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June 28, 2000

The Honorable John H. Hankinson
Regional Administrator
U.S. Environmental Protection Agency, Region IV
Atlanta Federal Center
61 Forsyth Street, Southwest
Atlanta, Georgia 30303-8960

Dear Mr. Hankinson:

As governor of the state of Alabama, I am providing this response to your letter of April 28, 2000, which requests the state's recommendations regarding the extent of non-attainment areas for the eight-hour ozone air quality standard. The information provided is based on monitoring data from 1997 to 1999, inclusive.

I want to reiterate that Alabama believes the Environmental Protection Agency's schedule for the designation process is premature, in light of the District of Columbia's circuit court ruling that the new standard cannot be enforced. In fact, if the U.S. Supreme Court upholds the lower court's ruling, all efforts toward designation will have been unnecessary. Furthermore, I am sure you are aware of federal legislation recently passed by the House which recognizes the judicial rulings adverse to EPA by prohibiting the agency from proceeding with the designation process.

Enclosed please find an attachment which provides data from Alabama's ozone monitoring network and this state's recommendations for the extent of ozone non-attainment areas. The enclosed appendices provide detailed information on the factors which EPA suggested be addressed in support of any non-attainment area recommended to be smaller than a metropolitan statistical area.

In response to your presumptions regarding the extent of non-attainment areas, I recommend that the following Alabama counties not be included: St. Clair, Blount, Limestone, Baldwin and Russell.

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Should you require additional information, please contact Mr. Ron Gore of the Alabama Department of Environmental Management's Air Quality Division at (334) 271-7868.

Sincerely,

Don Siegelman
Governor

DS/sb/me

Enclosure

ATTACHMENT 1

OZONE DATA (1997 TO 1999) FOR THE STATE OF ALABAMA

County	AIRS ID	Site	1997 4th Max	1998 4th Max	1999 4th Max	3 Year Average
Sumter	01-119-0002	Gaston	0.062	0.068	0.073	0.067
Shelby	01-117-0004	Helena	0.084	0.107	0.100	**0.097**
Montgomery	01-101-1002	Montgomery	0.068	0.092	0.092	0.084
Mobile	01-097-0028	Axis	0.071	0.078	0.079	0.076
Mobile	01-097-0003	Chickasaw	0.081	0.098	0.085	**0.088**
Lawrence	01-079-0002	Sipsey	0.076	0.085	0.073	0.084
Elmore	01-051-0001	Wetumpka	0.070	0.091	0.077	0.079
Clay	01-027-0001	Ashland	0.079	0.094	0.091	**0.088**
Jefferson	01-073-1003	Fairfield	0.086	0.101	0.092	**0.093**
Jefferson	01-073-2006	Hoover	0.083	0.094	0.097	**0.091**
Jefferson	01-073-1005	McAdory	0.079	0.096	0.092	**0.089**
Jefferson	01-073-5002	Pinson	0.078	0.091	0.096	**0.088**
Jefferson	01-073-6002	Tarrant	0.088	0.090	0.092	**0.090**
Madison	01-089-0014	Huntsville	0.086	0.092	0.093	**0.090**

All figures are 8-hour averages.
Prepared by ADEM (3/00)

Designated Area	Designation Type	Classification Type
Birmingham Area		
Jefferson County.....	Nonattainment	
Shelby County.....	Nonattainment	
Clay County.....	Nonattainment	
Huntsville Area		
Madison County.....	Nonattainment	
Mobile Area		
Mobile County.....	Nonattainment	
Rest of State		
Autauga County	Unclassifiable/Attainment	
Baldwin County		
Barbour County		
Bibb County		
Blount County		
Bullock County		
Butler County		
Calhoun County		
Chambers County		
Cherokee County		
Chilton County		
Choctaw County		
Clarke County		
Cleburne County		
Coffee County		
Colbert County		
Conecuh County		
Coosa County		
Covington County		
Crenshaw County		
Cullman County		
Dale County		
Dallas County		
DeKalb County		
Elmore County		
Escambia County		
Etowah County		
Fayette County		
Franklin County		
Geneva County		
Greene County		
Hale County		
Henry County		
Houston County		
Jackson County		
Lamar County		
Lauderdale County		
Lawrence County		
Lee County		

Limestone County	Unclassifiable/Attainment
Lowndes County	
Macon County	
Marengo County	
Marion County	
Marshall County	
Monroe County	
Montgomery County	
Morgan County	
Perry County	
Pickens County	
Pike County	
Randolph County	
Russell County	
St. Clair County	
Sumter County	
Talladega County	
Tallapoosa County	
Tuscaloosa County	
Walker County	
Washington County	
Wilcox County	
Winston County	

Estimated Impact of the NOx SIP Call on 8-Hr Ozone Design Values in Alabama

The following table contains two sets of 8-hour ozone design values for counties in Alabama. The data in the column "Ambient" were determined based on monitoring data for the period 1995 through 1997. For counties with more than one monitor, the highest design value from among the monitors was selected. The data in the column "SIP Call" were calculated by applying rollback factors to the ambient data. These rollback factors were determined by comparing model-predicted 8-hour ozone concentrations for a SIP Call scenario to those from a 1995 Base Year scenario. The SIP Call scenario includes a projection of growth to 2007 and Clean Air Act controls on VOC, NOX, and CO, as well as, the NOX SIP Call controls applied in all 23 jurisdictions covered by the Final NOX SIP Call Rulemaking. The ozone modeling of these scenarios was performed using UAM-V for the OTAG grid configuration and episodes. This modeling exercise was conducted in the Fall of 1998 and the results were included as part of Table C-12 of the Regulatory Impact Assessment for the Tier 2 Notice of Proposed Rulemaking.

County Name	**Ambient 8-Hr Design Values (ppb)**	**NOX SIP Call 8-Hr Design Values (ppb)**
Clay	86	72
Elmore	77	65
Geneva	69	63
Jefferson	92	82
Lawrence	81	70
Madison	84	73
Mobile	79	75
Montgomery	70	63
Shelby	95	83
Sumter	66	60

Future 8-hour design values for 2007 reflecting EPA's Tier 2 controls and the NOX SIP Call were prepared for 4 monitoring sites in Macon, Columbus, and Augusta, Georgia. This analysis was prepared by the EPA Office of Air Quality Planning and Standards (OAQPS). These estimated design values include a projection of emissions to 2007 with growth, Clean Air Act controls, Federal measures, the NOX SIP Call, and Tier 2. The design values are developed through a relative reduction analysis technique and existing EPA regional modeling analyses. The 8-hour design values were developed using the draft attainment model EPA's draft 8-hour ozone modeling guidance ("Use of Models and Other Analyses In Attainment Demonstrations for the 8-Hour Ozone NAAQS, EPA-454/R-99-004 (1999)") to develop a local relative reduction factor (RRF). Essentially, the ratio of the model's future to base year predictions at each monitor is determined. These numbers are called relative reduction factors. Future 8-hour ozone design values are estimated at existing monitor sites by multiplying a modeled relative reduction factor at locations in the regional modeling that are near each monitor times the observed monitor-specific 8-hour ozone design value. The observed monitor-specific 8-hour design values are based on 1997- 1999 data. As indicated in the table below, with the two national control measures, i.e., the Nox SIP call and Tier 2, 8-hour design values that are less than 84 parts per billion (ppb) could result. The following procedures were used to calculate these 8-hour future design values:

(1) The 1996 base year and 2007 control case regional scale modeling results performed for the Tier 2 rulemaking were used to develop 2007 Relative Reduction Factors (RRFs) according to the methodology in EPA's draft 8-hour modeling guidance.
(2) These RRFs were calculated for each of the four monitoring sites in the table below.
(3) The 8-hour ambient design values provided by Region IV were truncated to integer form then multiplied by the corresponding RRF value. The resulting future year design value estimates were truncated to integer form as provided in the table below.

City	Site ID	8-Hour Ambient Design Value (ppb)	2007 Tier 2+SIP Call Design Value (ppb)
Augusta	13-245-0091	92	78
Columbus	13-215-0008	86	74
Columbus	13-215-1003	88.67	76
Macon	13-021-0012	104	83

Appendix A

ADEM recommends that the Birmingham Nonattainment Area for the 8-hour NAAQS for ozone exclude Blount and St. Clair Counties. EPA guidance (dated March 28, 2000) states that if a State wishes to propose a nonattainment area boundary smaller than the MSA boundary, the State must address how certain factors affect the drawing of the nonattainment boundary. Full discussion of each of these factors for the Birmingham Nonattainment Area is provided in this Appendix.

The factors that provide the most compelling evidence to exclude Blount and St. Clair Counties are listed below:

- Total annual emissions of NOx and VOC in comparison to Jefferson and Shelby Counties
- Population density and degree of urbanization in comparison to Jefferson and Shelby Counties
- Location of emission sources (i.e. the lack of significant point sources)
- Limited expected growth
- Traffic (Daily VMT)
- Meteorology
- Level of control of emission sources
- Regional emission reductions

Data provided to ADEM by the Regional Planning Commission of the Greater Birmingham Area is included at the end of the appendix. ADEM referenced this data as a supplement to the data that had already been collected.

A. Emissions and air quality in adjacent areas (including adjacent C/MSAs)

The counties and MSA's adjacent to the Birmingham MSA are depicted in Figure 1. To evaluate emissions for the counties adjacent to Blount and St. Clair, ADEM obtained the 1996 annual NOx and VOC emission estimates from EPA's recommended web site[1]. Table 1 lists these emissions which include all anthropogenic sources (i.e. point, area, mobile, and nonroad mobile) for the counties that are adjacent to Blount and St. Clair.

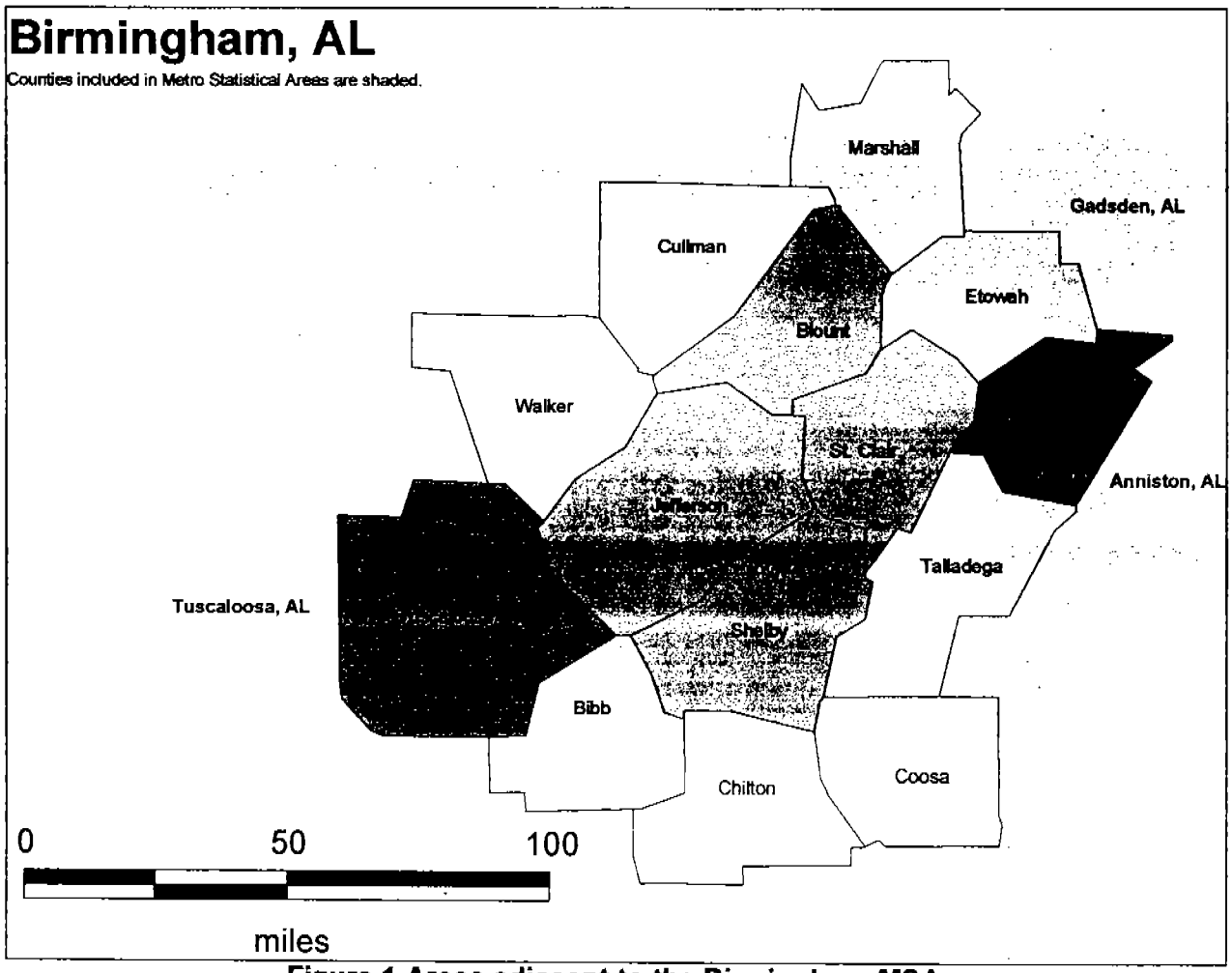


Figure 1 Areas adjacent to the Birmingham MSA

[1] www.pechan.com/emissions3/html/net.htm

Table 1 Annual Emissions for Areas Adjacent to Blount and St. Clair Counties

County	1996 Annual VOC Emissions (Tons)	Ranking for VOC	1996 Annual NOx Emissions (Tons)	Ranking for NOx
Blount	2,843	10	3,239	10
Calhoun	10,804	3	10,308	5
Cullman	5,504	7	5,577	8
Etowah	8,732	4	11,157*	4
Jefferson	53,426	1	88,719* [M]	1
Marshall	6,217	6	6,393	7
Shelby	11,198	2	35,113* [M]	3
St. Clair	3,410	9	5,208	9
Talladega	8,037	5	8,490	6
Walker	4,714	8	36,715*	2

*County has one or more utility plants located within its boundary
[M] County has an ozone monitor

As shown in Table 1, emissions in Blount and St. Clair are less than the emissions in the surrounding counties. A logical conclusion would be that emissions from these two counties would not play a significant role in the air quality outside their boundaries. In addition, emissions originating from within the two counties do not appear substantial enough to produce exceedances of the NAAQS for ozone.

Except for Jefferson and Shelby counties, there are no ozone monitors sited in any counties adjacent to Blount and St. Clair. Because of the lack of available monitored air quality data for Blount and St. Clair and adjacent areas, no conclusion can be made in regard to air quality impacts from surrounding areas.

B. Population Density and degree of urbanization including commercial development (significant difference from surrounding areas)

To evaluate the various aspects of population, ADEM obtained the 1990 to 1999 population estimates for the Birmingham MSA from the Alabama State Data Center[2]. Information on business data (i.e. retail employment and manufacturing employment) was obtained from the US Census Bureau's *County Business Patterns*.

Population densities were calculated by dividing the population estimates by the land area of each county (in square miles). Figure 2 depicts the population densities for the counties in the Birmingham MSA. Blount and St. Clair have similar land areas (646 and 634 square miles, respectively), while Jefferson and Shelby are larger (1,113 and 795 square miles, respectively). Although the difference in the land areas skews impact of the population density factor, Blount and St. Clair have much smaller population densities than either Jefferson or Shelby. This population density factor fortifies the recommendation to exclude Blount and St. Clair from the Birmingham Nonattainment Area.

Population trends/data are presented as Figures 3 and 4. Figure 3 demonstrates that Blount and St. Clair each have a population that that has remained less than 50% of Shelby County's population and less than 10% of Jefferson County's population over the years. In addition, Figure 4 demonstrates that the combined population of Blount and St. Clair counties only represents approximately 12% of the total population for the entire Birmingham MSA. These population factors fortify the recommendation to exclude Blount and St. Clair from the Birmingham Nonattainment Area.

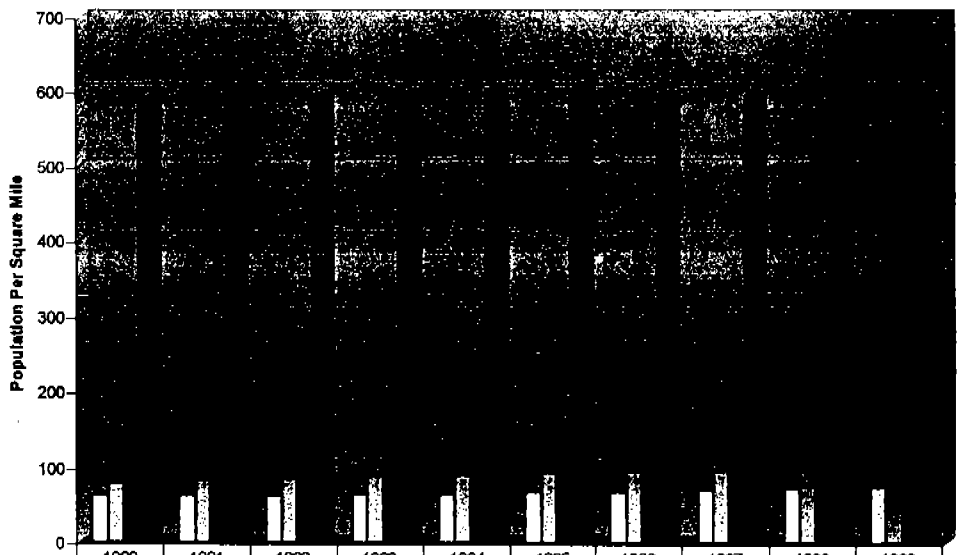
The amount and percent of urban population in the Birmingham MSA is presented in Table 2. This data clearly shows that Blount and St. Clair have an insignificant urban population in comparison to the urban population of Jefferson and Shelby. In addition, the combined urban population of Blount and St. Clair only represents approximately 3% of the total urban population for the entire Birmingham MSA. This factor fortifies the recommendation to exclude Blount and St. Clair counties from the Birmingham Nonattainment Area.

Table 2 Urban Population for Birmingham MSA

County Name	% Urban[3]	1990 Population	1990 Urban Population	% of MSA Total 1990 Urban Population	1999 Population	1999 Urban Population	% of MSA Total 1999 Urban Population
Jefferson Co	89.4%	652,078	582,958	88.2%	657,422	587,735	84.2%
Shelby Co	59.3%	100,131	59,378	9.0%	146,392	86,810	12.4%
St Clair Co	28.2%	50,090	14,125	2.1%	63,852	18,006	2.6%
Blount Co	12.3%	39,408	4,847	0.7%	47,411	5,832	0.8%
MSA Totals	78.6%	841,707	661,308	***	915,077	698,384	***

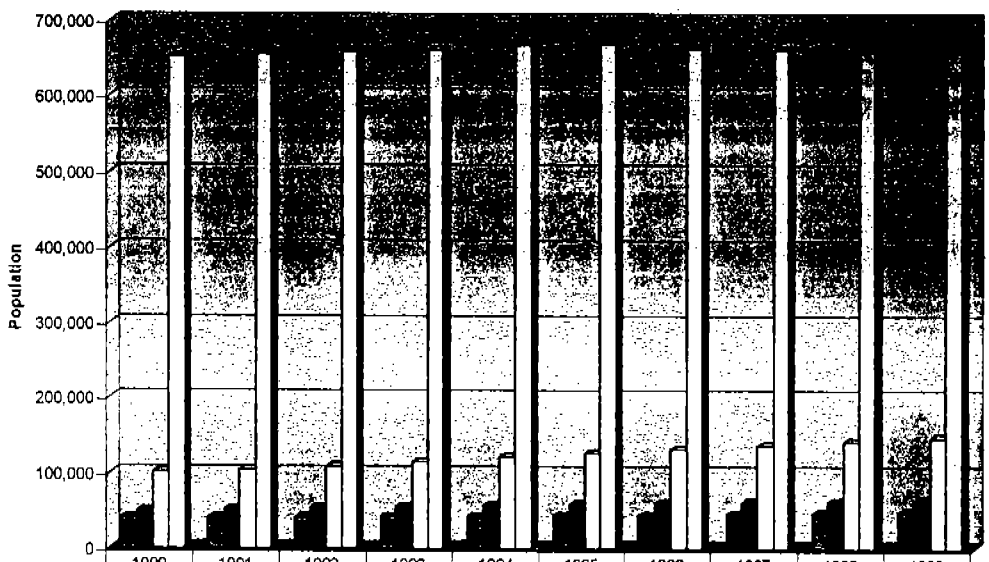
[2] The Alabama State Data Center (ASDC) is a network of 27 public agencies working together through a cooperative agreement with the U.S. Bureau of the Census to facilitate use and delivery of Census and other data to the public. Internet site: http://cber.cba.ua.edu/est_prj.html

[3] Based on the 1990 US Census



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Blount Co	61	62	62	63	64	66	67	70	72	73
St Clair Co	79	81	83	86	88	91	94	96	98	101
Shelby Co	126	130	135	143	151	158	164	171	177	184
Jefferson Co	586	589	592	593	600	602	595	593	593	591

Figure 2 Population Density for Birmingham MSA



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Blount Co	39,408	39,861	40,232	40,998	41,366	42,587	43,548	44,930	46,266	47,411
St Clair Co	50,090	51,376	52,898	54,528	56,013	57,811	59,389	60,694	62,003	63,852
Shelby Co	100,131	103,370	107,530	113,583	119,966	125,314	130,133	135,752	140,715	146,392
Jefferson Co	652,078	655,705	658,563	660,131	668,146	669,520	662,344	660,119	659,524	657,422

Figure 3 Population Data for Birmingham MSA

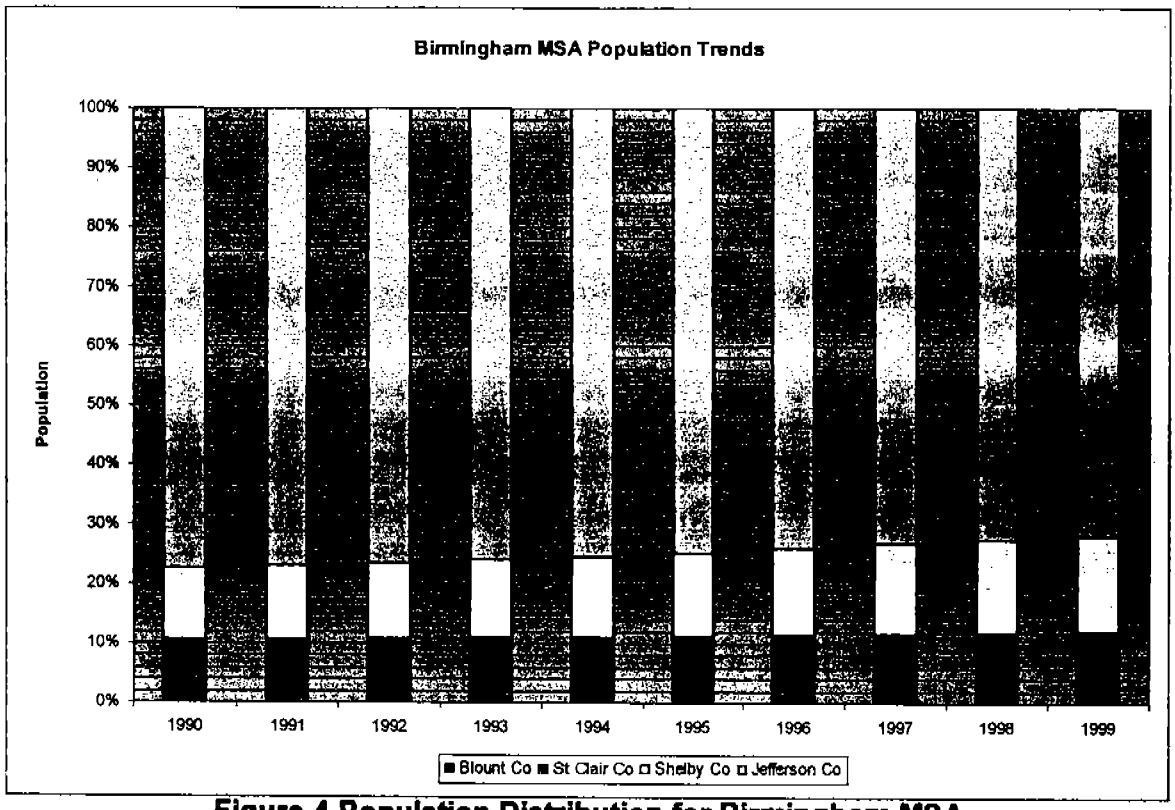


Figure 4 Population Distribution for Birmingham MSA

Tables 3, 4, and 5 show the trends in Total Employment, Manufacturing Employment, and Retail Employment, respectively, for the counties in the Birmingham MSA. Figure 5 demonstrates that the number of Total Employees for Blount and St. Clair is not substantial in comparison to Jefferson and Shelby. This factor fortifies the recommendation to exclude Blount and St. Clair counties from the Birmingham Nonattainment Area.

Although Blount and St. Clair show a large growth trend in retail employees, a growth in retail employment would not be as indicative of possible emission increases as growth in manufacturing employees. In addition, St. Clair County's 36% growth in total employees is insignificant given that those employees still only represent 2.7% of the total number of employees in the Birmingham MSA. This growth does not contradict the impact of the overall employment numbers.

Table 3 Total Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Jefferson	337,279	341,854	361,636	344,275	352,849	4.6%	83.8%
Shelby	28,767	30,921	35,913	49,359	49,001	70.3%	11.6%
St Clair	8,507	9,450	10,577	11,225	11,565	35.9%	2.7%
Blount	7,233	8,355	9,238	7,902	7,818	8.1%	1.9%
MSA Total	381,786	390,580	417,364	412,761	421,233	10.3%	

Table 4 Manufacturing Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Jefferson	40,229	40,249	42,422	41,677	39,620	-1.5%	74.4%
Shelby	7,901	7,924	7,853	8,289	7,837	-0.8%	14.7%
St Clair	2,849	2,831	3,214	3,147	3,085	8.3%	5.8%
Blount	2,804	3,030	3,091	2,897	2,742	-2.2%	5.1%
MSA Total	53,783	54,034	56,580	56,010	53,284	-0.9%	

Table 5 Retail Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Jefferson	62,574	64,237	75,965	65,847	66,378	6.1%	83.8%
Shelby	5,033	6,127	7,244	8,364	8,495	68.8%	10.7%
St Clair	1,496	2,108	2,286	2,644	2,623	75.3%	3.3%
Blount	1,258	1,383	1,445	1,435	1,692	34.5%	2.1%
MSA Total	70,361	73,855	86,940	78,290	79,188	12.5%	

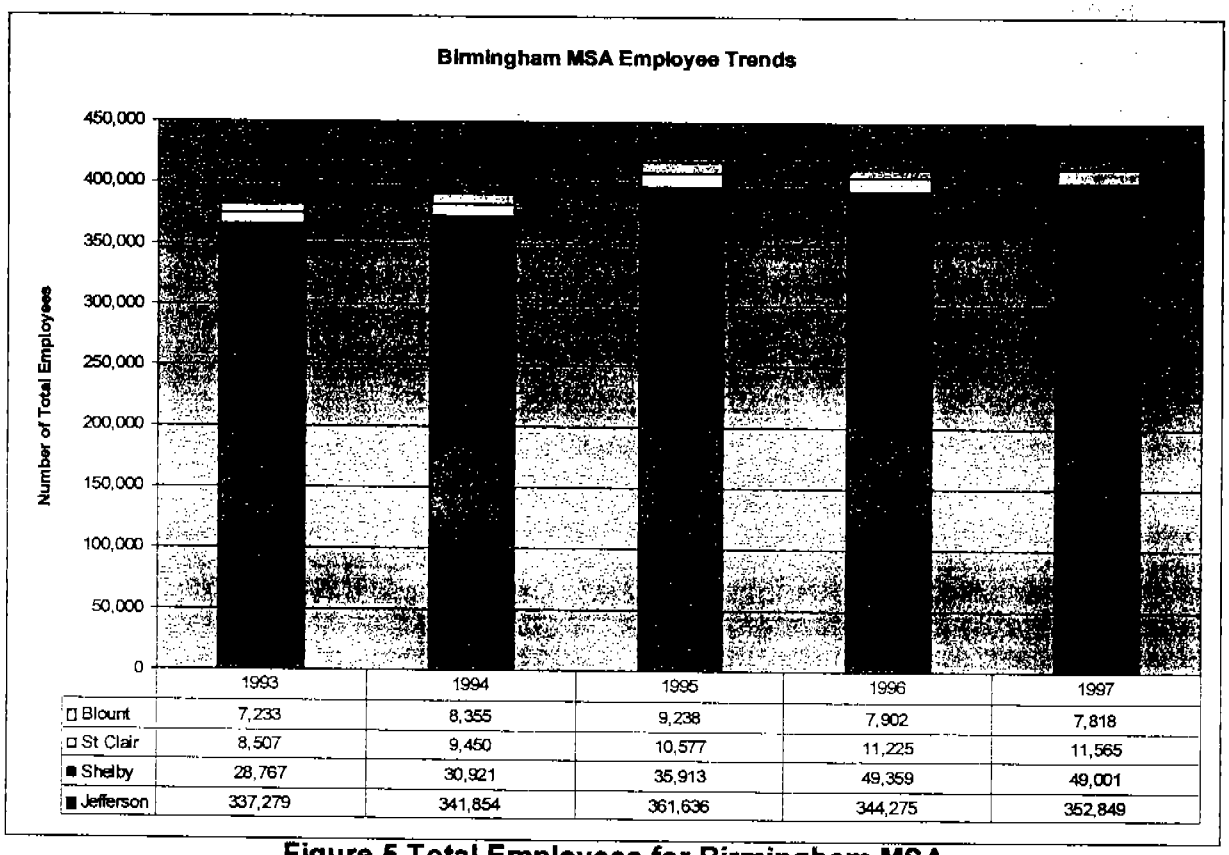


Figure 5 Total Employees for Birmingham MSA

C. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale)

Table 6 demonstrates that each ozone monitor in Jefferson and Shelby exceeds the 8-hour NAAQS for ozone. Figure 6 identifies the ozone monitoring sites which provided the 1997, 1998, and 1999 data for the Birmingham MSA. During this time period, all ozone monitoring sites were located in Jefferson and Shelby. The recommendation to exclude Blount and St. Clair was not influenced by monitoring data because of the lack of ozone monitoring data outside of Jefferson and Shelby counties.

