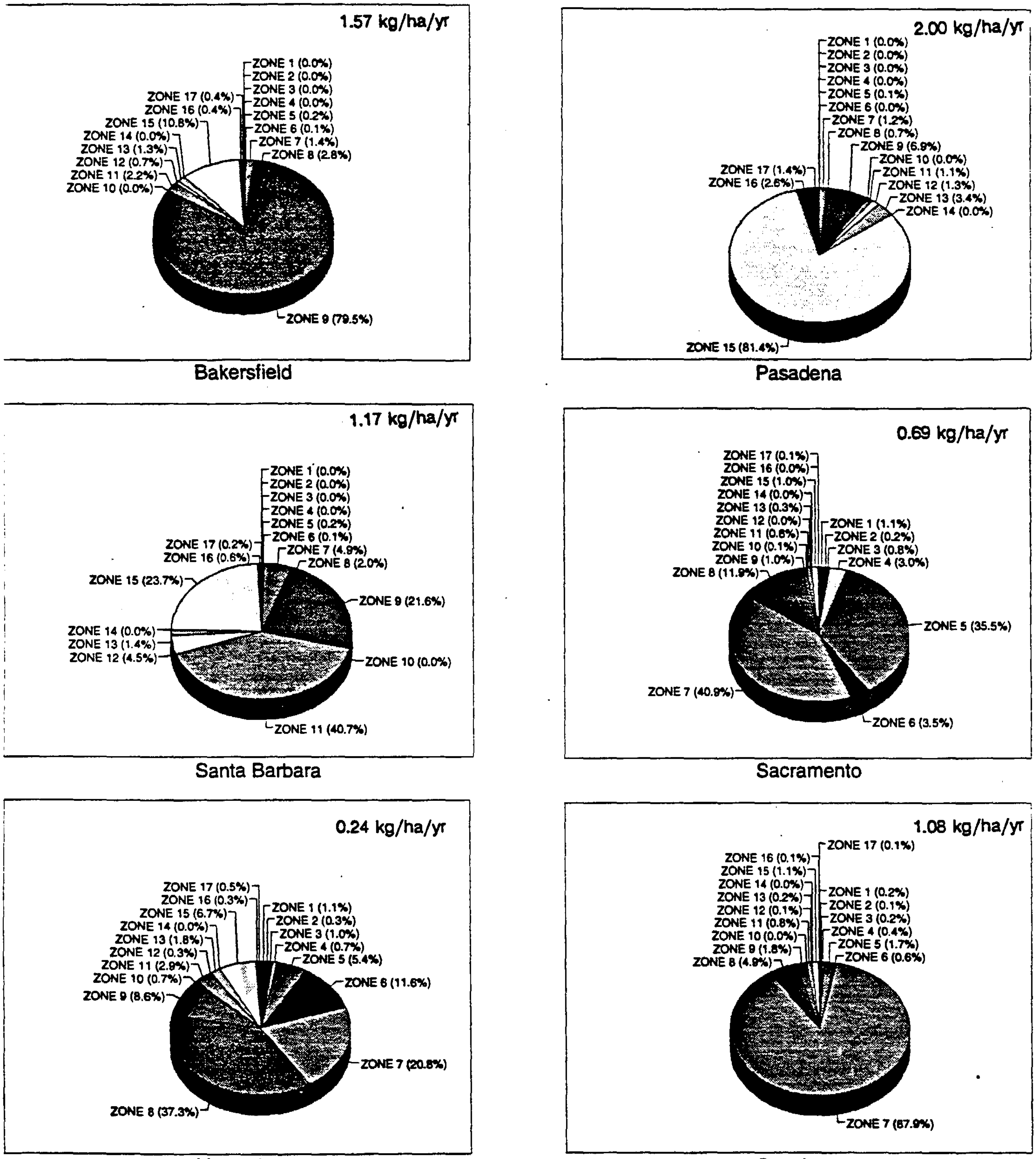


FIGURE B-13: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) dry deposition at various receptor sites during the composite spring season.

