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New Jersey Portion of the Metropolitan Philadelphia AQCR Nonattainment and Maintenance Study For TSP

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NEW JERSEY PORTION OF THE METROPOLITAN PHILADELPHIA AQCR NONATTAINMENT AND MAINTENANCE STUDY FOR TSP

Final Report

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Region II
Air Programs Branch
New York, New York 10007

Contract No. 68-02-2539
Task Order No. 6

Project Officer

George Kerr

Prepared by

Victor L. Corbin
Susan Pultz

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GCA CORPORATION
GCA/TECHNOLOGY DIVISION
Bedford, Massachusetts

DISCLAIMER

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ABSTRACT

The Camden Area is not attaining the secondary TSP standard and is unclassified with regard to the primary TSP standard. The objective of this study was to use dispersion modeling and filter analysis to identify the reasons for the secondary standard violation, and to propose, demonstrate and analyze, by means of dispersion modeling, various control strategies to attain and maintain the secondary standards through 1990. The data utilized and developed under this contract were to be formatted such that the data would satisfy the minimum data requirements for SIP submission as outlined in the Clean Air Act Amendments of 1977.

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SECTION 1

INTRODUCTION

Based on the NASN monitoring site in the City of Camden, the region around this monitor is not in attainment of the TSP standard. The reason for the nonattainment of the standard is unknown. Since the Clean Air Act Amendments of 1977 specify that all nonattainment areas must have a new SIP submission by January 1, 1979, this contract was awarded to try and determine the reason for the nonattainment of the standard, and to develop control strategies which would attain and maintain the standard through 1990. In addition to developing the control strategies, a detailed set of backup information is required to substantiate the recommendations and conclusions of the SIP. The minimum data requirements, as outlined in the Clean Air Act Amendments of 1977, were satisfied, and the data are included in the appropriate sections of this report.

This study examined the attainment and maintenance of the secondary TSP standards through 1990 for the City of Camden. In order to determine the air quality for future years and perform strategy analysis, a number of distinct tasks had to be implemented. In order to better understand the steps followed in the performance of this contract, the project was broken down into a number of small and clearly identifiable tasks which are defined and described in the following sections.

SECTION 2

DEVELOPMENT OF EMISSION INVENTORY

DEVELOPMENT OF POINT SOURCE EMISSIONS DATA

The basic point source emission inventory which was initially utilized in this study was the inventory previously developed under Contract No. 68-02-1376, Task No. 24.[1] Since Contract No. 68-02-1376, Task Order No. 24 was completed, GCA has developed a number of error checking programs to check the consistency of the NEDS data. As a result of this analysis, only the U.S. Steel Fairless-Works had any changes made to the emissions, and this was a decrease in TSP of 6,000 ton/year from one of the sources.

Based on additional information on compliant sources, a number of changes were made to the inventory for the projection years. The sources which were changes are listed in Table 1.

PROJECTION OF POINT SOURCE EMISSIONS

In order to calculate air quality for future years, the emissions have to be projected to the year of interest. For most of the counties, the projection parameters which were utilized are not the same as the projection values used in Contract 68-02-1376. The new projection parameters are from the final Regional Development Guide which was developed by the Delaware Valley Regional Planning Commission (DVRPC). Tables 2 and 3 list the growth factors for the various categories for each county in the region. For Salem and New Castle Counties, the same projections were utilized as in the previous study under Contract No. 68-02-1376.

Power plants were not projected using the growth factors, but rather data obtained under Contract No. 68-02-1376 was utilized to calculate future year emissions from the various power plants. For the Owens-Corning Plant listed in Table 1, three point sources were added for the future years to the inventory for completeness and accuracy. Tables 4 and 5 list the major point source emissions in each county by SIC category.

TABLE 1. REVISED PARTICULATE EMISSION RATES

Company name	Emission rate (ton/yr)	
	Old	Revised
Owens-Corning	0	107
Gulf & Western	18	1.4
Kewanee Oil Corp.	504	5.6
Certain-Teed	299	1.0

TABLE 2. POINT SOURCE GROWTH FACTORS, 1982

SIC code	Agriculture 1 to 9	Mining 10 to 14	Construction 15 to 17	Manufacturing 18 to 39	Transportation and Communication 40 to 49	Wholesale 50 to 51	Retail 52 to 59
Bucks	0.901	0.973	1.052	0.989	1.034	0.951	1.041
Chester	0.826	0.954	0.987	0.996	0.982	0.970	1.051
Delaware	0.890	0.959	0.991	1.007	1.059	1.001	1.107
Montgomery	0.833	0.959	1.027	1.006	1.240	0.999	1.099
Philadelphia	0.899	0.959	1.051	1.026	1.006	1.059	1.066
Burlington	0.898	0.993	1.069	1.053	1.117	1.028	1.099
Camden	0.901	0.988	1.056	1.020	1.053	1.026	1.109
Gloucester	0.910	1.018	1.123	0.995	1.107	0.944	1.173
Mercer	0.890	0.929	1.107	1.044	1.079	1.042	1.062
Salem	0.870	0.957	1.046	1.409	1.366	1.600	1.600
New Castle	0.870	0.957	1.046	1.409	1.366	1.600	1.600

TABLE 3. POINT SOURCE GROWTH FACTORS, 1990

SIC code	Agriculture 1 to 9	Mining 10 to 14	Construction 15 to 17	Manufacturing 18 to 39	Transportation and Communication 40 to 49	Wholesale 50 to 51	Retail 52 to 59	Finance Insurance Real Estate 60 to 67	Services 68 to 84	Government 85 to 97
Bucks	0.803	0.947	1.105	0.978	1.069	0.901	1.083	1.191	1.125	1.285
Chester	0.652	0.909	1.975	0.991	0.964	0.940	1.102	1.091	1.039	1.173
Delaware	0.780	0.918	0.981	1.015	1.118	1.001	1.215	1.026	1.349	1.217
Montgomery	0.666	0.918	1.053	1.013	1.049	0.997	1.198	1.060	1.175	1.285
Philadelphia	0.798	0.917	1.103	1.053	1.013	1.117	1.132	1.078	1.285	1.327
Burlington	0.795	0.986	1.137	1.106	1.235	1.055	1.198	1.239	1.383	1.170
Camden	0.801	0.977	1.111	1.039	1.106	1.052	1.218	1.052	1.424	1.316
Gloucester	0.820	1.036	1.245	0.989	1.215	0.887	1.346	1.225	1.621	1.511
Mercer	0.780	0.857	1.214	1.087	1.158	1.084	1.124	1.145	1.150	1.302
Salem	0.740	0.914	1.092	1.818	1.732	2.200	2.200	2.200	2.200	2.200
New Castle	0.740	0.914	1.092	1.818	1.732	2.200	2.200	2.200	2.200	2.200

TABLE 4. POINT SOURCE EMISSIONS OF PARTICULATES BY SIC FOR 1982 (TPY)

Sic code	Burlington	Camden	Gloucester	Mercer	Salem	Total	Category
13		8				8	Oil and gas extraction
14		170				170	Quarrying and mining
20		79				79	Food and kindred products
26		54				54	Paper and allied products
28	65	82	27	300	254	728	Chemicals and allied products
29		214	2,613		901	3,728	Petroleum refining
32	1,384	403	2	311	448	2,548	Stone, clay, glass and concrete
33	352		83			435	Primary metals
34	83	29				112	Fabricated metal products
36		30				30	Electrical and electronic machinery
37				3		3	Transportation equipment
39					3	3	Miscellaneous manufacturing
49	39		402	1,635	72	2,148	Electricity production
Large point sources	1,923	1,069	3,127	2,249	1,678	10,046	
Small point sources	182	4,469	354	115	165	1,285	
Total	2,105	1,538	3,481	2,364	1,843	11,331	

TABLE 5. POINT SOURCE EMISSIONS BY SIC FOR 1990 (TYP)

Sic code	Burlington	Camden	Gloucester	Mercer	Salem	Total	Category
13		8				8	Oil and gas extraction
14		168				168	Mining and quarrying
20		82				82	Food and kindred products
26		54				54	Paper and allied products
28	69	85	27	312	327	820	Chemical and allied products
29		218	2,597		1,164	3,979	Petroleum refining
32	1,456	406	2	320	581	2,765	Stone, clay, glass and concrete
33	370		82			452	Primary metals
34	88	29				117	Fabricated metal products
36		30				30	Electrical and electronic machinery
37				3		3	Transportation equipment
39					4	4	Miscellaneous manufacturing
49	31		441	1,353	63	1,888	Electricity production
Large point sources	2,014	1,080	3,149	1,988	2,139	10,370	
Small point sources	192	483	353	120	210	1,358	
Total	2,206	1,563	3,502	2,108	2,349	11,728	

DEVELOPMENT OF AREA SOURCE EMISSIONS DATA

Under Contract No. 68-02-1376, an area emissions inventory was prepared for 1974, and this inventory was utilized for this study. No changes were made in the methodology or allocation of emissions.

PROJECTION OF AREA SOURCE EMISSIONS

The 1974 area emission inventory was projected to 1982 and 1990 using the growth factors in Tables 6 and 7. These factors were obtained from the Regional Development Guide developed by DVRPC. These factors differ from those used in Contract No. 68-02-1376. In addition to projecting the inventory, the emission factor for particulate emissions from motor vehicles was modified to account for the reduction in particulates from the increasing number of vehicles equipped with catalytic converters. Table 8 lists the emission factors utilized, and Tables 9 and 10 list the emissions by source category for 1982 and 1990.

TABLE 6. AREA SOURCE GROWTH FACTORS (1982)

	Population	Households	Commercial Institutional Employment	Industrial Employment	VMT Freeway
Bucks	1.073	1.071	1.057	0.991	1.096
Chester	1.019	1.069	1.029	0.994	1.019
Delaware	1.039	1.099	1.107	1.012	1.271
Montgomery	1.061	1.122	1.072	1.008	1.140
Philadelphia	1.008	1.065	1.104	1.021	1.141
Burlington	1.073	1.092	1.115	1.062	1.006
Camden	1.071	1.130	1.129	1.025	1.115
Gloucester	1.118	1.150	1.197	1.008	1.073
Mercer	1.058	1.092	1.092	1.047	1.148
Salem	1.108	1.108	1.600	1.409	1.218
New Castle	1.108	1.108	1.600	1.409	1.218

TABLE 7. AREA SOURCE GROWTH FACTORS (1990)

	Population	Households	Commercial Institutional Employment	Industrial Employment	VMT Freewa
Bucks	1.146	1.143	1.114	0.982	1.191
Chester	1.038	1.137	1.059	0.988	1.038
Delaware	1.078	1.198	1.215	1.024	1.542
Montgomery	1.121	1.244	1.144	1.015	1.28
Philadelphia	1.015	1.131	1.209	1.043	1.28
Burlington	1.145	1.185	1.231	1.124	1.01
Camden	1.142	1.260	1.258	1.049	1.23
Gloucester	1.236	1.300	1.393	1.017	1.14
Mercer	1.116	1.183	1.183	1.095	1.29
Salem	1.215	1.215	2.200	1.818	1.47
New Castle	1.215	1.215	2.200	1.818	1.43

TABLE 8. PROJECTION PARAMETER FOR AREA SOURCE CATEGORIES

Category number	Major classification	Minor classification	Projection parameter
1	Residential fuel	Anthracite coal	NP*
2	Residential fuel	Bituminous coal	NP
3	Residential fuel	Distillate oil	Housing units
4	Residential fuel	Residual oil	NP
5	Residential fuel	Natural gas	Housing units
6	Residential fuel	Wood	NP
7	Comm'l & institl fuel	Anthracite coal	C/I employment
8	Comm'l & institl fuel	Bituminous coal	C/I employment
9	Comm'l & institl fuel	Distillate oil	C/I employment
10	Comm'l & institl fuel	Residual oil	C/I employment
11	Comm'l & institl fuel	Natural gas	C/I employment
12	Comm'l & institl fuel	Wood	NP
13	Industrial fuel	Anthracite coal	Industrial employment
14	Industrial fuel	Bituminous coal	Industrial employment
15	Industrial fuel	Coke	NP
16	Industrial fuel	Distillate oil	Industrial employment
17	Industrial fuel	Residual oil	Industrial employment
18	Industrial fuel	Natural gas	Industrial employment
19	Industrial fuel	Wood	NP
20	Industrial fuel	Process gas	NP
21	On-site incineration	Residential	NP
22	On-site incineration	Industrial	NP
23	On-site incineration	Comm's & institl	NP
24	Open burning	Residential	NP
25	Open burning	Industrial	NP
26	Open burning	Comm's & institl	NP
27	Gasoline fuel	Light vehicle	Average VMT projection
28	Gasoline fuel	Heavy vehicle	Average VMT projection
29	Gasoline fuel	Off highway	Population
30	Diesel fuel	Heavy vehicle	Average VMT projection
31	Diesel fuel	Off highway	Population
32	Diesel fuel	Rail locomotive	Population
33	Aircraft	Military	Projected aircraft operation
34	Aircraft	Civil	Projected aircraft operation
35	Aircraft	Commercial	Projected aircraft operation
36	Vessels	Anthracite coal	NP

(Continued)

TABLE 8 (continued).

Category number	Major classification	Minor classification	Projection parameter
37	Vessels	Diesel oil	Population
38	Vessels	Residual oil	Population
39	Vessels	Gasoline	NP
40	Evaporation	Solvent purchased	Population
41	Evaporation	Gas marketed	Average VMT projection
42	Measured VEH miles	Limited access rds	VMT FWY projections
43	Measured VEH miles	Rural roads	VMT FWY projections
44	Measured VEH miles	Suburban roads	VMT nonFWY projections
45	Measured VEH miles	Urban roads	VMT nonFWY projections
46	Dirt roads traveled	-	NP
47	Dirt airstrips	-	NP
48	Construct land area	-	NP
49	Rock handlg & storage	-	NP
50	Forest fires	Area-acres	NP
51	Slash burning	Area-acres	NP
52	Frost control	Orchard heaters	NP
53	Structure fires	No. year	NP
54	Coal refuse burning	Size of bank	NP

*NP = No growth was projected for those categories.

TABLE 9. MOTOR VEHICLE EMISSION FACTOR FOR PARTICULATES

Year	g/mi
1974	0.33
1982	0.29
1990	0.25

TABLE 10. AREA EMISSIONS OF PARTICULATE FOR 1982 (ton/yr)

No.	Source	Category	County						
			Burlington	Camden	Gloucester	Mercer	Salem	Total	Percent
1	Residential fuel	Anthracite coal	61	93	27	57	9	247	2.9
2	Residential fuel	Bituminous coal	0	0	0	0	0	0	0
3	Residential fuel	Distillate oil	68	126	54	86	23	357	4.2
4	Residential fuel	Residual oil	0	0	0	0	0	0	0
5	Residential fuel	Natural gas	36	62	18	38	3	157	1.8
6	Residential fuel	Wood	4	1	3	2	6	16	0.2
7	Com/inst. fuel	Anthracite coal	0	0	0	0	0	0	0
8	Com/inst. fuel	Bituminous coal	0	0	0	0	0	0	0
9	Com/inst. fuel	Distillate oil	23	53	11	42	5	134	1.6
10	Com/inst. fuel	Residual oil	77	166	35	137	17	432	5.1
11	Com/inst. fuel	Natural gas	10	19	0	17	2	48	0.6
12	Com/inst. fuel	Wood	0	0	0	0	0	0	0
13	Industrial fuel	Anthracite coal	0	0	0	0	0	0	0
14	Industrial fuel	Bituminous coal	164	419	147	618	175	1,523	18.0
15	Industrial fuel	Coke	0	0	0	0	0	0	0
16	Industrial fuel	Distillate oil	0	0	0	0	0	0	0
17	Industrial fuel	Residual oil	0	0	0	69	0	69	0.8
18	Industrial fuel	Natural gas	0	14	0	16	0	30	0.3
19	Industrial fuel	Wood	0	0	0	0	0	0	0
20	Industrial fuel	Process gas	0	0	0	0	0	0	0
21	Incineration	Residential	0	0	0	0	0	0	0
22	Incineration	Industrial	8	5	87	0	5	105	1.2
23	Incineration	Com/inst.	1	4	0	2	0	7	0.1
24	Open burning	Residential	0	0	0	0	0	0	0
25	Open burning	Industrial	0	2	1	0	1	4	0.05
26	Open burning	Com/inst.	4	3	187	3	2	199	2.3
27	Gasoline fuel	LDV	0	0	0	0	0	0	0
28	Gasoline fuel	HDV	0	0	0	0	0	0	0
29	Gasoline fuel	Off highway	15	24	9	16	4	68	0.8
30	Diesel fuel	HDV	0	0	0	0	0	0	0
31	Diesel fuel	Off highway	13	21	8	14	3	59	0.7
32	Diesel fuel	Rail locomotive	31	47	18	30	6	132	1.6
33	Aircraft	Military	445	0	0	74	3	522	6.2
34	Aircraft	Civil	23	4	31	48	2	108	1.3
35	Aircraft	Commercial	71	1	0	44	0	116	1.4
36	Vessels	Anthracite coal	0	0	0	0	0	0	0
37	Vessels	Diesel oil	10	27	46	1	107	191	2.3
38	Vessels	Residual oil	0	6	0	0	0	6	0.1
39	Vessels	Gasoline	0	0	0	0	0	0	0
40	Evaporation	Solvent	0	0	0	0	0	0	0
41	Evaporation	Gas marketed	0	0	0	0	0	0	0
42	Measured miles	LTD access roads	256	319	209	222	114	1,120	13.2
43	Measured miles	Rural roads	0	0	0	0	110	110	1.3
44	Measured miles	Suburban roads	0	0	0	0	30	30	0.3
45	Measured miles	Urban roads	845	753	476	564	50	2,688	31.7
	Total		2,165	2,169	1,367	2,100	677	8,478	