Table 6 Birmingham MSA Ozone Monitoring Data

County	AIRS ID	Site	1997 4th Max	1998 4th Max	1999 4th Max	3 Year Average
Jefferson	01-073-1003	Fairfield (G)	0.086	0.101	0.092	**0.093**
Jefferson	01-073-2006	Hoover (F)	0.083	0.094	0.097	**0.091**
Jefferson	01-073-1005	McAdory (E)	0.079	0.096	0.092	**0.089**
Jefferson	01-073-5002	Pinson (H)	0.078	0.091	0.096	**0.088**
Jefferson	01-073-6002	Tarrant (I)	0.088	0.090	0.092	**0.090**
Shelby	01-117-0004	Helena (Q)	0.084	0.107	0.100	**0.097**

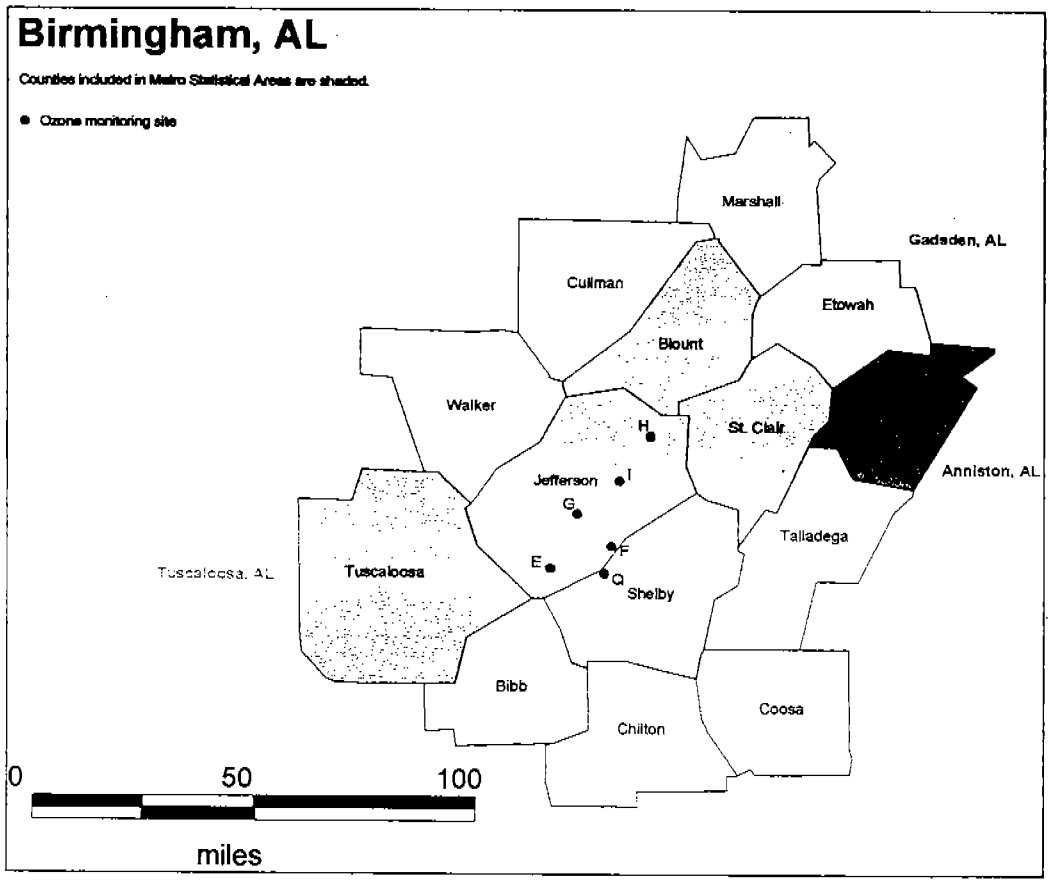


Figure 6 Ozone Monitoring Sites in Birmingham MSA and Adjacent Areas

D. Location of Emission Sources

Figure 7 depicts the location of large point sources in the Birmingham MSA and surrounding counties. The base map was obtained from EPA's recommended web site[4], but two corrections were made. The large utility located in Walker County was added, and the large NOx source incorrectly indicated as being located in Blount County was removed. Tables 7 and 8 present the distribution of NOx emissions among point, area[5], and mobile sources in the Birmingham MSA. Tables 9 and 10 present the same information for VOC emissions. Figures 8 and 9 illustrate this data. Figure 10 presents the emission densities for the counties in the Birmingham MSA.

Blount and St. Clair only account for 6% of the total annual NOx emissions and 9% of the total annual VOC emissions in the Birmingham MSA. Each county also has a significantly less emission density than Jefferson and Shelby. The lack of large point sources of NOx or VOC emissions located in Blount and St. Clair counties, the minimal area and mobile source emissions, and the smaller emission densities fortify the recommendation to exclude Blount and St. Clair counties from the Birmingham Nonattainment Area.

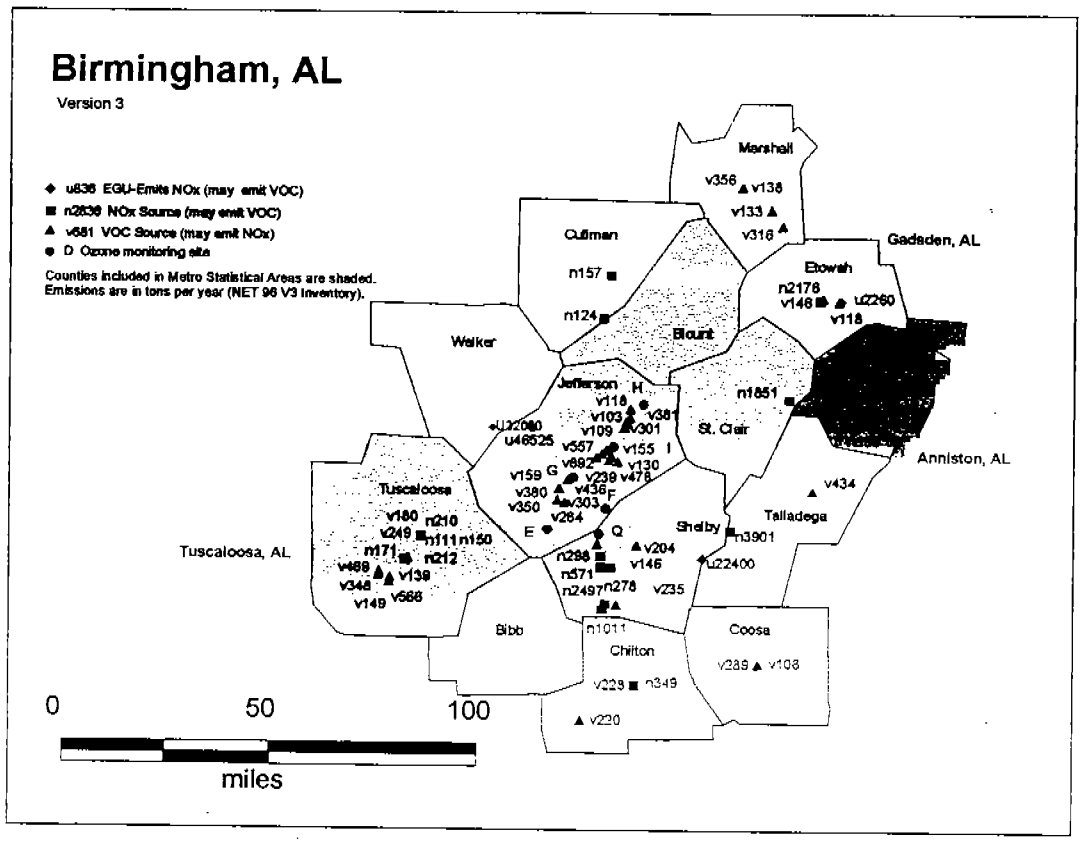


Figure 7 Location of Large Points Sources in Birmingham MSA

[4] www.pechan.com/emissions3/map_idx.htm

[5] Area sources include the nonroad mobile sources

Table 7 NOx Annual Emissions (Tons)

FIPS Code	Name	Point		Area		Mobile		Total Emissions	
01073	Jefferson Co	46,525	61.6%	14,588	74.6%	27,607	74.4%	88,720	67%
01117	Shelby Co	27,048	35.8%	3,154	16.1%	4,785	12.9%	34,987	26%
01115	St Clair Co	1,899	2.5%	893	4.6%	2,419	6.5%	5,211	4%
01009	Blount Co	43	0.1%	918	4.7%	2,278	6.1%	3,239	2%
MSA Total Emissions		**75,515**		**19,553**		**37,089**		**132,157**	

Table 8 Cumulative NOx Contributions

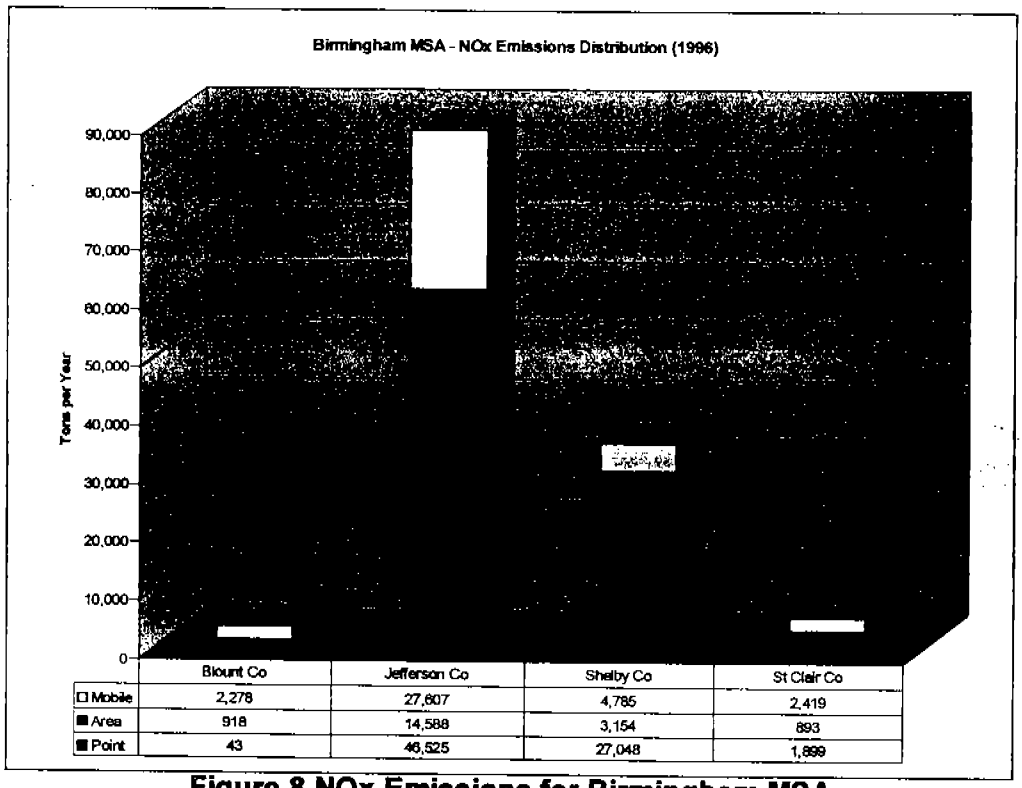
County Name	Factor	Annual 1996 Emissions (Tons)	% of MSA Total Emissions	Cumulative %
Jefferson Co	Point Source NOx Emissions (tons)	46,525	35.2%	35.2%
Jefferson Co	Mobile Source NOx Emissions (tons)	27,607	20.9%	56.1%
Shelby Co	Point Source NOx Emissions (tons)	27,048	20.5%	76.6%
Jefferson Co	Area Source NOx Emissions (tons)	14,588	11.0%	87.6%
Shelby Co	Mobile Source NOx Emissions (tons)	4,785	3.6%	91.2%
Shelby Co	Area Source NOx Emissions (tons)	3,154	2.4%	93.6%
St Clair Co	Mobile Source NOx Emissions (tons)	2,419	1.8%	95.4%
Blount Co	Mobile Source NOx Emissions (tons)	2,278	1.7%	97.2%
St Clair Co	Point Source NOx Emissions (tons)	1,899	1.4%	98.6%
Blount Co	Area Source NOx Emissions (tons)	918	0.7%	99.3%
St Clair Co	Area Source NOx Emissions (tons)	893	0.7%	100.0%
Blount Co	Point Source NOx Emissions (tons)	43	0.0%	100.0%
	MSA Total Emissions	***132,157***		

Table 9 VOC Annual Emissions (Tons)

FIPS Code	Name	Point		Area		Mobile		Total Emissions	
01073	Jefferson Co	7,682	85.2%	19,205	65.9%	26,540	81.1%	53,427	75%
01117	Shelby Co	1,140	12.6%	6,441	22.1%	3,642	11.1%	11,223	16%
01115	St Clair Co	152	1.7%	1,924	6.6%	1,335	4.1%	3,411	5%
01009	Blount Co	39	0.4%	1,576	5.4%	1,228	3.8%	2,843	4%
MSA Total Emissions		**9,013**		**29,146**		**32,745**		**70,904**	

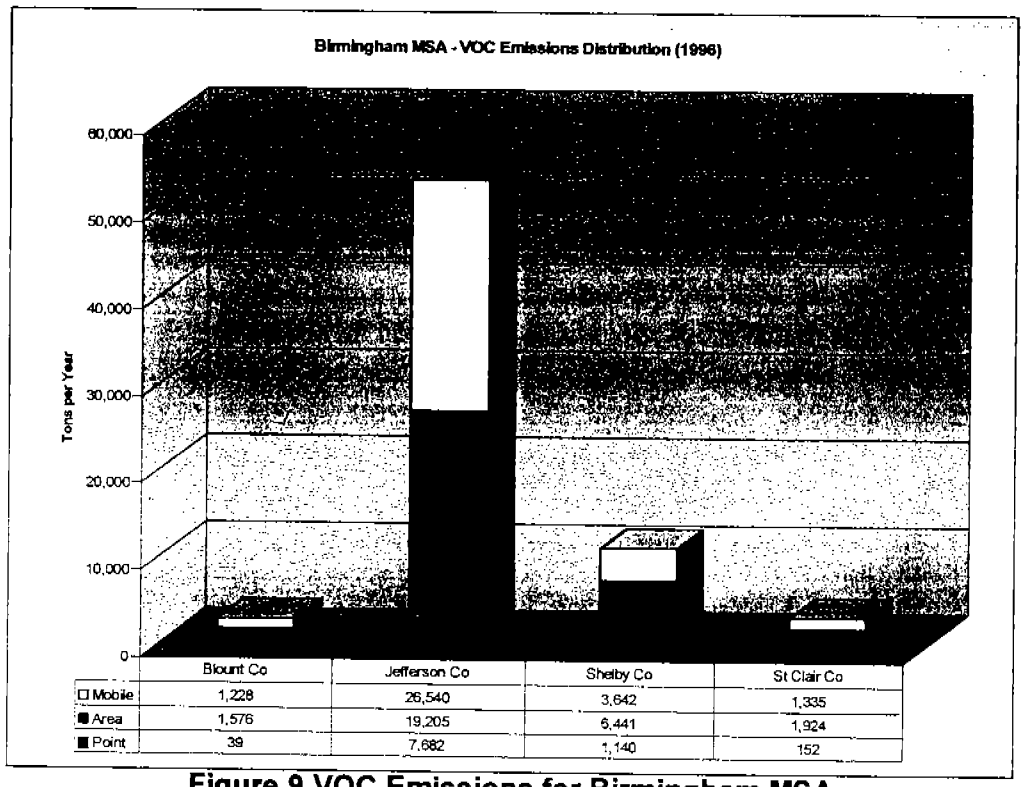
Table 10 Cumulative VOC Contributions

County Name	Factor	Annual 1996 Emissions (Tons)	% of MSA Total Emissions	Cumulative %
Jefferson Co	Mobile Source VOC Emissions (tons)	26,540	37.4%	37.4%
Jefferson Co	Area Source VOC Emissions (tons)	19,205	27.1%	64.5%
Jefferson Co	Point Source VOC Emissions (tons)	7,682	10.8%	75.4%
Shelby Co	Area Source VOC Emissions (tons)	6,441	9.1%	84.4%
Shelby Co	Mobile Source VOC Emissions (tons)	3,642	5.1%	89.6%
St Clair Co	Area Source VOC Emissions (tons)	1,924	2.7%	92.3%
Blount Co	Area Source VOC Emissions (tons)	1,576	2.2%	94.5%
St Clair Co	Mobile Source VOC Emissions (tons)	1,335	1.9%	96.4%
Blount Co	Mobile Source VOC Emissions (tons)	1,228	1.7%	98.1%
Shelby Co	Point Source VOC Emissions (tons)	1,140	1.6%	99.7%
St Clair Co	Point Source VOC Emissions (tons)	152	0.2%	99.9%
Blount Co	Point Source VOC Emissions (tons)	39	0.1%	100.0%
	MSA Total Emissions	***70,904***		



	Blount Co	Jefferson Co	Shelby Co	St Clair Co
Mobile	2,278	27,807	4,785	2,419
Area	918	14,588	3,154	893
Point	43	46,525	27,048	1,899

Figure 8 NOx Emissions for Birmingham MSA



	Blount Co	Jefferson Co	Shelby Co	St Clair Co
Mobile	1,228	26,540	3,642	1,335
Area	1,576	19,205	6,441	1,924
Point	39	7,682	1,140	152

Figure 9 VOC Emissions for Birmingham MSA

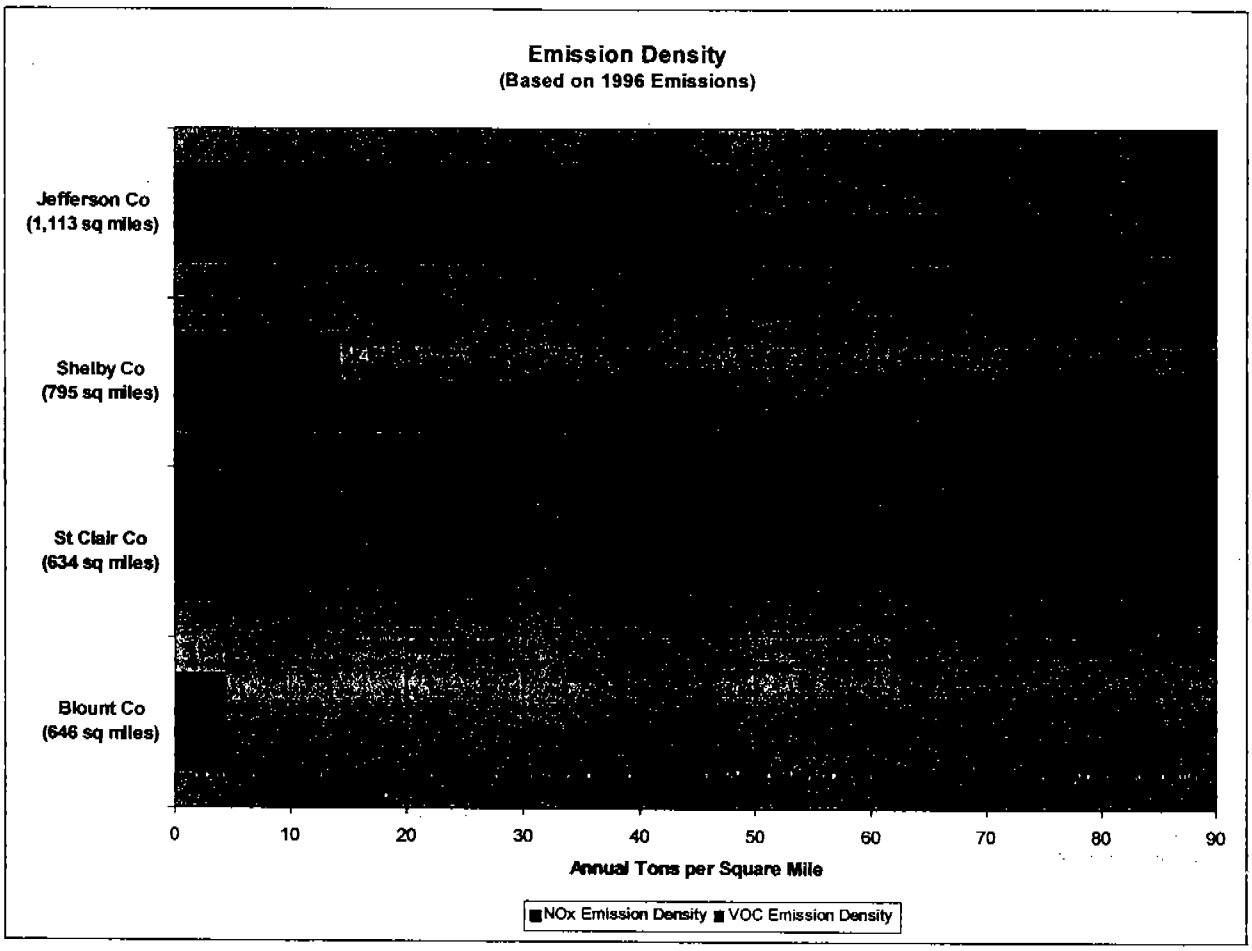


Figure 10 Emission Density for Birmingham MSA

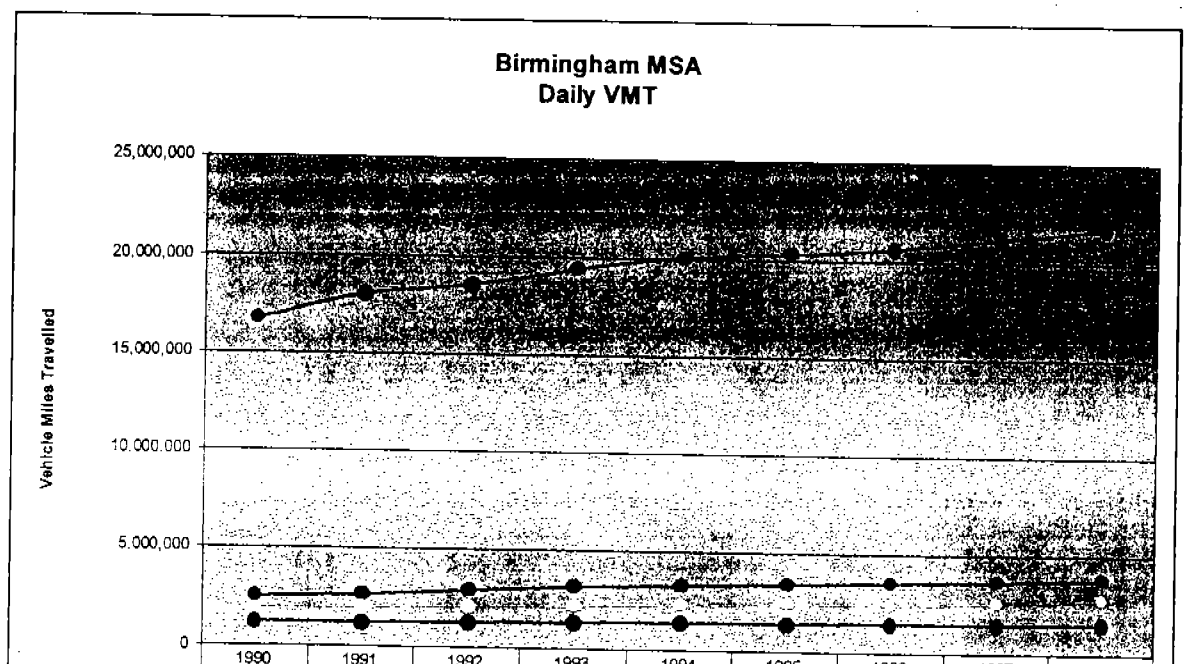
E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the Alabama Department of Transportation and the commuting patterns were obtained from the US Census Bureau web site. The commuting patterns available were based on the 1990 US Census. Table 11 presents the 1990 and 1998 Daily VMT estimates for the counties in the Birmingham MSA and Figure 11 demonstrates the trend from 1990 to 1998 for each county. Figure 12 presents the breakdown of 1998 Daily VMT into urban and rural. Figure 13 presents the commuting patterns among the counties in the Birmingham MSA.

Table 11 shows that the Daily VMT for Blount and St. Clair combined comprises approximately 15% of the Daily VMT for the Birmingham MSA. Figure 12 demonstrates that the Blount has no urban Daily VMT and St. Clair only has a minimal amount of urban Daily VMT. The low percentage of Daily VMT and the limited amount of urban Daily VMT fortify the recommendation to exclude Blount and St. Clair counties from the Birmingham Nonattainment Area.

Table 11 Daily VMT for Birmingham MSA

County	1990 Daily VMT	1998 Daily VMT	Daily VMT Change (1990-1998)	% Change	% of MSA 1998 Daily VMT
Jefferson Co	16,768,348	21,690,292	4,921,944	29.4%	72.8%
Shelby Co	2,493,390	3,779,695	1,286,306	51.6%	12.7%
St Clair Co	1,999,158	2,791,197	792,039	39.6%	9.4%
Blount Co	1,244,452	1,542,385	297,933	23.9%	5.2%
MSA Total	***22,505,347***	***29,803,569***	***7,298,222***	***32.4%***	



	1990	1991	1992	1993	1994	1995	1996	1997	1998
Blount Co	1,244,452	1,230,647	1,266,482	1,361,416	1,403,021	1,407,014	1,452,865	1,493,996	1,542,385
Jefferson Co	16,768,348	18,071,641	18,546,940	19,365,985	20,028,042	20,297,167	20,615,791	21,156,009	21,690,292
St Clair Co	1,999,158	2,024,765	2,137,819	2,220,947	2,348,050	2,470,192	2,469,106	2,585,118	2,791,197
Shelby Co	2,493,390	2,621,162	2,899,088	3,153,562	3,299,569	3,413,894	3,538,744	3,651,901	3,779,695

Figure 11 Daily VMT Trend for Birmingham MSA

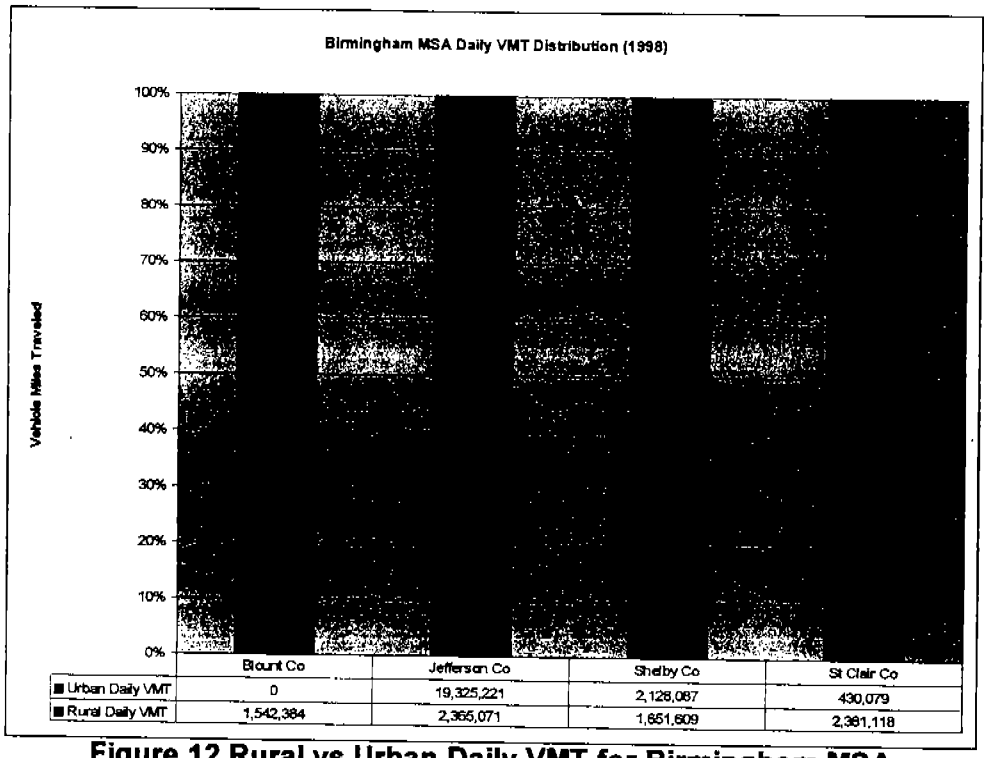


Figure 12 Rural vs Urban Daily VMT for Birmingham MSA

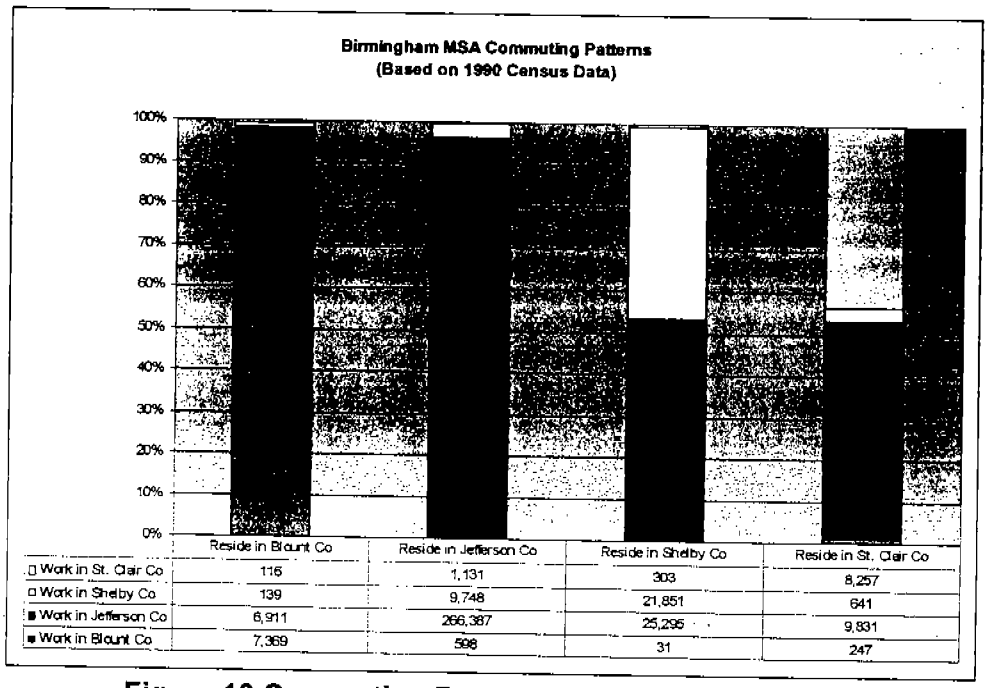


Figure 13 Commuting Patterns for Birmingham MSA

Although Figure 12 indicates that there is significant commuting from Blount and St. Clair into Jefferson County, the impact of this commuting will be lessened by the national low sulfur fuel standards. Therefore, this factor was not considered to play a significant role in the recommendation to exclude Blount and St. Clair from the Birmingham Nonattainment Area.

F. Expected Growth (including extent, pattern, and rate of growth)

There is little information available about expected growth. Table 12 provides population growth estimates that were supplied by the Regional Planning Commission of the Greater Birmingham Area. The estimates show significant growth expected for Shelby, Blount, and St. Clair counties, with the most significant growth expected in Shelby County. There has been no major source growth in Blount or St. Clair for the past 20 years. Since no other information about expected growth is available, and population growth estimates are not enough to influence a decision about designating a nonattainment area, this factor presents no compelling reason to include Blount and St. Clair in the Birmingham Nonattainment Area.

Table 12 Population Projections for Birmingham MSA

County Name	1990	1999	2005	2025	% Change 1990-1999	% Change 1999-2005	% Change 2005-2025
Blount Co	39,408	47,411	51,430	68,868	20.3%	8.5%	33.9%
St Clair Co	50,090	63,852	69,210	97,104	27.5%	8.4%	40.3%
Shelby Co	100,131	146,392	171,740	275,092	46.2%	17.3%	60.2%
Jefferson Co	652,078	657,422	664,960	704,552	0.8%	1.1%	6.0%

G. Meteorology

It is clear that meteorology plays a major role in the formation and transport of ozone. In the Birmingham area in particular, wind direction and speed are important indicators to where ozone forms and travels. In the 1997-1999 ozone seasons, ozone levels exceeded the proposed 8-hour standard approximately sixty days over the three-year period.[6] A wind analysis was accomplished to determine if wind directions could be correlated with high ozone. Historically, when evaluating the meteorological conditions associated with the one-hour standard for the Birmingham area, a northerly component to the wind provided the highest ozone concentrations. This is clearly identified in the wind rose in Figure 1, which indicates a predominate N/NE component of the wind. However, during "O_3 season daytime hours", a different depiction of the surface winds arises. As seen in the wind rose in Figure 2, during "O_3 season daytime hours" or the period roughly corresponding to 6am – 3pm, no dominant wind direction can be identified. This implies, as long suspected, that wind direction is a function of many variables, including synoptic scale weather systems, surface level heating and terrain influenced wind flows. With respect to Blount and St. Clair counties, this analysis would imply that monitored data within the area would provide the best indicator of transported ozone into those counties.

With respect to possible transport of ozone and its precursors out of Blount and St. Clair Counties, an additional analysis was completed. Of the approximately sixty exceedance days between 1997 – 1999, twenty six days had average 6 am – 3 pm wind directions between 22.5 degrees and 157.5 degrees, or blowing from Blount & St. Clair counties into the Jefferson/Shelby County area. Of these days, only one day showed the elevated ozone concentrations at the Pinson monitor, which is located closest to Blount and St. Clair counties. This implies that on one day the air entering Jefferson County contained elevated levels of ozone or its precursors. Please refer to Figure 3 for locations of ozone monitors in the Jefferson/Shelby county area. However, as previously explained in point A cumulative emissions of NO_X and VOC's in Blount and St. Clair counties are 6.3 and 8.8 percent, respectively. Based on relatively low emissions from these counties, it is highly unlikely that emissions from those counties impact the Jefferson/Shelby county area.

In summary, meteorology plays an important role in ozone formation and transport. However, with respect to Blount and St. Clair counties, there is insufficient monitoring data to support the inclusion of Blount and St. Clair counties into the Birmingham MSA. In addition, the variability of the winds during "O_3 season daytime hours" and the low level of emissions in the two county area would suggest that emissions from Blount and St. Clair counties do not negatively impact the Jefferson/Shelby county area.

