

Georgia Department of Natural Resources

Environmental Protection Division • Air Protection Branch
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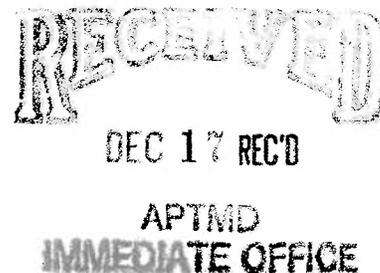
Noel Holcomb, Commissioner

Carol A. Couch, Ph.D., Director

Heather Abrams, Branch Chief

December 18, 2007

James I. Palmer, Jr.
Regional Administrator
U.S. EPA, Region 4
161 Forsyth Street, S.W.
Atlanta, Georgia 30303-3104



Re: Recommended Designations of 24-hour Non-Attainment Areas in Georgia

Dear Mr. Palmer:

On October 17, 2006, the United States Environmental Protection Agency (U.S. EPA) promulgated a revised 24-hr average fine particulate matter (PM_{2.5}) National Ambient Air Quality Standard. The revised standard was effective December 18, 2006. Section 107(d)(1) of the Clean Air Act requires each state to submit to the EPA no later than one year following promulgation of a new or revised NAAQS, its recommended designation of each area of the State as attainment, non-attainment, or unclassifiable under the standard. The Georgia Environmental Protection Division (EPD) has developed recommended designations in accordance with U.S. EPA's June 8, 2007, memorandum "Area Designations for the Revised 24-Hour Fine Particle National Ambient Air Quality Standard" and U.S. EPA's "Guidance for Determining Boundaries of 24-Hour Fine Particle Attainment and Non-Attainment Areas."

The attached table provides EPD's initial recommendation for the designation status of each county in Georgia. It is recommended that all or parts of 22 counties in Georgia noted in the table be designated as non-attainment. EPD intends to revise this recommendation once 2007 monitoring is available and 2005-2007 design values can be determined. EPD also may revise this recommendation after U.S. EPA has taken action on EPD and other pertinent requests to exclude data from use in identifying a violation in accordance with EPA's Final Rule on the Treatment of Data Influenced by Exceptional Events.

In developing the 24-hour PM_{2.5} non-attainment area recommendation, EPD based the boundary recommendation on the nine factors contained in Attachment 2 of EPA's Area Designations for the Revised 24-Hour Fine Particle National Ambient Air Quality Standard memorandum. For the first two of the nine factors (emissions data and air quality data), EPD utilized a revised "L-Score Approach" similar to the approach presented by U.S. EPA to STAPPA/ALAPCO (now NACAA) on May 5, 2004. EPD also considered five of the remaining seven factors: population density and degree of urbanization, commuting patterns, population growth rates, jurisdictional boundaries, and level of control of emission sources, were also considered. Two of the nine factors, meteorology and geography/topography, were not an issue in developing the boundary recommendation. The technical analysis of these factors is attached.

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EPD also considered the current boundary for that Atlanta annual PM_{2.5} non-attainment area in establishing the recommended boundary for the Atlanta 24-hour PM_{2.5} non-attainment area.

Georgia EPD's recommended PM_{2.5} non-attainment designation for the Atlanta Non-Attainment Area is as follows:

Barrow, Bartow, Carroll, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Hall, Henry, Newton, Paulding, Rockdale, Spalding, and Walton counties, a section of Heard County defined as the northeast portion that extends north of 33 degrees 24 minutes (north) to the Carroll County border and east of 85 degrees 3 minutes (west) to the Coweta County border, and a section of Putnam county defined as the area described by U.S. Census 2000 block group identifier 13-237-9603-1.

Georgia EPD recommends that all other counties and portions of counties be designated as unclassifiable/attainment for the 24-hour PM_{2.5} standard.

If you have any questions or need more information, please contact Heather Abrams at (404) 363-7016 or Jimmy Johnston at (404) 363-7014.