TABLE 11. AREA EMISSIONS OF PARTICULATE FOR 1990 (ton/yr)

No.	Source	Category	County						
			Burlington	Camden	Gloucester	Mercer	Salem	Total	Percent
1	Residential fuel	Anthracite coal	61	93	27	57	9	247	2.8
2	Residential fuel	Bituminous coal	0	0	0	0	0	0	0
3	Residential fuel	Distillate oil	74	140	61	93	25	393	4.4
4	Residential fuel	Residual oil	0	0	0	0	0	0	0
5	Residential fuel	Natural gas	39	69	21	41	3	173	1.9
6	Residential fuel	Wood	5	2	3	2	7	19	0.2
7	Com./inst. fuel	Anthracite coal	0	0	0	0	0	0	0
8	Com/inst. fuel	Bituminous coal	0	0	0	0	0	0	0
9	Com/inst. fuel	Distillate oil	26	60	12	46	7	151	1.7
10	Com/inst. fuel	Residual oil	84	185	40	149	23	481	5.4
11	Com/inst. fuel	Natural gas	11	21	0	18	3	53	0.6
12	Com/inst. fuel	Wood	0	0	0	0	0	0	0
13	Industrial fuel	Anthracite coal	0	0	0	0	0	0	0
14	Industrial fuel	Bituminous coal	173	429	149	646	226	1,623	18.2
15	Industrial fuel	Coke	0	0	0	0	0	0	0
16	Industrial fuel	Distillate oil	0	0	0	0	0	0	0
17	Industrial fuel	Residual oil	0	0	0	72	0	72	0.8
18	Industrial fuel	Natural gas	0	14	0	16	0	30	0.3
19	Industrial fuel	Wood	0	0	0	0	0	0	0
20	Industrial fuel	Process gas	0	0	0	0	0	0	0
21	Incineration	Residential	0	0	0	0	0	0	0
22	Incineration	Industrial	8	5	87	0	5	105	1.2
23	Incineration	Com/inst.	1	4	0	2	0	7	0.1
24	Open burning	Residential	0	0	0	0	0	0	0
25	Open burning	Industrial	0	2	1	0	1	4	0.1
26	Open burning	Com/inst.	4	3	187	3	2	199	2.2
27	Gasoline fuel	LDV	0	0	0	0	0	0	0
28	Gasoline fuel	HDV	0	0	0	0	0	0	0
29	Gasoline fuel	Off highway	16	27	10	18	4	75	0.8
30	Diesel fuel	HDV	0	0	0	0	0	0	0
31	Diesel fuel	Off highway	14	23	9	16	4	66	0.7
32	Diesel fuel	Rail locomotive	33	50	20	32	7	142	1.6
33	Aircraft	Military	445	0	0	74	3	522	5.9
34	Aircraft	Civil	31	5	42	66	2	146	1.6
35	Aircraft	Commercial	97	1	0	60	0	158	1.8
36	Vessels	Anthracite coal	0	0	0	0	0	0	0
37	Vessels	Diesel oil	11	28	50	1	117	207	2.2
38	Vessels	Residential oil	0	6	0	0	0	6	0.1
39	Vessels	Gasoline	0	0	0	0	0	0	0
40	Evaporation	Solvent	0	0	0	0	0	0	0
41	Evaporation	Gas marketed	0	0	0	0	0	0	0
42	Measured miles	LTD access roads	238	323	209	230	130	1,130	12.7
43	Measured miles	Rural roads	0	0	0	0	127	127	1.4
44	Measured miles	Suburban roads	0	0	0	0	34	34	0.4
45	Measured miles	Urban roads	841	766	509	560	56	2,732	30.7
	Total		2,212	2,256	1,437	2,202	795	8,902	

SECTION 3

CALIBRATION OF AQDM FOR TSP

An analysis of the TSP monitoring data was performed, and attempts were made to calibrate the AQDM model for TSP. The starting point for this task was the TSP calibration in the Metropolitan Philadelphia study performed under EPA Contract No. 68-02-1376, Task 24. Two additional monitoring sites were added to the data base, a site in Cherry Hill, New Jersey (Site Code 310740003), and the NASN site in Camden, New Jersey (Site Code 310720001). A regression analysis was performed for all TSP monitors in the Metropolitan Philadelphia region which were not highly influenced by fugitive sources. Seven of the 50 monitors were found to be highly influenced by fugitive sources and were eliminated from the analysis. The results are plotted in Figure 1. Since the correlation coefficient was low (0.493), another regression analysis was performed for only the New Jersey monitoring data. The results, Figure 2, were encouraging in that the correlation coefficient increased (0.682) substantially over the case where all monitors in the Metropolitan Region were utilized. An analysis of the two outlying points was made, and it became apparent that one outlying monitor, which was located in Mercer County, was being largely influenced by the U.S. Steel Fairless Works. The Pennsylvania Department of Environmental Protection was contacted regarding the emissions we were utilizing, and they were found to be high. In addition, due to the large particle size of the emissions, considerable deposition occurs within the plant boundaries. As a result of this information, the Mercer site was removed from the data base, and the model was recalibrated using 16 monitors, rather than all 17 monitors, giving a correlation coefficient of 0.844 (Figure 3). The air quality and site data for the New Jersey monitors is listed in Table 12.

For all air quality modeling runs, the regression line plotted in Figure 3 was utilized.

One difficulty with the adopted regression line is the 16 $\mu g/m^3$ underprediction of the NASN site in Camden. The model is unable to predict the high concentrations at this monitor based on the emission rates in the inventory. It appears that this site is being influenced by a localized emission source. Until this source is identified, and the emissions quantified for input to the model, the air quality of this monitor cannot be adequately predicted.

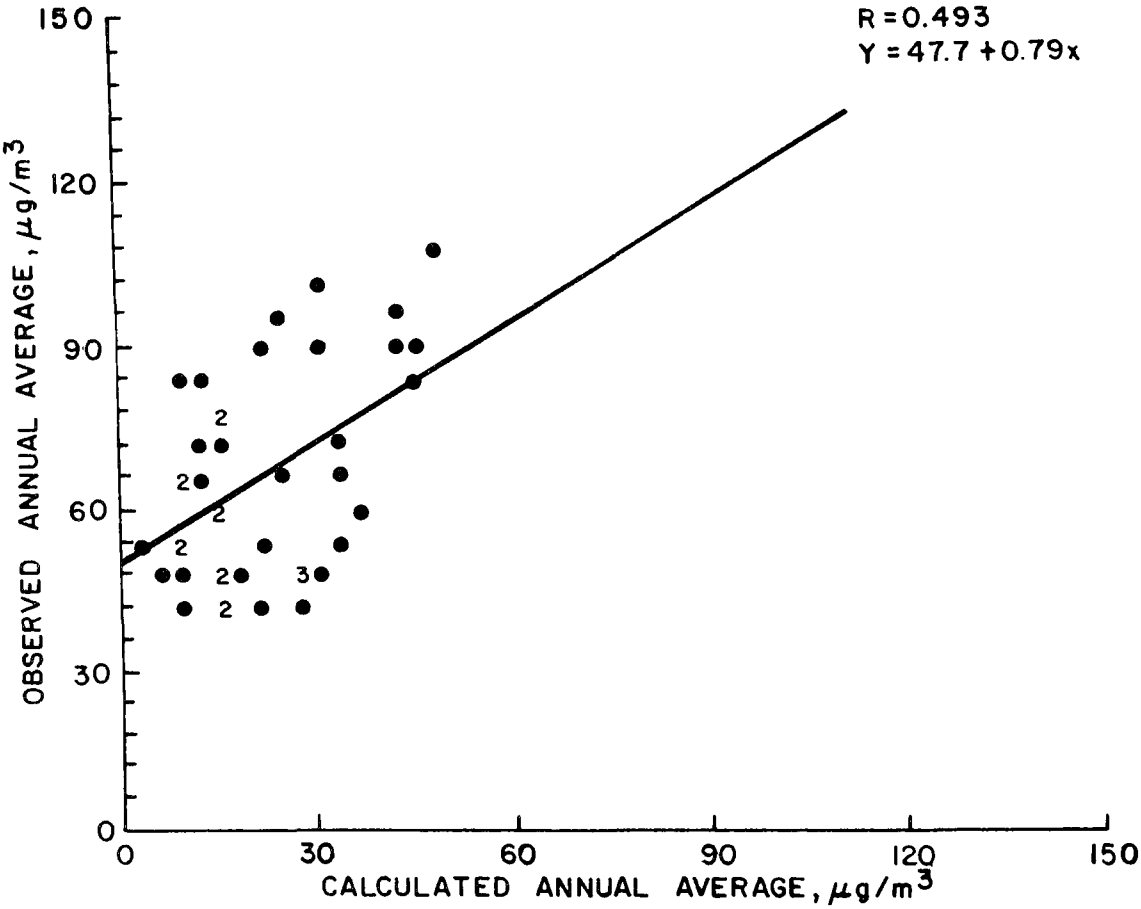


Figure 1. TSP calibration for 43 select New Jersey and Pennsylvania monitors (1974).

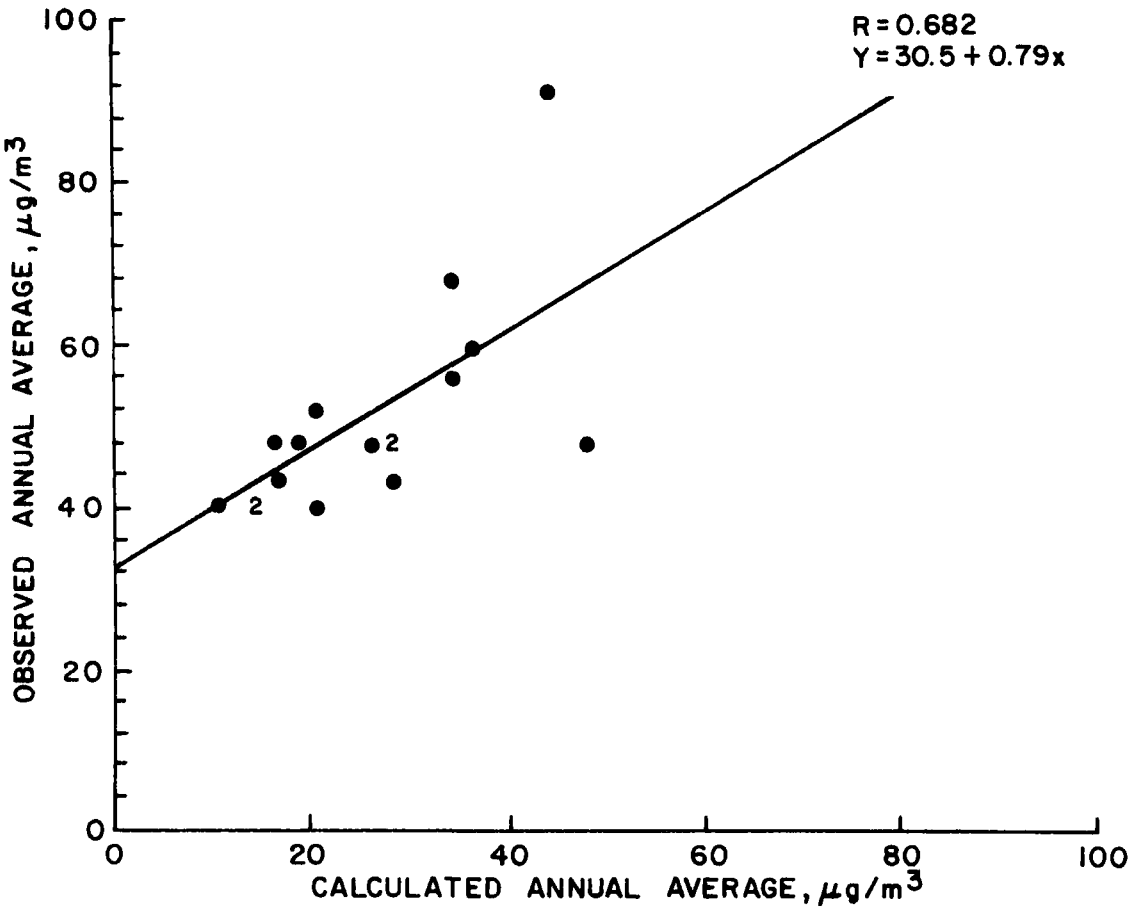


Figure 2. TSP calibration for all 17 New Jersey monitors (1974).

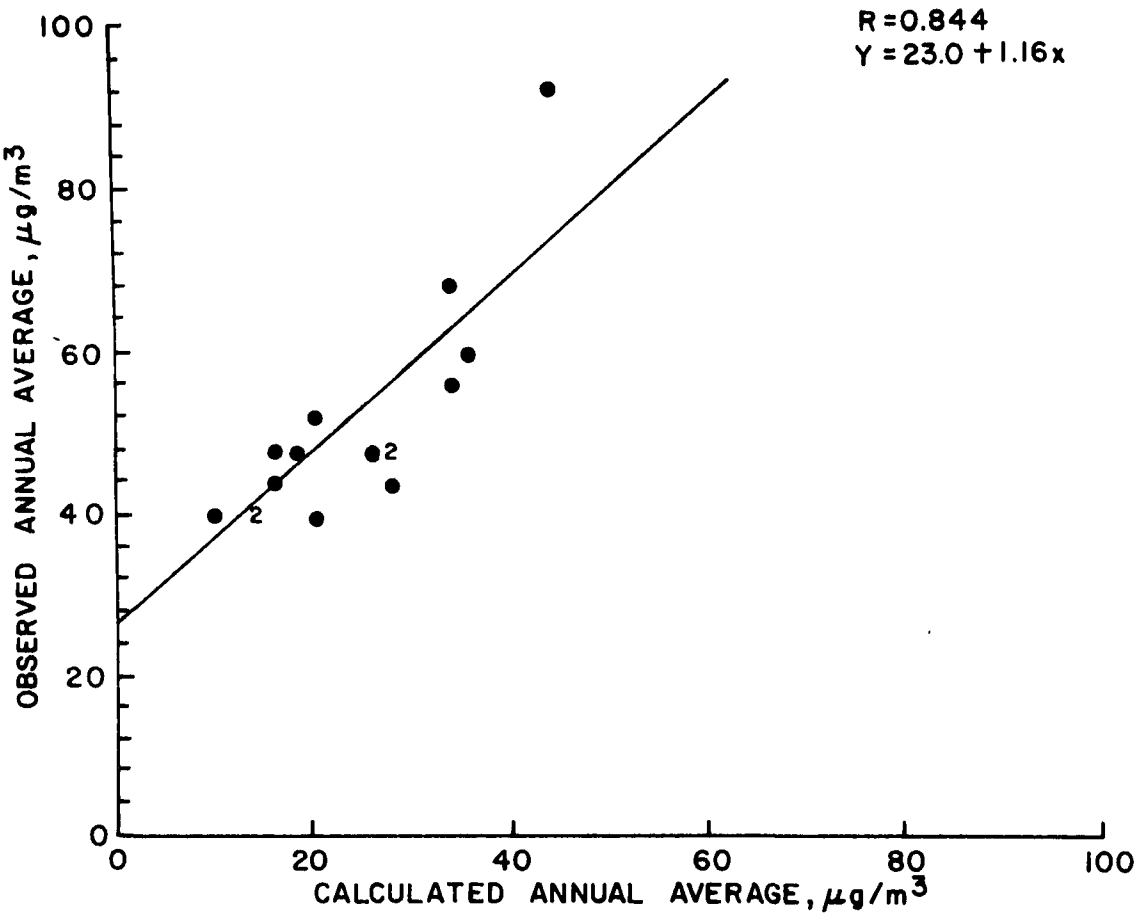


Figure 3. TSP calibration for 16 select New Jersey monitors (1974).

TABLE 12. COMPARISON OF PREDICTED AND OBSERVED ANNUAL ARITHMETIC AV

Station county	SAROAD site code	Station type	Station UTM coordinates		Observed air quality ($\mu g/m^3$)
			Easting (km)	Northing (km)	
Burlington	310640002	SUB-RES	526.3	4,434.7	49.
Burlington	310660003	SUB-RES	514.7	4,416.3	41.
Burlington	310660004	RUR-AGR	530.6	4,440.5	44.
Burlington	310660005	RUR-AGR	514.1	4,434.7	48.
Camden	310720001	CC-IND.	489.4	4,421.4	90.
Camden	310740003	RUR-NR.URB	505.3	4,404.7	53.
Camden	310740003	SUB-RES	496.5	4,419.3	55.
Gloucester	310900001	RUR-AGR	491.6	4,391.9	39.
Camden	311000001	SUB-RES	494.7	4,419.0	58.
Gloucester	311700001	SUB-RES	489.4	4,395.3	45.
Gloucester	311760001	RUR-AGR	475.0	4,400.8	40.
Mercer	312980001	RUR-AGR	512.4	4,462.6	46.
Mercer	312980002	SUB-RES	533.6	4,462.4	47.
Mercer	312980003	SUB-COMM	524.9	4,448.0	48.
Salem	314900001	RUR-AGR	469.3	4,387.0	39.
Mercer	315400001	CC-COMM	519.5	4,452.0	68.
Gloucester	316060001	SUB-RES	487.4	4,408.9	49.