[6] This dataset has not been fully QA/QC'd

H. Geography/Topography (mountain ranges or other air basin boundaries)

The geography/topography of an area definitely influences the creation and transport of ozone. Birmingham is located in North Central Alabama in both Jefferson and Shelby counties. The city is situated in the foothills of the Appalachians, about 300 miles inland from the Gulf of Mexico. With the hills running northeast to southwest, the city itself lies in the Birmingham-Big Canoe Valley. Off to the north and west the terrain levels out to the Cumberland Plateau. To the south and east, there is rougher terrain, such as the Cahaba Ridge and Valley and the Coosa Ridge and Valley. The northwestern half of Jefferson County is included in the Cumberland Plateau, while all of Shelby County consists of several ridges and valleys. As seen in Figure 1 of point G, there is a large northeast component of wind in the Birmingham Area. This implies drainage into the area at night as winds channel down the valleys.

The topography of the Birmingham is very complex and it is suspected that it plays a large role in ozone formation and transport. However, there is no monitoring data or air quality analyses to demonstrate the extent of its influence. Therefore, data to support the inclusion or exclusion of counties in a MSA based on topography is insufficient.

I. Jurisdictional Boundaries

Within the Birmingham Metropolitan Intrastate air quality control region (40 CFR, §81.41), the current 1-hour nonattainment area consists of Jefferson and Shelby Counties. The Jefferson County Department of Health holds jurisdiction within the county boundaries of Jefferson County for which monitoring data demonstrates the county to be in nonattainment for the eight-hour standard. The ADEM holds jurisdiction for Blount, St. Clair and Shelby Counties. The State's monitor in Shelby County supports this county to be in nonattainment. Discussion elsewhere in this document demonstrates the State's recommendations for exclusion of Blount and St. Clair Counties as a part of the 8-hour nonattainment boundary.

J. Level of Control of Emission Sources

Since 1979, statewide reasonably available control technology (RACT) has been in place for volatile organic compounds (VOCs) as found under ADEM Admin Code Chapter 335-3-6. Also in place since 1990, has been the institution of statewide regulations for the control of evaporative emissions in the gasoline marketing chain, commonly referred as 'Stage I' vapor recovery. Over the past 28 year history of Alabama's air pollution control program, the state has been delegated the authority to implement other standards of performance such as the New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPs), and the federal Prevention of Significant Deterioration regulations for protection of degradation of clean air areas. In addition, the Jefferson County Department of Health has in place, a level of VOC regulations within its boundaries that are more stringent than state requirements.

Under the proposed 1-hour attainment demonstration plan for the Birmingham area, the state proposes further nitrogen oxide reductions from electric generating plants beyond that required by the Acid Rain program, as well as, the continuance of cleaner gasoline being sold in the area. Additionally, as discussed under regional emission reductions, the EPA has required a NO_X SIP Call for 22 states, including Alabama that, by 2003, will result in large reductions in NO_X emissions from major utilities, large industrial boilers and gas turbines, cement kilns and

large stationary reciprocating internal combustion engines. Work is currently being performed by ADEM to complete the regional NO_X SIP. At the national level, EPA has finalized the Tier 2 vehicle/national fuel standards, which take effect beginning in 2004. However, the States will also begin to realize the benefits of cleaner vehicles with the National Low Emission Vehicle standards this Fall with the 2001 model year vehicles.

K. Regional Emission Reductions

EPA performed Urban Airshed Modeling to estimate the impact of implementation of the NO_X SIP Call for Alabama. The results obtained from EPA for Alabama demonstrates in the table in Attachment 1 that the Birmingham area is expected to attain the new 8-hour standard. The significant reductions resulting from Tier II vehicles and from nationwide low-sulfur gasoline bolster EPA's conclusion that regional and nationwide efforts will enable this area to attain the 8-hour standard without further controls.

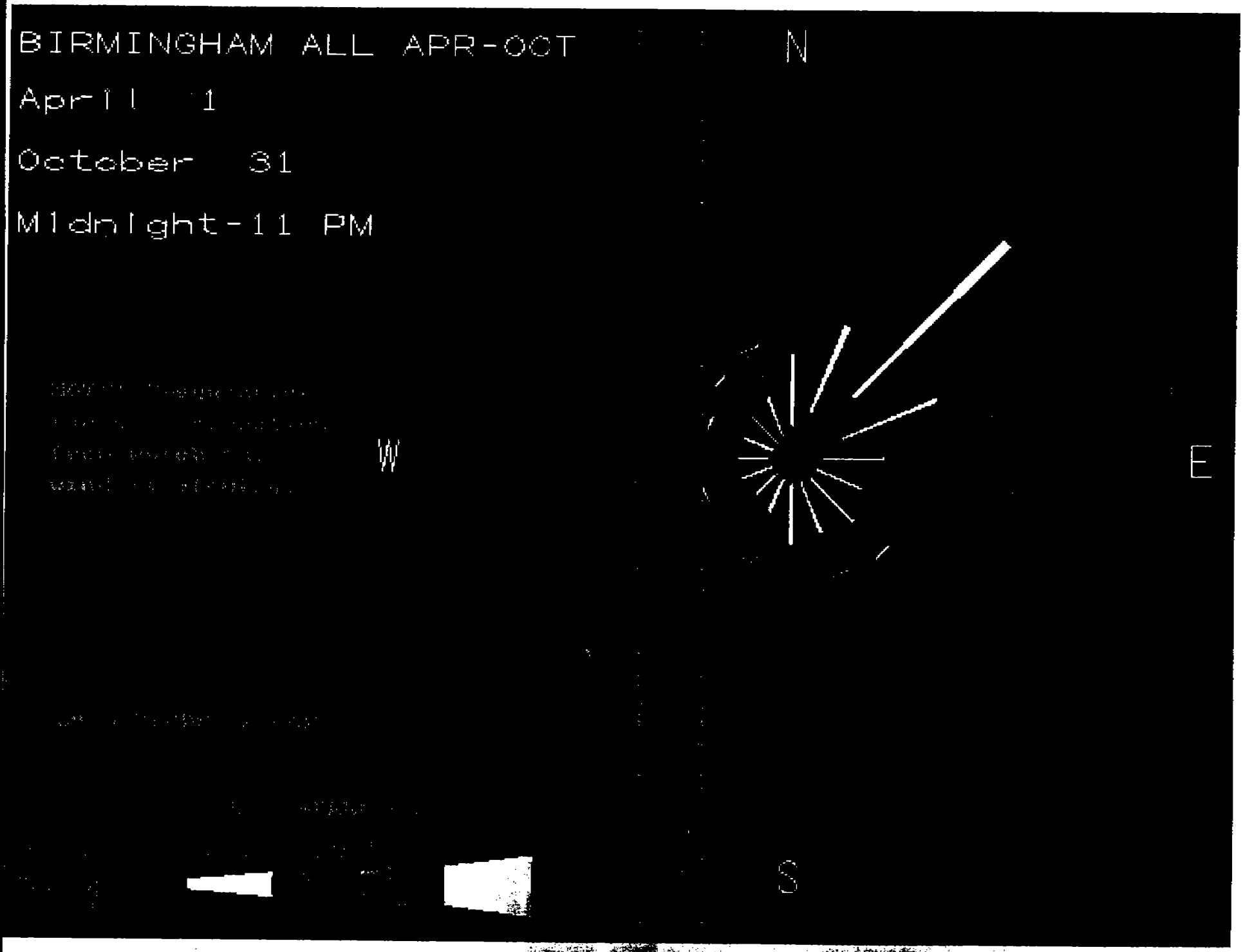

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Figure A-1

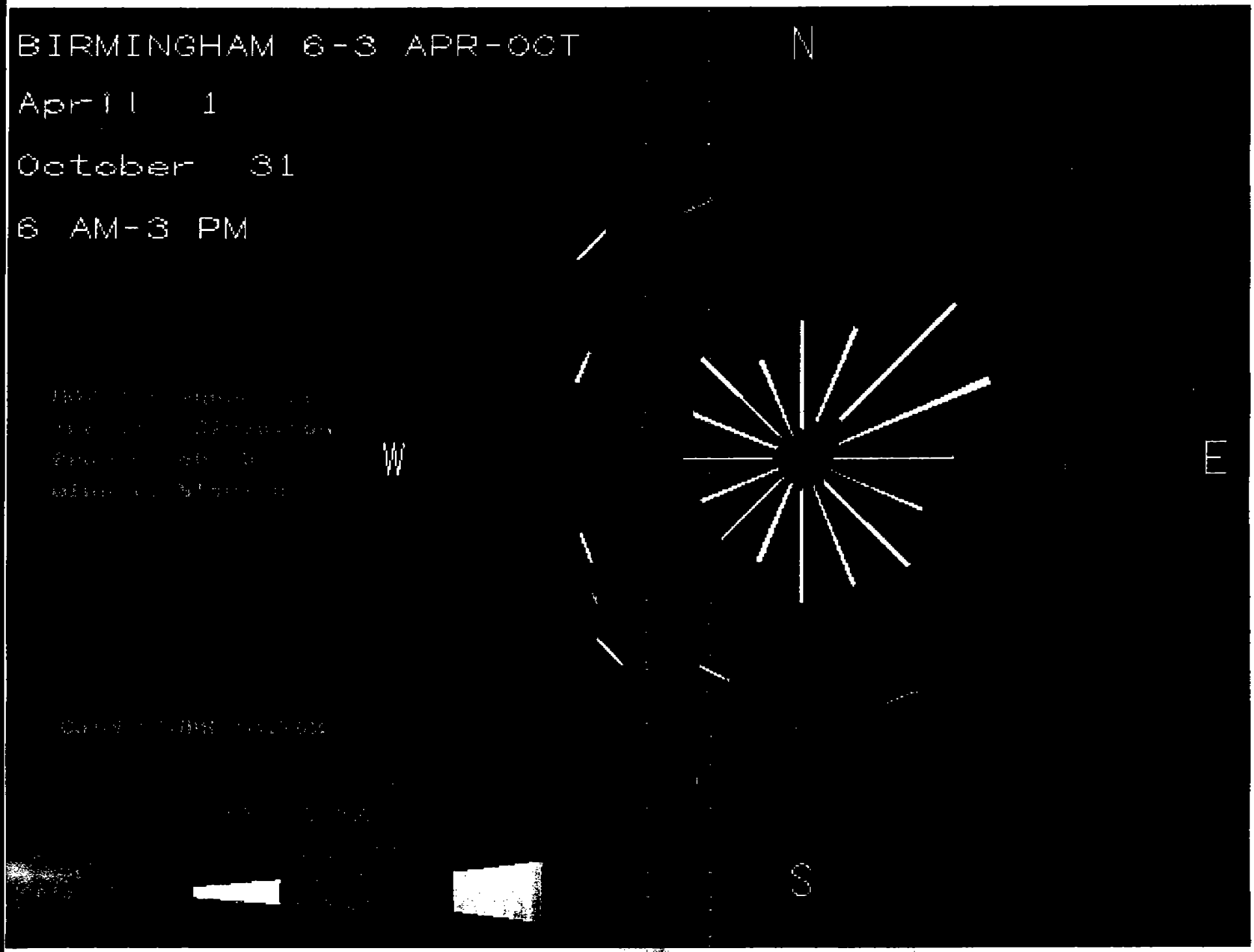
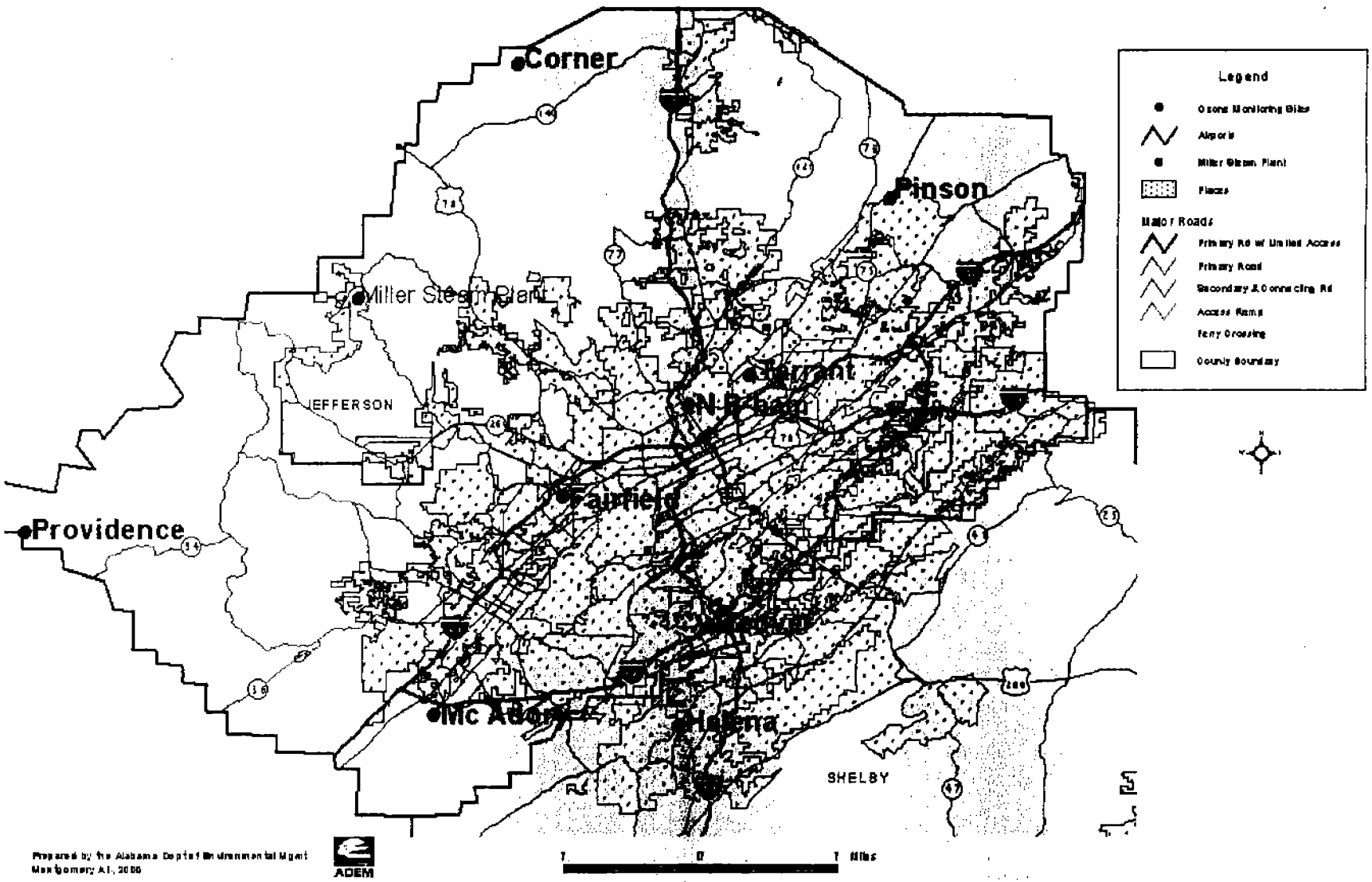


Figure A-2

Ozone Monitoring Sites in Jefferson and Shelby Counties



Prepared by the Alabama Department of Environmental Management
Montgomery, AL, 2006

Appendix B

ADEM recommends that the Huntsville Nonattainment Area for the 8-hour NAAQS for ozone exclude Limestone County. EPA guidance (dated March 28, 2000) states that if a State wishes to propose a nonattainment area boundary smaller than the MSA boundary, the State must address how certain factors affect the drawing of the nonattainment boundary. Therefore, a discussion of these factors for the Huntsville Nonattainment Area is provided in this Appendix.

The factors that provide the most compelling evidence to exclude Limestone County are listed below:

- Population density and degree of urbanization in comparison to Madison County
- Location of emission sources (i.e. the lack of significant point sources)
- Level of control of emission sources
- Regional emission reductions

A. Emissions and air quality in adjacent areas (including adjacent C/MSAs)

The counties and MSA's adjacent to the Huntsville MSA are depicted in Figure 1. To evaluate emissions for counties adjacent to Limestone County, ADEM obtained the 1996 annual NOx and VOC emission estimates from EPA's recommended web site[1]. Table 1 lists these emissions which include all anthropogenic sources (i.e. point, area, mobile, and nonroad mobile) for the counties that are adjacent to Limestone.

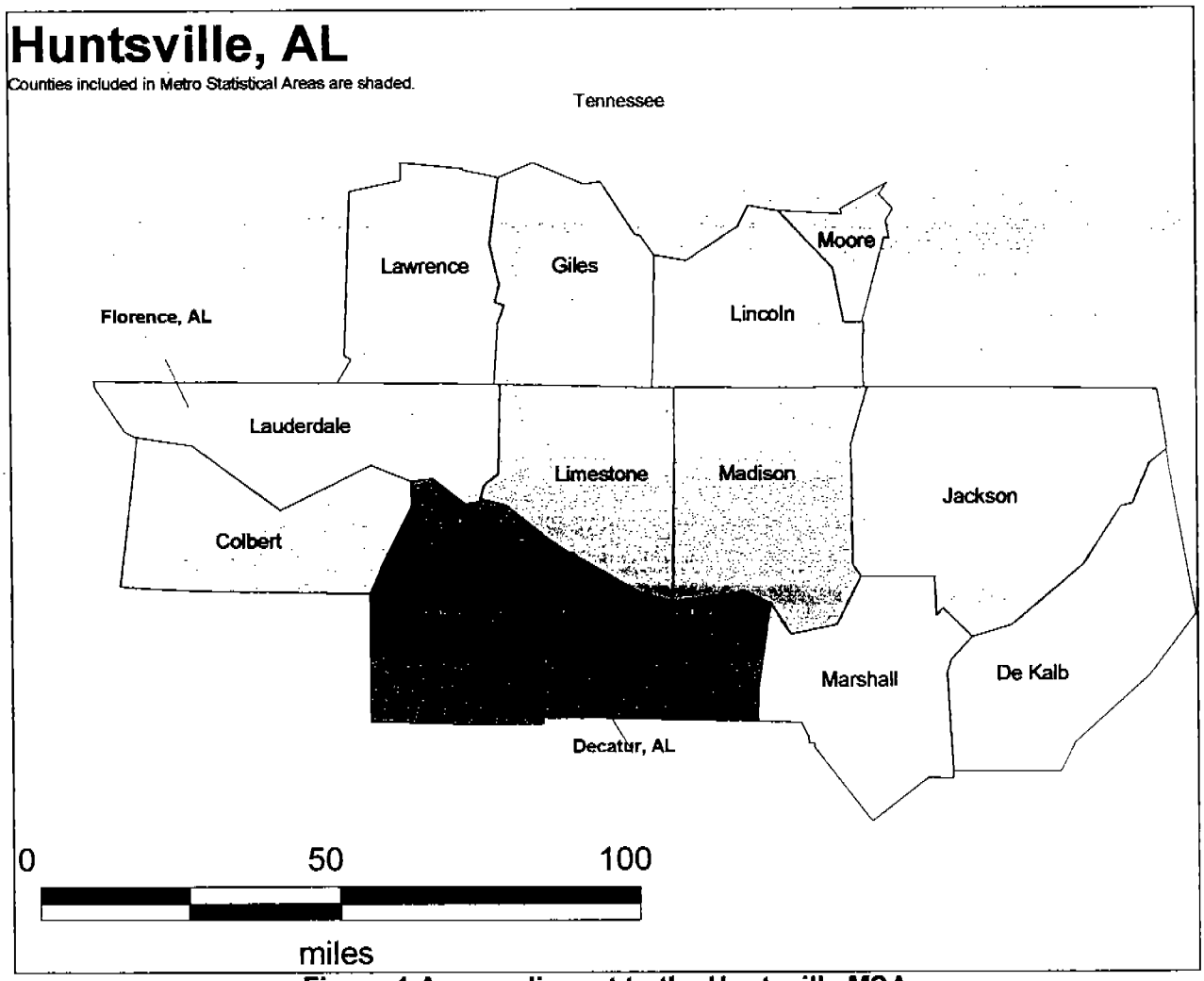


Figure 1 Areas adjacent to the Huntsville MSA

[1] www.pechan.com/emissions3/html/net.htm

Table 1 Annual Emissions for Areas Adjacent to Limestone County

County	1996 Annual VOC Emissions (Tons)	Ranking for VOC	1996 Annual NOx Emissions (Tons)	Ranking for NOx
Giles (TN)	2,902	8	2,040	8
Lauderdale	7,348	3	6,946	3
Lawrence[M]	4,242	6	6,171	4
Lawrence(TN)[M]	5,812	4	2,656	6
Limestone	5,158	5	4,734	5
Lincoln (TN)	3,011	7	2,255	7
Madison[M]	19,339	2	18,401	1
Morgan	22,163	1	16,876	2

[M] County has an ozone monitor

Madison (AL) and Lawrence (TN) both have a design value above the 8-hour NAAQS for ozone based on monitoring data for 1997, 1998, and 1999, while the design value for Lawrence (AL) meets the 8-hour NAAQS for ozone based on the same years of data. There were no other ozone monitoring sites in this area during this time period; therefore, there is limited air quality information. Additionally, there is no distinct disparity in emissions among the adjacent areas.

Evaluating the emissions and air quality in adjacent areas provides no compelling indicator as to whether Limestone should be included or excluded from the Huntsville Nonattainment Area.

B. Population Density and degree of urbanization including commercial development (significant difference from surrounding areas)

To evaluate the various aspects of population, ADEM obtained the 1990 to 1999 population estimates for the Huntsville MSA from the Alabama State Data Center[2]. Information on business data (i.e. retail employment and manufacturing employment) was obtained from the US Census Bureau's *County Business Patterns*.

Population densities were calculated by dividing the population estimates by the land area of each county (in square miles). Figure 2 depicts the population densities for the counties in the Huntsville MSA. Madison has a larger land area than Limestone (805 versus 568, respectively) which skews the impact of the population density factor. Despite having a smaller land area, Limestone still has a significantly smaller population density than Madison. This population density factor fortifies the recommendation to exclude Limestone County from the Huntsville Nonattainment Area.

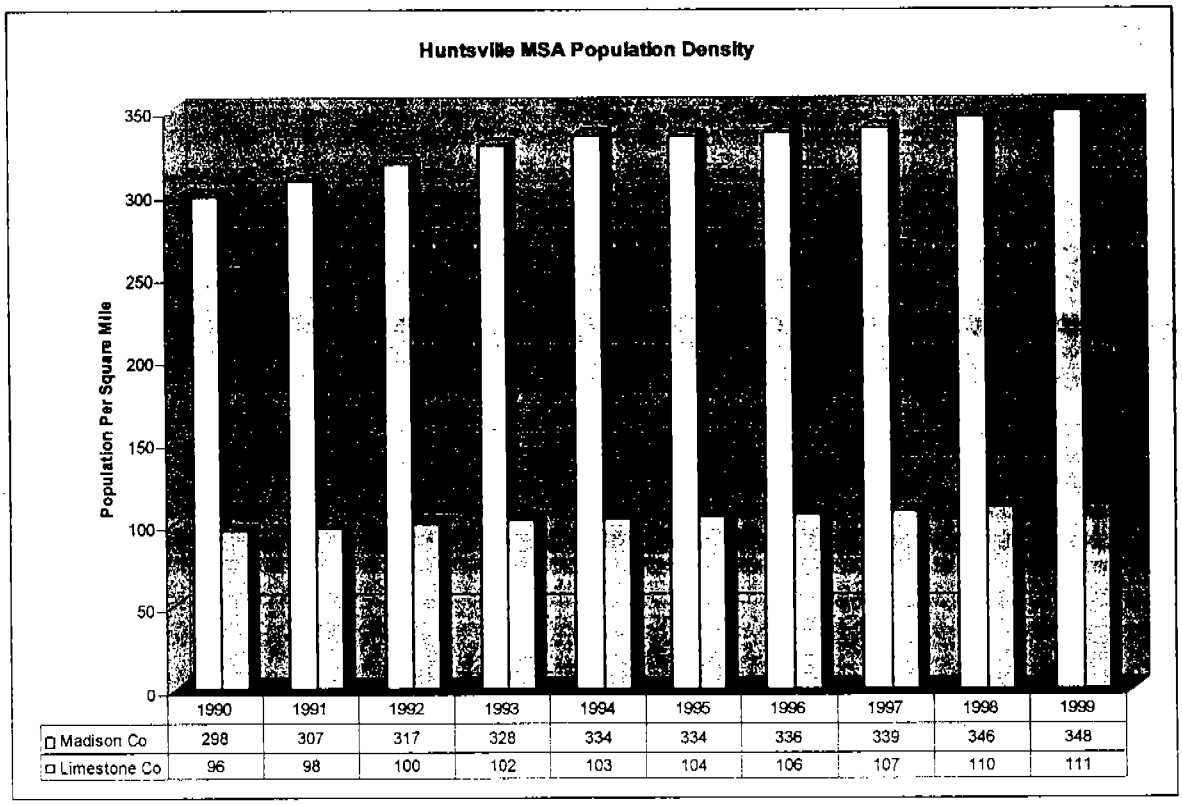


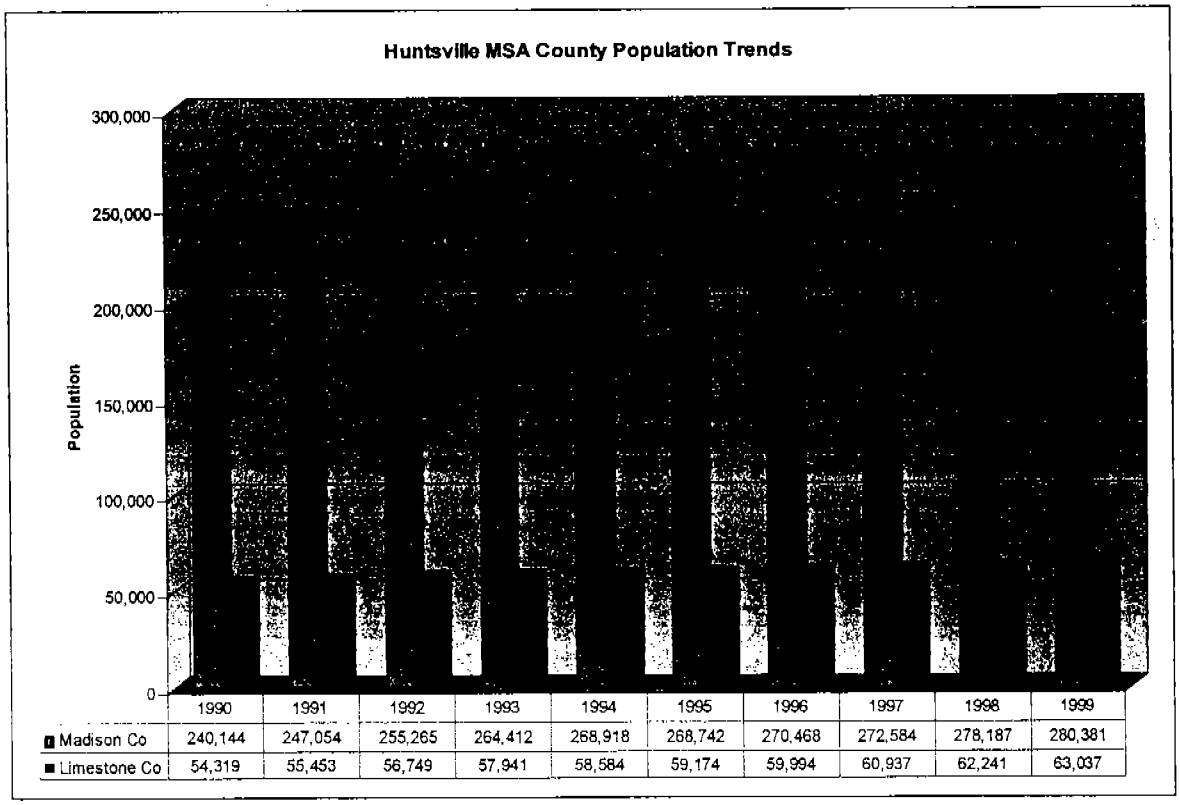
Figure 2 Population Density for Huntsville MSA

[2] The Alabama State Data Center (ASDC) is a network of 27 public agencies working together through a cooperative agreement with the U.S. Bureau of the Census to facilitate use and delivery of Census and other data to the public. Internet site: http://cber.cba.ua.edu/est_prj.html

Table 2 compares the 1990 and 1999 population estimates. Population data is also presented in Figures 3 and 4. This data reveals that Madison has a significantly higher population that Limestone. There has been no significant growth in Limestone; in fact, population is growing at the same rate in each county. Madison has consistently represented over 80% of the Huntsville MSA's population. These population factors fortify the recommendation to exclude Limestone from the Huntsville Nonattainment Area.

Table 2 Huntsvile MSA Population

County	1990	1999	Population Change (1990-1999)	% Change	% of MSA 1999 Population
Madison County	240,144	280,381	40,237	16.8%	81.6%
Limestone County	54,319	63,037	8,718	16.0%	18.4%
MSA Total	***294,463***	***343,418***	***48,955***	***16.6%***	



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Madison Co	240,144	247,054	255,265	264,412	268,918	268,742	270,468	272,584	278,187	280,381
Limestone Co	54,319	55,453	56,749	57,941	58,584	59,174	59,994	60,937	62,241	63,037

Figure 3 Population Data for Huntsville MSA

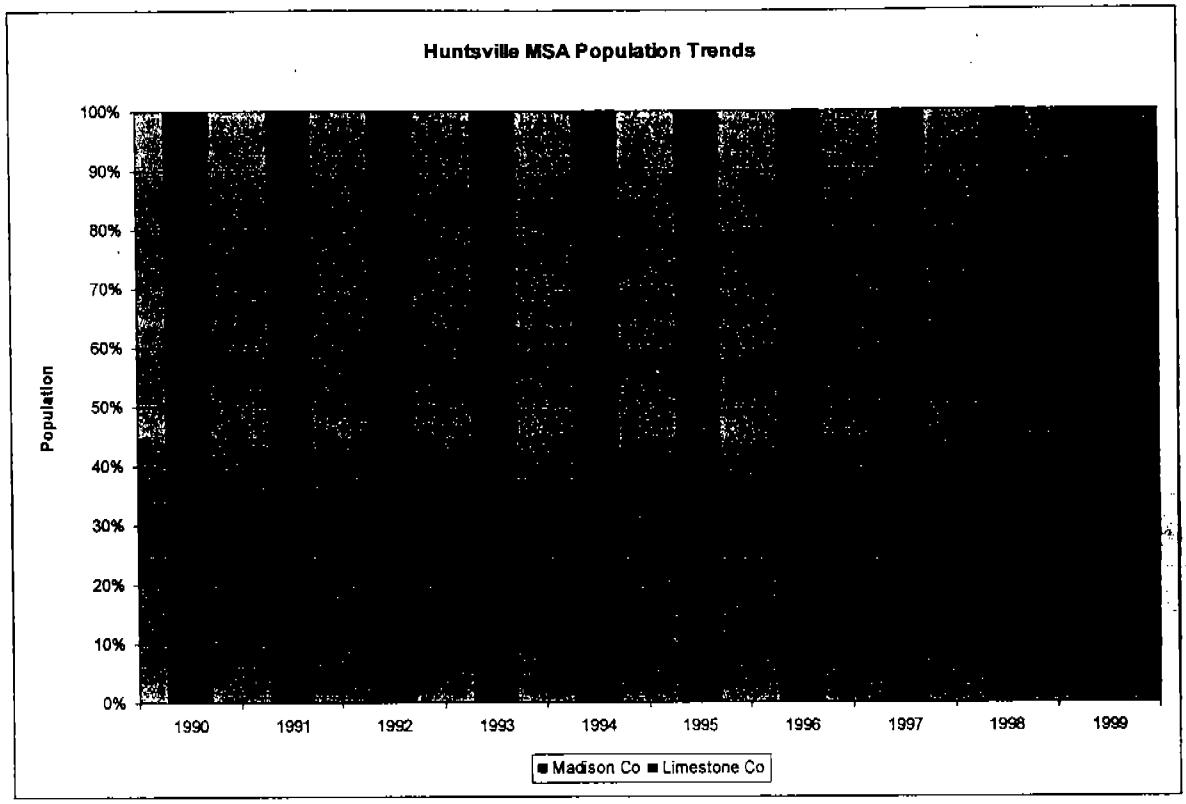


Figure 4 Population Distribution for Huntsville MSA

The amount and percent of urbanized population in the Huntsville MSA is presented in Table 3. This data clearly shows that Limestone has an insignificant urban population in comparison to Madison. This factor fortifies the recommendation to exclude Limestone County from the Huntsville Nonattainment Area.

