ONIS "TREY" GLENN, III
DIRECTOR

BOB RILEY
GOVERNOR

ADEM

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Montgomery, Alabama 36130-1463
(334) 271-7700
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March 12, 2009

Mr. A. Stanley Meiburg
Acting Regional Administrator
U.S. EPA, Region 4
Atlanta Federal Center
61 Forsyth Street, S.W.
Atlanta, Georgia 30303-8960

Dear Mr. Meiburg:

The Alabama Department of Environmental Management (ADEM) has been asked by Governor Bob Riley to respond to your letter of December 19, 2008, which requests the State's input regarding the extent of nonattainment areas for the 2008 8-hour ozone National Ambient Air Quality Standard (NAAQS). The underlying principle in developing our input into the designation process is air quality modeling performed by the Association for Southeastern Integrated Planning (ASIP), which indicates that the decrease in ozone concentrations that is predicted to result from several national, regional, and local emissions reduction initiatives will be sufficient to bring all areas of Alabama into attainment of the new 8-hour ozone standard beginning in the year 2012. Since additional local controls are unlikely to be required in order for these areas to meet this new NAAQS, it seems unnecessary to designate any counties as nonattainment areas beyond those with monitored data exceeding the standard. Further, ADEM has legal authority to impose reduction measures as necessary in any county near a nonattainment area, regardless of its attainment status. Thus, the only counties that should be designated as nonattainment are those with monitored data exceeding the NAAQS.

Enclosed please find a technical support document which provides data from our ozone monitoring network and support for our input as to the extent of ozone nonattainment areas. The enclosed appendices provide detailed information on the factors which EPA suggested be addressed in support of any nonattainment area recommended to be smaller than a Combined Statistical Area. The information provided is based on monitoring data from 2006 to 2008, inclusive.

Birmingham Branch
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (Fax)

Decatur Branch
2715 Sandlin Road, S. W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (Fax)

Mobile Branch
2204 Perimeter Road
Mobile, AL 36615-1131
(251) 450-3400
(251) 479-2593 (Fax)

Mobile - Coastal
4171 Commanders Drive
Mobile, AL 36615-1421
(251) 432-6533
(251) 432-6598 (Fax)

As documented in the attachment, the following counties have monitored data exceeding the NAAQS: Jefferson, Shelby, Madison, Mobile and Baldwin. In response to your presumptions regarding the extent of nonattainment areas, we recommend that the following Alabama counties not be included: Limestone, Lawrence, Morgan, St. Clair, Blount, Cullman, Walker, Bibb, Chilton, Lee, Macon and Russell.

Should you require additional information, please contact Mr. Ron Gore of the Air Division at (334) 271-7868.

Sincerely,

Onis "Trey" Glenn, III
Director

OTG/adh

cc: Carol Kemker, EPA

Recommendations
for
Designation of Non-Attainment Areas
for the
8-Hour Ozone NAAQS

Prepared by:

Alabama Department of Environmental Management

March 2009

ATTACHMENT 1

§81.301 Alabama--Ozone (8-Hour Standard)

Designated Area	Designation Type	Classification Type
Birmingham Area		
Jefferson County………..	Nonattainment	
Shelby County………….	Nonattainment	
Huntsville Area		
Madison County………..	Nonattainment	
Mobile Area		
Mobile County…………	Nonattainment	
Baldwin County……….	Nonattainment	
Rest of State		
Autauga County	Unclassifiable/Attainment	
Barbour County		
Bibb County		
Blount County		
Bullock County		
Butler County		
Calhoun County		
Chambers County		
Cherokee County		
Chilton County		
Choctaw County		
Clarke County		
Clay 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	Unclassifiable/Attainment
Lawrence County	
Lee County	
Limestone County	
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	

Alabama Ozone Monitor Locations

OZONE DATA (2006 to 2008) FOR THE STATE OF ALABAMA

County	AIRS ID	Site	2006 4th Max (ppb)	2007 4th Max (ppb)	2008 4th Max (ppb)	3 Year Average (ppb)
Sumter	01-119-0002	Gaston	67	69	60	65
Shelby	01-117-0004	Helena	87	94	82	**87**
Montgomery	01-101-1002	Montgomery	74	80	69	74
Mobile	01-097-2005	Bay Road	80	81	70	**77**
Mobile	01-097-0003	Chickasaw	85	77	76	**79**
Baldwin	01-003-0010	Fairhope	81	78	72	**77**
Elmore	01-051-0001	Wetumpka	72	74	68	71
Jefferson	01-073-1003	Fairfield	84	88	74	**82**
Jefferson	01-073-2006	Hoover	89	93	79	**87**
Jefferson	01-073-1005	McAdory	84	91	75	**83**
Jefferson	01-073-5002	Pinson	78	81	79	**79**
Jefferson	01-073-6002	Tarrant	88	95	76	**86**
Jefferson	01-073-5003	Corner	81	90	77	**82**
Jefferson	01-073-1009	Providence	81	87	74	**80**
Jefferson	01-073-0023	North Bham	86	93	78	**85**
Jefferson	01-073-1010	Leeds	75	81	72	**76**
Madison	01-089-0014	Huntsville	79	82	73	**78**
Morgan	01-103-0011	Decatur	78	81	68	75
Houston	01-069-0004	Dothan	74	71	66	70
Colbert	01-033-1002	Muscle Shoals	76	76	66	72
Russell	01-113-0002	Phenix City	75	79	69	74
Tuscaloosa	01-125-0010	Tuscaloosa	77	80	68	75
Etowah	05-055-0011	Southside	74	75	64	71

Current 8-hour NAAQS for ozone is 75ppb

Estimated Impact of "On the Way Controls" On 8-Hour Ozone Design Values in Alabama

ASIP (Association of Southeastern Integrated Planning) has performed CMAQ Modeling to estimate the impact of various "on the way controls" on future 8-hour ozone levels in 10 Southeastern states including Alabama. The controls include CAIR (Clean Air Interstate Rule) which caps emissions of SO2 and NOx on EGU's by 2015, the NOx SIP Call, North Carolina CSA (capped SO2 and NOx emissions from two EGU's), Consent Agreements on several EGU's, 1-hour Ozone SIPS for Atlanta / Birmingham / N. Kentucky, 2007 emission standards for heavy duty diesel, Tier 2 tailpipe rule for onroad vehicles, large spark ignition and recreational vehicle rule, nonroad diesel rule and VOC 2-, 4-, 7-, 10 year MACT standards.

The results show that when the predicted changes in ozone concentrations resulting from these controls are applied to current design values, resulting future year design values in Alabama are below the 8-hour standard. Thus, significant emissions reductions resulting from national and regional initiatives will likely enable all areas of Alabama to attain the 8-hour ozone standard without additional local controls. Since additional local controls are unlikely to be required in order for local areas to meet the NAAQS, it seems unnecessary to designate any counties as non-attainment areas except those with monitored data exceeding the standard. These results are discussed in more detail below.

Model Assumptions

- CMAQ (version 4.5.1)
- Episodes modeled- contiguous year 2012
- 2012 Base Modeling
  - Grid Resolution (MM5)
  - 36 kilometer grid/with 12 kilometer grid
  - 19 vertical layers up to 15 kilometers
- CAIR
- NOx SIP Call
- North Carolina CSA
- Consent Agreements (APCO Plant Miller)
- One-hour Ozone SIPs (Atlanta / Birmingham / N. Kentucky)
- Heavy Duty Diesel Engine Standard (2007) for onroad trucks and buses
- Tier 2 Tailpipe (Onroad vehicles)
- Large Spark Ignition and Recreational Vehicle Rule
- Nonroad Diesel Rule
- VOC 2-, 4-, 7- and 10-year MACT Standards

Projected 2012 design values were calculated using relative reduction factors obtained from the ASIP modeling and the current design values*. The resulting 2012 design values for the entire state of Alabama are below the new 8-hour ozone standard (75 ppb) and demonstrate no need for further local controls. The results of this analysis are presented in the table below, which shows new design values for the base year 2012 calculated using the current design values* and the relative reduction factor (RRF) obtained by modeling the base year with the controls listed previously.

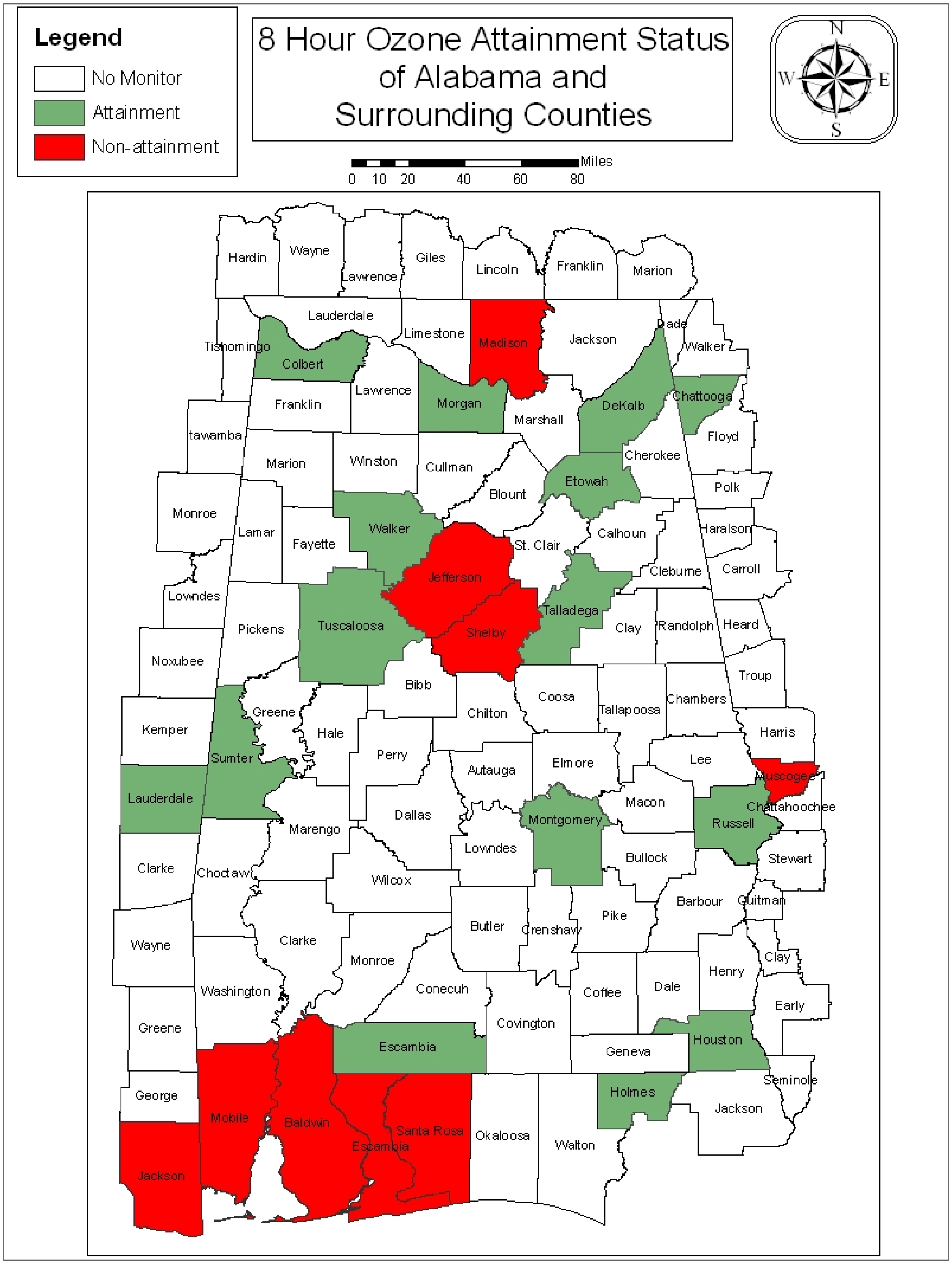
County	Monitor	Current Design Value (ppb)*	2012 Base RRF	New Design Value 2012(ppb)
Baldwin	Fairhope	78	0.8857	69
Elmore	Wetumpka	76.7	0.8249	63.2
Etowah	Southside	75	0.8474	63.5
Jefferson	N. Birmingham	77	0.8389	64.5
Jefferson	Fairfield	79	0.8306	65.6
Jefferson	McAdory	80	0.8247	65.9
Jefferson	Providence	81.3	0.7865	63.9
Jefferson	Leeds	72.5	0.8408	60.9
Jefferson	Hoover	83.7	0.8434	70.5
Jefferson	Pinson	78.7	0.8397	66
Jefferson	Corner	79.7	0.7773	61.9
Jefferson	Tarrant	78.7	0.8514	67
Lawrence	Sipsey	76.3	0.815	62.1
Madison	Huntsville	79.7	0.8145	64.9
Mobile	Chickasaw	77.7	0.8727	67.8
Mobile	Bay Road	79	0.8772	69.2
Montgomery	Montgomery	75	0.8318	62.3
Morgan	Decatur	82	0.8149	66.8
Shelby	Helena	88	0.8338	73.3
Sumter	Sumter	71.7	0.8139	58.3
Tuscaloosa	Tuscaloosa	75.5	0.8061	60.8
Muscogee, GA	Columbus Airport	75	0.8542	64
Muscogee, GA	Columbus Crime Lab	75	0.8575	64.3

*The current year 8-hour ozone Design Value (DVC) is based on the average of three years of Design Values from 2000-2002, 2001-2003 and 2002-2004.

8-Hour Ozone Concentrations in Areas Adjoining Alabama

As indicated in the table below, there are several counties bordering Alabama monitoring nonattainment for the 8-hour ozone standard. The map on the following page details the location of these counties in relation to the State. According to EPA's guidance (Dec. 4, 2008), presumptive boundaries for NAA designations are based on Combined Statistical Area boundaries. The violating monitor locations provided below are not included in any CSA in Alabama, with the exception of Muscogee Co. GA, to which discussion has been provided in Appendix D.

County	Site	3 Year Average(ppb)
Muscogee Co, GA	Columbus Airport	78
Muscogee Co, GA	Columbus Crime Lab	72
Escambia Co, FL	Ellyson	79
Escambia Co, FL	NAS	79
Escambia Co, FL	Warrington	77
Santa Rosa Co, FL	Holly Navarre	81
Jackson Co, MS	Pascagoula	78
Lauderdale Co, MS	Meridian	71
Chattooga Co, GA	Summerville	73
Holmes Co, FL	Bonifay	71


Legend
No Monitor
Attainment
Non-attainment
8 Hour Ozone Attainment Status of Alabama and Surrounding Counties
N
W
E
S
Miles
0 10 20 40 60 80
Hardin
Wayne
Lawrence
Giles
Lincoln
Franklin
Marion
Lauderdale
Limestone
Madison
Jackson
Dade
Walker
Tishomingo
Colbert
Lawrence
Franklin
Morgan
Marshall
DeKalb
Chattooga
Itawamba
Floyd
Cherokee
Marion
Winston
Cullman
Blount
Etowah
Polk
Monroe
Lamar
Fayette
Walker
St. Clair
Calhoun
Haralson
Jefferson
Cleburne
Carroll
Lowndes
Pickens
Tuscaloosa
Talladega
Clay
Randolph
Heard
Shelby
Noxubee
Bibb
Troup
Coosa
Tallapoosa
Chambers
Greene
Chilton
Kemper
Hale
Harris
Perry
Sumter
Autauga
Elmore
Lee
Muscogee
Lauderdale
Macon
Chattahoochee
Dallas
Montgomery
Russell
Marengo
Lowndes
Bullock
Stewart
Clarke
Choctaw
Wilcox
Barbour
Quitman
Pike
Butler
Crenshaw
Wayne
Clarke
Clay
Monroe
Henry
Conecuh
Washington
Coffee
Dale
Early
Covington
Greene
Houston
Escambia
Geneva
Seminole
George
Holmes
Jackson
Mobile
Baldwin
Santa Rosa
Escambia
Okaloosa
Walton
Jackson

Appendix A

ADEM recommends that the Birmingham Nonattainment Area (NAA) for the 8-hour NAAQS for ozone exclude the following counties in the Birmingham CSA: Bibb, Blount, Walker, Cullman, Chilton, and St. Clair Counties. EPA guidance (dated December 4, 2008) states that if a State wishes to propose a nonattainment area boundary smaller than the CSA 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 NAA is provided in this Appendix.

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

- Total annual emissions of NO_x 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

A. Emissions in the Birmingham CSA

The counties in the Birmingham CSA are depicted in Figure 1. To evaluate emissions for these counties, ADEM obtained the 2005 annual NO_x and VOC emission estimates from the National Emissions Inventory (NEI). Table 1 lists these emissions which include all anthropogenic sources (i.e. point, area, mobile, and nonroad mobile) for the counties in the Birmingham CSA.

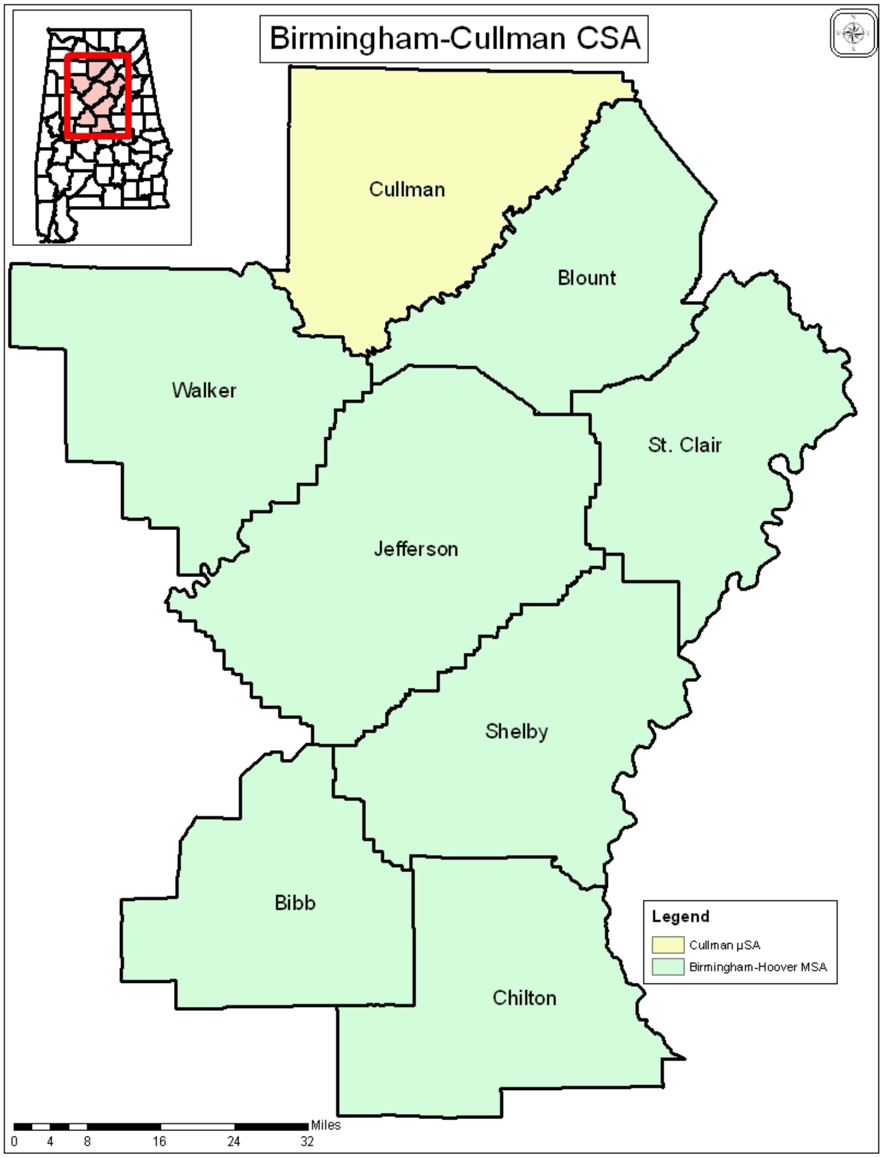


Figure 1 Birmingham CSA

Table 1 Annual Emissions for the Birmingham CSA

County	2005 Annual VOC Emissions (Tons)	Ranking for VOC	2005 Annual NO_x Emissions (Tons)	Ranking for NO_x
Bibb	1,579	8	941	8
Blount	3,364	7	2,500	7
Chilton	3,586	6	2,594	6
Cullman	7,775	3	3,508	5
St.Clair	5,657	4	6,375	4
Walker*	5,023	5	16,558	3
Shelby*[M]	10,492	2	38,692	2
Jefferson*[M]	44,015	1	56,520	1

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

As shown in Table 1, the total emissions in Bibb, Blount, Chilton, Cullman, Walker and St.Clair Counties are significantly less than the emissions in Jefferson and Shelby Counties. Given the total amount of emissions in these counties, it is unlikely that these emissions contribute significantly to the air quality outside their boundaries. Bibb, Blount, Chilton, Cullman, Walker and St.Clair Counties account for only 33% of the total VOC emissions and only 25% of the NO_x emissions in the CSA.

The impact of Walker County NOx emissions has been lessened by controls placed on Gorgas Steam Plant beginning in May 2003. These controls, which include low NOx burners installed on Units 6 and 7 and a SCR installed on the largest unit, Unit 10, were mandated by the 1-hour Ozone Attainment SIP for the Birmingham NAA and the Clean Air Interstate Rule (CAIR). Plant Gorgas also has permitted ozone season NOx limits based on a 30-day rolling average NOx emission rate averaged across all units.

The only ozone monitors in the Birmingham CSA are located in Jefferson and Shelby Counties. Because of the lack of monitored air quality data for Bibb, Blount, Chilton, Cullman, Walker, and St. Clair, no conclusion can be made as to the air quality in these individual counties. Several other factors will be used in this Appendix to demonstrate that these counties do not significantly impact the violating monitors in Jefferson and Shelby Counties.

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 2000 to 2007 population estimates for the Birmingham CSA from the Alabama State Data Center[1]. Information on business data (i.e. retail employment and manufacturing employment) was obtained from the U.S. 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 CSA. Bibb, Blount, Chilton, and, Walker Counties have much smaller population densities than either Jefferson or Shelby County. While Cullman and St. Clair Counties contribute values slightly less than Shelby County, they both are largely insignificant in comparison to Jefferson County. <u>This population density factor fortifies the recommendation to exclude Bibb, Blount, Chilton, Cullman, St.Clair and Walker from the Birmingham Nonattainment Area</u>.

Population trends/data are presented as Figures 3 and 4. Figure 3 demonstrates that Bibb, Blount, Chilton, Cullman, Walker and St. Clair Counties each have a population that has remained less than 45% of Shelby County's population and less than 13% of Jefferson County's population over the years. In addition, Figure 4 demonstrates that the combined population of Bibb, Blount, Cullman, Chilton, Walker and St. Clair Counties only represents approximately 29% of the total population for the entire Birmingham CSA. <u>These population factors fortify the recommendation to exclude Bibb, Blount, Cullman, Chilton, Walker, and St. Clair Counties from the Birmingham Nonattainment Area</u>.

The amount and percentage of urban population in the Birmingham CSA is presented in Table 2. This data clearly shows that Bibb, Blount, Chilton, Cullman, Walker and St. Clair Counties have an insignificant urban population in comparison to that of Jefferson and Shelby. In addition, the combined urban population of Bibb, Blount, Cullman, Chilton, Walker and St. Clair Counties only represents approximately 40% of the total urban population for the entire Birmingham CSA. <u>This factor fortifies the recommendation to exclude Bibb, Blount, Chilton, Cullman, St. Clair, and Walker Counties from the Birmingham Nonattainment Area</u>.

Table 2 Urban Population for the Birmingham CSA

	2007	% Urban	2007 Urban Area	% of CSA Total 2007 Urban Population
Bibb Co	21,535	19%	4,092	0.5%
Blount Co	56,614	9%	5,095	0.7%
Chilton Co	42,299	12%	5,076	0.7%
Cullman Co	80,554	24%	19,333	2.5%
Jefferson Co	658,779	89%	586,313	76.9%
St. Clair Co	78,054	13%	10,147	1.3%
Shelby Co	182,113	64%	116,552	15.3%
Walker Co	68,816	23%	15,828	2.1%
CSA Total	1,188,764	64%	762,436	100.0%

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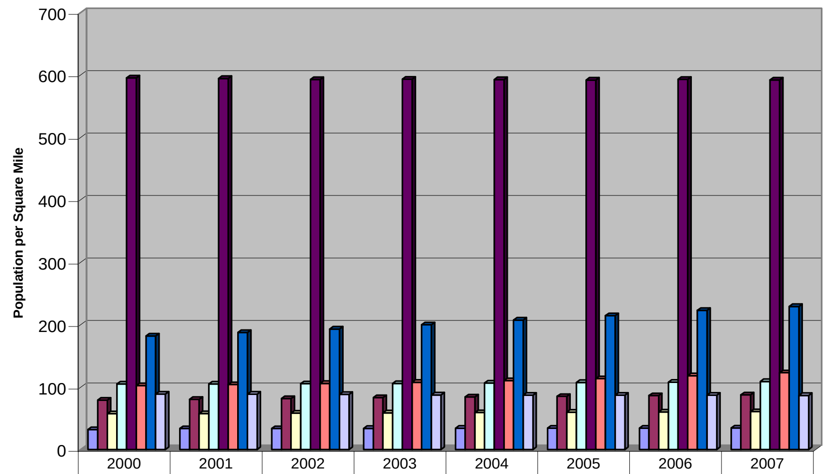
[1] The Alabama State Data Center (ASDC) is a network of 27 public agencies working together through a cooperative agreement with the U.S. Bureau of the Census to facilitate use and delivery of Census and other data to the public. Internet site: http://cber.cba.ua.edu/est_prj.html

[2] Based on 2000 U.S. Census

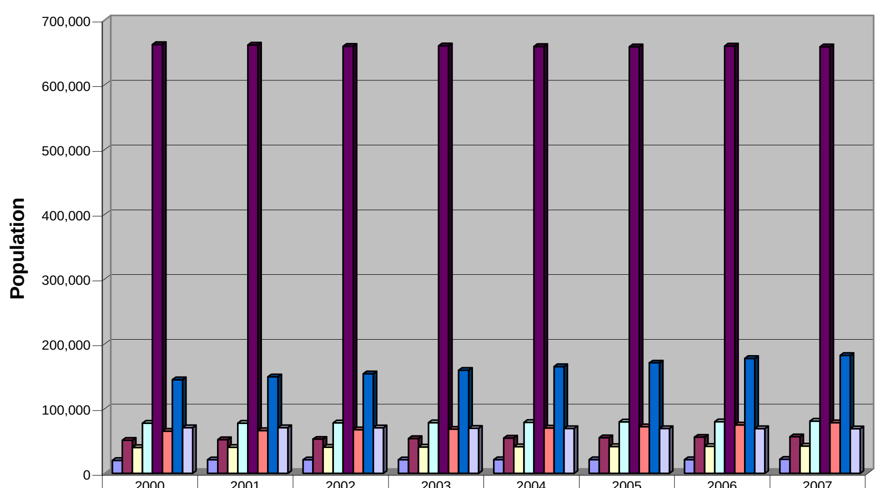
Figure 2 Population Density for the Birmingham CSA

Birmingham CSA Population Density



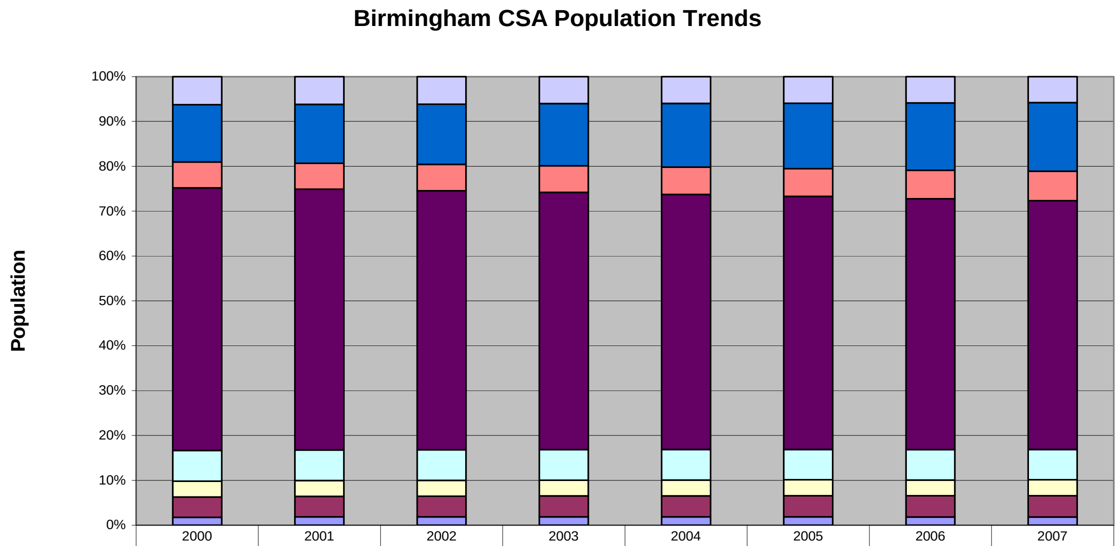
	2000	2001	2002	2003	2004	2005	2006	2007
Bibb Co	32	34	34	34	34	34	34	35
Blount Co	79	81	82	83	84	85	86	88
Chilton Co	57	58	58	59	59	60	60	61
Cullman Co	105	105	105	106	107	107	108	109
Jefferson Co	595	594	593	593	593	592	593	592
St. Clair Co	103	104	106	108	110	114	118	123
Shelby Co	182	188	193	200	207	214	223	229
Walker Co	89	89	88	88	87	87	87	87

Birmingham CSA Population Trends



	2000	2001	2002	2003	2004	2005	2006	2007
Bibb Co	19,939	20,947	20,994	21,051	21,227	21,397	21,341	21,535
Blount Co	51,184	51,996	52,767	53,705	54,441	54,983	55,811	56,614
Chilton Co	39,777	40,029	40,463	40,778	41,161	41,482	41,750	42,299
Cullman Co	77,581	77,672	77,835	78,126	78,718	79,368	79,790	80,554
Jefferson Co	662,201	661,399	659,535	660,074	659,340	658,638	659,777	658,779
St. Clair Co	65,079	66,015	67,100	68,303	69,984	72,025	74,954	78,054
Shelby Co	144,540	149,073	153,520	158,981	164,828	170,490	177,305	182,113
Walker Co	70,685	70,594	70,132	69,561	69,216	69,203	69,133	68,816

Figure 3 Population Data for the Birmingham CSA



	2000	2001	2002	2003	2004	2005	2006	2007
Walker Co	70,685	70,594	70,132	69,561	69,216	69,203	69,133	68,816
Shelby Co	144,540	149,073	153,520	158,981	164,828	170,490	177,305	182,113
St. Clair Co	65,079	66,015	67,100	68,303	69,984	72,025	74,954	78,054
Jefferson Co	662,201	661,399	659,535	660,074	659,340	658,638	659,777	658,779
Cullman Co	77,581	77,672	77,835	78,126	78,718	79,368	79,790	80,554
Chilton Co	39,777	40,029	40,463	40,778	41,161	41,482	41,750	42,299
Blount Co	51,184	51,996	52,767	53,705	54,441	54,983	55,811	56,614
Bibb Co	19,939	20,947	20,994	21,051	21,227	21,397	21,341	21,535

Figure 4 Population Distribution for the Birmingham CSA

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

All counties in the Birmingham CSA experienced slight growth in total employment, with the exception of Blount County (-5%). 74% of manufacturing employees are located in Jefferson and Shelby Counties while the remaining counties in the Birmingham CSA combine to contribute only 26%. This trend is also mirrored in retail employment for the Birmingham CSA, with Jefferson and Shelby accounting for 80% and Bibb, Blount, Chilton, Cullman, St. Clair and Walker Counties supplying just 20%. These facts further fortify the recommendation to exclude Bibb, Blount, Chilton, Cullman, Walker and St. Clair Counties from the Birmingham Nonattainment Area.

Table 3 Total Employees

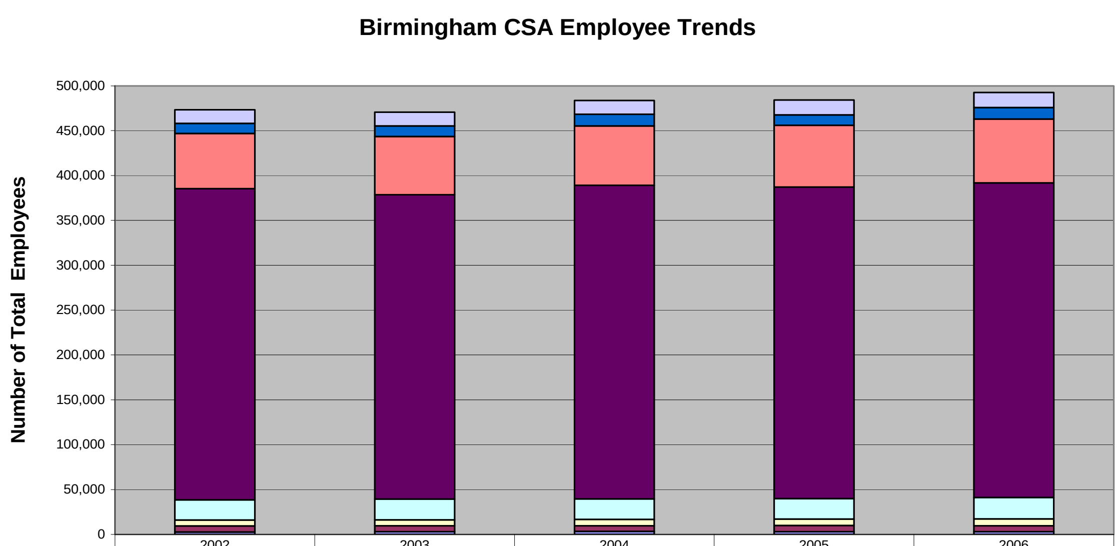
	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Bibb	2,586	2,999	3,202	3,142	3,132	21%	1%
Blount	6,973	6,640	6,441	6,741	6,629	-5%	1%
Chilton	6,495	6,741	7,104	7,216	7,588	17%	2%
Cullman	22,437	22,952	22,764	22,859	23,753	6%	5%
Jefferson	346,939	339,294	349,712	347,274	350,744	1%	71%
Shelby	61,665	64,871	66,058	68,712	71,240	16%	14%
St.Clair	11,197	11,771	12,988	11,799	12,765	14%	3%
Walker	15,070	15,515	15,557	16,469	16,641	10%	3%
MSA Total	473,362	470,783	483,826	484,212	492,492	4%	100%

Table 4 Manufacturing Employees

	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Bibb	302	429	353	383	424	40%	1%
Blount	1,655	1,334	1,148	1,214	1,216	-27%	3%
Chilton	1,197	1,385	1,493	1,585	1,726	44%	4%
Cullman	4,981	4,779	4,583	4,659	5,023	1%	10%
Jefferson	30,650	29,659	28,582	29,369	29,447	-4%	61%
Shelby	5,577	5,728	5,758	5,937	6,223	12%	13%
St.Clair	2,625	2,594	2,816	2,419	2,312	-12%	5%
Walker	1,454	1,646	1,539	1,603	1,640	13%	3%
CSA Total	48,441	47,554	46,272	47,169	48,011	-1%	100%

Table 5 Retail Employees

	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Bibb	518	552	541	548	569	10%	1%
Blount	1,264	1,221	1,233	1,248	1,273	1%	2%
Chilton	1,543	1,405	1,483	1,469	1,557	1%	2%
Cullman	3,781	3,678	3,605	3,631	3,706	-2%	5%
Jefferson	42,374	42,346	44,302	43,066	43,609	3%	65%
Shelby	7,787	8,111	9,648	9,437	10,365	33%	15%
St.Clair	1,464	1,618	1,930	1,774	2,526	73%	4%
Walker	3,705	3,729	3,702	3,719	4,002	8%	6%
CSA Total	62,436	62,660	66,444	64,892	67,607	8%	100%



	2002	2003	2004	2005	2006
Walker	15,070	15,515	15,557	16,469	16,641
St.Clair	11,197	11,771	12,988	11,799	12,765
Shelby	61,665	64,871	66,058	68,712	71,240
Jefferson	346,939	339,294	349,712	347,274	350,744
Cullman	22,437	22,952	22,764	22,859	23,753
Chilton	6,495	6,741	7,104	7,216	7,588
Blount	6,973	6,640	6,441	6,741	6,629
Bibb	2,586	2,999	3,202	3,142	3,132

Figure 5 Total Employees for the Birmingham CSA

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

Table 6 demonstrates that all of the ozone monitors in Jefferson and Shelby Counties exceed the 8-hour NAAQS for ozone. Figure 6 identifies the ozone monitoring sites which provided the 2006, 2007, and 2008 data for the Birmingham CSA. During this time period, all ozone monitoring sites were located in Jefferson and Shelby Counties. The recommendation to exclude Bibb, Blount, Chilton, Cullman, Walker, 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 CSA Ozone Monitoring Data

County	AIRS ID	Site	2006 4thMax (ppm)	2007 4thMax (ppm)	2008 4thMax (ppm)	3 Year Average (ppm)
Jefferson	01-073-1003	Fairfield	0.084	0.088	0.074	**0.082**
Jefferson	01-073-2006	Hoover	0.089	0.093	0.079	**0.087**
Jefferson	01-073-1005	McAdory	0.084	0.091	0.075	**0.083**
Jefferson	01-073-5002	Pinson	0.078	0.081	0.079	**0.079**
Jefferson	01-073-6002	Tarrant	0.088	0.095	0.076	**0.086**
Jefferson	01-073-5003	Corner	0.081	0.090	0.077	**0.082**
Jefferson	01-073-1009	Providence	0.081	0.087	0.074	**0.080**
Jefferson	01-073-0023	North Bham	0.086	0.093	0.074	**0.084**
Jefferson	01-073-1010	Leeds	0.075	0.081	0.072	**0.076**
Shelby	01-117-0004	Helena	0.087	0.094	0.082	**0.087**

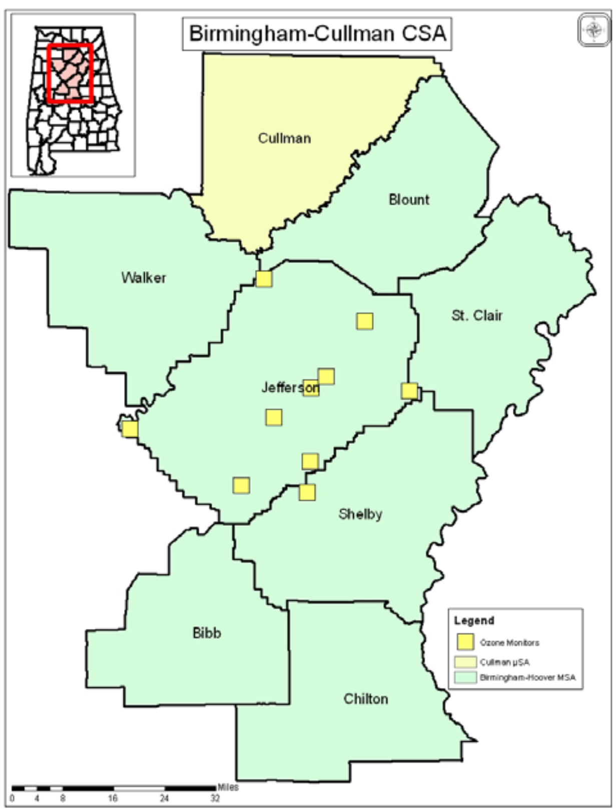


Figure 6 Ozone Monitoring Sites in the Birmingham CSA

D. Location of Emission Sources

Figure 7 depicts the location of large point sources in the Birmingham CSA and surrounding counties. The base map was created using Geographical Information Systems (GIS) with coordinates supplied by the facilities. Tables 7 and 9 present the distribution of NO_x emissions (in tons per year) among point, area, non-road and mobile sources in the Birmingham CSA. Tables 8 and 10 present the same information for VOC emissions. Figures 9 and 10 illustrate this data. Figure 8 presents the emission densities for the counties in the Birmingham CSA.

Bibb, Blount, Chilton, Cullman, Walker and St. Clair Counties account for only 25% of the total annual NO_x emissions and 33% of the total annual VOC emissions in the Birmingham CSA. Each county also has a smaller emissions density than Jefferson and Shelby Counties. The lack of large point sources of NO_x or VOC emissions located in Bibb, Blount, Chilton, Cullman, and St. Clair Counties, the minimal area and mobile source emissions, and the smaller emissions densities fortify the recommendation to exclude Bibb, Blount, Chilton, Cullman, Walker and St. Clair Counties from the Birmingham NAA.