SECTION 4

CALCULATED AIR QUALITY

With the calibration of the model, and the projection of emissions to 1982 and 1990, the air quality for TSP can be calculated for future years. The meteorology and model assumptions for the future years are the same as the assumptions and meteorology utilized in Contract 68-02-1376, Task Order 24. The STAR summary of windspeed, direction and stability for Philadelphia International Airport in 1974 was used for model calibration, while long-term averages were used for projection years. The model runs were separated into area contribution and point contribution, and a source receptor file was written on tape for each receptor used. In Figures 4 and 5 the regional TSP air quality contours are shown for 1982 and 1990. The calculated air quality values at each receptor are listed in Tables 13 and 14.

Since the air quality has been calculated as an arithmetic annual average, and the primary annual standard for TSP is given as a geometric average, a method is required to convert arithmetic to geometric average. With the use of Larsen[2] statistics, the geometric average can be calculated as follows:

$$mg = \frac{m}{\exp\ (0.5\ \ln^2 s_g)}$$

where m_g = geometric mean

m = arithmetic mean

s_g = geometric standard deviation

A typical s_g for this region is 1.70, giving the following relationship:

$$m_g = m/1.15$$

The highest calculated TSP concentration in the region was 82 $\mu g/m^3$ (annual arithmetic average); dividing by 1.15 yields 71.3 or the estimated geometric mean. Since 71.3 $\mu g/m^3$ is less than the primary annual standard, the region is in attainment of this primary standard.

In order to examine in closer detail the air quality in the City of Camden, the air quality was calculated for a 2 km grid. The resulting air quality is presented in Figures 6 and 7 and tabulated by receptor in Tables 15 and 16. The high concentration at the top of the figures is due to the dock-side grain loading facility in Philadelphia which causes a very localized high TSP concentration which did not appear in the 5 km resolution grid used for Figures 4 and 5.

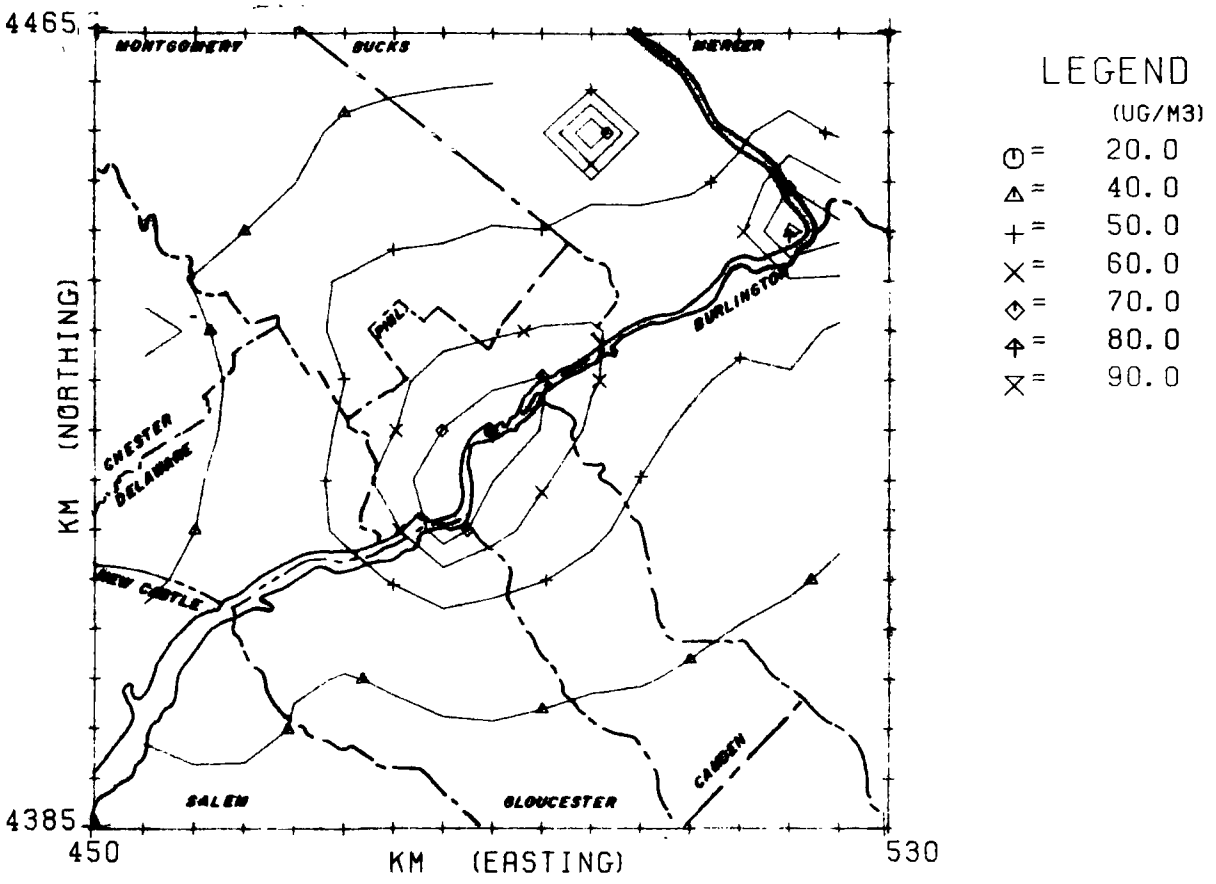


Figure 4. Arithmetic average, TSP in $\mu g/m^3$, 1982 air quality (no strategy).

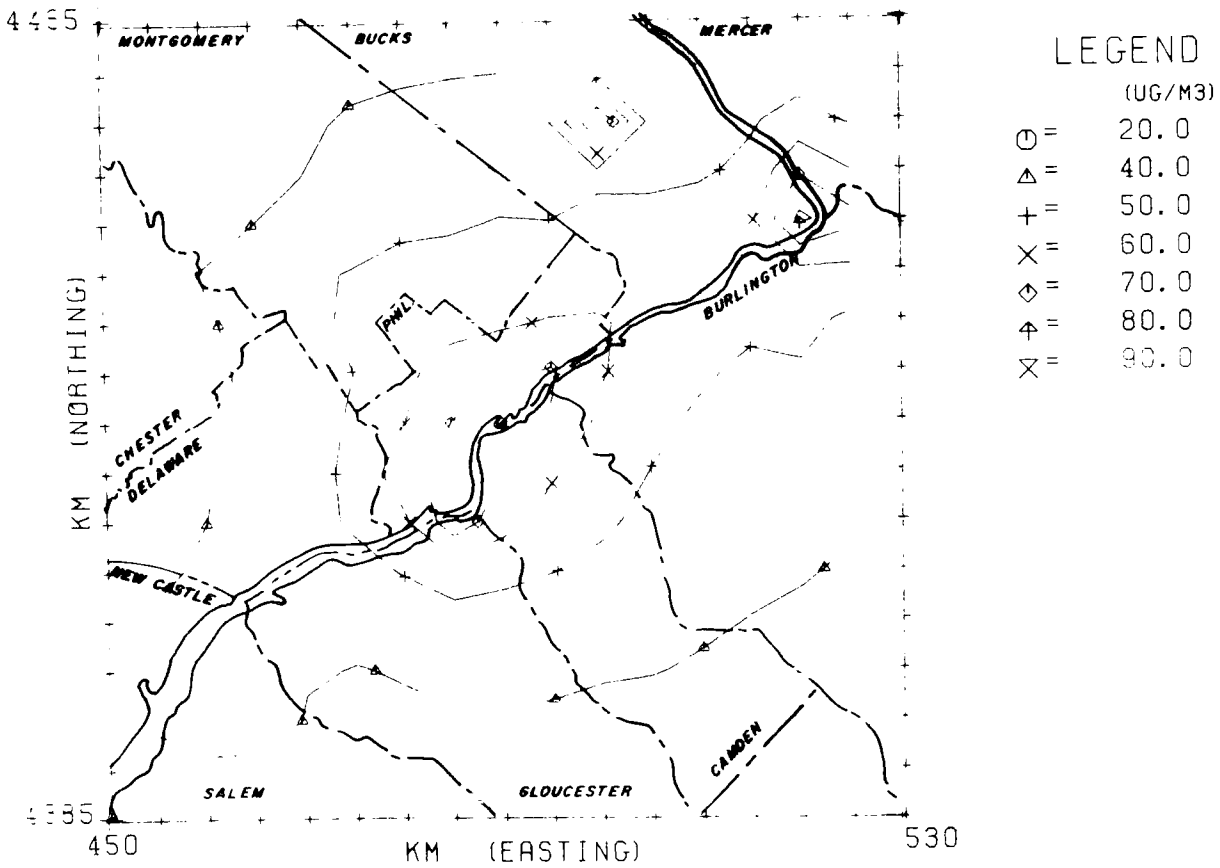


Figure 5. Arithmetic average, TSP in $\mu g/m^3$, 1990 air quality (no strategy)

TABLE 13. TSP AIR QUALITY 1982

NO.	EAST	NORTH	UG/M**3	NO.	EAST	NORTH	UG/M**3	N(
1	455.0	4390.0	35.	2	455.0	4395.0	39.	
4	455.0	4405.0	40.	5	455.0	4410.0	37.	
7	455.0	4420.0	38.	8	455.0	4425.0	38.	
10	455.0	4435.0	42.	11	455.0	4440.0	37.	
13	455.0	4450.0	38.	14	455.0	4455.0	35.	
16	460.0	4390.0	34.	17	460.0	4395.0	45.	
19	460.0	4405.0	43.	20	460.0	4410.0	40.	
22	460.0	4420.0	39.	23	460.0	4425.0	39.	
25	460.0	4435.0	39.	26	460.0	4440.0	40.	
28	460.0	4450.0	37.	29	460.0	4455.0	35.	
31	465.0	4390.0	35.	32	465.0	4395.0	43.	
34	465.0	4405.0	43.	35	465.0	4410.0	45.	
37	465.0	4420.0	41.	38	465.0	4425.0	41.	
40	465.0	4435.0	41.	41	465.0	4440.0	41.	
43	465.0	4450.0	38.	44	465.0	4455.0	36.	
46	470.0	4390.0	35.	47	470.0	4395.0	37.	
49	470.0	4405.0	42.	50	470.0	4410.0	46.	
52	470.0	4420.0	45.	53	470.0	4425.0	45.	
55	470.0	4435.0	46.	56	470.0	4440.0	47.	
58	470.0	4450.0	39.	59	470.0	4455.0	38.	
61	475.0	4390.0	35.	62	475.0	4395.0	37.	
64	475.0	4405.0	41.	65	475.0	4410.0	46.	
67	475.0	4420.0	52.	68	475.0	4425.0	51.	
70	475.0	4435.0	52.	71	475.0	4440.0	50.	
73	475.0	4450.0	42.	74	475.0	4455.0	41.	
76	480.0	4390.0	35.	77	480.0	4395.0	37.	
79	480.0	4405.0	43.	80	480.0	4410.0	49.	
82	480.0	4420.0	65.	83	480.0	4425.0	59.	
85	480.0	4435.0	53.	86	480.0	4440.0	54.	
88	480.0	4450.0	43.	89	480.0	4455.0	41.	
91	485.0	4390.0	36.	92	485.0	4395.0	38.	
94	485.0	4405.0	46.	95	485.0	4410.0	53.	
97	485.0	4420.0	75.	98	485.0	4425.0	69.	
100	485.0	4435.0	56.	101	485.0	4440.0	53.	1
103	485.0	4450.0	44.	104	485.0	4455.0	42.	1
106	490.0	4390.0	36.	107	490.0	4395.0	39.	1
109	490.0	4405.0	45.	110	490.0	4410.0	51.	1
112	490.0	4420.0	68.	113	490.0	4425.0	79.	1
115	490.0	4435.0	58.	116	490.0	4440.0	54.	1
118	490.0	4450.0	45.	119	490.0	4455.0	43.	1
121	495.0	4390.0	36.	122	495.0	4395.0	38.	1
124	495.0	4405.0	44.	125	495.0	4410.0	49.	1
127	495.0	4420.0	60.	128	495.0	4425.0	68.	1
130	495.0	4435.0	60.	131	495.0	4440.0	54.	1
133	495.0	4450.0	45.	134	495.0	4455.0	49.	1
136	500.0	4390.0	36.	137	500.0	4395.0	37.	1
139	500.0	4405.0	43.	140	500.0	4410.0	47.	1
142	500.0	4420.0	54.	143	500.0	4425.0	57.	1
145	500.0	4435.0	60.	146	500.0	4440.0	55.	1
148	500.0	4450.0	48.	149	500.0	4455.0	80.	1

(continued)

TABLE 13 (continued).

NO.	EAST	NORTH	UG/M**3	NO.	EAST	NORTH	UG/M**3	NO
151	505.0	4390.0	35.	152	505.0	4395.0	37.	1
154	505.0	4405.0	43.	155	505.0	4410.0	46.	1
157	505.0	4420.0	49.	158	505.0	4425.0	51.	1
160	505.0	4435.0	50.	161	505.0	4440.0	54.	1
163	505.0	4450.0	47.	164	505.0	4455.0	49.	1
166	510.0	4390.0	35.	167	510.0	4395.0	37.	1
169	510.0	4405.0	40.	170	510.0	4410.0	42.	1
172	510.0	4420.0	46.	173	510.0	4425.0	48.	1
175	510.0	4435.0	53.	176	510.0	4440.0	55.	1
178	510.0	4450.0	48.	179	510.0	4455.0	47.	1
181	515.0	4390.0	35.	182	515.0	4395.0	36.	1
184	515.0	4405.0	39.	185	515.0	4410.0	41.	1
187	515.0	4420.0	44.	188	515.0	4425.0	46.	1
190	515.0	4435.0	51.	191	515.0	4440.0	57.	1
193	515.0	4450.0	51.	194	515.0	4455.0	48.	1
196	520.0	4390.0	34.	197	520.0	4395.0	35.	1
199	520.0	4405.0	38.	200	520.0	4410.0	40.	2
202	520.0	4420.0	44.	203	520.0	4425.0	46.	2
205	520.0	4435.0	52.	206	520.0	4440.0	58.	2
208	520.0	4450.0	68.	209	520.0	4455.0	52.	2
211	525.0	4390.0	34.	212	525.0	4395.0	35.	2
214	525.0	4405.0	37.	215	525.0	4410.0	39.	2
217	525.0	4420.0	42.	218	525.0	4425.0	44.	2
220	525.0	4435.0	48.	221	525.0	4440.0	58.	2
223	525.0	4450.0	59.	224	525.0	4455.0	48.	2
226	489.4	4421.4	69.					

TABLE 14. TSP AIR QUALITY 1990

NO.	EAST	NORTH	UG/M**3	NO.	EAST	NORTH	UG/M**3	NO.
1	455.0	4390.0	36.	2	455.0	4395.0	41.	3
4	455.0	4405.0	42.	5	455.0	4410.0	39.	6
7	455.0	4420.0	38.	8	455.0	4425.0	38.	9
10	455.0	4435.0	42.	11	455.0	4440.0	37.	12
13	455.0	4450.0	38.	14	455.0	4455.0	35.	15
16	460.0	4390.0	36.	17	460.0	4395.0	50.	18
19	460.0	4405.0	46.	20	460.0	4410.0	41.	21
22	460.0	4420.0	40.	23	460.0	4425.0	39.	24
25	460.0	4435.0	39.	26	460.0	4440.0	40.	27
28	460.0	4450.0	37.	29	460.0	4455.0	36.	30
31	465.0	4390.0	37.	32	465.0	4395.0	47.	33
34	465.0	4405.0	45.	35	465.0	4410.0	46.	36
37	465.0	4420.0	42.	38	465.0	4425.0	41.	39
40	465.0	4435.0	42.	41	465.0	4440.0	42.	42
43	465.0	4450.0	38.	44	465.0	4455.0	37.	45
46	470.0	4390.0	36.	47	470.0	4395.0	39.	48
49	470.0	4405.0	43.	50	470.0	4410.0	47.	51
52	470.0	4420.0	46.	53	470.0	4425.0	45.	54
55	470.0	4435.0	46.	56	470.0	4440.0	48.	57
58	470.0	4450.0	40.	59	470.0	4455.0	38.	60
61	475.0	4390.0	36.	62	475.0	4395.0	38.	63
64	475.0	4405.0	43.	65	475.0	4410.0	47.	66
67	475.0	4420.0	53.	68	475.0	4425.0	51.	69
70	475.0	4435.0	52.	71	475.0	4440.0	51.	72
73	475.0	4450.0	43.	74	475.0	4455.0	41.	75
76	480.0	4390.0	36.	77	480.0	4395.0	39.	78
79	480.0	4405.0	44.	80	480.0	4410.0	51.	81
82	480.0	4420.0	66.	83	480.0	4425.0	59.	84
85	480.0	4435.0	54.	86	480.0	4440.0	55.	87
88	480.0	4450.0	44.	89	480.0	4455.0	41.	90
91	485.0	4390.0	37.	92	485.0	4395.0	39.	93
94	485.0	4405.0	47.	95	485.0	4410.0	54.	96
97	485.0	4420.0	77.	98	485.0	4425.0	70.	99
100	485.0	4435.0	57.	101	485.0	4440.0	54.	102
103	485.0	4450.0	45.	104	485.0	4455.0	43.	105
106	490.0	4390.0	37.	107	490.0	4395.0	40.	108
109	490.0	4405.0	46.	110	490.0	4410.0	52.	111
112	490.0	4420.0	70.	113	490.0	4425.0	81.	114
115	490.0	4435.0	59.	116	490.0	4440.0	55.	117
118	490.0	4450.0	46.	119	490.0	4455.0	44.	120
121	495.0	4390.0	37.	122	495.0	4395.0	39.	123
124	495.0	4405.0	45.	125	495.0	4410.0	50.	126
127	495.0	4420.0	61.	128	495.0	4425.0	69.	129
130	495.0	4435.0	61.	131	495.0	4440.0	55.	132
133	495.0	4450.0	46.	134	495.0	4455.0	49.	135
136	500.0	4390.0	36.	137	500.0	4395.0	38.	138
139	500.0	4405.0	44.	140	500.0	4410.0	48.	141
142	500.0	4420.0	55.	143	500.0	4425.0	58.	144
145	500.0	4435.0	61.	146	500.0	4440.0	56.	147
148	500.0	4450.0	49.	149	500.0	4455.0	80.	150

(continued)

TABLE 14 (continued).

