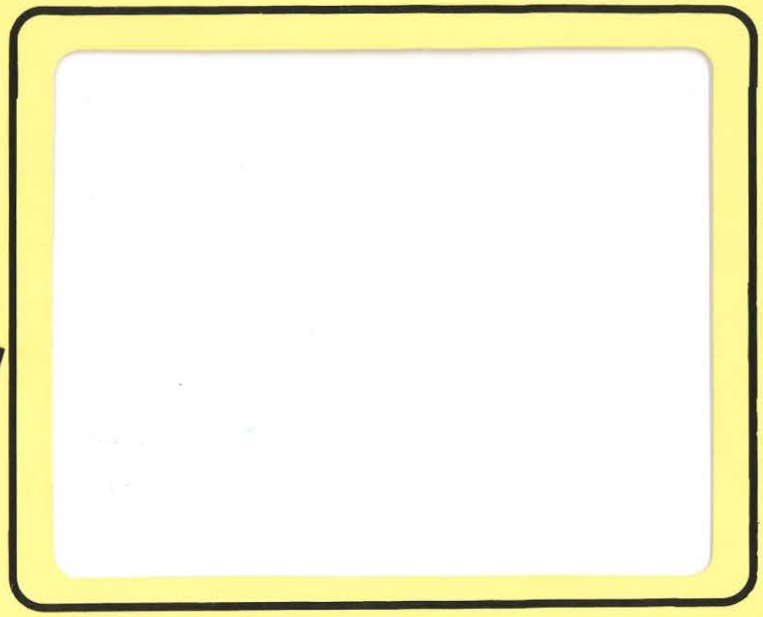


IOWA DEPARTMENT OF ENVIRONMENTAL QUALITY

AIR QUALITY MANAGEMENT DIVISION

DRAFT

THE AIR QUALITY DISPLAY MODEL ANALYSIS FOR SUSPENDED PARTICULATES IN THE QUAD CITIES, IOWA-ILLINOIS

August 1, 1978

The
Air Quality Display Model
Analysis
for the Quad Cities, Iowa-Illinois

Report on
Methods, Procedures, and Results

Prepared by the
Air and Land Quality Division
of the Iowa Department of Environmental Quality

August, 1978

Abstract

The Iowa Department of Environmental Quality (DEQ) is currently examining possible revisions of the State Implementation Plan. These air pollution control srategy revisions are being evaluated so that the National Ambient Air Quality Standards can eventually be attained and maintained in all parts of Iowa as required by the Clean Air Act Amendments of 1977. To accomplish this, it is necessary to analyze current air quality attainment problems.

To examine these current air quality attainment problems, a dispersion model is used. The dispersion model is a computer program that predicts what the ambient air quality will be at a certain point within an air basin. The Air Quality Display Model (AQDM) is the major tool DEQ used to model each air basin. AQDM is a computer model that combines point source emissions (industrial plants), area source emissions (residential heating, fugitive dust, solid waste disposal, transportation, etc.) and meteorological factors (wind speed, wind direction, average temperature, pressure, and mixing height) over a specified area to predict the annual distribution of pollutants for that area. From the results obtained by using AQDM, a reliable estimation of source contribution is found.

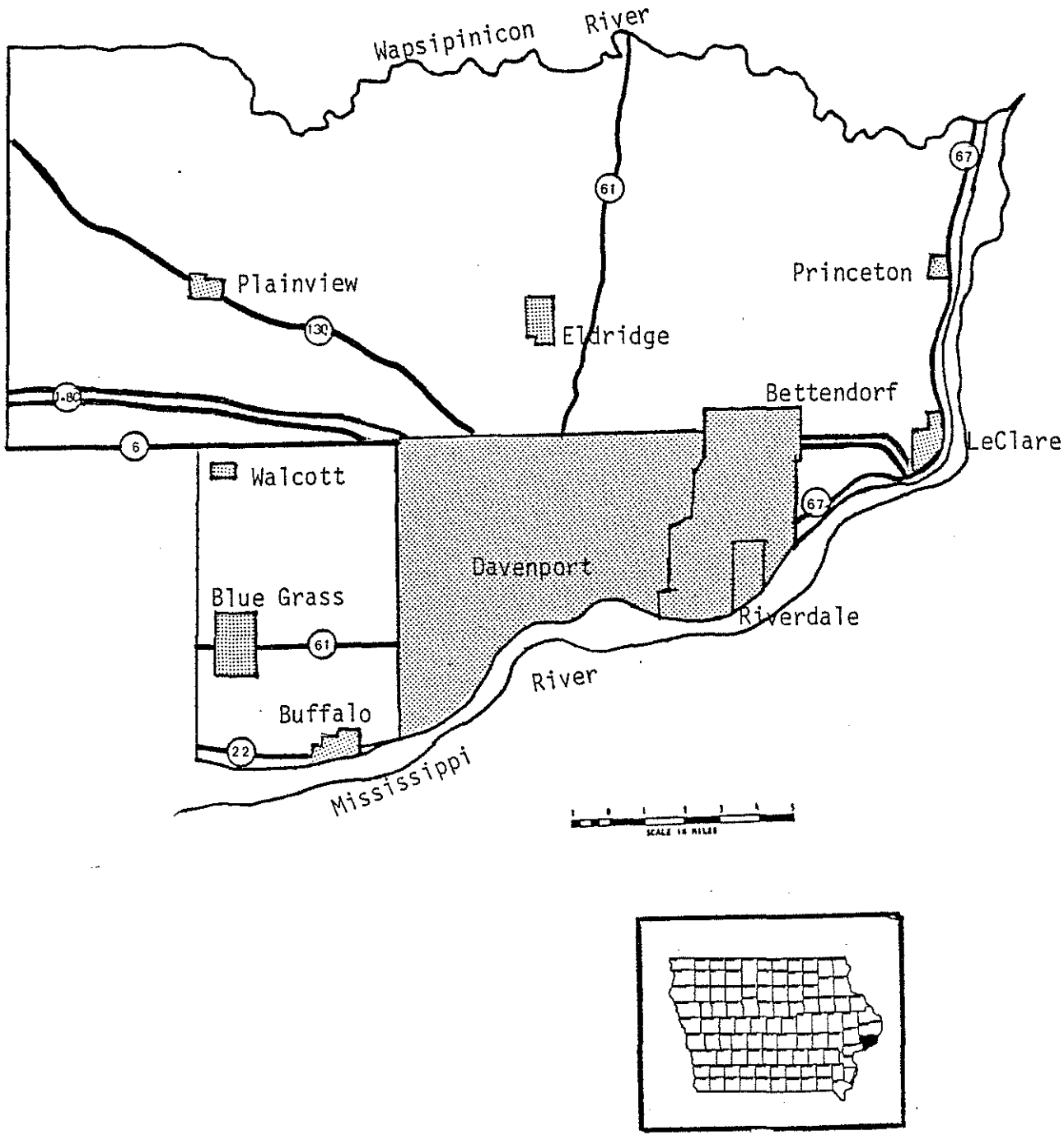
TABLE OF CONTENTS

County Statistics

The Iowa portion of the Quad Cities is located in Scott County. Scott County borders the Mississippi River on the east and south and the Wapsipinicon River on the north. The gently rolling terrain of the county ends abruptly at the Mississippi River forming a line of bluffs as the eastern and southern border. Davenport is the largest city in the Iowa portion of the Quad Cities, Bettendorf is the second largest city. (See Figure 1) The 1970 population for Davenport was 98,469; for Bettendorf, 24,290; for Scott County, 142,687, and for the Quad Cities metropolitan area 362,638. the major industrial processes in Quad Cities are cement manufacturing, farm and industrial machinery manufacturing, aluminum fabrication, cast metal production, grain processing, handling and transferring, rock and gravel mining and processing, meat processing, scrap metal processing and electricity generation. Major sources of fugitive dust and fugitive emissions include construction, agricultural tilling, roads (both paved and unpaved), grain transferring, cement manufacturing, scrap metal processing, and rock and gravel mining and processing.

Scott County is situated in a temperate climate in the middle of a large land mass. The area is largely influenced by presssure systems moving in a general west-east direction. The winds are dominant from the west to northwest and east to southeast, except for the area of Scott County in the Mississippi River valley which may have winds channelled in directions paralleling the river. The mean annual temperature is 51 degrees Farenheit, the mean annual precipitation is 34 inches. Neutral atmospheric stability is dominant for the area, with slightly unstable and stable conditions occurring less frequently.

Figure 1
Illustration of Scott County
and Location in Iowa



Background

Because of large-scale natural suspended particulate emissions (such as volcanoes and dust storms) and large-scale man-made suspended particulate sources (such as agricultural activiites) which cannot be accurately modeled, a natural background estimate must be developed for Iowa to include in any modeling.

To develop a numerical value for background, extensive monitoring of an isolated rural area must be conducted. The background of suspended particulates in Iowa was estimated from monitoring conducted from 1959 to 1965 at Backbone State Park in northeast Iowa. This site appears to be the most isolated area monitored in the State and is located away from any localized agricultural and urban sources. However, because of the large amount of agricultural activity in the State, an additional contribution from soil erosion, tilling, and travel on unpaved surfaces is inevitable and thus a true background measurement not influenced by any man-made sources is unlikely. Therefore the background recorded at Backbone State Park is expected to include not only a natural worldwide background but a local and statewide background. To estimate the contribution of all sources to the background site, a study of rural sources was conducted.

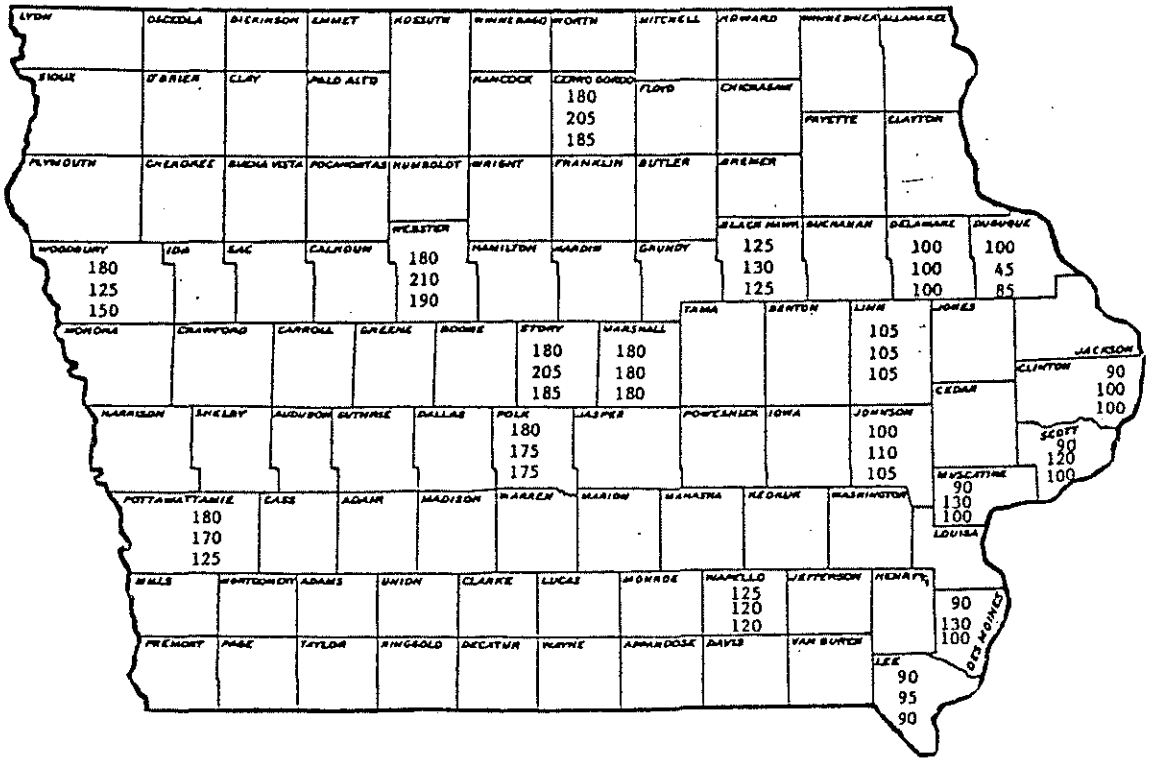
The background figure monitored at Backbone State Park averaged 44 micrograms per cubic meter annual arithmetic mean. An estimated breakdown of sources accounting for this monitored value is shown in Table 1 below.

TABLE 1

Source Contributions to the Recorded
Background level at Backbone State Park
(Values shown are in micrograms per cubic meter [ug/m^3])

Worldwide Concentration	15 ug/m^3
Continental Concentration	10 ug/m^3
Unpaved Roads	6 ug/m^3
Agriculture (soil erosion)	13 ug/m^3
Total Background	44 ug/m^3

Figure 2
Agricultural Index For Selected
Counties in Iowa



100 The first number represents the climatic factor for the county using the Federal Soil Conservation's climatic factors for Iowa. Deleware County is the reference county and has been given a value of 100. Numbers greater than 100 represent drier conditions while numbers less than 100 represent wetter conditions.

100 The second number represents the proportion of tilled land in soybeans or row crops. Deleware County is the reference county and has been given a value of 100. A county registering 200 would have twice the amount of land in soybeans or row crops.

100 The third number represents the agricultural index for the county. Deleware County is the reference county and has been given a value of 100. This index was based on the climatic factor, proportion of tilled land, and county size. Numbers greater than 100 represent areas of more severe wind erosion than Deleware County while numbers less than 100 represent areas of less severe soil erosion.

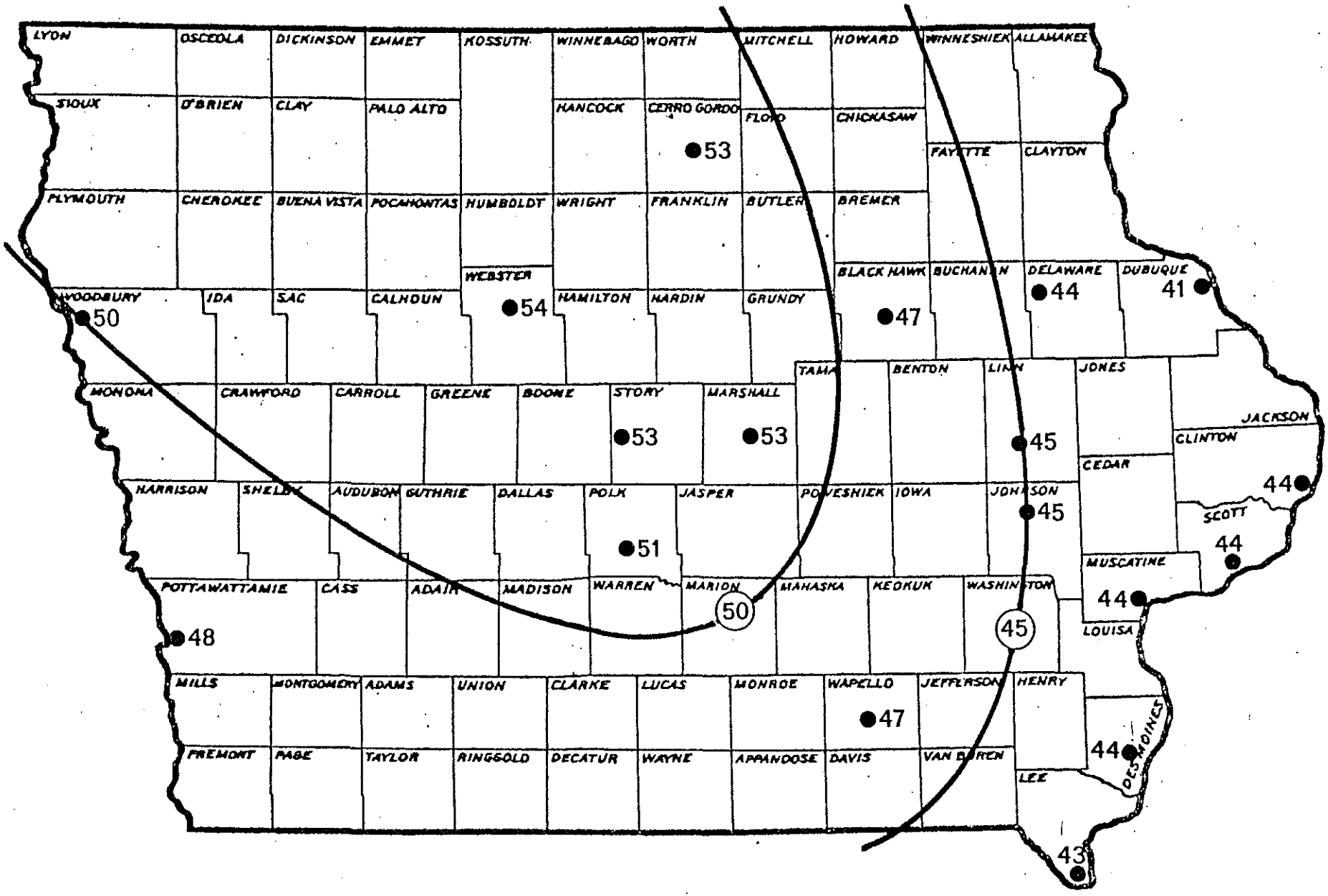


Figure 3
Estimations of Rural Background levels in Iowa
(Values shown are arithmetic means in micrograms per cubic meter)

The worldwide and continental values were obtained from studies conducted by GCA Corporation for DEQ[1]. This natural background that is not influenced by man is approximately 25 ug/m^3. The unpaved road estimate of 6 ug/m^3 was established by computer modeling of all rural unpaved roads in a five county area. The remaining 13 ug/m^3 was assumed to be from agricultural processes such as tilling and soil erosion.