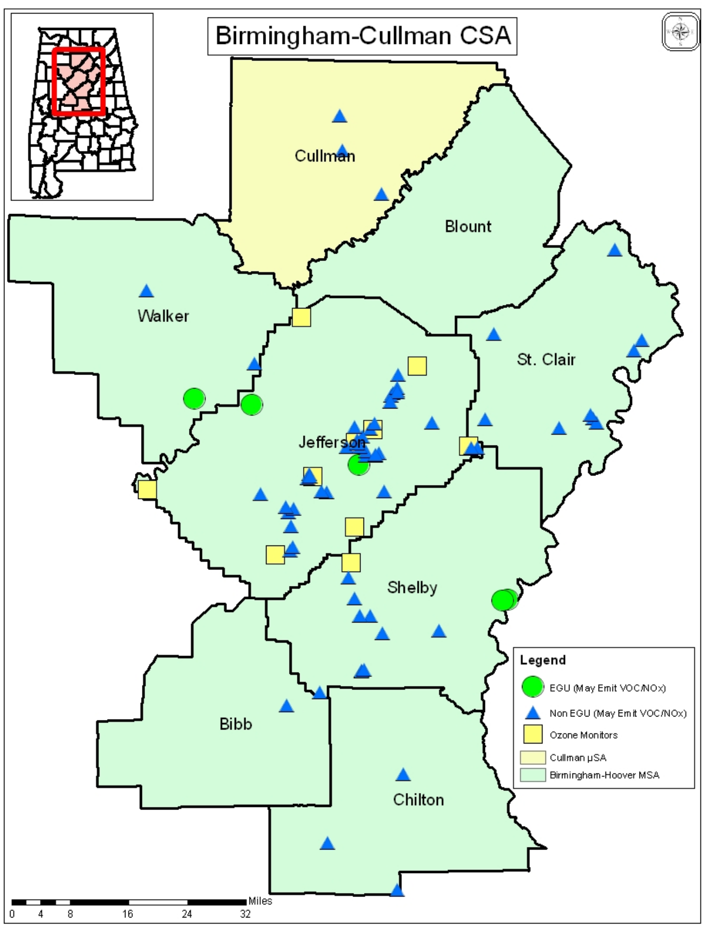


Figure 7 Location of Large Points Sources in the Birmingham CSA

Table 7 NOx Annual Emissions (Tons)

FIPs	County	Point		Area		Mobile		Non-Road		Total Emissions	
01007	Bibb Co	26	0%	118	2%	551	2%	246	2%	941	1%
01021	Chilton Co	271	0%	291	5%	1,661	5%	371	2%	2,594	2%
01043	Cullman Co	216	0%	537	8%	2,142	7%	612	4%	3,508	3%
01115	St.Clair Co	1,590	2%	370	6%	2,741	9%	1,674	11%	6,375	5%
01117	Shelby Co	31,969	43%	725	11%	3,470	11%	2,527	16%	38,692	30%
01127	Walker Co	13,009	17%	558	9%	1,792	6%	1,199	8%	16,558	13%
01009	Blount Co	0	0%	476	7%	1,479	5%	545	3%	2,500	2%
01073	Jefferson Co	28,000	37%	3,348	52%	16,721	55%	8,451	54%	56,520	44%
CSA Total Emissions		**75,082**		**6,423**		**30,557**		**15,625**		**127,688**	

Table 8 VOC Annual Emissions (Tons)

FIPs	County	Point		Area		Mobile		Non-Road		Total Emissions	
01007	Bibb Co	70	1%	1,077	2%	304	1%	128	1%	1,579	2%
01021	Chilton Co	415	6%	2,024	5%	890	4%	257	3%	3,586	4%
01043	Cullman Co	489	7%	4,998	11%	1,221	6%	1,066	11%	7,775	10%
01115	St.Clair Co	275	4%	3,133	7%	1,493	7%	756	8%	5,657	7%
01117	Shelby Co	466	7%	5,050	11%	2,181	11%	2,795	28%	10,492	13%
01127	Walker Co	277	4%	3,083	7%	1,155	6%	507	5%	5,023	6%
01009	Blount Co	0	0%	2,332	5%	788	4%	243	2%	3,364	4%
01073	Jefferson Co	4,726	70%	22,711	51%	12,305	61%	4,272	43%	44,015	54%
CSA Total Emissions		**6,718**		**44,409**		**20,339**		**10,025**		**81,492**	

Figure 8 Emission Density for the Birmingham CSA

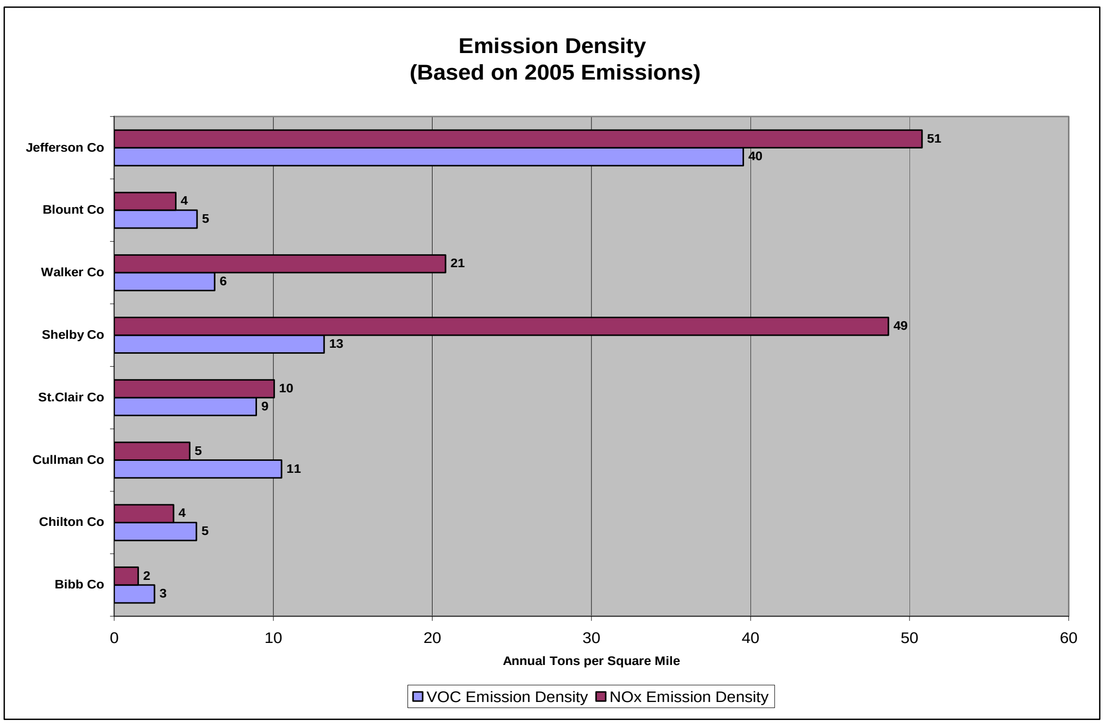


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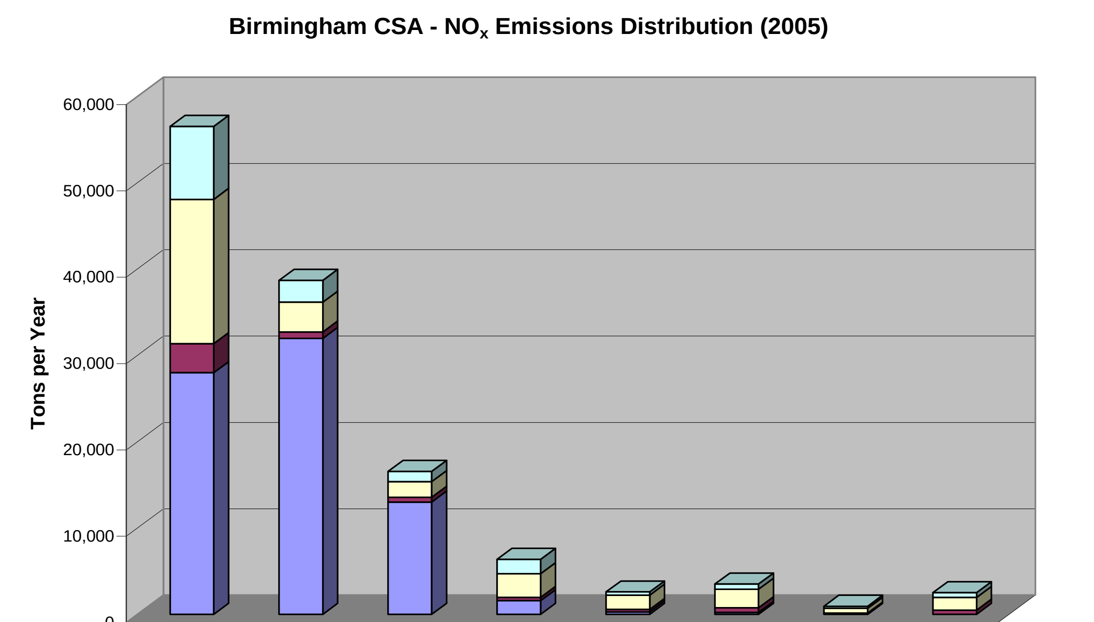
Table 9 Cumulative NOx Contributions

County Name	Factor	Annual 2005 Emissions (Tons)	% of CSA Total Emissions	Cumulative %
Shelby Co	Point Source NO_x Emissions	31,969	25.04%	25.04%
Jefferson Co	Point Source NO_x Emissions	28,000	21.93%	46.97%
Jefferson Co	Mobile Sources NO_x Emissions	16,721	13.10%	60.06%
Walker Co	Point Source NO_x Emissions	13,009	10.19%	70.25%
Jefferson Co	Non-Road NO_x Emissions	8,451	6.62%	76.87%
Shelby Co	Mobile Sources NO_x Emissions	3,470	2.72%	79.59%
Jefferson Co	Area Source NO_x Emissions	3,348	2.62%	82.21%
St. Clair Co	Mobile Sources NO_x Emissions	2,741	2.15%	84.36%
Shelby Co	Non-Road NO_x Emissions	2,527	1.98%	86.34%
Cullman Co	Mobile Sources NO_x Emissions	2,142	1.68%	88.01%
Walker Co	Mobile Sources NO_x Emissions	1,792	1.40%	89.42%
St. Clair Co	Non-Road NO_x Emissions	1,674	1.31%	90.73%
Chilton Co	Mobile Sources NO_x Emissions	1,661	1.30%	92.03%
St.Clair Co	Point Source NO_x Emissions	1,590	1.25%	93.27%
Blount Co	Mobile Sources NO_x Emissions	1,479	1.16%	94.43%
Walker Co	Non-Road NO_x Emissions	1,199	0.94%	95.37%
Shelby Co	Area Source NO_x Emissions	725	0.57%	95.94%
Cullman Co	Non-Road NO_x Emissions	612	0.48%	96.42%
Walker Co	Area Source NO_x Emissions	558	0.44%	96.86%
Bibb Co	Mobile Sources NO_x Emissions	551	0.43%	97.29%
Blount Co	Non-Road NO_x Emissions	545	0.43%	97.71%
Cullman Co	Area Source NO_x Emissions	537	0.42%	98.14%
Blount Co	Area Source NO_x Emissions	476	0.37%	98.51%
Chilton Co	Non-Road NO_x Emissions	371	0.29%	98.80%
St.Clair Co	Area Source NO_x Emissions	370	0.29%	99.09%
Chilton Co	Area Source NO_x Emissions	291	0.23%	99.32%
Chilton Co	Point Source NO_x Emissions	271	0.21%	99.53%
Bibb Co	Non-Road NO_x Emissions	246	0.19%	99.72%
Cullman Co	Point Source NO_x Emissions	216	0.17%	99.89%
Bibb Co	Area Source NO_x Emissions	118	0.09%	99.98%
Bibb Co	Point Source NO_x Emissions	26	0.02%	100.00%
Blount Co	Point Source NO_x Emissions	0	0.00%	100.00%
CSA Total Emissions		**127,689**		

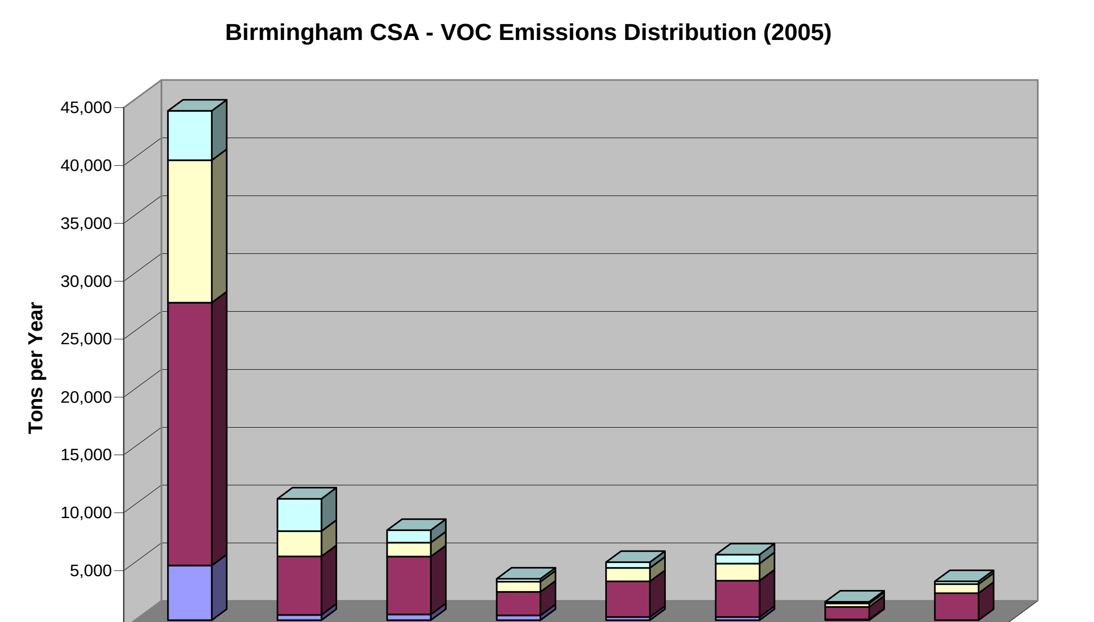
Table 10 Cumulative VOC Contributions

County Name	Factor	Annual 2005 Emissions (Tons)	% of CSA Total Emissions	Cumulative %
Jefferson Co	Area Source VOC Emissions	22,711	27.87%	27.87%
Jefferson Co	Mobile Source VOC Emissions	12,305	15.10%	42.97%
Shelby Co	Area Source VOC Emissions	5,050	6.20%	49.17%
Cullman Co	Area Source VOC Emissions	4,998	6.13%	55.30%
Jefferson Co	Point Source VOC Emissions	4,726	5.80%	61.10%
Jefferson Co	Non-Road VOC Emissions	4,272	5.24%	66.34%
St.Clair Co	Area Source VOC Emissions	3,133	3.84%	70.19%
Walker Co	Area Source VOC Emissions	3,083	3.78%	73.97%
Shelby Co	Non-Road VOC Emissions	2,795	3.43%	77.40%
Blount Co	Area Source VOC Emissions	2,332	2.86%	80.26%
Shelby Co	Mobile Source VOC Emissions	2,181	2.68%	82.94%
Chilton Co	Area Source VOC Emissions	2,024	2.48%	85.42%
St. Clair Co	Mobile Source VOC Emissions	1,493	1.83%	87.26%
Cullman Co	Mobile Source VOC Emissions	1,221	1.50%	88.75%
Walker Co	Mobile Source VOC Emissions	1,155	1.42%	90.17%
Bibb Co	Area Source VOC Emissions	1,077	1.32%	91.49%
Cullman Co	Non-Road VOC Emissions	1,066	1.31%	92.80%
Chilton Co	Mobile Source VOC Emissions	890	1.09%	93.89%
Blount Co	Mobile Source VOC Emissions	788	0.97%	94.86%
St. Clair Co	Non-Road VOC Emissions	756	0.93%	95.79%
Walker Co	Non-Road VOC Emissions	507	0.62%	96.41%
Cullman Co	Point Source VOC Emissions	489	0.60%	97.01%
Shelby Co	Point Source VOC Emissions	466	0.57%	97.58%
Chilton Co	Point Source VOC Emissions	415	0.51%	98.09%
Bibb Co	Mobile Source VOC Emissions	304	0.37%	98.47%
Walker Co	Point Source VOC Emissions	277	0.34%	98.81%
St.Clair Co	Point Source VOC Emissions	275	0.34%	99.14%
Chilton Co	Non-Road VOC Emissions	257	0.32%	99.46%
Blount Co	Non-Road VOC Emissions	243	0.30%	99.76%
Bibb Co	Non-Road VOC Emissions	128	0.16%	99.91%
Bibb Co	Point Source VOC Emissions	70	0.09%	100.00%
Blount Co	Point Source VOC Emissions	0	0.00%	100.00%
CSA Total Emissions		**81,491**		



	Jefferson Co	Shelby Co	Walker Co	St.Clair Co	Chilton Co	Cullman Co	Bibb Co	Blount Co
Non-Road	8,451	2,527	1,199	1,674	371	612	246	545
Mobile	16,721	3,470	1,792	2,741	1,661	2,142	551	1,479
Area	3,348	725	558	370	291	537	118	476
Point	28,000	31,969	13,009	1,590	271	216	26	0

Figure 9 NO_x Emissions for the Birmingham CSA



	Jefferson Co	Shelby Co	Cullman Co	Chilton Co	Walker Co	St.Clair Co	Bibb Co	Blount Co
Non-Road	4,272	2,795	1,066	257	507	756	128	243
Mobile	12,305	2,181	1,221	890	1,155	1,493	304	788
Area	22,711	5,050	4,998	2,024	3,083	3,133	1,077	2,332
Point	4,726	466	489	415	277	275	70	0

Figure 10 VOC Emissions for the Birmingham CSA

E. Traffic and Commuting Patterns

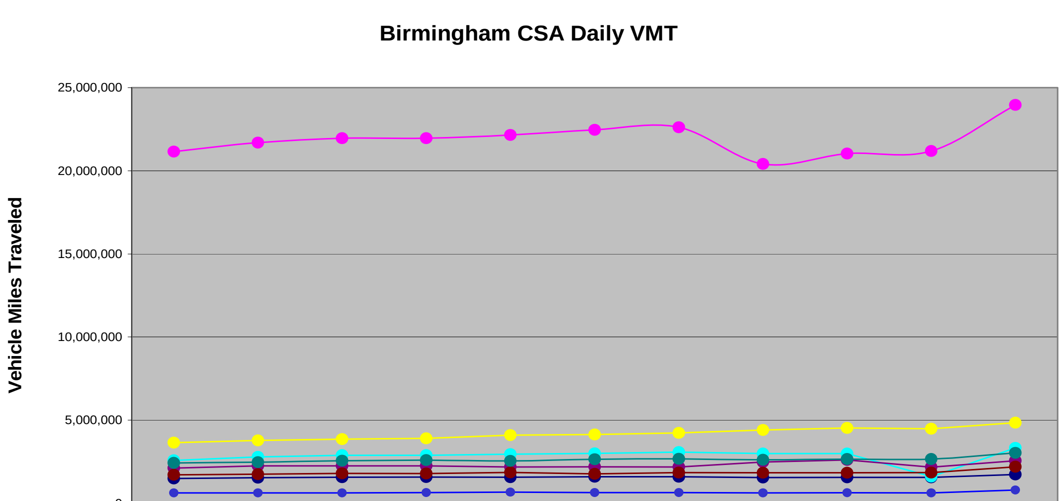
Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the Alabama Department of Transportation and the commuting patterns were obtained from the U.S. Census Bureau web site. The commuting patterns were based on the 2000 U.S. Census. Table 11 presents the 1997 and 2007 Daily VMT estimates for the counties in the Birmingham CSA, and Figure 11 demonstrates the trends from 1997 to 2007 for each county. Figure 12 presents the breakdown of 2007 DVMT into urban and rural. Figure 13 presents the commuting patterns among the counties in the Birmingham CSA.

Table 11 shows that the DVMT for Bibb, Blount, Chilton, Cullman, Walker and St. Clair Counties combined comprise approximately 32% of the Daily VMT for the Birmingham CSA. Figure 12 demonstrates that Bibb, Blount, and Chilton Counties have no urban DVMT and Cullman, St. Clair, and Walker Counties have only a minimal amount of urban DVMT. The low percentage of DVMT and the limited amount of urban DVMT fortify the recommendation to exclude Bibb, Blount, Cullman, Chilton, Walker and St. Clair Counties from the Birmingham Nonattainment Area.

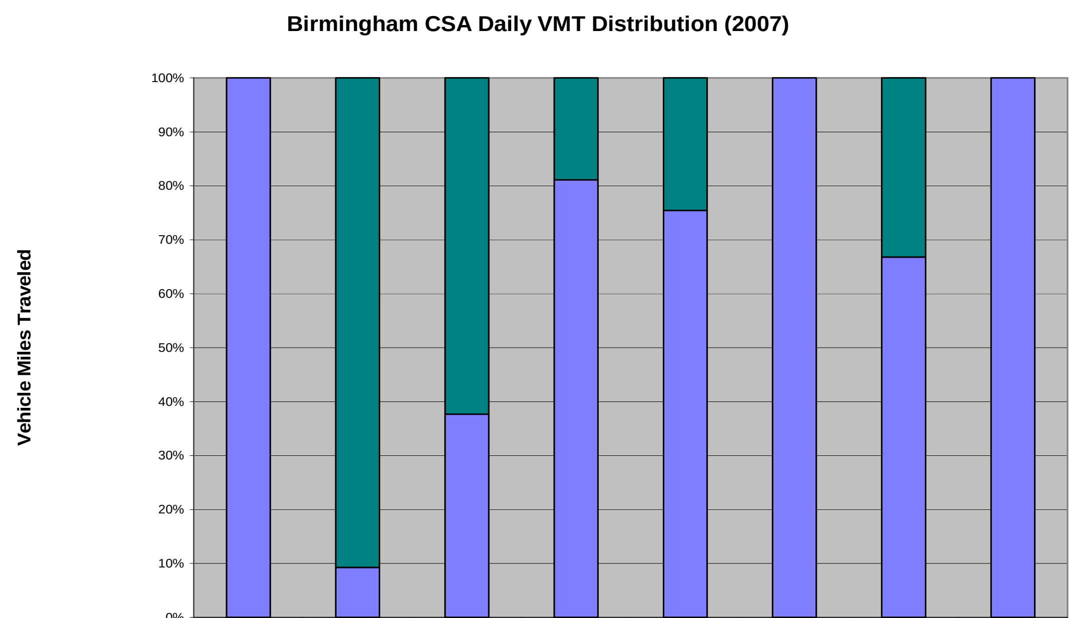
Table 11 Daily VMT for the Birmingham CSA

County	1997 Daily VMT	2007 Daily VMT	Daily VMT Change (1997-2007)	% Change	% of CSA 2007 Daily VMT
Blount	1,493,996	1,736,551	242,555	16%	4%
Jefferson	21,156,010	23,956,173	2,800,163	13%	56%
Shelby	3,651,901	4,843,841	1,191,940	33%	11%
St.Clair	2,585,118	3,326,548	741,430	29%	8%
Walker	2,119,281	2,557,783	438,502	21%	6%
Chilton	1,717,290	2,194,979	477,689	28%	5%
Cullman	2,429,603	3,029,867	600,264	25%	7%
Bibb	621,840	807,212	185,372	30%	2%
CSA Total	**35,775,039**	**42,452,954**	**6,677,915**	**19%**	**100%**

Figure 11 Daily VMT Trend for the Birmingham CSA

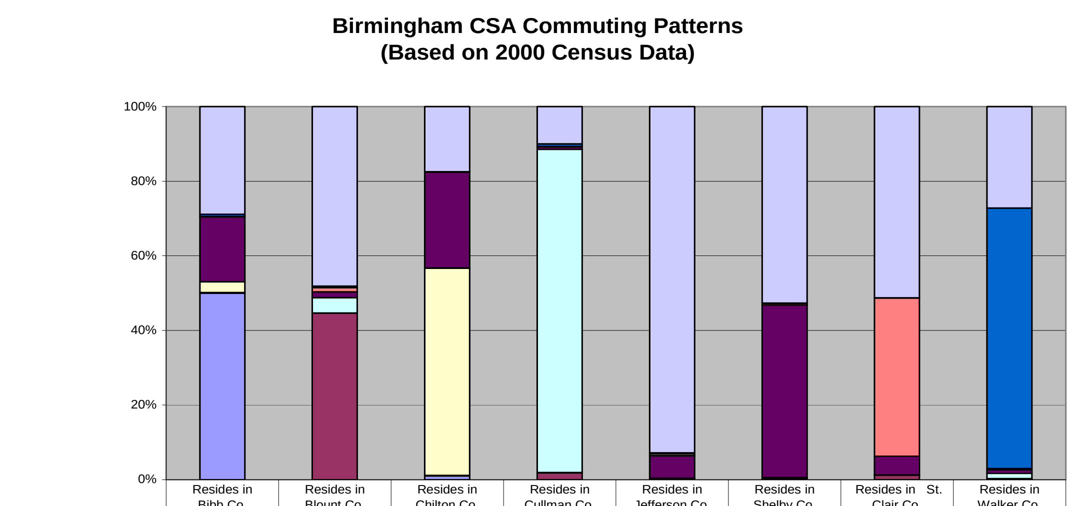


	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Blount	1,493,996	1,542,384	1,571,675	1,579,631	1,576,698	1,590,667	1,594,687	1,552,548	1,557,438	1,563,617	1,736,551
Jefferson	21,156,010	21,690,292	21,951,545	21,953,933	22,148,272	22,462,846	22,617,315	20,400,020	21,028,626	21,185,334	23,956,173
Shelby	3,651,901	3,779,696	3,855,247	3,906,718	4,098,753	4,135,243	4,235,533	4,412,909	4,524,384	4,489,334	4,843,841
St.Clair	2,585,118	2,791,197	2,894,061	2,886,654	2,962,332	2,996,080	3,078,935	2,990,525	2,994,832	1,604,914	3,326,548
Walker	2,119,281	2,250,681	2,251,511	2,249,780	2,193,250	2,201,665	2,187,722	2,481,539	2,605,589	2,179,480	2,557,783
Chilton	1,717,290	1,753,198	1,799,589	1,794,546	1,858,548	1,765,198	1,847,508	1,839,756	1,831,512	1,850,964	2,194,979
Cullman	2,429,603	2,478,120	2,565,204	2,590,801	2,549,781	2,644,284	2,674,220	2,612,987	2,659,238	2,665,832	3,029,867
Bibb	621,840	631,766	624,276	644,770	669,694	650,576	652,121	621,517	637,874	630,291	807,212



	Blount	Jefferson	Shelby	St.Clair	Walker	Chilton	Cullman	Bibb
Urban Daily VMT 2007	0	43,472,501	6,037,066	1,258,463	1,257,672	0	2,012,217	0
Rural Daily VMT 2007	1,736,551	4,439,845	3,650,615	5,394,633	3,857,893	2,194,979	4,047,517	807,212

Figure 12 Rural vs. Urban Daily VMT for the Birmingham CSA



	Resides in Bibb Co.	Resides in Blount Co.	Resides in Chilton Co.	Resides in Cullman Co.	Resides in Jefferson Co.	Resides in Shelby Co.	Resides in St. Clair Co.	Resides in Walker Co.
Works in Jefferson Co.	1,849	9,669	2,552	2,851	265,661	37,119	12,870	6,746
Works in Walker Co.	33	75	0	198	735	28	11	17,293
Works in St. Clair Co.	9	237	14	9	1,363	321	10,648	68
Works in Shelby Co.	1,116	312	3,747	219	17,351	32,573	1,256	245
Works in Cullman Co.	0	820	16	24,760	405	36	13	353
Works in Chilton Co.	183	16	8,115	23	73	249	13	20
Works in Blount Co.	13	8,966	15	522	550	27	290	47
Works in Bibb Co.	3,199	2	149	0	114	112	2	2

Figure 13 Commuting Patterns for the Birmingham CSA

Although Figure 13 indicates that there is significant commuting from Blount and St. Clair Counties into Jefferson County, the impact of this commuting is lessened by Tier II and 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 Counties from the Birmingham

Nonattainment Area. This factor fortifies the recommendation to exclude Bibb, Chilton, Cullman, and Walker Counties 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 Alabama Data Center. The estimates show significant growth expected for Bibb, Blount, Chilton, St. Clair and Shelby Counties, with the most significant growth expected in Shelby 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 presents no compelling reason to include Bibb, Blount, Chilton, Cullman, Walker and St. Clair Counties in the Birmingham Nonattainment Area.

Table 12 Population Projections for the Birmingham CSA

County Name	2000	2007	2015	2025	% Change 2000-2007	% Change 2007-2015	% Change 2015-2025
Bibb Co	20,826	21,535	26,910	30,749	3.4%	25.0%	14.3%
Blount Co	51,024	56,614	70,005	81,713	11.0%	23.7%	16.7%
Chilton Co	39,593	42,299	51,347	59,022	6.8%	21.4%	14.9%
Cullman Co	77,483	80,554	91,341	98,897	4.0%	13.4%	8.3%
Jefferson Co	662,047	658,779	682,336	701,651	-0.5%	3.6%	2.8%
St. Clair Co	64,742	78,054	87,614	102,121	20.6%	12.2%	16.6%
Shelby Co	143,293	182,113	216,308	265,083	27.1%	18.8%	22.5%
Walker Co	70,713	68,816	73,529	73,970	-2.7%	6.8%	0.6%

G. Meteorology

It is known that meteorology plays a major role in the formation and transport of ozone. In the Birmingham area, wind direction and speed are important indicators to where ozone forms and travels. In the 2006-2008 ozone seasons, ozone levels exceeded the new 8-hour standard (75 ppb) on sixty four days over the three-year period.

A wind analysis was accomplished to determine the extent to which wind directions could be correlated with high ozone. During the last three ozone seasons, the May – September winds in the Birmingham area had a predominant wind direction out of the north, and a marked minimum frequency of winds blowing from the northwest (see Figure A-1). In addition, there are two secondary wind directions, one from the east and one from the west. When one considers only the daytime (6AM-6PM) winds (Figure A-2), the general pattern changes very little. However, on those days when the 8-hour ozone standard was exceeded in the Birmingham area, the wind blew overwhelmingly from the north with the east to south directions showing up somewhat as well. This phenomenon is clearly seen in Figure A-3 (all hours) and Figure A-4 (daytime hours only). Also of note is the number of calms during the daytime on exceedance days. It's almost twice as much as it is on a non-exceedance day.

In addition to the wind roses, back trajectories were run using the National Oceanic and Atmospheric Administration HYSPLIT model to verify the wind directions on exceedance days and to show any other important wind patterns observed in and around the Birmingham area. As illustrated in the modeled back trajectories in Figures A-5 through A-15, the predominant north wind is present along with the east and south directions. The westerly wind illustrated in the wind roses is also observed but more importantly this west wind shows up mostly when there is recirculation. This recirculation plays a huge role in the build up of ozone in and around the Birmingham monitors on high ozone days.

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

The geography/topography of an area can influence the creation and transport of ozone. The Birmingham CSA 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.

I. Jurisdictional Boundaries

Within the Birmingham Combined Statistical Area, Jefferson and Shelby Counties are currently violating the 8-hour ozone NAAQS. The Jefferson County Department of Health holds jurisdiction within the county boundaries of Jefferson County for which 2006-2008 monitoring data demonstrates the county to be violating the eight-hour standard. The ADEM holds jurisdiction for Bibb, Blount, Chilton, Cullman, Walker, St. Clair and Shelby Counties. The 2006-2008 data from the State's monitor in Shelby County supports the inclusion of Shelby County in the Birmingham Nonattainment Area. Discussion elsewhere in this document demonstrates the State's recommendations for exclusion of Bibb, Blount, Chilton, Cullman, Walker 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 31 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 1-hour attainment demonstration plan for the Birmingham area, which was approved by EPA on November 7, 2001, the state required 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 required a NO_X SIP Call for 22 states, including Alabama that, by 2004, was to result in large reductions in NO_X emissions from major utilities, large industrial boilers and gas turbines, and cement kilns. Alabama's NOx SIP was approved by EPA on July 16, 2001. Further, EPA recently issued a rule known as the Clean Air Interstate Rule (CAIR) for 28 states, including Alabama. CAIR requires additional reductions in NOx and SO2 emissions from utilities. Phase I of CAIR begins in 2009 and Phase II in 2015. Alabama's CAIR SIP was approved by EPA on October 1, 2007.

At the national level, EPA has finalized the Tier 2 vehicle/national fuel standards, which took effect beginning in 2004. However, the States had already begun to realize the benefits of cleaner vehicles with the National Low Emission Vehicle standards with the 2001 model year vehicles.

K. Regional Emission Reductions

ASIP has performed CMAQ Modeling to estimate the impact of implementing several "on the books" regional and local controls. These controls include: CAIR, NOX SIP Call, North Carolina Clean Smokestacks Act, Consent Agreements, One-Hour Ozone SIPs, Heavy duty diesel engine standards, highway diesel fuel control, Large Spark Ignition and Recreational Vehicle Rule, Nonroad Diesel Rule, VOC MACT Standards and Tier II national fuel standards. EPA recently promulgated a rule known as the Clean Air Interstate Rule (CAIR) for 28 states, including Alabama. Phase I of CAIR begins in 2009 and Phase II in 2015. Alabama's CAIR SIP was approved by EPA on October 1, 2007. All of these programs will collectively result in substantial reductions in emissions of NOx and VOC.

The results obtained from ASIP for Alabama demonstrate that the reductions in 8-hour ozone resulting from these national programs will be sufficient to bring all monitored areas of Alabama into attainment of the 8-hour standard beginning in 2012. These results are documented in Attachment 1. Since additional local controls are unlikely to be required in order for Birmingham to meet the NAAQS, it is unnecessary to designate Counties as nonattainment beyond those with monitoring data exceeding the standard. Further, the lack of a nonattainment designation in a county does not preclude ADEM from requiring controls in the county if controls are deemed necessary

Figure A-1

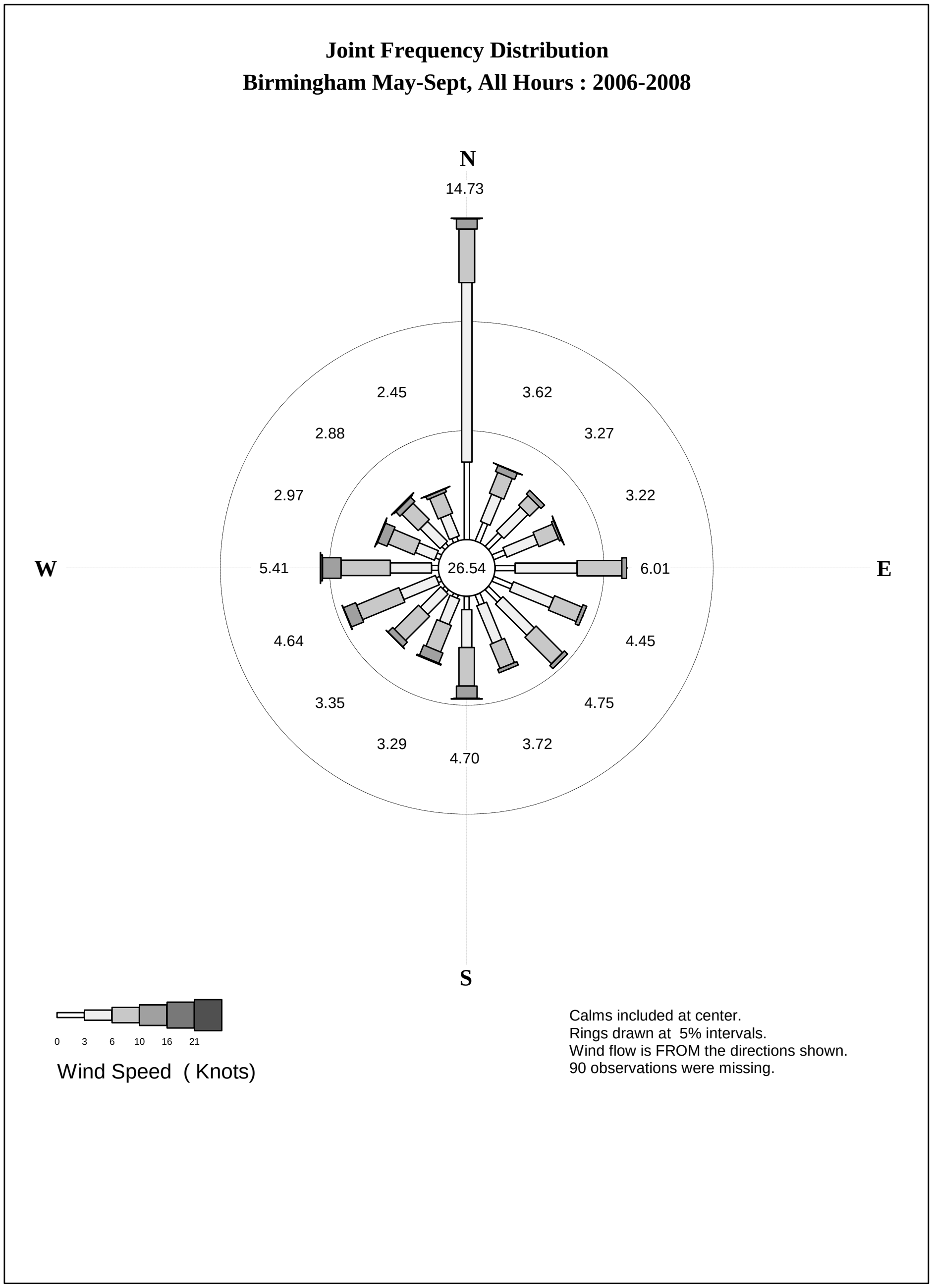

Joint Frequency Distribution
Birmingham May-Sept, All Hours : 2006-2008
N
14.73
2.45
3.62
2.88
3.27
2.97
3.22
W
5.41
26.54
6.01
E
4.64
4.45
3.35
4.75
3.29
3.72
4.70
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
90 observations were missing.

Figure A-2

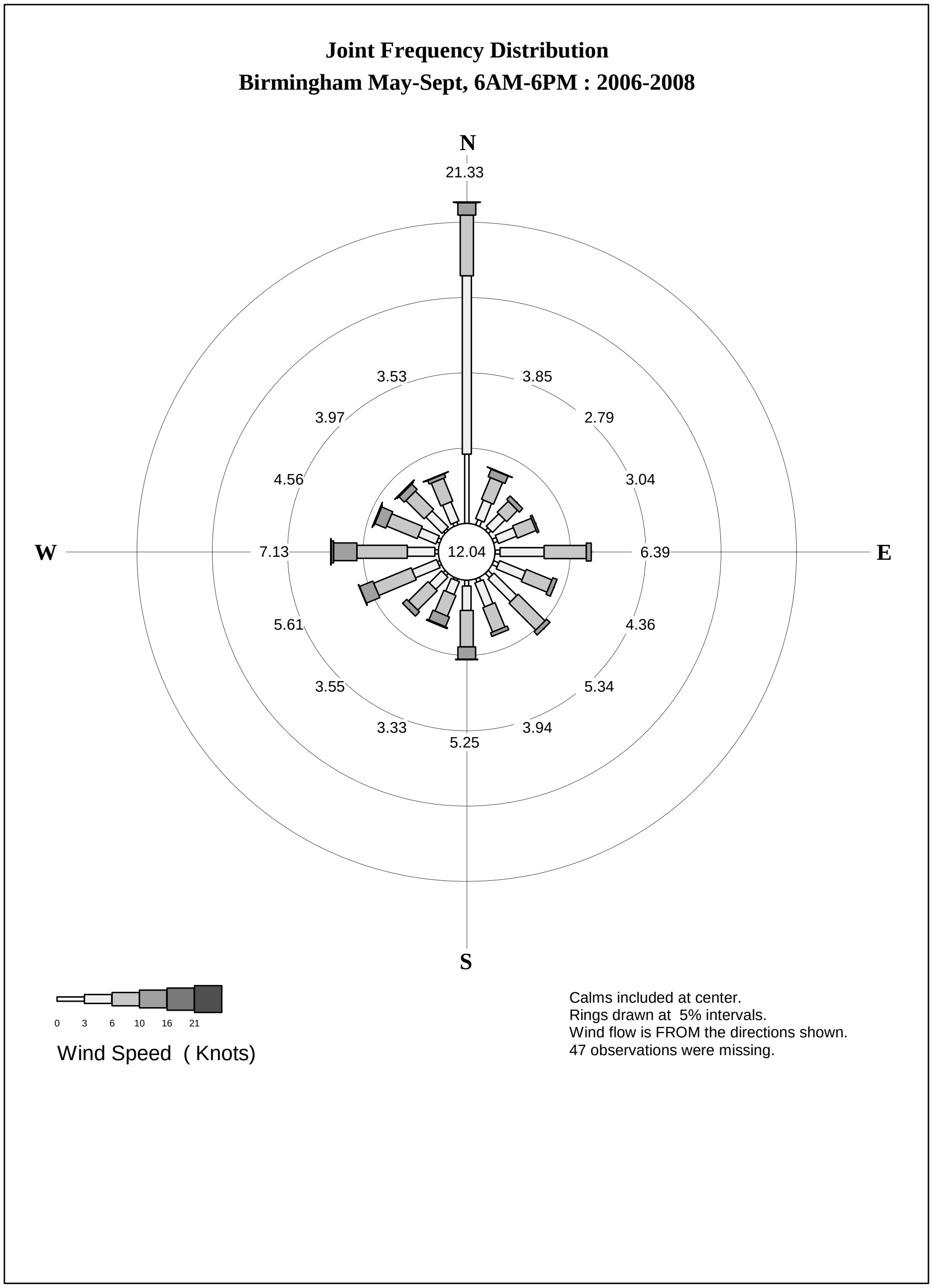
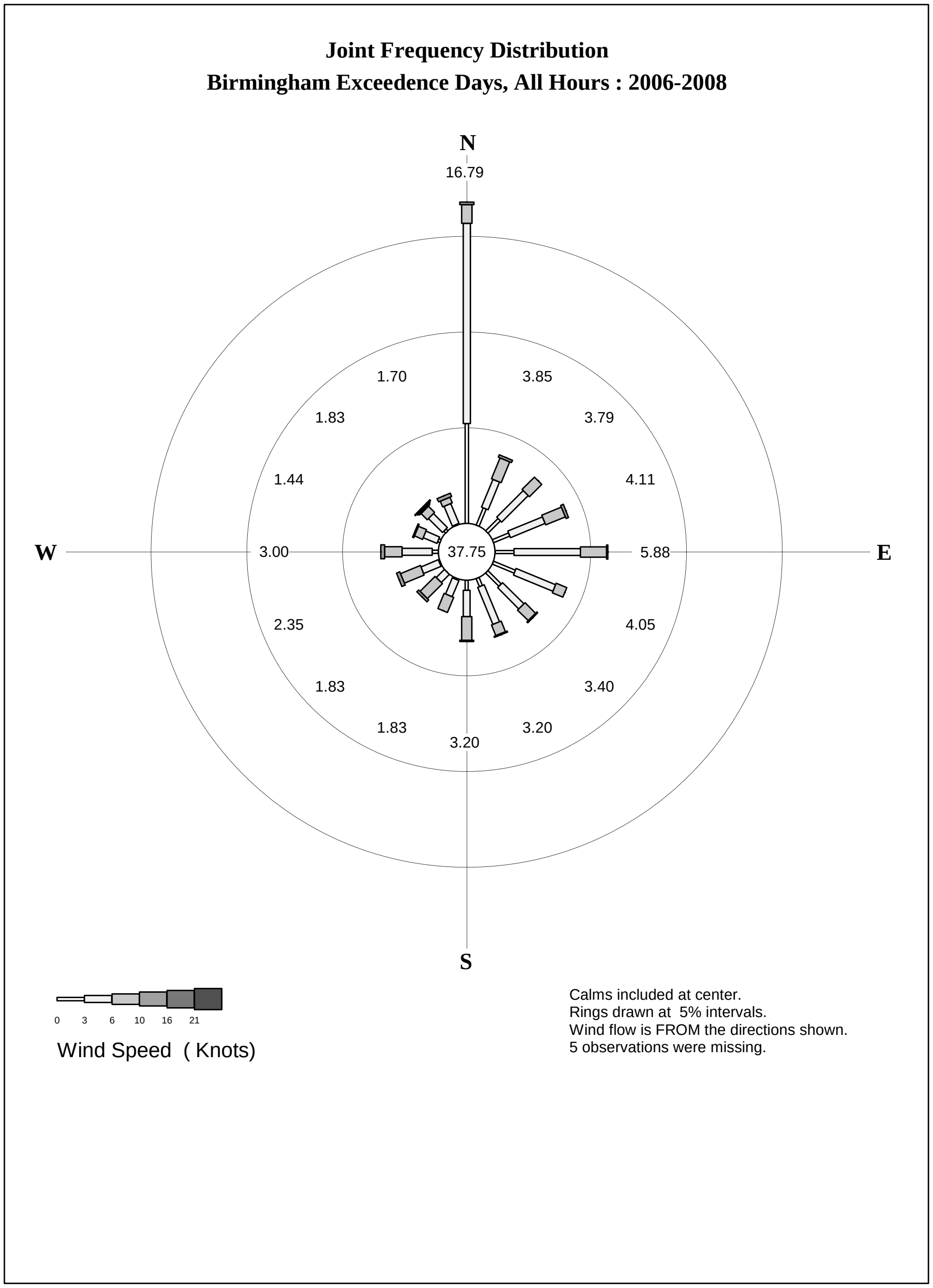
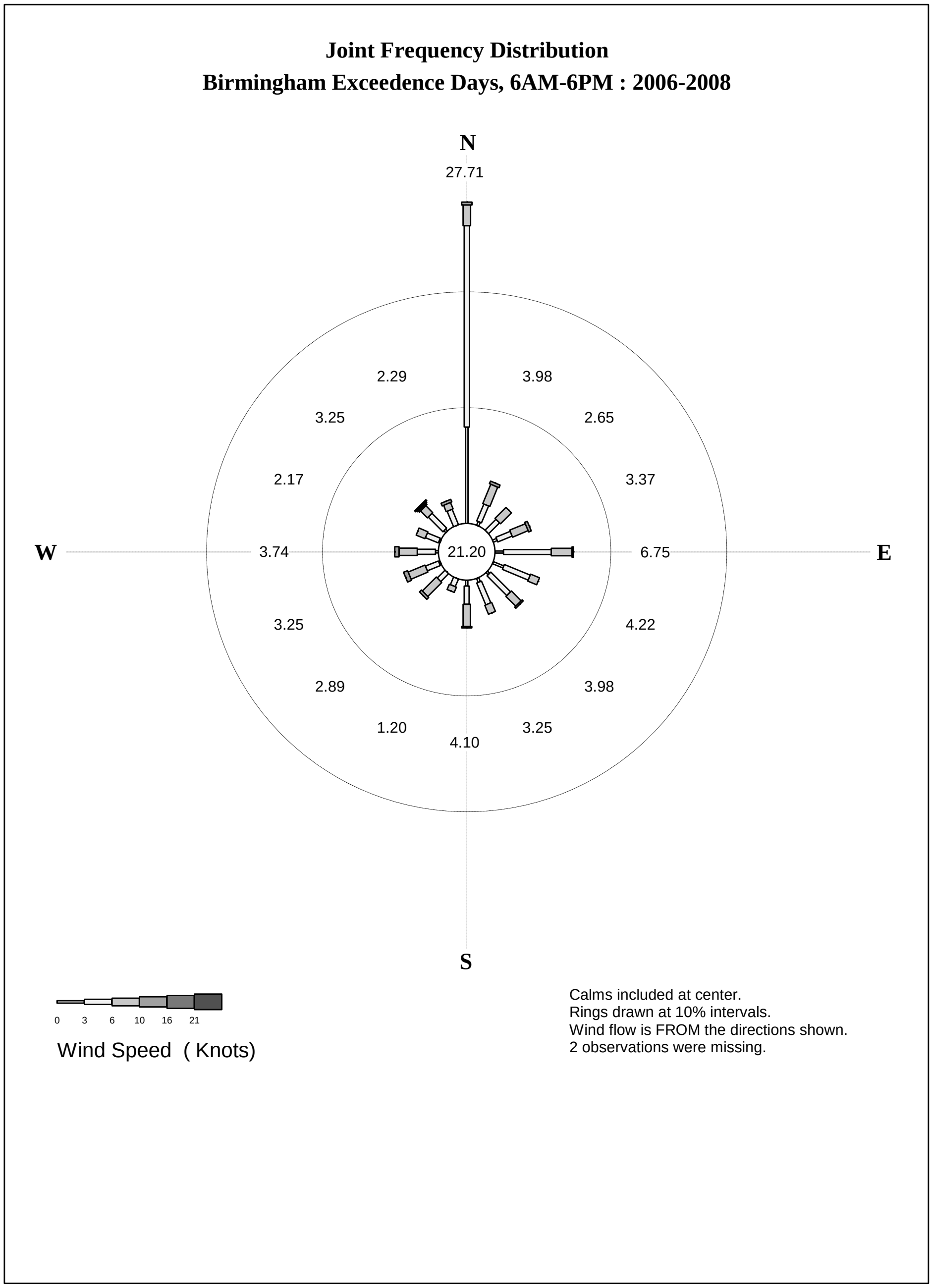

Joint Frequency Distribution
Birmingham May-Sept, 6AM-6PM : 2006-2008
N
21.33
3.53
3.85
3.97
2.79
4.56
3.04
W
7.13
12.04
6.39
E
5.61
4.36
3.55
5.34
3.33
3.94
5.25
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
47 observations were missing.