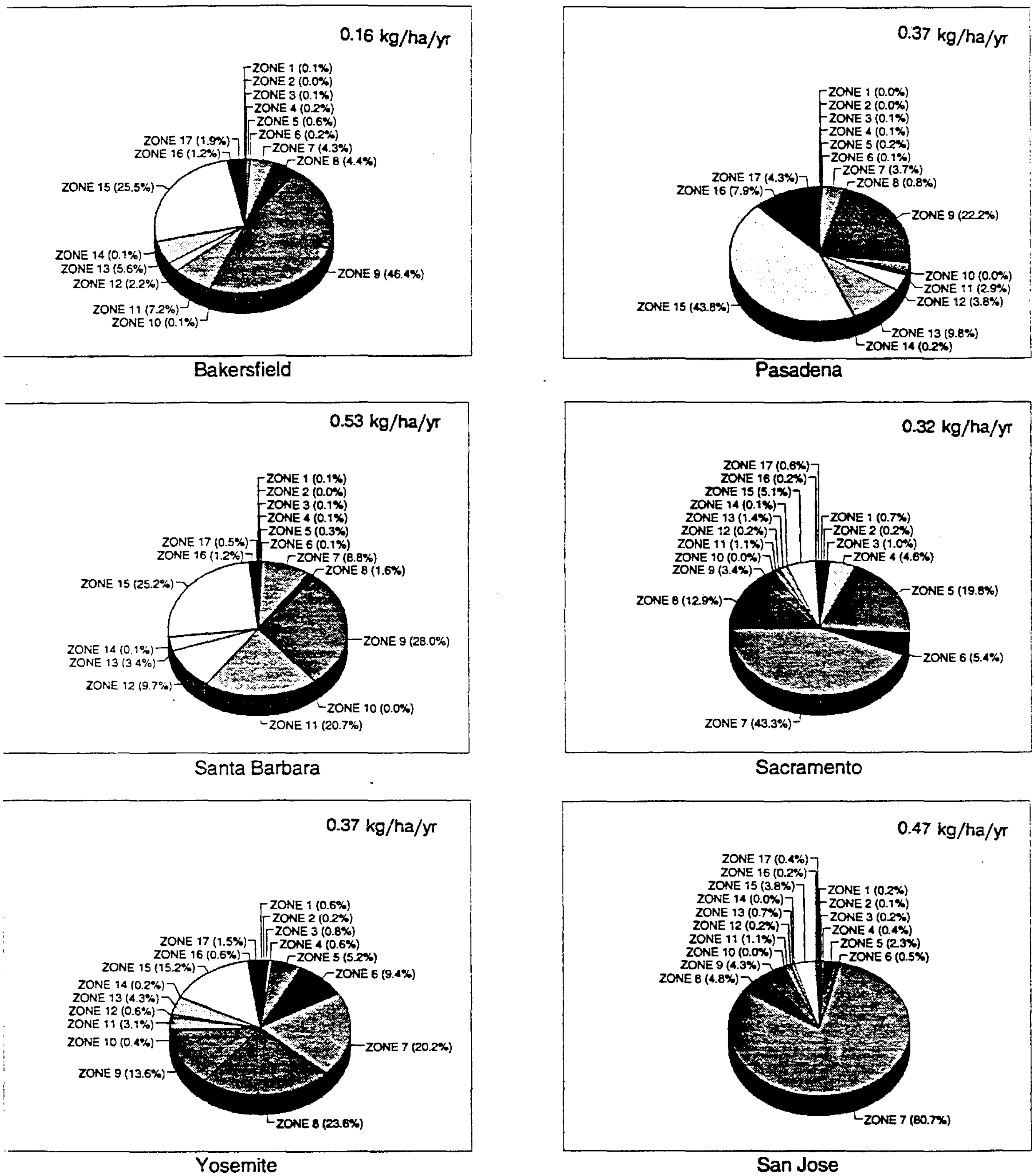


FIGURE B-14: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) wet deposition at various receptor sites during the composite spring season.