Table 3 Urban Population for Huntsville MSA

County Name	% Urban[3]	1990 Population	1990 Urban Population	% of MSA Total 1990 Urban Population	1999 Population	1999 Urban Population	% of MSA Total 1999 Urban Population
Madison	78.1%	240,144	187,552	91.7%	280,381	218,978	91.7%
Limestone	31.30%	54,319	17,002	8.3%	63,037	19,731	8.3%
MSA Totals	69.5%	294,463	204,554	***	343,418	238,708	***

[3] Based on the 1990 US Census

Tables 4, 5, and 6 show the trends in Total Employment, Manufacturing Employment, and Retail Employment, respectively, for the Huntsville MSA. Figure 5 demonstrates that the number of Total Employees for Limestone is not substantial in comparison to Madison. In addition, Madison and Limestone show similar growth trends in employment, none of which show remarkable growth. This factor fortifies the recommendation to exclude Limestone County from the Huntsville Nonattainment Area.

Table 4 Total Employees

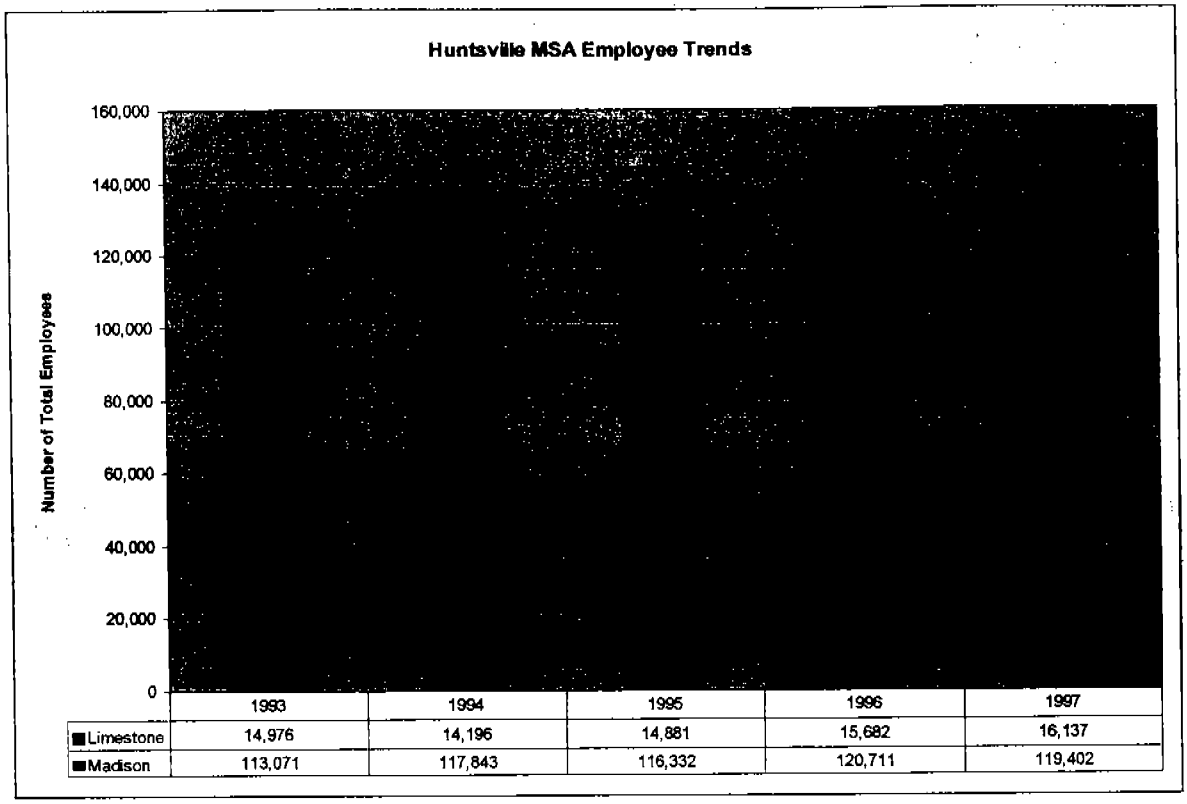
	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Madison	113,071	117,843	116,332	120,711	119,402	5.6%	88.1%
Limestone	14,976	14,196	14,881	15,682	16,137	7.8%	11.9%
MSA Total	128,047	132,039	131,213	136,393	135,539	5.9%	

Table 5 Manufacturing Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Madison	31,738	30,277	30,438	31,863	28,920	-8.9%	81.1%
Limestone	7,137	6,466	6,642	6,511	6,730	-5.7%	18.9%
MSA Total	38,875	36,743	37,080	38,374	35,650	-8.3%	

Table 6 Retail Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Madison	21,375	23,058	24,114	24,932	26,359	23.3%	87.4%
Limestone	3,048	3,093	3,350	3,902	3,807	24.9%	12.6%
MSA Total	24,423	26,151	27,464	28,834	30,166	23.5%	



	1993	1994	1995	1996	1997
Limestone	14,976	14,196	14,881	15,682	16,137
Madison	113,071	117,843	116,332	120,711	119,402

Figure 5 Total Employees for Huntsville MSA

C. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale)

Table 7 presents the ozone monitoring data for the Huntsville MSA and surrounding areas. The Madison (AL) and Lawrence (TN) monitors exceed the 8-hour NAAQS for ozone. Figure 6 maps these ozone monitoring sites which provided the 1997, 1998, and 1999 data for the Huntsville MSA. The recommendation to exclude Limestone was not influenced by monitoring data because no ozone monitoring data was available for Limestone.

Table 7 Huntsville MSA Ozone Monitoring Data

County	AIRS ID	Site	1997 4th Max	1998 4th Max	1999 4th Max	3 Year Average
Lawrence	01-079-0002	Sipsey (J)	0.076	0.085	0.073	0.084
Madison	01-089-0014	Huntsville (L)	0.086	0.092	0.093	**0.090**
Lawrence (TN)	47-099-0002	Busby Road (U)	0.079	0.090	0.097	**0.088**

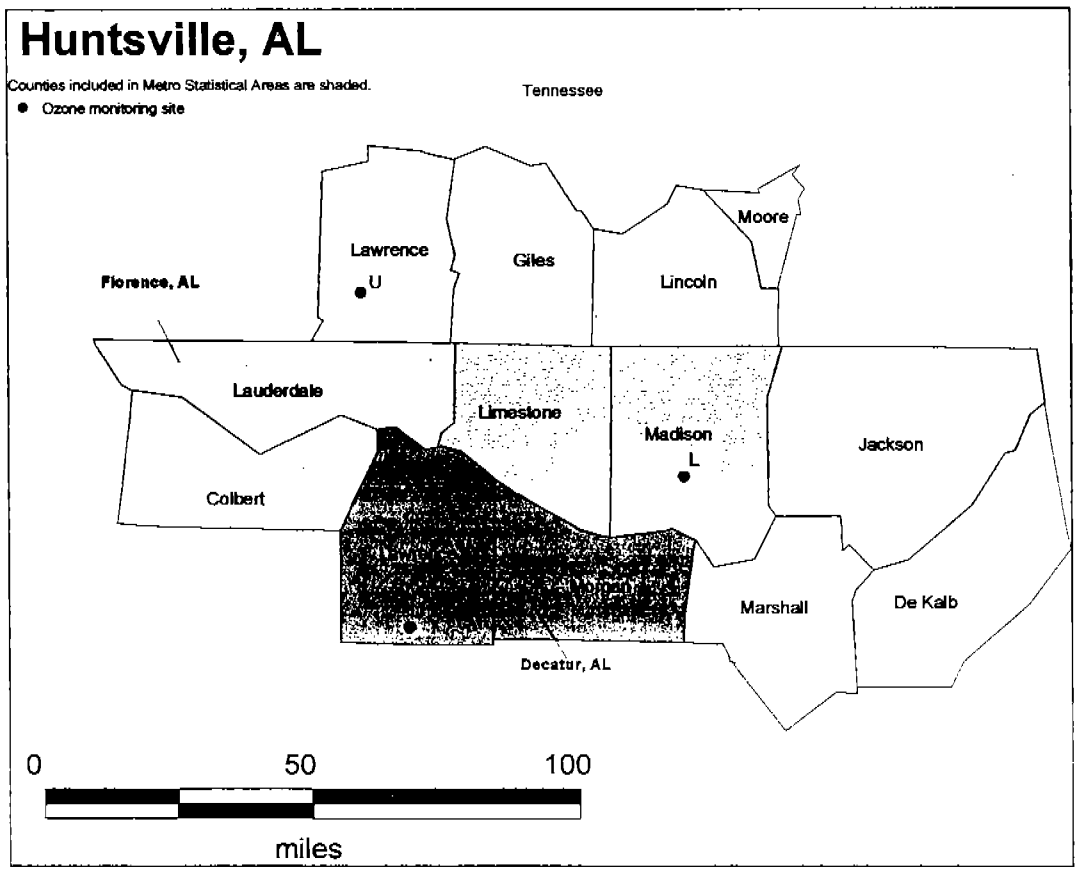


Figure 6 Ozone Monitoring Sites in Huntsville MSA and Adjacent Areas

D. Location of Emission Sources

Figure 7 depicts the location of large point sources in the Huntsville MSA and surrounding counties. The base map was obtained from EPA's recommended web site[4]. Tables 8 and 9 present the distribution of NOx emissions among point, area[5], and mobile sources in the Huntsville MSA. Tables 10 and 11 present the same information for VOC emissions. Figures 8 and 9 illustrate this data. Figure 10 presents the emission densities for the counties in the Huntsville MSA.

Limestone only accounts for 20% of the total annual NOx emissions and 20% of the total annual VOC emissions in the Huntsville MSA. In addition, Limestone has a significantly less emission density than Madison. The lack of large point sources of NOx or VOC emissions located in Limestone, the minimal area and mobile source emissions, and the smaller emission densities fortify the recommendation to exclude Limestone from the Huntsville Nonattainment Area.

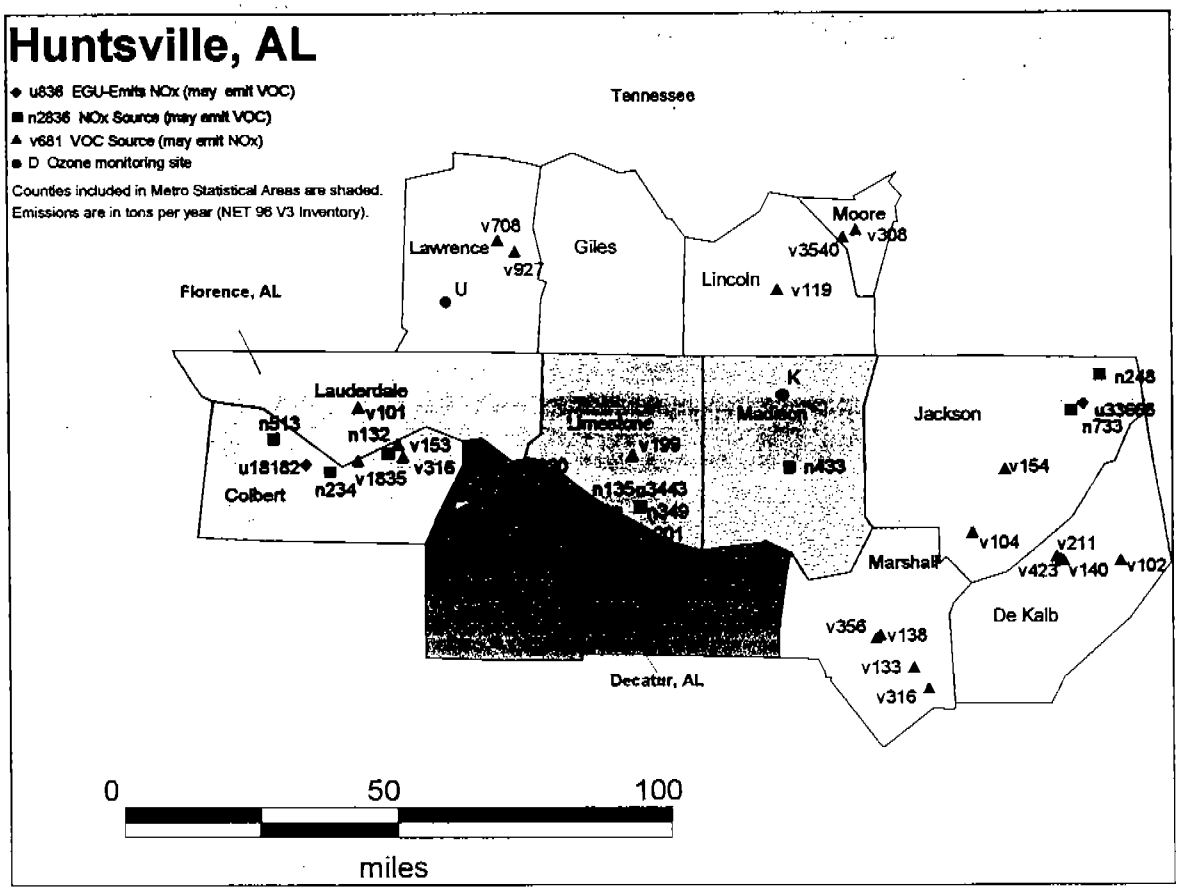


Figure 7 Location of Large Points Sources in Huntsville MSA

[4] www.pechan.com/emissions3/map_idx.htm

[5] Area sources include the nonroad mobile sources

Table 8 NOx Annual Emissions (Tons)

FIPS Code	Name	Point		Area		Mobile		Total Emissions	
01083	Limestone Co	245	22.5%	1,987	19.7%	2,528	20.5%	4,760	20%
01089	Madison Co	845	77.5%	8,121	80.3%	9,777	79.5%	18,743	80%
MSA Total Emissions		**1,090**		**10,108**		**12,305**		**23,503**	

Table 9 Cumulative NOx Contributions

County Name	Factor	Annual 1996 Emissions (Tons)	% of MSA Total Emissions	Cumulative %
Madison Co	Mobile Source NOx Emissions (tons)	9,777	41.6%	41.6%
Madison Co	Area Source NOx Emissions (tons)	8,121	34.6%	76.2%
Limestone Co	Mobile Source NOx Emissions (tons)	2,528	10.8%	86.9%
Limestone Co	Area Source NOx Emissions (tons)	1,987	8.5%	95.4%
Madison Co	Point Source NOx Emissions (tons)	845	3.6%	99.0%
Limestone Co	Point Source NOx Emissions (tons)	245	1.0%	100.0%
	MSA Total Emissions	***23,503***		

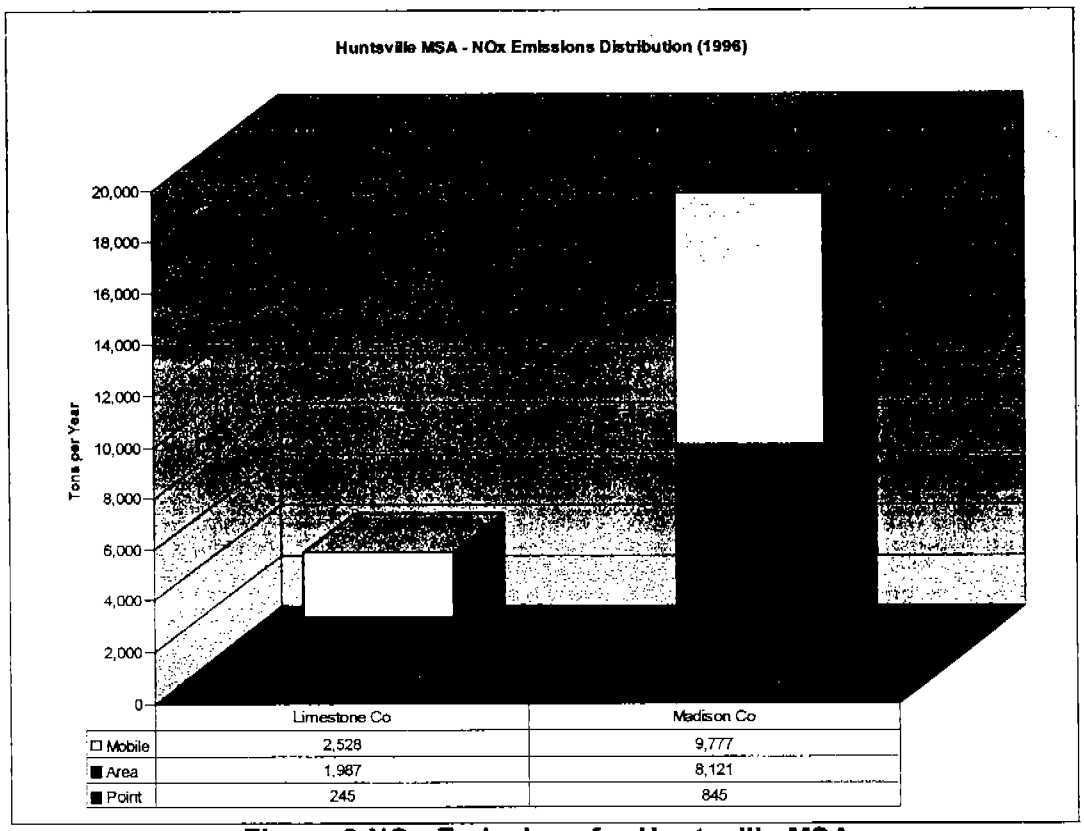


Figure 8 NOx Emissions for Huntsville MSA

Table 10 VOC Annual Emissions (Tons)

FIPS Code	Name	Point		Area		Mobile		Total Emissions	
01083	Limestone Co	326	23.0%	3,430	25.0%	1,404	13.5%	5,160	20%
01089	Madison Co	1,094	77.0%	10,271	75.0%	8,967	86.5%	20,332	80%
MSA Total Emissions		**1,420**		**13,701**		**10,371**		**25,492**	

Table 11 Cumulative VOC Contributions

County Name	Factor	Annual 1996 Emissions (Tons)	% of MSA Total Emissions	Cumulative %
Madison Co	Area Source VOC Emissions (tons)	10271	40.3%	40.3%
Madison Co	Mobile Source VOC Emissions (tons)	8967	35.2%	75.5%
Limestone Co	Area Source VOC Emissions (tons)	3430	13.5%	88.9%
Limestone Co	Mobile Source VOC Emissions (tons)	1404	5.5%	94.4%
Madison Co	Point Source VOC Emissions (tons)	1094	4.3%	98.7%
Limestone Co	Point Source VOC Emissions (tons)	326	1.3%	100.0%
	MSA Total Emissions	***25,492***		

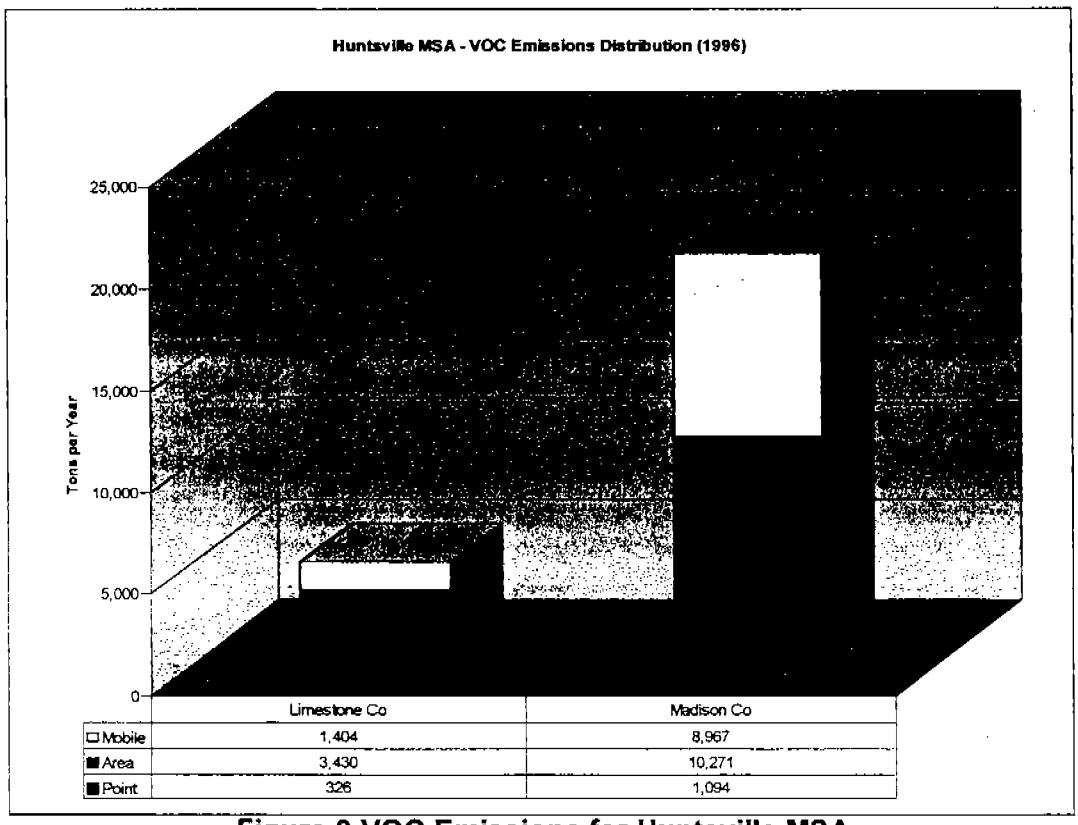


Figure 9 VOC Emissions for Huntsville MSA

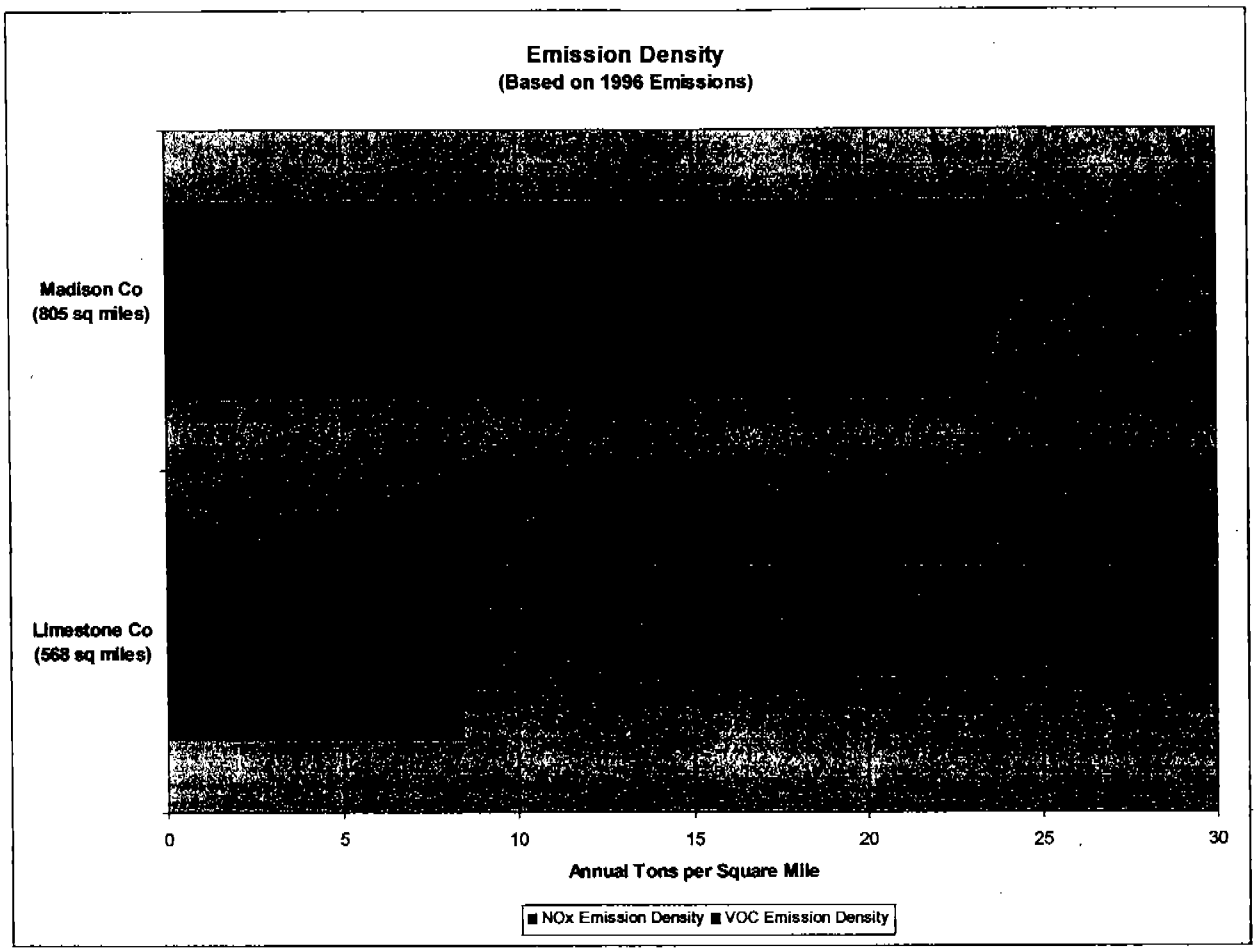


Figure 10 Emission Density for Huntsville MSA

E. Traffic and Commuting Patterns

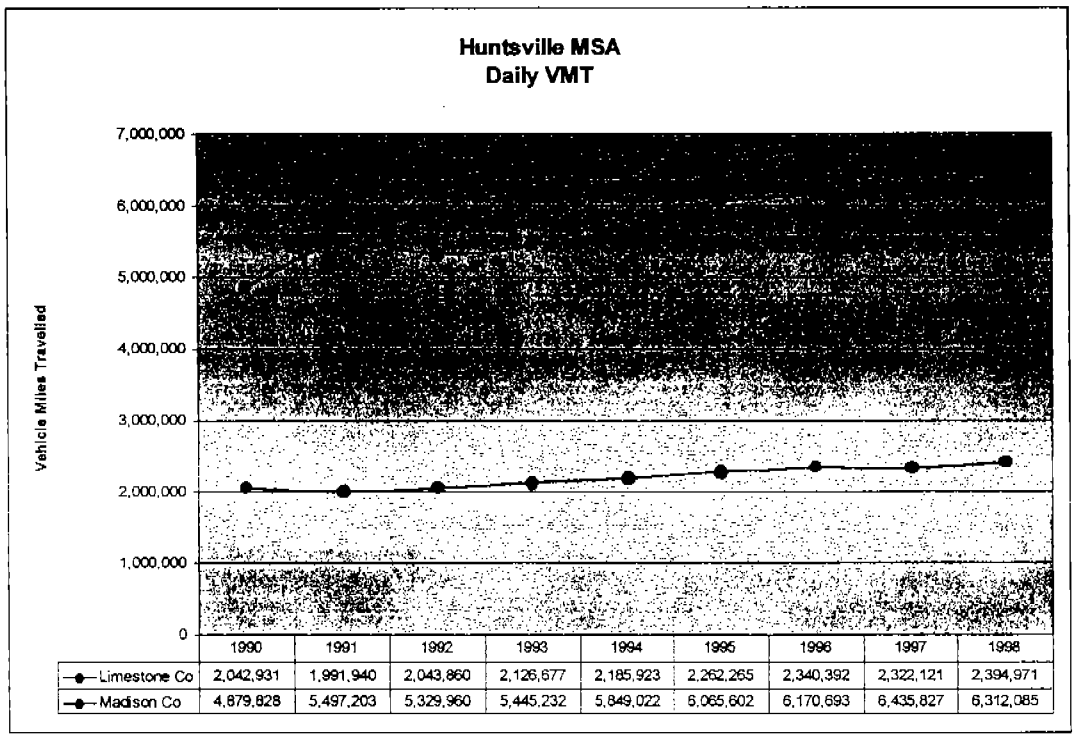
Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the Alabama Department of Transportation and the commuting patterns were obtained from the US Census Bureau web site. The commuting patterns available were based on the 1990 US Census. Table 12 presents the 1990 and 1998 Daily VMT estimates for the Huntsville MSA and Figure 11 demonstrates the Daily VMT trend from 1990 to 1998 for each county. Figure 12 presents the rural and urban distribution of Daily VMT. Figure 13 presents the commuting patterns within the Huntsville MSA.

Table 12 shows that the Daily VMT for Limestone comprises approximately 28% of the Daily VMT for the Huntsville MSA. However, Figure 12 demonstrates that the majority of this Daily VMT occurs in rural areas, thereby it is not expected to significantly impact the air quality.

Although Figure 13 indicates that there is substantial commuting from Limestone into Madison, the majority of Limestone residents work within their county. The impact of commuting between counties will be lessened by the national low sulfur fuel standards. Therefore, this factor was not considered to play a significant role in the recommendation to exclude Limestone from the Huntsville Nonattainment Area.

Table 12 Daily VMT for Huntsville MSA

County	1990 Daily VMT	1998 Daily VMT	Daily VMT Change (1990-1998)	% Change	% of MSA 1998 Daily VMT
Madison Co	4,879,828	6,312,085	1,432,256	29.4%	72.5%
Limestone Co	2,042,931	2,394,971	352,040	17.2%	27.5%
MSA Total	***6,922,760***	***8,707,056***	***1,784,296***	***25.8%***	



	1990	1991	1992	1993	1994	1995	1996	1997	1998
Limestone Co	2,042,931	1,991,940	2,043,860	2,126,677	2,185,923	2,262,265	2,340,392	2,322,121	2,394,971
Madison Co	4,879,828	5,497,203	5,329,960	5,445,232	5,849,022	6,065,602	6,170,693	6,435,827	6,312,085

Figure 11 Daily VMT Trend for Huntsville MSA

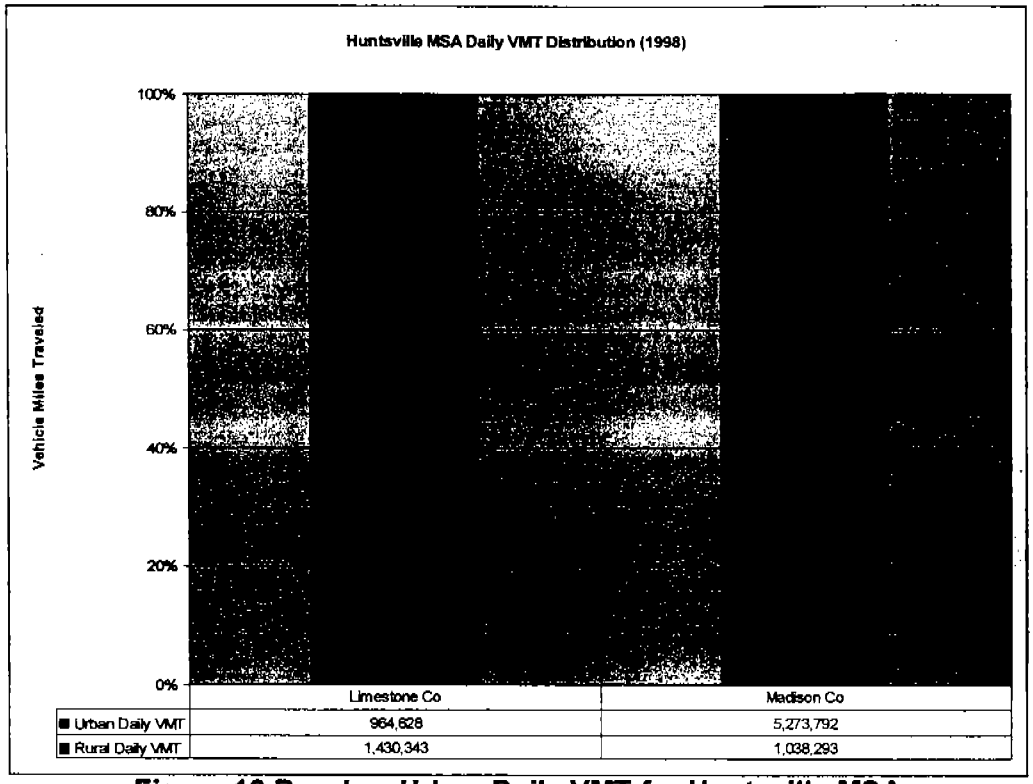


Figure 12 Rural vs Urban Daily VMT for Huntsville MSA

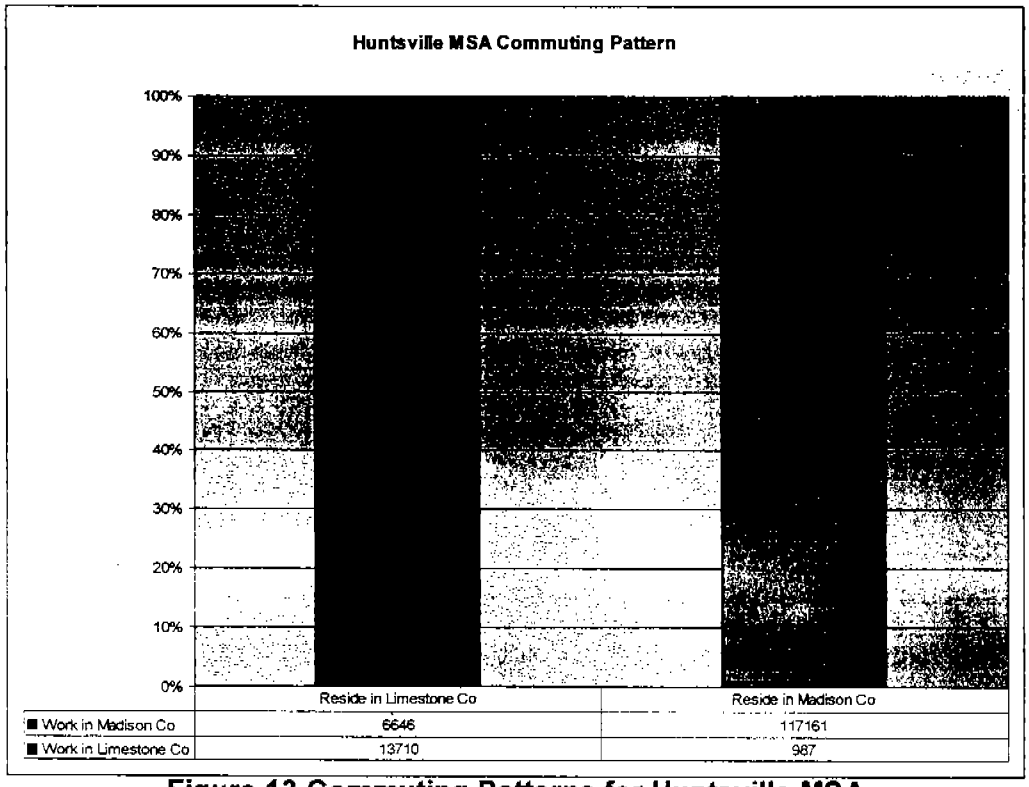


Figure 13 Commuting Patterns for Huntsville MSA

F. Expected Growth (including extent, pattern, and rate of growth)

There is little information available about expected growth. Table 13 provides population growth estimates that were obtained from the Alabama Data Center. The estimates do not show that significant growth is expected in either county. Since no other information about expected growth is available, and population growth estimates are not enough to influence a decision about designating a nonattainment area, this factor did not play a role in the recommendation to exclude Limestone from the Huntsville Nonattainment Area.