Figure A-3



Joint Frequency Distribution
Birmingham Exceedence Days, All Hours : 2006-2008
N
16.79
W
E
S
1.70
3.85
1.83
3.79
1.44
4.11
3.00
37.75
5.88
2.35
4.05
1.83
3.40
1.83
3.20
3.20
0 3 6 10 16 21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
5 observations were missing.

Figure A-4



Joint Frequency Distribution
Birmingham Exceedence Days, 6AM-6PM : 2006-2008
N
27.71
2.29
3.98
3.25
2.65
2.17
3.37
W
3.74
21.20
6.75
E
3.25
4.22
2.89
3.98
1.20
3.25
4.10
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 10% intervals.
Wind flow is FROM the directions shown.
2 observations were missing.

Figure A-5

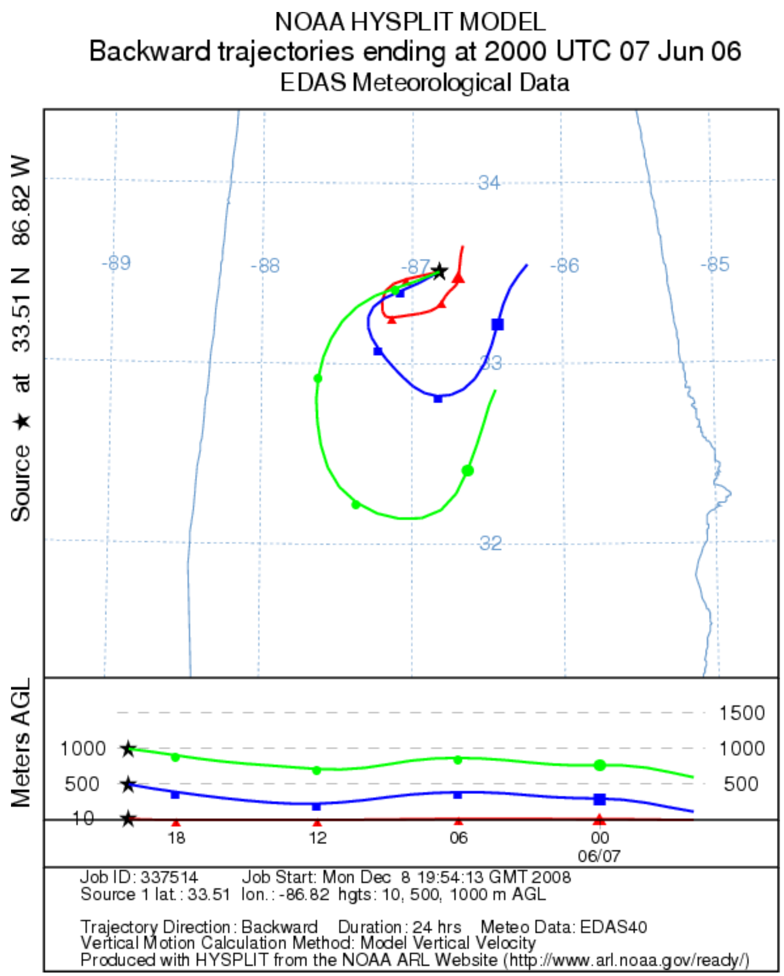


Figure A-6

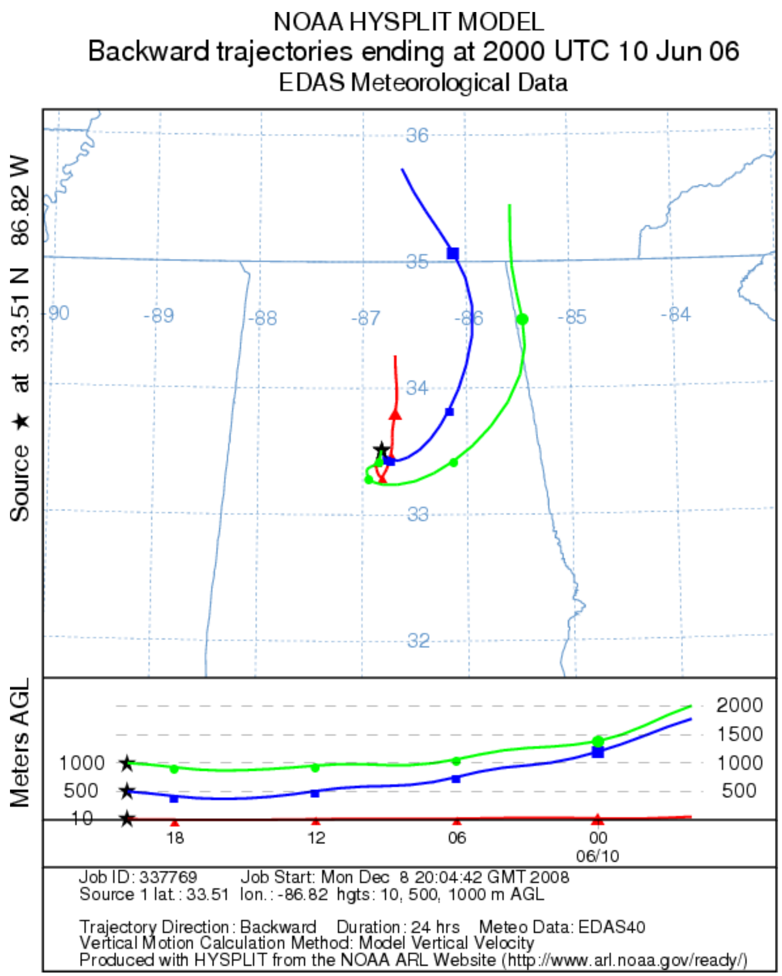
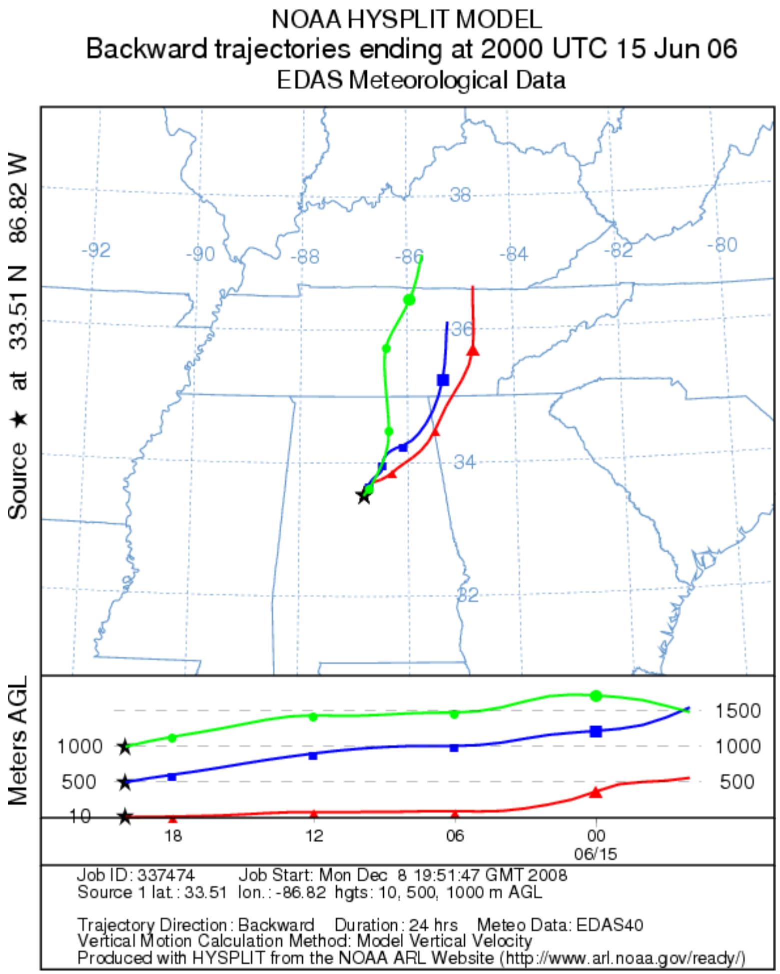


Figure A-7



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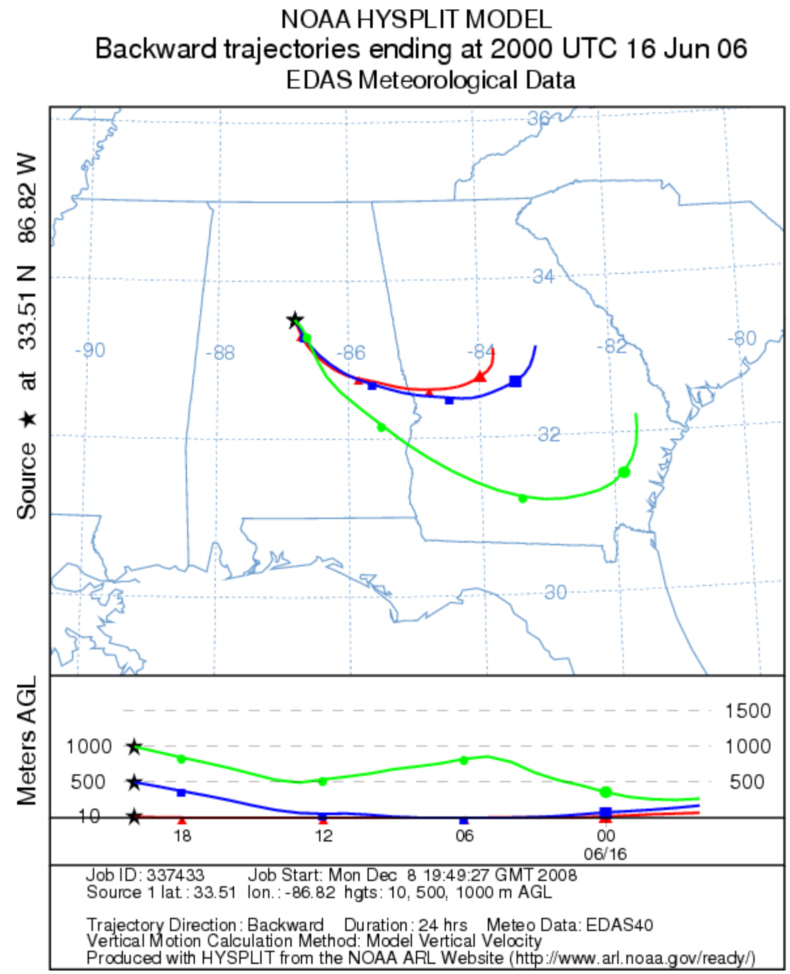
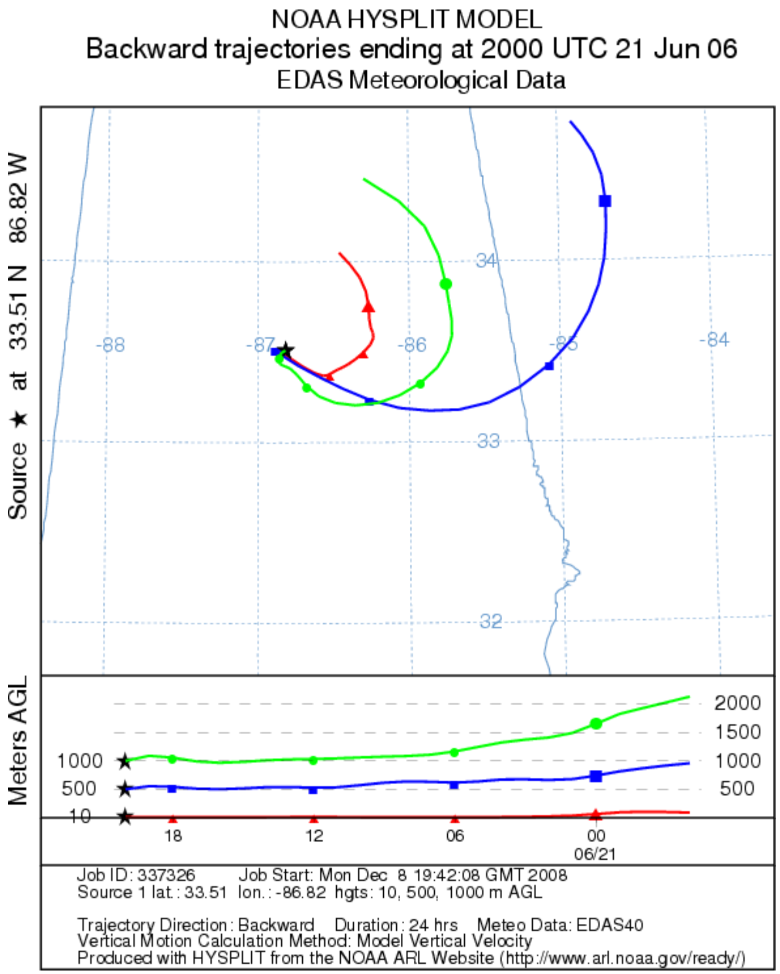


Figure A-9



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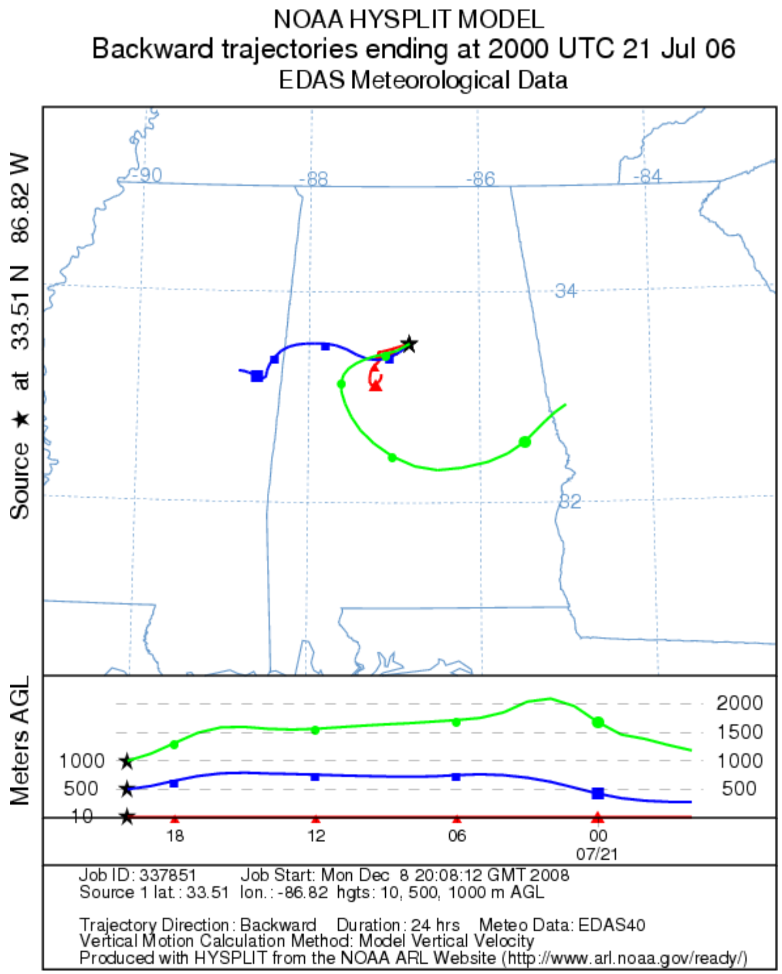


Figure A-11

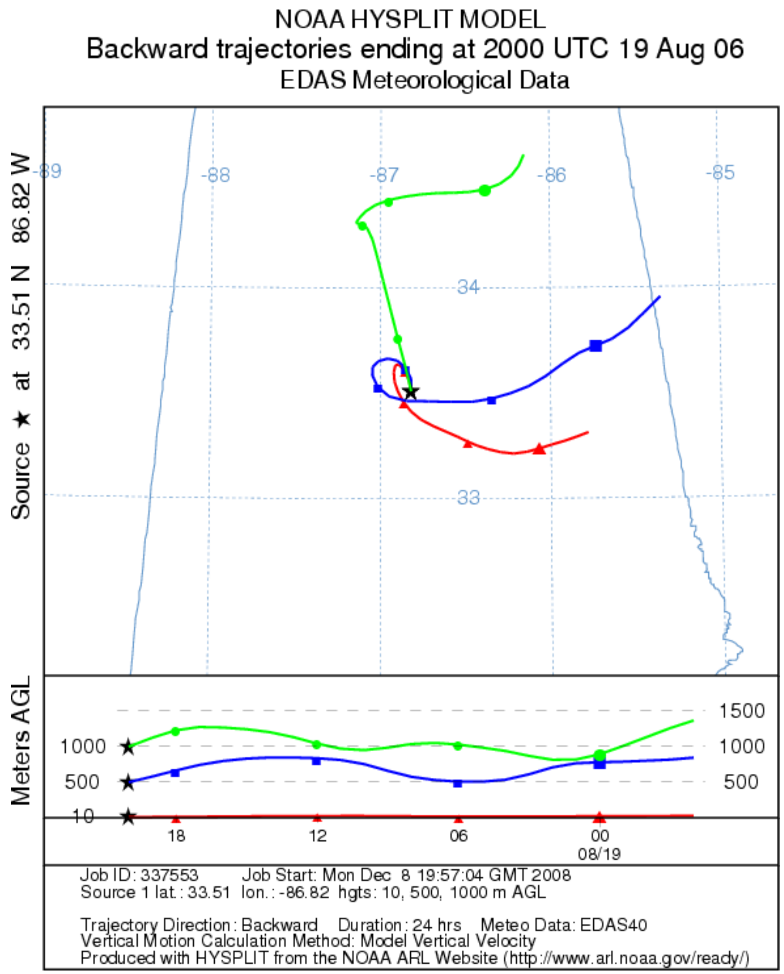


Figure A-12

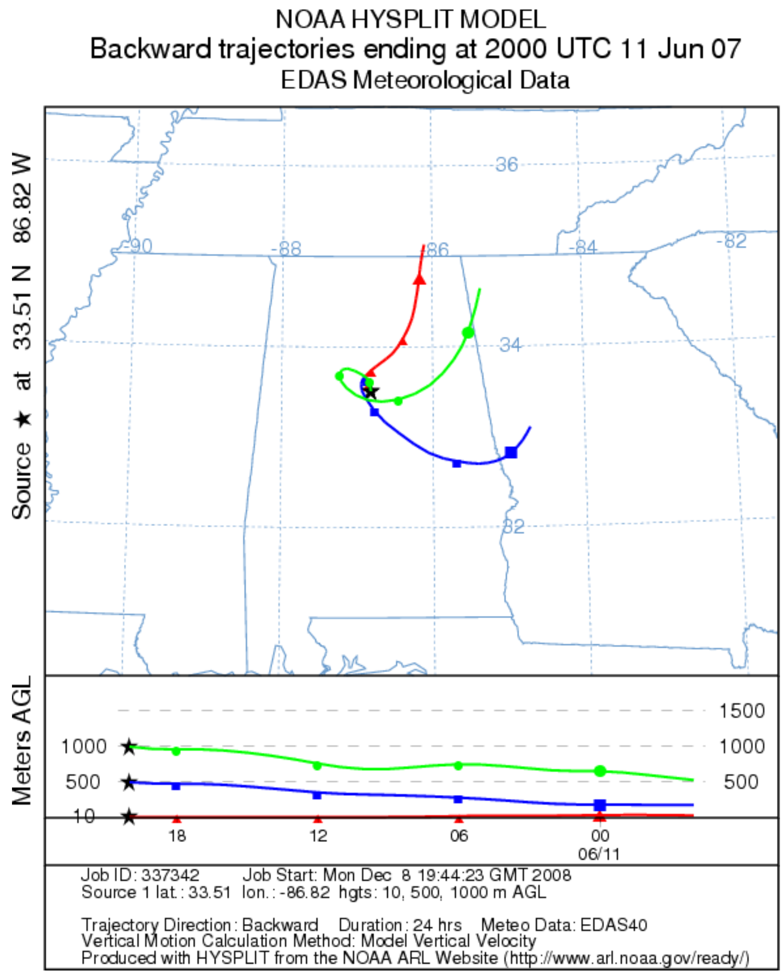


Figure A-13

NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 22 Jun 07
EDAS Meteorological Data

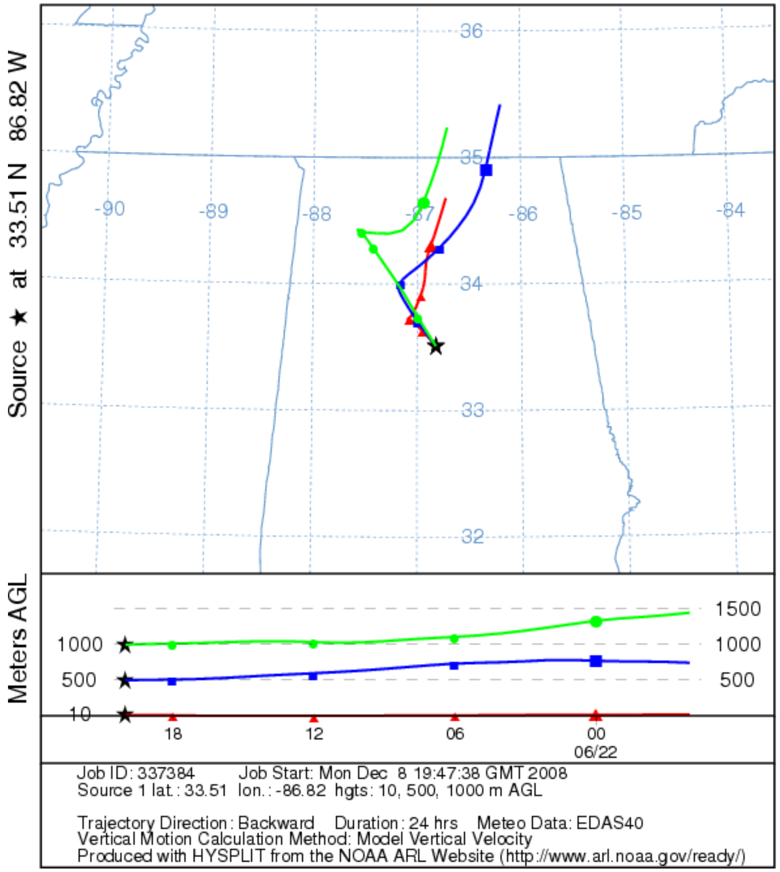


Figure A-14

NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 15 Aug 07
EDAS Meteorological Data

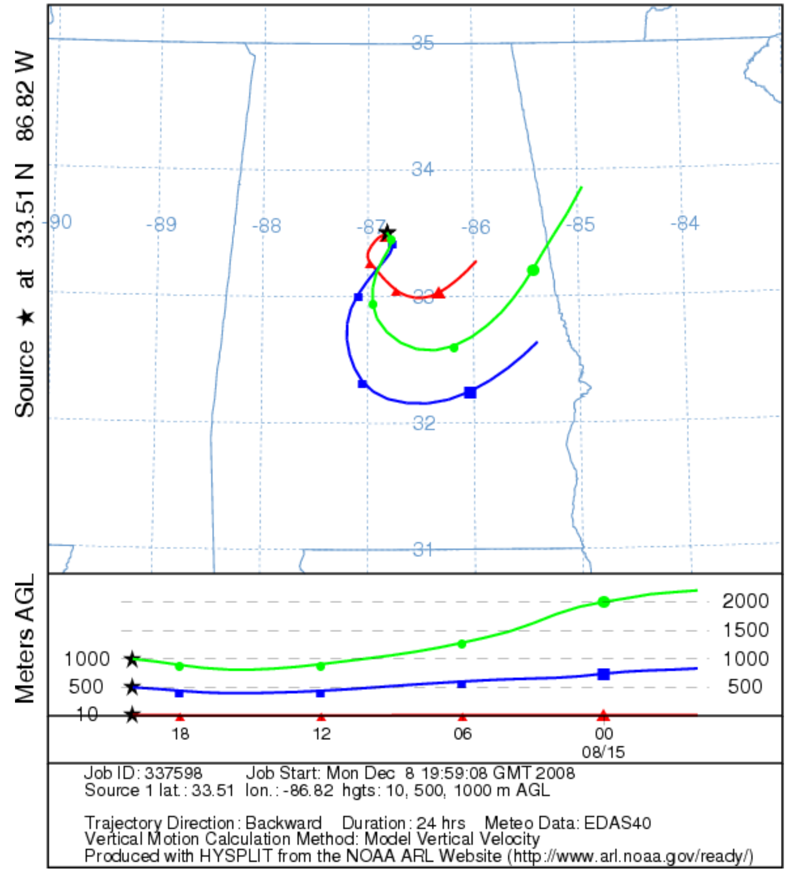
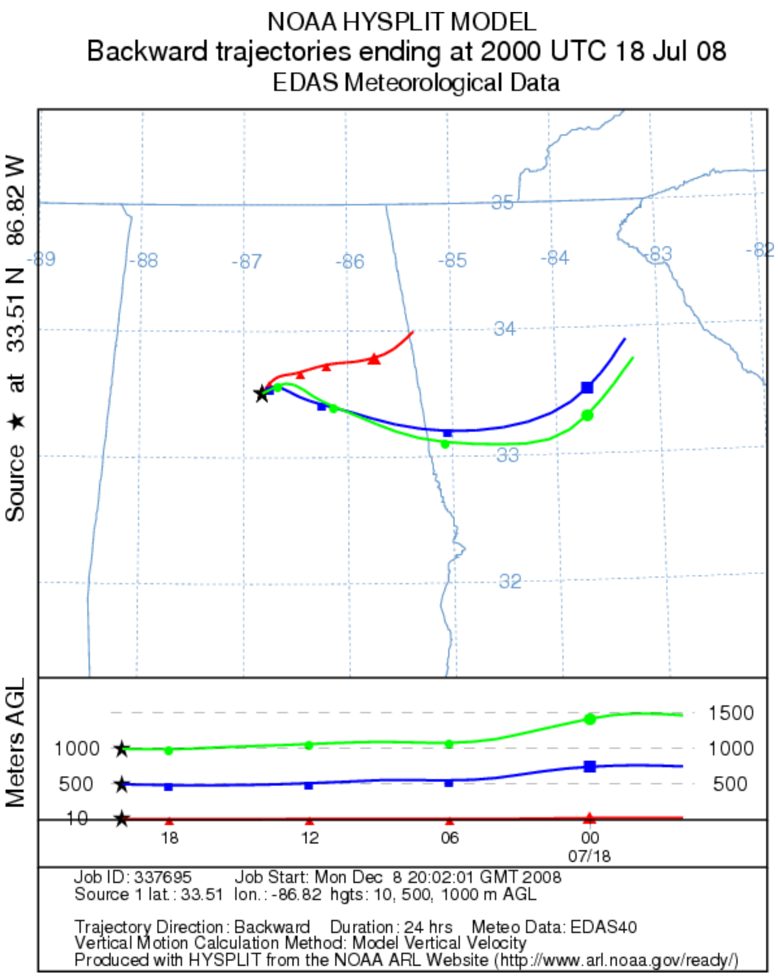


Figure A-15


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 18 Jul 08
EDAS Meteorological Data
Source ★ at 33.51 N 86.82 W
Meters AGL
1500
1000
500
10
18
12
06
00
07/18
Job ID: 337695 Job Start: Mon Dec 8 20:02:01 GMT 2008
Source 1 lat.: 33.51 lon.: -86.82 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

Appendix B

ADEM recommends that the Huntsville Nonattainment area for the 8-hour NAAQS for ozone not include the following counties in the Huntsville CSA: Morgan, Limestone, and Lawrence. EPA guidance (dated December 4, 2008) states that a State must address how certain factors affect the drawing of the nonattainment boundary. Therefore, a discussion of these factors for the Huntsville CSA is provided in this Appendix. The Huntsville CSA consists of four counties: Madison, Morgan, Limestone, and Lawrence.

The factors that provide the most compelling evidence to exclude Morgan County from the Huntsville Nonattainment area are listed below:

- Monitoring data
- Commuting Patterns
- Location of emission sources (i.e. the lack of significant area, mobile, and non-road sources)
- Level of control of emission sources
- Regional emission reductions

The factors that provide the most compelling evidence to exclude Limestone and Lawrence County from the Huntsville Nonattainment area include:

- Total annual emissions of NOx and VOC
- Population density
- Location of emission sources (i.e. the lack of significant area, mobile, and non-road sources)
- Daily VMT
- Level of control of emission sources
- Regional emission reductions

A. Emissions in the Huntsville CSA

The Huntsville CSA's location is depicted in Figure 1. To evaluate emissions for the Huntsville CSA, ADEM obtained the 2005 annual NOx and VOC emission estimates from the EPA's NEI website. Table 1 lists these emissions which include all anthropogenic sources (i.e. point, area, mobile, and non-road mobile) for the Huntsville CSA.

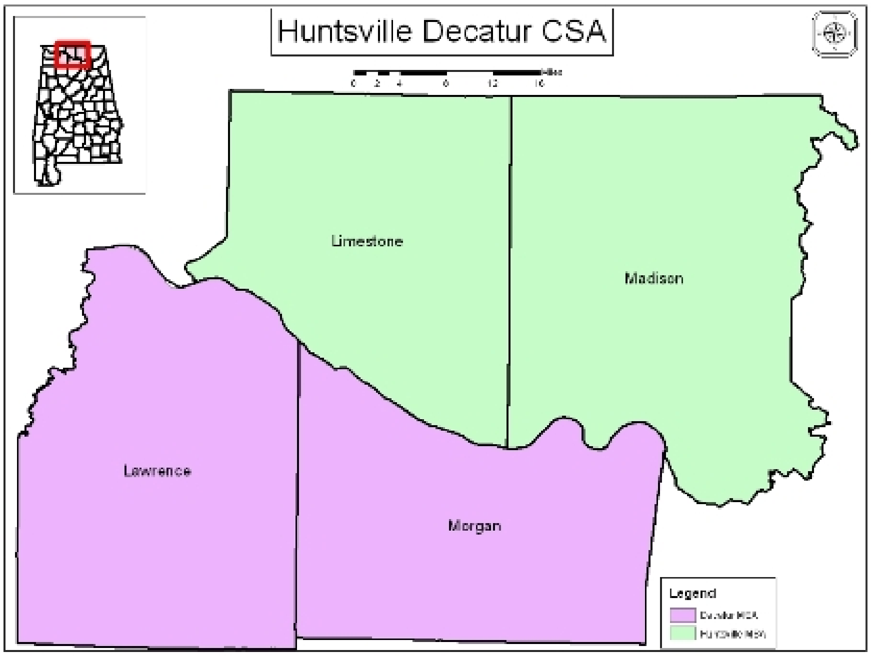


Figure 1 Huntsville CSA

Table 1 Annual Emissions for Huntsville CSA

County	2005 Annual VOC Emissions (Tons)	Ranking for VOC	2005 Annual NOx Emissions (Tons)	Ranking for NOx
Lawrence	3,654	4	4,615	3
Limestone	7,185	3	4,574	4
Madison[M]	17,120	1	11,176	1
Morgan[M]	13,165	2	8,591	2

[M] County has an ozone monitor

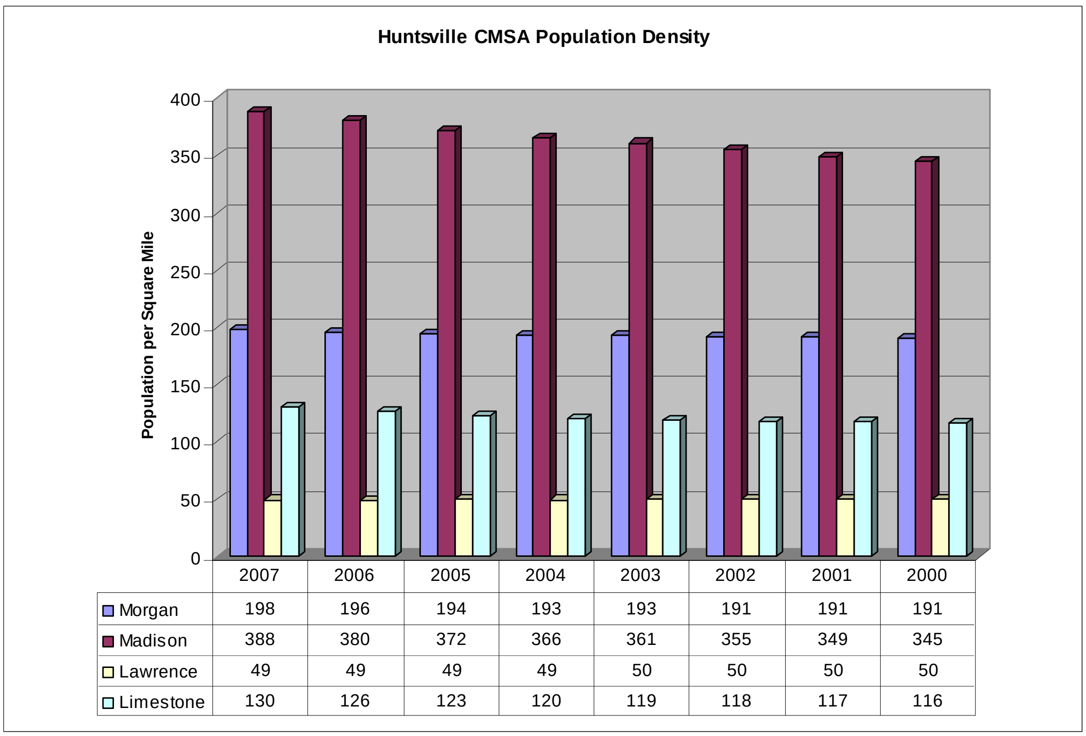
As shown in Table 1, emissions in Lawrence and Limestone Counties are less than half of the emissions in Madison County. Further, emissions in Lawrence and Limestone Counties do not appear to be substantial enough to produce exceedances of the NAAQS for ozone. Madison County has a design value above the 8-hour NAAQS for ozone based on monitoring data for 2006, 2007, and 2008, while the design value for Morgan County meets the 8-hour NAAQS for ozone based on the same years of data.

Evaluating the emissions and air quality in adjacent areas provides no directly compelling indicator as to whether Lawrence, Limestone, and Morgan Counties should be included or excluded in an 8-hour ozone nonattainment area. There are no factors that indicate contribution of emissions from adjacent 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 2000 to 2007 population estimates for the Huntsville CSA from the Alabama State Data Center[1]. Information on business data (i.e. retail employment and manufacturing employment) was obtained from the U.S. 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 CSA. No significant changes in population density are indicated. <u>The population density factor fortifies the recommendation to exclude Morgan, Limestone and Lawrence Counties from the Huntsville nonattainment area.</u>



	2007	2006	2005	2004	2003	2002	2001	2000
Morgan	198	196	194	193	193	191	191	191
Madison	388	380	372	366	361	355	349	345
Lawrence	49	49	49	49	50	50	50	50
Limestone	130	126	123	120	119	118	117	116

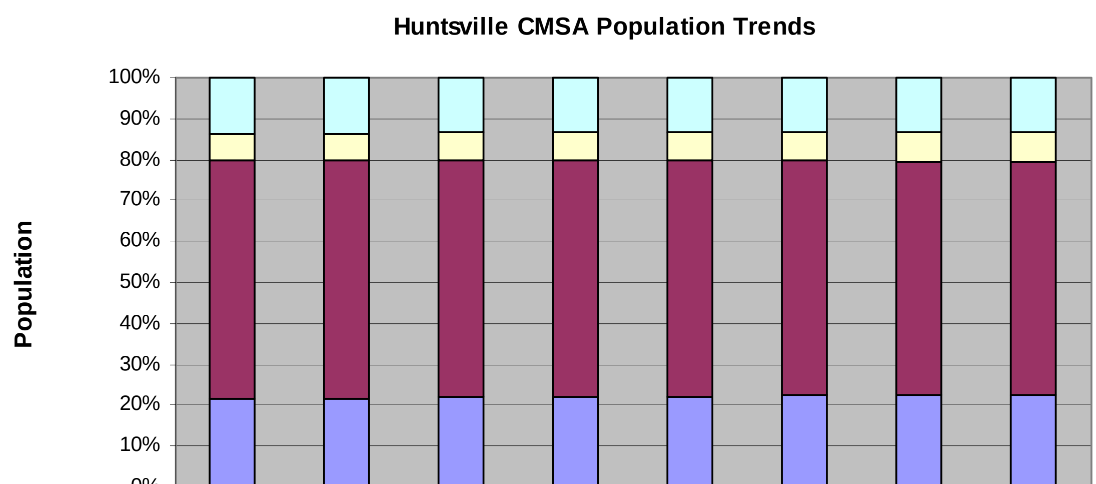
Figure 2 Population Density for the Huntsville CSA

[1] 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 2000 and 2007 population estimates. Population data is also presented in Figure 3. This data reveals that there has been some growth in the Huntsville CSA; in fact, population is growing at about the same rate in Madison and Limestone Counties, although Madison County makes up 58.1% of the CSA population while Limestone County makes up only 13.7%.

Table 2 Huntsville CSA Population

County	2000	2007	Population Change (2000-2007)	% Change	% of CSA 2007 Population
Morgan	111,197	115,050	3,853	3.47%	21.4%
Madison	277,864	312,734	34,870	12.55%	58.1%
Lawrence	34,851	34,229	-622	-1.78%	6.4%
Limestone	65,913	73,898	7,985	12.11%	13.7%
Area Total	491,825	537,918	46,093	9.37%	100.0%



	2007	2006	2005	2004	2003	2002	2001	2000
Limestone	73,898	71,777	69,824	68,429	67,692	67,105	66,628	65,913
Law rence	34,229	33,936	34,316	34,221	34,405	34,653	34,837	34,851
Madison	312,734	306,277	299,662	294,399	290,484	285,880	281,193	277,864
Morgan	115,050	114,099	112,814	112,123	112,224	111,359	111,470	111,197

Figure 3 Population Data for the Huntsville CSA

The amount and percent of urbanized population in the Huntsville CSA is presented in Table 3. This data clearly shows that there has been some growth in the Huntsville CSA's urban population. Madison County comprises greater than 50% of the Huntsville CSA's population, which is predominantly urban.

Table 3 Urban Population for the Huntsville CSA

County	% Urban	2007 Population	2007 Urban Population	% of CSA Total 2007 Urban Population
Madison County	77%	312,734	240,805	72.5%
Morgan County	56%	115,050	64,428	19.4%
Limestone County	33%	73,898	24,386	7.3%
Lawrence County	7%	34,229	2,396	0.7%
CSA Total	62%	535,911	332,016	100.0%

Tables 4, 5, and 6 show the trends in Total Employment, Manufacturing Employment, and Retail Employment, respectively, for the Huntsville CSA. Madison and Lawrence Counties show similar growth trends in employment; however, Madison County dwarfs all of the CSA counties in total employees. Figure 4 demonstrates that there has not been substantial growth in the number of Total Employees for Morgan and Limestone Counties. Figure 5 demonstrates that only Madison experienced any growth in manufacturing. These factors fortify the recommendation to exclude Limestone, Lawrence, and Morgan Counties from the 8-hour ozone nonattainment area.