NO.	EAST	NORTH	UG/M**3	NO.	EAST	NORTH	UG/M**3	NO.
151	505.0	4390.0	36.	152	505.0	4395.0	38.	153
154	505.0	4405.0	44.	155	505.0	4410.0	47.	156
157	505.0	4420.0	50.	158	505.0	4425.0	52.	159
160	505.0	4435.0	57.	161	505.0	4440.0	55.	162
163	505.0	4450.0	48.	164	505.0	4455.0	49.	165
166	510.0	4390.0	36.	167	510.0	4395.0	37.	168
169	510.0	4405.0	41.	170	510.0	4410.0	43.	171
172	510.0	4420.0	47.	173	510.0	4425.0	49.	174
175	510.0	4435.0	54.	176	510.0	4440.0	55.	177
178	510.0	4450.0	49.	179	510.0	4455.0	47.	180
181	515.0	4390.0	35.	182	515.0	4395.0	37.	183
184	515.0	4405.0	40.	185	515.0	4410.0	42.	186
187	515.0	4420.0	45.	188	515.0	4425.0	47.	189
190	515.0	4435.0	52.	191	515.0	4440.0	58.	192
193	515.0	4450.0	52.	194	515.0	4455.0	49.	195
196	520.0	4390.0	35.	197	520.0	4395.0	36.	198
199	520.0	4405.0	39.	200	520.0	4410.0	41.	201
202	520.0	4420.0	44.	203	520.0	4425.0	47.	204
205	520.0	4435.0	53.	206	520.0	4440.0	59.	207
208	520.0	4450.0	68.	209	520.0	4455.0	53.	210
211	525.0	4390.0	34.	212	525.0	4395.0	35.	213
214	525.0	4405.0	38.	215	525.0	4410.0	39.	216
217	525.0	4420.0	42.	218	525.0	4425.0	44.	219
220	525.0	4435.0	48.	221	525.0	4440.0	58.	222
223	525.0	4450.0	60.	224	525.0	4455.0	49.	225
226	489.4	4421.4	71.					

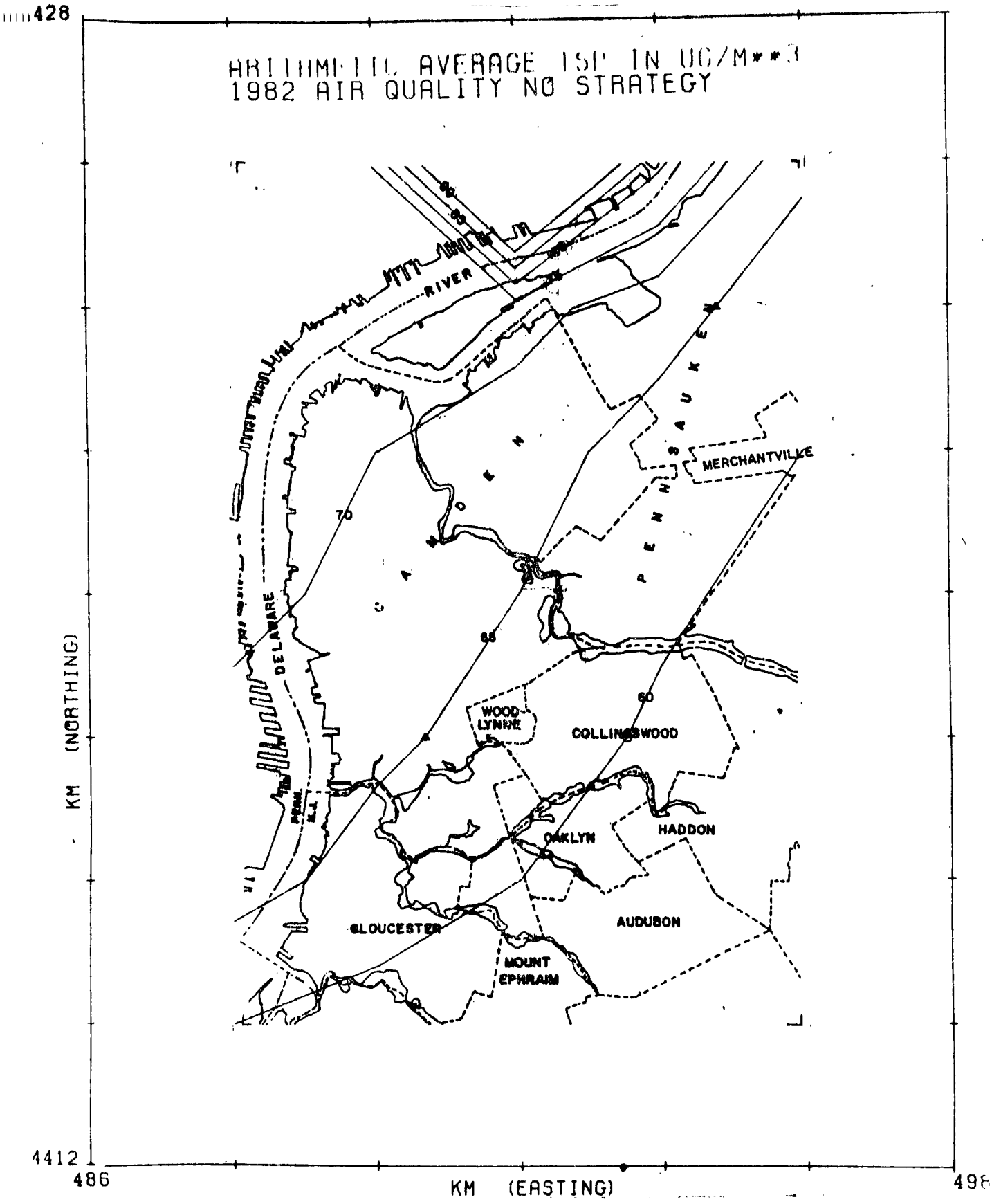


Figure 6. Camden TSP air quality for 1982.

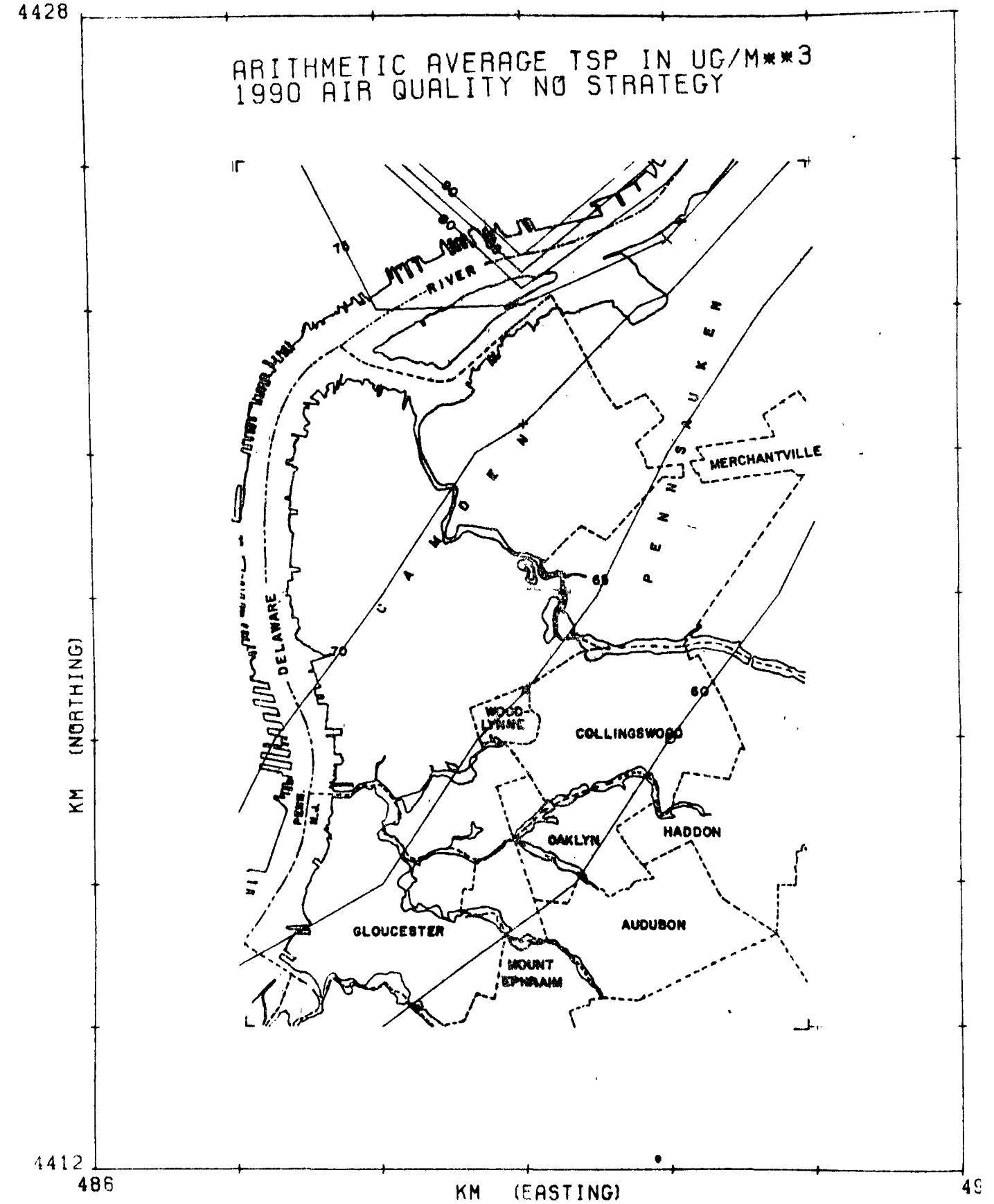


Figure 7. Camden TSP air quality for 1990.

TABLE 15. TSP AIR QUALITY IN CAMDEN 1982

NO.	EAST	NORTH	UG/M**3	NO.	EAST	NORTH	UG/M**3	NO
1	488.0	4414.0	60.	2	488.0	4416.0	67.	
4	488.0	4420.0	71.	5	488.0	4422.0	71.	
7	488.0	4426.0	72.	8	490.0	4414.0	58.	
10	490.0	4418.0	66.	11	490.0	4420.0	69.	
13	490.0	4424.0	73.	14	490.0	4426.0	75.	
16	492.0	4416.0	60.	17	492.0	4418.0	63.	
19	492.0	4422.0	67.	20	492.0	4424.0	72.	
22	494.0	4414.0	54.	23	494.0	4416.0	56.	
25	494.0	4420.0	61.	26	494.0	4422.0	63.	
28	494.0	4426.0	81.	29	496.0	4414.0	52.	
31	496.0	4418.0	56.	32	496.0	4420.0	58.	
34	496.0	4424.0	62.	35	496.0	4426.0	66.	

TABLE 16. TSP AIR QUALITY IN CAMDEN 1990

NO.	EAST	NORTH	UG/M**3	NO.	EAST	NORTH	UG/M**3	NO.
1	488.0	4414.0	62.	2	488.0	4416.0	69.	
4	488.0	4420.0	73.	5	488.0	4422.0	72.	
7	488.0	4426.0	73.	8	490.0	4414.0	60.	
10	490.0	4418.0	67.	11	490.0	4420.0	70.	1
13	490.0	4424.0	75.	14	490.0	4426.0	77.	1
16	492.0	4416.0	61.	17	492.0	4418.0	64.	1
19	492.0	4422.0	69.	20	492.0	4424.0	74.	2
22	494.0	4414.0	55.	23	494.0	4416.0	58.	2
25	494.0	4420.0	63.	26	494.0	4422.0	65.	2
28	494.0	4426.0	82.	29	496.0	4414.0	53.	3
31	496.0	4418.0	57.	32	496.0	4420.0	59.	3
34	496.0	4424.0	63.	35	496.0	4426.0	68.	3

The high concentrations do not exceed the primary annual standard anywhere in the New Jersey portion of the Metropolitan Philadelphia AQCR.

An analysis was performed to ascertain whether or not the secondary 2-hour standard of 260 $\mu g/m^3$ was being attained (attainment is defined as not exceeding this value more than once per year). Through Larsen statistical analysis, the annual average which should not be exeeded if the 24-hour standard is not to be exceeded, can be calculated. The generally accepted geometric annual value is 60 $\mu g/m^3$ which is determined assuming a geometric standard deviation of about 1.75. This corresponds to an arithmetic annual average value of 69 $\mu g/m^3$. Based on the annual arithmetic value of 69 $\mu g/m^3$, a section of the City of Camden would be in nonattainment of the secondary standard. To determine whether the 69 $\mu g/m^3$ was applicable for the Camden area, an analysis was performed to graphically calculate the average geometric standard deviation (see Figures 8 through 11), and to compare these calculated values with the values calculated directly from the air quality measurements. Table 17 lists the resulting values.

TABLE 17. GEOMETRIC STANDARD DEVIATIONS FOR THE CAMDEN AREA

Site code	Site identification	Calculated s_g	Graphical s_g
310740003 Sub-Res	Cherry Hill	1.58	1.92
310730003 Rur-Nr.Urb	Berlin Township	1.62	1.71
311000001 Sub-Res	South Park Drive	1.78	1.88
310720001 CC-Ind	NASN (Fire Station)	1.58	1.72
	Average	1.64	1.81

If the geometric standard deviation of 1.64 is utilized to calculate the annual arithmetic value which should not be exceeded to attain the 24-hour standard, the annual arithmetic value would be about 80 $\mu g/m^3$. However, if the geometric standard deviation of 1.81 is utilized to calculate the annual arithmetic value not to be exceeded, the value is 65 $\mu g/m^3$. The graphical technique utilized to determine the geometric standard deviation is more sensitive to the high end of the distribution, and considers the fact that the maximum value is more a function of the tail of the distribution rather than the complete distribution. Since any year has a maximum of 60 values in the frequency distribution, it may be advantageous to add the distributions from a number of years to obtain a more statistically significant geometric standard deviation. The importance of obtaining an accurate geometric standard deviation can be seen in that if 1.64 is the correct value, Camden is in attainment of the secondary standard; however, if 1.81 is the correct geometric standard deviation only a portion of the City is in attainment of the secondary standard.