Since the contribution from agricultural processes could easily be larger or smaller in other areas of the state depending on the farming practices, an investigation of these farming practices throughout the state was conducted. By comparing climatic factors, soil types, crops planted, and tilling frequencies in other areas of the state with the area around Backbone State Park, an index of soil erodibility was developed as shown in Figure 2. Using this index to increase or decrease the contribution of agricultural sources, an estimation of background throughout the State has been developed as shown in Figure 3.

Air Monitoring

The most accurate measurement of suspended particulate levels in an area is obtained by monitoring the air. Air quality data for suspended particulate are obtained using the high volume sampler. The sampler draws a known quantity of ambient air through a preweighed glass fiber filter for a twenty-four-hour period once every six days. After each twenty-four-hour period the sample filter is sent to the laboratory where it is weighed again. The weight difference measured in micrograms is the amount of particulate. Combined with the volume of air that passed through the filter during the twenty-four-hour period, the sampling results are calculated and recorded as the average micrograms of particulate matter per cubic meter of air for a twenty-four-hour period. The State of Iowa operates five suspended particulate monitors in the Iowa portion of the

Quad Cities. These monitors are located at: (1) Iowa-Illinois Gas and Elecric Company, Third and Pershing; (2) Central Fire Station, 331 Scott Street; (3) Monroe School, 1946 West Fourth Street; (4) Iowa Highway Patrol Station, 3200 Elmore Drive; and (5) Pleasant Valley School, Belmont Road, Riverdale. The State of Illinois operates six suspended particulate monitors in the Illinois portion of the Quad Cities. These monitors are located at: (6) Rock Island City Hall, 1528 Third Avenue; (7) Rock Island High School, 1400 - 25th Avenue, (8) Moline City Hall, 619 - 16th Avenue; (9) Moline High School, 3600 - 23rd Avenue, (10) East Moline City Hall, 915 - 16th Avenue; and (11) Milan, 125 West Second Avenue. All monitoring locations are shown in Figure 4. The monitored values at these sites are shown in Table 2. An asterik after the year indicates insufficient data for that year to calculate a valid annual mean.

The National Ambient Air Quality Standards were developed in 1971 as a guide to determining air quality problems thoughout the United States. The standards for suspended particulates were developed for a twenty-four-hour and annual time period. These time periods were also divided into two categories: primary, to protect the public's health; and secondary to protect the public's welfare. The national twenty-four-hour primary standard, not to be exceeded more than once per year, is 265 micrograms per cubic meter; the secondary standard is 150 micrograms per cubic meter. The primary annual standard not to be exceeded is 75 micrograms per cubic meter as an annual geometric mean; the secondary standard is 60 micrograms per cubic meter as an annual geometric mean.

The air monitoring data are an essential tool in calibrating the computer model. The annual means that are predicted by the model are correlated with the monitor-

TABLE 2

Air monitoring data for Quad Cities

Location	Year	Number of Samples	Maximum 24-Hour Value	2nd Max. 24-Hour Value	Arithmetic Mean	Geometric Mean	Standard Geometric Deviation
1. IA-IL Gas & Electric	1975	54	225	182	91	85	1.49
	1976	60	268	265	104	93	1.60
	1977	61	223	140	73	68	1.48
2. Central Fire Station	1975*	35	207	198	94	84	1.64
	1976	53	264	173	86	77	1.57
	1977	53	220	163	87	80	1.48
3. Monroe School	1975	59	151	136	67	61	1.59
	1976	61	249	160	77	68	1.67
	1977	61	252	158	79	72	1.54
4. IA Hiway Patrol Station	1975	56	166	166	66	58	1.61
	1976	59	1040	934	139	95	2.19
	1977	55	1017	832	239	148	2.83
Note: An unpaved access road was built adjacent to this monitoring site in 1976 elevating particulate levels.							
5. Pleasant Valley School	1975	60	150	106	54	48	1.61
	1976	56	277	176	72	63	1.69
	1977	58	146	143	68	61	1.57
6. Rock Island City Hall	1975	50	191	130	77	68	1.66
	1976	52	228	198	79	70	1.65
	1977	32	171	168	81	74	1.52
7. Rock Island High School	1975	56	143	130	70	61	1.68
	1976	58	129	116	67	61	1.53
	1977	50	200	117	63	58	1.52
8. Moline City Hall	1975	61	239	226	90	80	1.62
	1976	54	260	182	88	81	1.49
	1977	56	330	191	71	64	1.58

* These years do not have a sufficient number of samples to calculate a valid annual mean.

TABLE 2 (Continued)

Air monitoring data for Quad Cities

Location	Year	Number of Samples	Maximum 24-Hour Value	2nd Max. 24-Hour Value	Arithmetic Mean	Geometric Mean	Standard Geometric Deviation
9. Moline High School	1975	58	182	156	61	52	1.75
	1976	56	159	111	60	54	1.58
	1977	54	131	126	58	53	1.51
10. East Moline	1975	61	212	164	90	82	1.53
	1976	56	187	128	84	79	1.44
	1977	59	249	178	87	79	1.56
11. Milan	1975	58	246	236	110	99	1.59
	1976	58	203	165	96	90	1.45
	1977	55	300	169	95	86	1.57

ing data to estimate the accuracy of the projections. Large variances between the monitored values and the projections indicates poor correlation and revisions to the model inputs must be made. Small variances indicate good correlation and correct model inputs.

The Model (Annual Average Estimation)

A dispersion model is a compter program that predicts what the ambient air quality will be at a certain point within an air basin. The Air Quality Display Model (AQDM)[2] is the model DEQ used in each air basin. AQDM is a computer model that combines point source emissions (industrial plants), area source emissions (residential heating, fugitive dust, solid waste disposal, transportation, etc.) and meteorological factors (wind speed, wind direction, average temperature, average pressure, and mixing height) over a specified area to predict the annual distribution of pollutants for that area. The annual parti-

culate concentrations predicted by the model for each year are plotted as isopleths over the air basin. Five designated receptors are also broken down into specific source contribution percentages.

The computer algorithm and the program inputs reflect several assumptions. Assumptions used in the computer algorithm are:

(a) Total reflection of the pollutant plume takes place at the earth's surface.

(b) Conditions describing the plume are averaged over a time period of several minutes.

(c) All effluent gases and particulates have diameters less than 20 microns and have neutral buoyancy in the atmosphere. Zero fallout is assumed.

(d) The plume exhibits a Gaussian concentration distribution and the spread in both directions is considered to be a function of downwind distance and atmospheric stability only.

(e) The plume is a steady-state phenomenon resulting from a constant, continuous emission.

Assumptions used in the program input are:

(a) Point source data from plant emission inventory forms, from stack tests, and from permit information are accurate and complete.

(b) Sources not reporting stack parameters were given parameters of similar sources (this was true in interstate air basins where other states occasionally were not able to provide stack parameters).

(c) Area source data from the National Emissions Data System (NEDS) are accurate and complete.

(d) Population distribution and area source emissions are directly related.

(e) Fugitive emissions from paved and unpaved roads are accurately calculated.

Source of Suspended Particulates (Point)

All point sources in the Iowa portion of the Quad Cities were acquired from DEQ's current emission inventory. Stack emissions, diameters, emission velocities and temperatures were taken from values supplied by the plant operators on emission inventory forms, permit applications, or stack tests performed at the plant. Emissions for the modeled year were taken from the 1975 emission inventory and updated by permit applications, compliance schedules, or stack tests. All plant emission controls were assumed to be working the entire year unless breakdown or maintenance reports were submitted to the Department. The emissions during periods of emission control device breakdown or maintenance were added to the plant totals. All industrial point source estimates calculated were verified by the appropriate plant officials. Fugitive dust point sources were given plume heights of 6.0 meters. All source emsissions were calculated in tons per year and divided by 365 days to obtain the necessary model input of tons per day. No consideration was given to seasonal operation or weekend shutdowns.

Point sources in the Illinois portion of the Quad Cities were acquired from the Illinois Environmental Protection Agency. Stack emissions, diameters, emission velocities and temperatures were obtained from field evaluations by regional engineers. All emissions from Illinois reflect actual operating conditions in 1975. Fugitive dust point sources were given plume heights of 3.0 or 6.0 meters depending on the process. All source emissions were reported in grams per second, therefore the conversion to tons per day was conducted by the Iowa staff.

Sources of Suspended Particulates (Area)

Residential Emissions

Total residential emissions for fuel use in Scott County were taken from the National Emissions Data System (NEDS) estimates of area source emissions supplied by EPA. Rock Island County residential emissions were obtained from the Illinois EPA. Solid waste emissions were calculated using an estimated tonage of solid waste and an appropriate emission factor. The residential emissions were distributed by housing population calculated from the census projections prepared by Bi-State Metropolitan Planning Commission.[3]

The Scott and Rock Island housing populations were broken down into designated area sources in the model region as shown in Figure 5. Area housing populations were divided by the total county housing population and multiplied by the county emission totals to obtain area emissions for residential fuel use and solid waste.

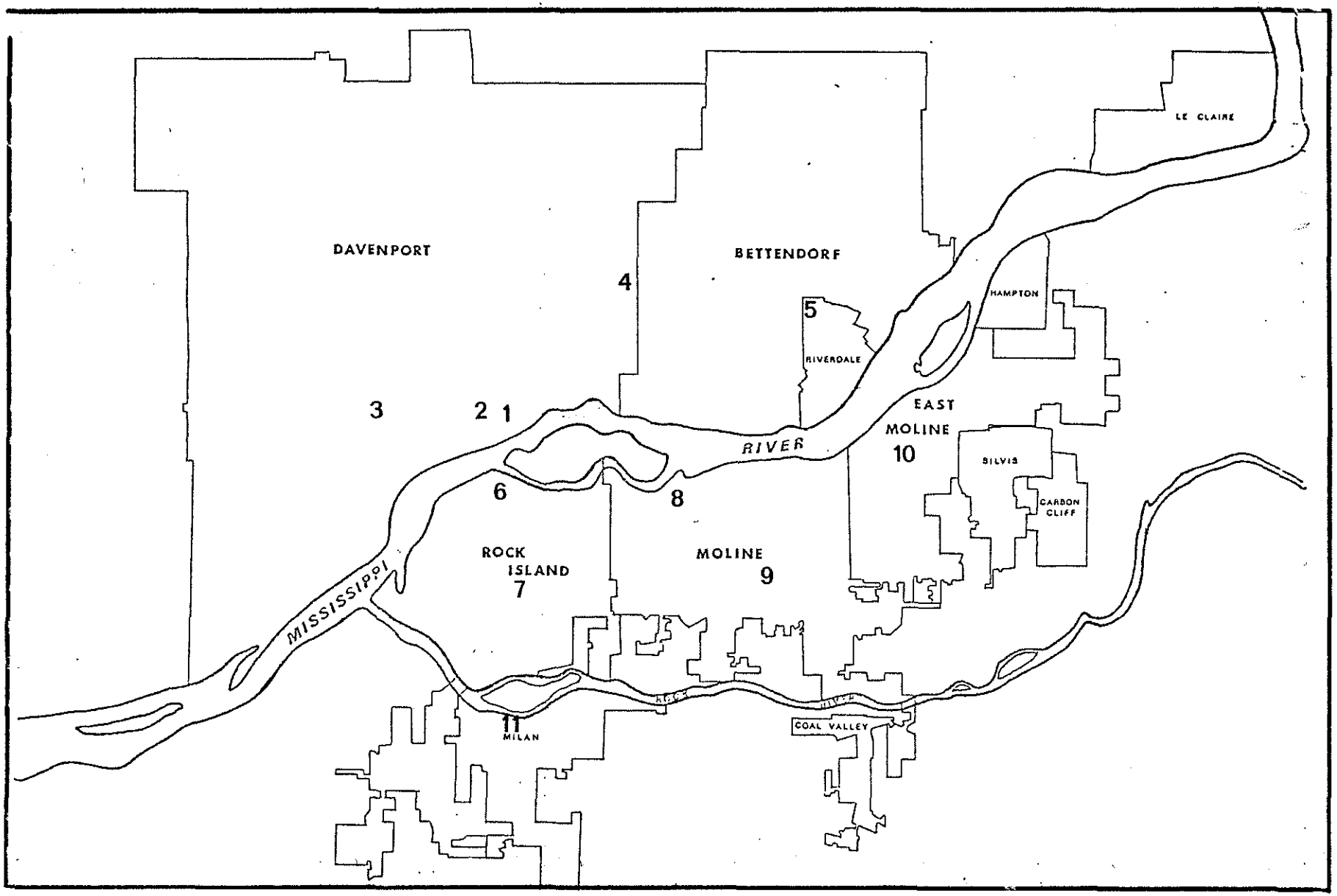
All housing emissions were assumed to be uniform for the county. Total particulate emissions for the modeled year were:

	Scott County	Rock Island County
Residential Fuel	63 tons per year	60 tons per year
Residential Solid Waste	415 tons per year	434 tons per year

Commercial-Institutional Emissions

Total commercial-institutional emissions for fuel use and solid waste disposal in Scott County were taken from the NEDS data supplied by EPA. Commercial-institutional emissions for Rock Island County were supplied by the Illinois EPA.

Figure 4 Location of Suspended Particulate Air Monitoring Equipment in the Quad Cities



1 Ia-Ill Gas & Electric
2 Central Fire Station
3 Monroe School
4 Ia Highway Patrol Station
5 Pleasant Valley School
6 Rock Island City Hall
7 Rock Island High School
8 Moline City Hall
9 Moline High School
10 East Moline City Hall
11 Milan

Ninety percent of the county emissions was assumed to be in the major urban center, while ten percent was assumed to be in the smaller cities.

All commercial-institutional building emissions were assumed to be uniform for the county. Total particulate emissions for the modeled year were:

	Scott County	Rock Island County
Commercial-Institutional Fuel	182 tons per year	65 tons per year
Commercial-Institutional Solid Waste	100 tons per year	0 tons per year

Transportation-Motor Vehicle

Total emissions from transportation sources, excluding fugitive emissions, were taken from the NEDS data supplied by EPA and emissions data from the Illinois EPA. Emissions from major highway line sources and rural paved and unpaved roads were individually calculated.

Major access street and highway line source emissions were calculated by multiplying the emission factor for vehicles (0.66 grams per vehicle mile)[4] by the product of the length of the road segment and the traffic flow count. Each line source emission was assigned to the appropriate designated area and was assumed to disperse equally over the area. All car and truck emissions were assumed to be approximately the same. After all major access highway emissions were calculated, the total line source emissions assigned to each area was subtracted from the county totals and distributed by the population proportion in each area.

Fugitive dust from vehicle travel on paved and unpaved roads was calculated from emission factors found in two recent reports.[5,6] Fugitive dust from unpaved roads was calculated by multiplying the emission factor (1179 grams per vehicle mile) by the product of the length of the road segment and the traffic flow

count. Thirty percent of these emissions was assumed to actually become suspended. Paved road emissions were also calculated by multiplying the emission factor (11 grams per vehicle mile) by the product of the length of the road segment and the traffic flow count. These emission factors were derived from an emission formula that combines conditions of the road, vehicle speeds, and climatological factors to obtain grams of particulate per vehicle mile. Emissions from each road segment are assumed to disperse equally over the designated areas. Thirty percent of these emissions was assumed to actually become suspended.