Sincerely,



Carol A. Couch, Ph.D.
Director

CAC:JJ:klc

Attachments

c: Kay Prince, U.S. EPA Region 4
Heather Abrams
Jimmy Johnston

RECOMMENDED DESIGNATION STATUS FOR GEORGIA COUNTIES

County Name	Designation
Appling	Unclassifiable/Attainment
Atkinson	Unclassifiable/Attainment
Bacon	Unclassifiable/Attainment
Baker	Unclassifiable/Attainment
Baldwin	Unclassifiable/Attainment
Banks	Unclassifiable/Attainment
Barrow	Nonattainment
Bartow	Nonattainment
Ben Hill	Unclassifiable/Attainment
Berrien	Unclassifiable/Attainment
Bibb	Unclassifiable/Attainment
Bleckley	Unclassifiable/Attainment
Brantley	Unclassifiable/Attainment
Brooks	Unclassifiable/Attainment
Bryan	Unclassifiable/Attainment
Bulloch	Unclassifiable/Attainment
Burke	Unclassifiable/Attainment
Butts	Unclassifiable/Attainment
Calhoun	Unclassifiable/Attainment
Camden	Unclassifiable/Attainment
Candler	Unclassifiable/Attainment
Carroll	Nonattainment
Catoosa	Unclassifiable/Attainment
Charlton	Unclassifiable/Attainment
Chatham	Unclassifiable/Attainment
Chattahoochee	Unclassifiable/Attainment
Chattooga	Unclassifiable/Attainment
Cherokee	Nonattainment
Clarke	Unclassifiable/Attainment
Clay	Unclassifiable/Attainment
Clayton	Nonattainment
Clinch	Unclassifiable/Attainment
Cobb	Nonattainment
Coffee	Unclassifiable/Attainment
Colquitt	Unclassifiable/Attainment
Columbia	Unclassifiable/Attainment
Cook	Unclassifiable/Attainment
Coweta	Nonattainment
Crawford	Unclassifiable/Attainment
Crisp	Unclassifiable/Attainment
Dade	Unclassifiable/Attainment
Dawson	Unclassifiable/Attainment

RECOMMENDED DESIGNATION STATUS FOR GEORGIA COUNTIES

County Name	Designation
Decatur	Unclassifiable/Attainment
DeKalb	Nonattainment
Dodge	Unclassifiable/Attainment
Dooly	Unclassifiable/Attainment
Dougherty	Unclassifiable/Attainment
Douglas	Nonattainment
Early	Unclassifiable/Attainment
Echols	Unclassifiable/Attainment
Effingham	Unclassifiable/Attainment
Elbert	Unclassifiable/Attainment
Emanuel	Unclassifiable/Attainment
Evans	Unclassifiable/Attainment
Fannin	Unclassifiable/Attainment
Fayette	Nonattainment
Floyd	Unclassifiable/Attainment
Forsyth	Nonattainment
Franklin	Unclassifiable/Attainment
Fulton	Nonattainment
Gilmer	Unclassifiable/Attainment
Glascok	Unclassifiable/Attainment
Glynn	Unclassifiable/Attainment
Gordon	Unclassifiable/Attainment
Grady	Unclassifiable/Attainment
Greene	Unclassifiable/Attainment
Gwinnett	Nonattainment
Habersham	Unclassifiable/Attainment
Hall	Nonattainment
Hancock	Unclassifiable/Attainment
Haralson	Unclassifiable/Attainment
Harris	Unclassifiable/Attainment
Hart	Unclassifiable/Attainment
Heard	Nonattainment (partial)
Henry	Nonattainment
Houston	Unclassifiable/Attainment
Irwin	Unclassifiable/Attainment
Jackson	Unclassifiable/Attainment
Jasper	Unclassifiable/Attainment
Jeff Davis	Unclassifiable/Attainment
Jefferson	Unclassifiable/Attainment
Jenkins	Unclassifiable/Attainment
Johnson	Unclassifiable/Attainment
Jones	Unclassifiable/Attainment