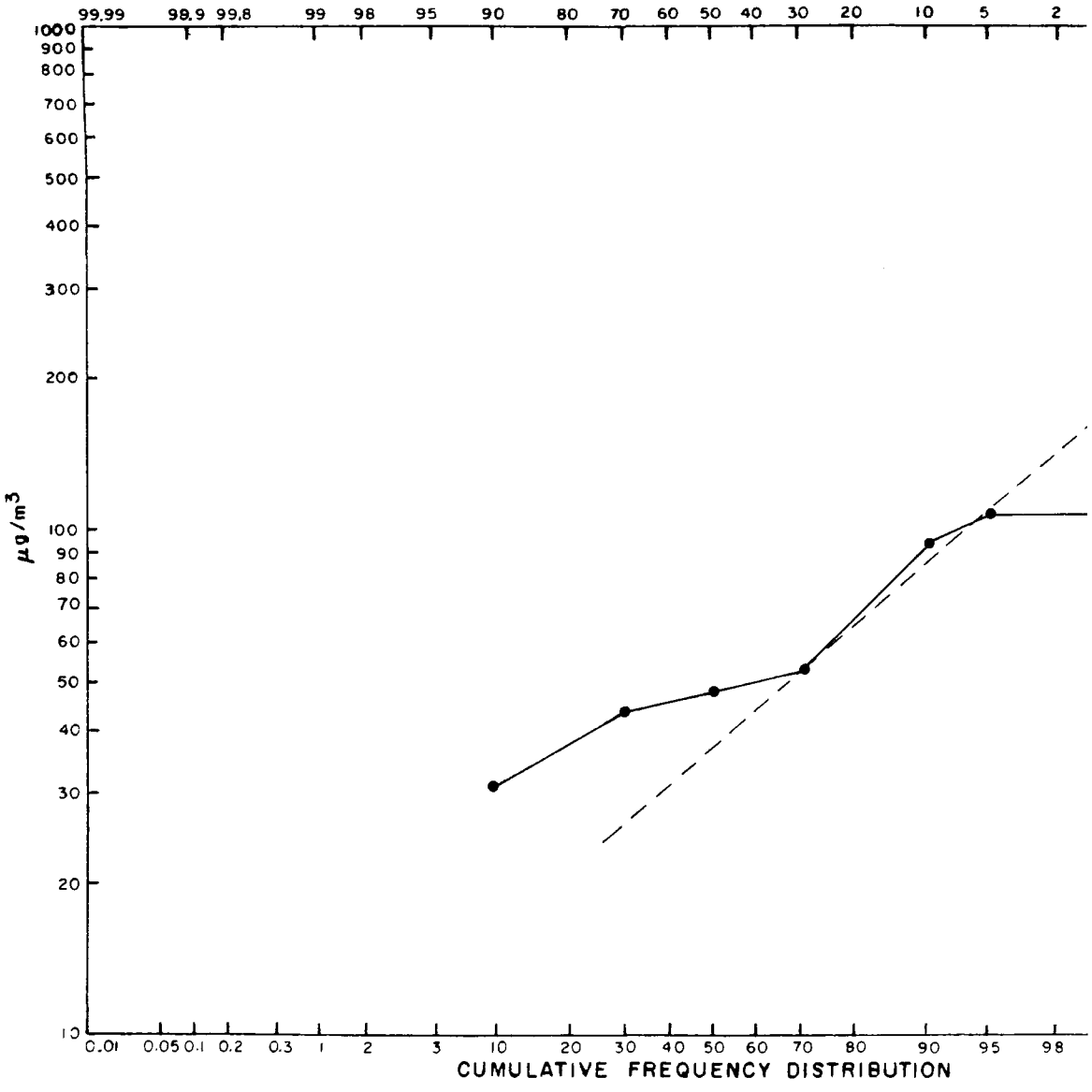


Figure 8. Frequency distribution for Cherry Hill s:

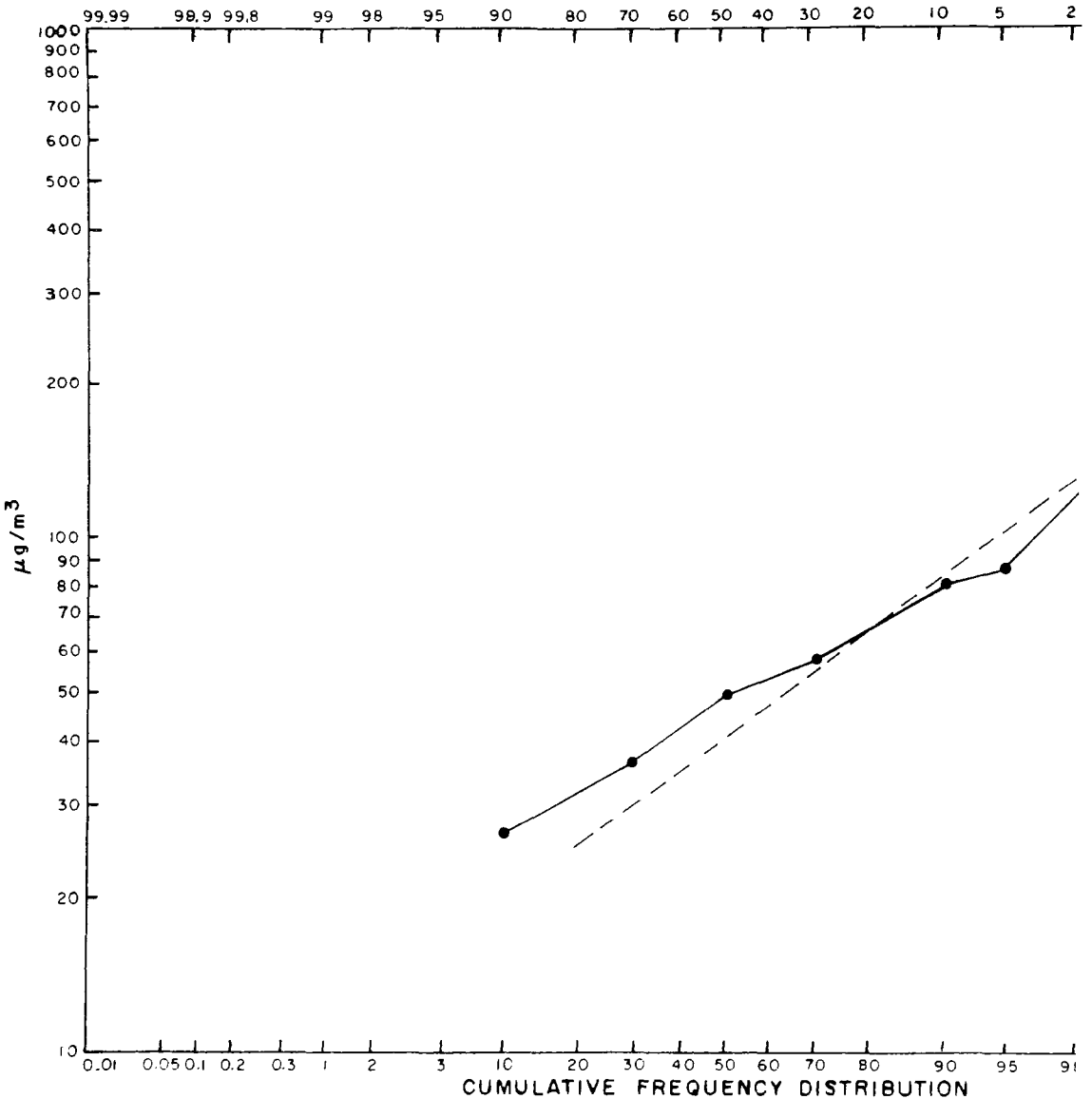


Figure 9. Frequency distribution for Berlin Township

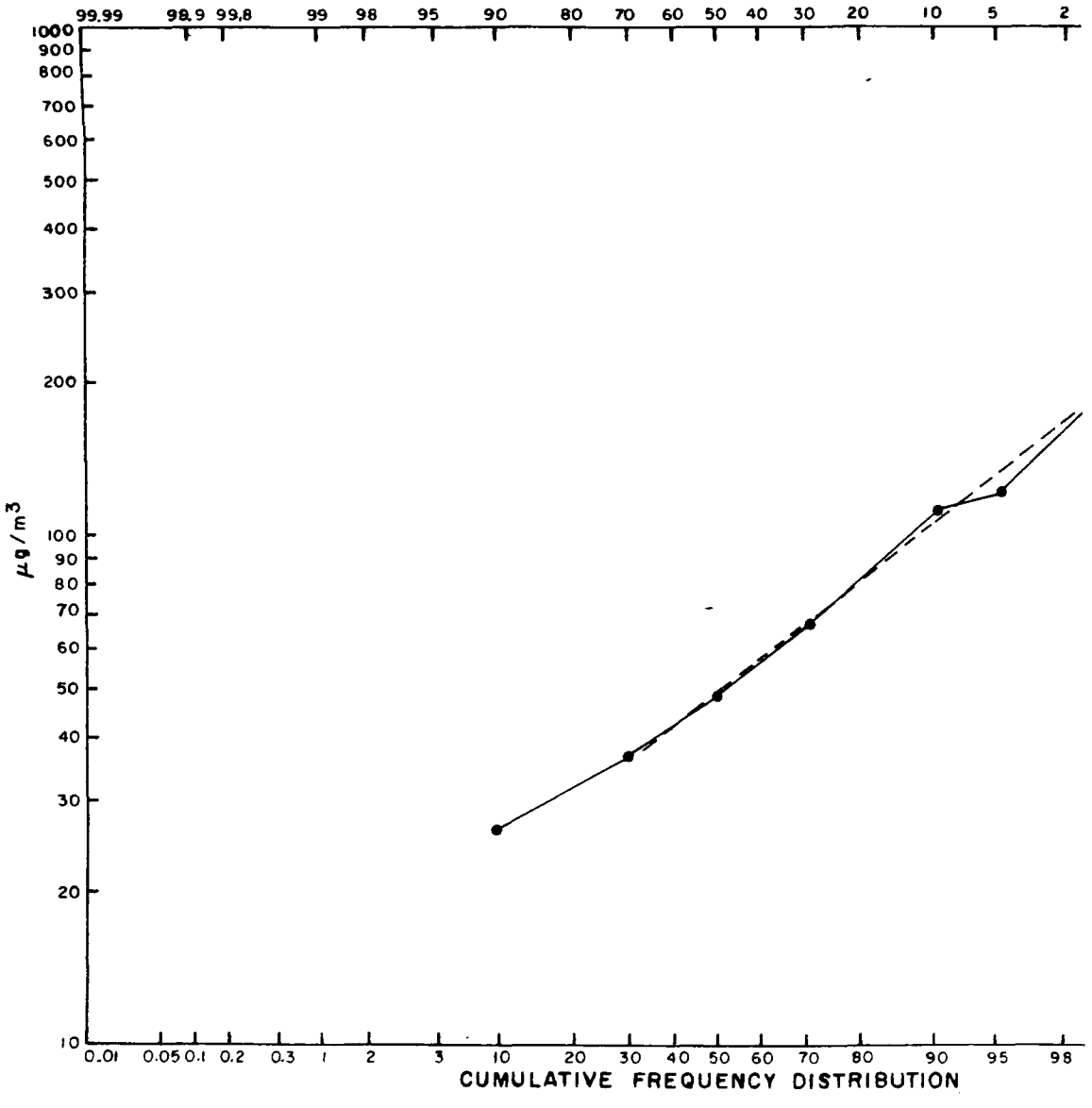


Figure 10. Frequency distribution for South Park Driv

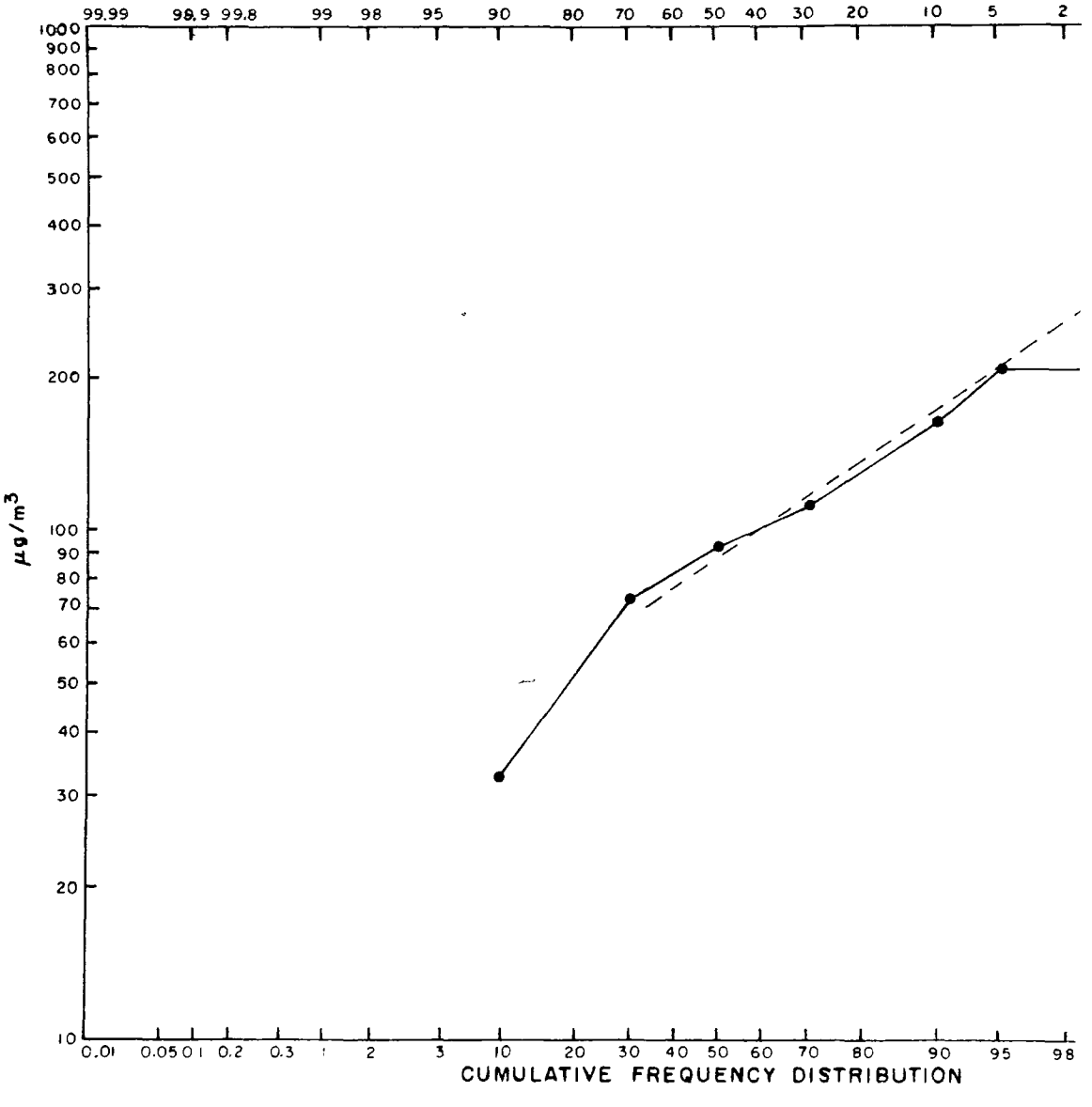


Figure 11. Frequency distribution for NASN sit

SECTION 5

AIR QUALITY ANALYSIS AND RECOMMENDATIONS

AIR QUALITY DATA AT THE NASN SITE IN CAMDEN

The air quality, as measured at the NASN site, is above the standard. Under this program, a short analysis was performed to determine the reason for the high air quality values. Modeling has underpredicted this monitor by about 16 $\mu g/m^3$, thus indicating that the source of the high TSP concentrations is not in the inventory, and it may be a localized fugitive source.

In order to determine the principal source types impacting the monitor, a study of the trace element analysis was performed for the filters analyzed by EPA. To conduct a reliable elemental balance determination of the sources contributing to TSP levels at a monitor, some eight tracer elements are required. These include: Sodium (marine tracer), Vanadium (oil combustion tracer), Lead (auto tracer), Zinc (incineration tracer), and Aluminum, Iron, Manganese, and Arsenic (soil and coal tracers). Both soil and coal are high in Iron and Aluminum, so Manganese (depleted in coal particulates) and Arsenic (depleted in windblown soil) are needed in order to separate these two similar particulates.

In the case of the NASN data, only four of these eight tracer elements have been analyzed. As a result, a meaningful total elemental balance is not possible with the NASN data. Certain source contributions can be roughly determined, however. For instance, the 1973-1974 annual average lead content (approximately 1.5 percent) of the sample at the City of Camden NASN station indicates that about 10 percent of the particulate load is due to automobile emissions. The Vanadium content (approximately 0.1 percent) indicates that oil combustion contributes only 1 to 2 percent of the ambient TSP load at this station. The other four TSP components (i.e., soil, marine, incineration, and coal) are not as confidently determined.

If the coal combustion is assumed to be zero, then the Iron content at the site (1.9 percent) indicates that soil makes up one-half of all particulates at the site. Applying this percentage contribution to the soil Manganese content (0.09 percent), however, underpredicts the ambient concentration found. Also, without considering the Aluminum content, the Iron content cannot be accurately used as a soil-tracer, due to possible interferences by other Iron sources such as auto body rust particulates, or industrial process emissions. Thus, it is not possible to confidently state the soil contribution without a complete elemental balance of all eight tracers.

It is interesting to note, however, that the Iron content at the Glassboro site in Gloucester County is much lower than that at the Camden site (25 percent versus 50 percent). Thus, if windblown urban particulates are the cause of the higher Iron content, this would explain why the AQDM model is better able to predict concentrations at the Glassboro site. If the above considerations are to be resolved, it seems clear that a more complete elemental balance analysis of TSP samples at the Camden site is required (including all eight tracer elements). Moreover, at least one other (complying) site should be similarly analyzed for comparative purposes.

ATTAINMENT OF THE PRIMARY ANNUAL TSP STANDARD

Attainment of the Primary Annual Standard in the region has been achieved, and it will be maintained through 1990. The high TSP air quality near Trenton is primarily due to the U.S. Steel Fairless Works. However, the actual impact of this source is considerably less than the calculated concentrations indicated because the emissions are predominantly large particles which, for the most part, settle onto the company's property. This conclusion was derived from discussions with the local field office of the Pennsylvania Department of Environmental Resources, and from the fact that the monitoring site in Trenton has considerably less observed TSP concentration than the model predicts.