Total estimated particulate emissions for the modeled year were:

	Scott County	Rock Island County
Vehicles	662 tons per year	836 tons per year
Fugitive (paved roads)	11000 tons per year	13900 tons per year
Fugitive (unpaved roads)	14800 tons per year	21712 tons per year

Transportation - Railroads

Total railroad fuel use emissions for railroads in Scott County were taken from the NEDS data supplied by EPA. Railroad emissions for Rock Island County were supplied by Illinois EPA. Approximate track mileage was estimated for each designated area. Emissions were distributed by the proportion of track miles in each area.

Transportation - Off Highway

Off highway transportation was considered to be any fuel burning machine not operated on a road (i.e., farm tractor, lawnmowers, motorized boats, etc.). Because of the difficulty in estimating the concentration of off-highway transportation, it was assumed that the NEDS emissions were distributed equally over the entire county. A similar distribution was used on the Illinois EPA emission in Rock Island County.

Transportation - Aircraft

The Quad Cities Airport emissions were distributd as four square kilometer area source. Emissions were based on values supplies by the Illinois EPA. Aircraft emissions for the Mount Joy airport north of Davenport were obtained from NEDS and included in area source 99 (See Figure 5).

A listing of area sources and total emissions used in the model is given in Appendix A.

Model Meteorology Parameters

To accurately model the suspended particulate emission sources, detailed meterological parameters are necessary.

Meteorological wind data consists of five stability classes and sixteen wind directions. These data were available for the Quad Cities Airport in Moline, and were obtained from the National Oceanic and Atmospheric Administration.

Other necessary meteorological parameters that were obtained for the Quad Cities are shown below:

Average daily mixing depth:	1180 meters
Average ambient temperature	284 degrees Kelvin (11 degrees Celsius)
Average ambient pressure	994 millibars

Results

A grid of 15 kilometers by 15 kilometers was set up around the Quad Cities metropolitan area with receptors placed at two kilometer intervals as shown in

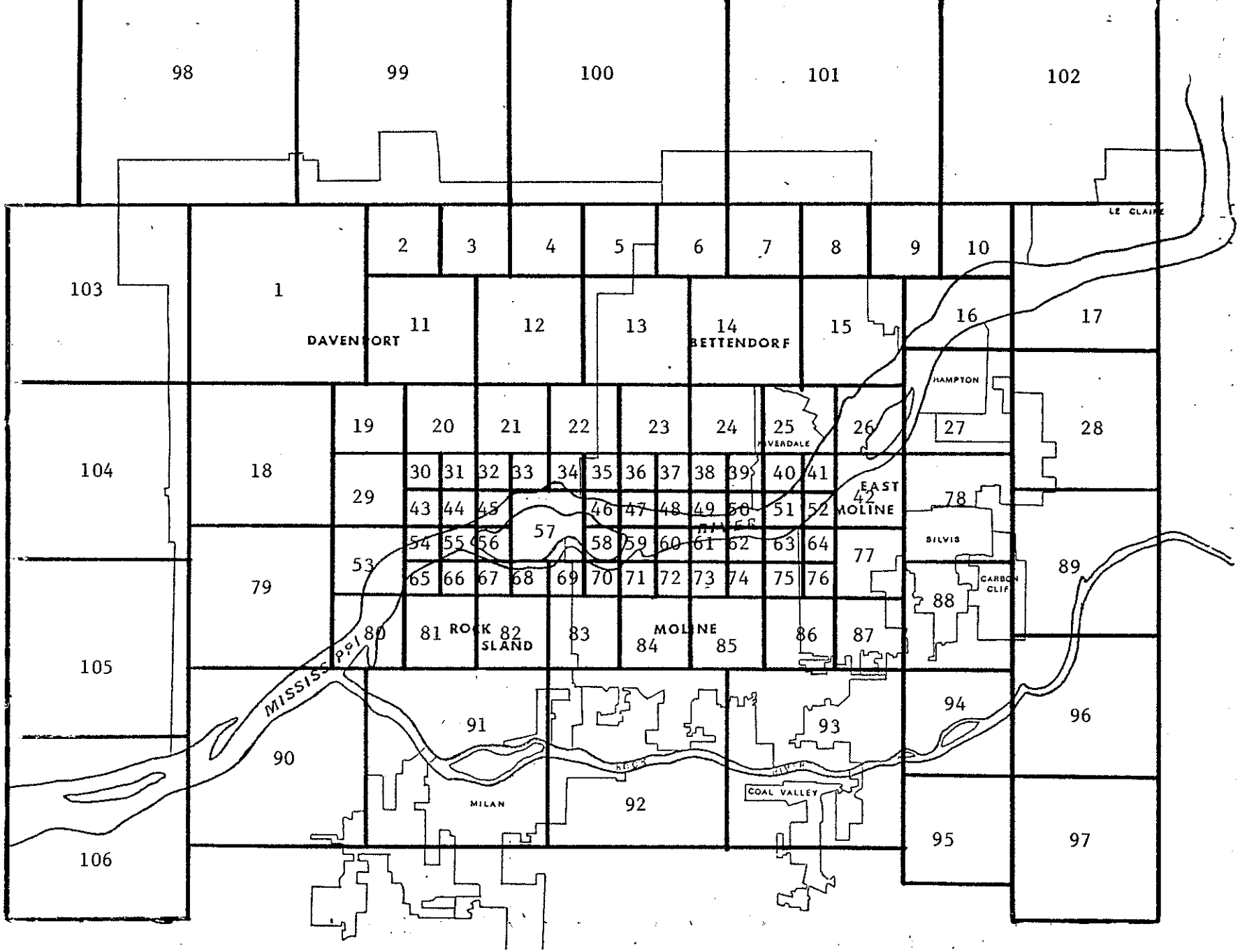


Figure 5 Area Source Grid Pattern
for the Quad Cities Area

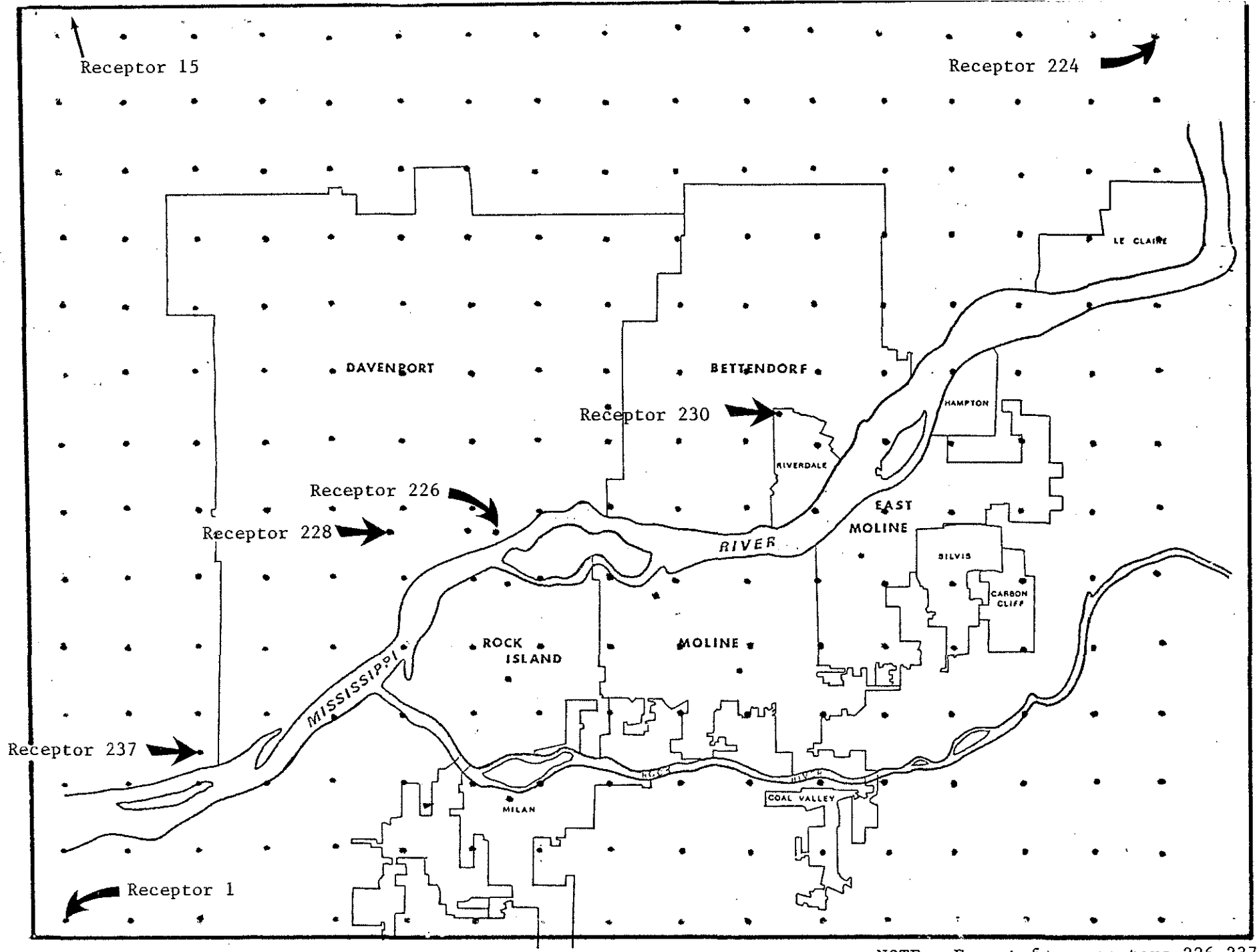
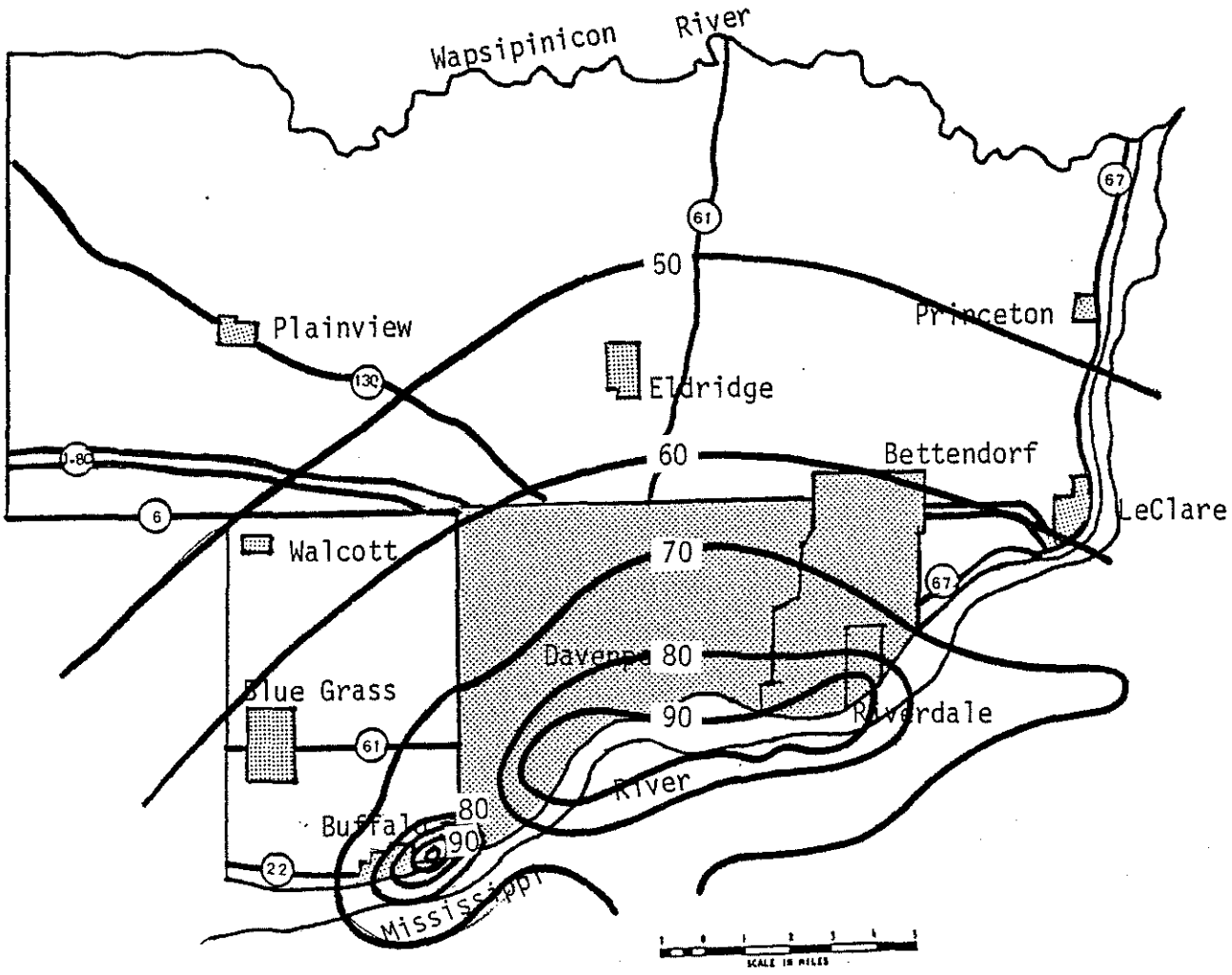


Figure 6
Receptor Locations for the Quad Cities
AQDM Model

NOTE: Except for receptors 226-237, grid numbering runs bottom to top and left to right. The top row of receptors is not shown in this figure.

Figure 7
Scott County
1977 Suspended Particulate Isopleth Map
(values shown are arithmetic means in micrograms per cubic meter)



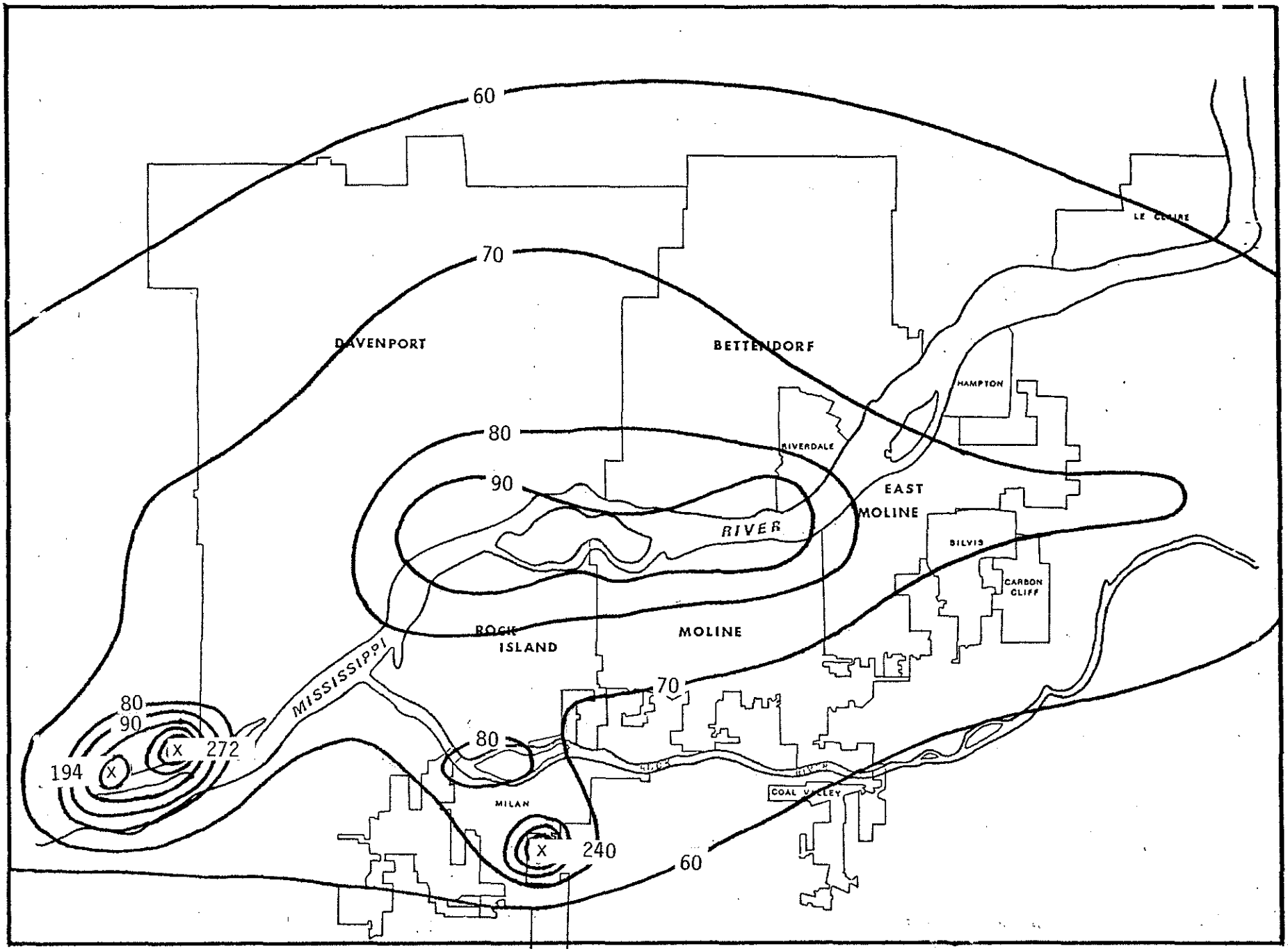


Figure 8
Suspended Particulate Isopleth Map
For the Quad Cities
(values shown are arithmetic means in micrograms per cubic meter)