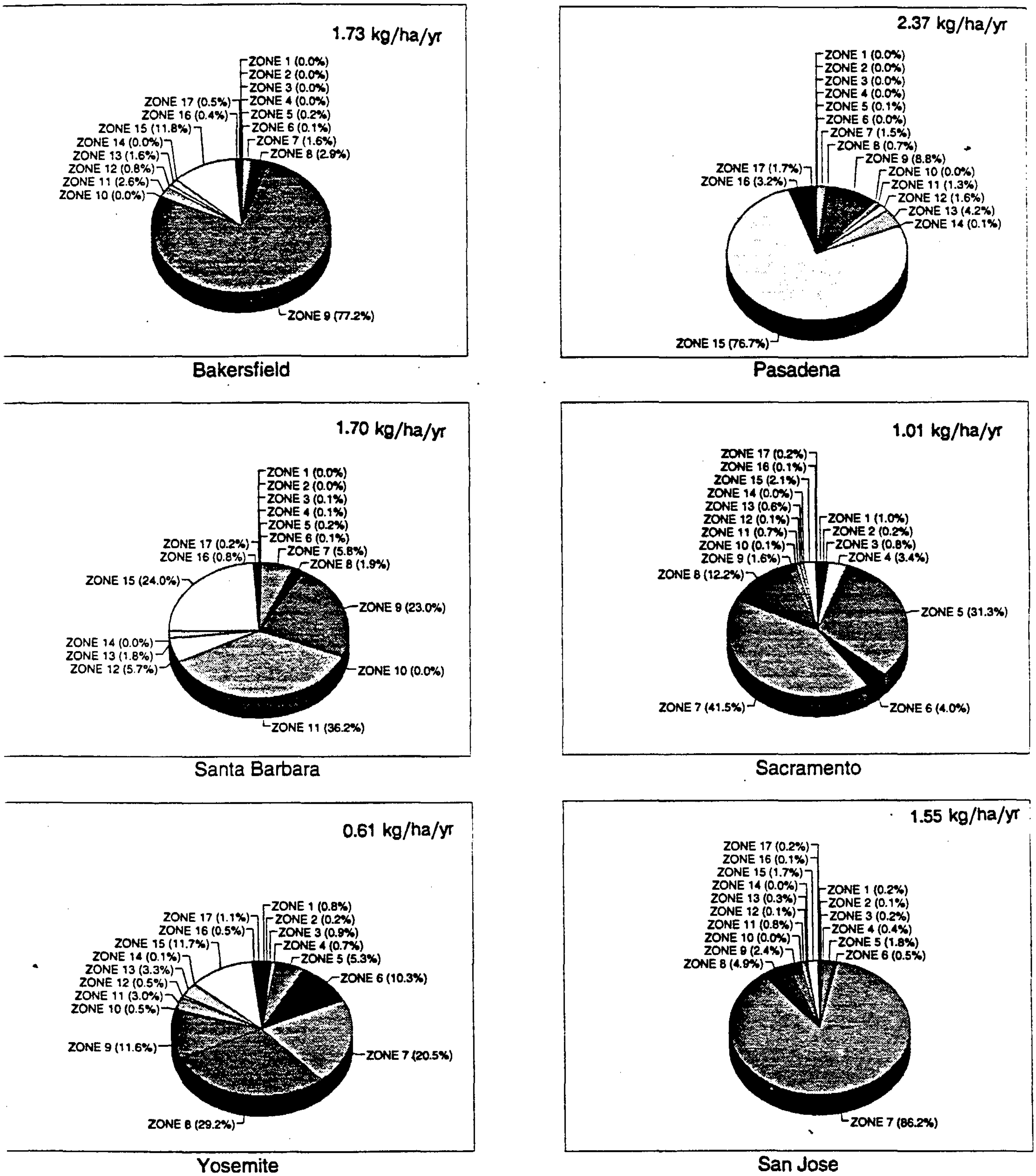


FIGURE B-15: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) deposition at various receptor sites during the composite spring season.