ATTAINMENT OF THE SECONDARY TSP STANDARD

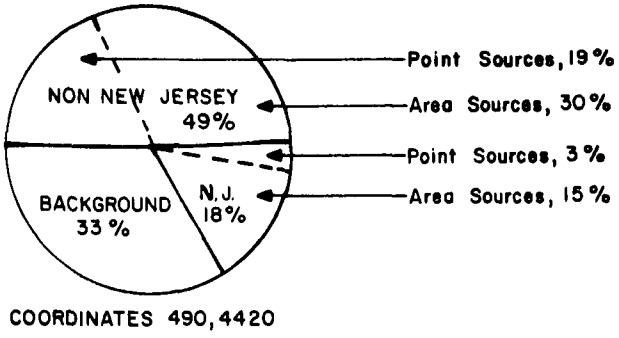
Based on the discussions in Section 4, the determination of the attainment of the secondary 24-hour standard is questionable. The main difficulty lies in the determination of the appropriate geometric standard deviation. Examining the limited data available at the Camden NASN and Cherry Hill sites gave low (1.58) geometric standard deviations. However, the data represented only about one-third of the year. The Berlin Township and South Park Drive sites had higher geometric standard deviations, but the peak observed concentrations were 152 $\mu g/m^3$ and 192 $\mu g/m^3$, both above the secondary standard.

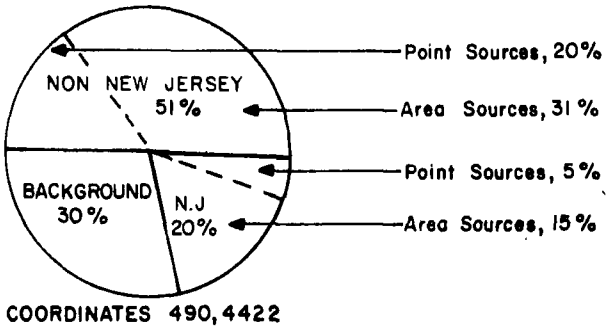
From the available data it appears that there may be a problem in attaining the secondary standard; however, it is not clear whether or not there is a problem. Further analysis of a more complete data base for all Camden monitors will be required to better define whether or not a problem exists.

Strategies were not presented to reduce emissions and make sure the secondary standard was achieved. The primary reason for not recommending any strategy is the large percentage of the air quality concentrations which are due to background and area sources. Figures 12 and 13 display the relative contributions of various regions to the recorded air quality. It becomes apparent that New Jersey's contribution is small; thus, controls by New Jersey alone would not radically improve the air quality. Appendix A contains the source contribution files for selected receptors in the region.

RECOMMENDATIONS FOR FURTHER STUDY

Two suggestions can be made concerning the air quality in the Camden area. The first is a detailed study around the NASN site to determine the reason for





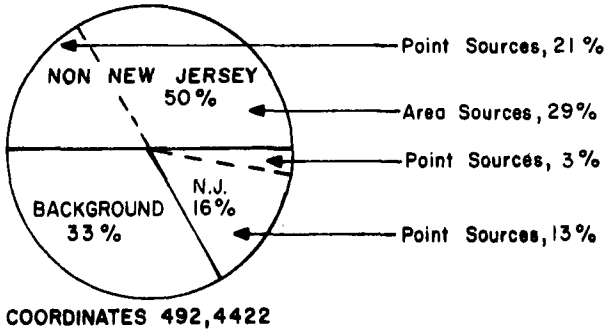


Figure 12. Distribution of the location of sources impacting selected receptors in Camden City in 1974.

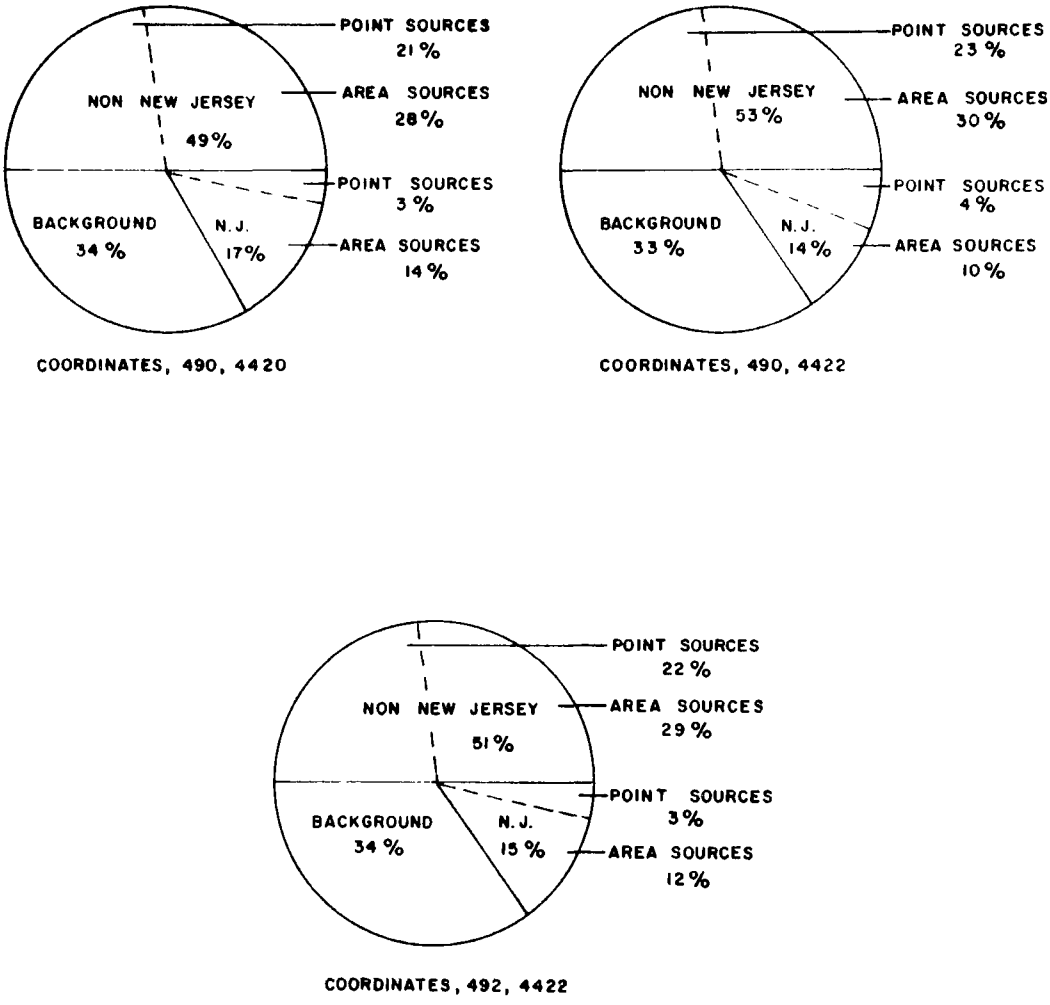


Figure 13. Distribution of the location of sources impacting selected receptors in Camden City in 1982.

the high concentrations observed at the site. The second recommendation is to look at a complete data base for the monitoring site in Camden to make a better determination of the geometric standard deviation, and to examine the concentration data to determine if values above the secondary standard are being observed.

Our recommendations for resolving the reason for the high TSP concentrations at the Camden NASN site are as follows:

1. Examine historical data to assess the trends in air quality.

2. Perform a complete elemental analysis to determine the principal source categories which are contributing to the high TSP concentrations.

3. Perform a detailed mini-inventory around the site.

4. Perform some modeling to see if the new inventory accounts for the observed concentrations.

5. Perform the above analysis for a nearby compliance site to help assess the differences between the sites which may account for the high concentrations.

6. Set up a special monitoring program to identify the emission sources and emission rates.

Some of these recommendations can be easily implemented with a minimal expenditure of manpower and funds, while others are very extensive and expensive. We recommend that the above steps be followed in the order presented so that no more effort than required would be expended to resolve the problem.

REFERENCES

1. Emission Inventory and Sulfur Dioxide Alternatives for the Metropolitan Philadelphia Region. U.S. Environmental Protection Agency, Region III, Air Programs Branch, Philadelphia, Pennsylvania. EPA 903/9-77-030. August 1977

2. Larsen, Ralph I. A Mathematical Model for Relating Air Quality Measurements to Air Quality Standards. U.S. Environmental Protection Agency, Office of Air Programs, Research Triangle Park, North Carolina. AP-89. November 1971.

APPENDIX A

SOURCE CONTRIBUTION FILES FOR SELECTED RECEPTORS

County name	County code
New Castle	0180
Burlington	0660
Camden	0740
Gloucester	1760
Mercer	2980
Salem	4900
Bucks	1200
Chester	1660
Delaware	2360
Montgomery	6000
Philadelphia	7160

1974 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 520.0 4450.0

POINT SOURCE CONTRIBUTION IS 23.88

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.22
0660	0.51
0740	0.17
1760	0.11
2980	0.62
4900	0.13
1200	19.56
1660	0.28
2360	0.20
6000	0.44
7160	1.63

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
2980	0007	0.28	1200	0020	0.37	1200	0025	3.39	1200	0025	0.41
1200	0025	0.53	1200	0029	0.14	1200	0029	0.45	1200	0029	0.14
1200	0029	0.45	1200	0038	0.28	1200	0046	6.35	1200	0046	0.25
1200	0046	0.26	1200	0046	0.10	1200	0046	3.22	1200	0046	0.42
1200	0046	1.65	1200	0046	0.27	1200	0053	0.26	7160	1587	0.12
7160	2064	0.25									

AREA SOURCE CONTRIBUTION IS 19.36

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	0.42
660	0.93
740	0.69
1760	0.31
2980	8.15
4900	0.10
1200	2.85
1660	0.32
2360	0.47
6000	2.01
7160	3.09

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
2980	0102	0.38	2980	0104	0.14	2980	0113	0.10	2980	0203	0.11
2980	0204	0.62	2980	0211	4.86	2980	0212	0.17	2980	0213	0.53
2980	0214	0.12	2980	0302	0.19	2980	0303	0.15	2980	0311	0.12

1974 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 4e0.0 4395.0

POINT SOURCE CONTRIBUTION IS 9.51

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	1.82
0660	0.04
0740	0.08
1760	0.08
2980	0.02
4900	5.91
1200	0.35
1660	0.35
2360	0.28
6000	0.24
7160	0.35

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0180	0008	0.15	0180	0010	0.28	0180	0016	0.14	4900	0001	0.17
4900	0001	0.33	4900	0002	0.25	4900	0010	1.29	4900	0011	3.55
1200	0046	0.11									

AREA SOURCE CONTRIBUTION IS 7.73

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	3.57
660	0.10
740	0.24
1760	0.33
2980	0.04
4900	1.09
1200	0.12
1660	0.42
2360	0.53
6000	0.59
7160	0.52

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0630	0.23	180	0640	0.16	180	0720	0.12	180	0742	0.20
180	0743	0.25	180	0744	0.16	180	0842	0.13	180	0851	0.19
180	0863	0.57	180	0961	0.14	4900	0600	0.19	4900	0702	0.17
4900	0711	0.19	7160	0103	0.11						

1974 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 460.0 4395.0

POINT SOURCE CONTRIBUTION IS 9.51

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	1.82
0660	0.04
0740	0.08
1760	0.08
2980	0.02
4900	5.91
1200	0.35
1660	0.35
2360	0.28
6000	0.24
7160	0.35

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0180	0008	0.15	0180	0010	0.28	0180	0016	0.14	4900	0001	0.17
4900	0001	0.33	4900	0002	0.25	4900	0010	1.29	4900	0011	3.55
1200	0046	0.11									

AREA SOURCE CONTRIBUTION IS 7.73

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	3.57
660	0.10
740	0.24
1760	0.33
2980	0.04
4900	1.09
1200	0.12
1660	0.42
2360	0.53
6000	0.59
7160	0.52

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0630	0.23	180	0640	0.16	180	0720	0.12	180	0742	0.20
180	0743	0.25	180	0744	0.16	180	0842	0.13	180	0851	0.19
180	0863	0.57	180	0961	0.14	4900	0600	0.19	4900	0702	0.17
4900	0711	0.19	7160	0103	0.11						

1974 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 490.0 4422.0

POINT SOURCE CONTRIBUTION IS 15.83

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.43
0660	0.25
0740	1.93
1760	0.35
2980	0.06
4900	0.31
1200	1.35
1660	0.40
2360	0.46
6000	0.59
7160	9.70

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0740	0006	0.17	0740	0037	0.60	0740	0038	0.76	4900	0011	0.14
1200	0046	0.83	1200	0046	0.23	7160	1511	0.11	7160	1573	0.11
7160	1587	0.34	7160	1589	0.12	7160	2045	0.11	7160	2064	0.11
7160	2064	2.01	7160	9504	1.02	7160	9504	1.02	7160	9505	0.11
7160	9702	0.11									

AREA SOURCE CONTRIBUTION IS 27.31

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	0.86
660	0.67
740	4.63
1760	1.02
2980	0.16
4900	0.20
1200	0.42
1660	0.54
2360	1.63
6000	2.35
7160	14.80

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0863	0.14	740	0503	0.12	740	0602	0.11	740	0604	0.11
740	0611	0.23	740	0612	0.11	740	0613	0.30	740	0614	0.11
740	0702	0.68	740	0711	0.86	740	0712	0.26	740	0713	0.51
740	0714	0.28	1760	0724	0.12	1760	0813	0.11	2360	0431	0.10
6000	0104	0.10	6000	0210	0.11	6000	0453	0.11	7160	0103	1.42
7160	0212	0.12	7160	0213	0.23	7160	0214	0.36	7160	0221	0.11
7160	0223	1.04	7160	0304	0.29	7160	0311	0.49	7160	0312	0.52
7160	0313	0.46	7160	0314	0.41	7160	0321	0.94	7160	0323	0.80
7160	0324	0.97	7160	0402	0.13	7160	0411	0.12	7160	0412	0.37
7160	0414	0.11	7160	0421	0.82	7160	0422	1.03	7160	0423	0.41
7160	0424	0.33	7160	0431	0.64	7160	0432	0.15	7160	0433	0.28
7160	0434	0.18	7160	0501	0.12	7160	0502	0.11	7160	0511	0.20
7160	0512	0.33	7160	0513	0.18	7160	0521	0.19	7160	0522	0.16

1974 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 490.0 4420.0

POINT SOURCE CONTRIBUTION IS 13.61

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.42
0660	0.21
0740	0.87
1760	0.40
2980	0.06
4900	0.32
1200	1.24
1660	0.38
2360	0.42
6000	0.54
7160	8.75

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0740	0037	0.14	0740	0038	0.14	0740	0046	0.11	1760	0026	0.12
4900	0011	0.14	1200	0046	0.38	1200	0046	0.21	7160	1501	0.11
7160	1581	0.12	7160	1587	0.34	7160	1589	0.12	7160	2045	0.11
7160	2064	0.10	7160	2064	1.81	7160	9504	0.47	7160	9504	0.47
7160	9507	0.11	7160	9507	0.11	7160	9702	0.15			

AREA SOURCE CONTRIBUTION IS 28.41

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	0.87
660	0.61
740	7.46
1760	1.23
2980	0.15
4900	0.21
1200	0.39
1660	0.53
2360	1.67
6000	2.09
7160	13.20

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0863	0.14	740	0503	0.15	740	0602	0.15	740	0604	0.17
740	0611	0.29	740	0612	0.13	740	0613	0.45	740	0614	0.14
740	0702	0.79	740	0711	3.53	740	0712	0.31	740	0713	0.10
740	0714	0.19	1760	0724	0.15	1760	0813	0.14	2360	0222	0.10
2360	0431	0.12	7160	0103	1.41	7160	0212	0.13	7160	0213	0.22
7160	0214	0.43	7160	0221	0.17	7160	0223	1.29	7160	0304	0.23
7160	0311	0.61	7160	0312	0.57	7160	0313	0.37	7160	0314	0.35
7160	0321	0.99	7160	0323	0.64	7160	0324	0.64	7160	0402	0.13
7160	0412	0.25	7160	0414	0.11	7160	0421	0.62	7160	0422	0.69
7160	0423	0.29	7160	0424	0.25	7160	0431	0.45	7160	0433	0.23
7160	0434	0.15	7160	0501	0.12	7160	0511	0.18	7160	0512	0.24
7160	0514	0.16	7160	0521	0.15	7160	0522	0.13			

1982 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 490.0 4420.0

POINT SOURCE CONTRIBUTION IS 14.01

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.49
0660	0.22
0740	0.73
1760	0.42
2980	0.03
4900	0.38
1200	1.04
1660	0.38
2360	0.60
6000	0.54
7160	9.17

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0740	0037	0.14	0740	0038	0.15	1760	0026	0.13	4900	0011	0.20
1200	0046	0.19	1200	0046	0.21	7160	1501	0.11	7160	1581	0.12
7160	1587	0.35	7160	1589	0.12	7160	2045	0.11	7160	2064	0.11
7160	2064	1.92	7160	9504	0.55	7160	9504	0.55	7160	9505	0.11
7160	9507	0.13	7160	9507	0.13	7160	9511	0.11	7160	9702	0.17