RECOMMENDED DESIGNATION STATUS FOR GEORGIA COUNTIES

County Name	Designation
Lamar	Unclassifiable/Attainment
Lanier	Unclassifiable/Attainment
Laurens	Unclassifiable/Attainment
Lee	Unclassifiable/Attainment
Liberty	Unclassifiable/Attainment
Lincoln	Unclassifiable/Attainment
Long	Unclassifiable/Attainment
Lowndes	Unclassifiable/Attainment
Lumpkin	Unclassifiable/Attainment
McDuffie	Unclassifiable/Attainment
McIntosh	Unclassifiable/Attainment
Macon	Unclassifiable/Attainment
Madison	Unclassifiable/Attainment
Marion	Unclassifiable/Attainment
Meriwether	Unclassifiable/Attainment
Miller	Unclassifiable/Attainment
Mitchell	Unclassifiable/Attainment
Monroe	Unclassifiable/Attainment
Montgomery	Unclassifiable/Attainment
Morgan	Unclassifiable/Attainment
Murray	Unclassifiable/Attainment
Muscogee	Unclassifiable/Attainment
Newton	Nonattainment
Oconee	Unclassifiable/Attainment
Oglethorpe	Unclassifiable/Attainment
Paulding	Nonattainment
Peach	Unclassifiable/Attainment
Pickens	Unclassifiable/Attainment
Pierce	Unclassifiable/Attainment
Pike	Unclassifiable/Attainment
Polk	Unclassifiable/Attainment
Pulaski	Unclassifiable/Attainment
Putnam	Nonattainment (partial)
Quitman	Unclassifiable/Attainment
Rabun	Unclassifiable/Attainment
Randolph	Unclassifiable/Attainment
Richmond	Unclassifiable/Attainment
Rockdale	Nonattainment
Schley	Unclassifiable/Attainment
Screven	Unclassifiable/Attainment
Seminole	Unclassifiable/Attainment
Spalding	Nonattainment

RECOMMENDED DESIGNATION STATUS FOR GEORGIA COUNTIES

County Name	Designation
Stephens	Unclassifiable/Attainment
Stewart	Unclassifiable/Attainment
Sumter	Unclassifiable/Attainment
Talbot	Unclassifiable/Attainment
Taliaferro	Unclassifiable/Attainment
Tattnall	Unclassifiable/Attainment
Taylor	Unclassifiable/Attainment
Telfair	Unclassifiable/Attainment
Terrell	Unclassifiable/Attainment
Thomas	Unclassifiable/Attainment
Tift	Unclassifiable/Attainment
Toombs	Unclassifiable/Attainment
Towns	Unclassifiable/Attainment
Treutlen	Unclassifiable/Attainment
Troup	Unclassifiable/Attainment
Turner	Unclassifiable/Attainment
Twiggs	Unclassifiable/Attainment
Union	Unclassifiable/Attainment
Upson	Unclassifiable/Attainment
Walker	Unclassifiable/Attainment
Walton	Nonattainment
Ware	Unclassifiable/Attainment
Warren	Unclassifiable/Attainment
Washington	Unclassifiable/Attainment
Wayne	Unclassifiable/Attainment
Webster	Unclassifiable/Attainment
Wheeler	Unclassifiable/Attainment
White	Unclassifiable/Attainment
Whitfield	Unclassifiable/Attainment
Wilcox	Unclassifiable/Attainment
Wilkes	Unclassifiable/Attainment
Wilkinson	Unclassifiable/Attainment
Worth	Unclassifiable/Attainment

Nonattainment Area Designations for Georgia under the 24-hour PM_{2.5} Standard

This document contains Georgia EPD's analysis for designating nonattainment areas in Georgia under the 24-hour fine particulate matter (PM_{2.5}) standard. This analysis has been conducted in accordance with U.S. EPA's 2007 memorandum "Area Designations for the Revised 24-Hour Fine Particle National Ambient Air Quality Standard" and U.S. EPA's "Guidance for Determining Boundaries of 24-Hour Fine Particle Attainment and Nonattainment Areas".

MONITORING DATA

FRM measurements of 24-hour PM_{2.5} concentrations in and around Georgia during 2004-2006 were analyzed and used to identify sites currently violating the revised 24-hour PM_{2.5} standard. Design values (DV) were calculated for each site (Figure 1) by averaging the 98th percentile 24-hour PM_{2.5} concentrations for 2004, 2005, and 2006 (Table 1). The 98th percentile concentration is dependent on the number of measurements taken each year. Assuming no missing data, the 98th percentile for sites that measure PM_{2.5} on a daily basis would result in the 8th high concentration. Sites that measure PM_{2.5} every third day would result in the 3rd high concentration and sites that measure 24-hour PM_{2.5} every sixth day would result in the 2nd high concentration. If the 2004-2006 DV for a site is equal to or larger than 35.5 µg/m³, the site is violating the standard. Table 1 contains the 98th percentile concentrations and the 2004-2006 DVs for each monitor in and adjacent to Georgia. Using the 98th percentile PM_{2.5} concentrations listed in EPA's AQS database results in DVs over the revised 24-hour PM_{2.5} at two sites in Georgia. These sites are Forest Park (13-063-0091) located in Clayton county (Atlanta MSA) and Columbus Airport (13-215-0008) located in Muscogee county (Columbus MSA). In addition, the Phenix City monitor (01-113-0001) located in Alabama (across the river from Columbus) and the Maxwell Road monitor (47-065-0031) located in Chattanooga, TN are violating the revised 24-hour PM_{2.5} standard. However, we feel that the Columbus Airport monitor should not be classified as a violating monitor and will meet the revised 24-hour PM_{2.5} standard once missing data is filled via data substitution. Furthermore, the Phenix City and Maxwell Road monitors will meet the revised 24-hour PM_{2.5} standard once flagged exceptional events have been accepted into the AQS database by EPA.