Table 4 Total Employees

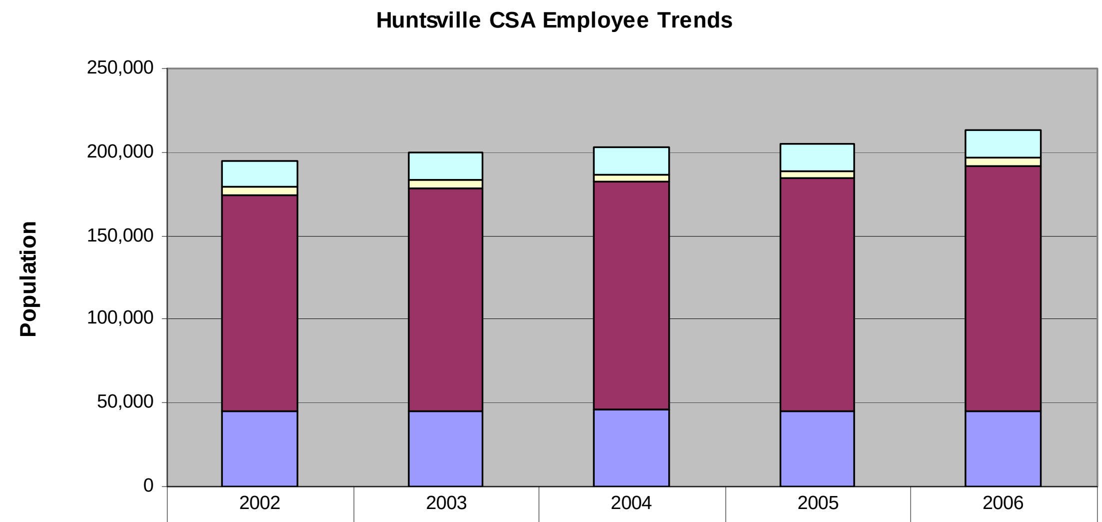
	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Morgan	45,184	45,456	46,608	45,418	45,179	-1.10%	21%
Madison	129,354	133,106	135,587	138,753	146,536	13.30%	68.10%
Lawrence	4,334	4,382	4,538	4,767	4,914	13.40%	2.30%
Limestone	15,496	16,690	16,491	16,380	16,423	6%	7.60%
CSA Total	196,370	201,637	205,228	207,323	215,058	9.5%	100%

Table 5 Manufacturing Employees

	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Morgan	12,664	12,492	12,543	12,106	12,131	-4.2%	30%
Madison	20,848	20,651	19,274	19,102	21,474	3.0%	53.1%
Lawrence	2,499	2,499	2,499	2,499	1,376	-44.9%	3.4%
Limestone	5,953	6,119	5,485	5,538	5,424	-8.9%	13.4%
CSA Total	41,964	41,761	39,801	39,245	40,405	-3.7%	100%

Table 6 Retail Employees

	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Morgan	6,235	6,175	6,299	5,906	6,072	-2.61%	21.3%
Madison	17,383	17,767	18,914	18,712	18,938	8.95%	66.3%
Lawrence	671	694	680	880	796	18.63%	2.8%
Limestone	2,456	2,456	2,707	2,695	2,751	12.01%	9.6%
CSA Total	26,745	27,092	28,600	28,193	28,557	6.78%	100%



	2002	2003	2004	2005	2006
Limestone	15,496	16,690	16,491	16,380	16,423
Law rence	4,334	4,382	4,538	4,767	4,914
Madison	129,354	133,106	135,587	138,753	146,536
Morgan	45,184	45,456	46,608	45,418	45,179

Figure 4 Total Employees for the Huntsville CSA

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 CSA. The table shows that the Madison County monitor exceeds the 8-hour NAAQS for ozone while the Morgan County monitor meets the 8-hour NAAQS for ozone. Figure 5 maps these ozone monitoring sites which provided the 2006, 2007, and 2008 data for the Huntsville CSA. <u>The recommendation to exclude Morgan County is supported by monitoring data that shows Morgan is meeting the 8-hour NAAQS for ozone.</u>

Table 7 Huntsville CSA Ozone Monitoring Data

County	AIRS ID	Site	2006 4th Max (ppm)	2007 4th Max (ppm	2008 4th Max (ppm	3 Year Average (ppm)
Morgan	01-103-0011	Decatur	0.078	0.081	0.068	0.075
Madison	01-089-0014	Huntsville	0.079	0.082	0.073	0.079

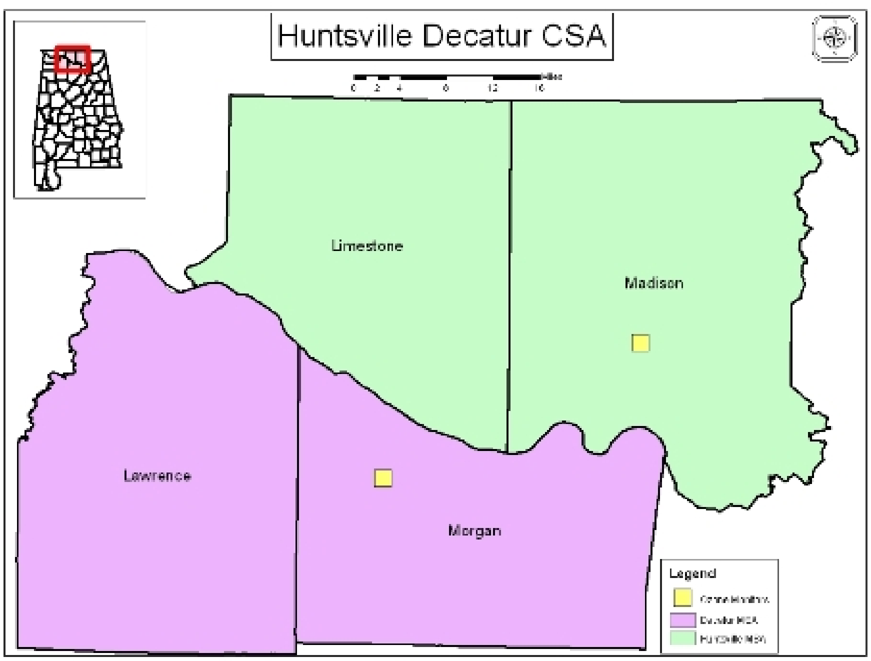


Figure 5 Ozone Monitoring Sites in Huntsville CSA

D. Location of Emission Sources

Figure 6 depicts the location of large point sources in the Huntsville CSA and surrounding counties. The base map was created in GIS using coordinates supplied by the facilities. Tables 8 and 9 present the distribution of NOx emissions (in tons per year) among point, area, mobile, and non-road sources in the Huntsville CSA. Tables 10 and 11 present the same information for VOC emissions. Figures 7 and 8 illustrate this data. Figure 9 presents the emission densities for the Huntsville CSA.

Madison County's larger population contributes to the greater percentage of area, mobile, and non-road sources, subsequently giving Madison County the greatest number in total annual NOx emissions at 39%. Although Morgan County has the largest amount of point sources at 55%, overall the annual emission total for point for Morgan County is comparably low. Lawrence and Morgan Counties account for most of the point source NOx and VOC emissions in the CSA. However, as discussed in Section G, the wind infrequently blows from the direction of Lawrence or Morgan counties on high ozone days in Huntsville. The total annual emissions for Lawrence and Limestone Counties are half the total of annual emissions for Madison County. <u>The lack of large point sources of NOx or VOC located in Lawrence and Limestone Counties fortifies the recommendation to exclude these counties from the Huntsville NAA</u>.

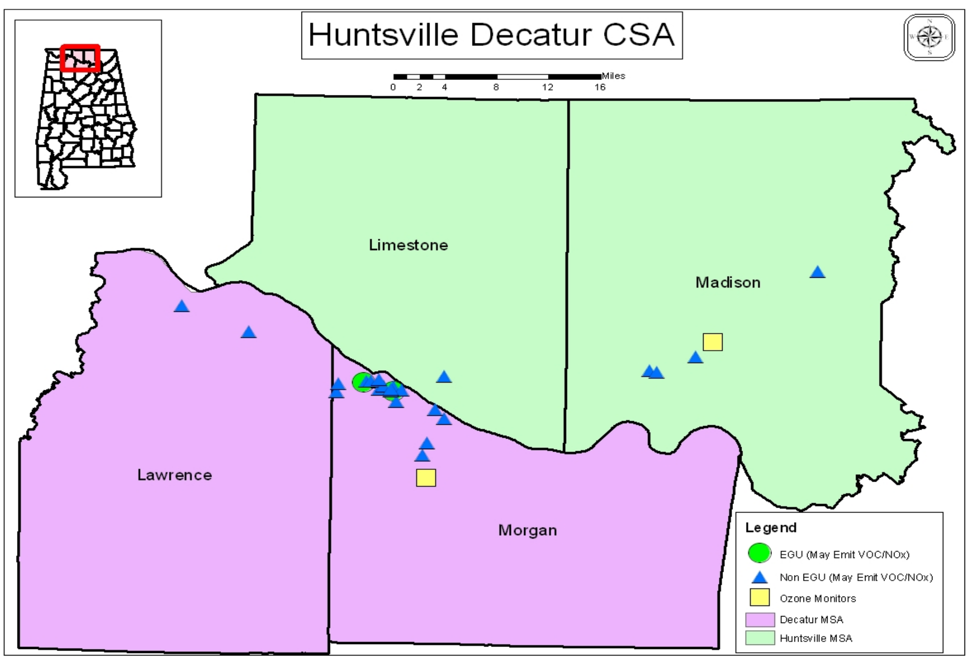


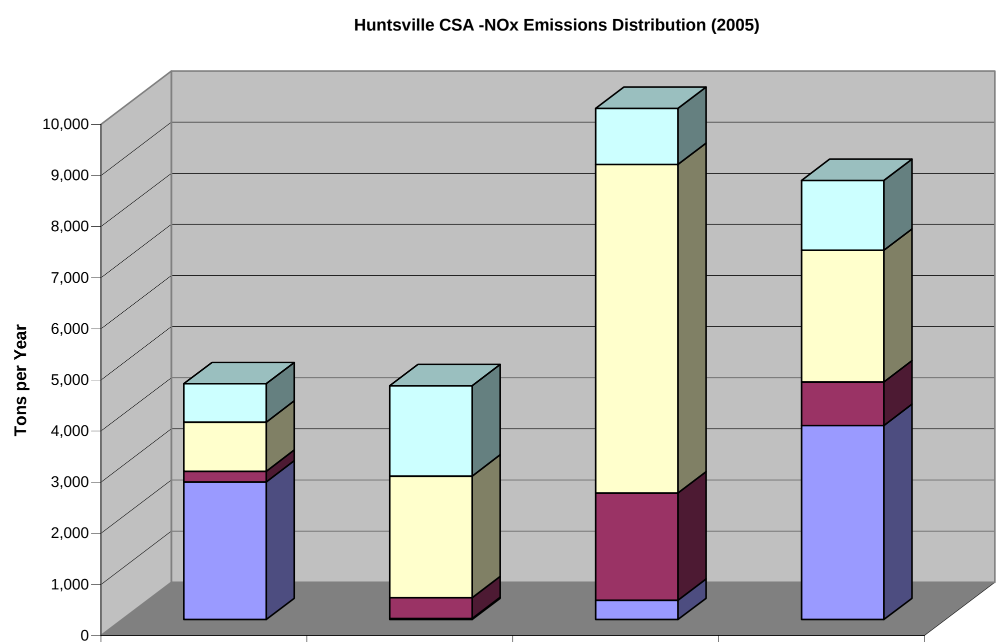
Figure 6 Location of Large Point Sources in the Huntsville CSA

Table 8 NOx Annual Emissions (Tons)

FIPS Code	County	Point		Area		Mobile		Non-Road		Total Emissions	
01079	**Lawrence Co**	2,693	39.1%	208	5.8%	962	7.8%	752	12.2%	4,615	15.9%
01083	**Limestone Co**	20	0.3%	407	11.4%	2,380	19.3%	1,768	28.7%	4,574	15.8%
01089	**Madison Co**	375	5.4%	2,100	58.9%	6,428	52.1%	2,273	36.9%	11,176	38.6%
01103	**Morgan Co**	3,797	55.1%	851	23.9%	2,576	20.9%	1,367	22.2%	8,591	29.7%
CMSA Total Emissions		**6,884**		**3,566**		**12,346**		**6,160**		**28,956**	

Table 9 Cumulative NOx Contributions

County Name	Factor	Annual 2005 Emissions (Tons)	% of Area Total Emissions	Cumulative %
Madison Co	Mobile NOx Emissions (Tons)	6,428	22.2%	22.2%
Morgan Co	Point NOx Emissions (Tons)	3,797	13.1%	35.3%
Lawrence Co	Point NOx Emissions (Tons)	2,693	9.3%	44.6%
Morgan Co	Mobile NOx Emissions (Tons)	2,576	8.9%	53.5%
Limestone Co	Mobile NOx Emissions (Tons)	2,380	8.2%	61.7%
Madison Co	Non-Road NOx Emissions (Tons)	2,273	7.9%	69.6%
Madison Co	Area NOx Emissions (Tons)	2,100	7.3%	76.8%
Limestone Co	Non-Road NOx Emissions (Tons)	1,768	6.1%	82.9%
Morgan Co	Non-Road NOx Emissions (Tons)	1,367	4.7%	87.7%
Lawrence Co	Mobile NOx Emissions (Tons)	962	3%	91.0%
Morgan Co	Area NOx Emissions (Tons)	851	2.9%	93.9%
Lawrence Co	Non-Road NOx Emissions (Tons)	752	2.6%	96.5%
Limestone Co	Area NOx Emissions (Tons)	407	1.4%	97.9%
Madison Co	Point NOx Emissions (Tons)	375	1.3%	99.2%
Lawrence Co	Area NOx Emissions (Tons)	208	0.7%	99.9%
Limestone Co	Point NOx Emissions (Tons)	20	0.1%	100.0%
Area Total Emissions		**28,956**		



	Lawrence Co	Limestone Co	Madison Co	Morgan Co
Non-Road	752	1,768	2,273	1,367
Mobile	962	2,380	6,428	2,576
Area	208	407	2,100	851
Point	2,693	20	375	3,797

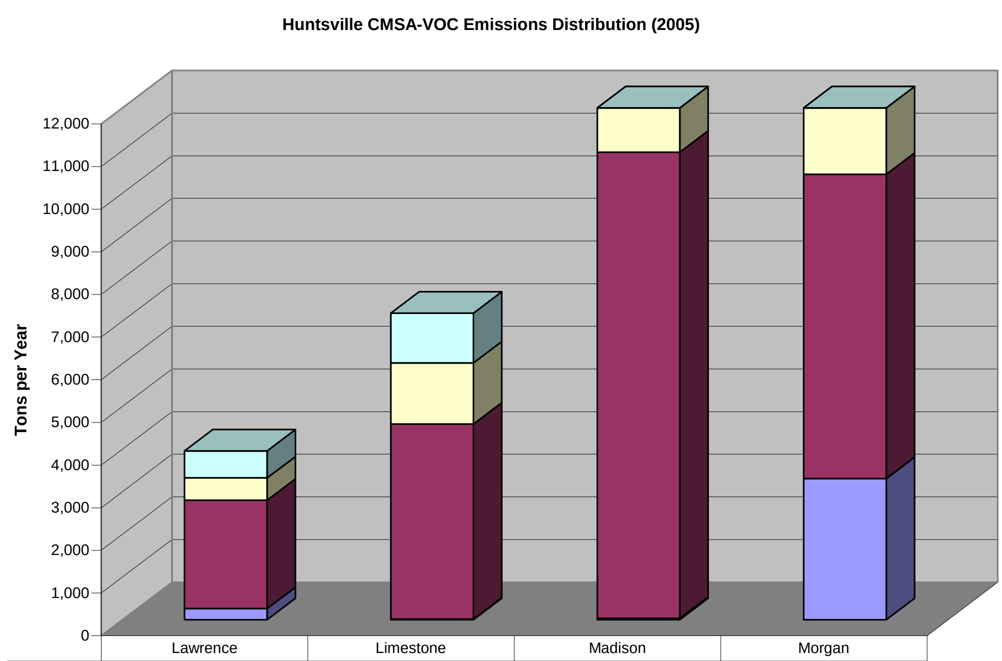
Figure 7 NOx Emissions for the Huntsville CSA

Table 10 VOC Annual Emissions (Tons)

FIPs	County	Point		Area		Mobile		Non-Road		Total Emissions	
01079	Lawrence	258	7.2%	2,542	10.1%	522	6%	632	15.4%	3,955	9.5%
01083	Limestone	15	0.4%	4,570	18.2%	1,434	17%	1,166	28.3%	7,185	17.3%
01089	Madison	34	0.9%	10,927	43.4%	4,665	55%	1,494	36.3%	17,120	41.3%
01103	Morgan	3,305	91.5%	7,139	28.4%	1,897	22%	823	20.0%	13,165	31.8%
CMSA Total Emissions		**3,613**		**25,178**		**8,517**		**4,115**		**41,424**	

Table 11 Cumulative VOC Contributions

County Name	Factor	Annual 2005 Emissions (Tons)	% of Area Total Emissions	Cumulative %
Madison	Area VOC Emissions (Tons)	10,927	26.4%	26.0%
Morgan	Area VOC Emissions (Tons)	7,139	17.2%	43.2%
Madison	Mobile VOC Emissions (Tons)	4,665	11.3%	54.5%
Limestone	Area VOC Emissions (Tons)	4,570	11.0%	65.5%
Morgan	Point VOC Emissions (Tons)	3,305	8.0%	73.5%
Lawrence	Area VOC Emissions (Tons)	2,542	6.1%	79.6%
Morgan	Mobile VOC Emissions (Tons)	1,897	4.6%	84.2%
Madison	Non-road VOC Emissions (Tons)	1,494	3.6%	87.8%
Limestone	Mobile VOC Emissions (Tons)	1,434	3.5%	91.3%
Limestone	Non-road VOC Emissions (Tons)	1,166	2.8%	94.1%
Morgan	Non-road VOC Emissions (Tons)	823	2.0%	96.1%
Lawrence	Non-road VOC Emissions (Tons)	632	1.5%	97.6%
Lawrence	Mobile VOC Emissions (Tons)	522	1.3%	98.9%
Lawrence	Point VOC Emissions (Tons)	258	0.6%	99.5%
Madison	Point VOC Emissions (Tons)	34	0.1%	99.6%
Limestone	Point VOC Emissions (Tons)	15	0.0%	100.0%
	Area Total Emissions	**41,424**		



	Lawrence	Limestone	Madison	Morgan
Non-Road	632	1,166	1,494	823
Mobile	522	1,434	4,665	1,897
Area	2,542	4,570	10,927	7,139
Point	258	15	34	3,305

Figure 8 VOC Emissions for the Huntsville CSA

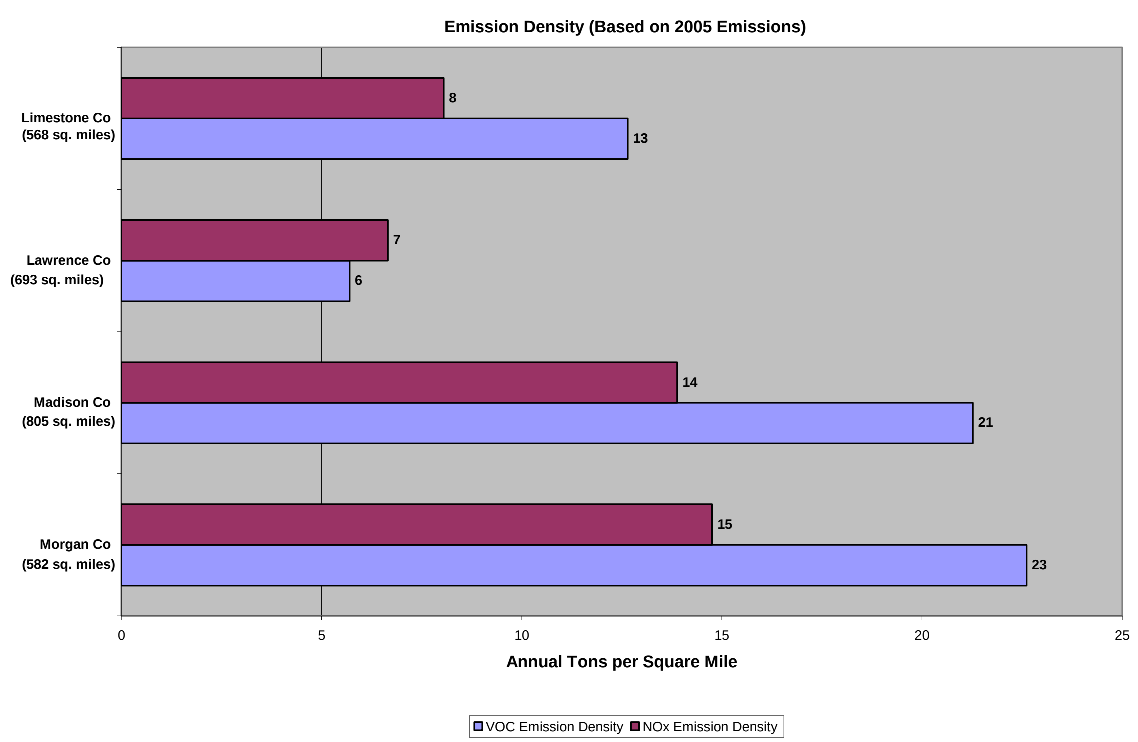


Figure 9 Emission Densities for the Huntsville CSA

E. Traffic and Commuting Patterns

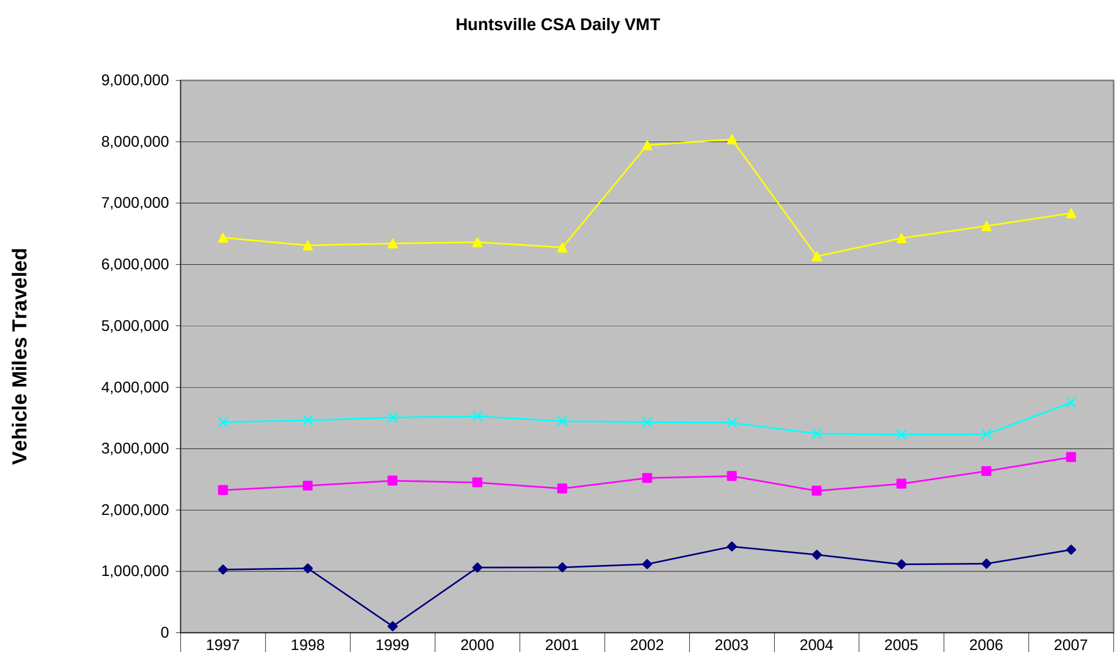
Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the Alabama Department of Transportation and the commuting patterns were obtained from the US Census Bureau web site. The commuting patterns available were based on the 2000 US Census. Table 12 presents the 1997 and 2007 DVMT estimates for the Huntsville CSA, and Figure 10 demonstrates the DVMT trend from 1997 to 2007 for each county. Figure 11 presents the rural and urban distribution of DVMT for the Huntsville CSA. Figure 12 presents the commuting patterns between the counties within the Huntsville CSA.

Table 12 shows that the DVMT for the Huntsville CSA has increased over the period of eleven years. Figure 11 demonstrates the DVMT for rural and urban areas. DVMT in Madison County comprises almost 50% of the entire CSA's VMT and is largely urban.

Figure 12 indicates that there is relatively insignificant commuting from Lawrence, Limestone, or Morgan Counties into Madison County. <u>This factor fortifies the recommendation to exclude Lawrence, Limestone, and Morgan Counties from the Huntsville 8-hour ozone nonattainment area</u>.

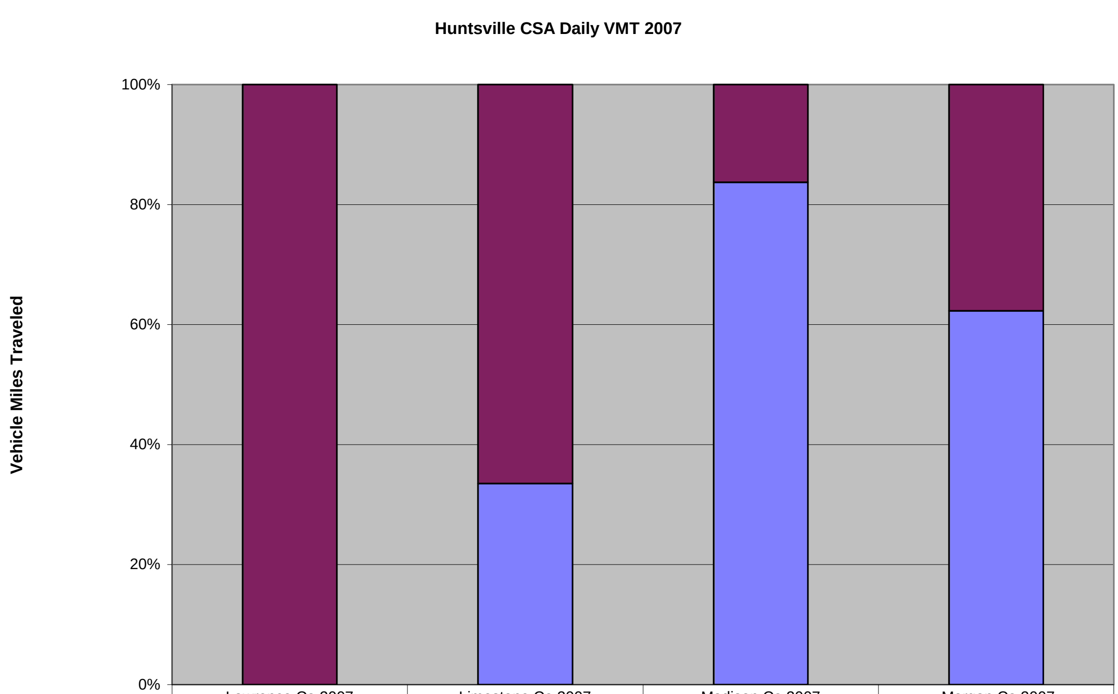
Table 12 Daily VMT for the Huntsville CSA

County	1997 Daily VMT	2007 Daily VMT	Daily VMT Change (1998-2007)	% Change	% of Area 2007 Daily VMT
Lawrence	1,028,400	1,351,016	322,616	31.4%	9.1%
Limestone	2,322,121	2,859,290	537,169	23.1%	19.3%
Madison	6,435,827	6,837,199	401,372	6.2%	46.2%
Morgan	3,431,346	3,752,627	321,281	9.4%	25.4%
CSA Total	**13,217,694**	**14,800,132**	**1,582,438**	**12.0%**	**100.0%**



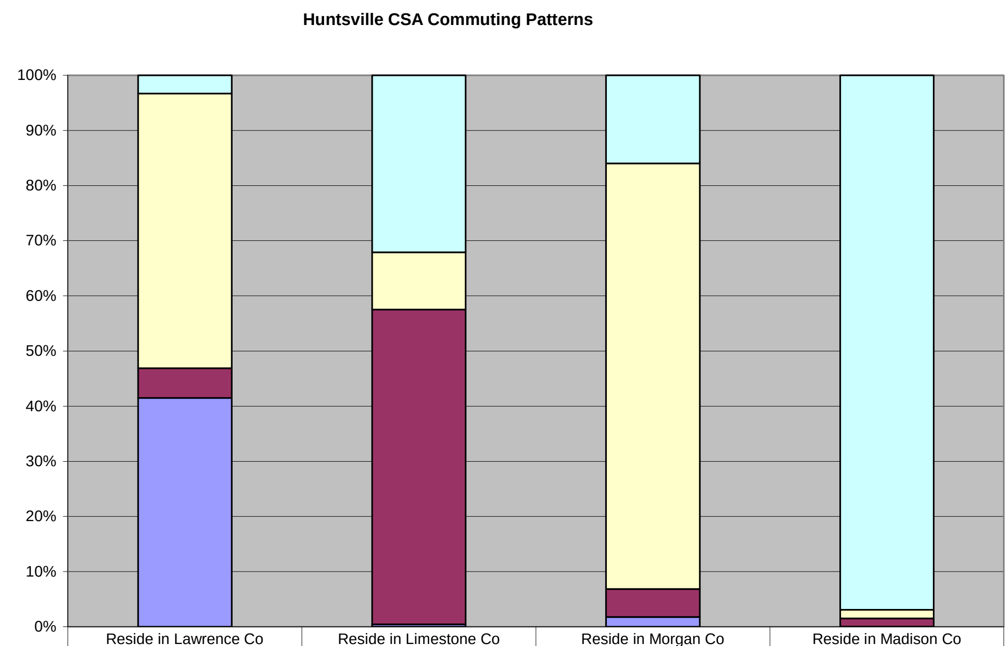
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Lawrence Co	1,028,400	1,050,174	106,221	1,062,989	1,065,238	1,119,112	1,406,941	1,270,483	1,116,270	1,126,198	1,351,016
Limestone Co	2,322,121	2,394,971	2,476,678	2,448,828	2,349,040	2,520,331	2,551,926	2,312,093	2,428,751	2,631,272	2,859,290
Madison Co	6,435,827	6,312,085	6,344,420	6,362,897	6,278,132	7,943,851	8,039,973	6,132,881	6,431,487	6,628,390	6,837,199
Morgan Co	3,431,346	3,459,809	3,507,750	3,528,052	3,447,434	3,430,554	3,421,549	3,243,551	3,230,781	3,237,642	3,752,627

Figure 10 Daily VMT Trend for the Huntsville CSA



	Lawrence Co 2007	Limestone Co 2007	Madison Co 2007	Morgan Co 2007
Rural Daily VMT	1,351,016	1,900,659	1,112,299	1,414,701
Urban Daily VMT	-	958,631	5,724,900	2,337,926

Figure 11 Rural vs. Urban Daily VMT for the Huntsville CSA



	Reside in Lawrence Co	Reside in Limestone Co	Reside in Morgan Co	Reside in Madison Co
Work in Madison Co	431	8,878	7,459	126,240
Work in Morgan Co	6,522	2,868	36,005	2,052
Work in Limestone Co	705	15,783	2,380	1,901
Work in Lawrence	5,435	122	816	35

Figure 12 Commuting Patterns for the Huntsville CSA

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 Morgan, Lawrence, and Limestone from the Huntsville 8-hour ozone nonattainment area.

Table 13 Population Projections for the Huntsville CSA

County Name	2000	2007	2015	2025	Percent Change 2000-2007	Percent Change 2007-2015	Percent Change 2015-2025
Lawrence	34,803	34,229	38,347	39,664	-1.6%	12.0%	3.4%
Limestone	65,676	73,898	81,747	90,865	12.5%	10.6%	11.2%
Madison	276,700	312,734	324,153	349,713	13.0%	3.7%	7.9%
Morgan	111,064	115,050	124,358	131,112	3.6%	8.1%	5.4%

G. Meteorology

It is known that meteorology plays a major role in the formation and transport of ozone. In the Huntsville area, wind direction and speed are important indicators to where ozone forms and travels. In the 2006-2008 ozone seasons, ozone levels exceeded the new 8-hour standard (75 ppb) on 17 days over the three-year period.

A wind analysis was accomplished to determine the extent to which wind directions could be correlated with high ozone. During the last three ozone seasons, the May – September winds in the Huntsville area had a predominant wind direction out of the north, and a marked minimum number of winds blowing from the northwest and northeast directions. In addition there was a high occurrence of winds blowing from the east to south quadrant (see Figure B-1). When one considers only the daytime (6AM-6PM) winds (Figure B-2), the general pattern changes very little. However, on those days when the 8-hour ozone standard was exceeded in the Huntsville area, the wind blew overwhelmingly from the north with the east to south directions showing up as well. This phenomenon is clearly seen in Figure B-3 (all hours) and Figure B-4 (daytime hours only). Also note the number of calms during the daytime on exceedence days is more than twice as much as it is on a non-exceedence day.

In addition to the wind roses, back trajectories were run using the National Oceanic and Atmospheric Administration HYSPLIT model to verify the wind directions on exceedence days and to show any other important wind patterns observed in and around the Huntsville area. As illustrated in the modeled back trajectories in Figures B-5 through B-16, the trajectories show the dominant wind blowing from the north and to a lesser amount the east to south direction as shown in the wind roses. In addition, a couple of the trajectories illustrate recirculation in the lowest level.

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 Huntsville area is located in far northern Alabama (Madison County) about 20 miles south of the Alabama/Tennessee border. It lies in the southern extremities of the Appalachians on the Cumberland Plateau. The area is surrounded by hills, and a few mountains and the Tennessee River runs through the southern part of Madison County.

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 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 counties (Limestone, Lawrence, and Morgan) in the Huntsville CSA are in the jurisdiction of the State air program under the purview of the ADEM. Adjacent to the Huntsville MSA is the Decatur MSA consisting of Morgan and Lawrence Counties. The Huntsville CSA consists of the following four counties: Lawrence, Limestone, Morgan, and Madison. The State of Alabama holds jurisdiction within Madison County, in which the State's monitor is located, which supports representative data for Madison County being recommended as the 8-hour nonattainment boundary. The monitor in Decatur supports representative data for the recommendation that Morgan County be excluded as an 8-hour ozone nonattainment area. Discussion elsewhere in this document demonstrates the State's recommendations for exclusion of the Lawrence and Limestone counties of the Huntsville CSA 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. Throughout the 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 (PSD) regulations for protection of degradation of clean air areas.

Additionally, the EPA required a NO_X SIP Call for 22 states, including Alabama that beginning in 2004, resulted in large reductions in NO_X emissions from major utilities, large industrial boilers, gas turbines and cement kilns. Alabama's NOx SIP was approved by EPA on July 16, 2001. EPA recently issued a rule known as the Clean Air Interstate Rule (CAIR) for 28 states, including Alabama, that, when fully implemented, will reduce SO2 emissions in these states by over 70 percent and NOx emissions by over 60 percent from 2003 levels. Phase I of CAIR begins in 2009 and Phase II in 2015. Alabama's CAIR SIP was approved by EPA on October 1, 2007. At the national level, EPA has finalized the Tier 2 vehicle/national fuel standards, which took effect beginning in 2004. The States have already begun to realize the benefits of cleaner vehicles with the National Low Emission Vehicle standards with the 2001 MY vehicles.

K. Regional Emission Reductions

ASIP has performed CMAQ Modeling to estimate the impact of implementing several "on the books" regional and local controls. These controls include: CAIR, NOX SIP Call, North Carolina Clean Smokestacks Act, Consent Agreements, One-Hour Ozone SIPs, Heavy duty diesel engine standards, highway diesel fuel control, Large Spark Ignition and Recreational Vehicle Rule, Nonroad Diesel Rule, VOC MACT Standards and Tier II national fuel standards. EPA recently promulgated a rule known as the Clean Air Interstate Rule (CAIR) for 28 states, including Alabama. Phase I of CAIR begins in 2009 and Phase II in 2015. Alabama's CAIR SIP was approved by EPA on October 1, 2007. All of these programs will collectively result in substantial reductions in emissions of NOx and VOC.

The results obtained from ASIP for Alabama demonstrate that the reductions in 8-hour ozone resulting from these national programs will be sufficient to bring all monitored areas of Alabama into attainment of the 8-hour standard beginning in 2012. These results are documented in Attachment 1. Since additional local controls are unlikely to be required in order for Huntsville to meet the NAAQS, it is unnecessary to designate Counties as nonattainment beyond those with monitoring data exceeding the standard. Further, the lack of a nonattainment designation in a county does not preclude ADEM from requiring controls in the county if controls are deemed necessary.

Figure B-1

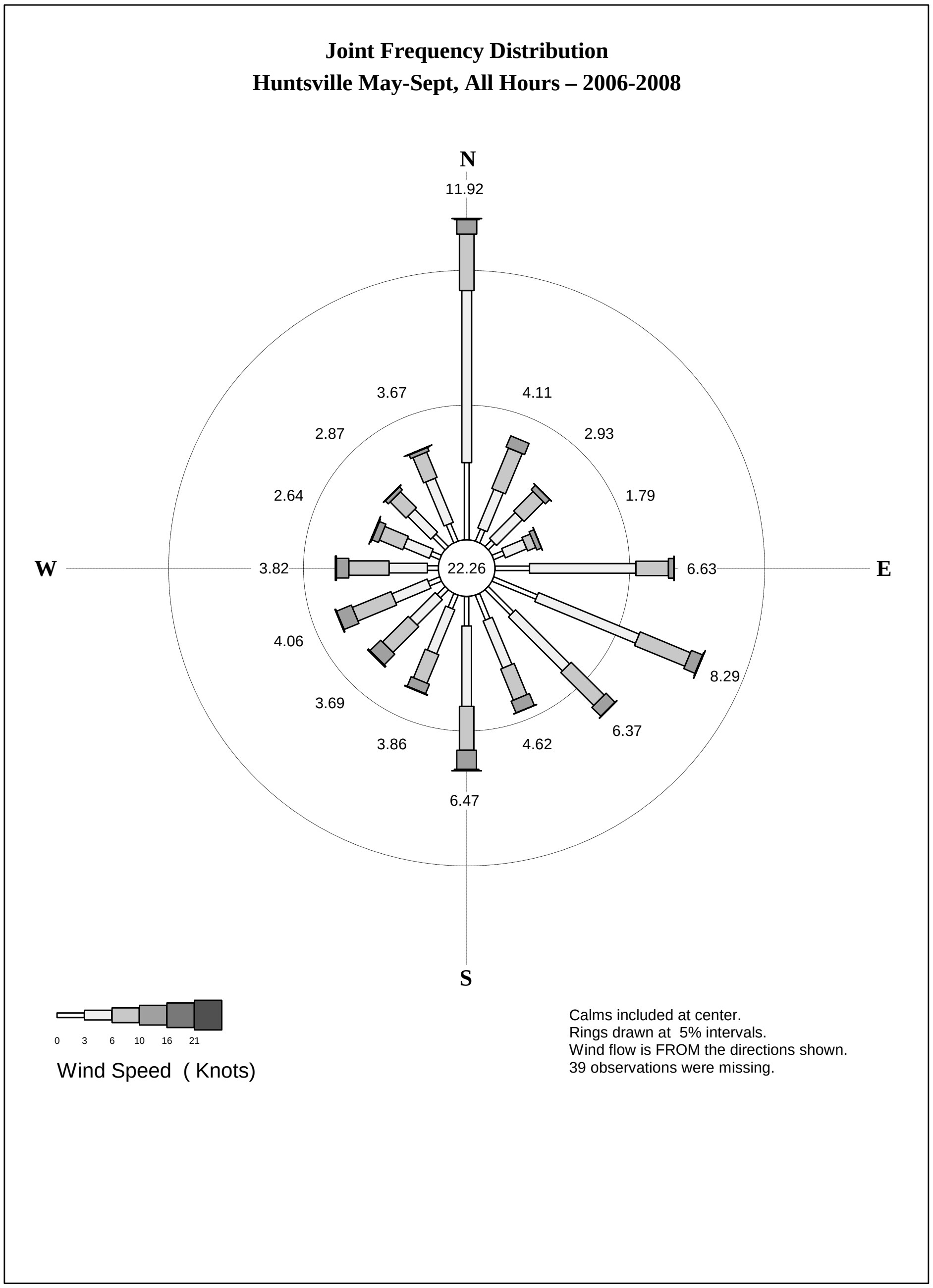

Joint Frequency Distribution
Huntsville May-Sept, All Hours – 2006-2008
N
11.92
3.67
4.11
2.87
2.93
2.64
1.79
W
3.82
22.26
6.63
E
4.06
8.29
3.69
6.37
3.86
4.62
6.47
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
39 observations were missing.

Figure B-2

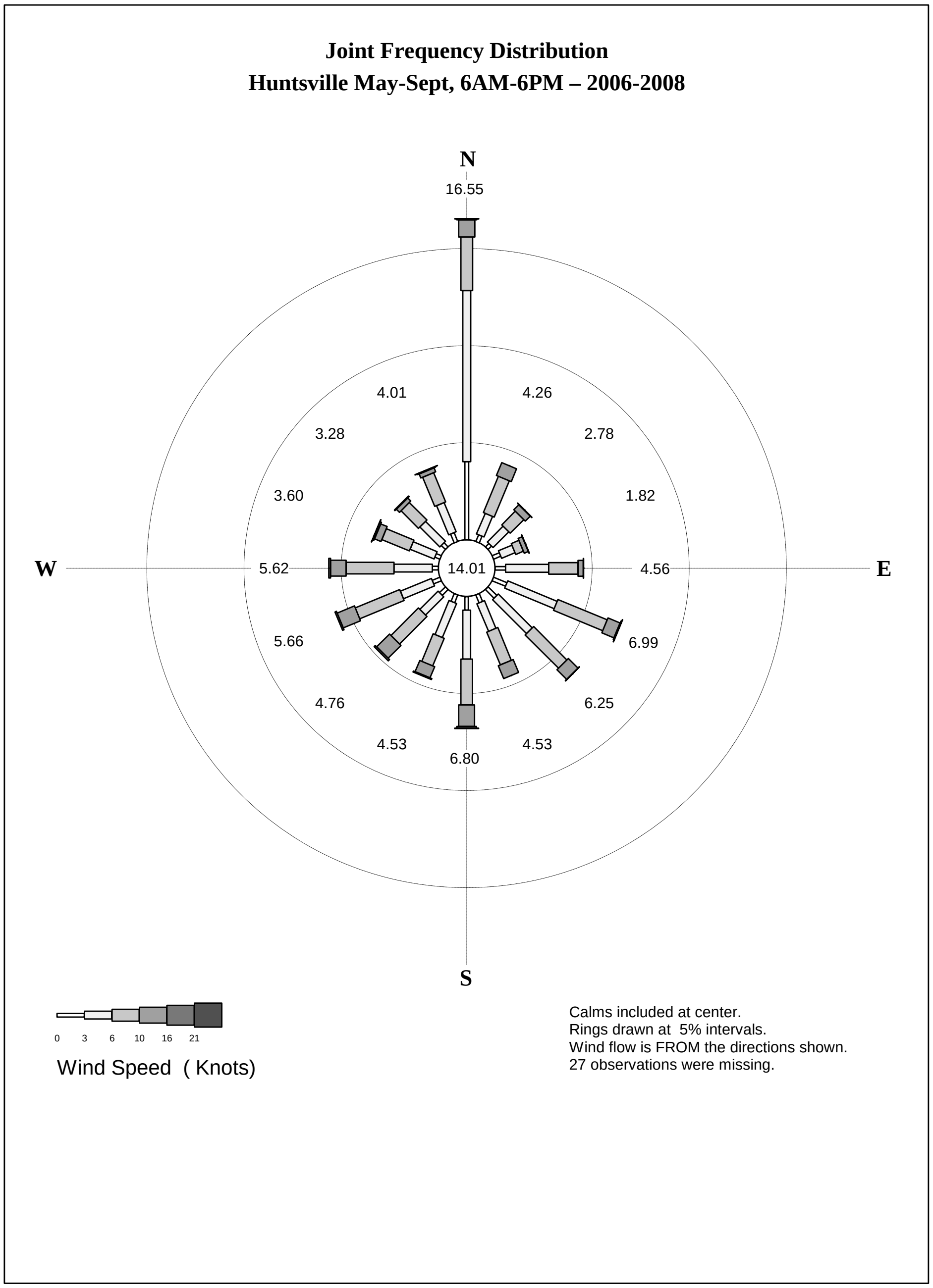

Joint Frequency Distribution
Huntsville May-Sept, 6AM-6PM – 2006-2008
N
16.55
4.01
4.26
3.28
2.78
3.60
1.82
W
5.62
14.01
4.56
E
5.66
6.99
4.76
6.25
4.53
4.53
6.80
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
27 observations were missing.