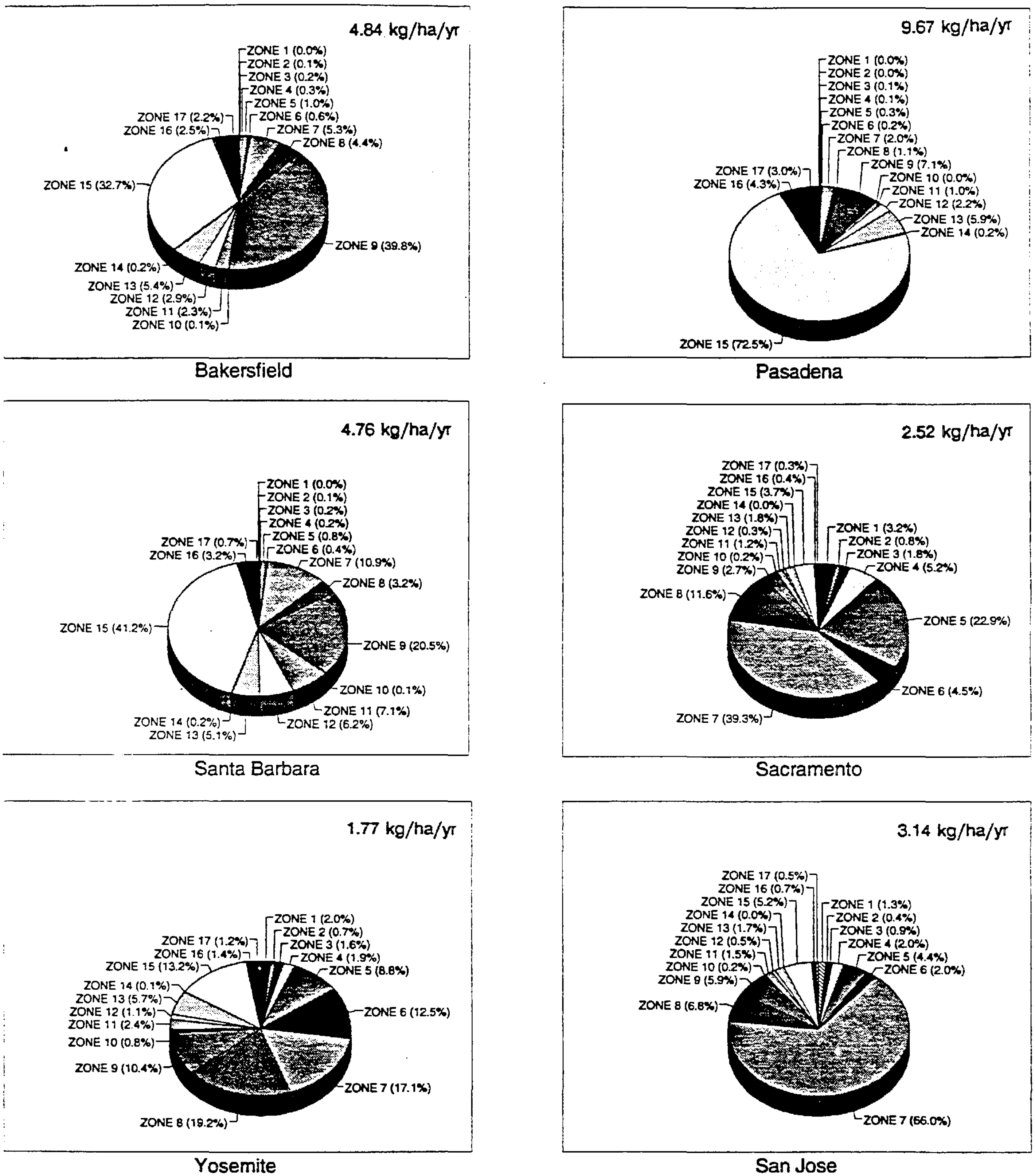


FIGURE B-16: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) dry deposition at various receptor sites during the composite spring season.