PM_{2.5} measurements at the Columbus Airport site are performed every sixth day. If data were available for the full year, the 98th percentile would be the second highest value. However, this site did not begin operation until March 2004 (data is missing for January and February). As a result, the corresponding 98th percentile concentration is the first highest value in 2004 (48.5 µg/m³). Since January and February are typically some of the cleanest months, we believe it is appropriate to fill the missing data with measurements from a nearby representative monitor and recalculate the 98th percentile concentration. To fill the missing data for January and February, PM_{2.5} concentrations for the Columbus Airport site were compared against concentrations from other nearby monitors for 2004-2006 (Figures 2a, 2b, 2c). The Columbus Airport concentrations were highly correlated with the Columbus Health Department concentrations (Figure 3). Therefore, data from Columbus Health Department was used to fill in the missing 2004 data for

January and February at the Columbus Airport site. As a result, the 98th percentile 24-hour PM_{2.5} concentration in 2004 was the second high value (30.2 µg/m³) instead of the first high value (48.5 µg/m³) resulting in a 2004-2006 DV of 30.1 µg/m³ (well below the 24-hour PM_{2.5} standard) instead of 36.2 µg/m³ (based on AQS data).

According to the AQS database, the 98th percentile 24-hour PM_{2.5} concentration for the Phenix City monitor (01-113-0001) in Russell County, AL was 40.1 µg/m³ in 2004, 38.8 µg/m³ in 2005, and 29.3 µg/m³ in 2006 resulting in a 2004-2006 DV of 36.1 µg/m³. This DV is over the revised 24-hour PM_{2.5} standard. However, the Alabama Department of Environmental Management (ADEM) has flagged January 1, 2004 (40.1 µg/m³) as an exceptional event. As a result, the new 98th percentile 24-hour PM_{2.5} concentration for 2004 is 38.0 µg/m³ resulting in a new 2004-2006 DV of 35.4 µg/m³. This DV is below the revised 24-hour PM_{2.5} standard.

According to the AQS database, the 98th percentile 24-hour PM_{2.5} concentration for the Maxwell Road monitor (47-065-0031) located in Chattanooga, TN was 30.8 µg/m³ in 2004, 36.9 µg/m³ in 2005, and 39.1 µg/m³ in 2006 resulting in a 2004-2006 DV of 35.6 µg/m³. This DV is over the revised 24-hour PM_{2.5} standard. However, the Tennessee Department of Environment and Conservation (TDEC) has flagged July 4, 2006 (49.2 µg/m³) as an exceptional event. As a result, the new 98th percentile 24-hour PM_{2.5} concentration for 2006 is 28.7 µg/m³ resulting in a new 2004-2006 DV of 32.1 µg/m³. This DV is below the revised 24-hour PM_{2.5} standard.

The next sections contain analyses that have been performed to identify counties in Georgia that may be contributing to high 24-hour PM_{2.5} measurements at the Forest Park monitor in the Atlanta MSA.

EMISSIONS AND AIR QUALITY

EPA's 2007 memo and guidance lists emissions and air quality as two of the nine factors to be considered in assessing which areas to include as part of a designated nonattainment area. The guidance also notes that "the same boundaries established for implementing the annual PM_{2.5} standards may also be appropriate for implementing the 24-hour PM_{2.5} standards in areas where both standards are violated. Adopting this approach may more easily facilitate overall air quality planning for attaining the suite of PM_{2.5} standards."