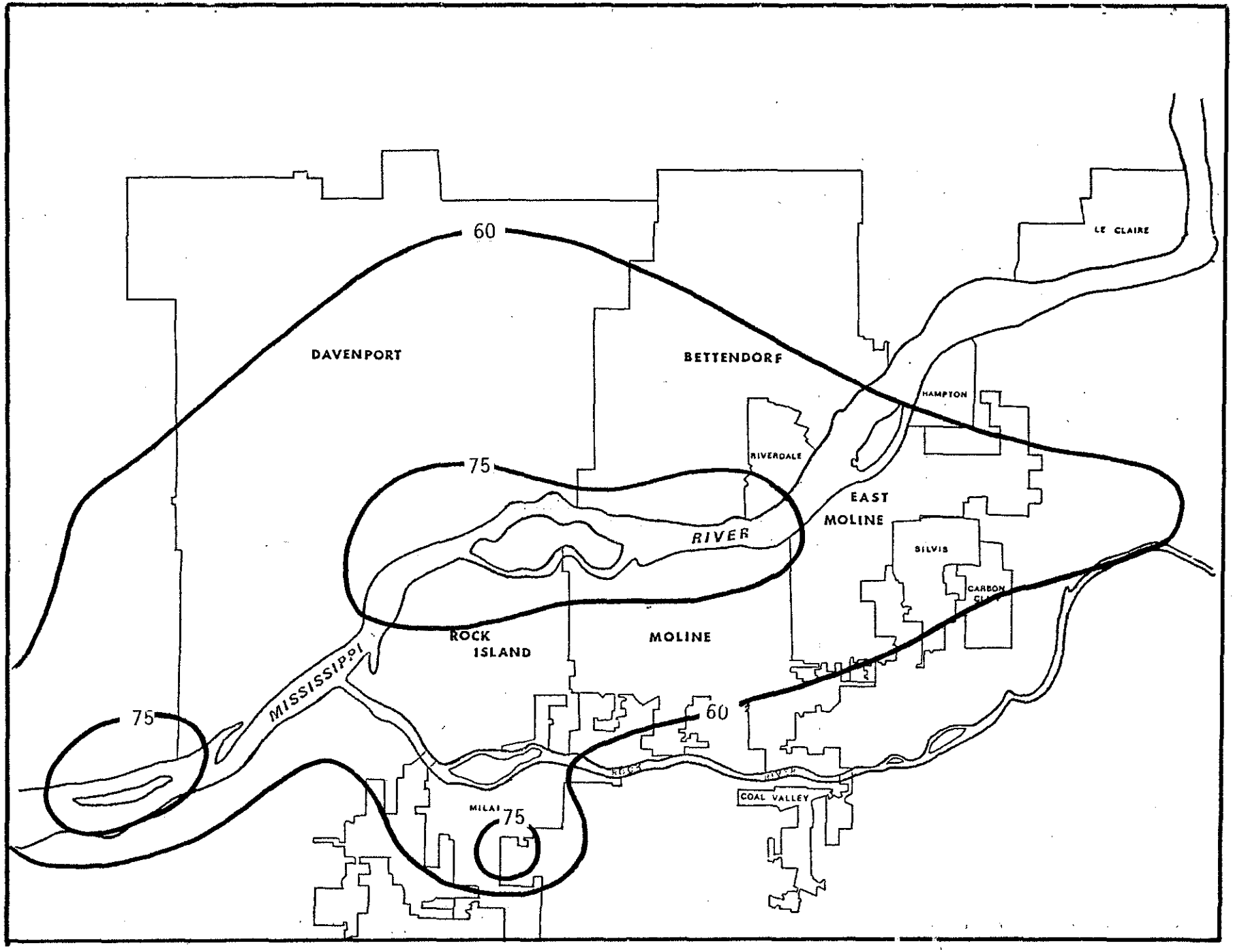


Figure 9

Suspended Particulate Isopleth Map
for the Quad Cities
(values shown are geometric means in micrograms per cubic meter)

TABLE 3
Source Contributions to Five
Selected Receptors
(values shown are in micrograms per cubic meter)

Source	Receptor 226 Third and Pershing	Receptor 228 Monroe School	Receptor 230 Pleasant Valley School	Receptor 237 Buffalo Area	Receptor 15 Scott County
Point Sources					
Catepiller Tractor	0.0	0.0	0.0	0.0	0.0
Iowa-Illinois Gas & Electric	0.0	0.0	0.0	0.0	0.0
Aluminum Company of America	0.0	0.0	0.1	0.0	0.0
Sivyer Steel Casting	0.2	0.1	0.2	0.0	0.0
J. I. Case	0.3	0.2	0.3	0.1	0.0
Kelsey Hayes Company	0.6	0.1	0.0	0.0	0.0
Oscar Mayer & Company	0.4	0.2	0.0	0.0	0.0
Frank Foundry	0.6	3.2	0.1	0.0	0.0
Nichols-Homeshield	0.7	1.0	0.1	0.0	0.0
Ralston Purina	1.4	3.0	0.2	0.0	0.0
Alloy Metal Products	0.2	0.9	0.0	0.0	0.0
Black Hawk Foundry	0.3	1.0	0.1	0.0	0.0
Mississippi River Grain Elevator	0.2	0.2	0.1	17.5	0.1
Pillsbury, Elevator 1	0.4	0.4	0.2	110.6	0.1
Pillsbury, Elevator 2	0.3	2.7	0.6	0.0	0.0

TABLE 3 (Continued)
Source Contributions to Five
Selected Receptors
(values shown are in micrograms per cubic meter)

Source	Receptor 226 Third and Pershing	Receptor 228 Monroe School	Receptor 230 Pleasant Valley School	Receptor 237 Buffalo Area	Receptor 15 Scott County
Point Sources					
Linwood Stone Products	1.6	1.6	0.9	66.0	0.5
Martin Marietta Cement	1.2	1.4	0.7	20.0	0.6
Dundee Cement	0.1	0.0	0.0	0.0	0.0
Moline Generating	0.0	0.0	0.0	0.0	0.0
International Harvester (E. Moline)	0.0	0.0	0.0	0.0	0.0
John Deere Harvester	0.0	0.0	0.0	0.0	0.0
John Deere (E. Moline)	0.4	0.3	0.4	0.1	0.1
John Deere Planter Works	0.2	0.1	0.1	0.0	0.0
Moline Consumers Co.	0.1	0.1	0.1	0.0	0.0
Consumers Ready Mix	0.0	0.0	0.0	0.0	0.0
International Harvester (Rock Island)	0.1	0.1	0.0	0.0	0.0
J. I. Case Co. (Rock Island)	0.0	0.0	0.0	0.0	0.0
Swords Veneer and Lumber	0.0	0.0	0.0	0.0	0.0

Figure 6. Twelve additional receptors located throughout the county were also included in the total receptor count. Eleven of the twelve additional receptors were particulate monitoring site locations.

Expected concentrations at each receptor are given in Appendix B. Graphical displays of these results are illustrated in Figure 7 for Scott County and Figure 8 for the Quad Cities metropolitan area. Each line represents an isopleth of suspended particulate concentration as an annual arithmetic mean. The highest concentration expected was 272 micrograms per cubic meter at receptor 237. Figure 9 illustrates the AQDM results as geometric means which can be compared with the national standards.

To estimate the impact of each source on a receptor, a special audit was requested for receptors 15, 226, 228, 230, and 237. Results for each source are given in Appendix B and a summary is shown in Table 3.

To estimate the accuracy of the modeling results, a comparison of expected concentrations and monitoring data is nececssary. This comparison is shown in Table 4. Monitoring stations 1-9 are all calculated greater than the observed values. Variances range from 13 to 16 micrograms per cubic meter at the central business districts in Davenport, Rock Island and Moline and at the residential sites in Rock Island and Moline. This large area of consistently higher calculated values than actual observed values suggests an overestimation of area source such as transportation emissions. The general isopleth pattern, however, appears to be accurate even though the magnitude is fifteen to twenty percent high. The residential areas of Davenport and Bettendorf also are calculated higher than observed values, but the magnitude is much lower than in the central

TABLE 4

Comparison of Air Monitoring Data
with Projected Concentrations

Monitor Location	1977 Arithmetic Mean	Projected Concentration
1. Iowa-Illinois Gas and Electric Co.	85*	93
2. Central Fire Station	87	100
3. Monroe School	79	96
4. Iowa Highway Patrol Station	68*	75
5. Pleasant Valley School	68	72
6. Rock Island City Hall	81	94
7. Rock Island High School	63	77
8. Moline City Hall	71	87
9. Moline High School	58	72
10. East Moline City Hall	87	78
11. Milan	95	73

* Represents monitoring data from a previous year because of invalidation of the 1977 monitoring data for this location.

business districts. This area ranges from four to six micrograms per cubic meter higher than the observed values. Again, this consistent overcalculation suggests improper area source inputs.

The two monitoring sites that do not follow the pattern of overcalculating area emissions are East Moline and Milan. The calculated values at these two sites are smaller than the actual observed values. The site at Milan appears to be influenced by fugitive emissions from the rock crushing operations or by fugitive emissions created as a result of these operations. These fugitive emissions appear to contribute more particulate to the area than the model projects. The high value at the monitor in East Moline currently cannot be explained.

Although the calculated concentrations are not exactly the same as the actual monitored values, the projected concentrations represent averages that have been subjected to many necessary assumptions. Therefore, these projections should be used more as a guideline on locating and interpreting high concentration areas than as an exact calculation of suspended particulate levels at each receptor.

An estimated breakdown of the annual suspended particulate concentrations by source types using this model is shown in Table 5 for receptors located at Monroe School, Pleasant Valley School and in rural Scott County. A graphical display of the estimated contributions by various suspended particulate source types is shown in Figure 10.

The largest sources of particulates shown in Table 5, aside from background, are transportation sources and industrial sources. The transportation sources appear to be the largest contributor not only at the sites listed in Table 5, but also at most of the other monitoring sites. The fugitive dust gen-

TABLE 5

Breakdown of Annual Suspended Particulate Concentration for Three Selected Sites in Scott County

Sources of Particulate	Expected Concentrations (ug/m^3)		
	Monroe School	Pleasant Valley School	Scott County
Point Sources (Industrial Process)	16.4	5.2	1.6
Area Sources			
Fuel use (Residential and Commercial)	1.2	1.7	0.0
Solid Waste Disposal (Open Burning)	5.3	3.5	0.0
Transportation			
Exhaust, Tire Wear	3.0	1.3	0.2
Fugitive Dust from Paved Roads	24.6	11.8	1.3
Fugitive Dust from Unpaved Roads	1.4	2.8	6.3
Miscellaneous (structural fire, construction)	0.1	1.5	0.0
Background	44.0	44.0	44.0
TOTAL	96.0	71.8	53.4

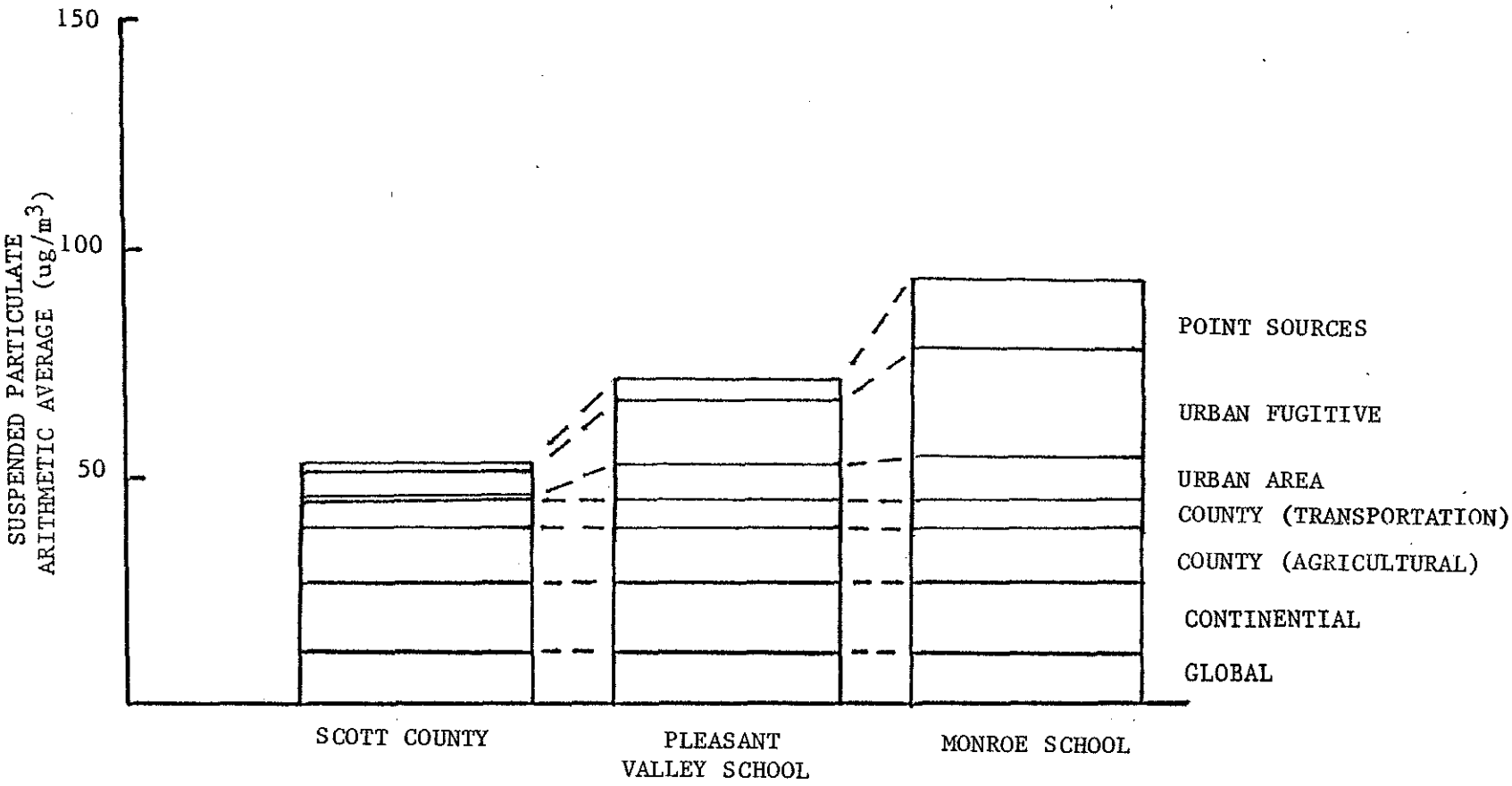


Figure 10. Estimated contributions of various suspended particulate source types

erated by the transportation sources are calculated to contribute from fifteen percent of the total projected concentration at the rural Scott County site to nearly thirty percent at the Monroe School monitoring site. The particulate emissions from the transportation source itself (i.e., from engine exhaust and tire wear) accounts for less than three percent of the total projected concentration. The fugitive dust emissions from paved roads are calculated to be extremely high throughout the Quad Cities area and may be largely resonsible for the overestimation of particulate concentration in this area. A reduction in the emission factor for paved road emissions would make the comparison between the calculated values and the monitoring values closer. However, the particulate contribution from paved roads would still be significantly large even if the estimated emissions were reduced by fifty percent.

The industrial point sources in the Quad Cities contribute from five to twenty percent of the total particulate concentrations except for an area southwest of Davenport near Buffalo and an area in Milan. Both of these areas are calculated to have a large industrial contribution above background. The area near Buffalo is affected by three sources, Pillsbury Elevator, Linwood Stone Products, and Martin Marietta Cement Company. These sources are calculated to contribute over seventy percent of the particulate concentrations in this area. A large part of the particulate concentration is expected to be produced from fugitive sources. These fugitive sources consist of grain handling at Pillsbury and rock conveying and handling at Linwood Stone and Martin Marietta Cement. These sources, however, show only a small impact on the Quad Cities metropolitan area. The other area of high particulate concentrations is located near Milan and appears to be caused by Allied Stone Products.