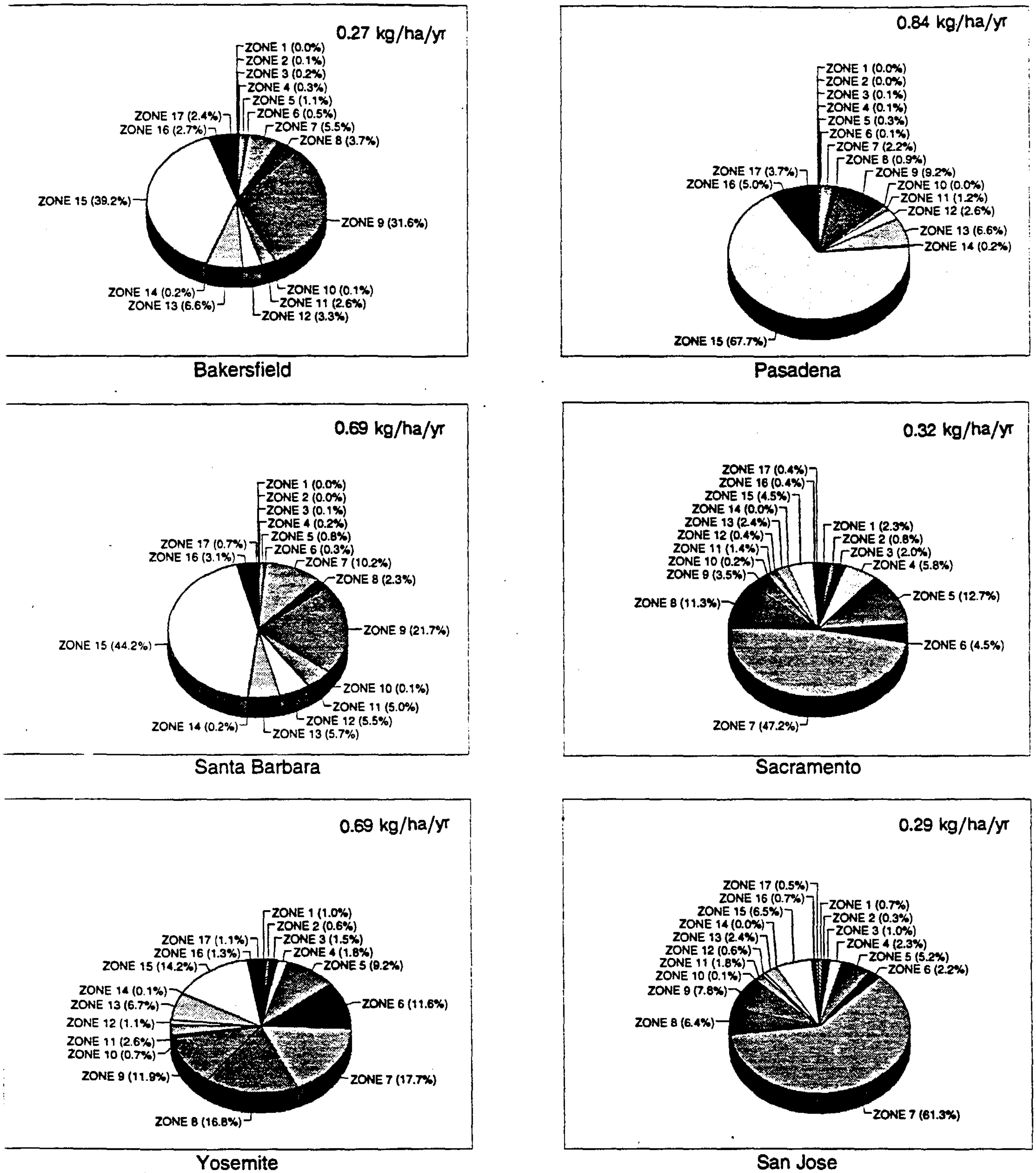


FIGURE B-17: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) wet deposition at various receptor sites during the composite spring season.