Figure B-3

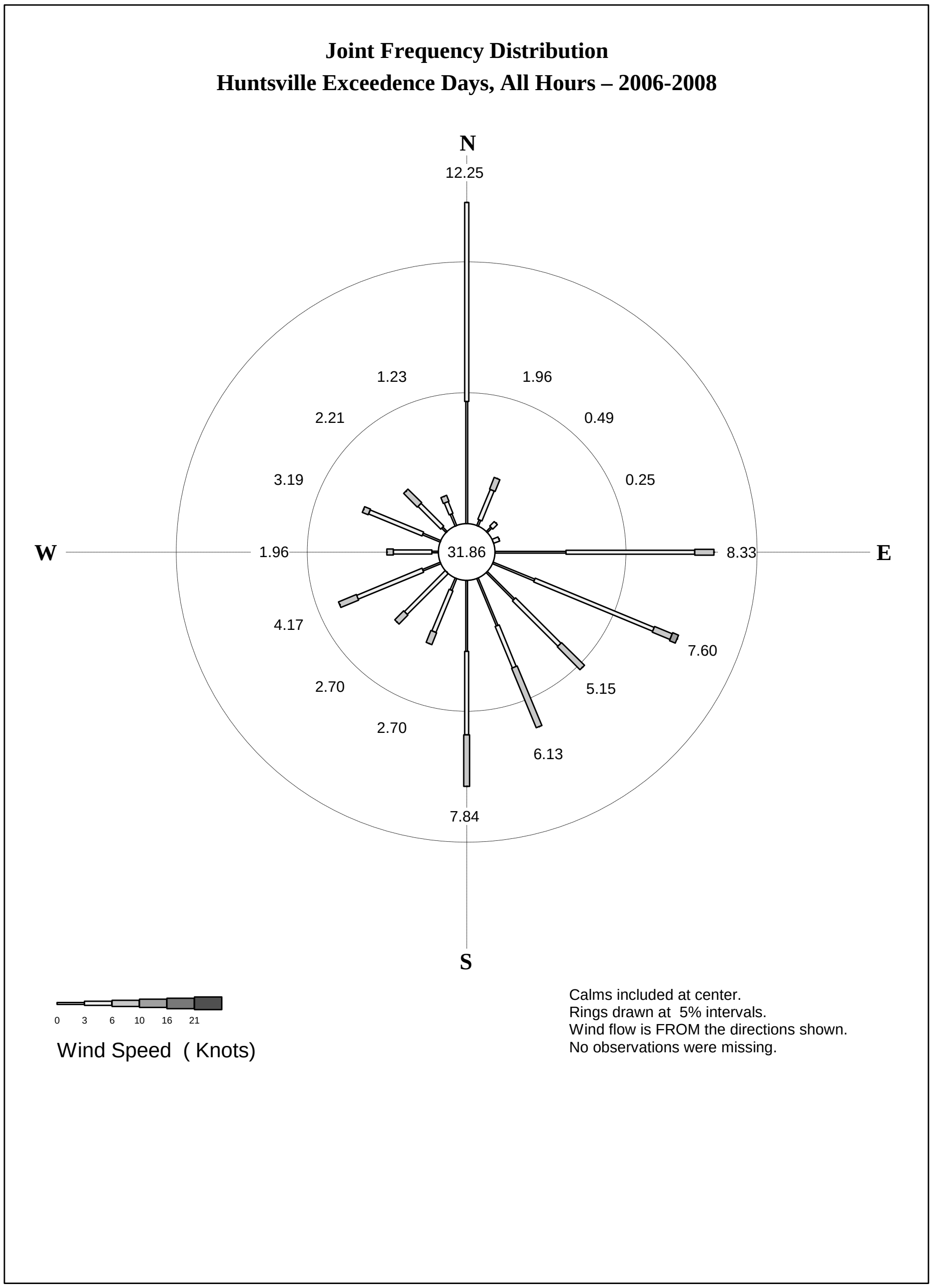

Joint Frequency Distribution
Huntsville Exceedence Days, All Hours – 2006-2008
N
12.25
1.23
1.96
2.21
0.49
3.19
0.25
W
1.96
31.86
8.33
E
4.17
7.60
2.70
5.15
2.70
6.13
7.84
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
No observations were missing.

Figure B-4

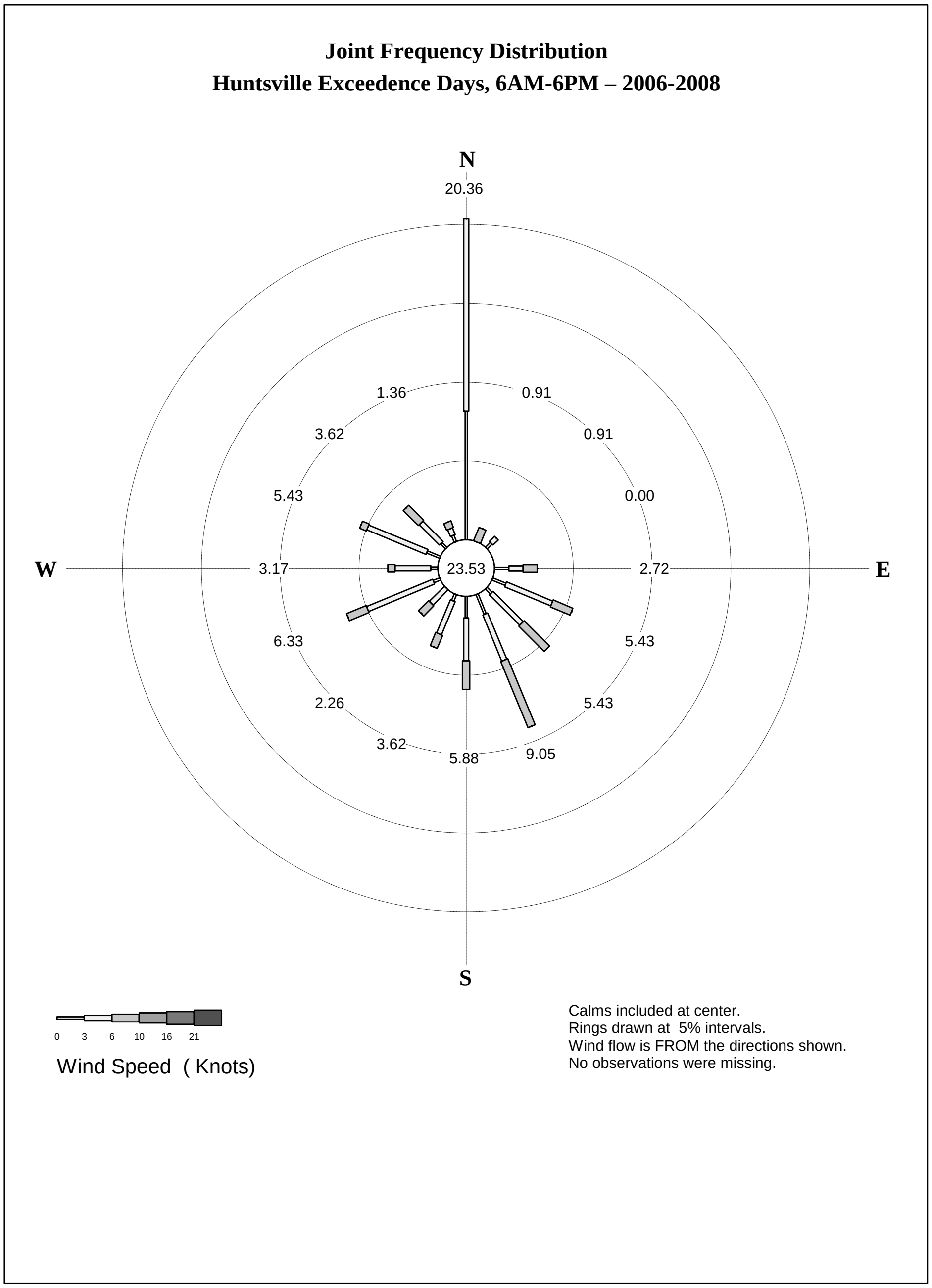

Joint Frequency Distribution
Huntsville Exceedence Days, 6AM-6PM – 2006-2008
N
20.36
1.36
0.91
3.62
0.91
5.43
0.00
W
3.17
23.53
2.72
E
6.33
5.43
2.26
5.43
3.62
5.88
9.05
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
No observations were missing.

Figure B-5

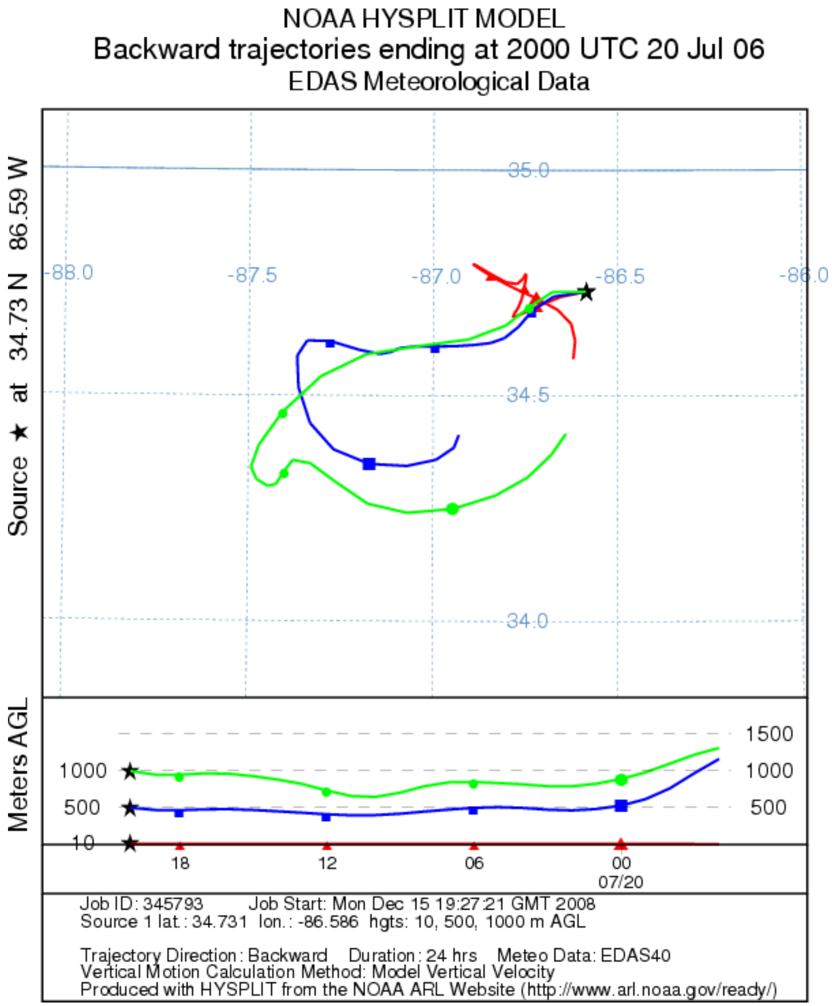


Figure B-6

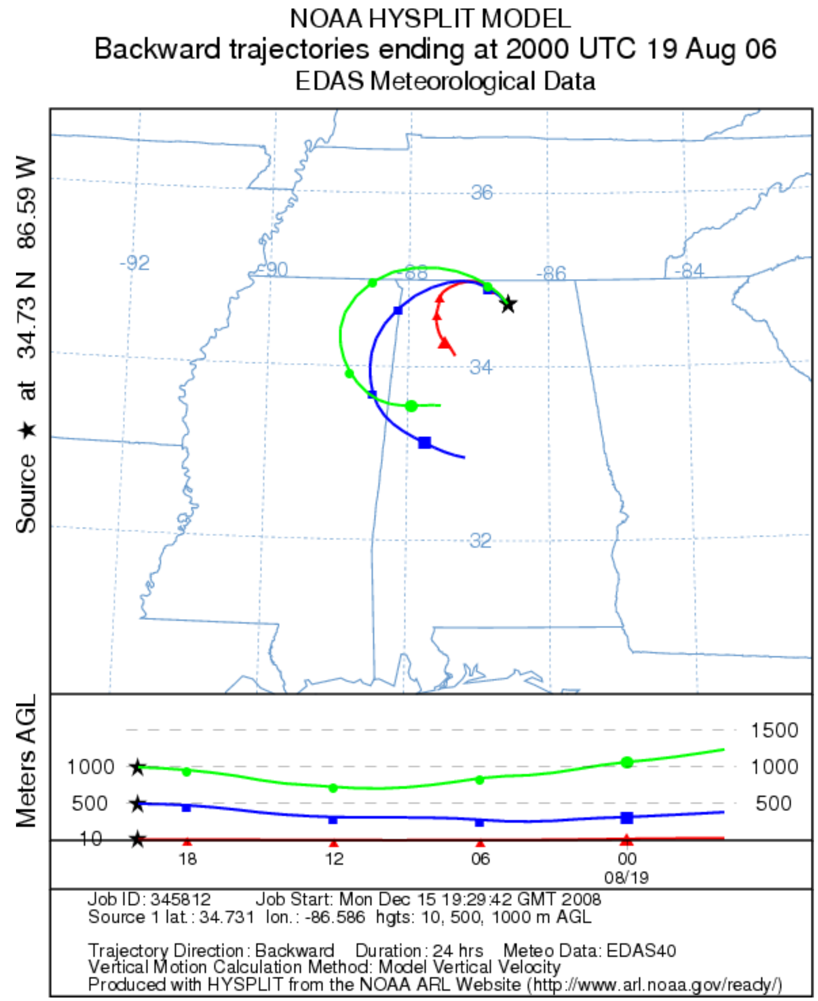


Figure B-7

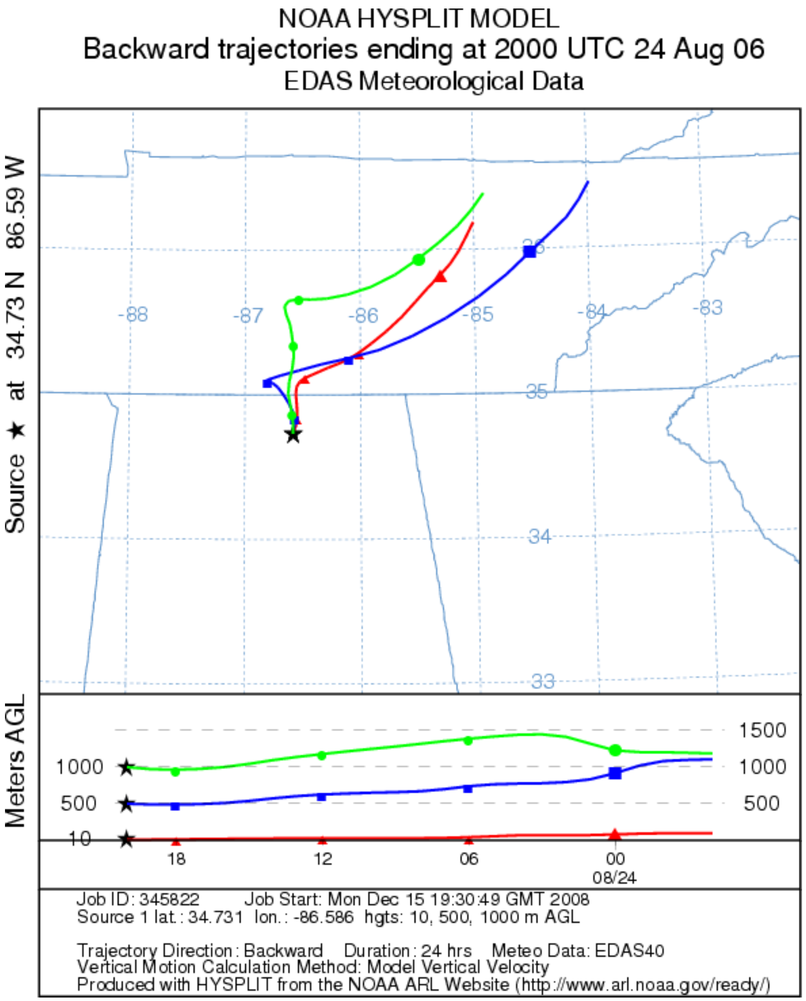


Figure B-8

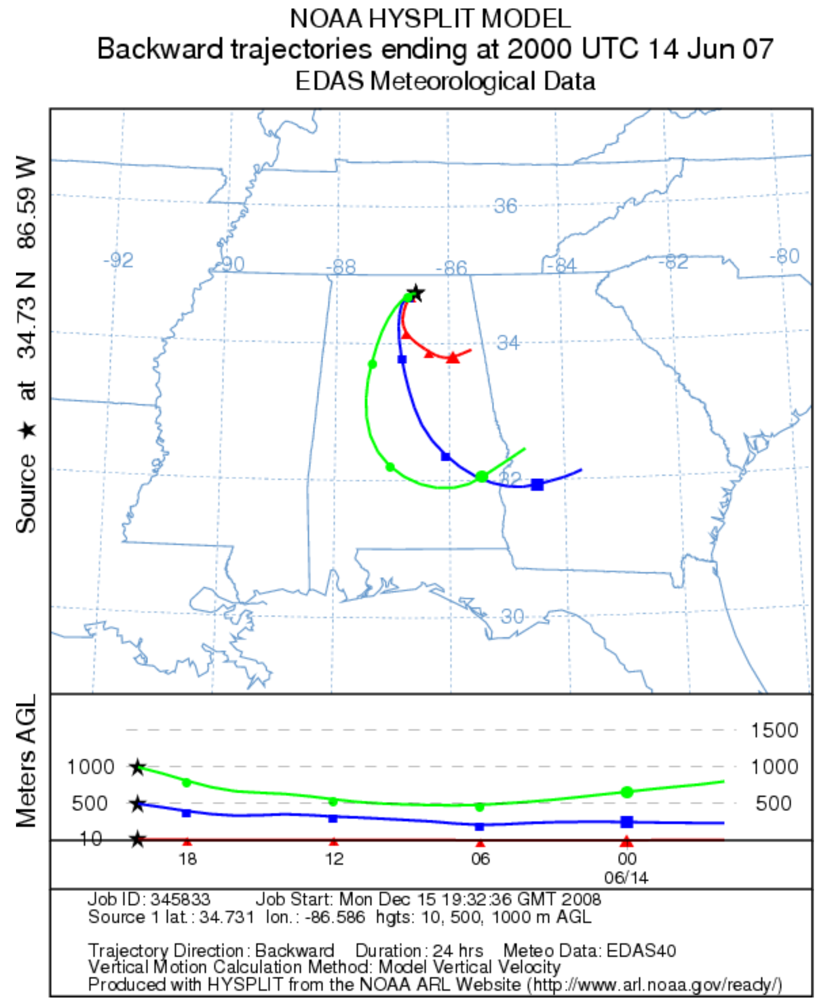


Figure B-9

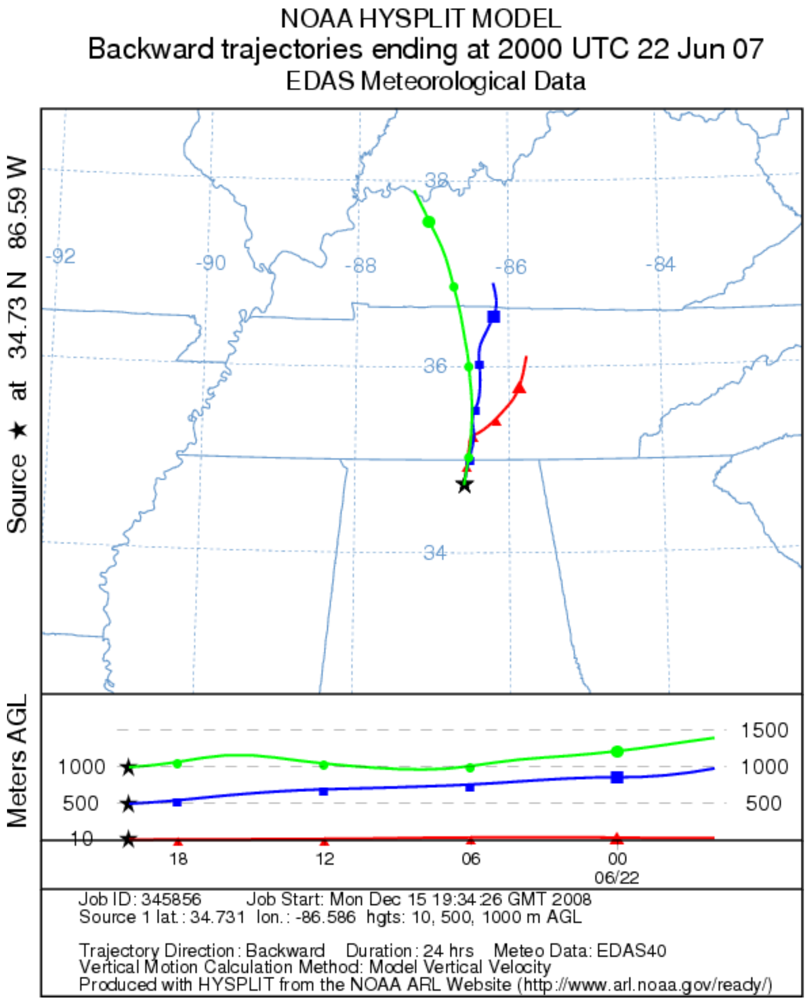


Figure B-10

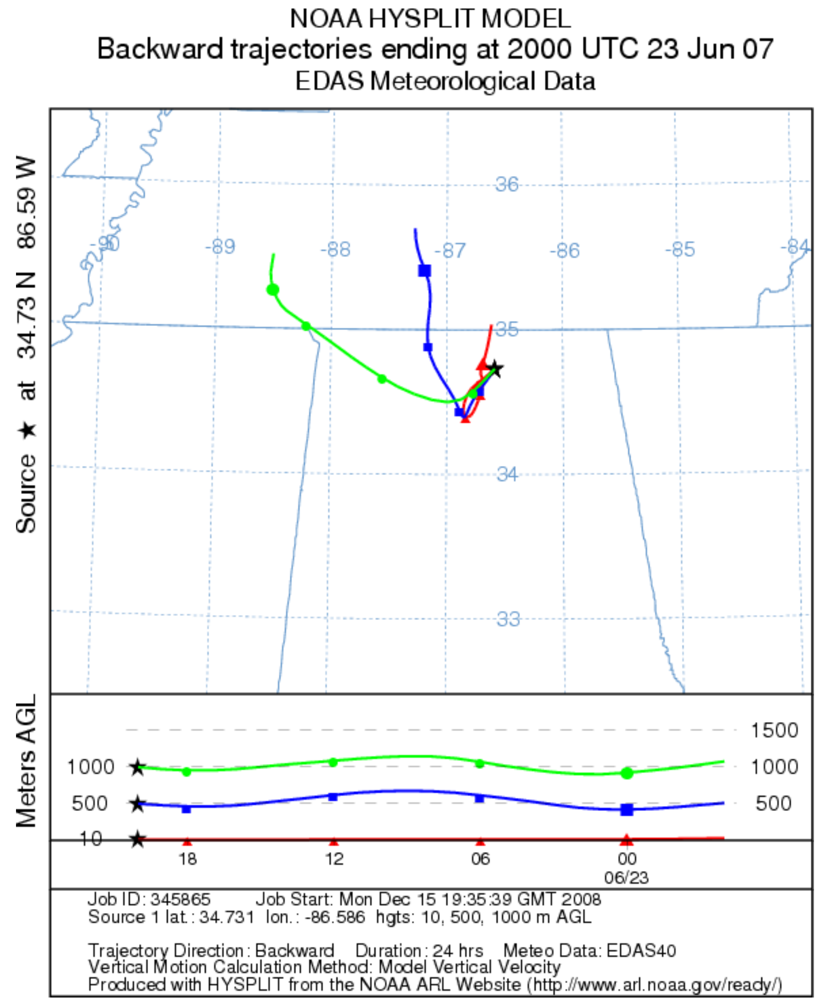


Figure B-11

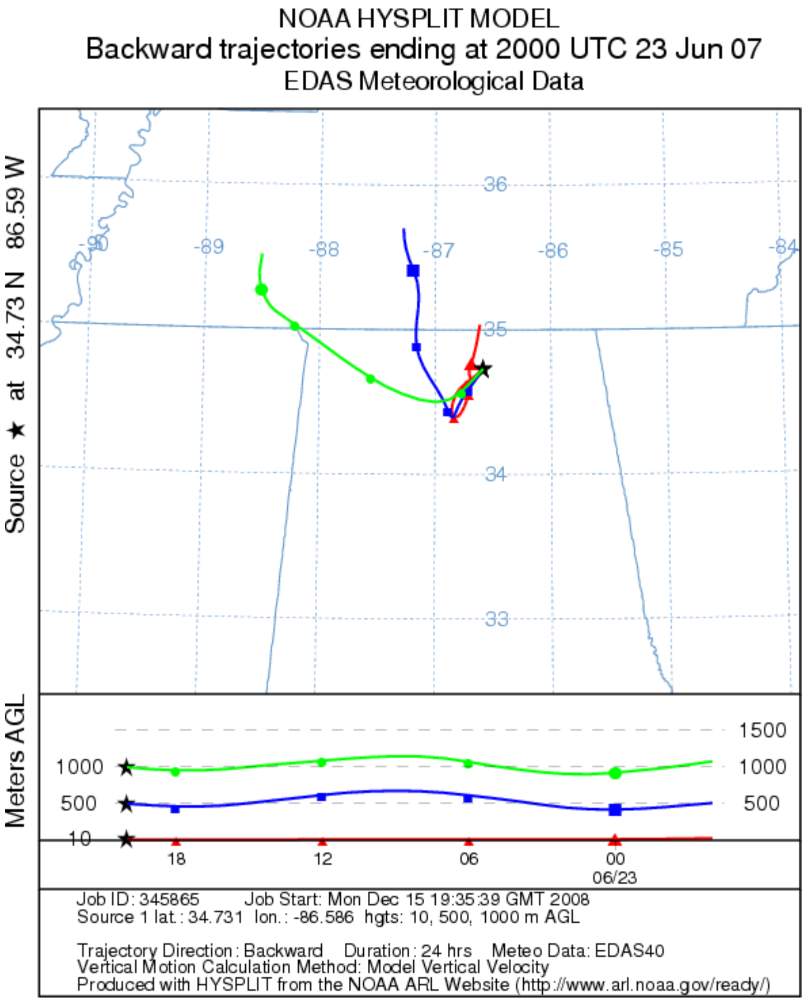


Figure B-12

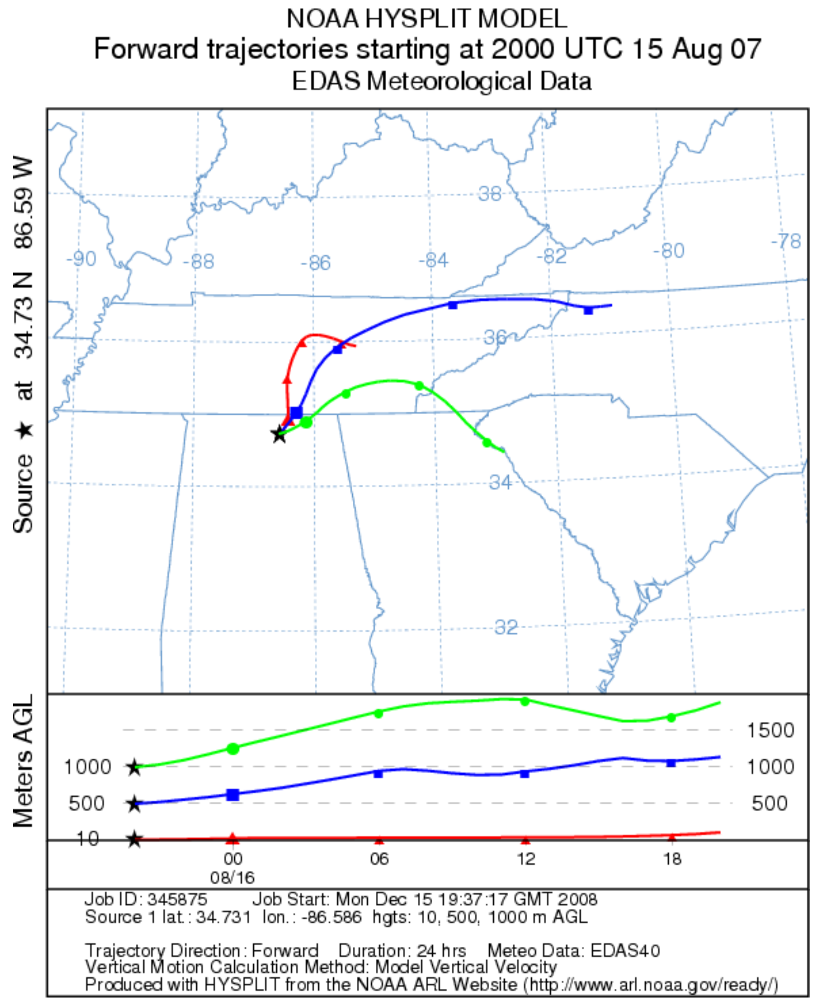


Figure B-13

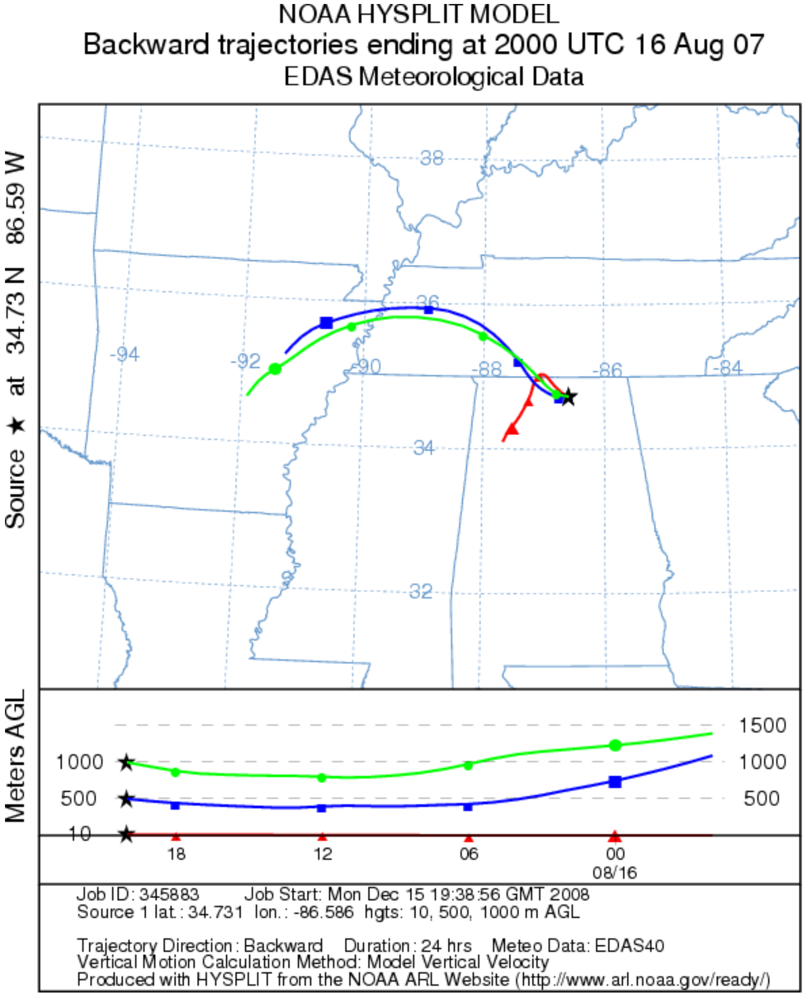


Figure B-14

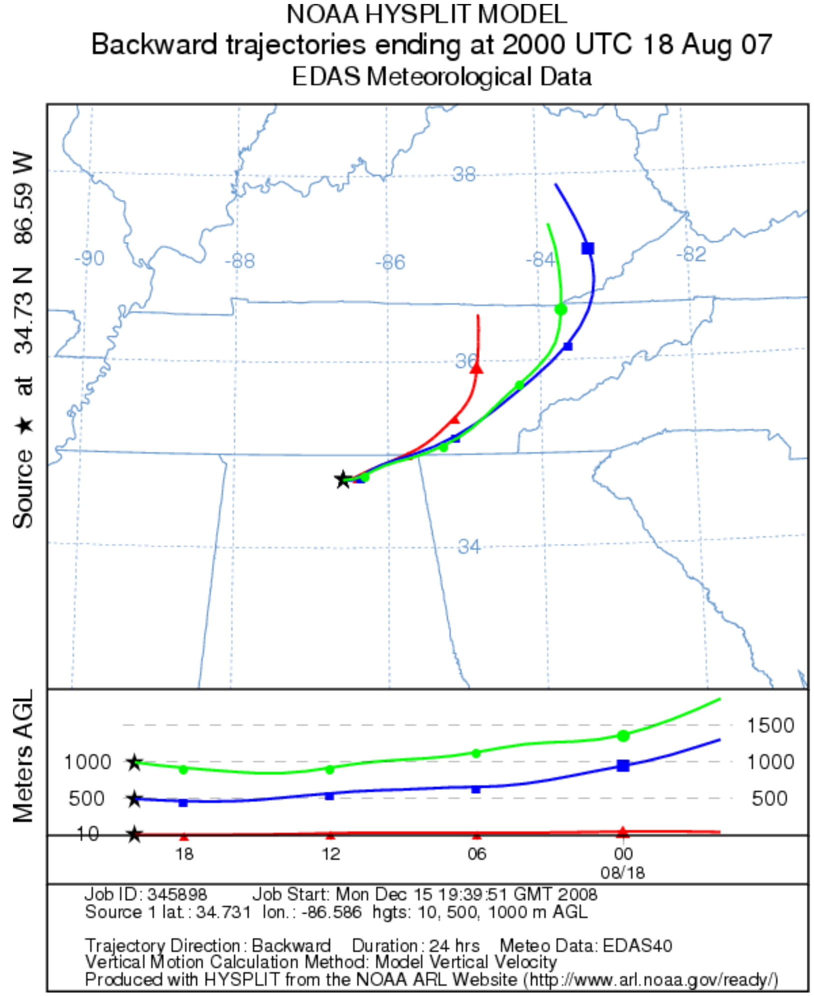


Figure B-15

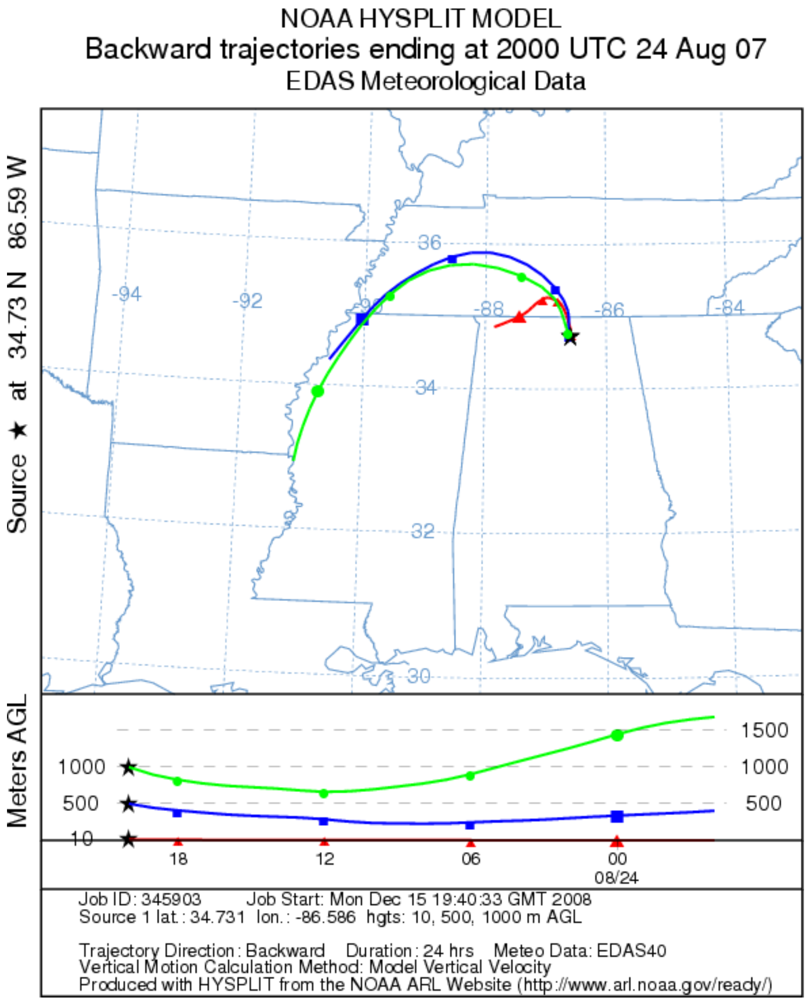


Figure B-16

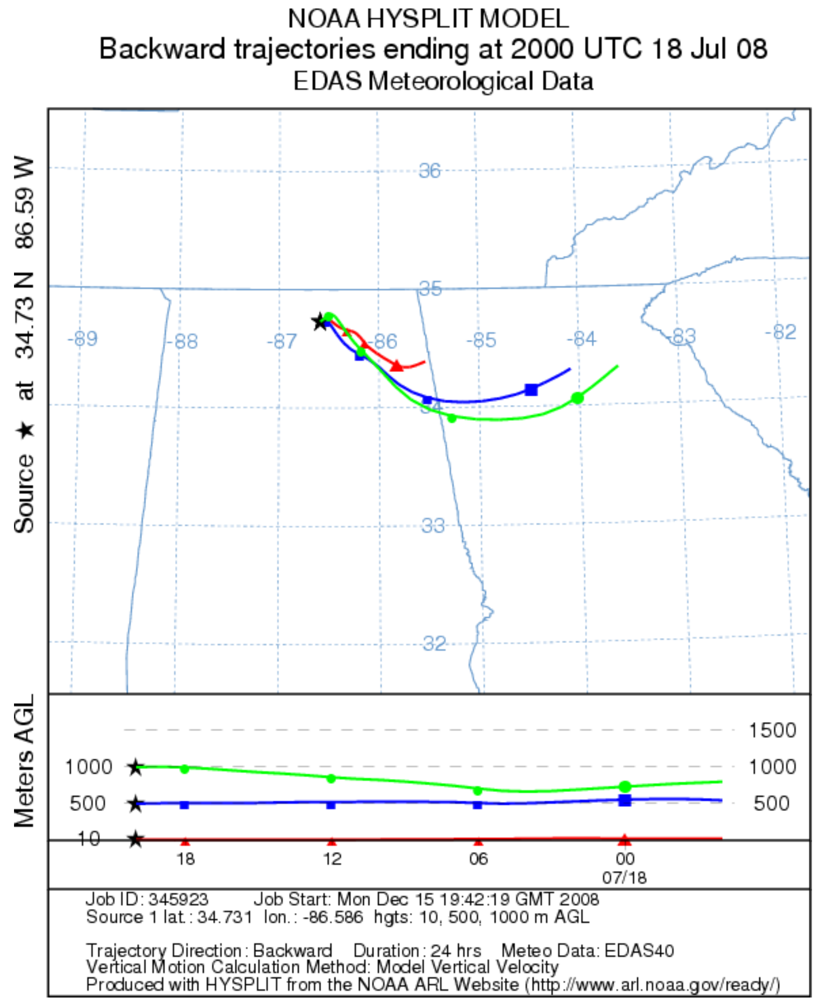
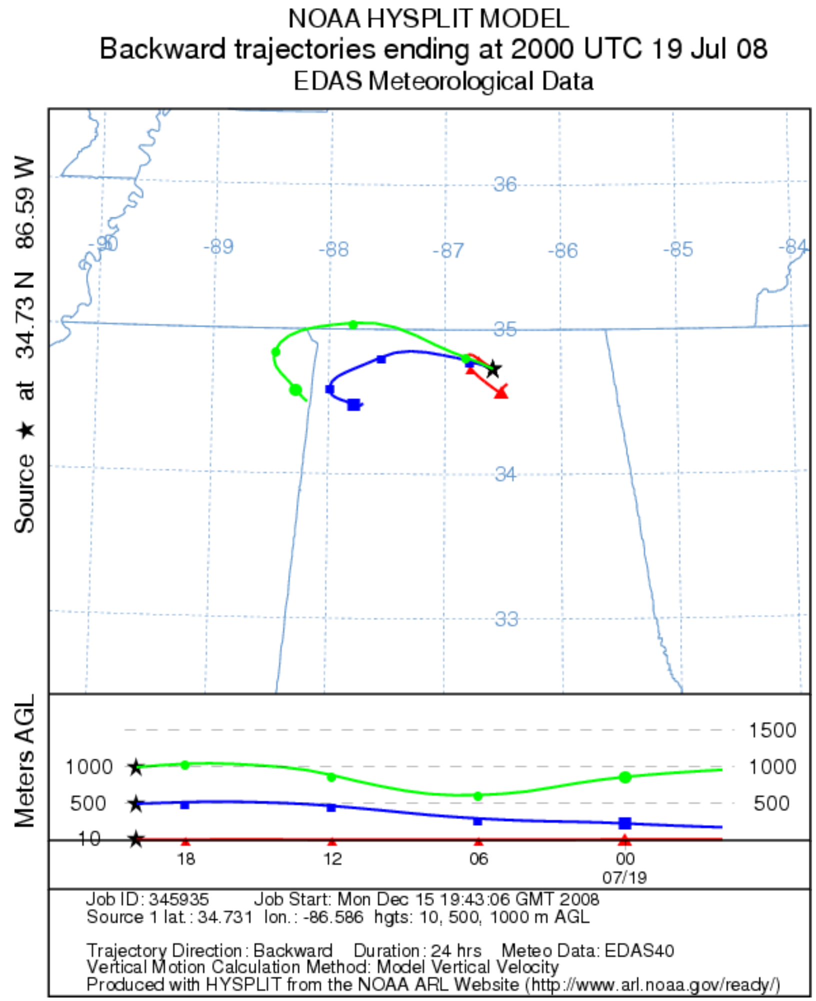


Figure B-17


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 19 Jul 08
EDAS Meteorological Data
Source ★ at 34.73 N 86.59 W
36
35
34
33
-90
-89
-88
-87
-86
-85
-84
Meters AGL
1500
1000
500
10
18
12
06
00
07/19
Job ID: 345935 Job Start: Mon Dec 15 19:43:06 GMT 2008
Source 1 lat.: 34.731 lon.: -86.586 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

Appendix C

ADEM recommends that the Mobile Nonattainment Area for the 8-hour NAAQS for ozone include Mobile and Baldwin Counties, which combine to create the Mobile-Daphne-Fairhope, AL Combined Statistical Area (CSA) as defined by the Office of Management and Budget in November 2007. This CSA includes the Mobile, AL Metropolitan Statistical Area and the Daphne-Fairhope, AL Micropolitan Statistical Area.

In the Robert J. Meyers memo dated December 4, 2008, titled, “Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards,” it is recommended that the Core Based Statistical Area (CBSA), which includes both metropolitan statistical areas and micropolitan areas, or CSAs (which included 2 or more adjacent CBSAs) serve as the presumptive boundary when considering the boundaries of an ozone nonattainment area. EPA recommends this as the presumptive area boundary because the factors used to establish these statistical areas are similar to those factors EPA will use to decide whether a nearby area is contributing to violations of the NAAQS when making nonattainment designations.

Based on 2006-2008 monitoring data, the three monitors located in the Mobile-Daphne-Fairhope, AL CSA all violated the 8-hour ozone NAAQS. Two of the monitors are located in Mobile County and one of the monitors is located in Baldwin County. Monitoring data for the area is shown in the table below. Therefore, ADEM submits that by recommending the entire two-county CSA, EPA’s recommendations for adequate and appropriate nonattainment area recommendations have been met. It should be noted that Baldwin County is the largest county in the State of Alabama in terms of geographic coverage.