Table 13 Population Projections for Huntsville MSA

County Name	1990	1999	2005	2015	% Change 1990-1999	% Change 1999-2005	% Change 2005-2015
Madison Co	240,144	280,381	306,470	342,020	16.8%	9.3%	11.6%
Limestone Co	54,319	63,037	66,316	71,240	16.0%	5.2%	7.4%

G. Meteorology

It is clear that meteorology plays a major role in the formation and transport of ozone. During the 1997-1999 ozone seasons, ozone levels exceeded the proposed eight hour standard on approximately 31 days over the three year period.[6] A preliminary wind analysis was completed to evaluate the predominate wind direction(s) in Huntsville during the ozone season (April – October). As seen in the wind rose in Figure 1, there is a large southeastern component to the winds during the "O_3 season daytime hours", corresponding to 6 am – 3 pm. However, since there are no monitoring studies to corroborate the meteorological data, the state of knowledge is not sufficient to play a role in the designation process.

H. Geography/Topography (mountain ranges or other air basin boundaries)

The geography/topography of an area definitely influences the creation and transport of ozone. The Hunstville area is located in Northeast Alabama in the southern extremities of the Appalachians on the Cumberland Plateau. The area is surrounded by mountains, and the Tennessee River, which bends to the south. Due to the variability of the terrain in the area and the lack of monitoring data or air quality analyses to evaluate the complex wind patterns that would promote the creation of ozone, the conclusion is that there is insufficient data to support the inclusion or exclusion of counties in the designation process.

I. Jurisdictional Boundaries

The Department has received and shared data with the Tennessee Department of Environment and Conservation (40 CFR, §81.72). Within the Tennessee River Valley- Cumberland Mountains Interstate air quality control region, there are no MSAs shared between the states of

[6] This dataset has not been fully QA/QC'd

Tennessee and Alabama. The City of Huntsville is the local air program whose jurisdictional boundaries are the Huntsville city limits. The remainder of Madison County and the adjoining county (Limestone) in the MSA are in the jurisdiction of the State air program under the purview of the ADEM. Madison and Limestone Counties have been formally designated attainment of the 1-hour standard since 1981. There are no current 1-hour nonattainment areas near these two counties. The monitor located in Huntsville supports representative data for Madison County being recommended as the 8-hour nonattainment boundary. Discussion elsewhere in this document demonstrates the State's recommendations for exclusion of Limestone County as a part of the 8-hour nonattainment boundary.

J. Level of Control of Emission Sources

Since 1979, statewide reasonably available control technology (RACT) has been in place for volatile organic compounds (VOCs) as found under ADEM Admin Code Chapter 335-3-6. Also in place since 1990, has been the institution of statewide regulations for the control of evaporative emissions in the gasoline marketing chain, commonly referred as 'Stage I' vapor recovery. Over the past 28 year history of Alabama's air pollution control program, the state has been delegated the authority to implement other standards of performance such as the New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPs), and the federal Prevention of Significant Deterioration regulations from protection of degradation of clean air areas. The City of Huntsville has an approved local program implementing regulations identical to the state.

Additionally, as discussed under regional emission reductions, the EPA has required a NO_X SIP Call for 22 states, including Alabama that, by 2003, will result in large reductions in NO_X emissions from major utilities, large industrial boilers and gas turbines, cement kilns and large stationary reciprocating internal combustion engines. Work is currently being performed by ADEM to complete the regional NO_X SIP. At the national level, EPA has finalized the Tier 2 vehicle/national fuel standards, which take effect beginning in 2004. However, the States will also begin to realize the benefits of cleaner vehicles with the National Low Emission Vehicle standards this Fall with the 2001 model year vehicles.

K. Regional Emission Reductions

EPA performed Urban Airshed Modeling to estimate the impact of implementation of the NO_X SIP Call for Alabama. The results obtained from EPA for Alabama demonstrates in the table in Attachment 1 that Madison County is expected to attain the new 8-hour standard. The significant reductions resulting from Tier II vehicles and from nationwide low-sulfur gasoline bolster EPA's conclusion that regional and nationwide efforts will enable this area to attain the 8-hour standard without further controls.

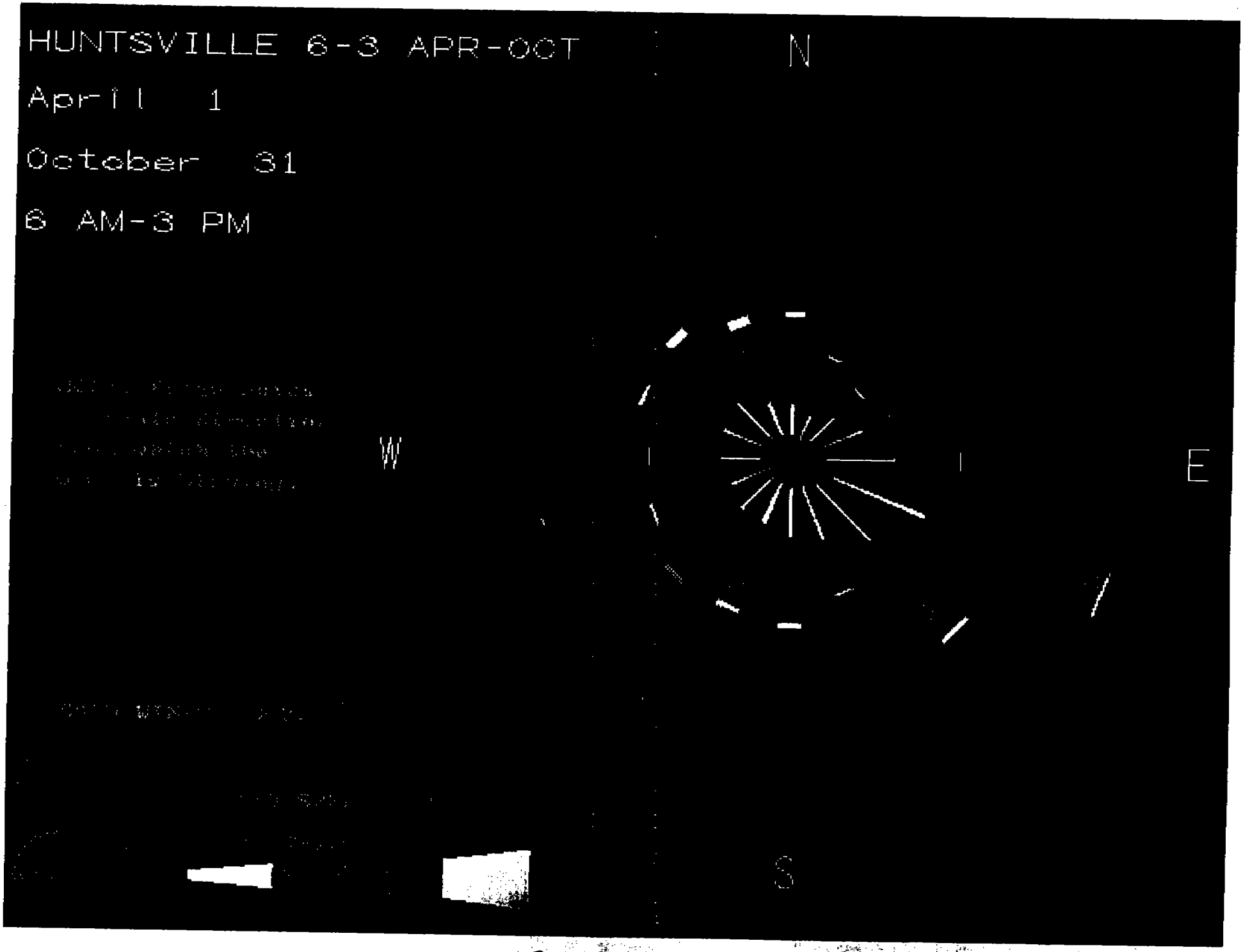


Figure R-1

Appendix C

ADEM recommends that the Columbus Nonattainment Area for the 8-hour NAAQS for ozone exclude Russell County. EPA guidance (dated March 28, 2000) states that if a State wishes to propose a nonattainment area boundary smaller than the MSA boundary, the State must address how certain factors affect the drawing of the nonattainment boundary. Therefore, a discussion of these factors for the Columbus Nonattainment Area is provided in this Appendix.

The factors that provide the most compelling evidence to exclude Russell County are listed below:

- Population density and degree of urbanization in comparison Muscogee County, Georgia
- Location of emission sources (i.e. the lack of significant point sources)
- Traffic (Daily VMT)
- Limited expected growth
- Level of control of emission sources
- Regional emission reductions

A. Emissions and air quality in adjacent areas (including adjacent C/MSAs)

The counties and MSA's adjacent to the Columbus MSA are depicted in Figure 1. To evaluate emissions for counties adjacent to Russell County, ADEM obtained the 1996 annual NOx and VOC emission estimates from EPA's recommended web site[1]. Table 1 lists these emissions which include all anthropogenic sources (i.e. point, area, mobile, and nonroad mobile) for the counties that are adjacent to Russell.

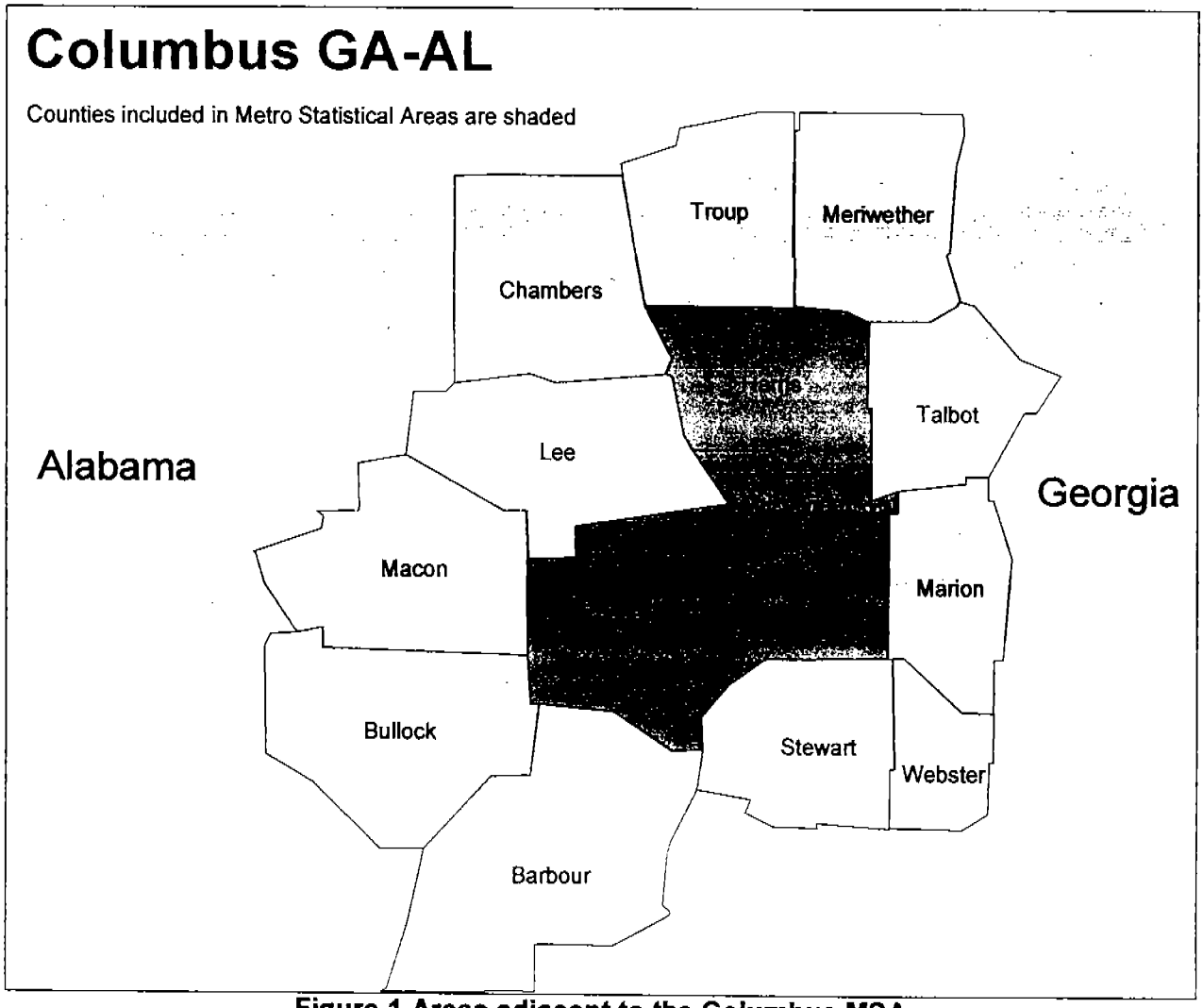


Figure 1 Areas adjacent to the Columbus MSA

[1] www.pechan.com/emissions3/html/net.htm

Table 1 Annual Emissions for Areas Adjacent to Russell County

County	1996 Annual VOC Emissions (Tons)	Ranking for VOC	1996 Annual NOx Emissions (Tons)	Ranking for NOx
Barbour	2,566	4	3,115	4
Bullock	1,189	7	1,069	7
Chattahoochee (GA)	1,571	6	1,168	6
Lee	8,252	2	6,880	3
Macon	1,913	5	1,616	5
Muscogee (GA)[M]	11,384	1	7,532	2
Russell	7,310	3	7,626	1
Stewart (GA)	854	8	843	8

[M] County has two ozone monitors

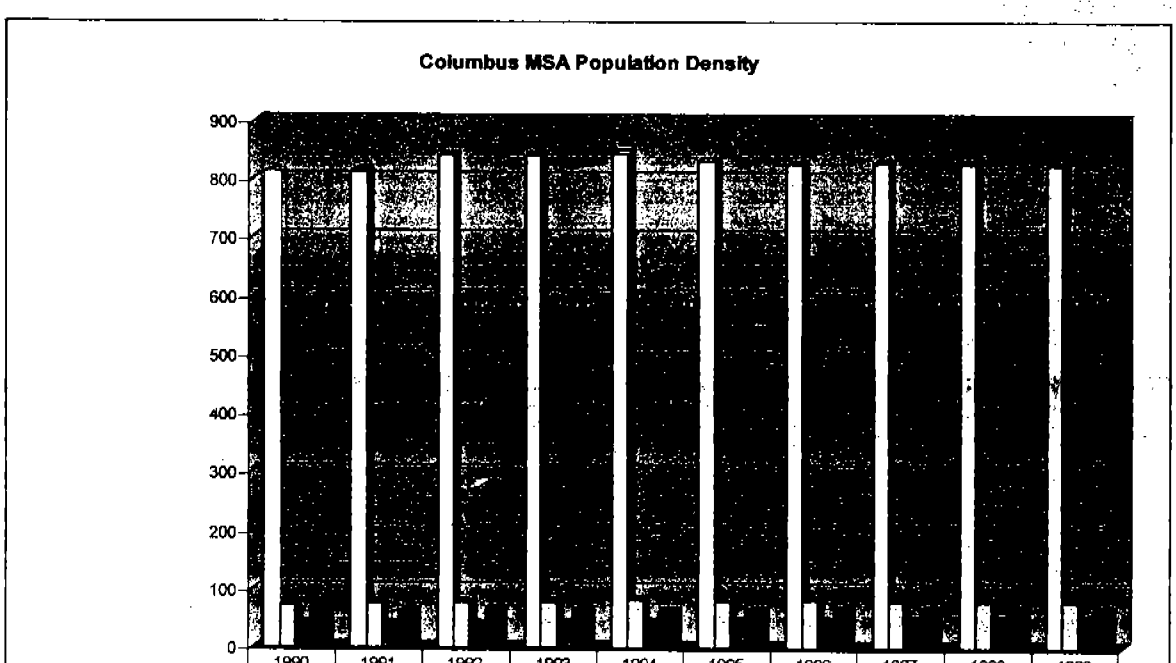
Muscogee (GA) has a design value above the 8-hour NAAQS for ozone based on monitoring data for 1997, 1998, and 1999. There were no other ozone monitoring sites in this area during this time period; therefore, there is limited air quality information. Although Muscogee (GA), Russell, and Lee have the largest and NOx and VOC emissions, without air quality monitoring data to determine the impact these emissions have on air quality, no conclusions can be drawn.

Evaluating the emissions and air quality in adjacent areas provides no compelling indicator as to whether Russell should be included or excluded from the Columbus Nonattainment Area.

B. Population Density and degree of urbanization including commercial development (significant difference from surrounding areas)

To evaluate the various aspects of population, ADEM obtained the 1990 to 1999 population estimates for the Columbus MSA from the Alabama State Data Center[2] and US Census Bureau. Information on business data (i.e. retail employment and manufacturing employment) was obtained from the US Census Bureau's *County Business Patterns.*

Population densities were calculated by dividing the population estimates by the land area of each county (in square miles). Georgia's counties are significantly smaller than Alabama's which skews the population density factor. However, Russell's population density is still significantly less than Muscogee County (GA). This population density factor fortifies the recommendation to exclude Russell County from the Columbus Nonattainment Area.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Chattahoochee Co (GA)	813	813	841	840	844	832	825	827	825	824
Harris Co (GA)	73	74	76	78	80	80	81	79	79	78
Muscogee Co (GA)	38	38	38	40	42	43	45	47	47	48
Russell Co	67	61	65	64	62	63	64	65	65	66

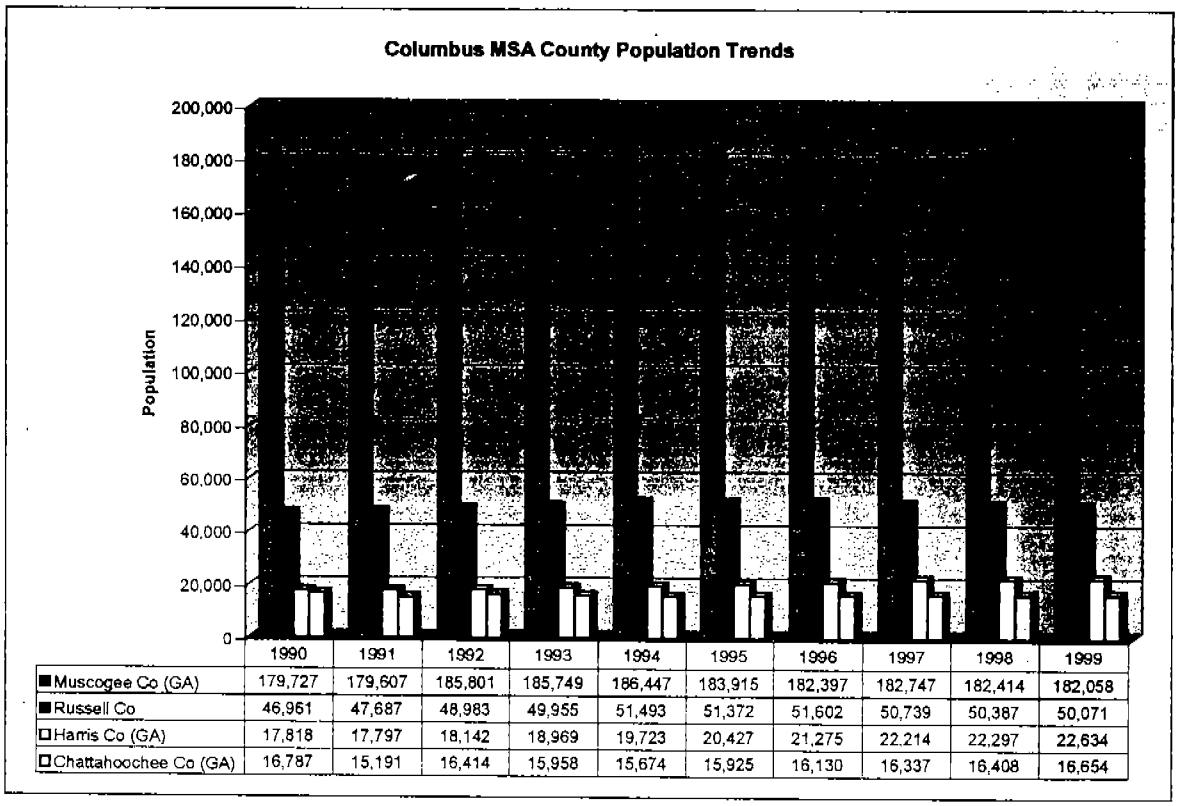
Figure 2 Population Density for Columbus MSA

[2] The Alabama State Data Center (ASDC) is a network of 27 public agencies working together through a cooperative agreement with the U.S. Bureau of the Census to facilitate use and delivery of Census and other data to the public. Internet site: http://cber.cba.ua.edu/est_prj.html

Table 2 compares the 1990 and 1999 population estimates. Population data is also presented in Figures 3 and 4. This data reveals that Muscogee County (GA) has a significantly higher population that Russell. There has been no significant growth in Russell. Muscogee Co (GA) has consistently represented over 80% of the Columbus MSA's population. These population factors fortify the recommendation to exclude Russell from the Columbus Nonattainment Area.

Table 2 Columbus MSA Population

County	1990	1999	Population Change (1990-1999)	% Change	% of MSA 1999 Population
Chattahoochee Co (GA)	16,787	16,654	-133	-0.8%	6.1%
Harris Co (GA)	17,818	22,634	4,816	27.0%	8.3%
Muscogee Co (GA)	179,727	182,058	2,331	1.3%	67.1%
Russell Co	46,961	50,071	3,110	6.6%	18.4%
MSA Total	***261,293***	***271,417***	***10,124***	***3.9%***	



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Muscogee Co (GA)	179,727	179,607	185,801	185,749	186,447	183,915	182,397	182,747	182,414	182,058
Russell Co	46,961	47,687	48,983	49,955	51,493	51,372	51,602	50,739	50,387	50,071
Harris Co (GA)	17,818	17,797	18,142	18,969	19,723	20,427	21,275	22,214	22,297	22,634
Chattahoochee Co (GA)	16,787	15,191	16,414	15,958	15,674	15,925	16,130	16,337	16,408	16,654

Figure 3 Population Data for Columbus MSA

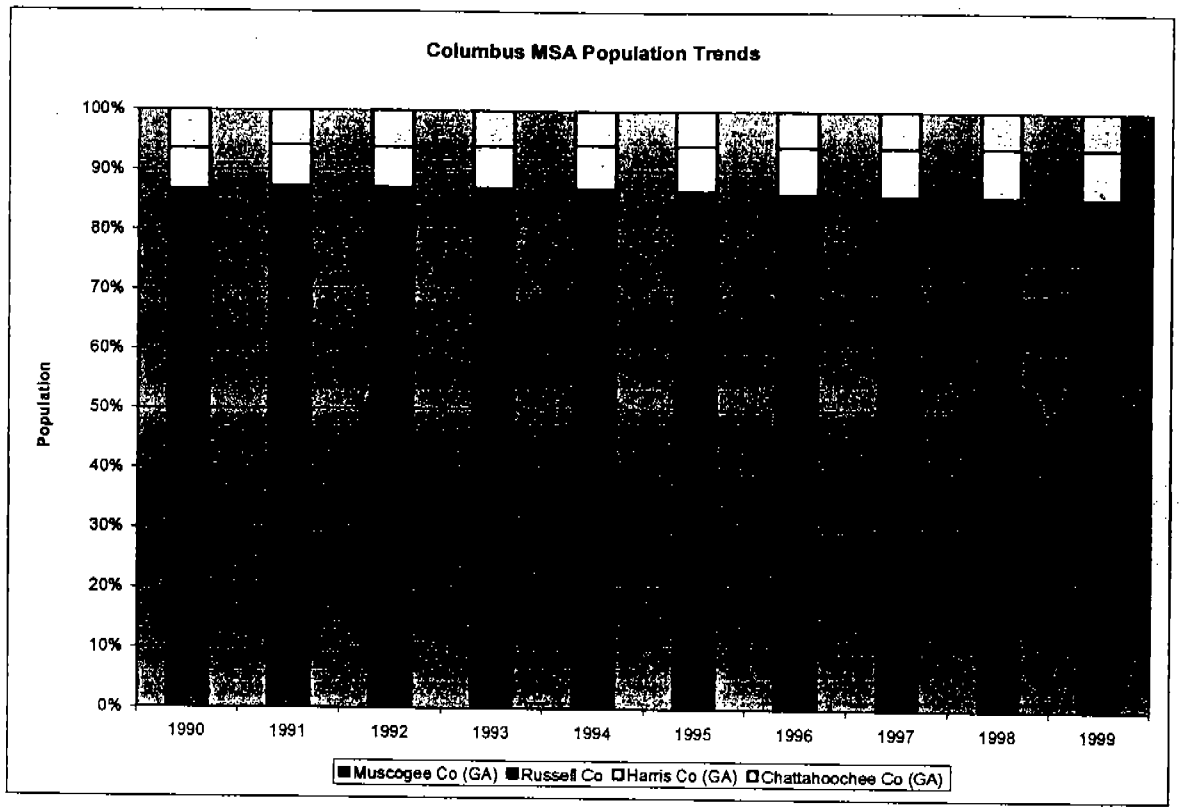


Figure 4 Population Distribution for Columbus MSA

The amount and percent of urbanized population in the Columbus MSA is presented in Table 3. This data clearly shows that Russell has an insignificant urban population in comparison to Muscogee County (GA). This factor fortifies the recommendation to exclude Russell County from the Columbus Nonattainment Area.

Table 3 Urban Population for Columbus MSA

County Name	% Urban [3]	1990 Population	1990 Urban Population	% of MSA Total 1990 Urban Population	1999 Population	1999 Urban Population	% of MSA Total 1999 Urban Population
Chattahoochee Co (GA)	86.0%	16,787	14,437	6.6%	16,654	14,322	6.4%
Harris Co (GA)	4.0%	17,818	713	0.3%	22,634	905	0.4%
Muscogee Co (GA)	97.0%	179,727	174,335	79.2%	182,058	176,596	78.7%
Russell Co	65.0%	46,961	30,525	13.9%	50,071	32,546	14.5%
MSA Total		***261,293***	***220,009***	***	***271,417***	***224,370***	***

[3] Based on the 1990 US Census

Tables 4, 5, and 6 show the trends in Total Employment, Manufacturing Employment, and Retail Employment, respectively, for the Columbus MSA. Figure 5 demonstrates that the number of Total Employees for Russell is not substantial in comparison to Muscogee County (GA). In addition, Russell shows no significant growth trends in employment. This factor fortifies the recommendation to exclude Russell County from the Columbus Nonattainment Area.

Table 4 Total Employees

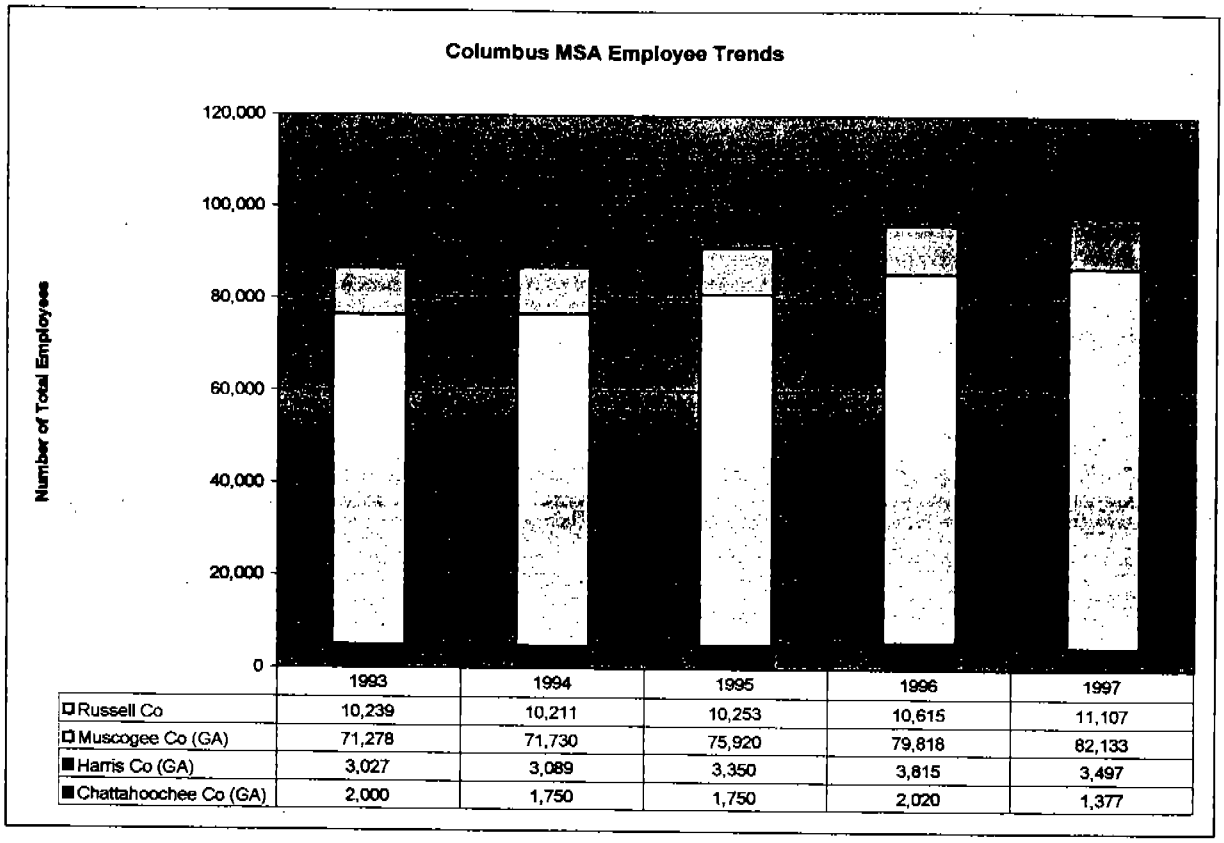
	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Chattahoochee Co (GA)	2,000	1,750	1,750	2,020	1,377	-31.2%	1.4%
Harris Co (GA)	3,027	3,089	3,350	3,815	3,497	15.5%	3.6%
Muscogee Co (GA)	71,278	71,730	75,920	79,818	82,133	15.2%	83.7%
Russell Co	10,239	10,211	10,253	10,615	11,107	8.5%	11.3%
MSA Total	86,544	86,780	91,273	96,268	98,114	13.4%	

Table 5 Manufacturing Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Chattahoochee Co (GA)	60	60	60	60	60	0.8%	0.3%
Harris Co (GA)	1,229	1,230	1,400	1,275	1,183	-3.7%	5.4%
Muscogee Co (GA)	16,152	16,066	16,658	17,249	17,183	6.4%	77.9%
Russell Co	3,603	3,536	3,376	3,588	3,620	0.5%	16.4%
MSA Total	21,044	20,892	21,494	22,172	22,046	4.8%	

Table 6 Retail Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Chattahoochee Co (GA)	60	10	60	60	41	-31.7%	0.2%
Harris Co (GA)	409	394	369	514	571	39.6%	2.6%
Muscogee Co (GA)	17,067	16,601	17,983	18,266	18,577	8.8%	84.9%
Russell Co	2,516	2,440	2,610	2,591	2,692	7.0%	12.3%
MSA Total	20,052	19,445	21,022	21,431	21,881	9.1%	



	1993	1994	1995	1996	1997
Russell Co	10,239	10,211	10,253	10,615	11,107
Muscogee Co (GA)	71,278	71,730	75,920	79,818	82,133
Harris Co (GA)	3,027	3,089	3,350	3,815	3,497
Chattahoochee Co (GA)	2,000	1,750	1,750	2,020	1,377

Figure 5 Total Employees for Columbus MSA

C. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale)

Table 7 presents the ozone monitoring data for the Columbus MSA. Both monitors exceed the 8-hour NAAQS for ozone, but the design values were not available. Figure 6 maps these ozone monitoring sites. The recommendation to exclude Russell was not influenced by monitoring data because no ozone monitoring data was available for Russell.