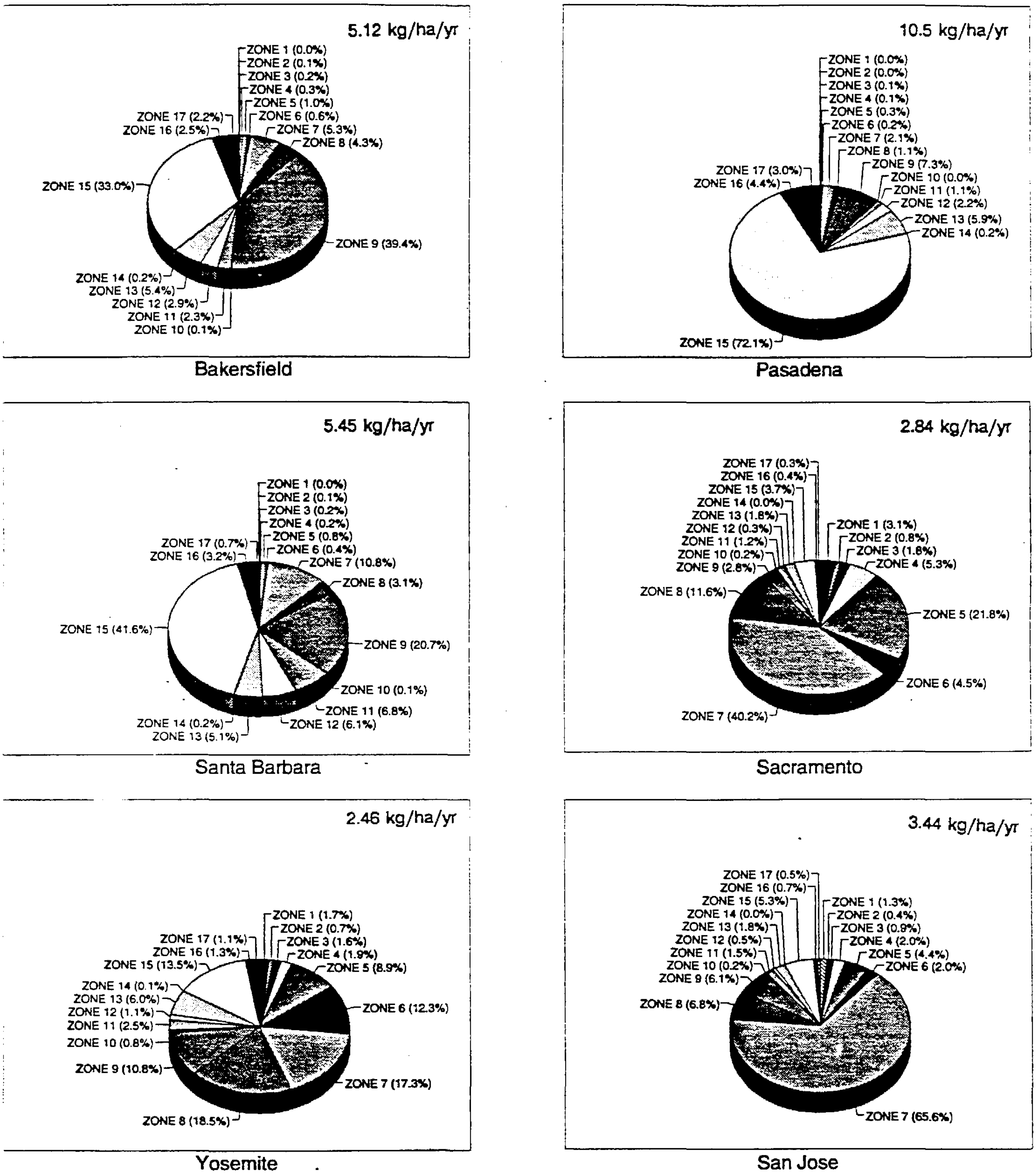


FIGURE B-18: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) deposition at various receptor sites during the composite spring season.