AREA SOURCE CONTRIBUTION IS 25.25

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	0.94
660	0.53
740	6.42
1760	1.13
2980	0.13
4900	0.22
1200	0.34
1660	0.45
2360	1.56
6000	1.96
7160	11.58

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0803	0.10	740	0503	0.14	740	0602	0.10	740	0604	0.16
740	0611	0.23	740	0612	0.12	740	0613	0.41	740	0614	0.13
740	0702	0.70	740	0711	2.96	740	0712	0.28	740	0714	0.17
1760	0724	0.15	1760	0813	0.14	2360	0831	0.11	7160	0103	1.28
7160	0212	0.12	7160	0213	0.20	7160	0214	0.37	7160	0221	0.17
7160	0223	1.13	7160	0304	0.19	7160	0311	0.52	7160	0312	0.49
7160	0313	0.31	7160	0314	0.30	7160	0321	0.85	7160	0323	0.56
7160	0324	0.59	7160	0402	0.11	7160	0412	0.21	7160	0421	0.52
7160	0422	0.59	7160	0423	0.25	7160	0424	0.22	7160	0431	0.40
7160	0433	0.28	7160	0434	0.13	7160	0501	0.10	7160	0511	0.15
7160	0512	0.21	7160	0513	0.14	7160	0521	0.13	7160	0522	0.11

1982 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 490.0 4422.0

POINT SOURCE CONTRIBUTION IS 16.38

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.50
0660	0.26
0740	1.83
1760	0.37
2980	0.04
4900	0.37
1200	1.12
1660	0.40
2360	0.65
6000	0.60
7160	10.25

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0740	0006	0.17	0740	0037	0.61	0740	0038	0.77	4900	0011	0.19
1200	0046	0.21	1200	0046	0.23	7160	1511	0.12	7160	1587	0.35
7160	1589	0.12	7160	2065	0.11	7160	2066	0.12	7160	2066	2.12
7160	9504	1.19	7160	9504	1.19	7160	9505	0.13	7160	9511	0.10
7160	9702	0.12									

AREA SOURCE CONTRIBUTION IS 24.41

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	0.93
660	0.57
740	4.06
1760	0.98
2980	0.14
4900	0.21
1200	0.36
1660	0.45
2360	1.52
6000	2.20
7160	13.01

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0803	0.10	740	0503	0.11	740	0604	0.10	740	0611	0.18
740	0612	0.10	740	0613	0.27	740	0702	0.60	740	0711	0.72
740	0712	0.24	740	0713	0.47	740	0714	0.24	1760	0724	0.12
1760	0813	0.11	6000	0210	0.11	7160	0103	1.29	7160	0212	0.11
7160	0213	0.21	7160	0214	0.30	7160	0221	0.11	7160	0223	0.91
7160	0304	0.24	7160	0311	0.42	7160	0312	0.85	7160	0313	0.39
7160	0314	0.36	7160	0321	0.81	7160	0323	0.69	7160	0324	0.90
7160	0402	0.11	7160	0411	0.10	7160	0412	0.31	7160	0414	0.10
7160	0421	0.69	7160	0422	0.88	7160	0423	0.36	7160	0424	0.29
7160	0431	0.58	7160	0432	0.14	7160	0433	0.25	7160	0434	0.16
7160	0501	0.11	7160	0511	0.17	7160	0512	0.28	7160	0513	0.16
7160	0521	0.17	7160	0522	0.14						

1982 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 492.0 4422.0

POINT SOURCE CONTRIBUTION IS 14.61

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.47
0660	0.27
0740	0.70
1760	0.38
2980	0.04
4900	0.35
1200	1.19
1660	0.39
2360	0.58
6000	0.57
7160	9.68

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0740	0037	0.15	0740	0038	0.18	1760	0026	0.11	4900	0011	0.10
1200	0029	0.11	1200	0029	0.11	1200	0046	0.21	1200	0046	0.24
7160	1587	1.30	7160	2015	0.14	7160	2064	1.58	7160	9504	0.90
7160	9504	0.90	7160	9505	0.13	7160	9702	0.11			

AREA SOURCE CONTRIBUTION IS 23.59

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	0.89
660	0.65
740	4.94
1760	0.95
2980	0.15
4900	0.21
1200	0.38
1660	0.48
2360	1.37
6000	2.11
7160	11.51

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
740	0604	0.10	740	0611	0.18	740	0612	0.12	740	0613	0.29
740	0614	0.13	740	0702	0.46	740	0711	0.86	740	0712	0.28
740	0713	0.15	740	0714	1.12	740	0723	0.11	1760	0724	0.13
1760	0813	0.10	6000	0210	0.11	7160	0103	1.06	7160	0213	0.17
7160	0214	0.27	7160	0221	0.12	7160	0223	0.75	7160	0304	0.21
7160	0311	0.34	7160	0312	0.32	7160	0313	0.32	7160	0314	0.28
7160	0321	0.63	7160	0323	0.56	7160	0324	0.60	7160	0412	0.24
7160	0421	0.62	7160	0422	0.75	7160	0423	0.29	7160	0424	0.26
7160	0431	0.64	7160	0432	0.22	7160	0433	0.27	7160	0434	0.24
7160	0511	0.18	7160	0512	0.25	7160	0513	0.12	7160	0521	0.17
7160	0522	0.20	7160	0524	0.11	7160	0531	0.14			

1982 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 460.0 4395.0

POINT SOURCE CONTRIBUTION IS 11.71

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	1.95
0660	0.06
0740	0.04
1760	0.11
2980	0.01
4900	7.90
1200	0.35
1660	0.30
2360	0.33
6000	0.20
7160	0.48

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0180	0008	0.14	0180	0015	0.10	0180	0016	0.19	0180	0058	0.11
4900	0002	0.10	4900	0002	0.34	4900	0002	0.10	4900	0010	1.85
4900	0011	5.28									

AREA SOURCE CONTRIBUTION IS 7.56

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	3.51
660	0.12
740	0.27
1760	0.36
2980	0.06
4900	1.12
1200	0.11
1660	0.44
2360	0.47
6000	0.47
7160	0.63

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0610	0.10	180	0630	0.25	180	0640	0.18	180	0720	0.13
180	0730	0.10	180	0742	0.18	180	0743	0.28	180	0744	0.18
180	0842	0.15	180	0851	0.22	180	0863	0.35	4900	0600	0.16
4900	0702	0.20	4900	0711	0.15	4900	0801	0.10	7160	0103	0.14

1982 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 520.0 4450.0

POINT SOURCE CONTRIBUTION IS 21.02

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.26
0660	0.60
0740	0.09
1760	0.12
2980	0.26
4900	0.17
1200	16.93
1660	0.25
2360	0.25
6000	0.40
7160	1.71

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
1200	0020	0.41	1200	0020	0.11	1200	0020	0.10	1200	0025	3.62
1200	0025	0.47	1200	0025	0.61	1200	0029	0.13	1200	0029	0.41
1200	0029	0.13	1200	0029	0.41	1200	0038	0.27	1200	0046	3.12
1200	0046	0.24	1200	0046	0.25	1200	0046	3.26	1200	0046	0.44
1200	0046	1.77	1200	0046	0.34	1200	0053	0.27	7160	1587	0.13
7160	2064	0.28									

AREA SOURCE CONTRIBUTION IS 17.60

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	0.48
660	0.88
740	0.66
1760	0.31
2980	7.46
4900	0.11
1200	2.43
1660	0.26
2360	0.46
6000	1.70
7160	2.84

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
660	0962	0.11	2980	0102	0.34	2980	0104	0.14	2980	0113	0.11
2980	0204	0.51	2980	0211	4.52	2980	0212	0.18	2980	0213	0.43
2980	0214	0.12	2980	0302	0.15	2980	0303	0.16	1200	0234	0.12
1200	0354	0.32	1200	0363	0.20	1200	0451	0.11	1200	0452	0.16
7160	0103	0.27	7160	0223	0.11	7160	0422	0.11			

1990 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 490.0 4420.0

POINT SOURCE CONTRIBUTION IS 14.73

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.60
0660	0.22
0740	0.75
1760	0.44
2980	0.05
4900	0.49
1200	1.03
1660	0.38
2360	0.44
6000	0.55
7160	9.80

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0740	0037	0.14	0740	0038	0.15	1760	0026	0.14	4900	0010	0.10
4900	0011	0.26	1200	0046	0.19	1200	0046	0.21	7160	1501	0.11
7160	1562	0.10	7160	1581	0.12	7160	1587	0.36	7160	1589	0.13
7160	2045	0.12	7160	2056	0.10	7160	2064	0.11	7160	2064	2.02
7160	9504	0.63	7160	9504	0.63	7160	9505	0.13	7160	9507	0.15
7160	9507	0.15	7160	9511	0.13	7160	9702	0.19.			

AREA SOURCE CONTRIBUTION IS 25.99

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	1.12
660	0.55
740	6.67
1760	1.17
2980	0.14
4900	0.27
1200	0.34
1660	0.45
2360	1.57
6000	2.01
7160	11.70

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0803	0.11	740	0503	0.14	740	0602	0.11	740	0604	0.17
740	0611	0.24	740	0612	0.12	740	0613	0.43	740	0614	0.14
740	0702	0.72	740	0711	3.08	740	0712	0.29	740	0714	0.17
1760	0724	0.15	1760	0813	0.14	2360	0431	0.11	7160	0103	1.37
7160	0212	0.13	7160	0213	0.20	7160	0214	0.37	7160	0221	0.17
7160	0223	1.13	7160	0304	0.19	7160	0311	0.52	7160	0312	0.49
7160	0313	0.31	7160	0314	0.30	7160	0321	0.85	7160	0323	0.56
7160	0324	0.59	7160	0402	0.11	7160	0812	0.21	7160	0421	0.52
7160	0422	0.59	7160	0423	0.25	7160	0424	0.22	7160	0431	0.40
7160	0433	0.20	7160	0434	0.13	7160	0501	0.18	7160	0511	0.15
7160	0512	0.21	7160	0513	0.14	7160	0521	0.13	7160	0522	0.11

1990 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 890.0 4422.0

POINT SOURCE CONTRIBUTION IS 17.29

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.62
0660	0.27
0740	1.88
1760	0.38
2980	0.03
4900	0.47
1200	1.11
1660	0.40
2360	0.49
6000	0.60
7160	11.04

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0740	0006	0.17	0740	0037	0.63	0740	0038	0.79	4900	0011	0.25
1200	0046	0.21	1200	0046	0.23	7160	1511	0.12	7160	1576	0.18
7160	1581	0.10	7160	1587	0.35	7160	1589	0.12	7160	2045	0.12
7160	2064	0.12	7160	2064	2.24	7160	9504	1.35	7160	9504	1.35
7160	9505	0.15	7160	9507	0.10	7160	9507	0.10	7160	9508	0.10
7160	9511	0.12	7160	9702	0.14						

AREA SOURCE CONTRIBUTION IS 25.05

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	1.11
660	0.59
740	4.22
1760	0.98
2980	0.15
4900	0.26
1200	0.37
1660	0.46
2360	1.53
6000	2.26
7160	13.13

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0863	0.11	740	0503	0.11	740	0604	0.10	740	0611	0.19
740	0612	0.10	740	0613	0.29	740	0614	0.10	740	0702	0.62
740	0711	0.75	740	0712	0.25	740	0713	0.49	740	0714	0.25
1760	0724	0.12	1760	0813	0.11	6000	0210	0.11	7160	0103	1.37
7160	0212	0.12	7160	0213	0.21	7160	0214	0.30	7160	0221	0.11
7160	0223	0.92	7160	0304	0.24	7160	0311	0.42	7160	0312	0.45
7160	0313	0.39	7160	0314	0.36	7160	0321	0.81	7160	0323	0.70
7160	0324	0.90	7160	0402	0.11	7160	0411	0.10	7160	0412	0.31
7160	0414	0.18	7160	0421	0.69	7160	0422	0.88	7160	0423	0.36
7160	0424	0.29	7160	0431	0.58	7160	0432	0.14	7160	0433	0.25
7160	0434	0.16	7160	0501	0.11	7160	0511	0.17	7160	0512	0.29
7160	0513	0.16	7160	0521	0.17	7160	0522	0.14			

1990 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 492.0 4422.0

POINT SOURCE CONTRIBUTION IS 15.36

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.58
0660	0.28
0740	0.72
1760	0.39
2980	0.03
4900	0.45
1200	1.18
1660	0.39
2360	0.42
6000	0.58
7160	10.34

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0740	0037	0.15	0740	0038	0.18	1760	0026	0.12	4900	0011	0.24
1200	0029	0.11	1200	0029	0.11	1200	0046	0.21	1200	0046	0.23
7160	1587	1.33	7160	2015	0.15	7160	2064	1.63	7160	9504	1.02
7160	9504	1.02	7160	9505	0.14	7160	9702	0.13			

AREA SOURCE CONTRIBUTION IS 24.23

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	1.06
660	0.67
740	5.13
1760	0.98
2980	0.15
4900	0.25
1200	0.38
1660	0.44
2360	1.38
6000	2.17
7160	11.62

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	[illegible]	0.10	740	0604	0.11	740	0611	0.19	740	0612	0.13
740	0613	0.30	740	0614	0.13	740	0702	0.47	740	0711	0.90
740	0712	0.29	740	0713	0.15	740	0714	1.16	740	0723	0.12
1760	0724	0.13	1760	0813	0.10	6000	0210	0.10	7160	0103	1.13
7160	0213	0.17	7160	0214	0.27	7160	0221	0.12	7160	0223	0.75
7160	0304	0.61	7160	0311	0.35	7160	0312	0.32	7160	0313	0.32
7160	0314	0.29	7160	0321	0.03	7160	0323	0.57	7160	0324	0.60
7160	0412	0.24	7160	0421	0.02	7160	0422	0.75	7160	0423	0.29
7160	0424	0.26	7160	0431	0.04	7160	0432	0.22	7160	0433	0.27
7160	0434	0.25	7160	0511	0.18	7160	0512	0.25	7160	0513	0.12
7160	0521	0.17	7160	0522	0.20	7160	0524	0.11	7160	0531	0.14

1990 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 460.0 4395.0

POINT SOURCE CONTRIBUTION IS 14.44

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	2.43
0660	0.06
0740	0.04
1760	0.11
2980	0.01
4900	10.18
1200	0.34
1660	0.30
2360	0.26
6000	0.20
7160	0.51

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
0180	0008	0.14	0180	0010	0.10	0180	0015	0.13	0180	0016	0.24
0180	0023	0.11	0180	0058	0.14	4900	0002	0.13	4900	0002	0.44
4900	0002	0.13	4900	0003	0.13	4900	0010	2.39	4900	0011	6.82

AREA SOURCE CONTRIBUTION IS 8.56

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	4.20
660	0.12
740	0.28
1760	0.38
2980	0.06
4900	1.36
1200	0.11
1660	0.44
2360	0.47
6000	0.49
7160	0.64

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
180	0610	0.13	180	0630	0.29	180	0640	0.23	180	0720	0.16
180	0732	0.12	180	0734	0.13	180	0742	0.23	180	0743	0.34
180	0744	0.22	180	0842	0.18	180	0851	0.27	180	0863	0.37
180	0961	0.11	4900	0600	0.22	4900	0702	0.24	4900	0711	0.17
4900	0801	0.13	7160	0103	0.15						

1990 DATA

COORDINATES FOR THIS SOURCE RECEPTOR FILE ARE 520.0 4450.0

POINT SOURCE CONTRIBUTION IS 21.08

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.32
0660	0.62
0740	0.10
1760	0.12
2980	0.26
4900	0.22
1200	16.78
1660	0.25
2360	0.20
6000	0.41
7160	1.82

COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3	COUNTY CODE	POINT CODE	CONTRIBUTION UG/M**3
4900	0011	0.11	1200	0020	0.41	1200	0020	0.11	1200	0020	0.10
1200	0025	3.59	1200	0025	0.47	1200	0025	0.61	1200	0029	0.13
1200	0029	0.41	1200	0029	0.13	1200	0029	0.41	1200	0038	0.26
1200	0046	3.12	1200	0046	0.24	1200	0046	0.24	1200	0046	3.23
1200	0046	0.43	1200	0046	1.75	1200	0046	0.34	1200	0053	0.27
7160	1587	0.13	7160	2064	0.29						

AREA SOURCE CONTRIBUTION IS 18.13

COUNTY CODE	COUNTY CONTRIBUTION UG/M**3
0180	0.0
180	0.58
660	0.90
740	0.69
1760	0.33
2980	7.73
4900	0.13
1200	2.43
1660	0.26
2360	0.46
6000	1.75
7160	2.87

COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3	COUNTY CODE	AREA CODE	CONTRIBUTION UG/M**3
660	0962	0.11	2980	0102	0.35	2980	0104	0.15	2980	0113	0.11
2980	0204	0.53	2980	0211	0.66	2980	0212	0.19	2980	0213	0.44
2980	0214	0.13	2980	0302	0.15	2980	0303	0.19	1200	0234	0.11
1200	0354	0.32	1200	0363	0.20	1200	0451	0.11	1200	0452	0.15
7160	0103	0.29	7160	0223	0.11	7160	0422	0.11			

APPENDIX B

EMISSION TRACKING SYSTEM

RATIONALE FOR A TRACKING SYSTEM

Tracking procedures constitute a regular assessment of air quality problems by determining whether or not actual emissions are comparable to projected emissions and whether or not emissions growth is occurring as slowly as predicted. Tracking thus facilitates the identification of areas where increases in emissions may cause the NAAQS to be violated. These procedures allow problems to be anticipated and addressed through control strategy modifications before the problems become critical.