Table 7 Columbus MSA Ozone Monitoring Data

County	AIRS ID	Site	1997 4th Max	1998 4th Max	1999 4th Max	3 Year Average
Muscogee (GA)	13-215-0008	Columbus Airport (M)	Not Available			>0.084
Muscogee (GA)	13-215-1003	Columbus (N)	Not Available			>0.084

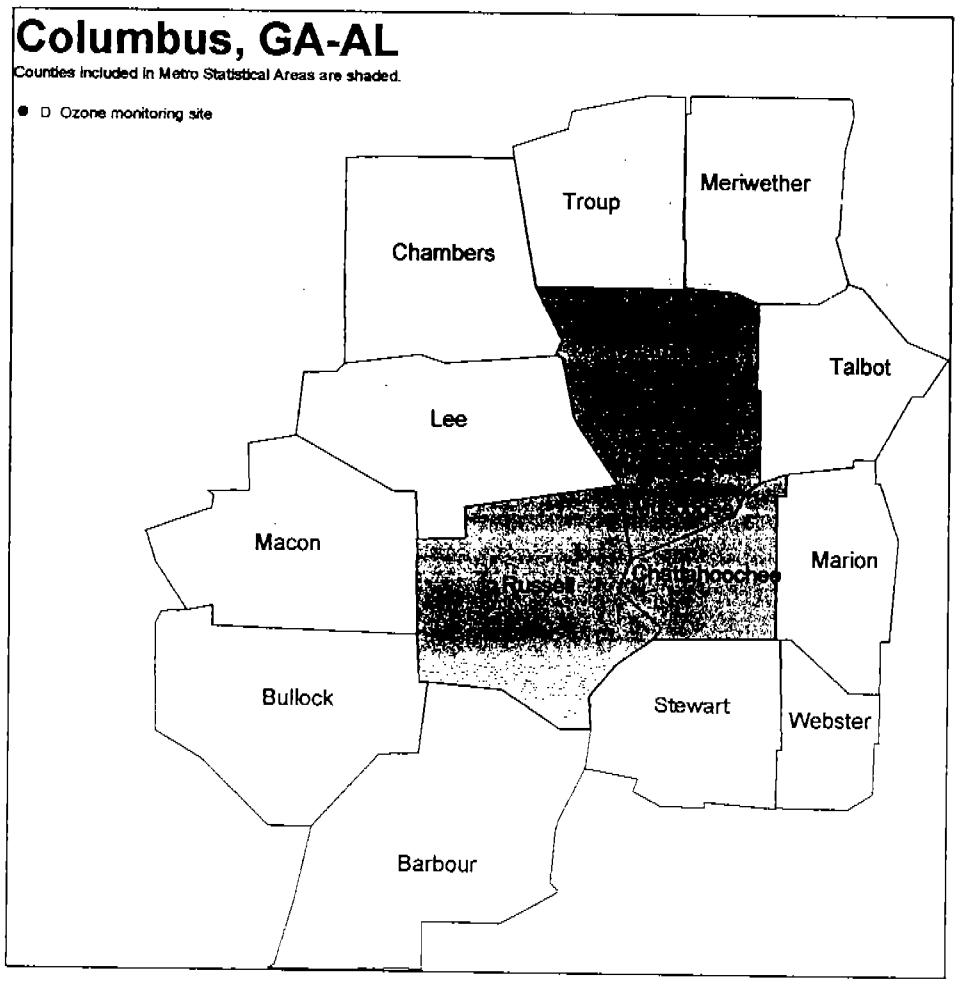


Figure 6 Ozone Monitoring Sites in Columbus MSA and Adjacent Areas

D. Location of Emission Sources

Figure 7 depicts the location of large point sources in the Columbus MSA and surrounding counties. The base map was obtained from EPA's recommended web site[4]. Tables 8 and 9 present the distribution of NOx emissions among point, area[5], and mobile sources in the Columbus MSA. Tables 10 and 11 present the same information for VOC emissions. Figures 8 and 9 illustrate this data. Figure 10 presents the emission densities for the counties in the Columbus MSA.

Russell and Muscogee County (GA) are roughly equivalent in annual NOx emissions, while Muscogee County (GA) exceeds Russell in annual VOC emissions by approximately 4,000 tons. Russell has one large point source of NOx which accounts the majority of its point source NOx emissions. This large point source is not located near the border of Russell and Muscogee County (GA). This source will be controlled by the NOx SIP Call. In addition, Russell does have an emission density less than Muscogee County (GA).

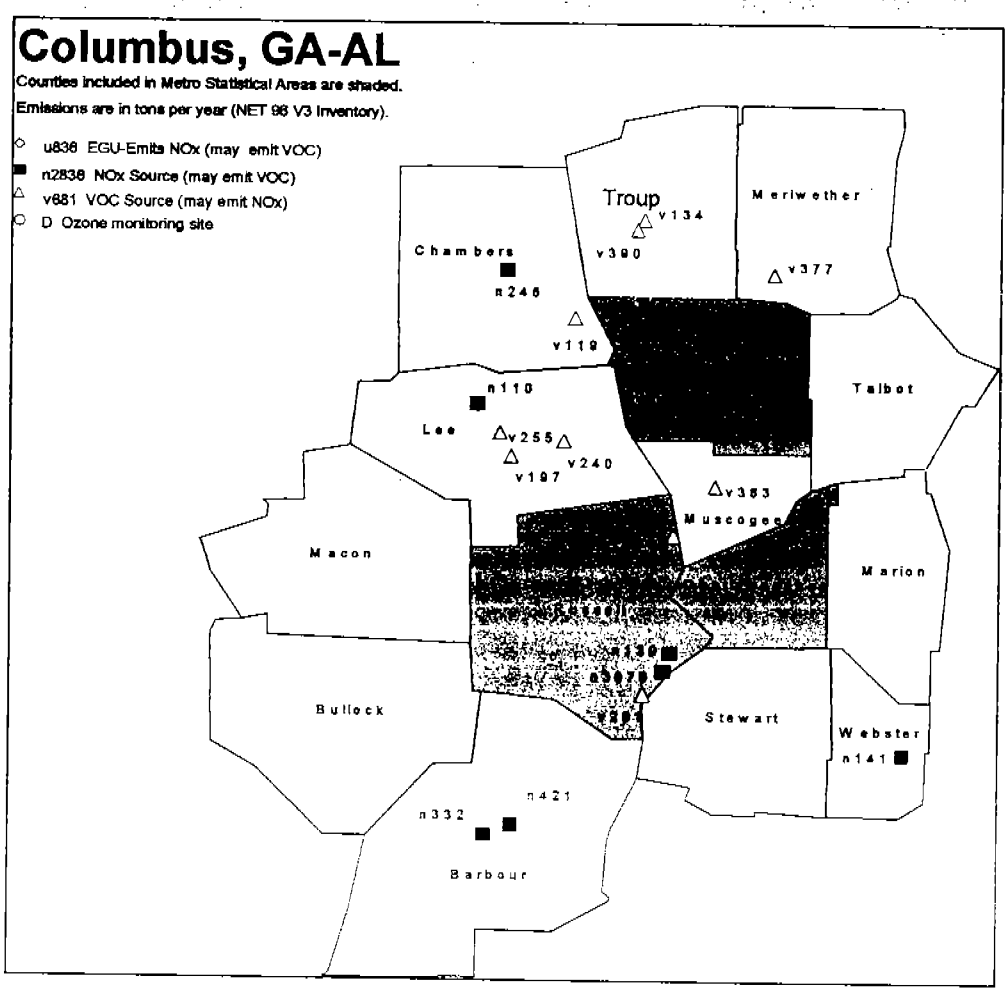


Figure 7 Location of Large Points Sources in Columbus MSA

[4] www.pechan.com/emissions3/map_idx.htm

[5] Area sources include the nonroad mobile sources

Table 8 NOx Annual Emissions (Tons)

FIPS Code	Name	Point		Area		Mobile		Total Emissions	
13215	Muscogee Co, GA	33	0.8%	2,611	49.5%	4,888	54.9%	7,532	41%
13053	Chattahoochee Co, GA	0	0.0%	640	12.1%	528	5.9%	1,168	6%
13145	Harris Co, GA	599	14.1%	433	8.2%	1,088	12.2%	2,120	11%
01113	Russell Co	3,631	85.2%	1,593	30.2%	2,402	27.0%	7,626	41%
MSA Total Emissions		**4,263**		**5,277**		**8,906**		**18,446**	

Table 9 Cumulative NOx Contributions

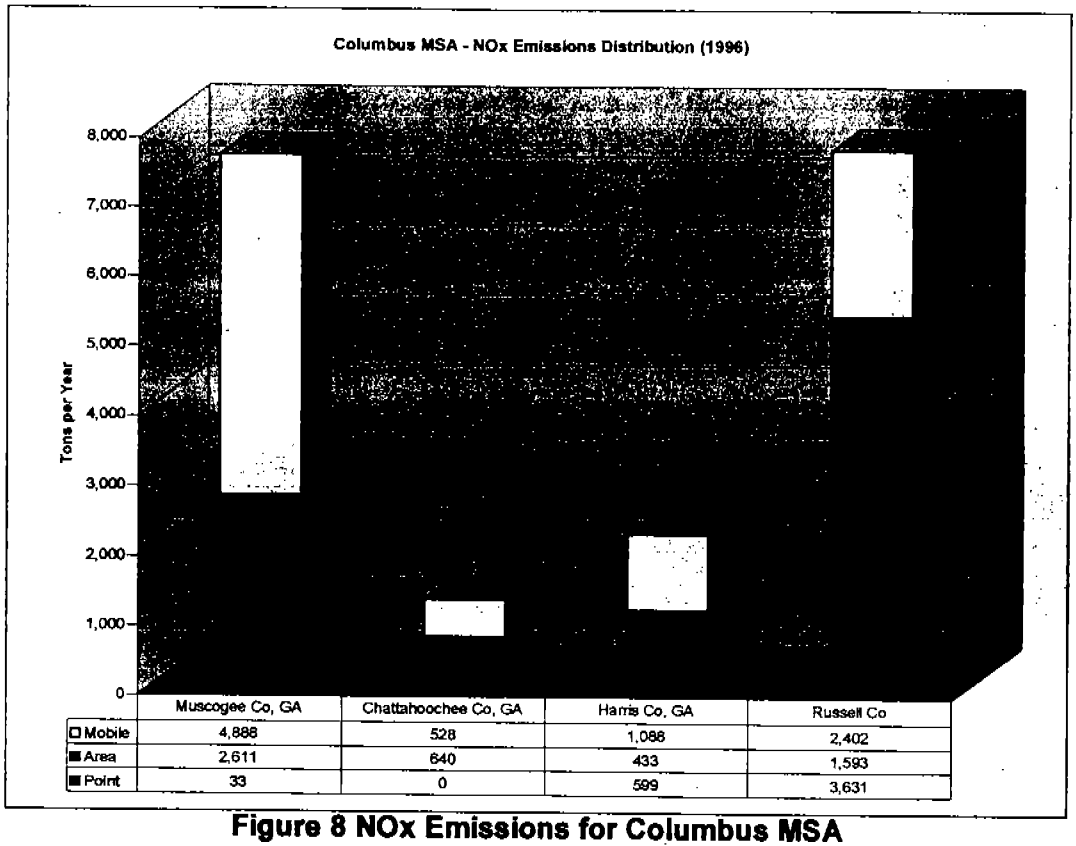
County Name	Factor	Annual 1996 Emissions (Tons)	% of MSA Total Emissions	Cumulative %
Muscogee Co, GA	Mobile Source NOx Emissions (tons)	4,888	26.5%	26.5%
Russell Co	Point Source NOx Emissions (tons)	3,631	19.7%	46.2%
Muscogee Co, GA	Area Source NOx Emissions (tons)	2,611	14.2%	60.3%
Russell Co	Mobile Source NOx Emissions (tons)	2,402	13.0%	73.4%
Russell Co	Area Source NOx Emissions (tons)	1,593	8.6%	82.0%
Harris Co, GA	Mobile Source NOx Emissions (tons)	1,088	5.9%	87.9%
Chattahoochee Co, GA	Area Source NOx Emissions (tons)	640	3.5%	91.4%
Harris Co, GA	Point Source NOx Emissions (tons)	599	3.2%	94.6%
Chattahoochee Co, GA	Mobile Source NOx Emissions (tons)	528	2.9%	97.5%
Harris Co, GA	Area Source NOx Emissions (tons)	433	2.3%	99.8%
Muscogee Co, GA	Point Source NOx Emissions (tons)	33	0.2%	100.0%
Chattahoochee Co, GA	Point Source NOx Emissions (tons)	0	0.0%	100.0%

Table 10 VOC Annual Emissions (Tons)

FIPS Code	Name	Point		Area		Mobile		Total Emissions	
13215	Muscogee Co, GA	504	14.4%	5,877	60.4%	5,003	60.4%	11,384	53%
13053	Chattahoochee Co, GA	0	0.0%	1,089	11.2%	481	5.8%	1,570	7%
13145	Harris Co, GA	25	0.7%	667	6.9%	561	6.8%	1,253	6%
01113	Russell Co	2,980	84.9%	2,094	21.5%	2,236	27.0%	7,310	34%
MSA Total Emissions		3,509		9,727		8,281		21,517	

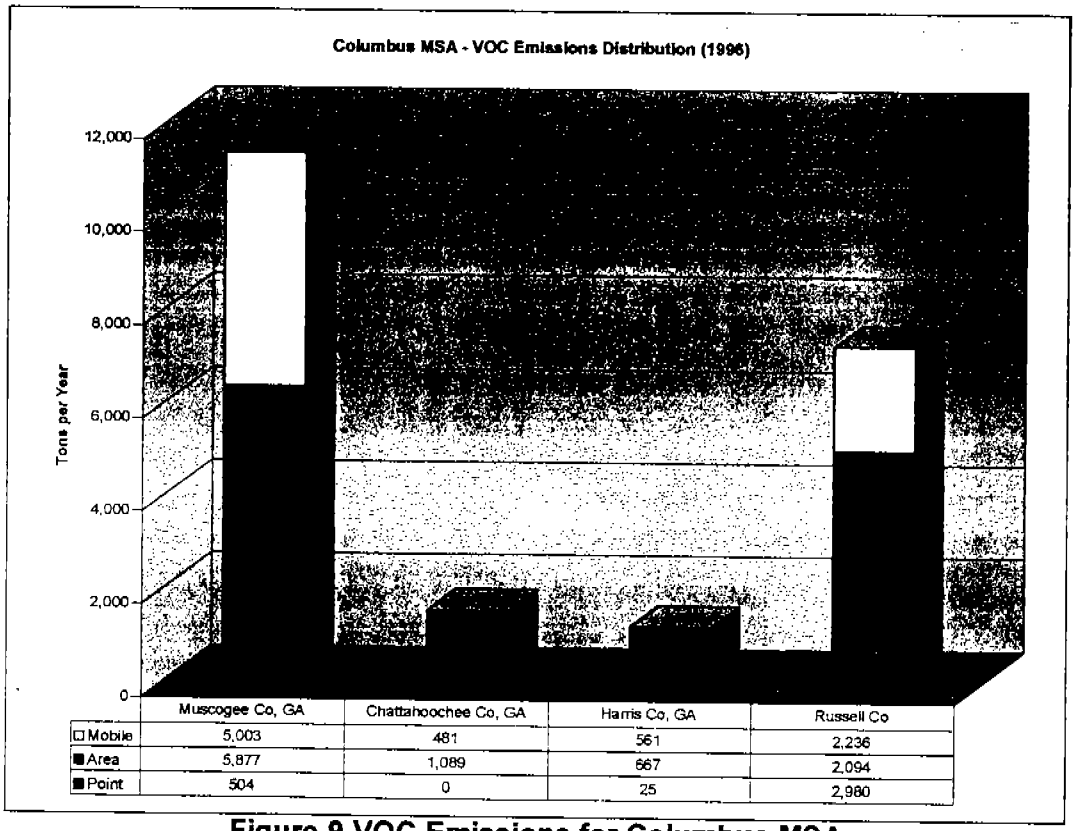
Table 11 Cumulative VOC Contributions

County Name	Factor	Annual 1996 Emissions (Tons)	% of MSA Total Emissions	Cumulative %
Muscogee Co, GA	Area Source VOC Emissions (tons)	5,877	27.3%	27.3%
Muscogee Co, GA	Mobile Source VOC Emissions (tons)	5,003	23.3%	50.6%
Russell Co	Point Source VOC Emissions (tons)	2,980	13.8%	64.4%
Russell Co	Mobile Source VOC Emissions (tons)	2,236	10.4%	74.8%
Russell Co	Area Source VOC Emissions (tons)	2,094	9.7%	84.5%
Chattahoochee Co, GA	Area Source VOC Emissions (tons)	1,089	5.1%	89.6%
Harris Co, GA	Area Source VOC Emissions (tons)	667	3.1%	92.7%
Harris Co, GA	Mobile Source VOC Emissions (tons)	561	2.6%	95.3%
Muscogee Co, GA	Point Source VOC Emissions (tons)	504	2.3%	97.6%
Chattahoochee Co, GA	Mobile Source VOC Emissions (tons)	481	2.2%	99.9%
Harris Co, GA	Point Source VOC Emissions (tons)	25	0.1%	100.0%
Chattahoochee Co, GA	Point Source VOC Emissions (tons)	0	0.0%	100.0%



	Muscogee Co, GA	Chattahoochee Co, GA	Harris Co, GA	Russell Co
Mobile	4,888	528	1,088	2,402
Area	2,611	640	433	1,593
Point	33	0	599	3,631

Figure 8 NOx Emissions for Columbus MSA



	Muscogee Co, GA	Chattahoochee Co, GA	Harris Co, GA	Russell Co
Mobile	5,003	481	561	2,236
Area	5,877	1,089	667	2,094
Point	504	0	25	2,980

Figure 9 VOC Emissions for Columbus MSA

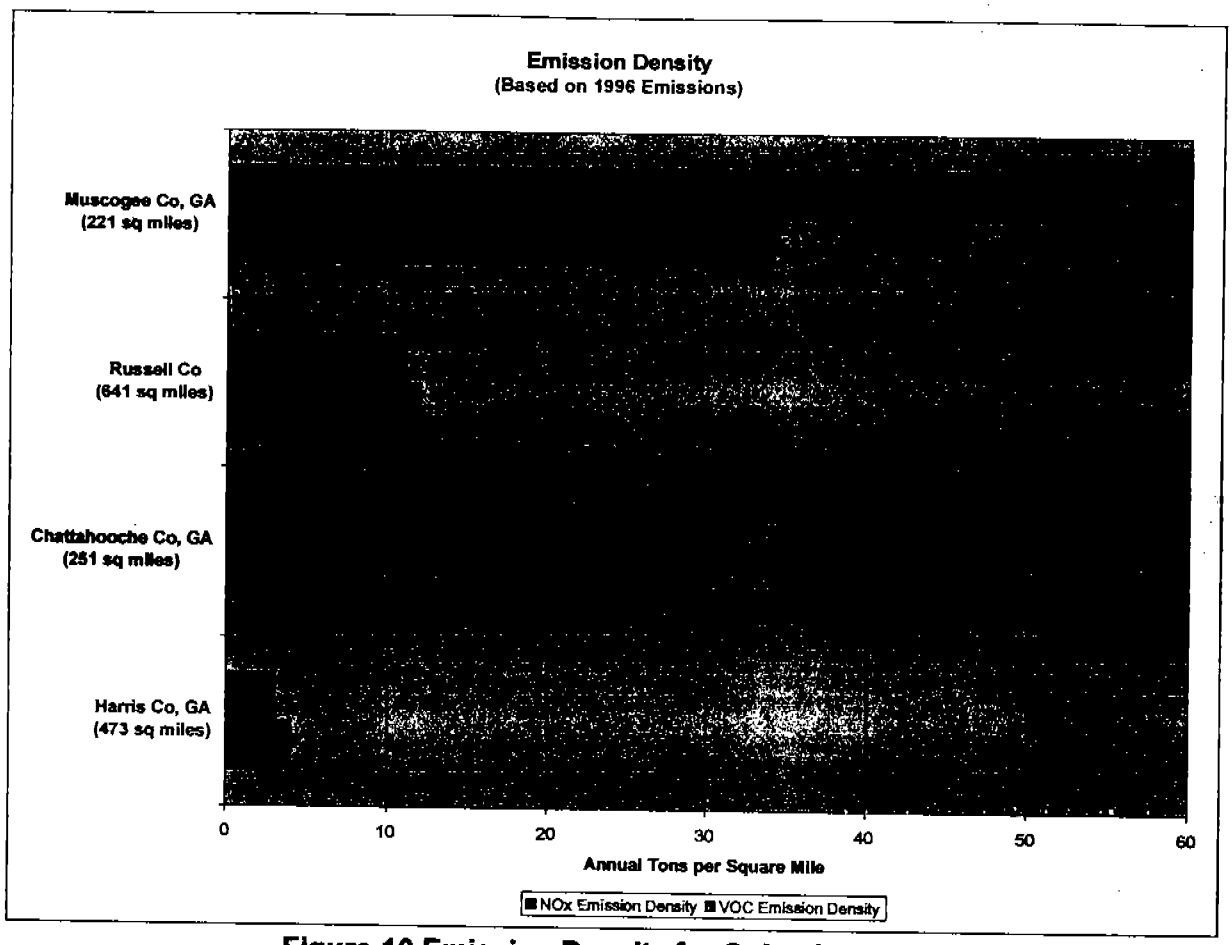


Figure 10 Emission Density for Columbus MSA

E. Traffic and Commuting Patterns

ADEM obtained annual estimates of the Daily Vehicle Miles Traveled (DVMT) for Russell County from the Alabama Department of Transportation; however, Georgia only supplied Daily VMT for 1997 for their counties in the Columbus MSA. Therefore, only a comparison of 1997 Daily VMT could be performed. Commuting patterns were obtained from the US Census Bureau web site. The commuting patterns available were based on the 1990 US Census.

Table 12 presents the 1997 Daily VMT estimates for the Columbus MSA. The Daily VMT in Russell County is less than half the Daily VMT in Muscogee County (GA). This factor fortifies the recommendation to exclude Russell from the Columbus Nonattainment Area.

Table 12 Daily VMT for Columbus MSA

County	1990 Daily VMT	1997 Daily VMT	Daily VMT Change (1990-1997)	% Change	% of MSA 1997 Daily VMT
Muscogee Co, GA	Unavailable	3,750,440	Unavailable	Unavailable	55.6%
Harris Co, GA	Unavailable	1,029,371	Unavailable	Unavailable	15.3%
Chattahoochee Co, GA	Unavailable	274,590	Unavailable	Unavailable	4.1%
Russell Co	1,234,188	1,692,890	458,703	37.2%	25.1%
MSA Total	***Unavailable***	6,747,291	***Unavailable***	***Unavailable***	

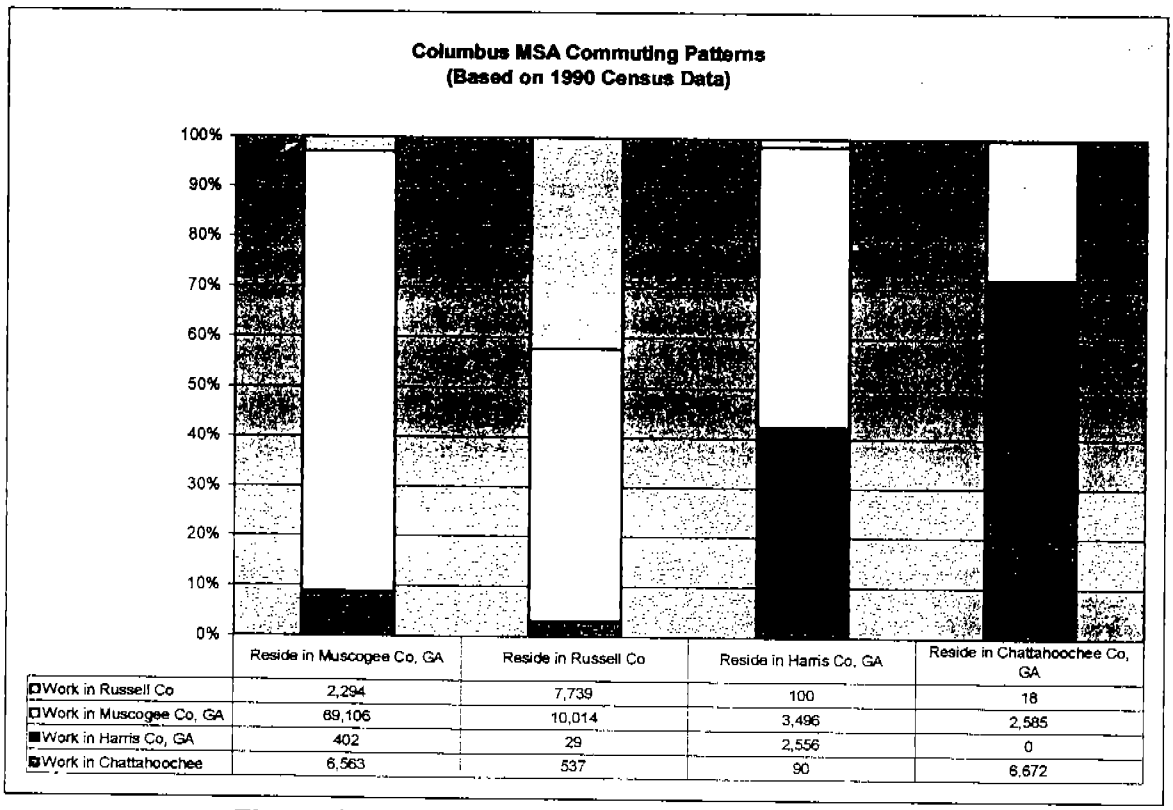


Figure 11 Commuting Patterns for Columbus MSA

Although Figure 11 indicates that there is significant commuting from Russell into Muscogee County (GA), 40% of Russell residents work within their county. The impact of commuting between counties will be lessened by the national low sulfur fuel standards. Therefore, this factor does not contradict the recommendation to exclude Russell County from the Columbus Nonattainment Area.

F. Expected Growth (including extent, pattern, and rate of growth)

Georgia supplied population growth estimates for the year 2007. These are presented in Table 13. Harris County (GA) is the only county that is expected to have significant growth by 2007. The lack of expected population growth fortifies the recommendation to exclude Russell from the Columbus Nonattainment Area.

Table 13 Population Projections for Columbus MSA

County	1990 Population	1998 Population	2000 Proj Population	2007 Projected Population	%Change in Population 1990 to 2000	% Change in Population 2000 to 2007
Harris, GA	17,788	22,315	23,664	28,799	33%	22%
Russell, AL	46,860	50,368	51,364	54,629	10%	6%
Muscogee, GA	179,280	182,752	184,457	186,738	3%	1%
Chattahoochee, GA	16,934	16,679	16,682	16,397	-1%	-2%

G. Meteorology

It is clear that meteorology is an integral part of the creation and transport of ozone. During the 1997-1999 ozone seasons, ozone levels exceeded the proposed eight hour standard on approximately 27 days over the three year period.[6] A preliminary wind analysis was completed to evaluate the predominate wind direction(s) in Columbus during the ozone season (April – October). As seen in the wind rose in Figure 1, there is a fairly strong northeastern/eastern component to the winds during the "O_3 season daytime hours", corresponding to 6 am – 3 pm. However, while it shows a fairly strong northeasterly/easterly component, it also indicates that the wind can vary throughout the day. Further, since there are no monitoring studies to correlate the meteorological data to the exceedance days, the state of knowledge is not sufficient to play a role in the designation process. Therefore, data to support the inclusion or exclusion of counties in a MSA based on meteorology is insufficient.

[6] This data set has not been fully QA/QC'd

H. Geography/Topography (mountain ranges or other air basin boundaries)

The geography/topography of an area definitely influences the creation and transport of ozone. Columbus and Phenix City are located Muscogee County, Georgia and Russell County, Alabama in extreme west central Georgia/east central Alabama. The terrain in the area is rolling with no distinguishing terrain features. In addition, the Chattahoochee River splits the two cities. Based on a lack of monitoring data or air quality analyses to evaluate to effects of the terrain on ozone formation and transport, the state of knowledge is not sufficient to play a role in the designation process.

I. Jurisdictional Boundaries

The Department has received and shared data with the Georgia Department of Natural Resources. Within the Columbus-Phenix City Interstate air quality control region (40 CFR § 81.58), there is the Columbus MSA for which Russell County, Alabama is a part of this interstate MSA. Muscogee, Harris and Chattahoochee Counties comprise the remainder of the Columbus MSA. Russell County is within the jurisdiction of the State of Alabama under the purview of the ADEM.

The Columbus-Phenix City area was redesignated attainment for the 1-hour ozone standard in March of 1986. There have been no violations since that time of the 1-hour standard and there are no existing 1-hour nonattainment areas near the Columbus MSA.

J. Level of Control of Emission Sources

Since 1979, statewide reasonably available control technology (RACT) has been in place for volatile organic compounds (VOCs) as found under ADEM Admin Code Chapter 335-3-6, for which Russell County has been subject. Also in place since 1990, has been the institution of statewide regulations for the control of evaporative emissions in the gasoline marketing chain, commonly referred as 'Stage I' vapor recovery. Over the past 28 year history of Alabama's air pollution control program, the state has been delegated the authority to implement other standards of performance such as the New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPs), and the federal Prevention of Significant Deterioration regulations for protection of degradation of clean air areas.

Additionally, as discussed under regional emission reductions, the EPA has required a NO_X SIP Call for 22 states, including Alabama that, by 2003, will result in large reductions in NO_X emissions from major utilities, large industrial boilers and gas turbines, cement kilns and large stationary reciprocating internal combustion engines. Work is currently being performed by ADEM to complete the regional NO_X SIP. At the national level, EPA has finalized the Tier 2 vehicle/national fuel standards, which take effect beginning in 2004. However, the States will also begin to realize the benefits of cleaner vehicles with the National Low Emission Vehicle standards this Fall with the 2001 model year vehicles.

K. Regional Emission Reductions

EPA performed Urban Airshed Modeling to estimate the impact of implementation of the NO_X SIP call as well as Tier 2 vehicle standards for Georgia. The results obtained from the Georgia Department of Natural Resources demonstrates in the table in Attachment 1 that Muscogee County, Georgia is expected to attain the new 8-hour standard. The significant reductions resulting in Russell County from Tier II vehicles and from nationwide low-sulfur gasoline bolster EPA's conclusion that regional and nationwide efforts will enable this area to attain the 8-hour standard without further local controls.