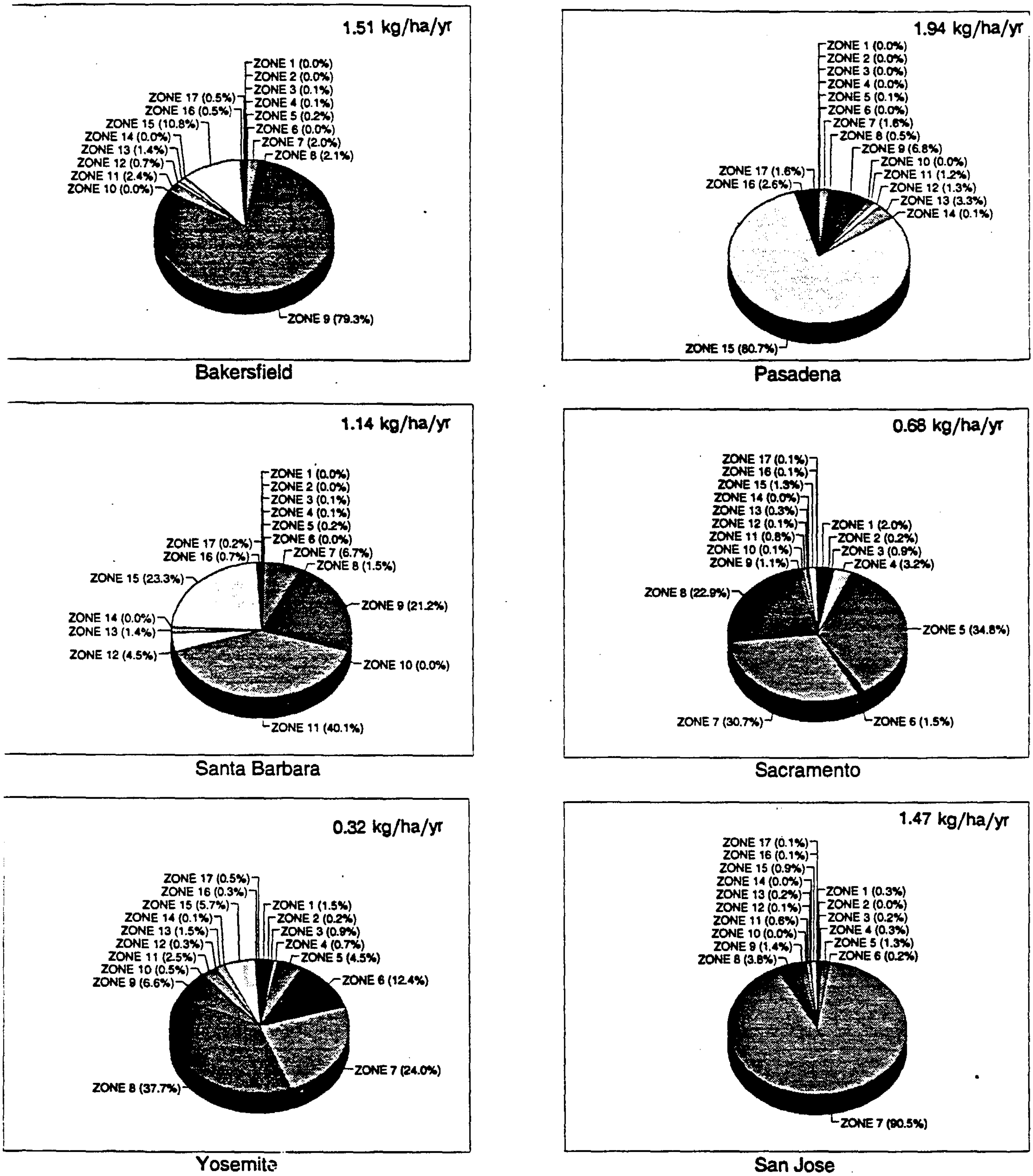
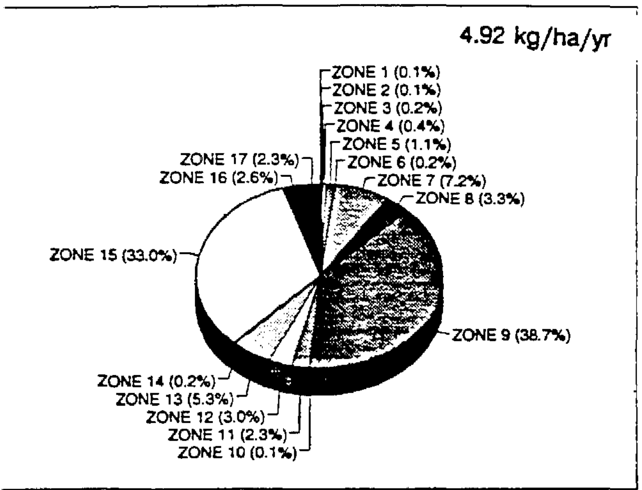
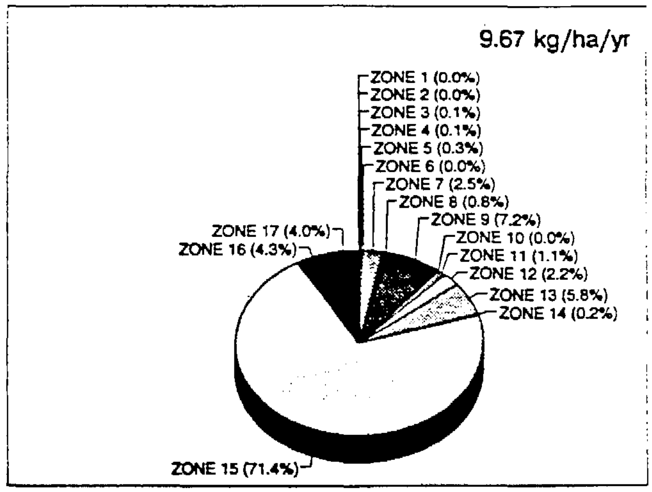