An additional contribution of three to five micrograms per cubic meter is calculated from solid waste disposal throughout the metropolitan area. This

concentration is unusually high primarily because of the large amount of commercial solid waste emissions reported in the NEDS data for Iowa.

Summary

The AQDM results for the Quad Cities indicate a large area of high particulate potential. This area encompasses most of the river front area of Iowa and Illinois. Another area of high particulate potential is located southwest of Davenport near Buffalo.

Most of the high particuate concentrations, above background, calculated for this area are expected to be caused by fugitive dust generated from transportation sources. Travel on both paved and unpaved areas accounts for nearly thirty percent of the annual particulate concentrations.

Industrial point sources contribute from five to twenty percent of the total annual concentration in most areas of Scott County. Only two areas, one near Buffalo, Iowa and one near Milan, Illinois, have a larger industrial contribution.

The monitoring values for 1977 for the Quad Cities support the general pattern of annual concentrations shown by the model. Most sites, however, are calculated higher than the actual monitored value, indicating more of an area source input error than a point source input error. These errors range from fifteen to twenty percent in the central business district to five to ten percent in the residential areas.

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5. Amick, R. S., Axetell, K., and Wells, D. M., "Fugitive Dust Emissions Inventory Techniques", Presented at the 67th Annual APCA meeting, #74-58, Page 7.

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APPENDIX A

QUAD CITIES SOURCES AND
CORRESPONDING SOURCE NUMBERS USED
IN THE AQDM PROGRAM

SOURCE NUMBER	SOURCE
Iowa Sources	
1	Catepillar Tractor Company
2-4	Iowa-Illinois Gas and Electric Company
5-8	Aluminum Company of America
9-11	Sivyer Steel Corporation
12-13	J.I. Case Company
14	Kelsey Hayes Company
15-16	Oscar Mayer and Company
17-19	Frank Foundry Corporation
20-24	Nichols-Homeshield, Inc.
25-36	Ralston Purina Company
37-38	Alloy Metal Products
39-41	Blackhawk Foundry
42-44	Mississippi River Grain Elevator
45-47	Pillsbury Company, Elevator 1
48	Pillsbury Company, Elevator 2
49-54,101	Linwood Stone Products
55-62, 102	Martin Marietta Cement
Illinois Sources	
63	Dundee Cement
64-65	Moline Generating
66-68	International Harvester (East Moline)
69	John Deere Harvester
70-73	John Deere (East Moline)
74-76	John Deere Planter Works
77	Moline Consumers Company
78	Consumers Ready Mix Company
79-82	International Harvester (Rock Island)
83	J.I. Case Company
84-87	Rock Island Arsenal
88-89	Swords Veneer and Lumber
90	Collison Stone Company
91	Anderson & Mandel Grain
92-94	Frank Foundries Machine Division
95-96	Rodman Industries
97	Rock Island Ready Mix
98	Ametek Inc.
99	Wisconsin Barge Line Inc.
100	Allied Stone Products
103	Quad Cities Airport
104-206	Area Sources

SOURCE DATA

SOURCE NUMBER	SOURCE LOCATION (KILOMETERS) HORIZONTAL	VERTICAL	SOURCE AREA SQUARE KILOMETERS	ANNUAL SOURCE EMISSION RATE (TONS/DAY) SO2	PART	STACK DATA HT (M)	DIAM (M)	VEL (M/SEC)	TEMP (DEG.K)
1	702.5	4609.4	0.0	0.0	0.012	13.4	1.2	15.2	533.
2	713.0	4601.6	0.0	0.0	0.040	43.9	2.6	8.5	462.
3	713.0	4601.6	0.0	0.0	0.070	43.9	2.6	9.1	463.
4	713.0	4601.6	0.0	0.0	0.760	105.5	4.1	23.8	420.
5	712.2	4601.2	0.0	0.0	0.066	21.3	1.4	11.6	450.
6	712.3	4601.3	0.0	0.0	0.094	30.5	2.5	5.2	477.
7	711.8	4601.1	0.0	0.0	0.006	16.5	1.5	5.2	450.
8	711.9	4601.0	0.0	0.0	0.063	6.1	1.2	10.1	1366.
9	709.8	4599.7	0.0	0.0	0.020	12.2	2.7	5.6	330.
10	709.8	4599.7	0.0	0.0	0.028	9.1	0.0	0.0	300.
11	709.8	4599.7	0.0	0.0	0.107	12.0	0.0	0.0	300.
12	708.6	4599.5	0.0	0.0	0.650	18.8	1.5	14.5	455.
13	708.6	4599.5	0.0	0.0	0.046	15.0	1.0	5.0	294.
14	703.1	4599.3	0.0	0.0	0.016	9.1	0.5	5.0	500.
15	700.9	4599.1	0.0	0.0	0.630	42.0	1.6	12.2	462.
16	700.9	4599.1	0.0	0.0	0.009	19.4	0.9	16.4	311.
17	700.1	4599.1	0.0	0.0	0.050	13.0	1.4	1.1	335.
18	700.1	4599.1	0.0	0.0	0.043	20.0	0.8	0.8	305.
19	700.1	4599.1	0.0	0.0	0.041	15.0	0.0	0.0	300.
20	700.1	4598.6	0.0	0.0	0.072	10.7	0.9	51.9	338.
21	700.1	4598.6	0.0	0.0	0.021	10.7	1.0	5.0	294.
22	700.1	4598.6	0.0	0.0	0.041	10.7	0.0	0.0	294.
23	700.1	4598.6	0.0	0.0	0.014	10.7	0.9	1.7	1077.
24	700.1	4598.6	0.0	0.0	0.057	10.7	0.9	2.5	1077.
25	699.8	4598.6	0.0	0.0	0.463	39.0	1.6	6.1	477.
26	699.8	4598.6	0.0	0.0	0.016	29.3	1.4	4.3	436.
27	699.8	4598.6	0.0	0.0	0.057	6.0	0.0	0.0	294.
28	699.8	4598.6	0.0	0.0	0.029	72.7	0.5	0.0	294.
29	699.8	4598.6	0.0	0.0	0.122	36.4	0.5	0.0	294.
30	699.8	4598.6	0.0	0.0	0.060	47.9	1.0	11.8	373.
31	699.8	4598.6	0.0	0.0	0.016	47.9	0.5	0.0	294.
32	699.8	4598.6	0.0	0.0	0.015	36.4	0.5	0.0	294.
33	699.8	4598.6	0.0	0.0	0.019	47.9	1.0	18.8	373.
34	699.8	4598.6	0.0	0.0	0.008	47.9	1.4	10.7	373.
35	699.8	4598.6	0.0	0.0	0.016	37.3	0.5	0.0	294.
36	699.8	4598.6	0.0	0.0	0.018	36.4	0.5	0.0	294.
37	699.6	4598.3	0.0	0.0	0.011	12.2	1.4	10.4	322.
38	699.6	4598.3	0.0	0.0	0.055	12.0	0.0	0.0	300.
39	698.5	4598.6	0.0	0.0	0.110	20.7	1.1	12.8	354.
40	698.5	4598.6	0.0	0.0	0.019	20.0	1.0	5.0	300.
41	698.5	4598.6	0.0	0.0	0.054	15.0	0.0	0.0	300.
42	694.8	4592.8	0.0	0.0	0.061	6.0	1.0	5.0	294.
43	694.8	4592.8	0.0	0.0	0.178	6.0	0.0	0.0	294.
44	694.8	4592.6	0.0	0.0	0.230	6.0	0.0	0.0	294.
45	694.3	4592.7	0.0	0.0	0.076	6.0	0.0	0.0	294.
46	694.3	4592.6	0.0	0.0	0.162	6.0	0.0	0.0	294.
47	694.3	4592.8	0.0	0.0	0.345	6.0	0.0	0.0	294.
48	700.0	4599.0	0.0	0.0	0.076	6.0	0.0	0.0	294.
49	693.0	4593.0	0.0	0.0	0.520	0.0	1.4	5.8	297.
50	693.3	4592.5	0.0	0.0	0.011	6.1	1.5	5.2	413.
51	693.3	4592.4	0.0	0.0	0.075	6.0	0.0	0.0	294.
52	693.3	4592.5	0.0	0.0	0.273	6.0	0.0	0.0	294.
53	693.6	4592.4	0.0	0.0	0.068	6.0	0.0	0.0	294.
54	693.3	4592.5	0.0	0.0	0.136	20.0	0.0	0.0	294.
55	692.7	4591.9	0.0	0.0	1.200	29.2	2.1	22.5	422.
56	692.7	4591.9	0.0	0.0	0.022	17.0	1.7	20.5	380.
57	692.7	4592.0	0.0	0.0	0.043	10.0	0.0	0.0	294.
58	692.7	4592.0	0.0	0.0	0.017	33.5	0.0	0.0	294.
59	692.7	4592.4	0.0	0.0	0.075	6.0	0.0	0.0	294.
60	692.6	4592.1	0.0	0.0	0.294	10.0	0.0	0.0	294.
61	692.7	4592.0	0.0	0.0	0.342	10.0	0.0	0.0	294.
62	692.6	4592.1	0.0	0.0	0.250	6.0	0.0	0.0	294.
63	701.0	4597.5	0.0	0.0	0.020	18.3	0.5	21.6	294.
64	706.0	4598.2	0.0	0.0	0.017	30.8	1.8	15.1	430.
65	706.0	4598.2	0.0	0.0	0.028	7.7	3.2	28.8	821.
66	712.8	4600.0	0.0	0.0	0.010	29.0	0.8	266.2	589.
67	712.4	4599.6	0.0	0.0	0.044	11.3	0.3	7.8	294.
68	712.6	4599.4	0.0	0.0	0.010	8.2	0.2	7.9	294.
69	714.0	4599.9	0.0	0.0	0.019	25.0	1.5	10.0	350.
70	715.3	4599.5	0.0	0.0	0.156	10.4	1.7	21.6	339.
71	715.3	4599.5	0.0	0.0	0.069	10.7	1.5	10.3	305.
72	715.3	4599.5	0.0	0.0	0.304	19.8	1.2	15.4	300.
73	715.3	4599.5	0.0	0.0	0.047	19.8	0.2	18.2	300.
74	705.7	4598.0	0.0	0.0	0.075	13.1	1.4	11.1	294.
75	705.7	4598.0	0.0	0.0	0.015	25.9	1.2	3.6	294.
76	705.7	4598.0	0.0	0.0	0.011	6.1	0.6	4.9	294.
77	717.4	4599.6	0.0	0.0	0.132	3.0	0.0	0.0	294.
78	708.4	4598.5	0.0	0.0	0.026	6.0	0.0	0.0	294.
79	704.5	4598.3	0.0	0.0	0.010	12.2	2.0	18.4	294.
80	704.5	4598.3	0.0	0.0	0.033	26.2	2.0	13.5	588.
81	704.5	4598.3	0.0	0.0	0.049	26.2	1.7	10.6	588.
82	704.5	4598.3	0.0	0.0	0.049	12.8	1.4	21.2	294.
83	701.0	4597.5	0.0	0.0	0.022	18.3	1.5	9.7	683.
84	705.2	4599.0	0.0	0.0	0.150	36.6	1.5	11.3	561.
85	705.2	4599.0	0.0	0.0	0.154	36.6	1.8	11.0	558.
86	705.2	4599.0	0.0	0.0	0.447	36.6	1.8	17.1	558.
87	705.2	4599.0	0.0	0.0	0.201	36.6	1.8	16.4	550.
88	701.3	4594.0	0.0	0.0	0.013	17.4	0.8	3.5	439.
89	701.3	4594.0	0.0	0.0	0.035	6.0	0.0	0.0	294.
90	704.2	4590.0	0.0	0.0	0.310	3.0	0.0	0.0	294.

91	701.9	4590.5	0.0	0.0	0.112	6.0	0.0	0.0	294.
92	707.8	4598.5	0.0	0.0	0.038	30.8	0.7	51.7	347.
93	707.8	4598.5	0.0	0.0	0.010	9.8	0.3	46.5	311.
94	707.8	4598.5	0.0	0.0	0.006	9.1	1.0	14.8	294.
95	703.2	4597.9	0.0	0.0	0.074	16.8	1.6	18.5	294.
96	703.2	4597.9	0.0	0.0	0.010	16.8	1.6	9.8	294.
97	711.3	4598.5	0.0	0.0	0.312	13.7	2.2	5.0	294.
98	701.9	4592.7	0.0	0.0	0.023	6.0	0.0	0.0	294.
99	700.5	4596.8	0.0	0.0	0.456	0.0	0.0	0.0	294.
100	702.9	4592.4	0.25	0.0	1.362	3.0	0.0	0.0	0.
101	693.3	4592.4	0.15	0.0	1.369	0.0	0.0	0.0	0.
102	692.3	4592.1	0.16	0.0	1.096	0.0	0.0	0.0	0.
103	707.0	4590.5	4.00	0.0	0.077	3.0	0.0	0.0	0.
104	695.0	4603.0	25.00	0.0	0.601	0.0	0.0	0.0	0.
105	700.0	4606.0	4.00	0.0	0.182	0.0	0.0	0.0	0.
106	702.0	4606.0	4.00	0.0	0.219	0.0	0.0	0.0	0.
107	704.0	4606.0	4.00	0.0	0.134	0.0	0.0	0.0	0.
108	706.0	4606.0	4.00	0.0	0.295	0.0	0.0	0.0	0.
109	708.0	4606.0	4.00	0.0	0.187	0.0	0.0	0.0	0.
110	710.0	4606.0	4.00	0.0	0.174	0.0	0.0	0.0	0.
111	712.0	4606.0	4.00	0.0	0.165	0.0	0.0	0.0	0.
112	714.0	4606.0	4.00	0.0	0.162	0.0	0.0	0.0	0.
113	716.0	4606.0	4.00	0.0	0.115	0.0	0.0	0.0	0.
114	700.0	4603.0	9.00	0.0	1.056	0.0	0.0	0.0	0.
115	703.0	4603.0	9.00	0.0	0.407	0.0	0.0	0.0	0.
116	706.0	4603.0	9.00	0.0	0.377	0.0	0.0	0.0	0.
117	709.0	4603.0	9.00	0.0	0.142	0.0	0.0	0.0	0.
118	712.0	4603.0	9.00	0.0	0.203	0.0	0.0	0.0	0.
119	715.0	4604.0	6.00	0.0	0.211	0.0	0.0	0.0	0.
120	718.0	4604.0	16.00	0.0	0.230	0.0	0.0	0.0	0.
121	695.0	4599.0	16.00	0.0	0.368	0.0	0.0	0.0	0.
122	699.0	4601.0	4.00	0.0	0.575	0.0	0.0	0.0	0.
123	701.0	4601.0	4.00	0.0	0.873	0.0	0.0	0.0	0.
124	703.0	4601.0	4.00	0.0	0.416	0.0	0.0	0.0	0.
125	705.0	4601.0	4.00	0.0	0.519	0.0	0.0	0.0	0.
126	707.0	4601.0	4.00	0.0	0.416	0.0	0.0	0.0	0.
127	709.0	4601.0	4.00	0.0	0.098	0.0	0.0	0.0	0.
128	711.0	4601.0	4.00	0.0	0.120	0.0	0.0	0.0	0.
129	713.0	4601.0	4.00	0.0	0.012	0.0	0.0	0.0	0.
130	715.0	4601.0	9.00	0.0	0.154	0.0	0.0	0.0	0.
131	718.0	4600.0	16.00	0.0	0.380	0.0	0.0	0.0	0.
132	699.0	4599.0	4.00	0.0	0.655	0.0	0.0	0.0	0.
133	701.0	4600.0	1.00	0.0	0.139	0.0	0.0	0.0	0.
134	702.0	4600.0	1.00	0.0	0.268	0.0	0.0	0.0	0.
135	703.0	4600.0	1.00	0.0	0.063	0.0	0.0	0.0	0.
136	704.0	4600.0	1.00	0.0	0.101	0.0	0.0	0.0	0.
137	705.0	4600.0	1.00	0.0	0.101	0.0	0.0	0.0	0.
138	706.0	4600.0	1.00	0.0	0.023	0.0	0.0	0.0	0.
139	707.0	4600.0	1.00	0.0	0.235	0.0	0.0	0.0	0.
140	708.0	4600.0	1.00	0.0	0.048	0.0	0.0	0.0	0.
141	709.0	4600.0	1.00	0.0	0.053	0.0	0.0	0.0	0.
142	710.0	4600.0	1.00	0.0	0.133	0.0	0.0	0.0	0.
143	711.0	4600.0	1.00	0.0	0.012	0.0	0.0	0.0	0.
144	713.0	4599.0	4.00	0.0	0.332	0.0	0.0	0.0	0.
145	701.0	4599.0	1.00	0.0	0.261	0.0	0.0	0.0	0.
146	702.0	4599.0	1.00	0.0	0.379	0.0	0.0	0.0	0.
147	703.0	4599.0	1.00	0.0	0.060	0.0	0.0	0.0	0.
148	706.0	4599.0	1.00	0.0	0.137	0.0	0.0	0.0	0.
149	707.0	4599.0	1.00	0.0	0.285	0.0	0.0	0.0	0.
150	708.0	4599.0	1.00	0.0	0.169	0.0	0.0	0.0	0.
151	709.0	4599.0	1.00	0.0	0.050	0.0	0.0	0.0	0.
152	710.0	4599.0	1.00	0.0	0.005	0.0	0.0	0.0	0.
153	699.0	4597.0	4.00	0.0	0.340	0.0	0.0	0.0	0.
154	701.0	4598.0	1.00	0.0	0.090	0.0	0.0	0.0	0.
155	702.0	4598.0	1.00	0.0	0.072	0.0	0.0	0.0	0.
156	703.0	4598.0	1.00	0.0	0.065	0.0	0.0	0.0	0.
157	704.0	4598.0	4.00	0.0	0.052	0.0	0.0	0.0	0.
158	706.0	4598.0	1.00	0.0	0.043	0.0	0.0	0.0	0.
159	707.0	4598.0	1.00	0.0	0.065	0.0	0.0	0.0	0.
160	708.0	4598.0	1.00	0.0	0.214	0.0	0.0	0.0	0.
161	709.0	4598.0	1.00	0.0	0.179	0.0	0.0	0.0	0.
162	710.0	4598.0	1.00	0.0	0.183	0.0	0.0	0.0	0.
163	711.0	4598.0	1.00	0.0	0.211	0.0	0.0	0.0	0.
164	712.0	4598.0	1.00	0.0	0.177	0.0	0.0	0.0	0.
165	701.0	4597.0	1.00	0.0	0.236	0.0	0.0	0.0	0.
166	702.0	4597.0	1.00	0.0	0.236	0.0	0.0	0.0	0.
167	703.0	4597.0	1.00	0.0	0.262	0.0	0.0	0.0	0.
168	704.0	4597.0	1.00	0.0	0.251	0.0	0.0	0.0	0.
169	705.0	4597.0	1.00	0.0	0.192	0.0	0.0	0.0	0.
170	706.0	4597.0	1.00	0.0	0.230	0.0	0.0	0.0	0.
171	707.0	4597.0	1.00	0.0	0.235	0.0	0.0	0.0	0.
172	708.0	4597.0	1.00	0.0	0.099	0.0	0.0	0.0	0.
173	709.0	4597.0	1.00	0.0	0.055	0.0	0.0	0.0	0.
174	710.0	4597.0	1.00	0.0	0.044	0.0	0.0	0.0	0.
175	711.0	4597.0	1.00	0.0	0.103	0.0	0.0	0.0	0.
176	712.0	4597.0	1.00	0.0	0.135	0.0	0.0	0.0	0.
177	713.0	4597.0	4.00	0.0	0.674	0.0	0.0	0.0	0.
178	715.0	4596.0	9.00	0.0	0.430	0.0	0.0	0.0	0.
179	695.0	4595.0	16.00	0.0	0.500	0.0	0.0	0.0	0.
180	699.0	4595.0	4.00	0.0	0.126	0.0	0.0	0.0	0.
181	701.0	4595.0	4.00	0.0	0.219	0.0	0.0	0.0	0.
182	703.0	4595.0	4.00	0.0	0.299	0.0	0.0	0.0	0.
183	705.0	4595.0	4.00	0.0	0.239	0.0	0.0	0.0	0.
184	707.0	4595.0	4.00	0.0	0.301	0.0	0.0	0.0	0.
185	709.0	4595.0	4.00	0.0	0.253	0.0	0.0	0.0	0.
186	711.0	4595.0	4.00	0.0	0.254	0.0	0.0	0.0	0.