Table 1 Mobile CSA Ozone Monitoring Data

County	AIRS ID	Site	2006 4th Max (ppm)	2007 4th Max (ppm)	2008 4th Max (ppm)	3 Year Average (ppm)
Mobile	01-097-2005	Bay Road	0.08	0.081	0.07	**0.077**
Mobile	01-097-0003	Chickasaw	0.085	0.077	0.076	**0.079**
Baldwin	01-003-0010	Fairhope	0.081	0.078	0.072	**0.077**

Figure 1 Mobile CSA

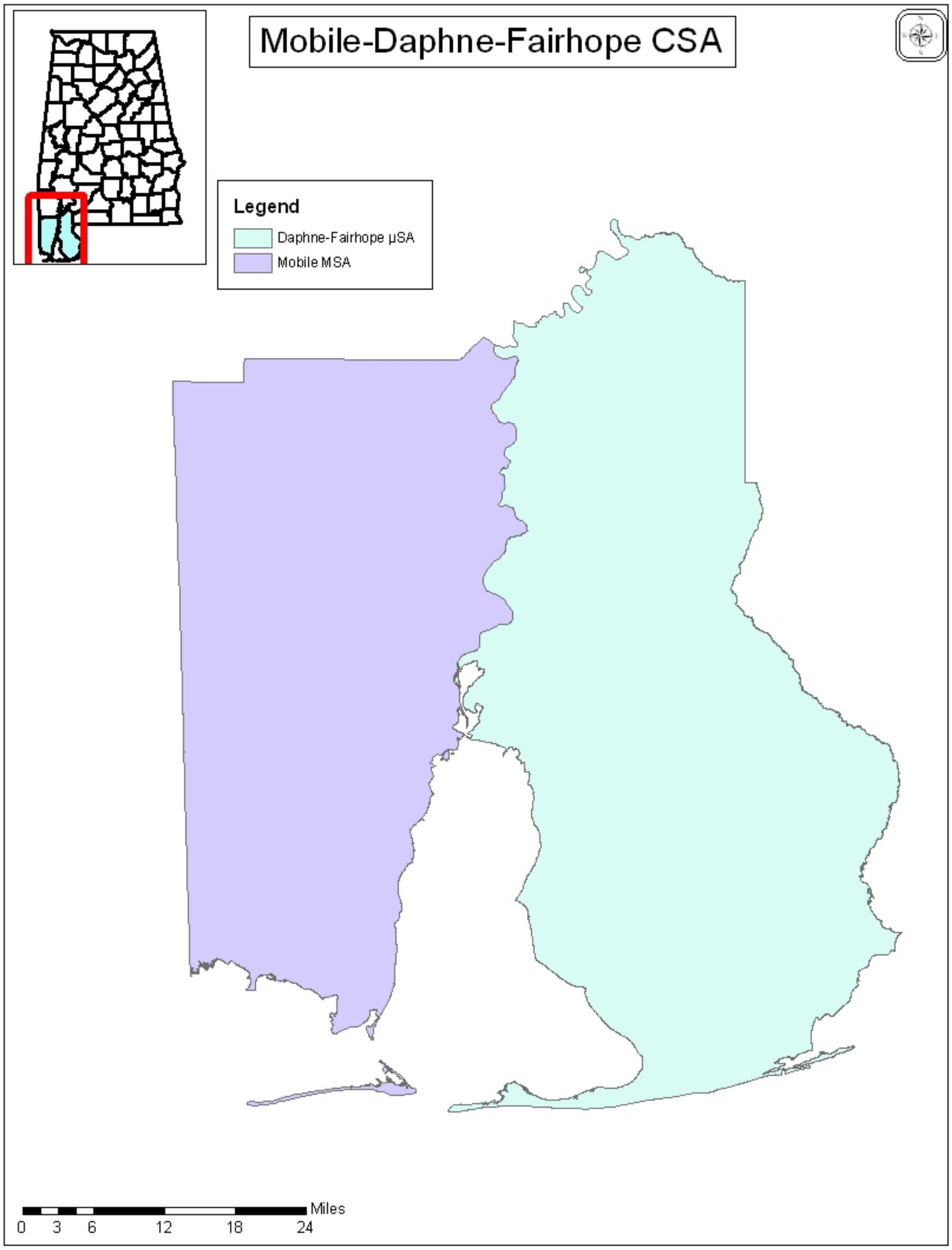


Figure 2 Ozone Monitoring Site in the Mobile

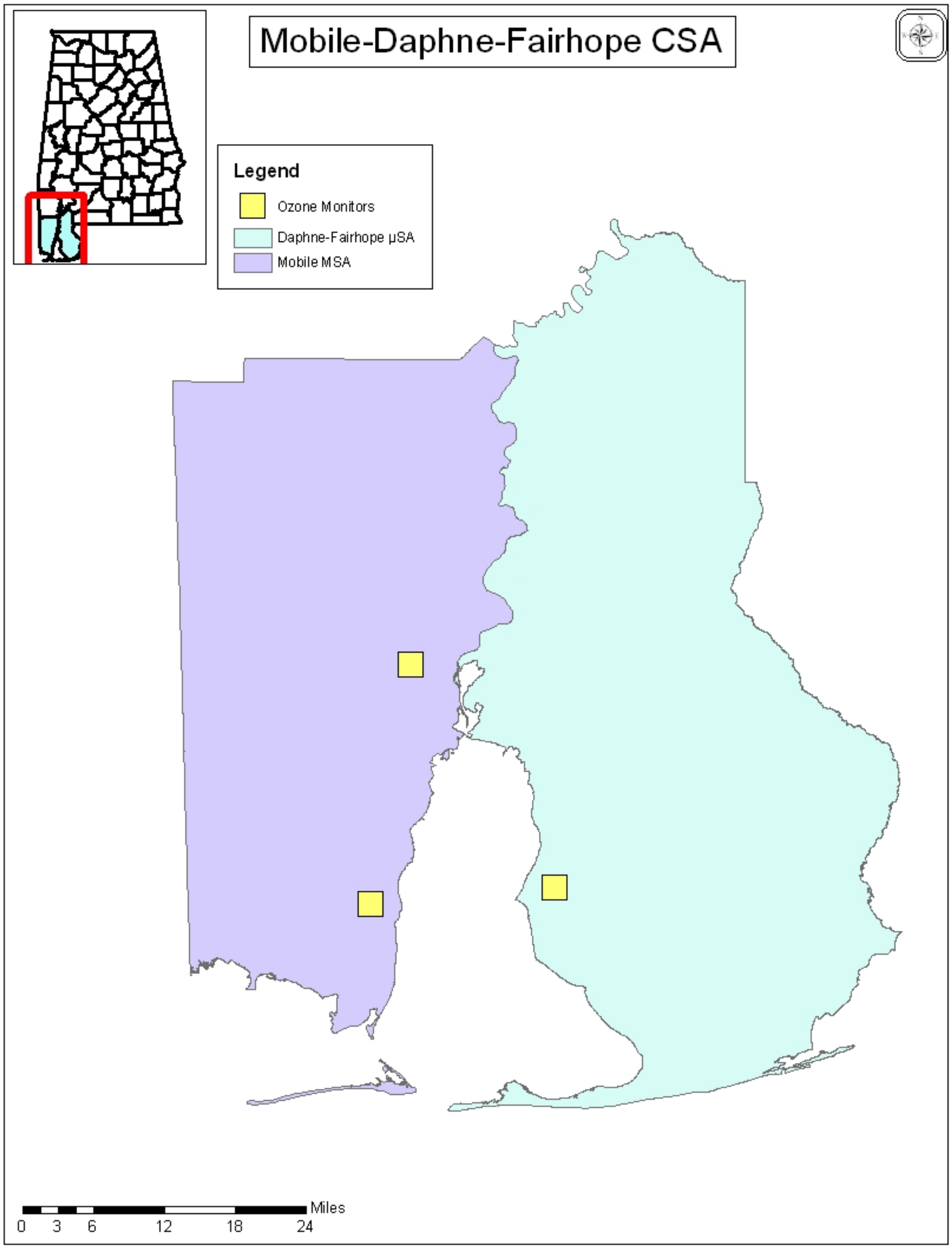
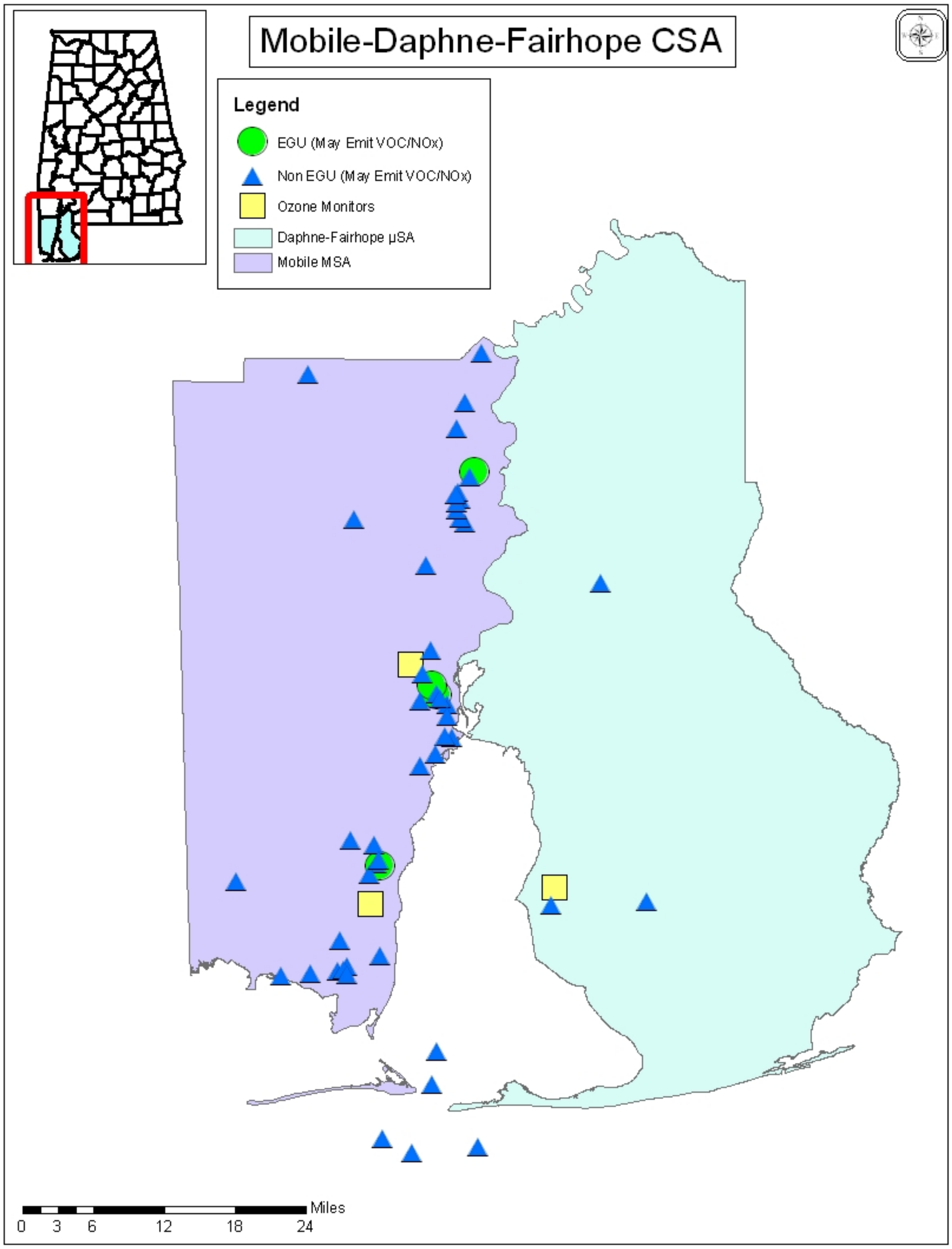


Figure 3 Locations of Large Point Sources in the Mobile CSA



Appendix D

The Columbus-Auburn-Opelika, GA-AL CSA contains the Columbus MSA (Russell County, AL, Muscogee County, GA, Chattahoochee County, GA, Harris County, GA, and Marion County, GA), the Auburn-Opelika MSA (Lee County, AL) and the Tuskegee µSA (Micropolitan Statistical Area) (Macon County, AL). There are three ozone monitors located in the Columbus-Auburn-Opelika, GA-AL CSA, with the monitor in noncompliance being the Columbus Airport monitor (13-215-0008) in Muscogee County, GA (See Figure 1). The only Alabama county in the Columbus-Auburn-Opelika GA-AL CSA with an ozone monitor is Russell County, which is in compliance with the 8-hour Ozone standard. EPA guidance dated December 4, 2008, recommends that the Core Based Statistical Area (CBSA, which is a MSA or a µSA) or Combined Statistical Area (CSA, which includes 2 or more adjacent CBSA's) serve as the starting point or "presumptive" boundary for establishing the geographic boundaries of an ozone nonattainment area. Accordingly, ADEM recommends that the Columbus nonattainment area for the 8-hour ozone NAAQS not include the following Alabama counties: Macon, Lee, or Russell. The December 4, 2008, guidance requires states to address how certain factors affect the drawing of the nonattainment boundary. Therefore, a discussion of these factors for the Columbus-Auburn-Opelika GA-AL CSA is provided in this Appendix.

The factors that provide the most compelling evidence to exclude Russell County, AL from the Columbus nonattainment area are listed below:

- Air Quality Monitoring data (Russell County has an attaining Ozone Monitor)
- Level of control of emission sources
- Emissions Data (Locations of sources and contribution to ozone concentrations-Russell County, AL has less NO_x and VOC emissions than Muscogee County, GA where the violating ozone monitor is located)
- Regional emission reductions

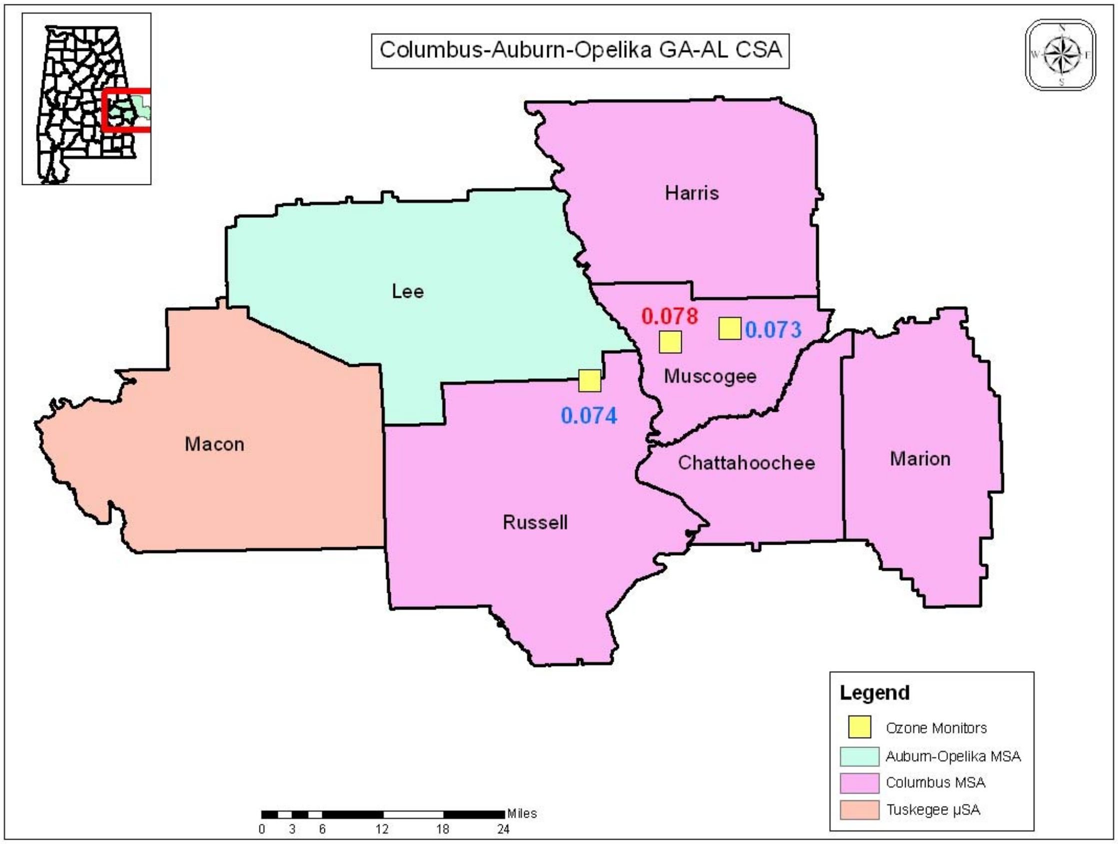
The factors that provide the most compelling evidence to exclude Macon County, AL from the Columbus nonattainment area include:

- Population density and degree of urbanization (Including commercial development)
- Emissions Data (Locations of sources and contribution to ozone concentrations-Macon has no major Point Sources)
- Location of emission sources (i.e. the lack of significant area, mobile, and non-road sources)
- Daily VMT
- Level of control of emission sources
- Regional emission reductions

The factors that provide the most compelling evidence to exclude Lee County from the Columbus nonattainment area include:

- Total annual emissions of NOx and VOC
- Population density and degree of urbanization (Including commercial development)
- Daily VMT
- Level of control of emission sources
- Regional emission reductions

Figure 1 The Columbus-Auburn-Opelika GA-AL CSA (units are ppm)



A. Emissions data for the Columbus-Auburn-Opelika GA-AL CSA

The counties in the Columbus-Auburn-Opelika GA-AL CSA are depicted in Figure 2. To evaluate emissions for the Columbus-Auburn-Opelika GA-AL CSA, ADEM obtained the 2005 NEI version 1 annual NOx and VOC emission estimates from EPA. Table 1 lists these emissions, which include all anthropogenic sources (i.e. point, area, mobile, and non-road mobile) for the Columbus-Auburn-Opelika GA-AL CSA. Further discussion of the location of the emission sources can be found in Section D.

Figure 2 The Columbus-Auburn-Opelika GA-AL CSA

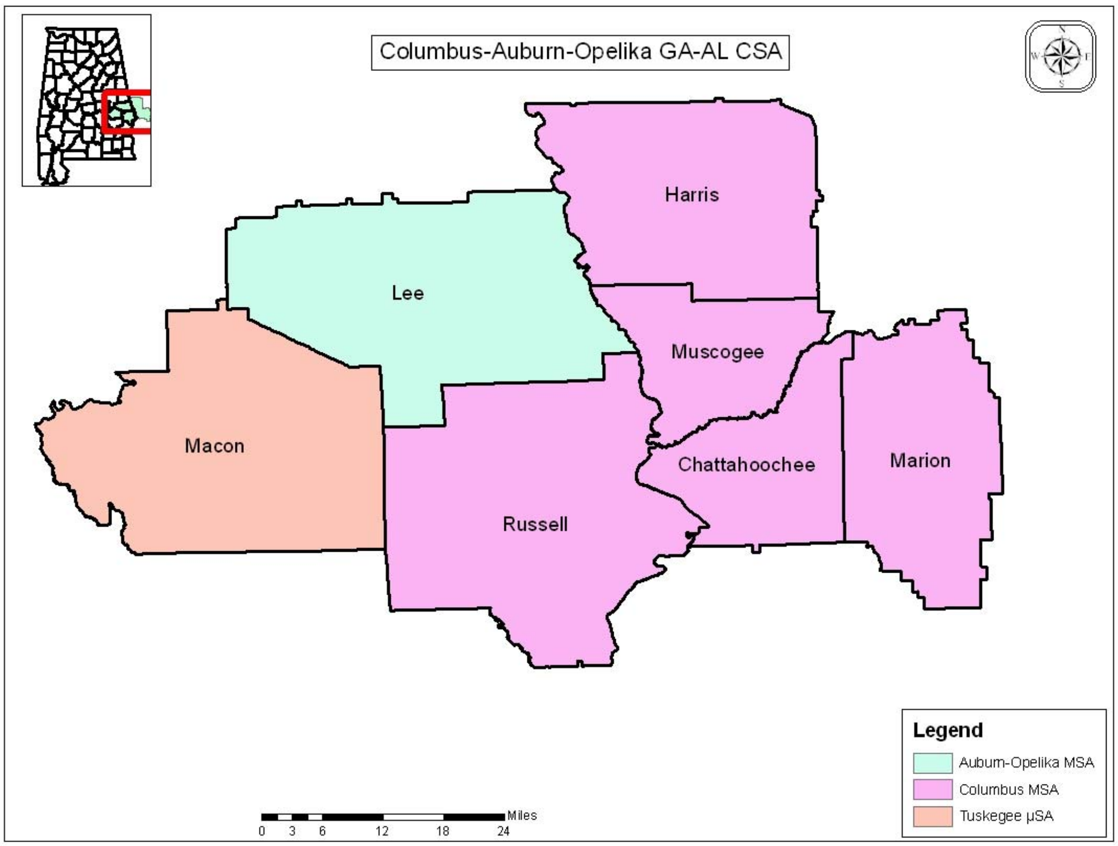


Table 1 Annual Emissions for the Columbus-Auburn-Opelika GA-AL CSA

County	2005 Annual VOC Emissions (Tons)	Ranking for VOC	2005 Annual NOx Emissions (Tons)	Ranking for NOx
Muscogee [M]	12,385	1	6,540	1
Russell [M]	8,552	2	4,977	2
Lee	6,650	3	4,490	3
Macon	4,186	4	1,740	4
Harris	2,246	5	1,593	5
Chattahoochee	1,246	6	576	6
Marion	901	7	435	7

[M] County has an ozone monitor

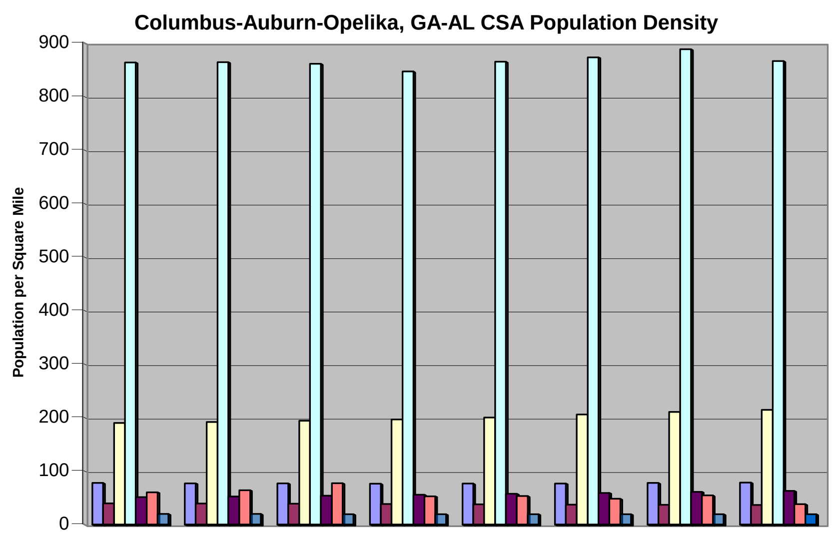
As shown in Table 1, NO_x and VOC emissions in Muscogee County, GA, where the violating ozone monitor (the Columbus Airport monitor) is located, ranked number one of the counties in the Columbus-Auburn-Opelika GA-AL CSA. Russell County, AL ranks number two, but its ozone monitor is in compliance with the 8-hour ozone NAAQS. As noted in Attachment 1 and seen in Figure 1, the Muscogee County ozone monitor located at the Columbus Crime Lab is also in compliance. Lee County, AL and Macon County, AL have NO_x and VOC emissions that are even less than those of Russell County. Section G of this appendix concludes that winds infrequently blow from the direction of Russell, Lee and Macon counties on high ozone days in Columbus and Phenix City. This suggests that regional emissions are more important than local emissions in the formation of ozone in the local area. Further, it is unlikely that emissions in Lee and Macon Counties are substantial enough to produce an exceedance of the ozone NAAQS or to significantly contribute to nonattainment in nearby counties.

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 2000 to 2007 population estimates for the Columbus-Auburn-Opelika GA-AL CSA from the Alabama State Data Center[1] and the State of Georgia. Information on business data (i.e. retail employment and manufacturing employment) was obtained from the U.S. 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 3 depicts the population densities for the counties in the Columbus-Auburn-Opelika GA-AL CSA. Muscogee County, GA ranks highest with all the other CSA counties being much lower. <u>The population density factor fortifies the recommendation to exclude Russell, Lee, and Macon Counties from the Columbus nonattainment area.</u>

Figure 3 Population Densities for the Columbus-Auburn-Opelika GA-AL CSA



	2000	2001	2002	2003	2004	2005	2006	2007
Russell	77	77	77	76	76	77	77	78
Macon	39	39	39	38	38	37	37	37
Lee	190	192	194	196	200	206	210	214
Muscogee	863	864	861	847	865	873	888	866
Harris	51	52	54	56	57	59	61	63
Chattahoochee	60	64	77	53	53	48	54	38
Marion	20	19	19	19	19	19	19	19

[1] 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 2000 and 2007 population estimates. Population data is also presented in Figures 4 and 5. Muscogee County makes up 42.9% of the CSA population while Russell and Macon AL Counties make up only 11.5% and 5.1%. This factor supports excluding Russell and Macon Counties from the NAA.

With the exception of Muscogee County, GA, Lee County's population is higher than the other counties in the CSA; however, it is important to note that Auburn University is located in Lee County. In 2007, student enrollment was 24,137, and the number of university employees was 9,554. While population figures for Lee County are higher than that of Russell or Macon County, it is important to note that 33,691 members of the population in Lee County could be attributed to this institution, and most do not commute outside of the area on a regular basis. Also, this institution is located in the western portion of Lee County. It should also be noted that the land area of Lee County is 2.8 times larger than the land area of Muscogee County.

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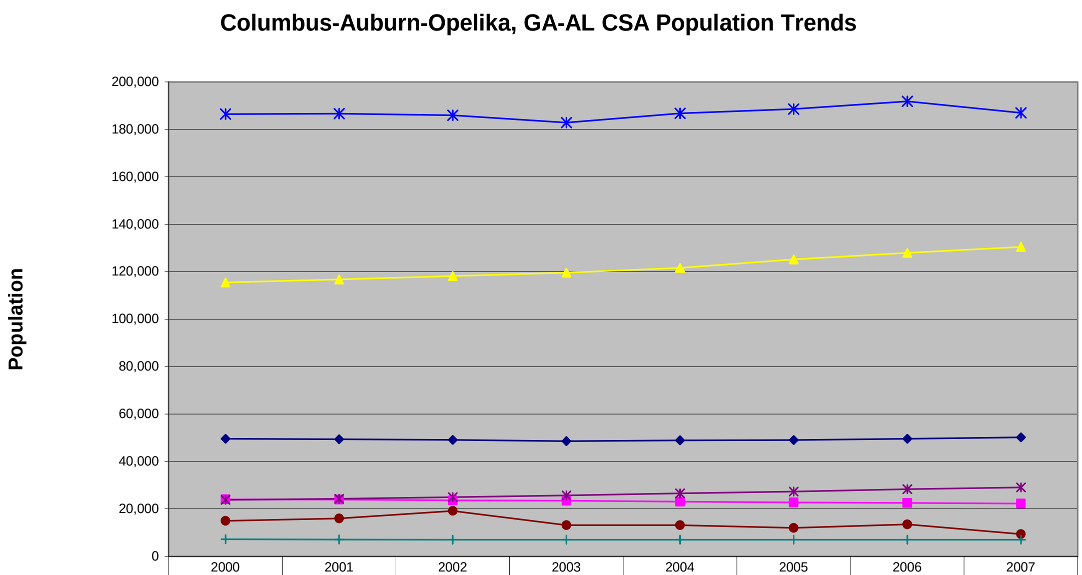
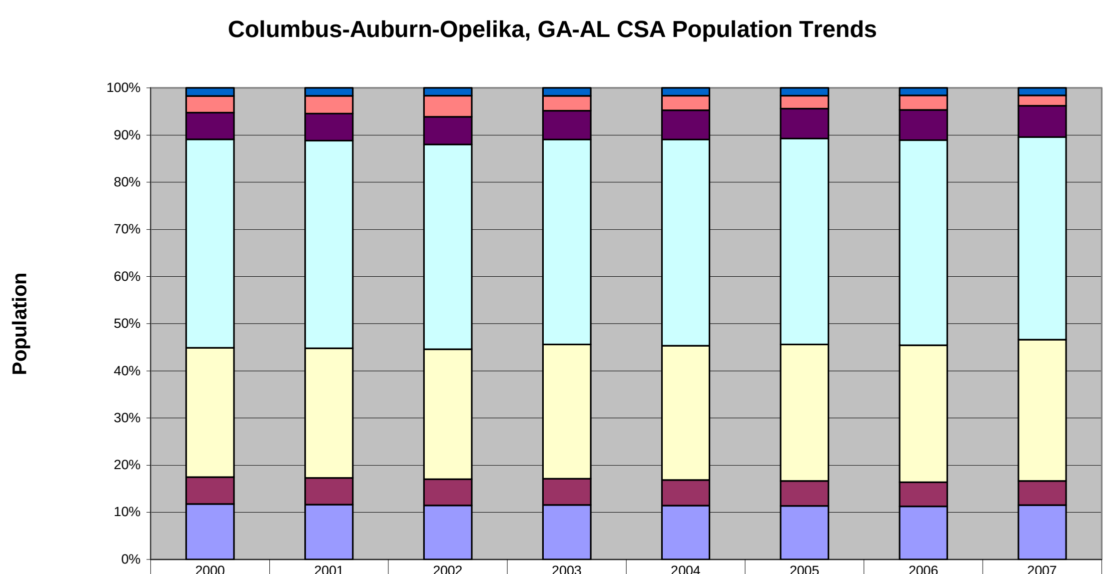
Table 2 Columbus-Auburn-Opelika GA-AL CSA Population

County	2000	2007	Population Change (2000-2007)	% Change	% of CSA 2007 Population
Muscogee	186,502	187,046	544	0.3%	42.9%
Lee	115,540	130,516	14,976	13.0%	30.0%
Russell	49,663	50,183	520	1.0%	11.5%
Harris	23,796	29,073	5,277	22.2%	6.7%
Macon	24,076	22,336	-1,740	-7.2%	5.1%
Chattahoochee	14,993	9,430	-5,563	-37.1%	2.2%
Marion	7,179	7,024	-155	-2.2%	1.6%
Total	421,749	435,608	13,859	3.3%	100.0%



	2000	2001	2002	2003	2004	2005	2006	2007
Russell	49,663	49,377	49,161	48,654	48,949	49,059	49,661	50,183
Macon	24,076	23,982	23,657	23,480	23,054	22,752	22,558	22,336
Lee	115,540	116,768	118,196	119,609	121,661	125,272	128,033	130,516
Muscogee	186,502	186,637	185,969	182,877	186,812	188,634	191,840	187,046
Harris	23,796	24,323	24,976	25,753	26,541	27,363	28,313	29,073
Chattahoochee	14,993	15,979	19,196	13,147	13,192	11,966	13,485	9,430
Marion	7,179	7,150	7,082	7,035	7,007	7,015	7,048	7,024

Figure 4 Columbus-Auburn-Opelika GA-AL CSA Population Trends



	2000	2001	2002	2003	2004	2005	2006	2007
Marion	7,179	7,150	7,082	7,035	7,007	7,015	7,048	7,024
Chattahoochee	14,993	15,979	19,196	13,147	13,192	11,966	13,485	9,430
Harris	23,796	24,323	24,976	25,753	26,541	27,363	28,313	29,073
Muscogee	186,502	186,637	185,969	182,877	186,812	188,634	191,840	187,046
Lee	115,540	116,768	118,196	119,609	121,661	125,272	128,033	130,516
Macon	24,076	23,982	23,657	23,480	23,054	22,752	22,558	22,336
Russell	49,663	49,377	49,161	48,654	48,949	49,059	49,661	50,183

Figure 5 Population Data for the Columbus-Auburn-Opelika GA-AL CSA

The amount and percent of urbanized population in the Columbus-Auburn-Opelika GA-AL CSA is presented in Table 3. Muscogee County is 97% urban and comprises 42.9% of the Columbus-Auburn-Opelika GA-AL CSA's population, which is predominantly urban. Russell, Lee and Macon Counties are only 64%, 67%, and 50% urban, respectively. This factor fortifies the recommendation to exclude Macon, Russell, and Lee Counties from the Columbus nonattainment area.

Table 3 Urban Population for the Columbus-Auburn-Opelika GA-AL CSA

County Name	Land Area (sq mi)	Urban %	2007 Population	% of CSA Urban Population	Population in Urban Area 2007
Muscogee	216	97.0%	187,046	42.9%	181,435
Lee	609	67.0%	130,516	30.0%	87,446
Russell	641	64.0%	50,183	11.5%	32,117
Macon	611	50.0%	22,336	5.1%	11,168
Chattahoochee	249	79%	9430	2.2%	7,450
Harris	464	3.0%	29,073	6.7%	872
Marion	367	0%	7024	1.6%	0
	3157		435,608	100.0%	320,487

Tables 4, 5, and 6 show the trends in Total Employment, Manufacturing Employment, and Retail Employment, respectively, for the counties in the Columbus-Auburn-Opelika GA-AL CSA. Figure 6 demonstrates that Muscogee County, GA has 57% of the total employees for the CSA, which is twice as much the next county (Lee County, AL). As previously documented, Auburn University is the largest employer in Lee County. The number of total employees for Russell (7%) and Macon (4%) Counties is not substantial in comparison to Muscogee County. This factor fortifies the recommendation to exclude Russell, Macon, and Lee Counties from the Columbus nonattainment area.

Muscogee County, GA had 46% of the manufacturing employees and 55% of the retail employees in the CSA, which ranks them as number one. Russell and Macon Counties together only accounted for 9% of the manufacturing employees and 11% of the retail employees in the CSA. These facts further fortify the recommendation to exclude Russell County, AL and Macon County, AL from the Columbus nonattainment area.

Table 4 Total Employees

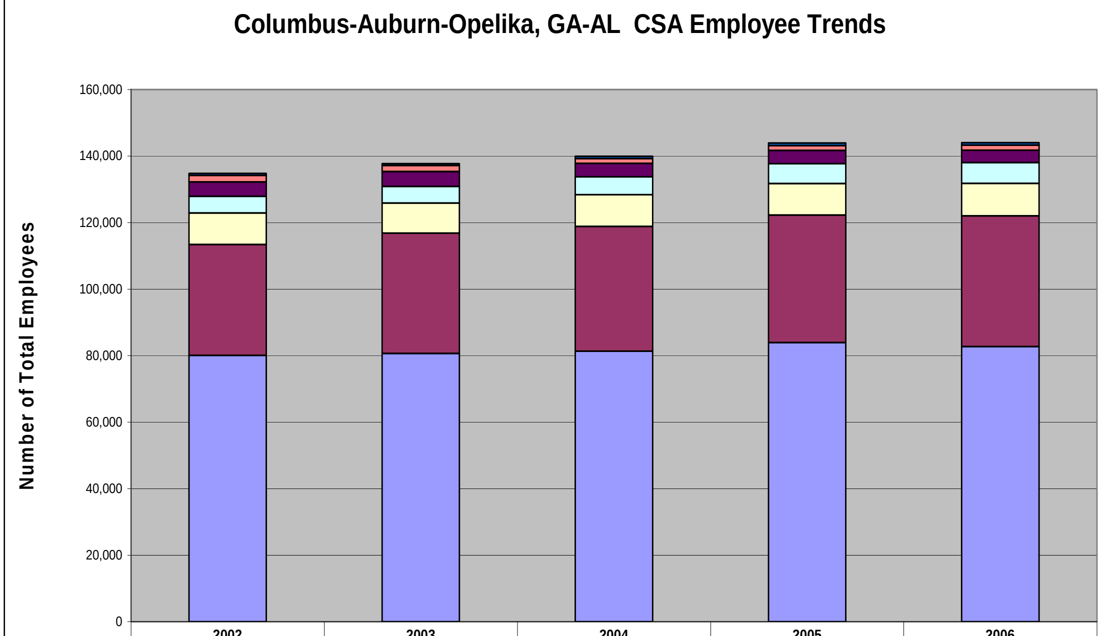
	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Muscogee	80,129	80,677	81,332	83,964	82,738	3%	57%
Lee	33,307	36,189	37,540	38,315	39,325	18%	27%
Russell	9,437	9,024	9,540	9,507	9,752	3%	7%
Macon	5,033	5,048	5,353	5,964	6,230	24%	4%
Harris	4,362	4,439	4,021	3,974	3,744	-14%	3%
Marion	1,943	1,805	1,510	1,445	1,500	-23%	1%
Chattahoochee	636	602	685	757	749	18%	1%
MSA Total	134,847	137,784	139,981	143,926	144,038	7%	100%

Table 5 Manufacturing Employees

	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Muscogee	12,043	11,573	10,815	9,940	9,391	-22%	46%
Lee	6,567	7,062	7,116	7,502	8,095	23%	40%
Russell	1,473	1,428	1,833	1,796	1,538	4%	8%
Harris	1,543	1,410	1,089	1,057	719	-53%	4%
Marion	1,750	750	676	750	540	-69%	3%
Macon	56	55	20-99	111	206	268%	1%
Chattahoochee	0	0	0	10	0	0%	0%
CMSA Total	**23,432**	**22,278**	**21,529**	**21,166**	**20,489**	-13%	100%

Table 6 Retail Employees

	2002	2003	2004	2005	2006	% Change 2002-2006	% of 2006 CSA Total
Muscogee	11,431	11,223	11,855	13,640	11,936	4%	55%
Lee	5,430	5,420	5,837	6,227	6,447	19%	30%
Russell	1,964	1,967	2,040	1,888	2,046	4%	9%
Macon	899	460	470	460	454	-49%	2%
Harris	266	320	321	353	306	15%	1%
Marion	230	190	201	246	289	26%	1%
Chattahoochee	65	64	51	69	62	-5%	0%
CMSA Total	20,285	19,644	20,775	22,883	21,540	6%	100%



	2002	2003	2004	2005	2006
Chattahoochee	636	602	685	757	749
Marion	1,943	1,805	1,510	1,445	1,500
Harris	4,362	4,439	4,021	3,974	3,744
Macon	5,033	5,048	5,353	5,964	6,230
Russell	9,437	9,024	9,540	9,507	9,752
Lee	33,307	36,189	37,540	38,315	39,325
Muscogee	80,129	80,677	81,332	83,964	82,738

Figure 6 Total Employees for the Columbus-Auburn-Opelika GA-AL CSA

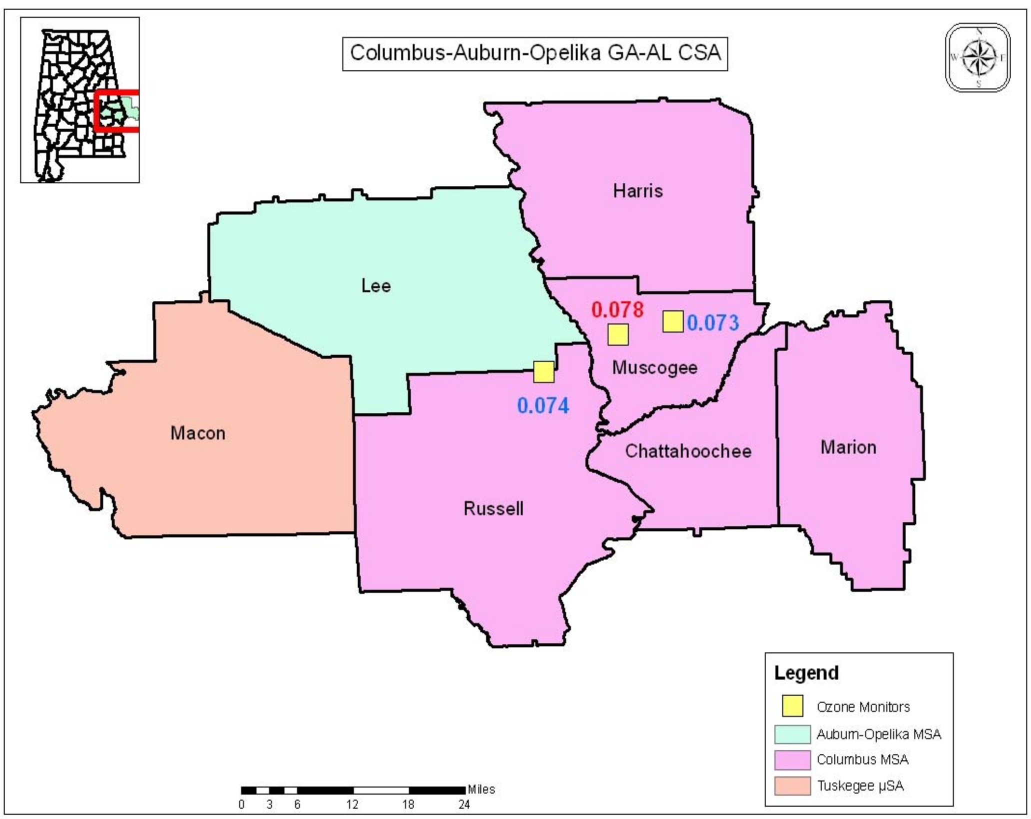
C. Monitoring data representing ozone concentrations in local areas and larger areas (urban or regional scale)

Table 7 presents the ozone monitoring data for the Columbus-Auburn-Opelika GA-AL CSA. The table shows that the Muscogee County Airport monitor exceeds the 8-hour ozone NAAQS, while the Russell County monitor meets the 8-hour ozone NAAQS. Figure 7 maps these ozone monitoring sites which provided the 2006, 2007, and 2008 data for the Columbus-Auburn-Opelika GA-AL CSA. The recommendation to exclude Russell County is supported by monitoring data that shows Russell County is meeting the 8-hour ozone NAAQS.

Table 7 Columbus-Auburn-Opelika GA-AL CSA Ozone Monitoring Data

County	AIRS ID	Site	2006 4th Max (ppm)	2007 4th Max (ppm)	2008 4th Max (ppm)	3 Year Average (ppm)
Russell	01-113-0002	Phenix City	0.075	0.079	0.069	0.074
Muscogee	13-215-0008	Columbus Air Port	0.080	0.083	0.073	0.078
Muscogee	13-215-1003	Columbus Crime Lab	0.073	0.074	0.072	0.073

Figure 7 Ozone Monitoring Sites in Columbus-Auburn-Opelika GA-AL CSA (units in ppm)



D. Location of Emission Sources

Figure 8 depicts the location of large point sources in the Columbus-Auburn-Opelika GA-AL CSA. The base map was created in GIS using coordinates supplied by the facilities. Figure 9 presents the emission densities for the Columbus-Auburn-Opelika GA-AL CSA. Tables 8 and 9 present the distribution of NOx emissions (in tons per year) among point, area, mobile, and non-road sources in the Columbus-Auburn-Opelika GA-AL CSA. Tables 10 and 11 present the same information for VOC emissions. Figures 7 and 8 illustrate this data.