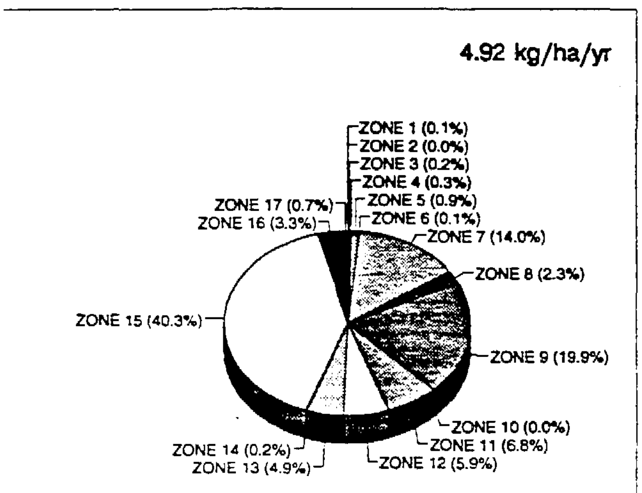
FIGURE B-19: Contribution (%) of the 17 source regions to total sulfur (SO_2 + sulfates) dry deposition at various receptor sites during the composite summer season.



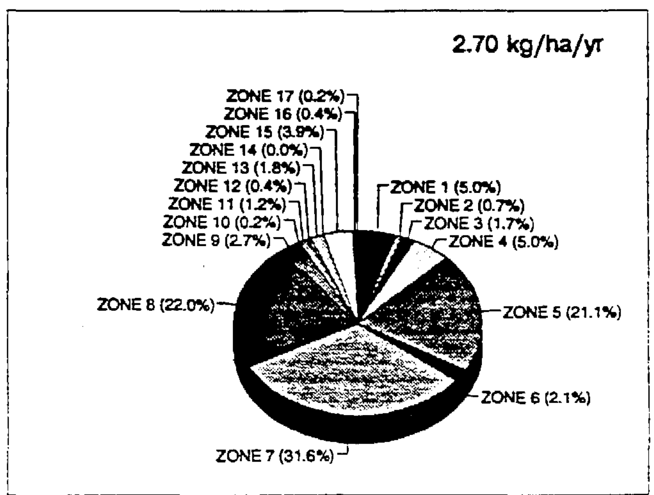
Bakersfield



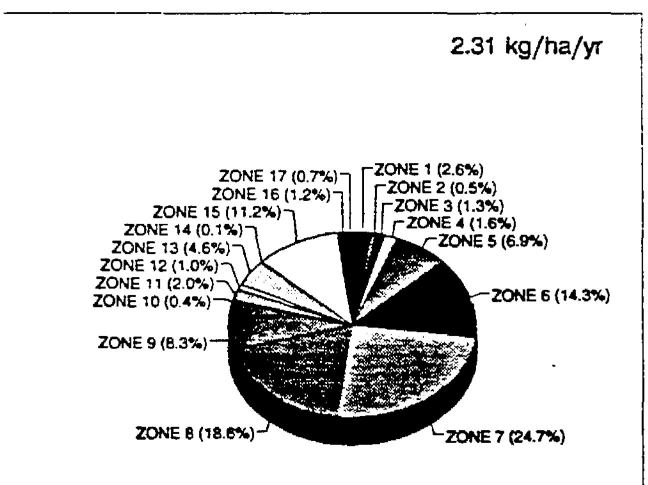
Pasadena



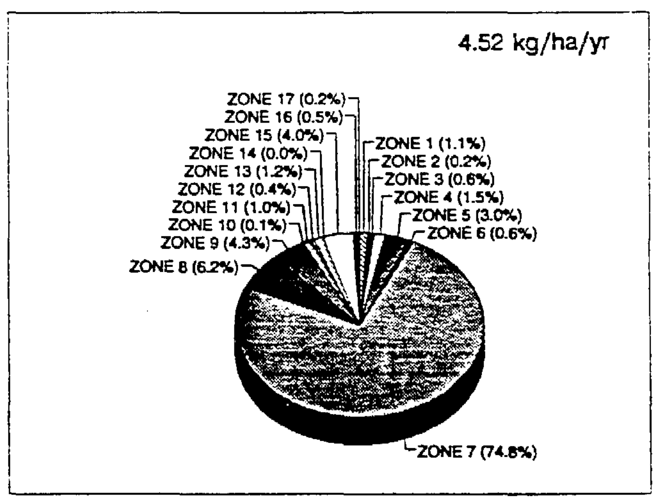
Santa Barbara



Sacramento



Yosemite



San Jose

FIGURE B-20: Contribution (%) of the 17 source regions to total nitrogen (NO_x + nitrates) dry deposition at various receptor sites during the composite summer season.