187	713.0	4595.0	4.00	0.0	0.215	0.0	0.0	0.0	0.
188	715.0	4595.0	9.00	0.0	0.495	0.0	0.0	0.0	0.
189	718.0	4596.0	16.00	0.0	0.135	0.0	0.0	0.0	0.
190	695.0	4590.0	25.00	0.0	0.399	0.0	0.0	0.0	0.
191	700.0	4590.0	25.00	0.0	1.004	0.0	0.0	0.0	0.
192	705.0	4590.0	25.00	0.0	0.747	0.0	0.0	0.0	0.
193	710.0	4590.0	25.00	0.0	0.585	0.0	0.0	0.0	0.
194	715.0	4592.0	9.00	0.0	0.215	0.0	0.0	0.0	0.
195	718.0	4592.0	16.00	0.0	0.314	0.0	0.0	0.0	0.
196	715.0	4589.0	9.00	0.0	0.061	0.0	0.0	0.0	0.
197	718.0	4588.0	16.00	0.0	0.087	0.0	0.0	0.0	0.
198	692.0	4608.0	36.00	0.0	0.640	0.0	0.0	0.0	0.
199	698.0	4608.0	36.00	0.0	1.434	0.0	0.0	0.0	0.
200	704.0	4608.0	36.00	0.0	0.588	0.0	0.0	0.0	0.
201	710.0	4608.0	36.00	0.0	0.390	0.0	0.0	0.0	0.
202	716.0	4608.0	36.00	0.0	0.409	0.0	0.0	0.0	0.
203	690.0	4593.0	25.00	0.0	0.559	0.0	0.0	0.0	0.
204	690.0	4598.0	25.00	0.0	0.583	0.0	0.0	0.0	0.
205	690.0	4603.0	25.00	0.0	0.864	0.0	0.0	0.0	0.
206	690.0	4588.0	25.00	0.0	0.392	0.0	0.0	0.0	0.

APPENDIX B

QUAD CITIES, IOWA-ILLINOIS 1977 PARTICULATE JUNE 1978

RECEPTOR CONCENTRATION DATA

RECEPTOR NUMBER	RECEPTOR LOCATION (KILOMETERS) HORIZ	VERT	EXPECTED ARITHMETIC MEAN (MICROGRAMS/CU. METER) SO2	PARTICULATES
1	690.0	4586.0	0.	52.
2	690.0	4588.0	0.	55.
3	690.0	4590.0	0.	60.
4	690.0	4592.0	0.	77.
5	690.0	4594.0	0.	68.
6	690.0	4596.0	0.	66.
7	690.0	4598.0	0.	66.
8	690.0	4600.0	0.	65.
9	690.0	4602.0	0.	64.
10	690.0	4604.0	0.	62.
11	690.0	4606.0	0.	60.
12	690.0	4608.0	0.	58.
13	690.0	4610.0	0.	56.
14	690.0	4612.0	0.	55.
15	690.0	4614.0	0.	53.
16	692.0	4586.0	0.	53.
17	692.0	4588.0	0.	56.
18	692.0	4590.0	0.	61.
19	692.0	4592.0	0.	194.
20	692.0	4594.0	0.	78.
21	692.0	4596.0	0.	69.
22	692.0	4598.0	0.	70.
23	692.0	4600.0	0.	68.
24	692.0	4602.0	0.	66.
25	692.0	4604.0	0.	64.
26	692.0	4606.0	0.	61.
27	692.0	4608.0	0.	59.
28	692.0	4610.0	0.	57.
29	692.0	4612.0	0.	55.
30	692.0	4614.0	0.	54.
31	694.0	4586.0	0.	54.
32	694.0	4588.0	0.	57.
33	694.0	4590.0	0.	63.
34	694.0	4592.0	0.	120.
35	694.0	4594.0	0.	91.
36	694.0	4596.0	0.	73.
37	694.0	4598.0	0.	73.
38	694.0	4600.0	0.	71.
39	694.0	4602.0	0.	68.
40	694.0	4604.0	0.	65.
41	694.0	4606.0	0.	62.
42	694.0	4608.0	0.	60.
43	694.0	4610.0	0.	58.
44	694.0	4612.0	0.	56.
45	694.0	4614.0	0.	54.
46	696.0	4586.0	0.	53.
47	696.0	4588.0	0.	56.
48	696.0	4590.0	0.	61.
49	696.0	4592.0	0.	76.
50	696.0	4594.0	0.	80.
51	696.0	4596.0	0.	73.
52	696.0	4598.0	0.	75.
53	696.0	4600.0	0.	73.
54	696.0	4602.0	0.	69.
55	696.0	4604.0	0.	66.
56	696.0	4606.0	0.	63.
57	696.0	4608.0	0.	61.
58	696.0	4610.0	0.	59.
59	696.0	4612.0	0.	56.
60	696.0	4614.0	0.	55.
61	698.0	4586.0	0.	53.
62	698.0	4588.0	0.	56.
63	698.0	4590.0	0.	62.
64	698.0	4592.0	0.	69.
65	698.0	4594.0	0.	72.
66	698.0	4596.0	0.	75.
67	698.0	4598.0	0.	80.
68	698.0	4600.0	0.	77.
69	698.0	4602.0	0.	71.
70	698.0	4604.0	0.	66.
71	698.0	4606.0	0.	65.
72	698.0	4608.0	0.	62.
73	698.0	4610.0	0.	60.
74	698.0	4612.0	0.	57.
75	698.0	4614.0	0.	56.
76	700.0	4586.0	0.	53.
77	700.0	4588.0	0.	57.
78	700.0	4590.0	0.	63.
79	700.0	4592.0	0.	70.
80	700.0	4594.0	0.	72.

QUAD CITIES, IOWA-ILLINOIS 1977 PARTICULATE JUNE 1978

RECEPTOR CONCENTRATION DATA

RECEPTOR NUMBER	RECEPTOR LOCATION (KILOMETERS) HORIZ	VERT	EXPECTED ARITHMETIC MEAN (MICROGRAMS/CU. METER) SO2	PARTICULATES
81	700.0	4596.0	0.	79.
82	700.0	4598.0	0.	90.
83	700.0	4600.0	0.	89.
84	700.0	4602.0	0.	79.
85	700.0	4604.0	0.	72.
86	700.0	4606.0	0.	69.
87	700.0	4608.0	0.	64.
88	700.0	4610.0	0.	61.
89	700.0	4612.0	0.	58.
90	700.0	4614.0	0.	56.
91	702.0	4586.0	0.	54.
92	702.0	4588.0	0.	57.
93	702.0	4590.0	0.	67.
94	702.0	4592.0	0.	84.
95	702.0	4594.0	0.	74.
96	702.0	4596.0	0.	80.
97	702.0	4598.0	0.	95.
98	702.0	4600.0	0.	99.
99	702.0	4602.0	0.	79.
100	702.0	4604.0	0.	72.
101	702.0	4606.0	0.	70.
102	702.0	4608.0	0.	64.
103	702.0	4610.0	0.	61.
104	702.0	4612.0	0.	58.
105	702.0	4614.0	0.	57.
106	704.0	4586.0	0.	54.
107	704.0	4588.0	0.	57.
108	704.0	4590.0	0.	240.
109	704.0	4592.0	0.	79.
110	704.0	4594.0	0.	72.
111	704.0	4596.0	0.	78.
112	704.0	4598.0	0.	90.
113	704.0	4600.0	0.	90.
114	704.0	4602.0	0.	79.
115	704.0	4604.0	0.	72.
116	704.0	4606.0	0.	70.
117	704.0	4608.0	0.	65.
118	704.0	4610.0	0.	61.
119	704.0	4612.0	0.	59.
120	704.0	4614.0	0.	57.
121	706.0	4586.0	0.	53.
122	706.0	4588.0	0.	56.
123	706.0	4590.0	0.	62.
124	706.0	4592.0	0.	65.
125	706.0	4594.0	0.	69.
126	706.0	4596.0	0.	77.
127	706.0	4598.0	0.	92.
128	706.0	4600.0	0.	88.
129	706.0	4602.0	0.	79.
130	706.0	4604.0	0.	72.
131	706.0	4606.0	0.	71.
132	706.0	4608.0	0.	65.
133	706.0	4610.0	0.	61.
134	706.0	4612.0	0.	59.
135	706.0	4614.0	0.	57.
136	708.0	4586.0	0.	53.
137	708.0	4588.0	0.	55.
138	708.0	4590.0	0.	59.
139	708.0	4592.0	0.	63.
140	708.0	4594.0	0.	67.
141	708.0	4596.0	0.	75.
142	708.0	4598.0	0.	93.
143	708.0	4600.0	0.	89.
144	708.0	4602.0	0.	77.
145	708.0	4604.0	0.	71.
146	708.0	4606.0	0.	70.
147	708.0	4608.0	0.	65.
148	708.0	4610.0	0.	61.
149	708.0	4612.0	0.	59.
150	708.0	4614.0	0.	57.
151	710.0	4586.0	0.	53.
152	710.0	4588.0	0.	55.
153	710.0	4590.0	0.	58.
154	710.0	4592.0	0.	62.
155	710.0	4594.0	0.	65.
156	710.0	4596.0	0.	72.
157	710.0	4598.0	0.	90.
158	710.0	4600.0	0.	95.
159	710.0	4602.0	0.	75.
160	710.0	4604.0	0.	70.

RECEPTOR CONCENTRATION DATA

RECEPTOR NUMBER	RECEPTOR LOCATION (KILOMETERS) HORIZ	VERT	EXPECTED ARITHMETIC MEAN (MICROGRAMS/CU. METER) SO2	PARTICULATES
161	710.0	4606.0	0.	69.
162	710.0	4608.0	0.	64.
163	710.0	4610.0	0.	61.
164	710.0	4612.0	0.	59.
165	710.0	4614.0	0.	57.
166	712.0	4586.0	0.	52.
167	712.0	4588.0	0.	55.
168	712.0	4590.0	0.	58.
169	712.0	4592.0	0.	60.
170	712.0	4594.0	0.	64.
171	712.0	4596.0	0.	70.
172	712.0	4598.0	0.	86.
173	712.0	4600.0	0.	79.
174	712.0	4602.0	0.	73.
175	712.0	4604.0	0.	69.
176	712.0	4606.0	0.	68.
177	712.0	4608.0	0.	64.
178	712.0	4610.0	0.	61.
179	712.0	4612.0	0.	58.
180	712.0	4614.0	0.	57.
181	714.0	4586.0	0.	52.
182	714.0	4588.0	0.	54.
183	714.0	4590.0	0.	57.
184	714.0	4592.0	0.	59.
185	714.0	4594.0	0.	63.
186	714.0	4596.0	0.	68.
187	714.0	4598.0	0.	74.
188	714.0	4600.0	0.	74.
189	714.0	4602.0	0.	70.
190	714.0	4604.0	0.	68.
191	714.0	4606.0	0.	67.
192	714.0	4608.0	0.	63.
193	714.0	4610.0	0.	60.
194	714.0	4612.0	0.	58.
195	714.0	4614.0	0.	57.
196	716.0	4586.0	0.	52.
197	716.0	4588.0	0.	54.
198	716.0	4590.0	0.	56.
199	716.0	4592.0	0.	59.
200	716.0	4594.0	0.	62.
201	716.0	4596.0	0.	66.
202	716.0	4598.0	0.	69.
203	716.0	4600.0	0.	74.
204	716.0	4602.0	0.	68.
205	716.0	4604.0	0.	67.
206	716.0	4606.0	0.	66.
207	716.0	4608.0	0.	62.
208	716.0	4610.0	0.	60.
209	716.0	4612.0	0.	58.
210	716.0	4614.0	0.	56.
211	718.0	4586.0	0.	52.
212	718.0	4588.0	0.	53.
213	718.0	4590.0	0.	55.
214	718.0	4592.0	0.	58.
215	718.0	4594.0	0.	60.
216	718.0	4596.0	0.	63.
217	718.0	4598.0	0.	66.
218	718.0	4600.0	0.	73.
219	718.0	4602.0	0.	66.
220	718.0	4604.0	0.	64.
221	718.0	4606.0	0.	63.
222	718.0	4608.0	0.	61.
223	718.0	4610.0	0.	59.
224	718.0	4612.0	0.	57.
225	718.0	4614.0	0.	56.
226	702.7	4599.3	0.	93.
227	702.0	4599.4	0.	100.
228	699.7	4599.4	0.	96.
229	706.2	4603.2	0.	75.
230	710.9	4603.0	0.	72.
231	702.2	4597.8	0.	94.
232	702.4	4595.4	0.	77.
233	707.5	4597.6	0.	87.
234	709.8	4595.5	0.	72.
235	713.6	4598.9	0.	78.
236	702.2	4591.6	0.	73.
237	694.0	4592.8	0.	272.