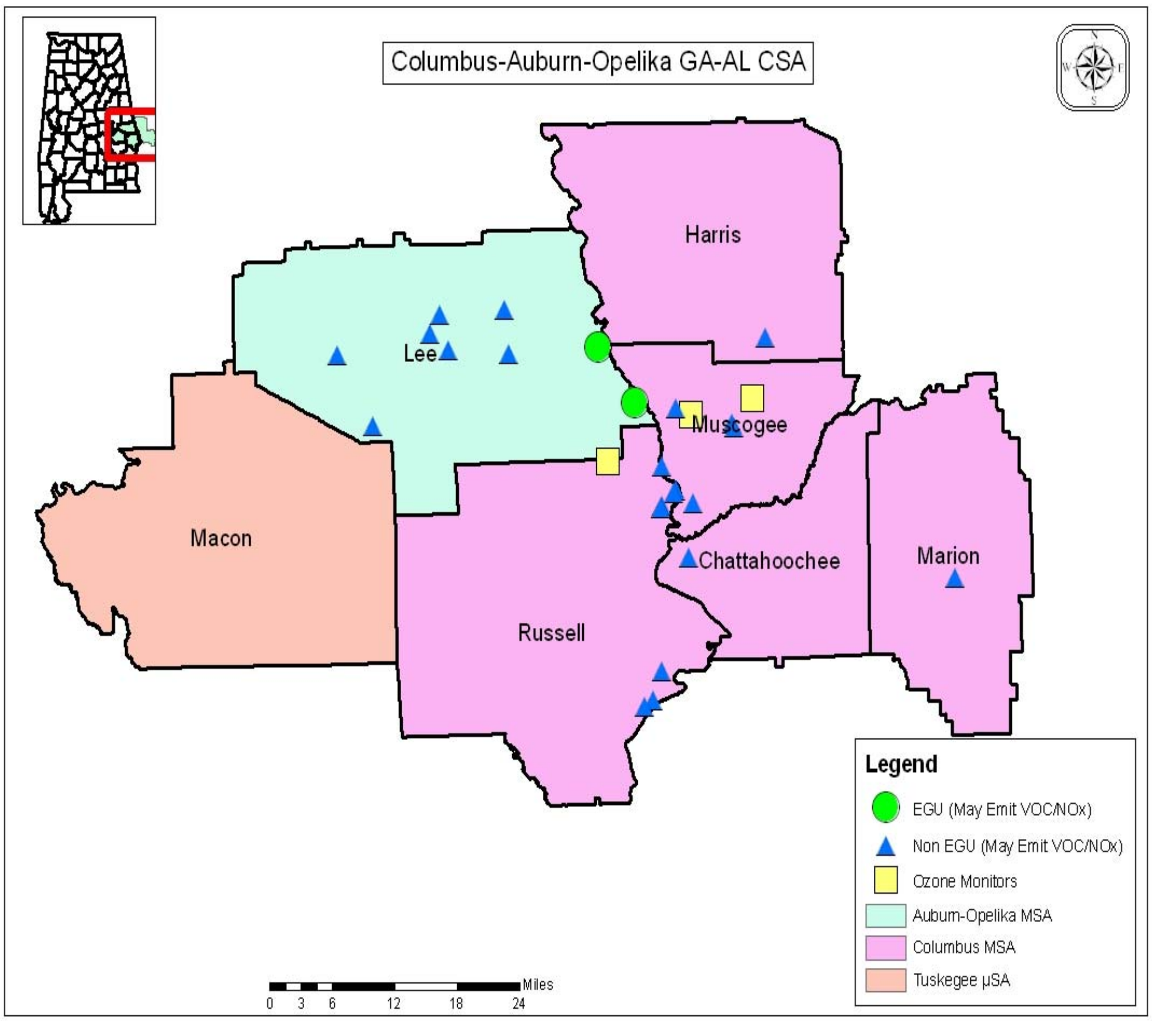


Figure 8 Locations of Large Point Sources in the Columbus-Auburn-Opelika GA-AL CSA

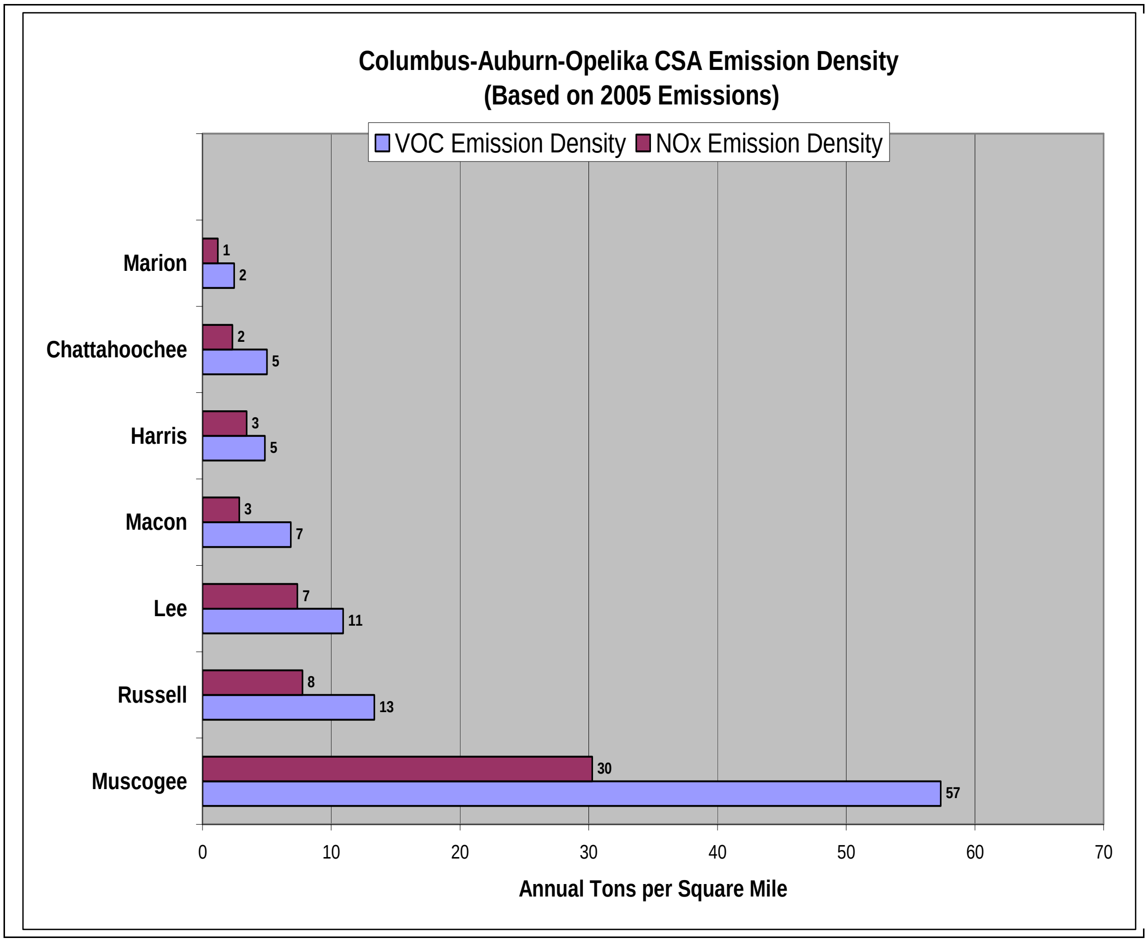


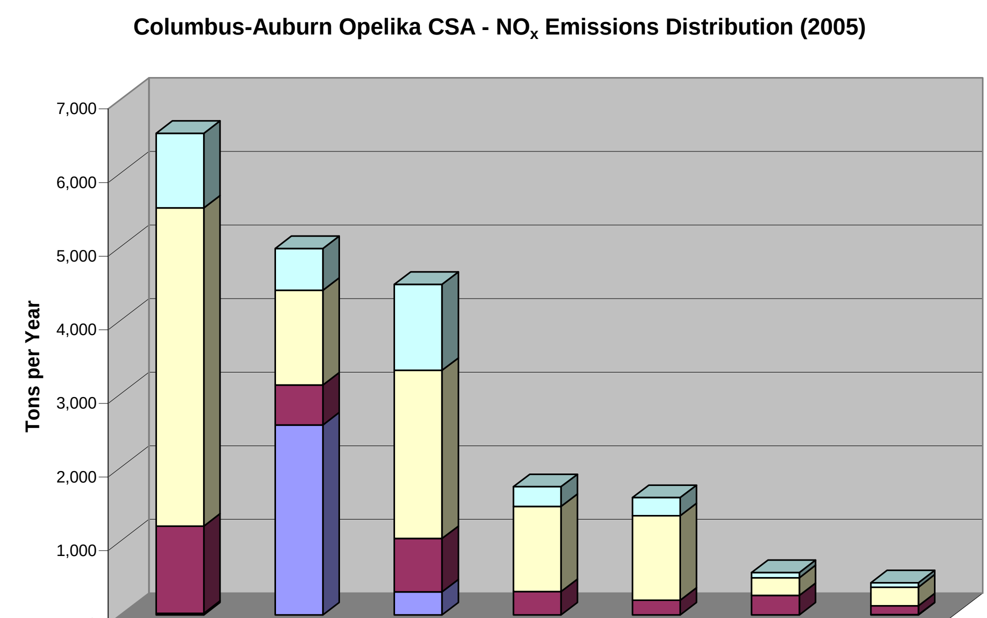
Figure 9 Emission Densities for the Columbus-Auburn-Opelika GA-AL CSA

Muscogee County, GA has the CSA's highest total annual NOx emissions at 32% of the CSA total, the highest total annual VOC emissions at 34% of the CSA total, and the highest NO_x and VOC emission densities. Russell County's relatively large annual emissions total may be misleading because Fort Benning's (located in Muscogee and Chattahoochee counties in Georgia) emissions may not have been totally accounted for. The 2008 NEI will begin accounting for emissions from military bases and airports as point sources. The majority of the NOx emissions in Lee County are from mobile sources. Any impacts from mobile source emissions will be mitigated at the national level by rules requiring cleaner vehicles and fuels.

The emissions density data supports the exclusion of Macon, Lee, and Russell Counties from the Columbus nonattainment area. Further, the lack of large point sources of NOx or VOC in Macon County, AL fortifies the recommendation to exclude it from the Columbus nonattainment area.

Table 8 NOx Annual Emissions (Tons)

County	Point	Point %	Area	Area %	Mobile	Mobile %	Non-Road	Non-Road %	Total Emissions	% of Total Emissions
Muscogee	21	1%	1,187	35%	4,319	40%	1,013	30%	6,540	32%
Russell	2,581	89%	543	16%	1,285	12%	569	17%	4,977	24%
Lee	311	11%	727	22%	2,284	21%	1,168	34%	4,490	22%
Macon	0	0%	318	9%	1,155	11%	268	8%	1,740	9%
Harris	0	0%	199	6%	1,146	11%	248	7%	1,593	8%
Chattahoochee	0	0%	263	8%	241	2%	72	2%	576	3%
Marion	3	0%	121	4%	254	2%	57	2%	435	2%
CSA Total Emissions	**2,915**		**3,358**		**10,683**		**3,395**			**20,351**



	Muscogee	Russell	Lee	Macon	Harris	Chattahoochee	Marion
Non-Road	1,013	569	1,168	268	248	72	57
Mobile	4,319	1,285	2,284	1,155	1,146	241	254
Area	1,187	543	727	318	199	263	121
Point	21	2,581	311				3

Figure 7 NOx Emissions for the Columbus-Auburn-Opelika GA-AL CSA

Table 9 Cumulative NOx Contributions

County Name	Factor	Annual 2005 Emissions (Tons)	% of CSA Total Emissions	Cumulative %
Muscogee Co, GA	Mobile Sources NO_x Emissions	4319	21.22%	21.22%
Russell Co, AL	Point Source NO_x Emissions	2581	12.68%	33.90%
Lee Co, AL	Mobile Sources NO_x Emissions	2284	11.22%	45.12%
Russell Co, AL	Mobile Sources NO_x Emissions	1285	6.31%	51.44%
Muscogee Co, GA	Area Source NO_x Emissions	1187	5.83%	57.27%
Lee Co, AL	Non-Road NO_x Emissions	1168	5.74%	63.01%
Macon Co, AL	Mobile Sources NO_x Emissions	1155	5.68%	68.68%
Harris Co, GA	Mobile Sources NO_x Emissions	1146	5.63%	74.31%
Muscogee Co, GA	Non-Road NO_x Emissions	1013	4.98%	79.29%
Lee Co, AL	Area Source NO_x Emissions	727	3.57%	82.87%
Russell Co, AL	Non-Road NO_x Emissions	569	2.80%	85.66%
Russell Co, AL	Area Source NO_x Emissions	543	2.67%	88.33%
Macon Co, AL	Area Source NO_x Emissions	318	1.56%	89.89%
Lee Co, AL	Point Source NO_x Emissions	311	1.53%	91.42%
Macon Co, AL	Non-Road NO_x Emissions	268	1.32%	92.73%
Chattahoochee Co, GA	Area Source NO_x Emissions	263	1.29%	94.02%
Marion Co, GA	Non-Road NO_x Emissions	254	1.25%	95.27%
Harris Co, GA	Non-Road NO_x Emissions	248	1.22%	96.49%
Chattahoochee Co, GA	Mobile Sources NO_x Emissions	241	1.18%	97.67%
Harris Co, GA	Area Source NO_x Emissions	199	0.98%	98.65%
Marion Co, GA	Mobile Sources NO_x Emissions	121	0.59%	99.25%
Chattahoochee Co, GA	Non-Road NO_x Emissions	72	0.35%	99.60%
Marion Co, GA	Area Source NO_x Emissions	57	0.28%	99.88%
Muscogee Co, GA	Point Source NO_x Emissions	21	0.10%	99.99%
Marion Co, GA	Point Source NO_x Emissions	3	0.01%	100.00%
Macon Co, AL	Point Source NO_x Emissions	0	0.00%	100.00%
Harris Co, GA	Point Source NO_x Emissions	0	0.00%	100.00%
Chattahoochee Co, GA	Point Source NO_x Emissions	0	0.00%	100.00%
CMSA Total Emissions		**20,351**		

Table 10 VOC Annual Emissions (Tons)

County	Point	Point %	Area	Area %	Mobile	Mobile %	Non-Road	Non-Road %	Total Emissions	% of Total Emissions
Muscogee	82	3%	7,863	35%	3,725	45%	715	28%	12,385	34%
Russell	1,886	71%	5,343	24%	1,048	13%	276	11%	8,552	24%
Lee	583	22%	3,725	16%	1,729	21%	613	24%	6,650	18%
Macon	0	0%	3,281	14%	615	7%	289	11%	4,186	12%
Harris	0	0%	952	4%	781	9%	512	20%	2,246	6%
Chattahoochee	0	0%	995	4%	172	2%	79	3%	1,246	3%
Marion	108	4%	528	2%	192	2%	73	3%	901	2%
CSA Total Emissions	**2,658**		**22,686**		**8,262**		**2,559**		**36,165**	

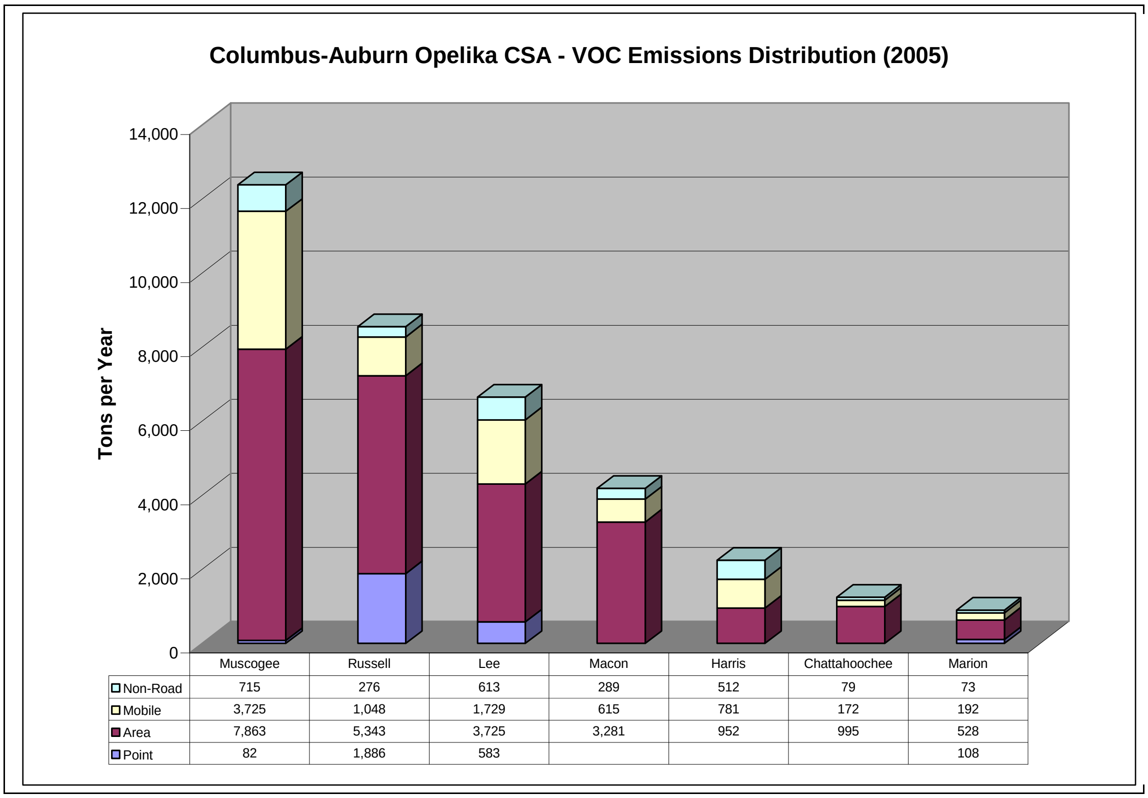


Figure 8 VOC Emissions for the Columbus-Auburn-Opelika GA-AL CSA

Table 11 Cumulative VOC Contributions

County Name	Factor	Annual 2005 Emissions (Tons)	% of CSA Total Emissions	Cumulative %
Muscogee Co, GA	Area Source VOC Emissions	7863	21.74%	21.74%
Russell Co, AL	Area Source VOC Emissions	5343	14.77%	36.51%
Muscogee Co, GA	Mobile Source VOC Emissions	3725	10.30%	46.81%
Lee Co, AL	Area Source VOC Emissions	3725	10.30%	57.11%
Macon Co, AL	Area Source VOC Emissions	3281	9.07%	66.18%
Russell Co, AL	Point Source VOC Emissions	1886	5.21%	71.40%
Lee Co, AL	Mobile Source VOC Emissions	1730	4.78%	76.18%
Russell Co, AL	Mobile Source VOC Emissions	1048	2.90%	79.08%
Chattahoochee Co, GA	Area Source VOC Emissions	996	2.75%	81.83%
Harris Co, GA	Area Source VOC Emissions	953	2.63%	84.46%
Harris Co, GA	Mobile Source VOC Emissions	781	2.16%	86.62%
Muscogee Co, GA	Non-Road VOC Emissions	716	1.98%	88.60%
Macon Co, AL	Mobile Source VOC Emissions	616	1.70%	90.30%
Lee Co, AL	Non-Road VOC Emissions	614	1.70%	92.00%
Lee Co, AL	Point Source VOC Emissions	583	1.61%	93.61%
Marion Co, GA	Mobile Source VOC Emissions	528	1.46%	95.07%
Harris Co, GA	Non-Road VOC Emissions	513	1.42%	96.48%
Macon Co, AL	Non-Road VOC Emissions	290	0.80%	97.28%
Russell Co, AL	Non-Road VOC Emissions	277	0.76%	98.05%
Marion Co, GA	Non-Road VOC Emissions	193	0.53%	98.58%
Chattahoochee Co, GA	Mobile Source VOC Emissions	172	0.47%	99.05%
Marion Co, GA	Point Source VOC Emissions	108	0.30%	99.35%
Muscogee Co, GA	Point Source VOC Emissions	83	0.23%	99.58%
Chattahoochee Co, GA	Non-Road VOC Emissions	79	0.22%	99.80%
Marion Co, GA	Area Source VOC Emissions	73	0.20%	100.00%
Macon Co, AL	Point Source VOC Emissions	0	0.00%	100.00%
Harris Co, GA	Point Source VOC Emissions	0	0.00%	100.00%
Chattahoochee Co, GA	Point Source VOC Emissions	0	0.00%	100.00%
CMSA Total Emissions		**36,165**		

E. Traffic and Commuting Patterns

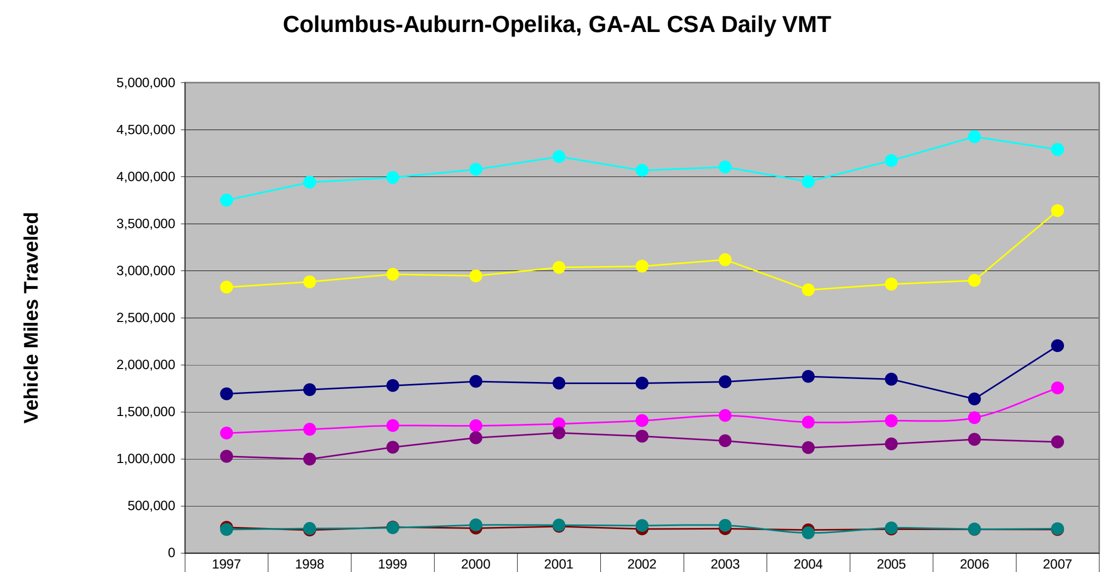
Estimates of the Daily Vehicle Miles Traveled (DVMT) were obtained from the Alabama Department of Transportation and the State of Georgia and the commuting patterns were obtained from the US Census Bureau web site. The available commuting patterns were based on the 2000 US Census. Table 12 presents the 1997 and 2007 DVMT estimates for the Columbus-Auburn-Opelika GA-AL CSA, and Figure 10 demonstrates the DVMT trend from 1997 to 2007 for each county. Figure 11 presents the rural and urban distribution of DVMT for the Columbus-Auburn-Opelika GA-AL CSA. Figure 12 presents the commuting patterns between the counties within the Columbus-Auburn-Opelika GA-AL CSA.

Table 12 shows that the DVMT for the Columbus-Auburn-Opelika GA-AL CSA has increased 51% since 1997. Figure 11 demonstrates the DVMT for rural and urban areas. DVMT in Muscogee County comprises 32% of the entire CSA's VMT and is 100% urban. The DVMT for Russell County comprises 17% of the CSA's VMT and is a little over one-half of the DVMT for Muscogee County. In addition, the land area of Russell County is almost 3 times that of Muscogee County. This factor fortifies the recommendation to exclude Russell County from the Columbus 8-hour ozone nonattainment area.

Figure 12 indicates that there is relatively insignificant commuting from Macon and Lee Counties into Muscogee County, GA. The impact of commuting is negligible and will be further lessened by the national cleaner fuel and vehicle standards. This factor fortifies the recommendation to exclude Macon and Lee Counties from the Columbus 8-hour ozone nonattainment area.

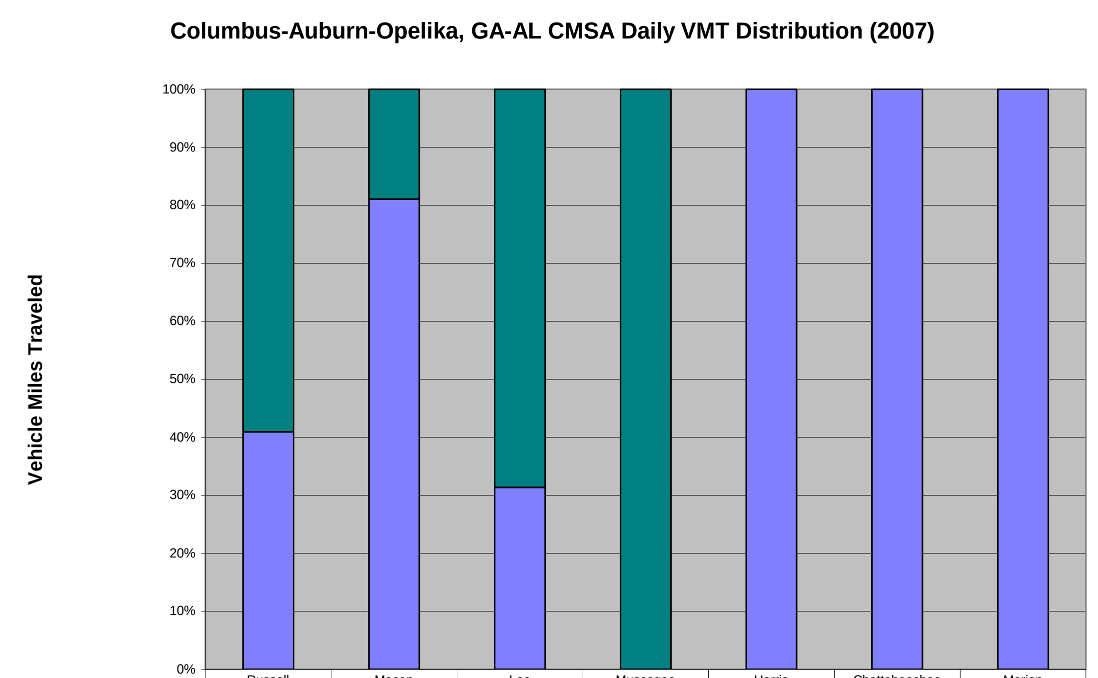
Table 12 Daily VMT for the Columbus-Auburn-Opelika GA-AL CSA

County	1997 Daily VMT	2007 Daily VMT	Daily VMT Change (1997-2007)	% Change	% of MSA 2007 Daily VMT
Muscogee	3,750,440	4,288,796	538,356	14%	32%
Macon	1,057,681	2,847,880	1,790,199	169%	21%
Lee	740,206	2,283,129	1,542,923	208%	17%
Russell	1,692,891	2,204,989	512,098	30%	17%
Harris	1,029,371	1,182,016	152,645	15%	9%
Marion	251,506	259,748	8,242	3%	2%
Chattahoochee	274,590	250,927	-23,662	-9%	2%
CMSA Total	**8,796,684**	**13,317,485**	**4,520,801**	**51%**	**100%**



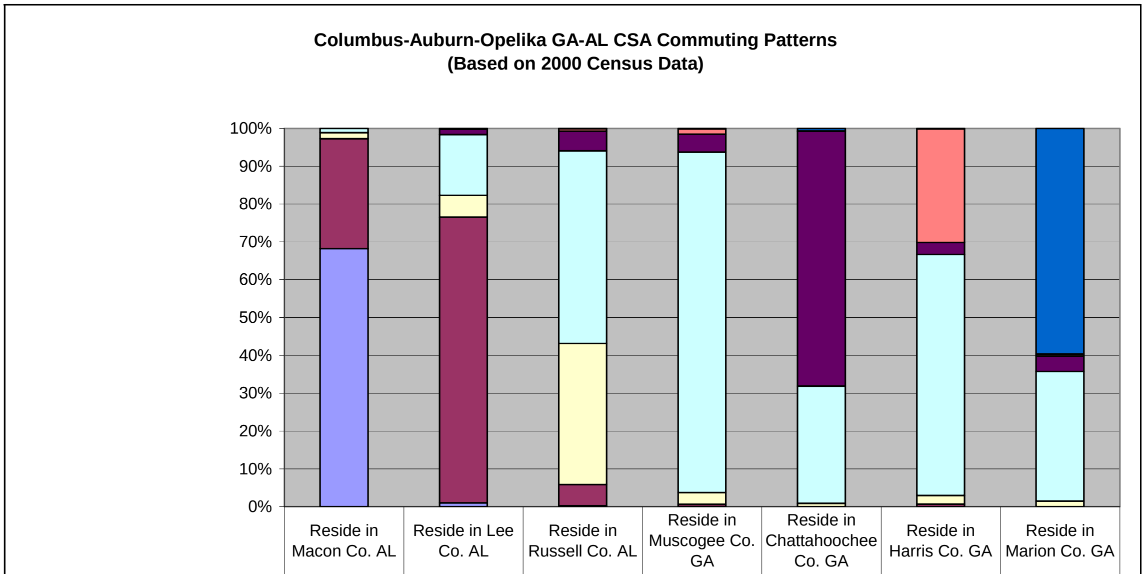
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Russell	1,692,891	1,738,179	1,780,570	1,824,485	1,806,545	1,806,544	1,821,199	1,878,447	1,848,114	1,638,605	2,204,989
Macon	1,276,891	1,315,153	1,355,484	1,353,712	1,375,462	1,407,434	1,462,577	1,392,203	1,406,210	1,439,972	1,755,993
Lee	2,827,060	2,882,779	2,963,166	2,946,022	3,036,790	3,048,529	3,117,276	2,798,256	2,857,793	2,897,531	3,640,079
Muscogee	3,750,440	3,940,756	3,992,865	4,078,925	4,213,229	4,067,534	4,102,504	3,948,933	4,172,136	4,425,629	4,288,796
Harris	1,029,371	999,377	1,124,959	1,226,665	1,277,783	1,241,912	1,195,290	1,121,857	1,161,527	1,209,902	1,182,016
Chattahoochee	274,590	245,988	277,308	266,835	285,562	257,840	260,640	246,469	255,255	253,059	250,927
Marion	251,506	262,641	269,756	298,916	298,399	293,800	295,724	216,246	269,232	256,384	259,748

Figure 10 DVMT Trend for the Columbus-Auburn-Opelika CSA



	Russell	Macon	Lee	Muscogee	Harris	Chattahoochee	Marion
Urban Daily VMT 2007	2,605,226	664,105	4,997,029	4,288,796	0	0	0
Rural Daily VMT 2007	1,804,752	2,847,880	2,283,129	0	1,182,016	250,927	259,748

Figure 11 Rural vs. Urban DVMT for the Columbus-Auburn-Opelika GA-AL CSA



	Reside in Macon Co. AL	Reside in Lee Co. AL	Reside in Russell Co. AL	Reside in Muscogee Co. GA	Reside in Chattahoochee Co. GA	Reside in Harris Co. GA	Reside in Marion Co. GA
Work in Marion Co. GA	0	0	7	106	55	14	1380
Work in Harris Co. GA	0	89	131	1,123	5	2867	12
Work in Chattahoochee Co. GA	0	668	981	3,748	5,482	304	95
Work in Muscogee Co. GA	68	7,597	9,623	71,862	2,523	6087	793
Work in Russell Co. AL	102	2,682	7,051	2,479	72	214	34
Work in Lee Co. AL	1,789	35,549	1,048	514	0	67	0
Work in Macon Co. AL	4,203	478	53	9	0	0	0

Figure 12 Commuting Patterns for the Columbus-Auburn-Opelika GA-AL CSA

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 and the State of Georgia. 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 Russell, Lee, or Macon Counties in the Columbus nonattainment area.

Table 13 Population Projections for the Columbus-Auburn-Opelika CSA

County Name	2000	2007	2015	2025	Percent Change 2000-2007	Percent Change 2007-2015	Percent Change 2015-2025
Lawrence	34,803	34,229	38,347	39,664	-1.6%	12.0%	3.4%
Limestone	65,676	73,898	81,747	90,865	12.5%	10.6%	11.2%
Madison	276,700	312,734	324,153	349,713	13.0%	3.7%	7.9%
Morgan	111,064	115,050	124,358	131,112	3.6%	8.1%	5.4%

G. Meteorology

It is known that meteorology plays a major role in the formation and transport of ozone. In the Phenix City/Columbus, Georgia area, wind direction and speed are important indicators to where ozone forms and travels. In the 2006-2008 ozone seasons, ozone levels exceeded the new 8-hour standard (75 ppb) on 8 days in Phenix City and 10 days in Columbus, Georgia, over the three-year period.

A wind analysis was accomplished to determine the extent to which wind directions could be correlated with high ozone. During the last three ozone seasons, the May – September winds in the Phenix City/Columbus, Georgia, area had two predominant wind directions. One was from the north and the other out of the east. In addition to these two predominant wind directions, there was a third direction from the west that stood out as well (see Figures D-1 and D-5). When one considers only the daytime (6AM-6PM) winds (Figures D-2 and D-6), the general pattern changes very little. However, on those days when the 8-hour ozone standard was exceeded, the wind blew overwhelmingly from the north. This phenomenon is clearly seen in Figure D-3 (all hours) and Figure D-4 (daytime hours only). Also of note is the number of calms during the daytime on exceedance days. It's more than twice as much as it is on a non-exceedance day for Phenix City and three and a half times as much for Columbus.

In addition to the wind roses, back trajectories were run using the National Oceanic and Atmospheric Administration HYSPLIT model to verify the wind directions on exceedance days and to show any other important wind patterns observed in and around the Phenix City/Columbus, Georgia, area. As illustrated in the modeled back trajectories in Figures D-7 through D-18, the trajectories back up the wind roses showing the dominant wind blowing from the north as well as stagnation conditions.

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

Phenix City is located in Eastern Alabama in Russell County and is about 70 miles east of Montgomery and 183 miles inland from the Gulf of Mexico. The northern part of the county is somewhat hilly but becomes flatter as one moves west or south away from the influence of the Appalachian foothills. The Chattahoochee River traverses the county from the northeast to southeast through a flat plain along the Alabama /Georgia state border.

I. Jurisdictional Boundaries

As stated in the opening paragraph of this Appendix, the Columbus-Auburn-Opelika, GA-AL CSA contains the Columbus Metropolitan Statistical Area (MSA), the Auburn-Opelika MSA and the Tuskegee Micropolitan Statistical Area (µSA). The Columbus MSA contains Russell County, AL, Muscogee County, GA, Chattahoochee County, GA, Harris County, GA, and Marion County, GA. The Auburn-Opelika MSA contains Lee County, AL and the Tuskegee µSA contains Macon County, AL. Russell, Lee, and Macon Counties are in the jurisdiction of the State of Alabama under the purview of the ADEM. Alabama's ozone monitor located in Russell County supports representative data for Russell County being recommended for attainment status for the new 8-hour ozone standard with a design value of 0.074 ppm.

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. Throughout the 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 (PSD) regulations for protection of degradation of clean air areas.

Additionally the EPA required a NO_X SIP Call for 22 states, including Alabama that, beginning in 2004, resulted in large reductions in NO_X emissions from major utilities, large industrial boilers and gas turbines, and cement kilns. Alabama’s NOx SIP was approved by EPA on July 16, 2001. Further, EPA recently issued a rule known as the Clean Air Interstate Rule (CAIR) for 28 states, including Alabama, that, when fully implemented, will reduce SO2 emissions in these states by over 70 percent and NOx emissions by over 60 percent from 2003 levels. Phase I of CAIR begins in 2009 and Phase II in 2015. Alabama’s CAIR SIP was approved by EPA on October 1, 2007.

At the national level, EPA has finalized the Tier 2 vehicle/national fuel standards, which took effect beginning in 2004. However, the States had already begun to realize the benefits of cleaner vehicles with the National Low Emission Vehicle standards with the 2001 model year vehicles.

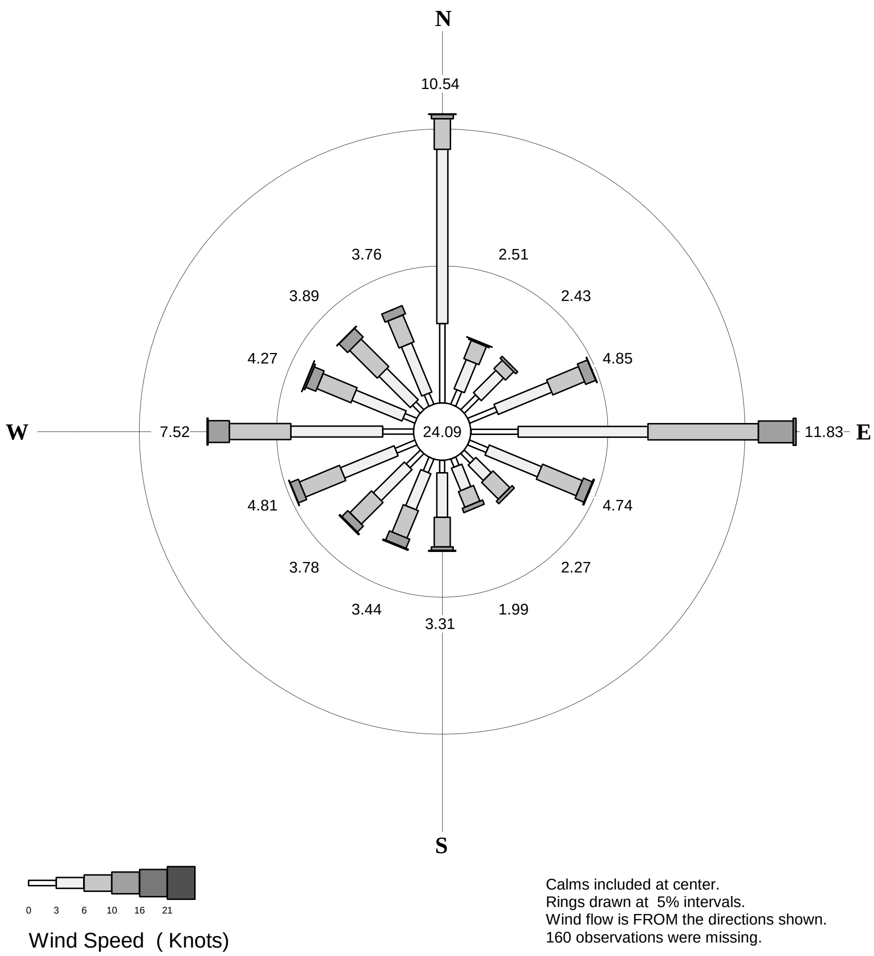
K. Regional Emission Reductions

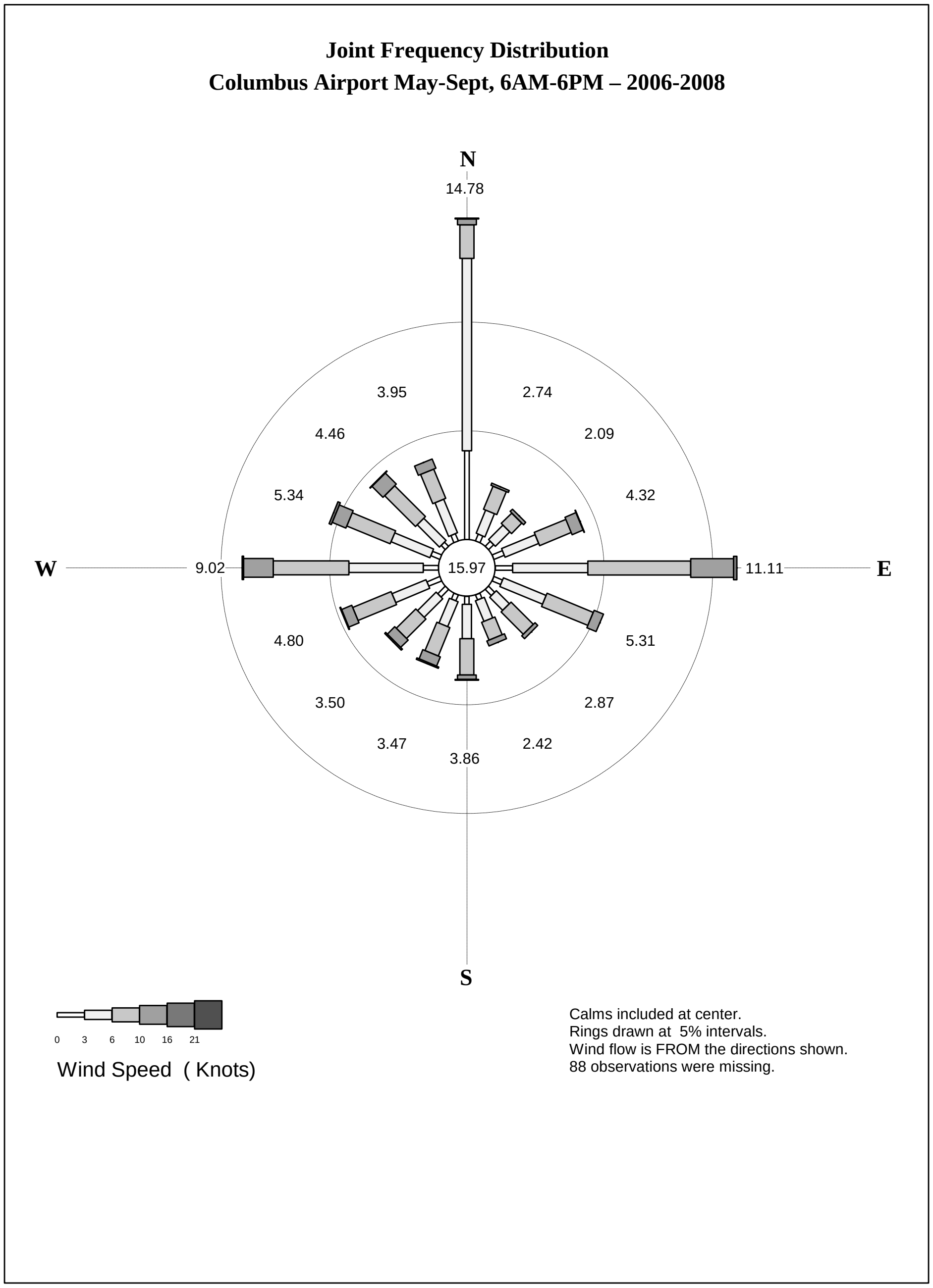
ASIP has performed CMAQ Modeling to estimate the impact of implementing several “on the books” regional and local controls. These controls include: CAIR, NOX SIP Call, North Carolina Clean Smokestacks Act, Consent Agreements, One-Hour Ozone SIPs, Heavy duty diesel engine standards, highway diesel fuel control, Large Spark Ignition and

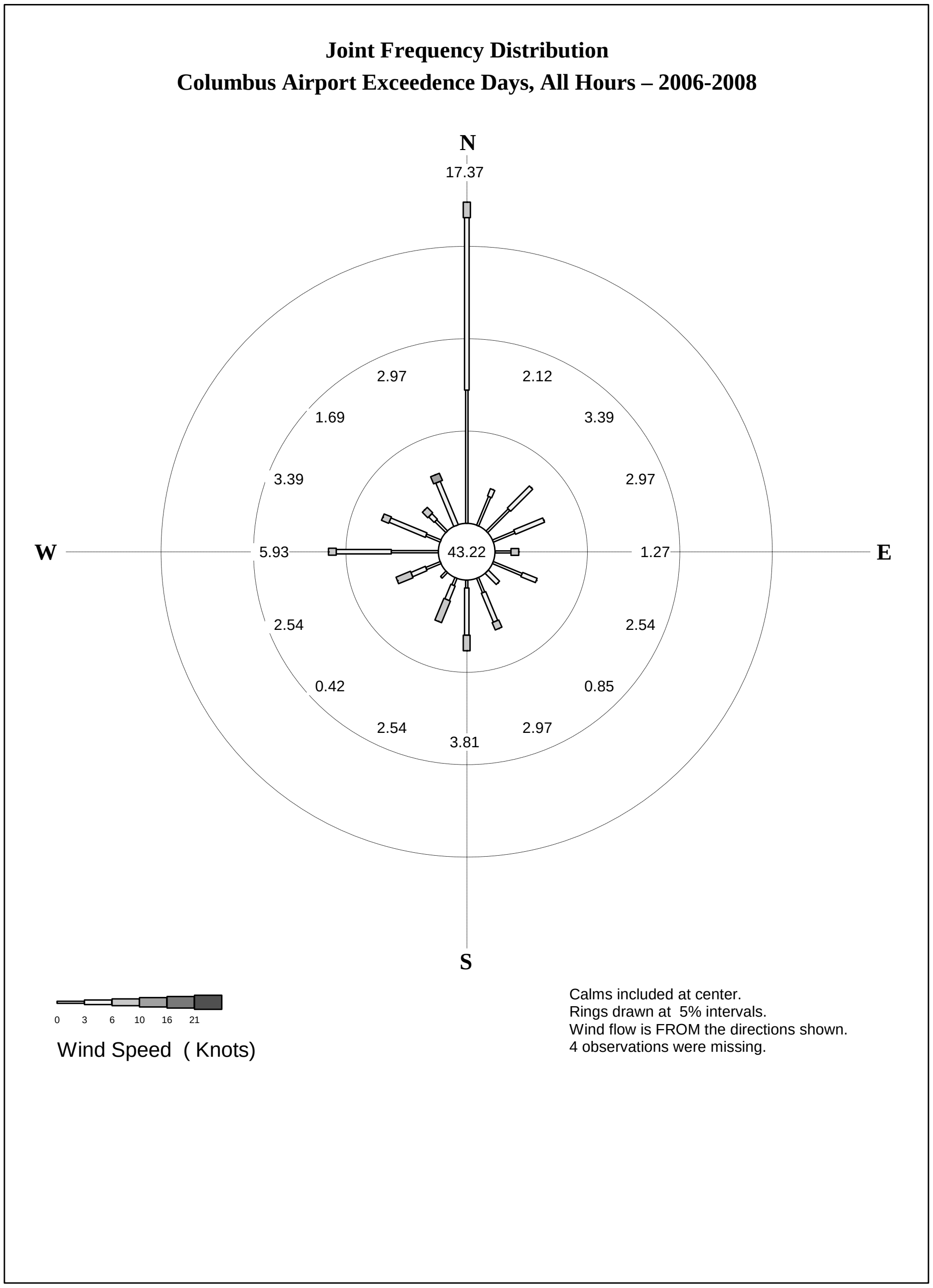
Recreational Vehicle Rule, Nonroad Diesel Rule, VOC MACT Standards and Tier II national fuel standards. EPA also promulgated a rule known as the Clean Air Interstate Rule (CAIR) for 28 states, including Alabama. Phase I of CAIR begins in 2009 and Phase II in 2015. Alabama's CAIR SIP was approved by EPA on October 1, 2007. All of these programs will collectively result in substantial reductions in emissions of NOx and VOC.