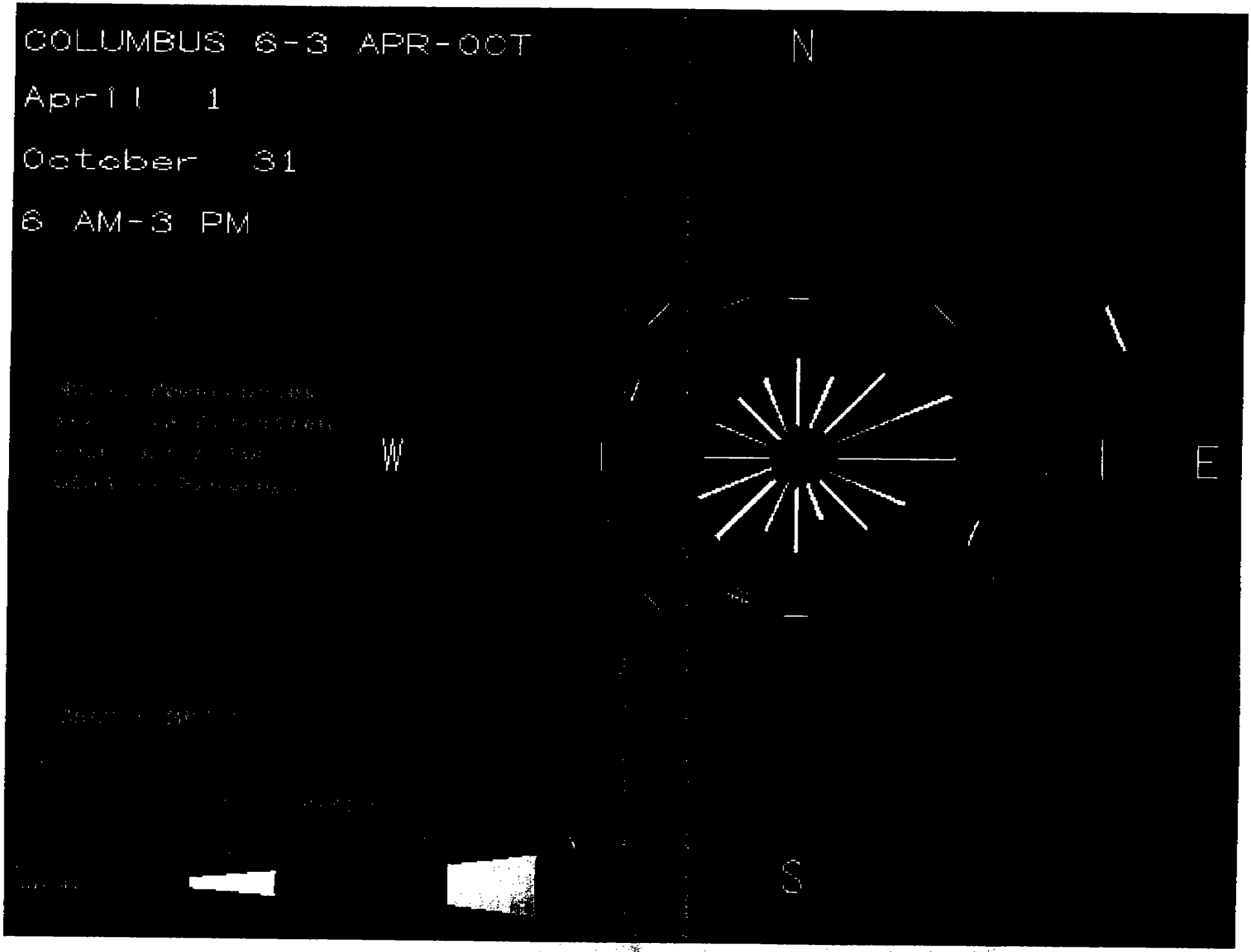


Figure C-1

Appendix D

ADEM recommends that the Mobile Nonattainment Area for the 8-hour NAAQS for ozone exclude Baldwin County. EPA guidance (dated March 28, 2000) states that if a State wishes to propose a nonattainment area boundary smaller than the MSA boundary, the State must address how certain factors affect the drawing of the nonattainment boundary. Therefore, a discussion of these factors for the Mobile Nonattainment Area is provided in this Appendix.

The factors that provide the most compelling evidence to exclude Baldwin County are listed below:

- Population density and degree of urbanization in comparison to Mobile County
- Location of emission sources (i.e. the lack of significant point sources)
- Traffic and commuting patterns
- Limited expected growth
- Level of control of emission sources
- Regional emission reductions

A. Emissions and air quality in adjacent areas (including adjacent C/MSAs)

The counties and MSA's adjacent to the Mobile MSA are depicted in Figure 1. To evaluate emissions for counties adjacent to Baldwin County, ADEM obtained the 1996 annual NOx and VOC emission estimates from EPA's recommended web site[1]. Table 1 lists these emissions which include all anthropogenic sources (i.e. point, area, mobile, and nonroad mobile) for the counties that are adjacent to Baldwin.

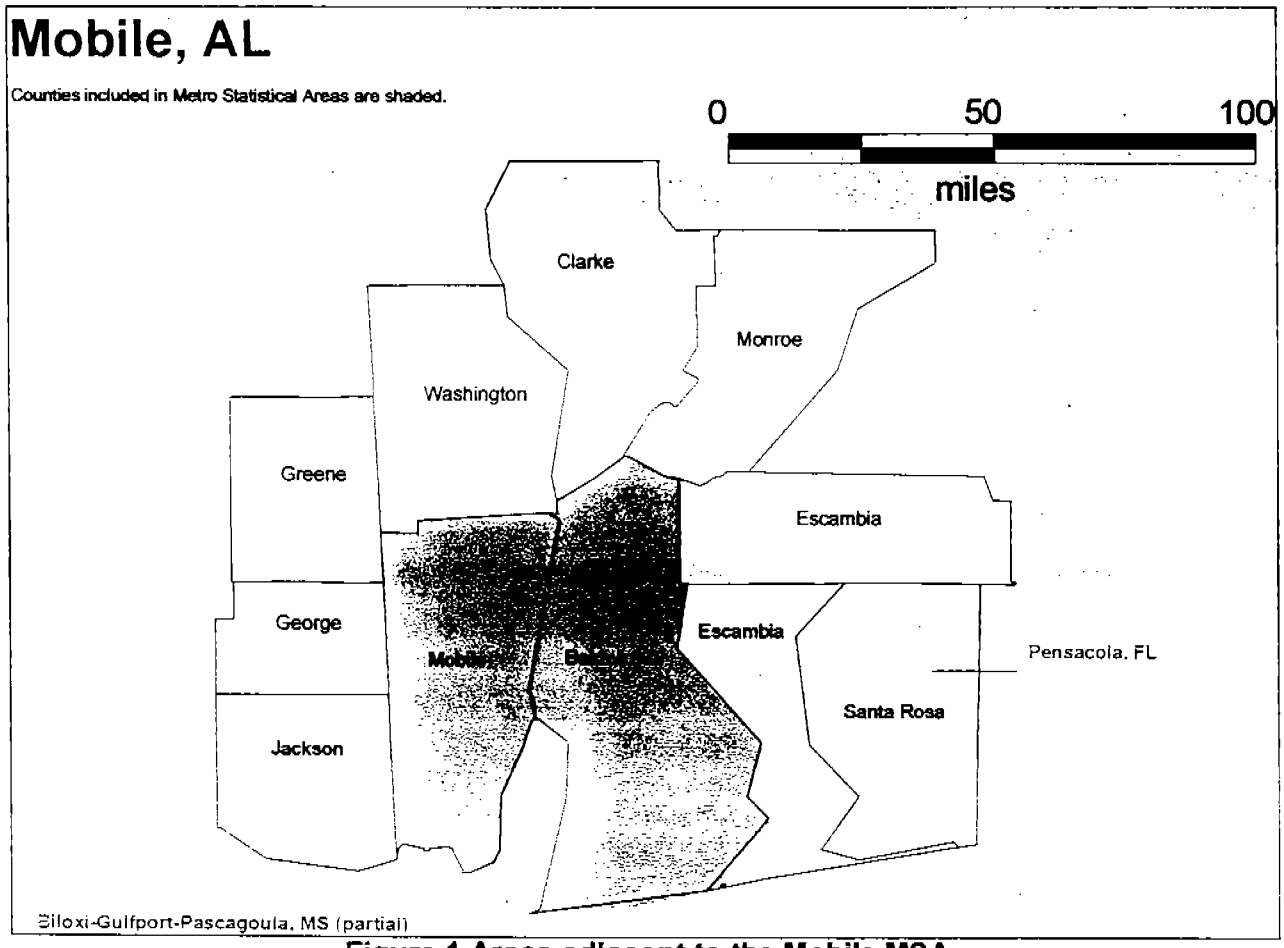


Figure 1 Areas adjacent to the Mobile MSA

[1] www.pechan.com/emissions3/html/net.htm

Table 1 Annual Emissions for Areas Adjacent to Baldwin County

County	1996 Annual VOC Emissions (Tons)	Ranking for VOC	1996 Annual NOx Emissions (Tons)	Ranking for NOx
Baldwin	9,570	3	10,190	4
Clarke	4,873	6	4,373	7
Escambia	6,587	4	5,744	5
Escambia (FL)[M]	32,348	2	30,167	2
Mobile[M]	53,270	1	76,890	1
Monroe	4,889	5	5,686	6
Washington	3,270	7	14,988	3

[M] County has an ozone monitor

The Chickasaw ozone monitor in Mobile County has a design value above the 8-hour NAAQS for ozone based on monitoring data for 1997, 1998, and 1999, while the design value for the Axis ozone monitor meets the 8-hour NAAQS for ozone based on the same years of data. Escambia County (FL) has three ozone monitors, two of which exceed the the 8-hour NAAQS for ozone based on monitoring data for 1997, 1998, and 1999. There were no other ozone monitoring sites in Baldwin County or other adjacent areas during this time period; therefore, there is limited air quality information.

Baldwin County's emissions are significantly less than the two counties which monitored nonattainment, Mobile and Escambia County (FL). Without monitoring data for Baldwin County, no conclusion can be made about the impact of Baldwin County's emissions on adjacent counties and vice versa.

Evaluating the emissions and air quality in adjacent areas provides no compelling indicator as to whether Baldwin should be included or excluded from the Mobile Nonattainment Area.

B. Population Density and degree of urbanization including commercial development (significant difference from surrounding areas)

To evaluate the various aspects of population, ADEM obtained the 1990 to 1999 population estimates for the Mobile MSA from the Alabama State Data Center[2]. Information on business data (i.e. retail employment and manufacturing employment) was obtained from the US Census Bureau's *County Business Patterns*.

Population densities were calculated by dividing the population estimates by the land area of each county (in square miles). Figure 2 depicts the population densities for the counties in the Mobile MSA. Baldwin has a larger land area than Mobile (1596 versus 1233, respectively) which skews the impact of the population density factor. Although it has a larger land area, Baldwin still has a significantly smaller population density than Mobile. This population density factor fortifies the recommendation to exclude Baldwin County from the Mobile Nonattainment Area.

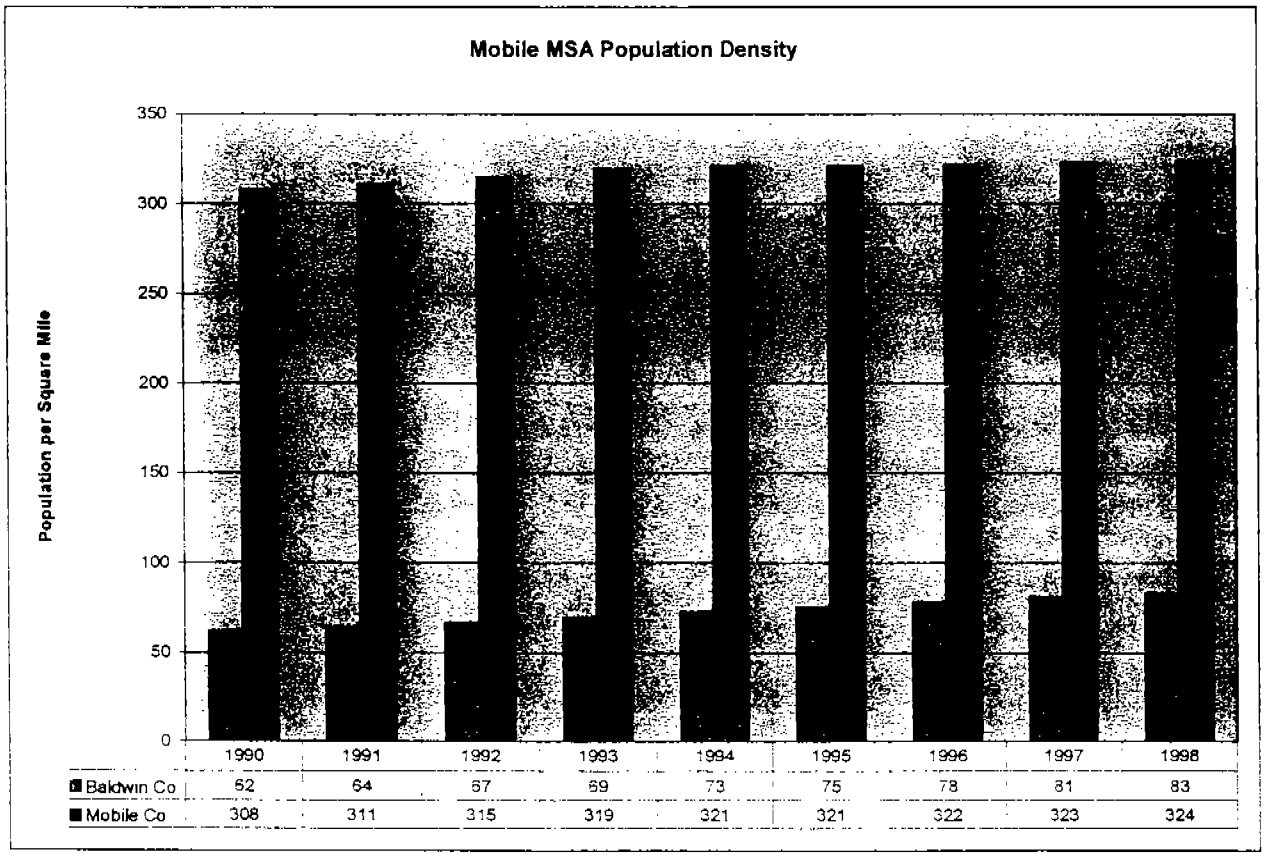


Figure 2 Population Density for Mobile MSA

[2] The Alabama State Data Center (ASDC) is a network of 27 public agencies working together through a cooperative agreement with the U.S. Bureau of the Census to facilitate use and delivery of Census and other data to the public. Internet site: http://cber.cba.ua.edu/est_prj.html

Table 2 compares the 1990 and 1999 population estimates. Population data is also presented in Figures 3 and 4. This data reveals that Mobile has a significantly higher population that Baldwin. Mobile has consistently represented over 70% of the Mobile MSA's population. This population factor fortifies the recommendation to exclude Baldwin from the Mobile Nonattainment Area.

Table 2 Mobile MSA Population

County	1990	1999	Population Change (1990-1999)	% Change	% of MSA 1999 Population
Mobile County	379,155	399,652	20,497	5.4%	74.6%
Baldwin County	98,920	135,820	36,900	37.3%	25.4%
MSA Total	***478,075***	***535,472***	***57,397***	***12.0%***	

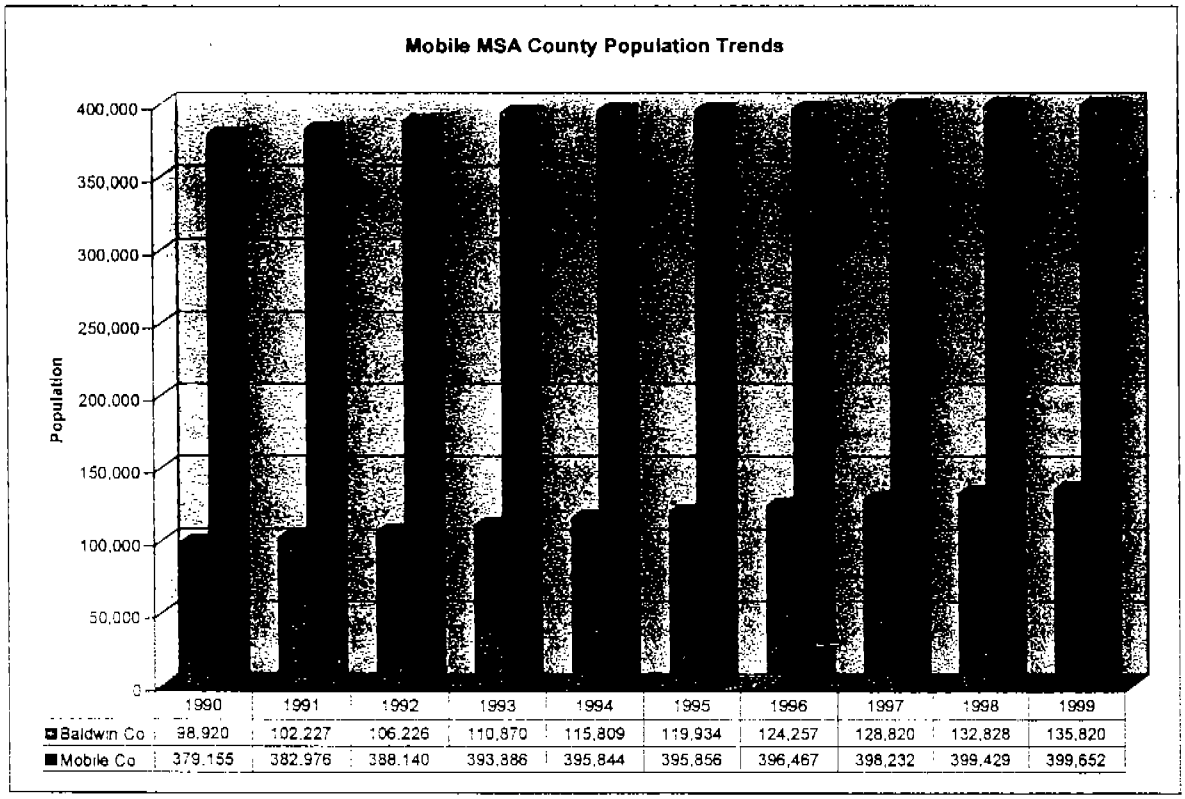


Figure 3 Population Data for Mobile MSA

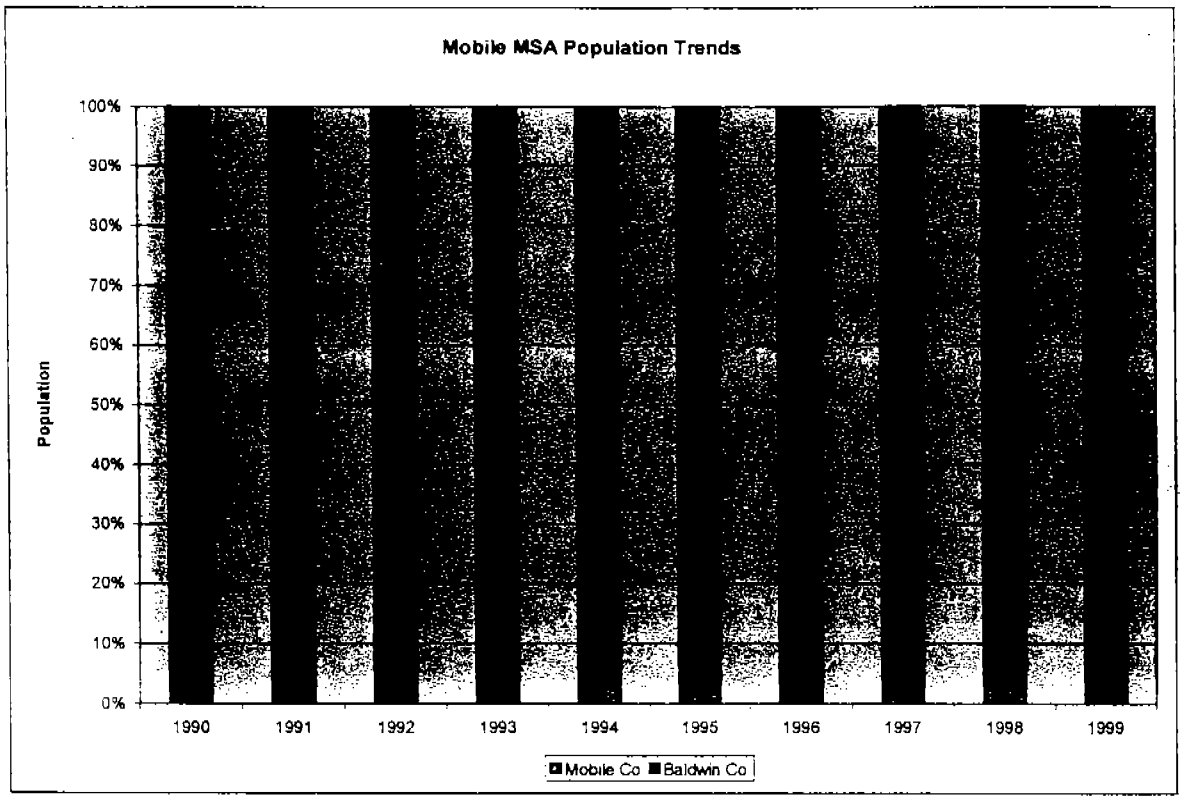


Figure 4 Population Distribution for Mobile MSA

The amount and percent of urbanized population in the Mobile MSA is presented in Table 3. This data clearly shows that Baldwin has an insignificant urban population in comparison to Mobile. This factor fortifies the recommendation to exclude Baldwin County from the Mobile Nonattainment Area.

Table 3 Urban Population for Mobile MSA

County Name	% Urban[3]	1990 Population	1990 Urban Population	% of MSA Total 1990 Urban Population	1999 Population	1999 Urban Population	% of MSA Total 1999 Urban Population
Mobile	81.30%	379,155	308,253	88.75%	399,652	324,917	85.83%
Baldwin	39.50%	98,920	39,073	11.25%	135,820	53,649	14.17%
MSA Totals	***72.6%***	***478,075***	***347,326***	***	***535,472***	***378,566***	***

[3] Based on the 1990 US Census

Tables 4, 5, and 6 show the trends in Total Employment, Manufacturing Employment, and Retail Employment, respectively, for the Mobile MSA. Figure 5 demonstrates that the number of Total Employees for Baldwin is not substantial in comparison to Mobile. In addition, Baldwin shows little growth in manufacturing employees, which correlates to industrial growth. This factor fortifies the recommendation to exclude Baldwin County from the Mobile Nonattainment Area.

Table 4 Total Employees

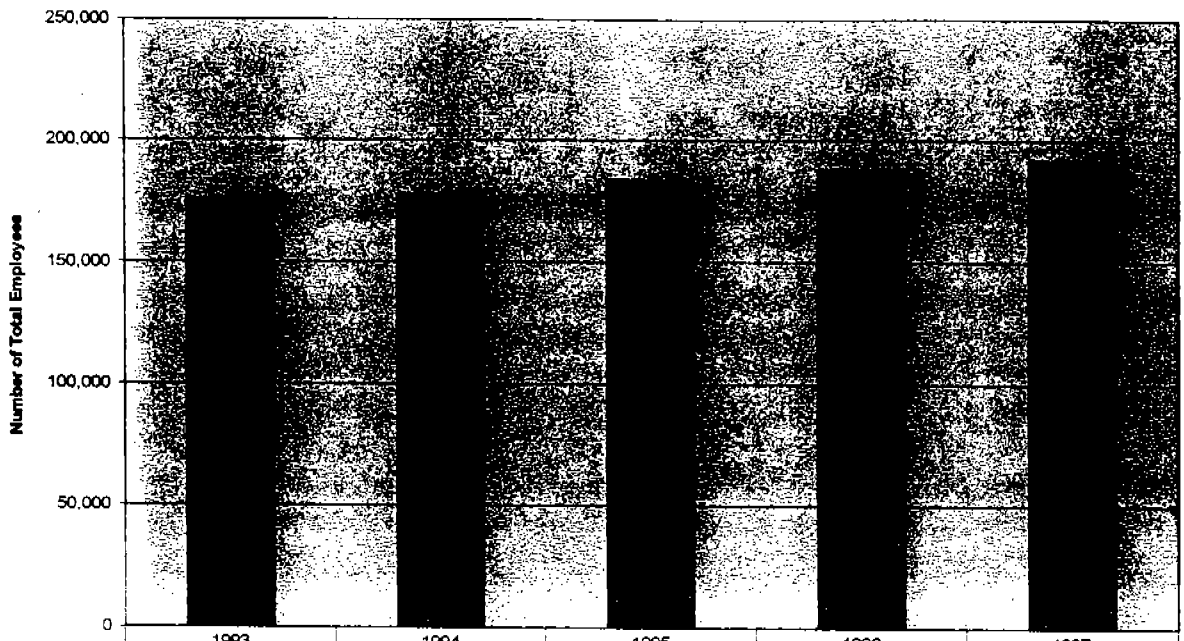
	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Baldwin	28,515	30,772	34,395	36,230	37,434	31.3%	19.5%
Mobile	147,179	146,635	149,274	151,833	154,463	4.9%	80.5%
MSA Total	175,694	177,407	183,669	188,063	191,897	9.2%	

Table 5 Manufacturing Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Baldwin	5,495	5,512	5,661	5,518	5,515	0.4%	19.6%
Mobile	23,784	23,730	24,193	23,265	22,597	-5.0%	80.4%
MSA Total	29,279	29,242	29,854	28,783	28,112	-4.0%	

Table 6 Retail Employees

	1993	1994	1995	1996	1997	% Change 1993-1997	% of 1997 MSA Total
Baldwin	8,811	9,569	10,577	11,440	11,776	33.7%	26.1%
Mobile	31,418	32,641	32,300	33,771	33,287	5.9%	73.9%
MSA Total	40,229	42,210	42,877	45,211	45,063	12.0%	



	1993	1994	1995	1996	1997
Baldwin	28,515	30,772	34,395	36,230	37,434
Mobile	147,179	146,635	149,274	151,833	154,463

Figure 5 Total Employees for Mobile MSA

C. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale)

Table 7 presents the ozone monitoring data for the Mobile MSA and surrounding area. One Mobile (AL), two Escambia (FL) monitors, and the Jackson (MS) monitor exceed the 8-hour NAAQS for ozone. Figure 6 maps these ozone monitoring sites which provided the 1997, 1998, and 1999 data for the Mobile MSA. The recommendation to exclude Baldwin was not influenced by monitoring data because no ozone monitoring data was available for Baldwin.

Table 7 Mobile MSA Ozone Monitoring Data

County	AIRS ID	Site	1997 4th Max	1998 4th Max	1999 4th Max	3 Year Average
Mobile	01-097-0028	Axis (N)	0.071	0.078	0.079	0.076
Mobile	01-097-0003	Chickasaw (M)	0.081	0.098	0.085	**0.088**
Escambia (FL)	12-033-0004	Ellyson Field (N)	0.084	0.088	0.081	**0.084**
Escambia (FL)	12-033-0018	Pensacola NAS (O)	0.086	0.102	0.086	**0.091**
Escambia (FL)	12-033-0024	Warrington Elem	0.089	0.103	0.083	**0.091**
Jackson (MS)	28-059-0006	Pascagoula (G)	Not Available			**>0.084**

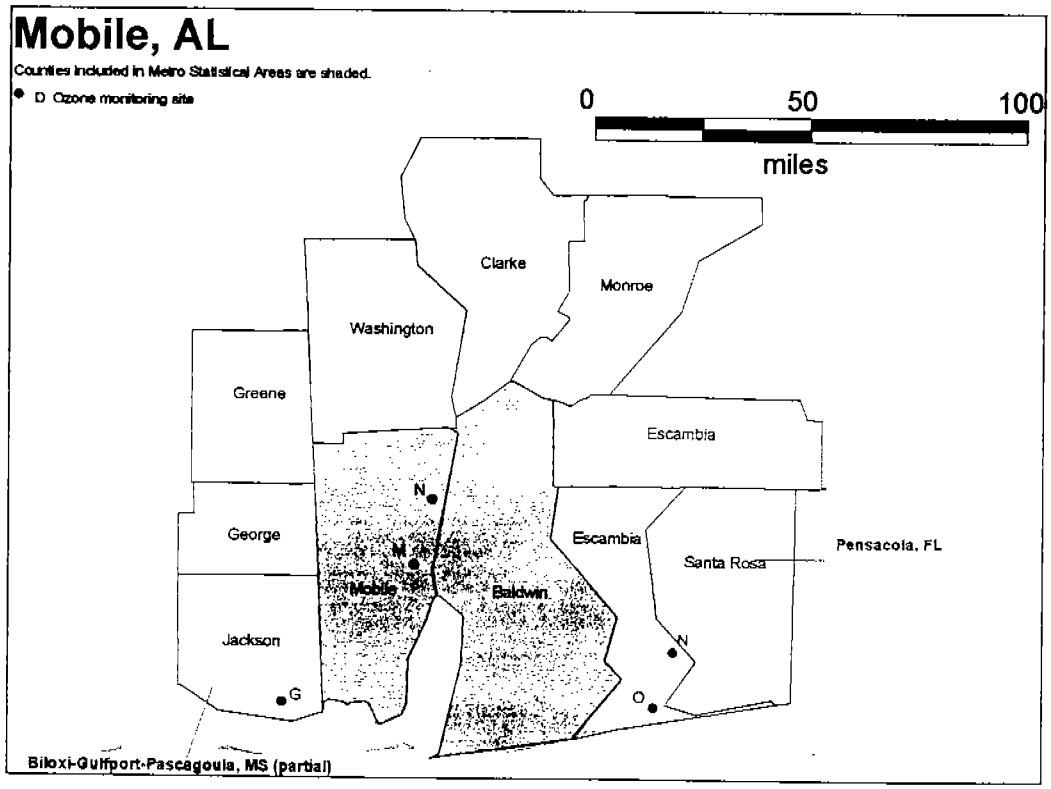


Figure 6 Ozone Monitoring Sites in Mobile MSA and Adjacent Areas

D. Location of Emission Sources

Figure 7 depicts the location of large point sources in the Mobile MSA and surrounding counties. The base map was obtained from EPA's recommended web site[4]. Tables 8 and 9 present the distribution of NOx emissions among point, area[5], and mobile sources in the Mobile MSA. Tables 10 and 11 present the same information for VOC emissions. Figures 8 and 9 illustrate this data. Figure 10 presents the emission densities for the counties in the Mobile MSA.

Baldwin only accounts for 12% of the total annual NOx emissions and 15% of the total annual VOC emissions in the Mobile MSA. In addition, Baldwin has a significantly less emission density than Mobile. The lack of large point sources of NOx or VOC emissions located in Baldwin, the minimal area and mobile source emissions, and the smaller emission densities fortify the recommendation to exclude Baldwin from the Mobile Nonattainment Area.