QUAD CITIES SOURCES AND
CORRESPONDING SOURCE NUMBERS USED
IN THE AQDM PROGRAM

SOURCE NUMBER	SOURCE
Iowa Sources	
1	Catepillar Tractor Company
2-4	Iowa-Illinois Gas and Electric Company
5-8	Aluminum Company of America
9-11	Sivyer Steel Corporation
12-13	J.I. Case Company
14	Kelsey Hayes Company
15-16	Oscar Mayer and Company
17-19	Frank Foundry Corporation
20-24	Nichols-Homeshield, Inc.
25-36	Ralston Purina Company
37-38	Alloy Metal Products
39-41	Blackhawk Foundry
42-44	Mississippi River Grain Elevator
45-47	Pillsbury Company, Elevator 1
48	Pillsbury Company, Elevator 2
49-54,101	Linwood Stone Products
55-62, 102	Martin Marietta Cement
Illinois Sources	
63	Dundee Cement
64-65	Moline Generating
66-68	International Harvester (East Moline)
69	John Deere Harvester
70-73	John Deere (East Moline)
74-76	John Deere Planter Works
77	Moline Consumers Company
78	Consumers Ready Mix Company
79-82	International Harvester (Rock Island)
83	J.I. Case Company
84-87	Rock Island Arsenal
88-89	Swords Veneer and Lumber
90	Collison Stone Company
91	Anderson & Mandel Grain
92-94	Frank Foundries Machine Division
95-96	Rodman Industries
97	Rock Island Ready Mix
98	Ametek Inc.
99	Wisconsin Barge Line Inc.
100	Allied Stone Products
103	Quad Cities Airport
104-206	Area Sources

QUAD CITIES, IOWA-ILLINOIS 1977 PARTICULATE JUNE 1978

SOURCE CONTRIBUTIONS TO FIVE SELECTED RECEPTORS

ANNUAL PARTICULATES

MICROGRAMS PER CUBIC METER

SOURCE	RECEPTOR 226	RECEPTOR 228	RECEPTOR 230	RECEPTOR 237	RECEPTOR 15
1	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
	0.0017	0.0010	0.0018	0.0004	0.0010
2	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
	0.0018	0.0015	0.0033	0.0007	0.0005
3	0.00 %	0.00 %	0.01 %	0.00 %	0.00 %
	0.0031	0.0025	0.0054	0.0012	0.0008
4	0.01 %	0.01 %	0.00 %	0.00 %	0.01 %
	0.0059	0.0055	0.0034	0.0039	0.0027
5	0.01 %	0.01 %	0.05 %	0.00 %	0.00 %
	0.0121	0.0092	0.0365	0.0045	0.0025
6	0.02 %	0.01 %	0.04 %	0.00 %	0.01 %
	0.0161	0.0124	0.0323	0.0062	0.0035
7	0.00 %	0.00 %	0.01 %	0.00 %	0.00 %
	0.0022	0.0018	0.0063	0.0007	0.0005
8	0.01 %	0.01 %	0.05 %	0.00 %	0.00 %
	0.0120	0.0090	0.0383	0.0044	0.0024
9	0.01 %	0.01 %	0.03 %	0.00 %	0.00 %
	0.0112	0.0078	0.0196	0.0028	0.0015
10	0.05 %	0.03 %	0.06 %	0.00 %	0.01 %
	0.0438	0.0313	0.0456	0.0077	0.0055
11	0.18 %	0.12 %	0.24 %	0.01 %	0.04 %
	0.1672	0.1195	0.1740	0.0294	0.0209
12	0.22 %	0.14 %	0.40 %	0.02 %	0.05 %
	0.2072	0.1342	0.2904	0.0560	0.0254
13	0.10 %	0.06 %	0.09 %	0.00 %	0.02 %
	0.0901	0.0606	0.0674	0.0133	0.0089
14	0.62 %	0.06 %	0.02 %	0.00 %	0.01 %
	0.5806	0.0572	0.0162	0.0050	0.0032
15	0.36 %	0.15 %	0.07 %	0.01 %	0.03 %
	0.3354	0.1466	0.0470	0.0349	0.0172
16	0.05 %	0.05 %	0.01 %	0.00 %	0.00 %
	0.0424	0.0441	0.0073	0.0023	0.0018
17	0.23 %	0.84 %	0.05 %	0.00 %	0.02 %
	0.2168	0.8101	0.0382	0.0125	0.0101
18	0.21 %	1.02 %	0.05 %	0.00 %	0.02 %
	0.1915	0.9754	0.0328	0.0108	0.0087
19	0.20 %	1.47 %	0.04 %	0.00 %	0.02 %
	0.1874	1.4140	0.0313	0.0103	0.0083
20	0.12 %	0.12 %	0.03 %	0.00 %	0.01 %
	0.1139	0.1189	0.0215	0.0117	0.0065
21	0.10 %	0.20 %	0.02 %	0.00 %	0.01 %
	0.0932	0.1918	0.0161	0.0056	0.0041
22	0.20 %	0.46 %	0.04 %	0.00 %	0.01 %
	0.1866	0.4384	0.0315	0.0110	0.0080
23	0.06 %	0.08 %	0.01 %	0.00 %	0.01 %
	0.0535	0.0736	0.0108	0.0037	0.0027
24	0.22 %	0.27 %	0.06 %	0.01 %	0.02 %
	0.2010	0.2600	0.0437	0.0152	0.0111
25	0.36 %	0.43 %	0.07 %	0.02 %	0.05 %
	0.3354	0.4079	0.0520	0.0556	0.0262
26	0.03 %	0.06 %	0.01 %	0.00 %	0.00 %
	0.0250	0.0554	0.0046	0.0028	0.0015
27	0.23 %	1.47 %	0.06 %	0.01 %	0.02 %
	0.2143	1.4114	0.0417	0.0160	0.0111
28	0.09 %	0.05 %	0.03 %	0.00 %	0.01 %
	0.0863	0.0456	0.0203	0.0077	0.0054
29	0.47 %	1.45 %	0.12 %	0.01 %	0.04 %
	0.4342	1.3883	0.0891	0.0341	0.0237
30	0.09 %	0.08 %	0.02 %	0.00 %	0.01 %
	0.0850	0.0750	0.0170	0.0103	0.0055
31	0.06 %	0.11 %	0.02 %	0.00 %	0.01 %
	0.0548	0.1049	0.0117	0.0044	0.0031
32	0.06 %	0.18 %	0.02 %	0.00 %	0.01 %
	0.0534	0.1707	0.0110	0.0042	0.0029
33	0.02 %	0.02 %	0.00 %	0.00 %	0.00 %
	0.0140	0.0151	0.0022	0.0023	0.0011
34	0.01 %	0.01 %	0.00 %	0.00 %	0.00 %
	0.0057	0.0057	0.0009	0.0010	0.0005
35	0.06 %	0.18 %	0.02 %	0.00 %	0.01 %
	0.0568	0.1751	0.0117	0.0045	0.0031
36	0.07 %	0.21 %	0.02 %	0.00 %	0.01 %
	0.0641	0.2048	0.0132	0.0050	0.0035
37	0.02 %	0.08 %	0.00 %	0.00 %	0.00 %
	0.0154	0.0755	0.0032	0.0020	0.0010
38	0.18 %	0.86 %	0.06 %	0.01 %	0.02 %
	0.1694	0.8246	0.0406	0.0159	0.0104
39	0.13 %	0.31 %	0.04 %	0.01 %	0.02 %
	0.1198	0.2961	0.0293	0.0197	0.0105
40	0.05 %	0.16 %	0.02 %	0.00 %	0.01 %
	0.0428	0.1579	0.0126	0.0056	0.0036
41	0.13 %	0.61 %	0.05 %	0.01 %	0.02 %
	0.1221	0.5889	0.0358	0.0159	0.0102
42	0.05 %	0.05 %	0.03 %	0.85 %	0.02 %
	0.0424	0.0438	0.0250	2.3121	0.0132

QUAD CITIES, IOWA-ILLINOIS 1977 PARTICULATE JUNE 1978

SOURCE CONTRIBUTIONS TO FIVE SELECTED RECEPTORS

ANNUAL PARTICULATES

MICROGRAMS PER CUBIC METER

SOURCE	RECEPTOR 226	RECEPTOR 228	RECEPTOR 230	RECEPTOR 237	RECEPTOR 15
85	0.04 %	0.02 %	0.03 %	0.00 %	0.01 %
	0.0381	0.0235	0.0189	0.0081	0.0031
86	0.05 %	0.04 %	0.05 %	0.00 %	0.01 %
	0.0510	0.0351	0.0348	0.0127	0.0053
87	0.03 %	0.02 %	0.02 %	0.00 %	0.00 %
	0.0241	0.0164	0.0161	0.0058	0.0024
88	0.01 %	0.01 %	0.01 %	0.01 %	0.00 %
	0.0137	0.0103	0.0062	0.0164	0.0019
89	0.04 %	0.03 %	0.02 %	0.02 %	0.01 %
	0.0374	0.0281	0.0168	0.0445	0.0051
90	0.21 %	0.10 %	0.14 %	0.09 %	0.07 %
	0.1926	0.0979	0.0959	0.2347	0.0385
91	0.09 %	0.06 %	0.06 %	0.04 %	0.02 %
	0.0848	0.0589	0.0401	0.1040	0.0133
92	0.03 %	0.02 %	0.03 %	0.00 %	0.01 %
	0.0268	0.0171	0.0198	0.0064	0.0027
93	0.02 %	0.01 %	0.02 %	0.00 %	0.00 %
	0.0195	0.0128	0.0110	0.0034	0.0018
94	0.01 %	0.01 %	0.01 %	0.00 %	0.00 %
	0.0117	0.0077	0.0066	0.0020	0.0011
95	0.19 %	0.06 %	0.04 %	0.01 %	0.01 %
	0.1741	0.0533	0.0262	0.0163	0.0058
96	0.03 %	0.02 %	0.01 %	0.00 %	0.00 %
	0.0306	0.0163	0.0086	0.0041	0.0018
97	0.41 %	0.30 %	0.67 %	0.04 %	0.11 %
	0.3823	0.2852	0.4807	0.1030	0.0561
98	0.03 %	0.01 %	0.01 %	0.01 %	0.01 %
	0.0233	0.0130	0.0100	0.0343	0.0031
99	1.50 %	1.46 %	0.61 %	0.13 %	0.21 %
	1.3980	1.4015	0.4417	0.3537	0.1129
100	1.44 %	0.64 %	0.80 %	0.60 %	0.35 %
	1.3450	0.6125	0.5753	1.6241	0.1849
101	0.95 %	0.92 %	0.73 %	13.88 %	0.63 %
	0.8869	0.8785	0.5253	37.7986	0.3365
102	0.72 %	0.72 %	0.56 %	3.24 %	0.54 %
	0.6664	0.6932	0.4033	8.8331	0.2866
103	0.04 %	0.03 %	0.04 %	0.02 %	0.02 %
	0.0335	0.0262	0.0309	0.0491	0.0094
104	0.30 %	0.32 %	0.42 %	0.05 %	0.38 %
	0.2828	0.3107	0.3018	0.1362	0.2025
105	0.08 %	0.09 %	0.13 %	0.01 %	0.12 %
	0.0757	0.0876	0.0920	0.0273	0.0648
106	0.11 %	0.09 %	0.19 %	0.01 %	0.13 %
	0.0987	0.0829	0.1338	0.0253	0.0713
107	0.06 %	0.04 %	0.14 %	0.01 %	0.08 %
	0.0540	0.0340	0.0987	0.0151	0.0405
108	0.10 %	0.10 %	0.32 %	0.01 %	0.17 %
	0.0955	0.0948	0.2319	0.0378	0.0884
109	0.06 %	0.06 %	0.20 %	0.01 %	0.11 %
	0.0517	0.0560	0.1433	0.0269	0.0598
110	0.06 %	0.05 %	0.20 %	0.01 %	0.10 %
	0.0547	0.0489	0.1434	0.0247	0.0554
111	0.05 %	0.05 %	0.18 %	0.01 %	0.09 %
	0.0465	0.0481	0.1279	0.0238	0.0487
112	0.05 %	0.06 %	0.16 %	0.01 %	0.08 %
	0.0441	0.0544	0.1178	0.0234	0.0452
113	0.04 %	0.04 %	0.14 %	0.01 %	0.06 %
	0.0352	0.0405	0.0997	0.0164	0.0310
114	0.66 %	0.65 %	1.13 %	0.07 %	0.58 %
	0.6151	0.6259	0.8125	0.1798	0.3098
115	0.24 %	0.26 %	0.57 %	0.03 %	0.21 %
	0.2238	0.2486	0.4080	0.0770	0.1094
116	0.24 %	0.26 %	0.66 %	0.03 %	0.17 %
	0.2213	0.2534	0.4761	0.0727	0.0884
117	0.10 %	0.10 %	0.34 %	0.01 %	0.06 %
	0.0931	0.0941	0.2413	0.0254	0.0308
118	0.14 %	0.12 %	1.07 %	0.01 %	0.08 %
	0.1332	0.1110	0.7719	0.0351	0.0450
119	0.11 %	0.10 %	0.40 %	0.01 %	0.10 %
	0.1066	0.0926	0.2860	0.0338	0.0533
120	0.11 %	0.09 %	0.27 %	0.02 %	0.10 %
	0.0983	0.0869	0.1917	0.0459	0.0560
121	0.33 %	0.41 %	0.25 %	0.04 %	0.20 %
	0.3111	0.3887	0.1784	0.1207	0.1059
122	0.73 %	0.79 %	0.53 %	0.04 %	0.24 %
	0.6772	0.7587	0.3933	0.1125	0.1257
123	1.26 %	1.25 %	0.96 %	0.07 %	0.35 %
	1.1693	1.2012	0.6877	0.1970	0.1894
124	0.39 %	0.60 %	0.59 %	0.04 %	0.20 %
	0.3669	0.5746	0.4257	0.1037	0.1045
125	0.73 %	0.69 %	1.03 %	0.04 %	0.22 %
	0.6791	0.6661	0.7389	0.1206	0.1156
126	0.59 %	0.44 %	1.01 %	0.03 %	0.17 %
	0.5457	0.4201	0.7261	0.0949	0.0893