The tracking system can also help identify specific sources of air quality problems. If air quality, as estimated by monitor data, remains poor despite the fact that emissions growth has occurred as predicted, then sources which were not included in the initial inventory or in the tracking procedures must be examined. For example, particulates from sources located outside of the five New Jersey counties may have a significant impact on air quality problems within these counties even though the counties emissions are growing as slowly as predicted. Sources beyond the New Jersey borders should, therefore, be tracked by asking local air pollution agencies for their most current air quality estimates, and emissions reduction schedules.

Section 301(a) of the Clean Air Act, Part 51 - "Requirements for Preparation, Adoption, and Submittal of Implementation Plans," requires that all areas of the state be assessed every 5 years to determine if any areas are in need of plan revisions. New Jersey must undertake detailed tracking every 5 years, but some level of tracking should be conducted in all counties annually. Frequent detailed tracking is particularly important in rapidly growing areas where the amount and type of new sources and their influence on air quality are most difficult to project. Areas experiencing less rapid growth may require less detailed annual tracking.

The procedures described here are designed to be applied in steps as more and more accuracy and detail is desired. A more detailed level of analysis is recommended whenever a review of the major growth indicators reveals that actual emissions growth differs substantially from projected emissions growth or if the most recent projections differ from the original projections.

Whenever tracking is conducted, sources which generate large quantities of particulates should be examined more thoroughly than sources which add relatively little to the air quality problem. For example, since about

46 percent of the area source emissions (or about 22 percent of all particulate emissions) are produced by motor vehicles, it is worthwhile to acquire the most detailed data available to estimate emissions from this source. Similarly, since only about 20 companies own point sources which produce about 70 percent of the point source emissions, these sources should be more carefully tracked than smaller point sources. Tracking the smaller area and point sources would require a large expenditure of time and add little accuracy to the total estimate.

The tracking procedures necessitate the continual gathering of data which can be used to estimate emissions for the analysis year, so that these estimates can be compared with the projected emissions for that year. Level A data provides for the least detailed level of tracking suggested while Level B data provides more accurate estimates. All data described here is available in New Jersey.

TRACKING AREA SOURCES

The major area sources of particulate emissions are motor vehicles, aircraft, residential, industrial and commercial/institutional development. Together these sources produce about 91 percent of the area source emissions. So these sources are emphasized in the tracking system. (See Section 2, Tables 9 and 10).

The growth indicators used for estimating each of these emission sources should be obtained for each of the five counties. County level data is recommended because data broken-down in this way is manageable, and available, yet fine enough for the required accuracy.

Motor Vehicles

Level A--

The growth indicator used to estimate motor vehicle emissions is vehicle miles traveled (VMT) as estimated for each county.

Level B--

A more accurate growth indicator for estimating motor vehicle emissions is VMT by each of the five following motor vehicle classifications: light-duty vehicles, light-duty trucks, heavy-duty gasoline vehicles, heavy-duty diesel vehicles and motorcycles. Still more accuracy can be added by acquiring the age mix of vehicles for each of the vehicle categories and annual miles driven by vehicles of each age group. Emissions factors are substantially lower for vehicles produced after 1973, when the catalytic converter came into use. So it is advisable to obtain estimates of how much VMT was generated by vehicles produced before and after 1973.

Residential, Commercial/Institutional and Industrial Area Source Emissions

Level A--

The growth indicator used to estimate emissions from the residential sector is number of households. The indicators for the commercial/institutional sector

are population and commercial employment. The industrial sector's emissions may be estimated using industrial employment.

Level B--

Estimates of area source fuel use by sector for each state are published annually by the Bureau of Mines. These data must be apportioned to the counties. For example, the state residential fuel total should be apportioned to the counties according to the percentage of the state's dwelling units which are located within that county (e.g., county residential fuel total

$$= \text{state residential fuel total} \times \frac{\text{No. county dwelling units}}{\text{No. state dwelling units}}).$$

Similarly, state commercial/institutional fuel use should be apportioned to the counties according to the percentage of the state population living in each county. Industrial fuel is apportioned according to industrial employment.

Another method for estimating area source emissions requires information from fuel dealers concerning their annual sales by county to each source category (residential, industrial, commercial/institutional). The area source totals are the fuel dealers figures minus any fuel consumed by point sources that are included in the source categories.

Data from fuel dealers can be used as an indicator of local use patterns that would not be discovered using Bureau of Mines data alone. But this data source is best used only as a supplement to Bureau of Mines data since not all dealers will be able to furnish adequate information.

If information from the two sources is not in agreement, state totals from Bureau of Mines are probably more accurate. The distribution to source categories, particularly residential and commercial/institutional may be more accurately provided by the fuel dealers. Assuming the residential and commercial/institutional area source totals can be adjusted, if necessary, so that the state total equals the state total figure provided by the Bureau of Mines. If fuel dealers can provide information only for groups of counties, these data can be distributed to individual counties using the apportioning method described above.

Aircraft Area Source Emissions

Level A--

Aircraft emissions are estimated using projections of demand for air travel. These projections are revised every few years, so the growth factor for the analysis year will sometimes be determined through interpolation.

Level B--

More accuracy in estimating aircraft emissions can be obtained by acquiring for each airport in each of the five counties, the number and type of aircraft operating from the airport and the number of LTOs for each aircraft.

Other Area Sources (Incineration, Open Burning, Off-Highway Fuel Usage, Vessels, Railroads

Level A--

These sources can be tracked using population as the growth indicator.

Level B: Fugitive Dust Tracking (other miscellaneous sources, such as forest fires, slash burning and agricultural frost control, are not included)--

A major source of fugitive dust is from the handling and storage of mineral products. Large rock-handling operations are generally included as point sources so they do not need to be tracked separately. Area source rock-handling operations would cover any smaller scale activities such as small sand and gravel yards, stone products manufacturers and other mineral products industries. These sources can be tracked by surveying these operations to determine tons of minerals processed per year.

TRACKING POINT SOURCES

Prepare a tabulation of emissions from all major point sources by surveying either all point sources emitting more than 25 tons per year of particulates or all point sources emitting more than 100 tons per year of particulates, depending upon the amount of detail desired. Point sources producing more than 100 ton/year particulates are responsible for about 70 percent of all point source emissions, while point sources emitting over 25 ton/year particulates create about 86 percent of the particulates from point sources. See Tables 18, 19 and 20.

TRACKING METHODOLOGY

Step 1

Acquire estimates of the indicators used to project the area source emissions inventory. The Level A area source growth indicators are population, employment, households, vehicle miles travelled and air travel demand. Determine growth factors for these indicators and then multiply base year emissions by these factors:

	Source	Growth factors
a.	Motor vehicle emissions	VMT
b.	Residential area source emissions	Households
c.	Commercial/Institutional area source emissions	Population
d.	Industrial area source emissions	Industrial employment
e.	Aircraft emissions	Air travel demand
f.	Miscellaneous sources emissions	Population

Proceed to Step 2 if:

a. Level A estimates of emissions for the analysis year exceed emissions projections for the analysis year.

TABLE 18. ANALYSIS OF POINT SOURCE EMISSIONS - 1978

County	Area sources		Point sources		Total ton/yr area and point	Emission points ≥ 25 ton/yr		Emission points ≥ 100 ton/yr	
	ton/yr	percent	ton/yr	percent		No. companies and No. points	Percentage of total points	No. companies and No. points	Percentage of total points
Burlington	2,814	54	2,375	46	5,189	8/14	86	4/4	63
Camden	2,649	64	1,506	36	4,155	8/18	59	2/3	21
Gloucester	1,633	28	4,103	72	5,736	7/22	88	4/5	69
Mercer	2,498	51	2,387	49	4,885	3/7	94	3/5	84
Salem	690	18	3,161	82	3,851	12/5	94	5/7	87
Total	10,284	43	13,532	57	23,816	31/73	86	18/23	70

TABLE 19. COMPANIES WITH INDIVIDUAL POINT SOURCES EMITTING MORE THAN 100 TON/YR PARTICULATES

Burlington:

1. Kaiser Gypsum, 2700 Burlington Ave., Delanco
2. U.S. Pipe, E. Pearl St., Burlington
3. National Gypsum Co., River Rd., Burlington
4. C. E. Glass, 700 Union Landing Rd., Cinnaminson

Camden:

5. Lafferty Asphalt, Gibsboro Rd., Voorhees
6. Johns Manville Corp., P.O. Box 130, Berlin

Gloucester:

7. Texaco, Rte. 130, W. Deptford Township
8. Rollins-Purle, Rte. 322E, Bridgeport
9. Mobil Oil Paulsboro, Billingsport
10. Matteo 1708, U.S. Rte. 130, W. Deptford Township

Mercer:

11. Public Service Electric, Lambert Rd., Trenton
12. Stauffer Chemical, 4407 S. Broad St., Yardville
13. Wenczel Tile, Klag & Enterprise, Trenton

Salem:

14. Atlantic City Electric, Pennsgrove
15. E.I. Dupont, Carneys Pt.
16. Anchor Hocking, Griffith St., Salem
17. A. Clemente Inc., Box 471, Pennsgrove
18. Meckel R. & Son, S. Gershal Ave.

TABLE 20. COMPANIES WITH INDIVIDUAL POINT SOURCES EMITTING MORE THAN 25 TON/YR PARTICULATES

Burlington:

19. Public Service Electric, W. Broad & Devlin, Burlington
20. Tenneco Plastic, Beverly Rd., Burlington 08016
21. Hoeganaes, River Rd. & Taylors Lane, Riverston
22. Griffin Pipe, 1100 W. Front, Florence 08518

Camden:

23. Georgia Pacific, Front of Desousse, Delair 08110
24. RCA Corp., Front & Cooper, Camden
25. Campbell Soup, 100 Market St., Camden
26. Formigli Corp., Plant 1, P.O. Box F, Berlin
27. Pettinos, G. F. Inc., New Freedom Rd., Winstown
28. Owens-Corning Fiberglass Corp., Fiberglass Rd., Barrington

Gloucester:

29. Shieldalloy Corp., Division of Metallurgical Inc., NE
30. Rollins Environmental Service, Rte. 322, Logan Township
31. South State Inc., P.O. Box 68

b. Growth in an area is particularly rapid, as in Gloucester County.

c. Particulate concentrations are particularly high or close to the NAAQS as in Camden County.

d. A detailed analysis has not been conducted in over a year.

Step 2

Use Level B data to estimate emissions for the analysis year by applying AP-42 emissions factors to the data. If the Level B estimates exceed projections, proceed to Step 3.

Step 3

Acquire the most recent projections for the year 1990 (final analysis year) for the area source growth indicators (population, households, employment, etc.). If the new projections of the growth indicators for 1990 do not exceed the original projections of the growth indicators for 1990, then no further tracking is necessary. Even though the estimated population, for example, is higher than the projected population in the analysis year, the most recent projections may predict the same 1990 population as the original projections. So, ultimately, emissions growth should not exceed the original projections. However, if the new projections of the growth indicators for 1990 exceed the old projections, proceed to Step 4.

Step 4

Estimate emissions for 1990 by applying growth factors from the new 1990 projections of population, vehicle miles travelled, etc. to base year emissions. Use the Proportional Roll-Forward model to estimate air quality levels in 1990. See Tables 21 and 22. If NAAQS are not violated, no further tracking is necessary. If a violation is predicted, proceed to Step 5.

Step 5

Conduct a detailed analysis such as that described in Guidelines for Air Quality Maintenance Planning and Analysis, Volumes 7, 12, and 13.

TRACKING METHODOLOGY USING MONITORING DATA

- Compare monitor data for the analysis year with air quality projections for the analysis year. If monitor data exceeds projections, proceed to Step 2.

- Refer to Step 2 of the emissions tracking procedure described previously. If monitor data exceeds air quality projections and emissions estimates exceed emissions projections, continue with the emissions tracking procedures. If monitor data exceeds air quality projections, but emissions estimates are

TABLE 21. PROJECTED EMISSIONS 1982 - 1990

	1982	1983	1984	1985	1986	1987	1988	1989	1990
Burlington									
Area	2,165	2,171	2,177	2,182	2,188	2,194	2,200	2,205	2,211
Point	2,105	2,119	2,132	2,138	2,152	2,165	2,179	2,192	2,206
Camden									
Area	2,167	2,178	2,189	2,200	2,212	2,223	2,234	2,245	2,256
Point	1,538	1,541	1,544	1,547	1,551	1,554	1,557	1,560	1,563
Gloucester									
Area	1,367	1,376	1,385	1,394	1,403	1,412	1,421	1,430	1,439
Point	3,481	3,484	3,486	3,489	3,492	3,494	3,497	3,499	3,502
Mercer									
Area	2,101	2,114	2,127	2,139	2,152	2,165	2,178	2,190	2,203
Point	2,363	2,369	2,375	2,081	2088	2,094	2,100	2,106	2,112
Salem									
Area	676	691	706	721	736	751	766	781	796
Point	1,843	1,908	1,972	2,027	2,091	2,156	2,220	2,284	2,349
Total									
Area	8,476	8,530	8,583	8,637	8,691	8,744	8,798	8,851	8,905
Point	11,330	11,421	11,509	11,282	11,374	11,463	11,553	11,641	11,732

TABLE 22. PROPORTIONAL ROLL-FORWARD MODEL

Present air quality may be projected 10 years for particulates using the proportional roll-forward model as shown in the following formula:

$$X_p = \frac{Q_{future}}{Q_{current}} (X_C - X_B) + X_B$$

where X_p = projected air quality level

X_B = background concentration

X_C = current air quality level

Q_{future} = projected emissions in 10 years

$Q_{current}$ = current year emissions

comparable to emissions projections, then (a) investigate emissions sources outside of the five county area, and (b) determine whether or not meteorological conditions have been unusual during the past year. It is possible that emissions growth is occurring as predicted, but air quality is worse than predicted because of sources outside of New Jersey or because of unusual weather.

- Perform analysis to determine if the composition of the elements found on the filter differs substantially from the base year composition.

DATA SOURCES

1. Population and Households:
   New Jersey Department of Labor and Industry
   Office of Demographic and Economic Analysis
   P.O. Box 845
   Trenton, N.J. 08625
   Shirley Goetz (609) 292-0076

2. Vehicle Miles Travelled:
   State Highway Department
   Planning Division
   Trenton, N.J. 08625
   (609) 292-4135
   Data for Salem County

   Delaware Valley Regional Planning Commission
   Department of Transportation
   Ronald Fijalkowski (215) L07-3000
   Data for Burlington Camden, Mercer and Gloucester

3. Employment:
   New Jersey Department of Labor and Industry
   Division of Planning and Research
   P.O. Box 359
   Trenton, N.J. 08625
   Ray Janowski (609) 292-8524
   Jerry Tischio (609) 292-1859

4. Residential/Commercial/Institutional and Industrial Area Source Fuel Use:
   Mineral Industry Survey
   U.S. Department of the Interior
   Bureau of Mines
   Washington, D.C.

   New Jersey Department of Energy, Technical Assistance
   101 Commerce Street
   Newark, N.J. 07102
   Kenneth Warren (201) 648-6290

This agency was established recently and is in the process of building a data base. Currently they do not compile information from the fuel companies, aside from data from annual reports, but they anticipate doing so. The New Jersey Department of Energy should be contacted and encouraged to develop data which could be useful in emissions monitoring.

5. Aircraft:
Bureau of Aviation Planning
1035 Parkway Ave.
Trenton, N.J. 08625
John J. Santarsiero, Bureau Chief
(609) 292-3052

FAA Air Traffic Activity Fiscal Year 19XX
U.S. Department of Transportation,
Federal Aviation Administration
Washington, D.C.

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16. ABSTRACT

THE CAMDEN AREA IS NOT ATTAINING THE SECONDARY TSP STANDARD AND IS UNCLASSIFIED WITH REGARD TO THE PRIMARY TSP STANDARD. THE OBJECTIVE OF THIS STUDY WAS TO USE DISPERSION MODELING AND FILTER ANALYSIS TO IDENTIFY THE REASONS FOR THE SECONDARY STANDARD VIOLATION, AND TO PROPOSE, DEMONSTRATE AND ANALYZE, BY MEANS OF DISPERSION MODELING, VARIOUS CONTROL STRATEGIES TO ATTAIN AND MAINTAIN THE SECONDARY STANDARDS THROUGH 1990. THE DATA UTILIZED AND DEVELOPED UNDER THIS CONTRACT WERE TO BE FORMATTED SUCH THAT THE DATA WOULD SATISFY THE MINIMUM DATA REQUIREMENTS FOR SIP SUBMISSION AS OUTLINED IN THE CLEAN AIR ACT AMENDMENTS OF 1977.

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