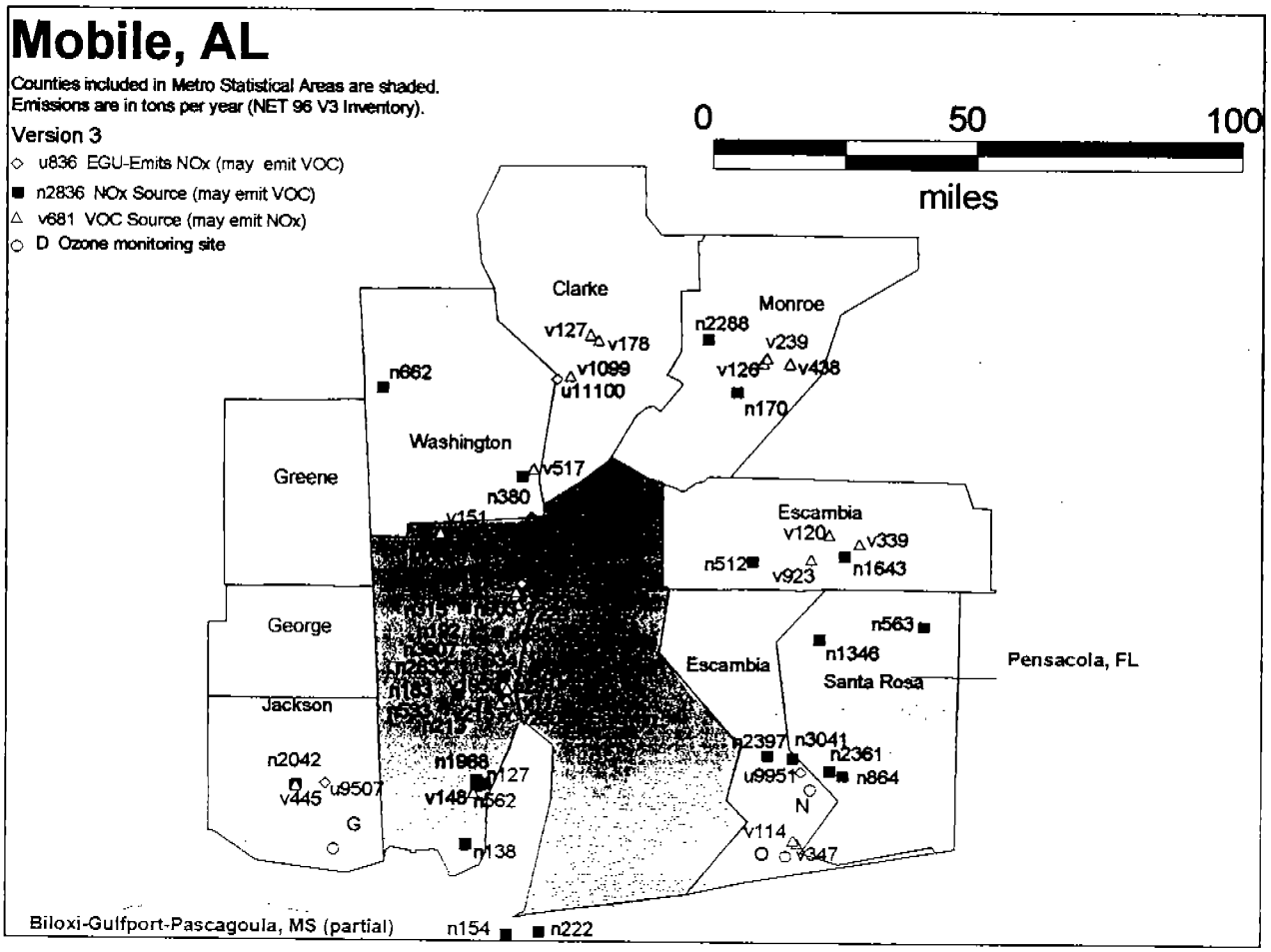


Figure 7 Location of Large Points Sources in Mobile MSA

[4] www.pechan.com/emissions3/map_idx.htm

[5] Area sources include the nonroad mobile sources

Table 8 NOx Annual Emissions (Tons)

FIPS Code	Name	Point		Area		Mobile		Total Emissions	
01003	Baldwin Co	240	0.5%	5,987	36.1%	4,098	21.8%	10,325	12%
01097	Mobile Co	51,752	99.5%	10,592	63.9%	14,711	78.2%	77,055	88%
MSA Total Emissions		**51,992**		**16,579**		**18,809**		**87,380**	

Table 9 Cumulative NOx Contributions

County Name	Factor	Annual 1996 Emissions (Tons)	% of MSA Total Emissions	Cumulative %
Mobile Co	Point Source NOx Emissions (tons)	51,752	59.2%	59.2%
Mobile Co	Mobile Source NOx Emissions (tons)	14,711	16.8%	76.1%
Mobile Co	Area Source NOx Emissions (tons)	10,592	12.1%	88.2%
Baldwin Co	Area Source NOx Emissions (tons)	5,987	6.9%	95.0%
Baldwin Co	Mobile Source NOx Emissions (tons)	4,098	4.7%	99.7%
Baldwin Co	Point Source NOx Emissions (tons)	240	0.3%	100.0%
	MSA Total Emissions	***87,380***		

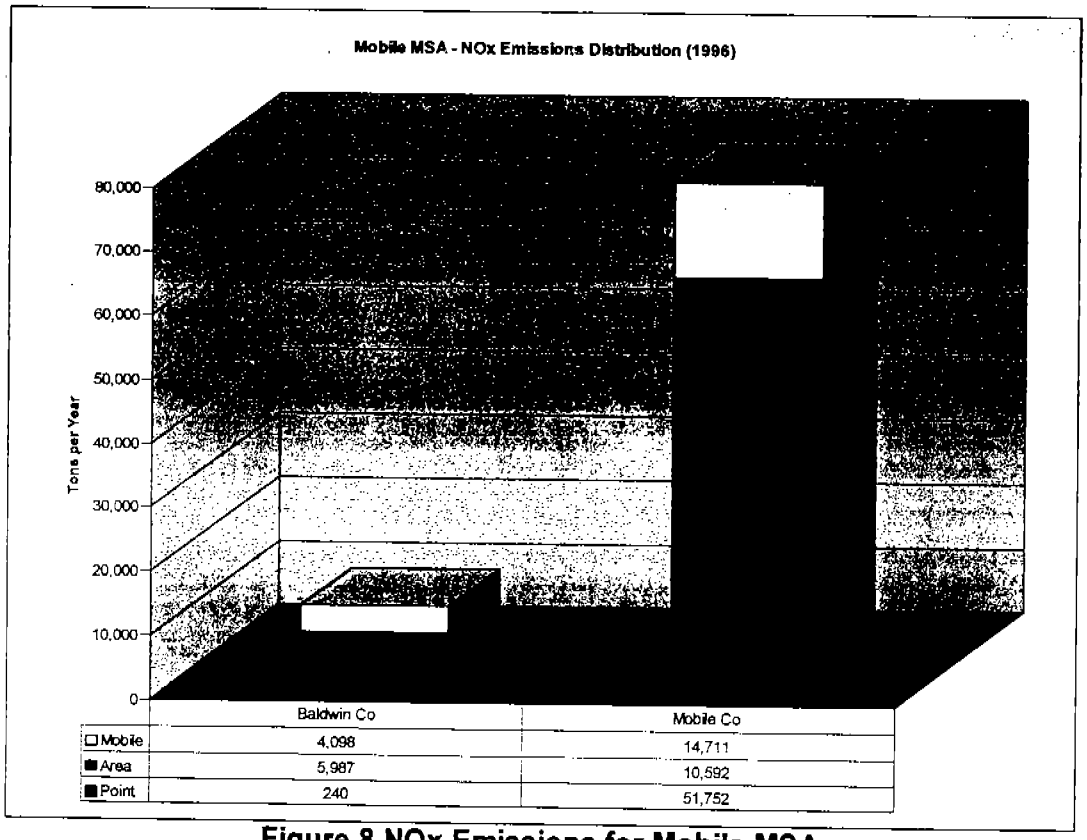


Figure 8 NOx Emissions for Mobile MSA

Table 10 VOC Annual Emissions (Tons)

FIPS Code	Name	Point		Area		Mobile		Total Emissions	
01003	Baldwin Co	346	1.6%	6,969	27.7%	2,313	14.6%	9,628	15%
01097	Mobile Co	21,697	98.4%	18,219	72.3%	13,542	85.4%	53,458	85%
MSA Total Emissions		**22,043**		**25,188**		**15,855**		**63,086**	

Table 11 Cumulative VOC Contributions

County Name	Factor	Annual 1996 Emissions (Tons)	% of MSA Total Emissions	Cumulative %
Mobile Co	Point Source VOC Emissions (tons)	21,697	34.4%	34.4%
Mobile Co	Area Source VOC Emissions (tons)	18,219	28.9%	63.3%
Mobile Co	Mobile Source VOC Emissions (tons)	13,542	21.5%	84.7%
Baldwin Co	Area Source VOC Emissions (tons)	6,969	11.0%	95.8%
Baldwin Co	Mobile Source VOC Emissions (tons)	2,313	3.7%	99.5%
Baldwin Co	Point Source VOC Emissions (tons)	346	0.5%	100.0%
	MSA Total Emissions	***63,086***		

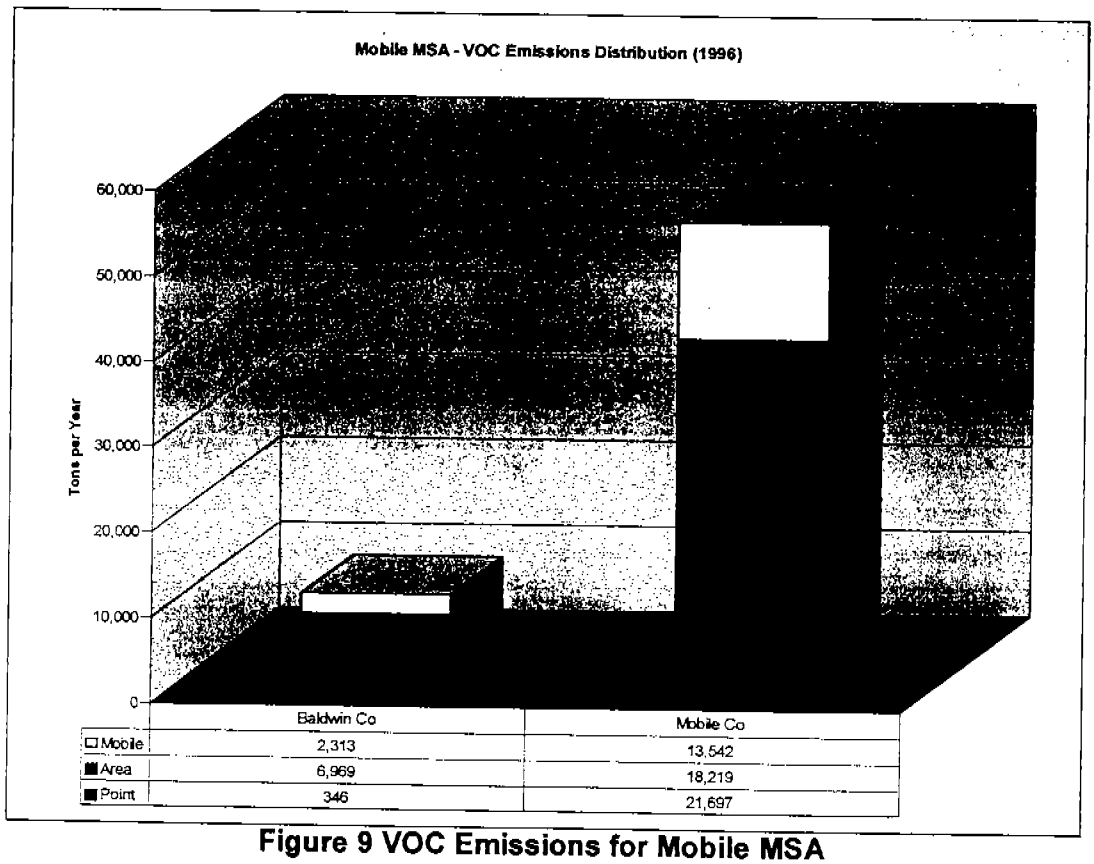


Figure 9 VOC Emissions for Mobile MSA

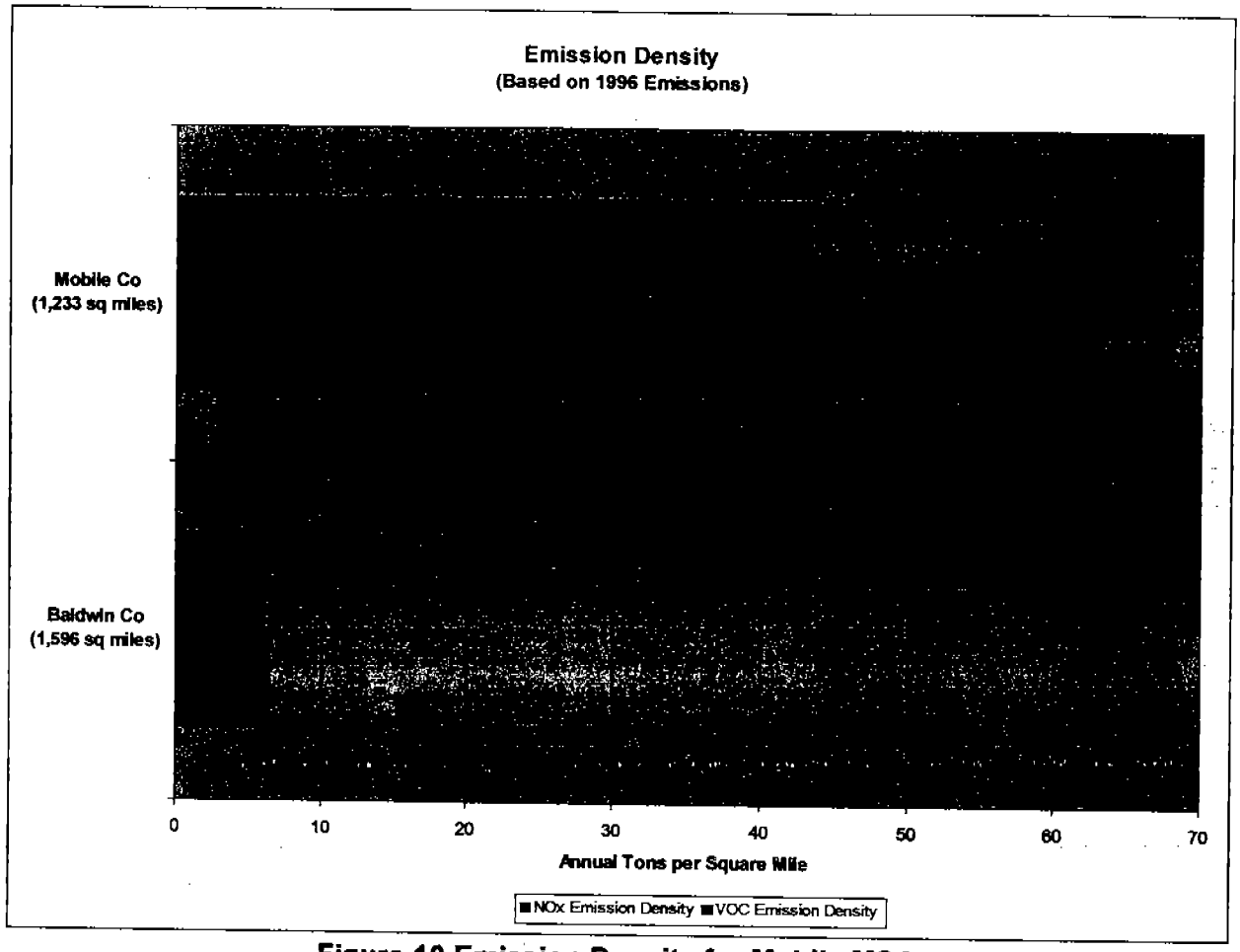


Figure 10 Emission Density for Mobile MSA

E. Traffic and Commuting Patterns

Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the Alabama Department of Transportation and the commuting patterns were obtained from the US Census Bureau web site. The commuting patterns available were based on the 1990 US Census. Table 12 presents the 1990 and 1998 Daily VMT estimates for the Mobile MSA and Figure 11 demonstrates the Daily VMT trend from 1990 to 1998 for each county. Figure 12 presents the rural and urban distribution of Daily VMT. Figure 13 presents the commuting patterns within the Mobile MSA.

Table 12 shows that the Daily VMT for Baldwin comprises approximately 32% of the Daily VMT for the Mobile MSA. However, Figure 12 demonstrates that the majority of this Daily VMT occurs in rural areas, thereby it is not expected to significantly impact the air quality.

Although Figure 13 indicates that there is moderate commuting from Baldwin into Mobile, the majority of Baldwin residents work within their county. The impact of commuting between counties will be lessened by the national low sulfur fuel standards. Therefore, this factor was not considered to play a significant role in the recommendation to exclude Baldwin from the Mobile Nonattainment Area.

Table 12 Daily VMT for Mobile MSA

County	1990 Daily VMT	1998 Daily VMT	Daily VMT Change (1990-1998)	% Change	% of MSA 1998 Daily VMT
Mobile Co	8,075,742	10,178,107	2,102,365	26.0%	67.7%
Baldwin Co	3,536,842	4,858,492	1,321,650	37.4%	32.3%
MSA Total	***11,612,584***	***15,036,599***	***3,424,015***	***29.5%***	

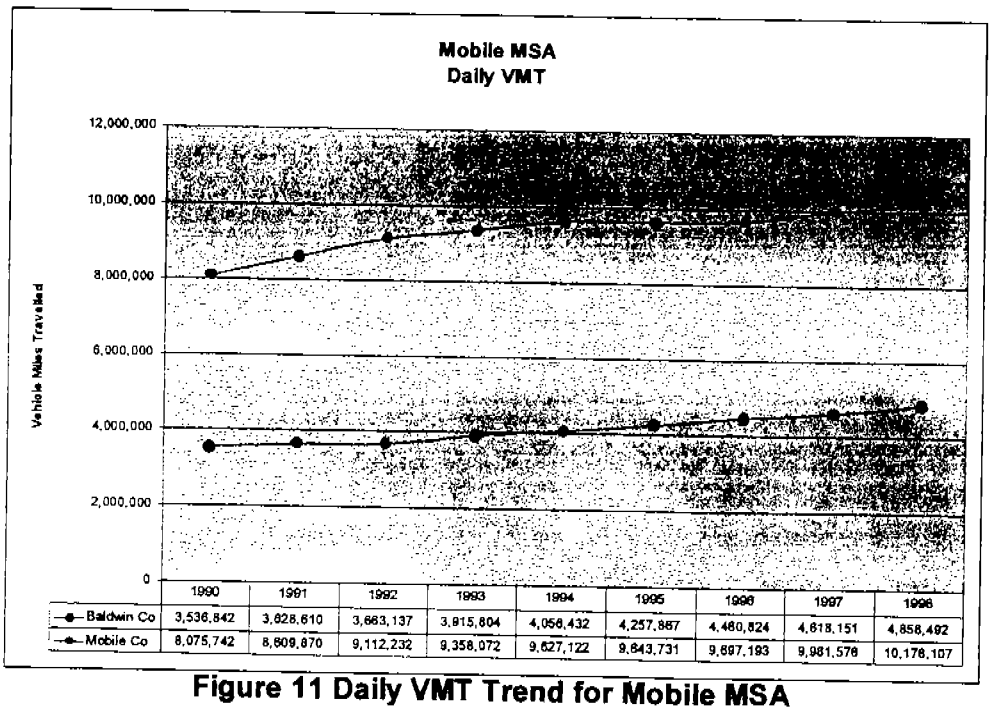


Figure 11 Daily VMT Trend for Mobile MSA

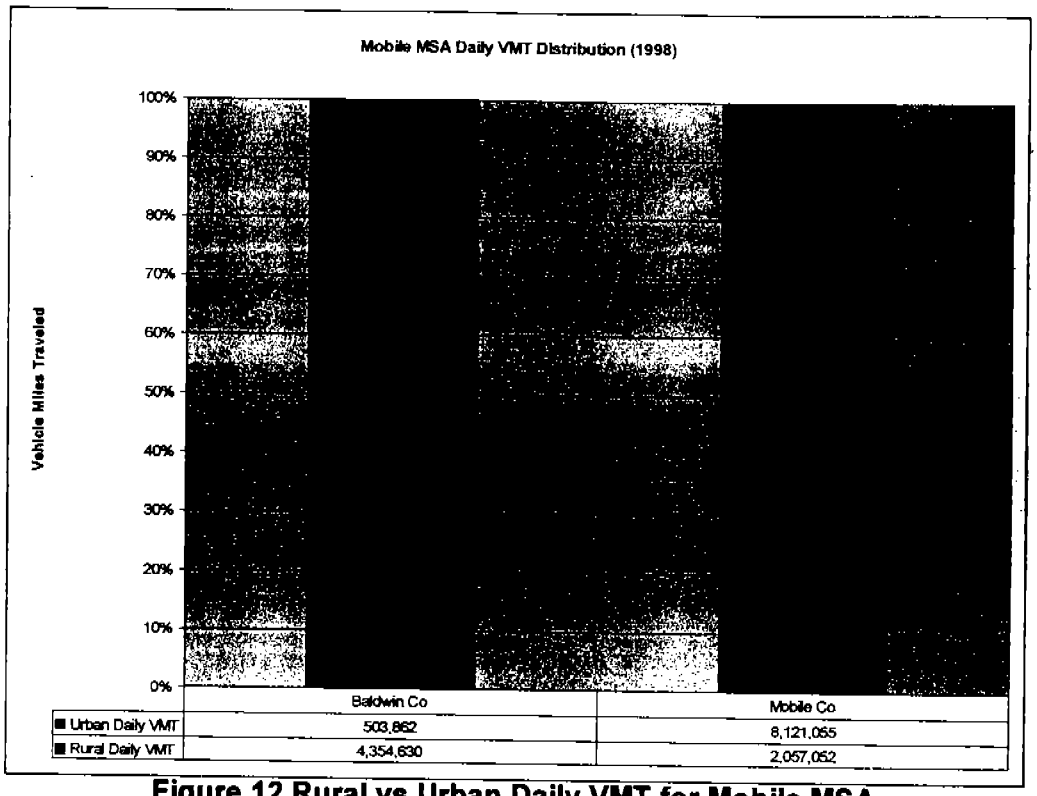


Figure 12 Rural vs Urban Daily VMT for Mobile MSA

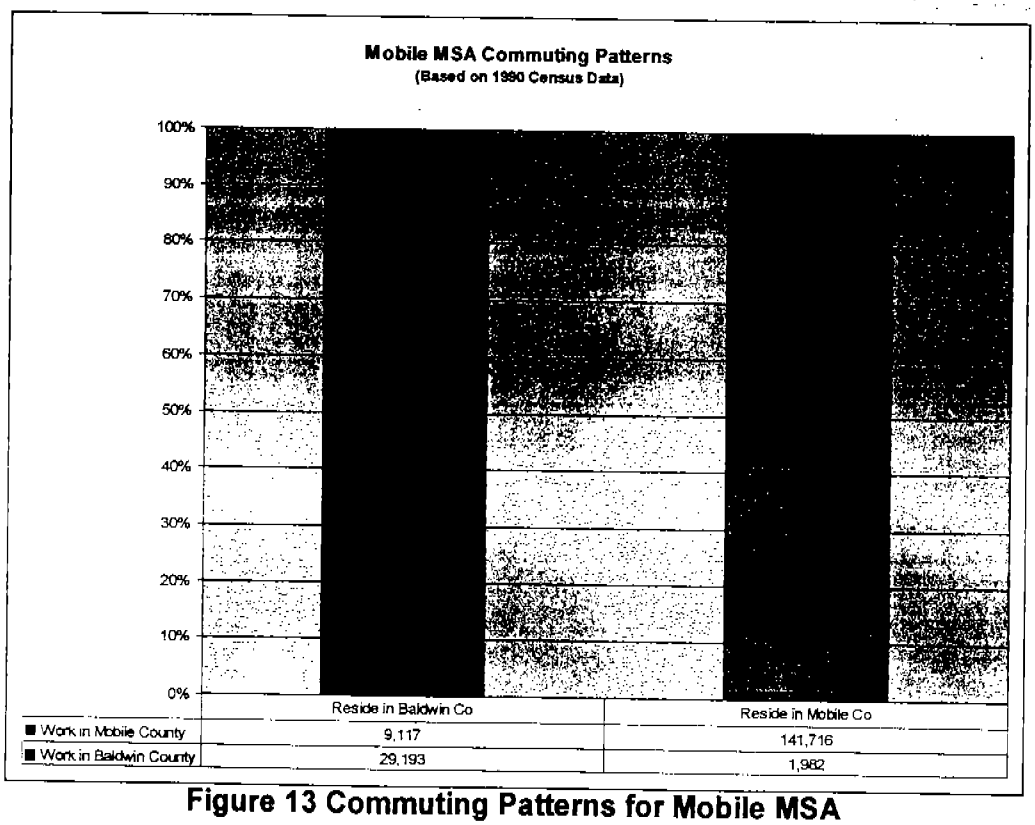


Figure 13 Commuting Patterns for Mobile MSA

F. Expected Growth (including extent, pattern, and rate of growth)

There is little information available about expected growth. Table 13 provides population growth estimates that were obtained from the Alabama Data Center. The estimates do not show that significant growth is expected in either county. Since no other information about expected growth is available, and population growth estimates are not enough to influence a decision about designating a nonattainment area, this factor did not play a role in the recommendation to exclude Baldwin from the Mobile Nonattainment Area.

Table 13 Population Projections for Mobile MSA

County Name	1990	1999	2005	2015	% Change 1990-1999	% Change 1999-2005	% Change 2005-2015
Mobile Co	379,155	399,652	420,905	458,321	5.4%	5.3%	8.9%
Baldwin Co	98,920	135,820	147,747	169,739	37.3%	8.8%	14.9%

G. Meteorology

It is clear that meteorology plays a major role in the formation and transport of ozone. During the 1997-1999 ozone seasons, ozone levels exceeded the proposed eight hour standard on approximately 17 days over the three year period.[6] As part of the Gulf Coast Ozone Study (GCOS), a consortium of States (Alabama, Mississippi, Florida & Louisiana) as well as private industry, are evaluating the conditions associated with elevated levels of ozone along the Gulf Coast. The GCOS has identified that high ozone does occur when the wind has a northerly component. However, the GCOS has also recognized that the sea/land breeze along the coast can play a critical role in the formation and transport of ozone. This can be seen in the wind rose in Figure 1. This wind rose shows the distribution of wind during the ozone season for "O_3 season daytime hours", which correspond to 6am – 3pm. While it shows a strong northerly component, it also indicates that the wind can vary throughout the day. The results of the GCOS study should provide States with a good idea of the meteorological conditions associated with elevated ozone levels. However, at this time the state of knowledge is not sufficient for meteorology to play a key role in the designation process.

H. Geography/Topography (mountain ranges or other air basin boundaries)

The Mobile area is located in the coastal plain, and does not have any significant topographic features that affect the formation and transport of ozone.

I. Jurisdictional Boundaries

The Department has received and shared data with the Florida Department of Environment Protection (DEP) and Mississippi Department of Environmental Quality (DEQ). Within the

[6] This data set has not been QA/QC'd

Mobile-Pensacola-Panama City-Southern Mississippi Interstate air quality control region (40 CFR, §81.68), there are no 'interstate' MSAs shared between the States of Mississippi and Florida; however, the Mississippi and Florida Gulf Coast MSAs do border the Mobile MSA. To the west of Mobile County lies the Biloxi-Gulfport-Pascagoula, Mississippi MSA comprised of Hancock, Harrison and Jackson Counties (Jackson borders Mobile County). To the east of Baldwin County lies the Pensacola, Florida MSA comprised of Escambia and Santa Rosa Counties (Escambia borders Baldwin County). Adjacent to the Pensacola MSA is the Fort Walton Beach, Florida MSA consisting of Okaloosa County, Florida.

The Mobile MSA consists of Mobile and Baldwin Counties and this MSA is within the jurisdiction of the State of Alabama under the purview of the ADEM. The Mobile area was redesignated attainment for the 1-hour ozone standard in May 1987. The area has continued to attain this standard since that time. There are no current 1-hour nonattainment areas near the Mobile area.

J. Level of Control of Emission Sources

Since 1979, statewide reasonably available control technology (RACT) has been in place for volatile organic compounds (VOCs) as found under ADEM Admin Code Chapter 335-3-6, for which Mobile County has been subject. Also in place since 1990, has been the institution of statewide regulations for the control of evaporative emissions in the gasoline marketing chain, commonly referred as 'Stage I' vapor recovery. Over the past 28 year history of Alabama's air pollution control program, the state has been delegated the authority to implement other standards of performance such as the New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPs), and the federal Prevention of Significant Deterioration regulations for protection of degradation of clean air areas.

Additionally, as discussed under regional emission reductions, the EPA has required a NO_X SIP Call for 22 states, including Alabama that, by 2003, will result in large reductions in NO_X emissions from major utilities, large industrial boilers and gas turbines, cement kilns and large stationary reciprocating internal combustion engines. Work is currently being performed by ADEM to complete the regional NO_X SIP. At the national level, EPA has finalized the Tier 2 vehicle/national fuel standards, which take effect beginning in 2004. However, the States will also begin to realize the benefits of cleaner vehicles with the National Low Emission Vehicle standards this Fall with the 2001 model year vehicles.

K. Regional Emission Reductions

In 1998, an effort to study ozone air pollution along the Gulf Coast began. The study is a cooperative effort between industry and the States of Alabama, Florida, Louisiana and Mississippi to study ozone along the Gulf Coast. The goals of the study are twofold. The first goal of the study is to gain a better understanding of the meteorological phenomena which drives the development and movement of ozone along the Gulf Coast and the associated coastal waters. The second goal of the study is to provide each State with information they will need to design State Implementation Plans to address potential 8-hour ozone nonattainment areas along the Gulf Coast. GCOS is scheduled to conclude its work in the fall of 2000.

There are significant regional and national control measures being undertaken which should significantly reduce emissions and ozone levels:

- NOx SIP Call reductions in the northern two-thirds of Alabama and Georgia
- Reductions from Tier II vehicle standards and nationwide low-sulfur gasoline
- Continuing implementation of Maximum Achievable Control Technology, Acid Rain rules, and urban air toxic controls
- Measures which may be undertaken as a result of the GCOS Study

Specific to Baldwin County, it is unlikely that any further local control measures will be needed to enable the coastal area to meet the 8-hour ozone standard since the county's emissions are almost totally from area and mobile sources. In any case, ADEM has the authority to impose any needed reductions in the county irrespective of its attainment status.

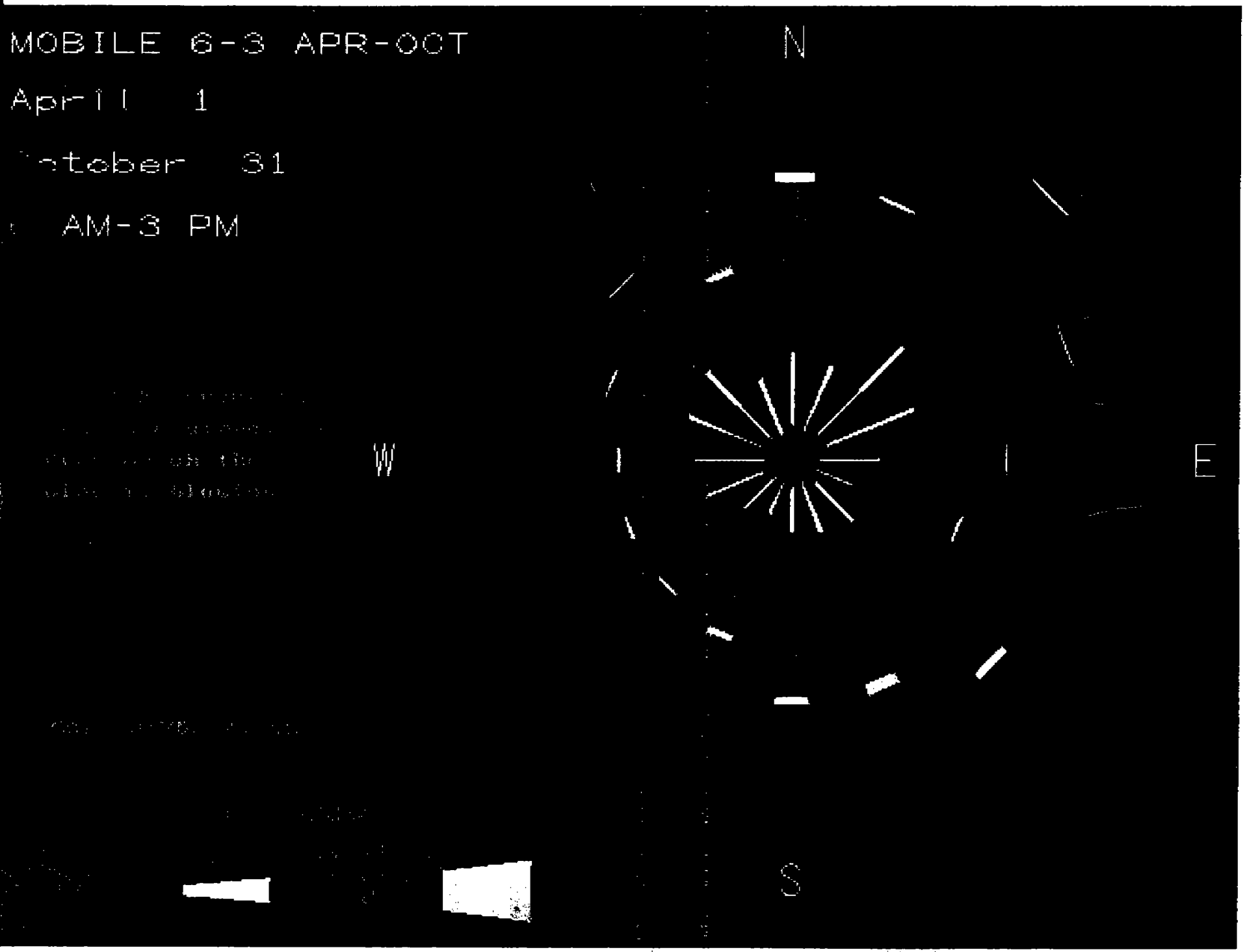


Figure D-1