QUAD CITIES, IOWA-ILLINOIS 1977 PARTICULATE JUNE 1978

SOURCE CONTRIBUTIONS TO FIVE SELECTED RECEPTORS

ANNUAL PARTICULATES

MICROGRAMS PER CUBIC METER

SOURCE	RECEPTOR 226	RECEPTOR 228	RECEPTOR 230	RECEPTOR 237	RECEPTOR 15
43	0.13 %	0.13 %	0.10 %	3.01 %	0.07 %
	0.1237	0.1278	0.0729	8.1917	0.0386
44	0.17 %	0.17 %	0.13 %	2.61 %	0.09 %
	0.1545	0.1597	0.0930	7.1123	0.0496
45	0.06 %	0.06 %	0.04 %	3.87 %	0.03 %
	0.0519	0.0534	0.0306	10.5464	0.0173
46	0.12 %	0.12 %	0.09 %	4.94 %	0.07 %
	0.1090	0.1122	0.0647	13.4626	0.0368
47	0.26 %	0.26 %	0.19 %	31.85 %	0.15 %
	0.2392	0.2461	0.1396	86.7154	0.0788
48	0.36 %	2.85 %	0.08 %	0.01 %	0.03 %
	0.3335	2.7378	0.0573	0.0194	0.0152
49	0.38 %	0.37 %	0.29 %	2.79 %	0.25 %
	0.3572	0.3566	0.2052	7.5859	0.1351
50	0.00 %	0.00 %	0.00 %	0.02 %	0.00 %
	0.0029	0.0030	0.0016	0.0643	0.0016
51	0.05 %	0.05 %	0.04 %	0.92 %	0.03 %
	0.0484	0.0492	0.0289	2.4953	0.0186
52	0.19 %	0.19 %	0.15 %	3.90 %	0.13 %
	0.1786	0.1811	0.1058	10.6195	0.0679
53	0.05 %	0.05 %	0.04 %	1.23 %	0.03 %
	0.0442	0.0450	0.0264	3.3587	0.0164
54	0.10 %	0.09 %	0.07 %	1.53 %	0.06 %
	0.0889	0.0901	0.0527	4.1792	0.0338
55	0.05 %	0.06 %	0.04 %	0.07 %	0.06 %
	0.0503	0.0583	0.0279	0.1891	0.0311
56	0.00 %	0.00 %	0.00 %	0.01 %	0.00 %
	0.0024	0.0030	0.0013	0.0145	0.0024
57	0.03 %	0.03 %	0.02 %	0.17 %	0.02 %
	0.0261	0.0263	0.0160	0.4522	0.0110
58	0.01 %	0.01 %	0.01 %	0.05 %	0.01 %
	0.0103	0.0104	0.0063	0.1408	0.0044
59	0.05 %	0.05 %	0.04 %	0.39 %	0.04 %
	0.0477	0.0498	0.0285	1.0581	0.0195
60	0.19 %	0.19 %	0.15 %	1.13 %	0.14 %
	0.1804	0.1827	0.1095	3.0708	0.0762
61	0.22 %	0.22 %	0.18 %	1.32 %	0.16 %
	0.2079	0.2091	0.1270	3.5967	0.0876
62	0.16 %	0.16 %	0.13 %	0.97 %	0.12 %
	0.1534	0.1554	0.0931	2.6490	0.0648
63	0.07 %	0.05 %	0.02 %	0.00 %	0.01 %
	0.0695	0.0469	0.0147	0.0089	0.0036
64	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
	0.0031	0.0021	0.0022	0.0009	0.0003
65	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
	0.0003	0.0003	0.0005	0.0002	0.0001
66	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
	0.0002	0.0002	0.0002	0.0001	0.0001
67	0.05 %	0.04 %	0.06 %	0.00 %	0.02 %
	0.0512	0.0395	0.0412	0.0117	0.0082
68	0.01 %	0.01 %	0.01 %	0.00 %	0.00 %
	0.0118	0.0092	0.0090	0.0028	0.0018
69	0.01 %	0.01 %	0.01 %	0.00 %	0.00 %
	0.0065	0.0051	0.0084	0.0023	0.0013
70	0.02 %	0.02 %	0.04 %	0.00 %	0.01 %
	0.0221	0.0178	0.0320	0.0104	0.0051
71	0.07 %	0.05 %	0.08 %	0.01 %	0.02 %
	0.0623	0.0512	0.0601	0.0193	0.0122
72	0.29 %	0.24 %	0.37 %	0.03 %	0.10 %
	0.2743	0.2255	0.2644	0.0851	0.0536
73	0.05 %	0.04 %	0.06 %	0.00 %	0.02 %
	0.0425	0.0349	0.0412	0.0132	0.0083
74	0.15 %	0.11 %	0.09 %	0.01 %	0.03 %
	0.1443	0.1064	0.0669	0.0280	0.0134
75	0.03 %	0.02 %	0.02 %	0.00 %	0.01 %
	0.0289	0.0213	0.0134	0.0056	0.0027
76	0.02 %	0.02 %	0.01 %	0.00 %	0.00 %
	0.0214	0.0157	0.0099	0.0041	0.0020
77	0.11 %	0.09 %	0.14 %	0.01 %	0.04 %
	0.1009	0.0851	0.1013	0.0363	0.0226
78	0.05 %	0.03 %	0.04 %	0.00 %	0.01 %
	0.0463	0.0311	0.0276	0.0081	0.0047
79	0.02 %	0.01 %	0.01 %	0.00 %	0.00 %
	0.0157	0.0072	0.0040	0.0020	0.0007
80	0.00 %	0.00 %	0.00 %	0.00 %	0.00 %
	0.0044	0.0042	0.0032	0.0018	0.0006
81	0.01 %	0.01 %	0.01 %	0.00 %	0.00 %
	0.0113	0.0090	0.0056	0.0030	0.0010
82	0.13 %	0.09 %	0.07 %	0.01 %	0.02 %
	0.1214	0.0896	0.0474	0.0182	0.0089
83	0.01 %	0.01 %	0.00 %	0.00 %	0.00 %
	0.0137	0.0099	0.0027	0.0033	0.0011
84	0.08 %	0.05 %	0.04 %	0.01 %	0.01 %
	0.0758	0.0467	0.0313	0.0154	0.0061

QUAD CITIES, IOWA-ILLINOIS 1977 PARTICULATE JUNE 1978

SOURCE CONTRIBUTIONS TO FIVE SELECTED RECEPTORS

ANNUAL PARTICULATES

MICROGRAMS PER CUBIC METER

SOURCE	RECEPTOR 226	RECEPTOR 228	RECEPTOR 230	RECEPTOR 237	RECEPTOR 15
169	0.34 %	0.25 %	0.23 %	0.04 %	0.06 %
	0.3132	0.2387	0.1664	0.1026	0.0321
170	0.30 %	0.28 %	0.23 %	0.04 %	0.07 %
	0.2801	0.2647	0.1678	0.1173	0.0377
171	0.33 %	0.25 %	0.24 %	0.04 %	0.08 %
	0.3048	0.2364	0.1747	0.1167	0.0406
172	0.14 %	0.09 %	0.12 %	0.02 %	0.03 %
	0.1293	0.0859	0.0852	0.0477	0.0166
173	0.07 %	0.05 %	0.07 %	0.01 %	0.02 %
	0.0640	0.0465	0.0507	0.0257	0.0093
174	0.05 %	0.04 %	0.06 %	0.01 %	0.01 %
	0.0446	0.0348	0.0430	0.0199	0.0074
175	0.10 %	0.08 %	0.17 %	0.02 %	0.03 %
	0.0952	0.0764	0.1190	0.0451	0.0172
176	0.12 %	0.10 %	0.16 %	0.02 %	0.04 %
	0.1160	0.0942	0.1154	0.0573	0.0224
177	0.54 %	0.44 %	0.73 %	0.10 %	0.21 %
	0.5058	0.4188	0.5226	0.2708	0.1097
178	0.33 %	0.27 %	0.38 %	0.05 %	0.13 %
	0.3057	0.2547	0.2736	0.1466	0.0689
179	0.43 %	0.46 %	0.32 %	0.12 %	0.21 %
	0.3979	0.4429	0.2308	0.3356	0.1118
180	0.16 %	0.16 %	0.09 %	0.05 %	0.04 %
	0.1483	0.1576	0.0635	0.1460	0.0206
181	0.29 %	0.24 %	0.17 %	0.08 %	0.06 %
	0.2704	0.2282	0.1208	0.2115	0.0333
182	0.39 %	0.25 %	0.27 %	0.09 %	0.08 %
	0.3605	0.2444	0.1930	0.2390	0.0453
183	0.24 %	0.17 %	0.18 %	0.06 %	0.07 %
	0.2216	0.1645	0.1271	0.1655	0.0356
184	0.26 %	0.20 %	0.27 %	0.07 %	0.08 %
	0.2396	0.1893	0.1955	0.1857	0.0437
185	0.17 %	0.17 %	0.24 %	0.05 %	0.08 %
	0.1619	0.1657	0.1689	0.1406	0.0415
186	0.18 %	0.16 %	0.28 %	0.05 %	0.07 %
	0.1702	0.1571	0.2019	0.1295	0.0384
187	0.15 %	0.12 %	0.17 %	0.04 %	0.06 %
	0.1436	0.1153	0.1241	0.0998	0.0322
188	0.31 %	0.25 %	0.33 %	0.08 %	0.13 %
	0.2873	0.2368	0.2386	0.2043	0.0717
189	0.07 %	0.06 %	0.08 %	0.02 %	0.04 %
	0.0661	0.0565	0.0572	0.0456	0.0189
190	0.21 %	0.20 %	0.18 %	0.10 %	0.13 %
	0.1938	0.1943	0.1326	0.2714	0.0708
191	0.51 %	0.50 %	0.50 %	0.26 %	0.32 %
	0.4796	0.4829	0.3579	0.6995	0.1695
192	0.34 %	0.29 %	0.40 %	0.16 %	0.16 %
	0.3132	0.2741	0.2907	0.4487	0.0838
193	0.21 %	0.19 %	0.33 %	0.11 %	0.13 %
	0.1996	0.1846	0.2353	0.2872	0.0704
194	0.08 %	0.08 %	0.12 %	0.04 %	0.05 %
	0.0766	0.0800	0.0854	0.1025	0.0279
195	0.13 %	0.12 %	0.13 %	0.05 %	0.07 %
	0.1229	0.1171	0.0951	0.1295	0.0392
196	0.02 %	0.02 %	0.03 %	0.01 %	0.01 %
	0.0174	0.0150	0.0189	0.0238	0.0076
197	0.02 %	0.02 %	0.03 %	0.01 %	0.02 %
	0.0202	0.0182	0.0223	0.0294	0.0101
198	0.16 %	0.15 %	0.25 %	0.04 %	0.56 %
	0.1468	0.1444	0.1767	0.1093	0.3012
199	0.35 %	0.35 %	0.67 %	0.08 %	1.17 %
	0.3280	0.3326	0.4820	0.2203	0.6230
200	0.14 %	0.13 %	0.28 %	0.03 %	0.48 %
	0.1280	0.1291	0.2037	0.0739	0.2537
201	0.09 %	0.10 %	0.13 %	0.02 %	0.26 %
	0.0815	0.0939	0.0938	0.0512	0.1380
202	0.12 %	0.12 %	0.22 %	0.02 %	0.22 %
	0.1101	0.1147	0.1585	0.0465	0.1155
203	0.34 %	0.34 %	0.28 %	0.17 %	0.30 %
	0.3129	0.3270	0.2025	0.4626	0.1594
204	0.36 %	0.40 %	0.29 %	0.08 %	0.39 %
	0.3400	0.3877	0.2111	0.2249	0.2090
205	0.38 %	0.41 %	0.47 %	0.07 %	0.71 %
	0.3585	0.3923	0.3404	0.1874	0.3807
206	0.17 %	0.17 %	0.14 %	0.11 %	0.17 %
	0.1572	0.1600	0.1016	0.2964	0.0924
BACK-GROUND	47.24 %	45.85 %	61.26 %	16.16 %	82.45 %
	44.	44.	44.	44.	44.
TOTAL	100.1 %	100.1 %	100.1 %	100.0 %	100.0 %
	93.2122	96.0443	71.8715	272.3655	53.3646

QUAD CITIES, IOWA-ILLINOIS 1977 PARTICULATE JUNE 1978

SOURCE CONTRIBUTIONS TO FIVE SELECTED RECEPTORS

ANNUAL PARTICULATES

MICROGRAMS PER CUBIC METER

SOURCE	RECEPTOR 226	RECEPTOR 228	RECEPTOR 230	RECEPTOR 237	RECEPTOR 15
127	0.12 %	0.09 %	0.29 %	0.01 %	0.04 %
	0.1085	0.0821	0.2104	0.0216	0.0202
128	0.11 %	0.09 %	0.32 %	0.01 %	0.04 %
	0.1067	0.0871	0.2288	0.0290	0.0237
129	0.01 %	0.01 %	0.03 %	0.00 %	0.00 %
	0.0092	0.0077	0.0194	0.0032	0.0023
130	0.11 %	0.09 %	0.24 %	0.02 %	0.05 %
	0.1017	0.0873	0.1742	0.0433	0.0270
131	0.24 %	0.21 %	0.41 %	0.04 %	0.13 %
	0.2277	0.1987	0.2921	0.1048	0.0667
132	1.32 %	5.79 %	0.64 %	0.07 %	0.24 %
	1.2311	5.5524	0.4588	0.2040	0.1258
133	0.52 %	0.87 %	0.16 %	0.01 %	0.05 %
	0.4803	0.8385	0.1162	0.0370	0.0290
134	1.85 %	0.90 %	0.35 %	0.03 %	0.10 %
	1.7271	0.8604	0.2514	0.0722	0.0549
135	0.37 %	0.17 %	0.10 %	0.01 %	0.02 %
	0.3415	0.1613	0.0700	0.0172	0.0126
136	0.59 %	0.22 %	0.18 %	0.01 %	0.04 %
	0.5503	0.2068	0.1277	0.0279	0.0218
137	0.33 %	0.18 %	0.18 %	0.01 %	0.04 %
	0.3101	0.1742	0.1318	0.0278	0.0208
138	0.06 %	0.04 %	0.04 %	0.00 %	0.01 %
	0.0565	0.0343	0.0308	0.0063	0.0047
139	0.49 %	0.32 %	0.51 %	0.02 %	0.09 %
	0.4606	0.3082	0.3637	0.0629	0.0482
140	0.09 %	0.06 %	0.13 %	0.00 %	0.02 %
	0.0797	0.0562	0.0909	0.0126	0.0097
141	0.08 %	0.06 %	0.13 %	0.00 %	0.02 %
	0.0764	0.0561	0.0937	0.0136	0.0106
142	0.18 %	0.13 %	0.40 %	0.01 %	0.05 %
	0.1693	0.1283	0.2879	0.0341	0.0262
143	0.01 %	0.01 %	0.04 %	0.00 %	0.00 %
	0.0137	0.0106	0.0274	0.0034	0.0023
144	0.35 %	0.27 %	0.46 %	0.04 %	0.11 %
	0.3257	0.2559	0.3274	0.1109	0.0584
145	1.40 %	2.05 %	0.32 %	0.03 %	0.10 %
	1.3068	1.9631	0.2296	0.0839	0.0513
146	5.24 %	1.43 %	0.49 %	0.04 %	0.14 %
	4.8843	1.3768	0.3501	0.1218	0.0735
147	1.76 %	0.18 %	0.08 %	0.01 %	0.02 %
	1.6356	0.1682	0.0558	0.0193	0.0114
148	0.43 %	0.23 %	0.23 %	0.02 %	0.05 %
	0.3983	0.2202	0.1617	0.0417	0.0263
149	0.71 %	0.42 %	0.55 %	0.03 %	0.10 %
	0.6619	0.4005	0.3923	0.0844	0.0547
150	0.35 %	0.22 %	0.27 %	0.02 %	0.06 %
	0.3261	0.2109	0.1927	0.0540	0.0323
151	0.09 %	0.06 %	0.10 %	0.01 %	0.02 %
	0.0824	0.0561	0.0730	0.0172	0.0095
152	0.01 %	0.01 %	0.01 %	0.00 %	0.00 %
	0.0072	0.0051	0.0074	0.0017	0.0009
153	0.65 %	0.74 %	0.31 %	0.07 %	0.11 %
	0.6077	0.7075	0.2229	0.1779	0.0609
154	0.36 %	0.28 %	0.09 %	0.01 %	0.03 %
	0.3321	0.2659	0.0657	0.0349	0.0166
155	0.51 %	0.19 %	0.08 %	0.01 %	0.02 %
	0.4711	0.1802	0.0559	0.0276	0.0132
156	0.43 %	0.15 %	0.07 %	0.01 %	0.02 %
	0.3980	0.1471	0.0537	0.0243	0.0119
157	0.12 %	0.08 %	0.06 %	0.01 %	0.02 %
	0.1079	0.0809	0.0432	0.0222	0.0090
158	0.11 %	0.06 %	0.06 %	0.01 %	0.01 %
	0.1001	0.0559	0.0459	0.0177	0.0080
159	0.13 %	0.08 %	0.08 %	0.01 %	0.02 %
	0.1196	0.0760	0.0579	0.0275	0.0116
160	0.34 %	0.24 %	0.27 %	0.03 %	0.07 %
	0.3205	0.2269	0.1970	0.0876	0.0384
161	0.25 %	0.18 %	0.30 %	0.03 %	0.06 %
	0.2371	0.1736	0.2138	0.0719	0.0320
162	0.23 %	0.17 %	0.29 %	0.03 %	0.06 %
	0.2172	0.1635	0.2097	0.0722	0.0326
163	0.24 %	0.18 %	0.41 %	0.03 %	0.07 %
	0.2268	0.1747	0.2933	0.0816	0.0372
164	0.19 %	0.14 %	0.24 %	0.02 %	0.06 %
	0.1738	0.1365	0.1739	0.0670	0.0308
165	0.65 %	0.46 %	0.22 %	0.04 %	0.08 %
	0.6031	0.4456	0.1593	0.1101	0.0411
166	0.71 %	0.38 %	0.23 %	0.04 %	0.08 %
	0.6584	0.3671	0.1674	0.1059	0.0410
167	0.73 %	0.33 %	0.27 %	0.05 %	0.08 %
	0.6818	0.3175	0.1944	0.1325	0.0451
168	0.53 %	0.32 %	0.27 %	0.05 %	0.08 %
	0.4906	0.3041	0.1967	0.1381	0.0427