The results obtained from ASIP for Alabama demonstrate that the reductions in 8-hour ozone resulting from these national programs will be sufficient to bring all monitored areas of Alabama into attainment of the 8-hour standard beginning in 2012. These results are documented in Attachment 1. Since additional local controls are unlikely to be required in order for the CSA to meet the NAAQS, it is unnecessary to designate counties as nonattainment beyond those with monitoring data exceeding the standard. Further, the lack of a nonattainment designation in a county does not preclude ADEM from requiring controls in the county if controls are deemed necessary.

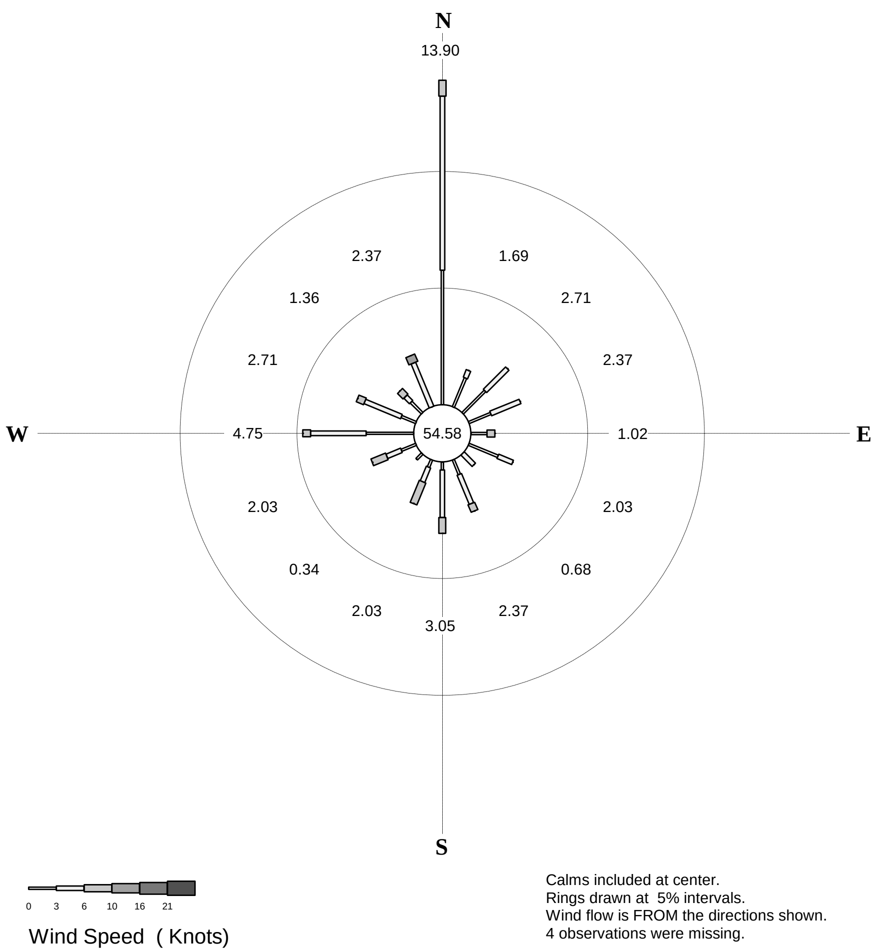
Joint Frequency Distribution
Columbus Airport May-Sept, All Hours – 2006-2008




Joint Frequency Distribution
Columbus Airport May-Sept, 6AM-6PM – 2006-2008
N
14.78
3.95
2.74
4.46
2.09
5.34
4.32
W
9.02
15.97
11.11
E
4.80
5.31
3.50
2.87
3.47
2.42
3.86
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
88 observations were missing.

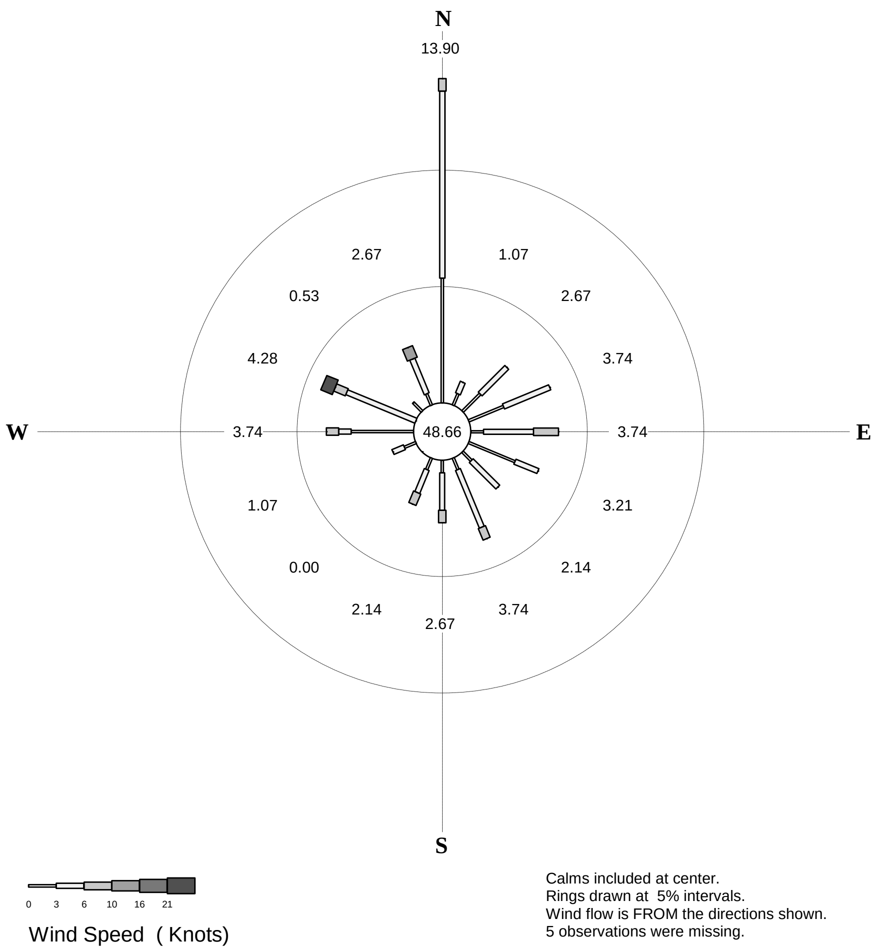

Joint Frequency Distribution
Columbus Airport Exceedence Days, All Hours – 2006-2008
N
17.37
2.97
2.12
1.69
3.39
3.39
2.97
W
5.93
43.22
1.27
E
2.54
2.54
0.42
0.85
2.54
3.81
2.97
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
4 observations were missing.

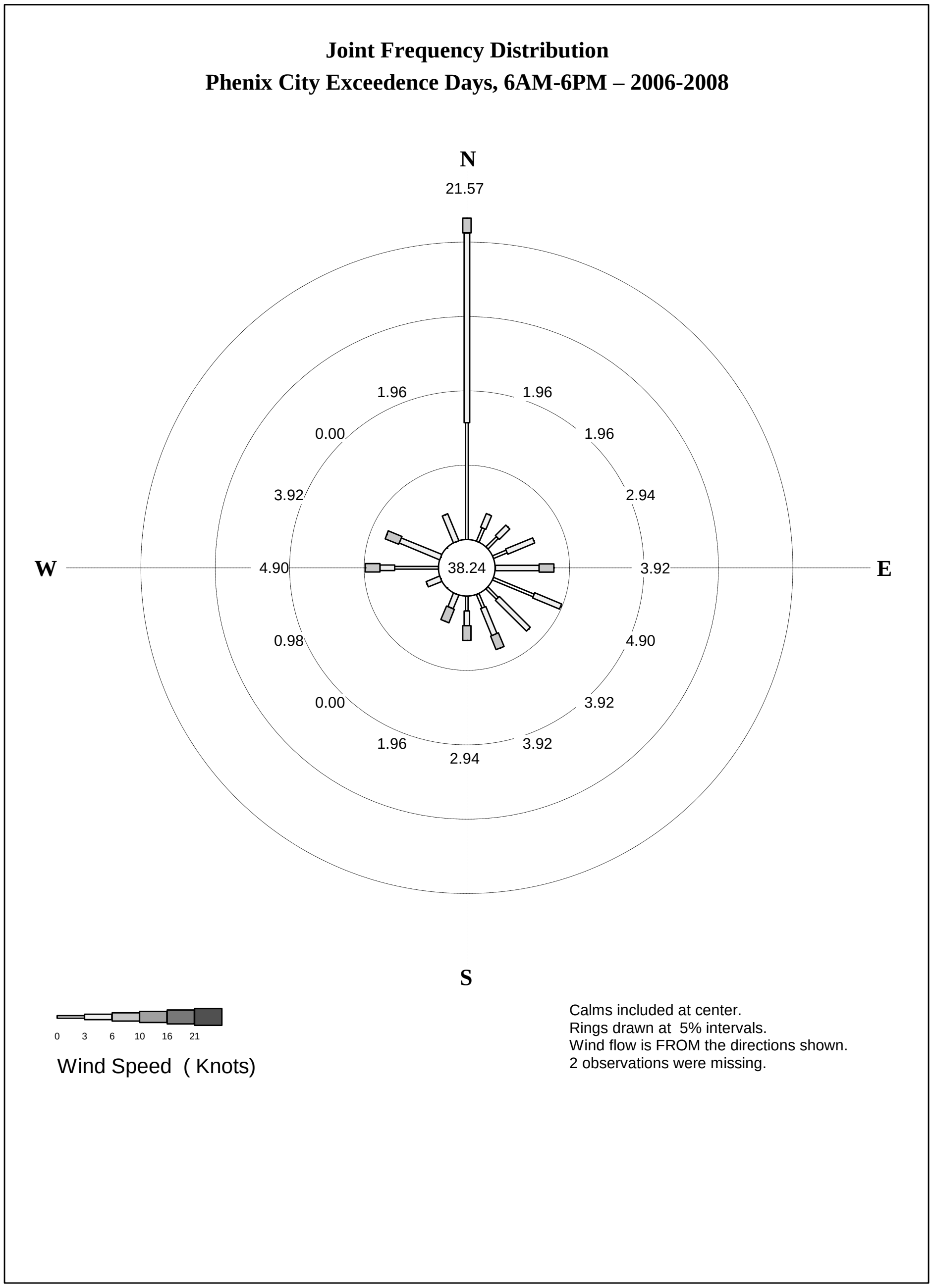
Joint Frequency Distribution
Columbus Airport Exceedence Days, 6AM-6PM – 2006-2008



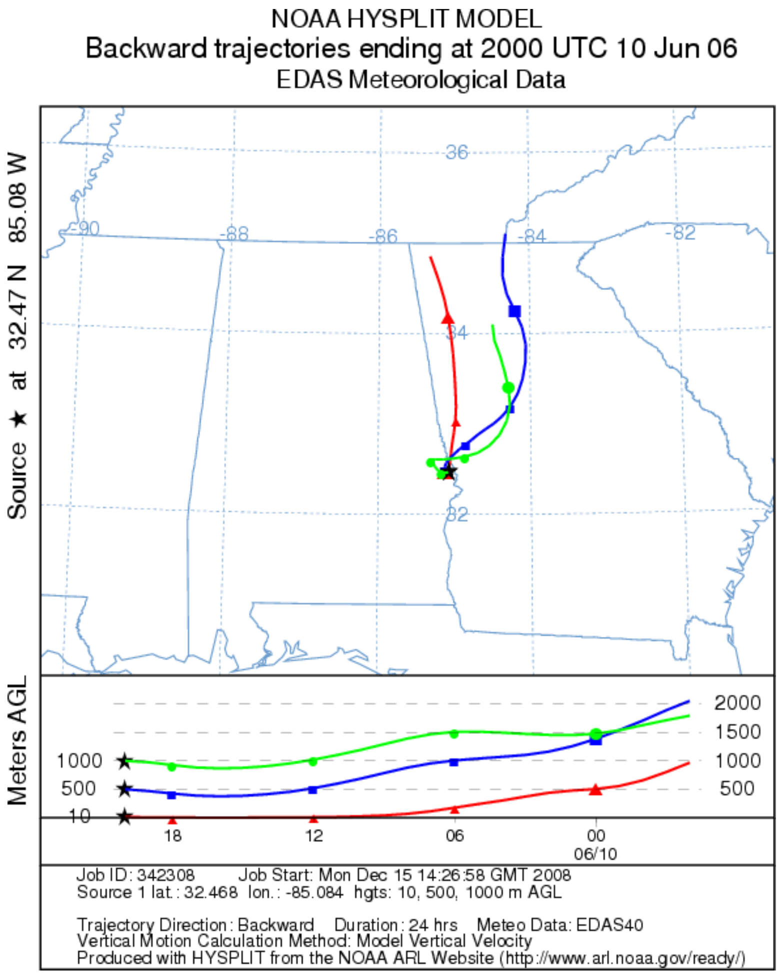
D-5

Joint Frequency Distribution
Phenix City Exceedence Days, All Hours – 2006-2008

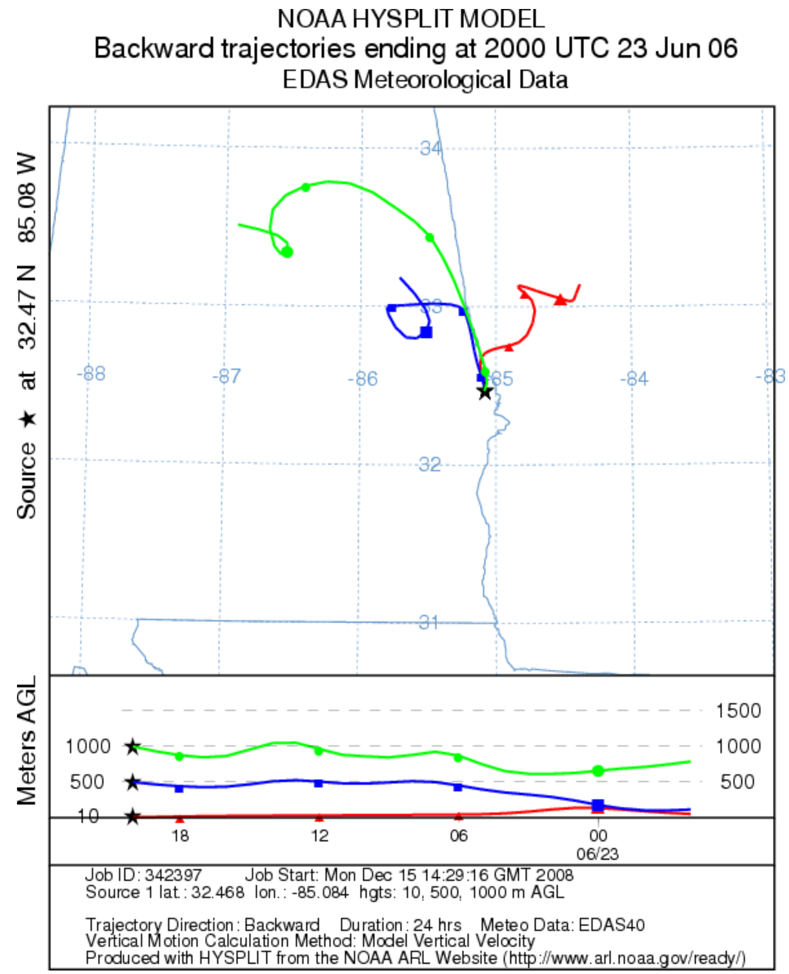



Joint Frequency Distribution
Phenix City Exceedence Days, 6AM-6PM – 2006-2008
N
21.57
1.96
1.96
1.96
0.00
3.92
2.94
W
4.90
38.24
3.92
E
0.98
4.90
0.00
3.92
1.96
2.94
3.92
S
0
3
6
10
16
21
Wind Speed (Knots)
Calms included at center.
Rings drawn at 5% intervals.
Wind flow is FROM the directions shown.
2 observations were missing.

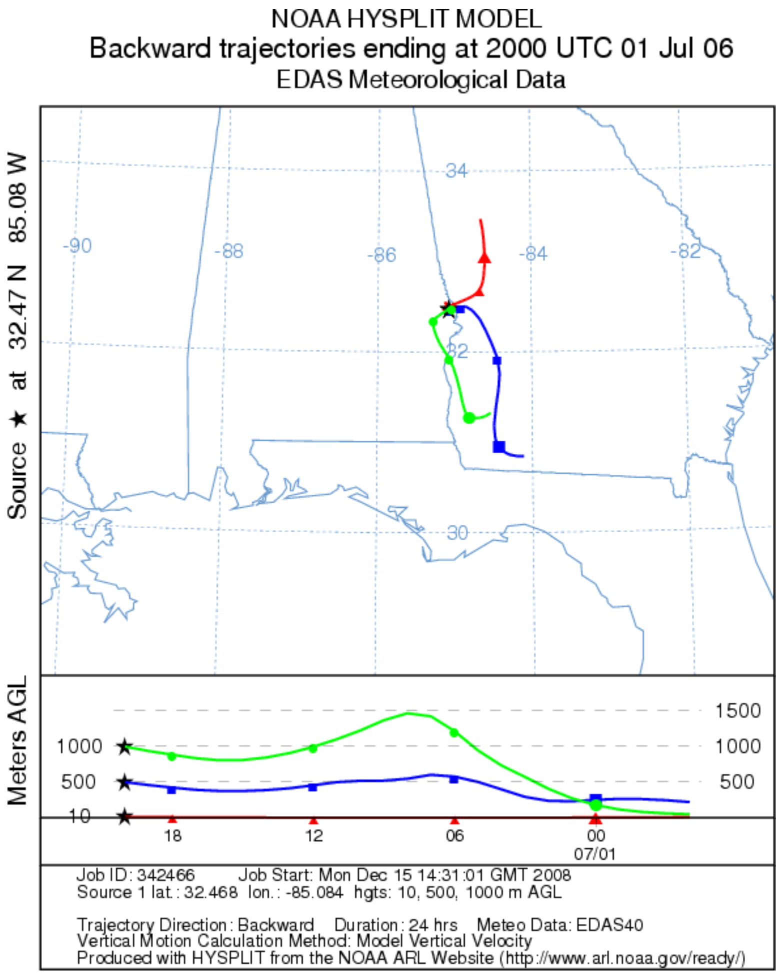
D-7


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 10 Jun 06
EDAS Meteorological Data
Source ★ at 32.47 N 85.08 W
-90
-88
-86
-84
-82
36
34
32
Meters AGL
1000
500
10
2000
1500
1000
500
18
12
06
00
06/10
Job ID: 342308 Job Start: Mon Dec 15 14:26:58 GMT 2008
Source 1 lat.: 32.468 lon.: -85.084 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

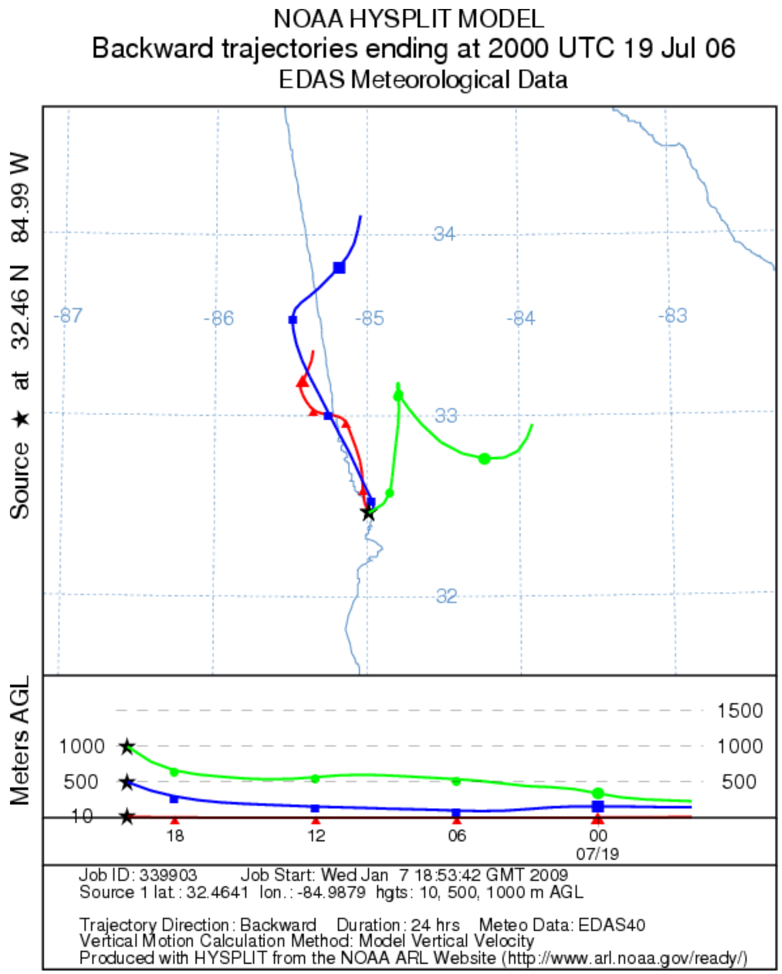
D-8


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 23 Jun 06
EDAS Meteorological Data
Source ★ at 32.47 N 85.08 W
-88
-87
-86
-85
-84
-83
34
33
32
31
Meters AGL
1000
500
10
1500
1000
500
18
12
06
00
06/23
Job ID: 342397 Job Start: Mon Dec 15 14:29:16 GMT 2008
Source 1 lat.: 32.468 lon.: -85.084 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

D-9


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 01 Jul 06
EDAS Meteorological Data
Source ★ at 32.47 N 85.08 W
Meters AGL
Job ID: 342466 Job Start: Mon Dec 15 14:31:01 GMT 2008
Source 1 lat.: 32.468 lon.: -85.084 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

D-10


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 19 Jul 06
EDAS Meteorological Data
Source ★ at 32.46 N 84.99 W
Meters AGL
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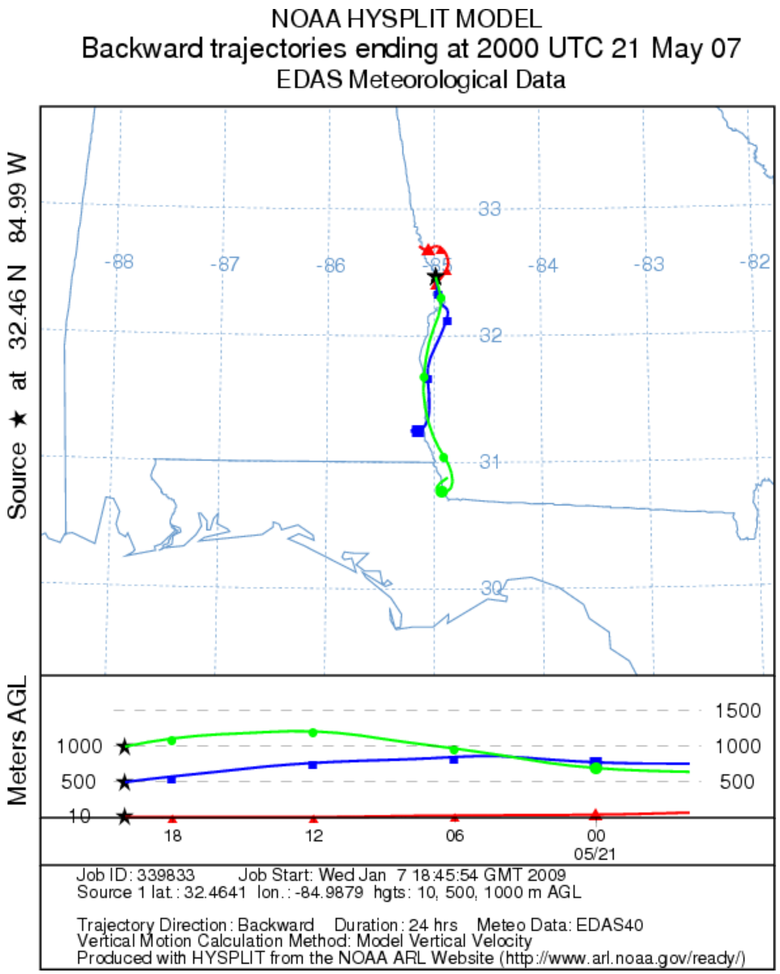
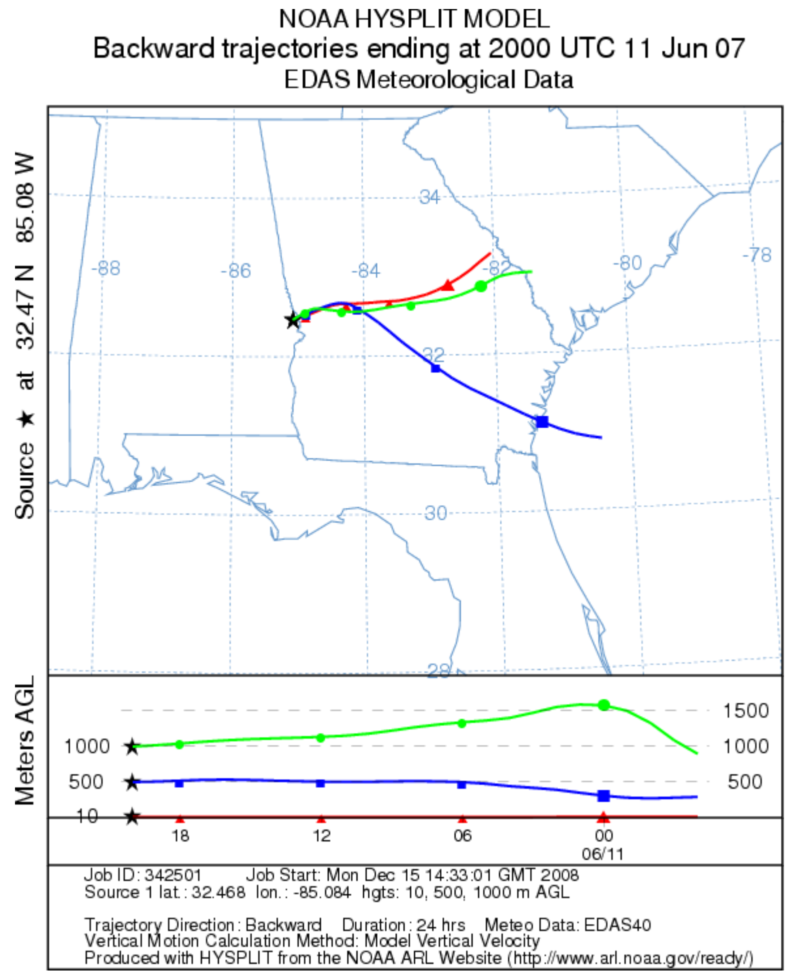
Source 1 lat.: 32.4641 lon.: -84.9879 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

D-11


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 21 May 07
EDAS Meteorological Data
Source ★ at 32.46 N 84.99 W
Meters AGL
1500
1000
500
10
18
12
06
00
05/21
Job ID: 339833 Job Start: Wed Jan 7 18:45:54 GMT 2009
Source 1 lat.: 32.4641 lon.: -84.9879 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

D-12


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 11 Jun 07
EDAS Meteorological Data
Source ★ at 32.47 N 85.08 W
Meters AGL
1500
1000
500
10
18
12
06
00
06/11
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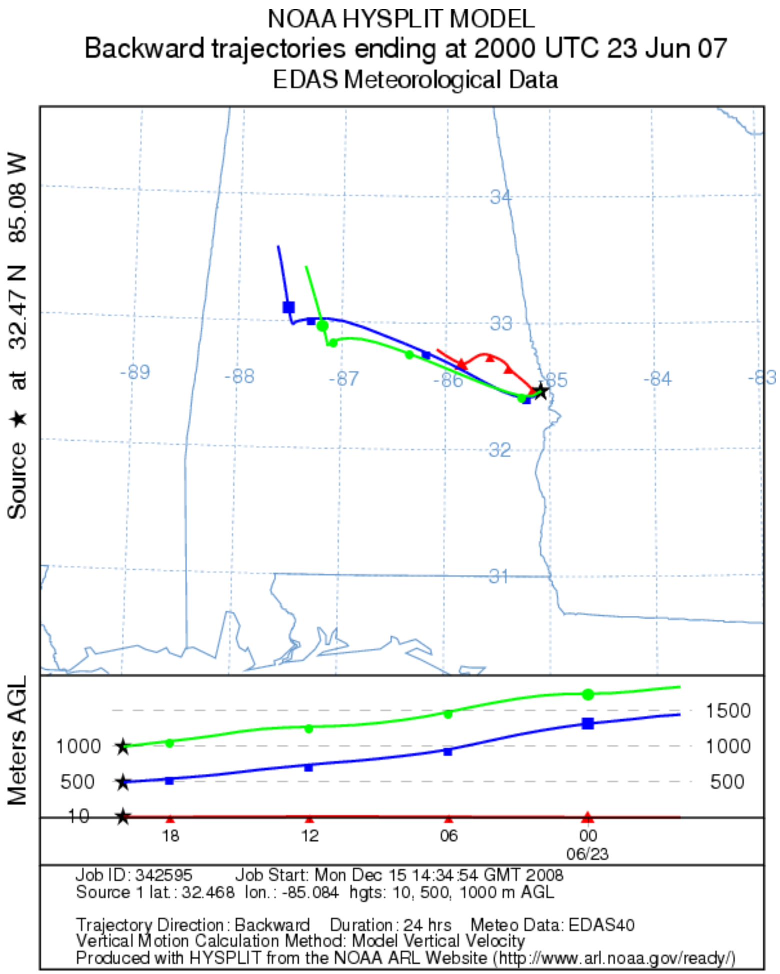
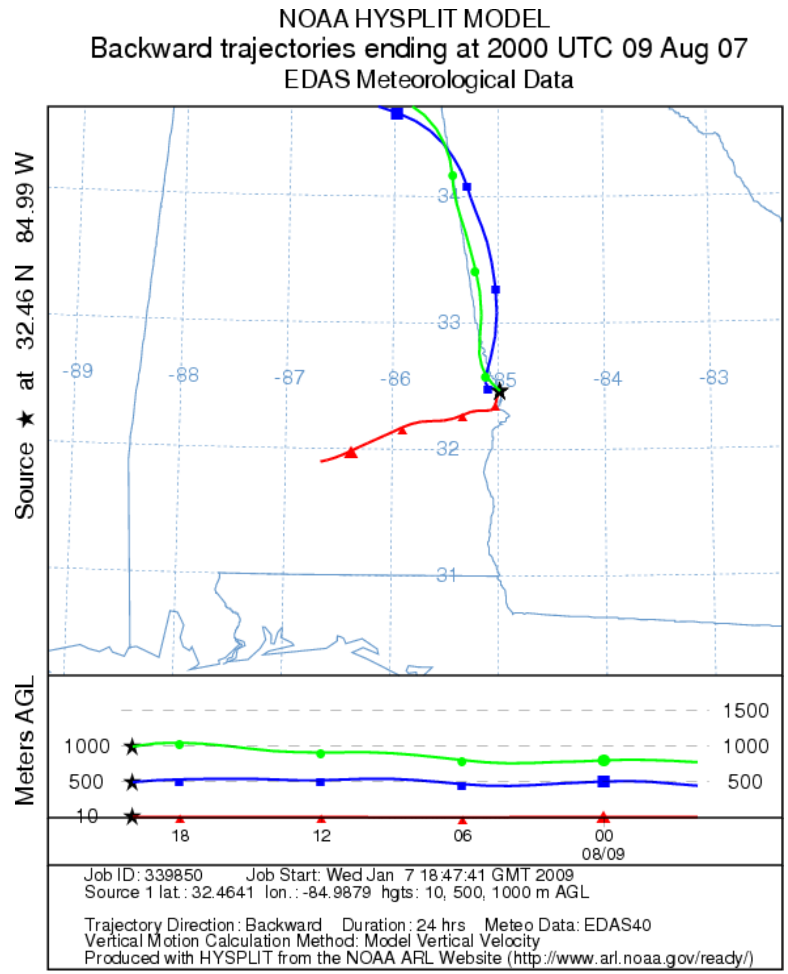
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

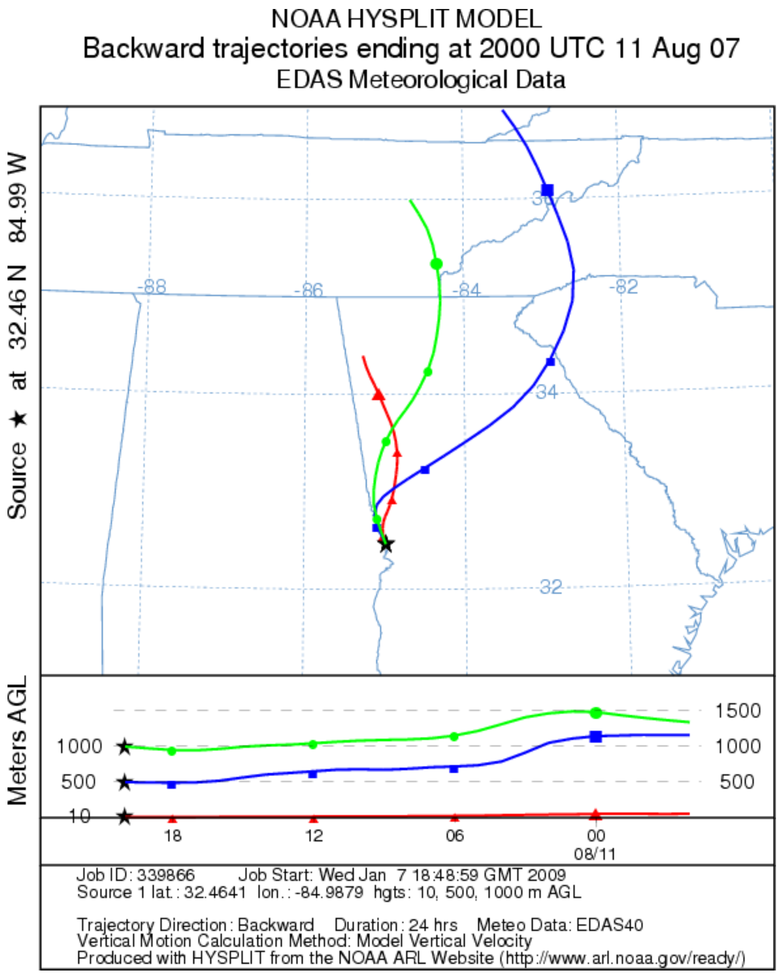
D-13


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 23 Jun 07
EDAS Meteorological Data
Source ★ at 32.47 N 85.08 W
Meters AGL
1500
1000
500
10
18
12
06
00
06/23
Job ID: 342595 Job Start: Mon Dec 15 14:34:54 GMT 2008
Source 1 lat.: 32.468 lon.: -85.084 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

D-14


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 09 Aug 07
EDAS Meteorological Data
Source ★ at 32.46 N 84.99 W
Meters AGL
1500
1000
500
10
18
12
06
00
08/09
Job ID: 339850 Job Start: Wed Jan 7 18:47:41 GMT 2009
Source 1 lat.: 32.4641 lon.: -84.9879 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

D-15


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 11 Aug 07
EDAS Meteorological Data
Source ★ at 32.46 N 84.99 W
Meters AGL
1500
1000
500
10
18
12
06
00
08/11
-88
-86
-84
-82
36
34
32
Job ID: 339866 Job Start: Wed Jan 7 18:48:59 GMT 2009
Source 1 lat.: 32.4641 lon.: -84.9879 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

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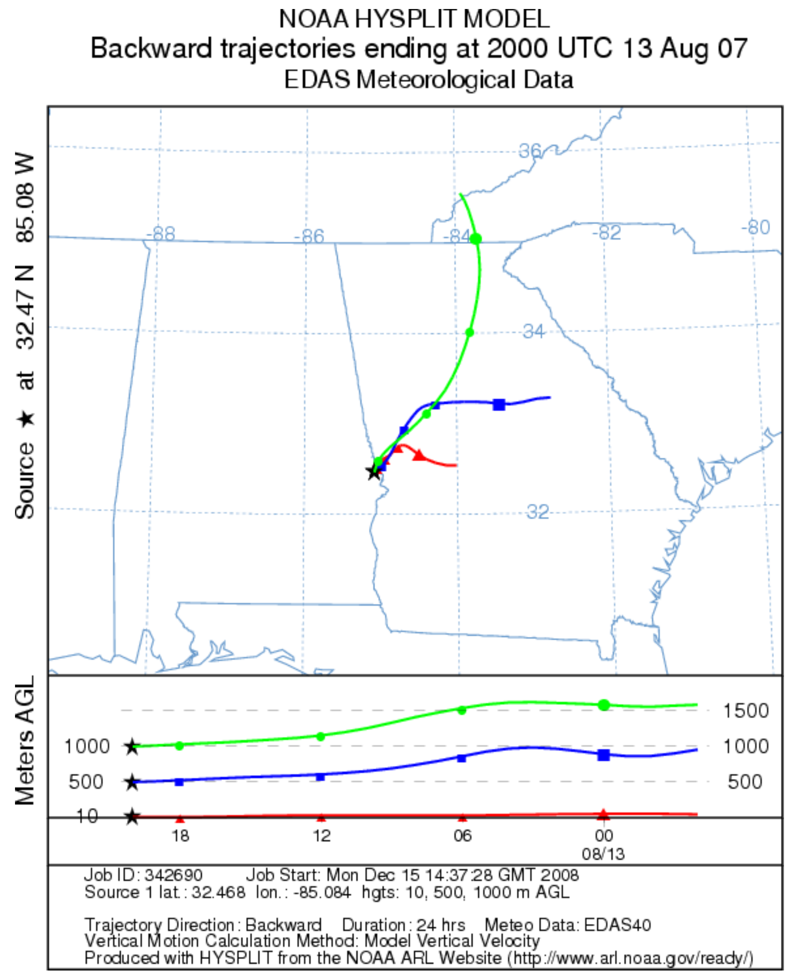
NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 13 Aug 07
EDAS Meteorological Data
Source ★ at 32.47 N 85.08 W
Meters AGL
1500
1000
500
10
18
12
06
00
08/13
-88
-86
-84
-82
-80
36
34
32
Job ID: 342690 Job Start: Mon Dec 15 14:37:28 GMT 2008
Source 1 lat.: 32.468 lon.: -85.084 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

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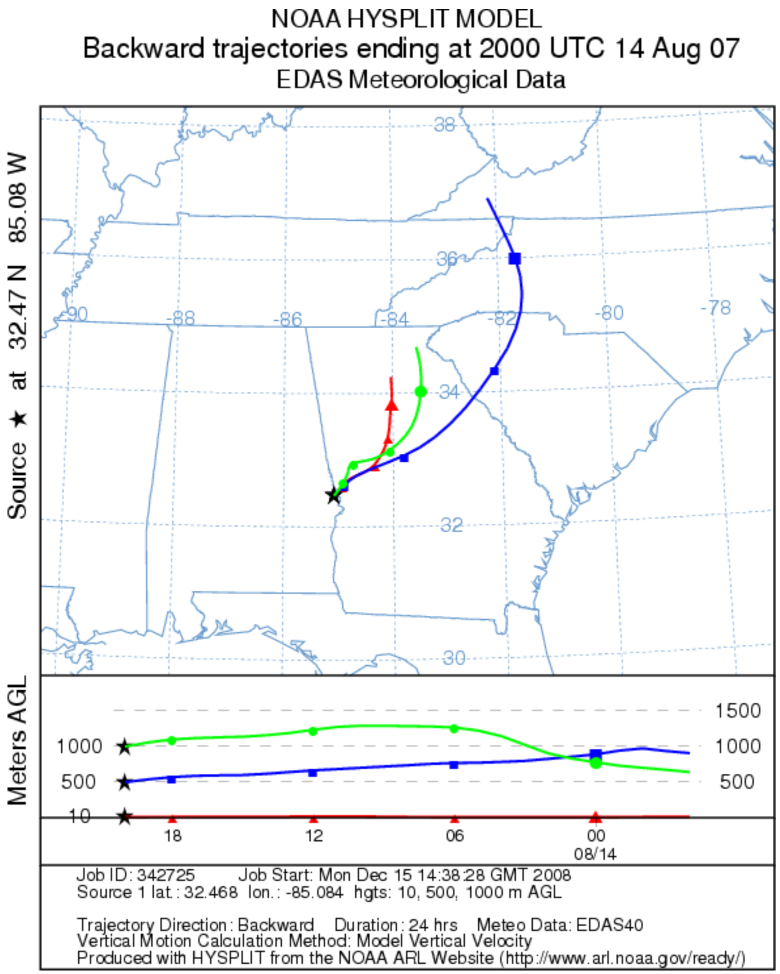
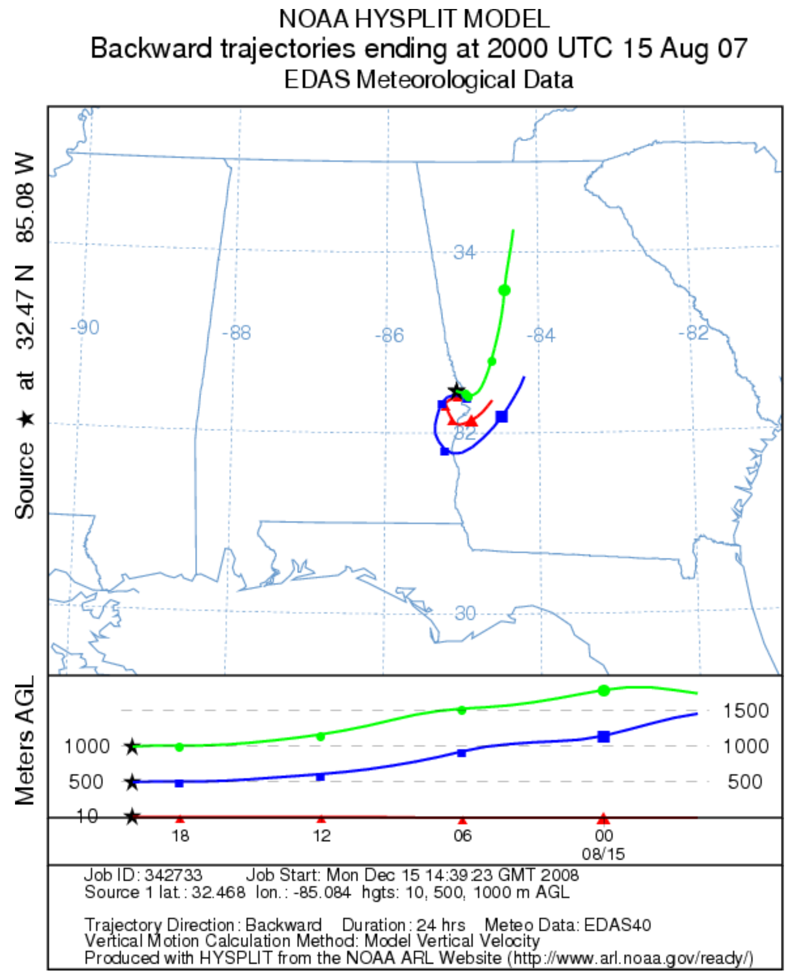

NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 14 Aug 07
EDAS Meteorological Data
Source ★ at 32.47 N 85.08 W
Meters AGL
18 12 06 00
08/14
Job ID: 342725 Job Start: Mon Dec 15 14:38:28 GMT 2008
Source 1 lat.: 32.468 lon.: -85.084 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)

D-18


NOAA HYSPLIT MODEL
Backward trajectories ending at 2000 UTC 15 Aug 07
EDAS Meteorological Data
Source ★ at 32.47 N 85.08 W
Meters AGL
18 12 06 00
08/15
Job ID: 342733 Job Start: Mon Dec 15 14:39:23 GMT 2008
Source 1 lat.: 32.468 lon.: -85.084 hgts: 10, 500, 1000 m AGL
Trajectory Direction: Backward Duration: 24 hrs Meteo Data: EDAS40
Vertical Motion Calculation Method: Model Vertical Velocity
Produced with HYSPLIT from the NOAA ARL Website (http://www.arl.noaa.gov/ready/)