For Atlanta, we started our analysis by identifying counties that were currently designated nonattainment for the annual PM_{2.5} standard in the Atlanta MSA (20 full counties and 2 partial counties). In addition, we considered all other counties adjacent to the 20 full nonattainment counties (Figures 4 & 5).

The emissions and air quality analysis was done through the use of a revised L-Score approach as described below.

Background

EPA has developed an equation to help evaluate the contribution of local emissions to an area's annual PM2.5 nonattainment problem. This equation will produce a value known as the local emissions score or "L-score" (EPA, 2004):

$$\begin{aligned} &= \left[\left(\frac{\text{County_SO2_tons}}{\text{CMSA_SO2_tons}} \right) * (\% \text{_SO4_Urban_excess}) \right] \\ &+ \left[\left(\frac{\text{County_NOx_tons}}{\text{CMSA_NOx_tons}} \right) * (\% \text{_NO3_Urban_excess}) \right] \\ &+ \left[\left(\frac{\text{County_Carbon_tons}}{\text{CMSA_Carbon_tons}} \right) * (\% \text{_Carbon_Urban_excess}) \right] \\ &+ \left[\left(\frac{\text{County_crustal_tons}}{\text{CMSA_crustal_tons}} \right) * (\% \text{_Crustal_Urban_excess}) \right] \end{aligned} \quad (\text{Eq. 1})$$

County-by-county L-scores are a quantitative way to rank the contribution of individual counties to a metropolitan area's "urban excess." Urban excess is defined as the local contribution of PM2.5 above the regional background concentrations and is calculated by taking the difference between PM2.5 concentrations recorded by an urban monitor and those recorded by a more regional or rural monitor. Percent urban excess can be calculated on a species-by-species basis if speciated PM2.5 monitoring data is available (Rao *et al.*, 2003). We have used a revised L-score approach that will focus on counties within the metropolitan area (1999 and 2003 definitions) and counties adjacent to those metropolitan areas to help identify which counties should be included in the nonattainment area.

Revised L-Score Equation for 24-hour PM2.5 Designations

Conceptually, the basic L-Score methodology proposed by EPA (EPA, 2004) is a sound approach for annual PM2.5. However, we feel the methodology must be revised to better quantify which counties are contributing to a metropolitan area's 24-hour PM2.5 nonattainment problem.

(1) PM2.5 and Speciated PM2.5 Daily Increment: Unlike urban excess which is calculated for the nonattainment designation under the annual PM2.5 standard, daily increments are calculated for the nonattainment designation under the 24-hr PM2.5 standard. 24-hr PM2.5 measurements that are larger than 30 µg/m³ are treated as concentrations on "high" days, and the rest of the measurements are considered as concentrations on "low" days. The difference between PM2.5 concentrations on high and low days is called the daily increment. Measurements from 2004 to 2006 are categorized into four quarters, and PM2.5 daily increments are calculated for each quarter. Corresponding speciated PM2.5 measurements at a nearby STN monitor are examined on the same high and low days to calculate the percent of PM2.5 daily increments associated with sulfate, nitrate, organic matter, elemental carbon, and crustal. The STN monitor in South DeKalb is used for the Atlanta MSA (Table 2).

(2) Normalize Emission Contributions by CMSA + non-CMSA Emissions: The process previously used by EPA to determine which counties should be nonattainment involves ranking the CMSA counties from highest L-score to lowest and then ranking the non-CMSA counties from highest L-score to lowest. A cumulative weighted emissions score is calculated for the CMSA counties and can be used to identify possible guidelines (e.g., 80%, 90%, 95%, etc.) for including CMSA and/or adjacent counties in the nonattainment area. This methodology assumes that the majority of the emissions contributing to an area's nonattainment problem are from within the CMSA counties. However, this is not necessarily the case. Many times, this approach will lead to CMSA counties being included in the nonattainment area when they have relatively small emission contributions to the urban excess compared to adjacent counties. Since all counties (CMSA and adjacent CMSA) contribute emissions to the daily increment, a better approach would be to normalize each species' contribution in Equation 1 by the total (CMSA + adjacent non-CMSA) emissions instead of just the CMSA emissions. The L-scores that result should be ranked from highest to lowest regardless of whether a county is in the CMSA or adjacent to the CMSA. A cumulative weighted emissions score can then be calculated for the entire area under consideration.

(3) Update L-score Equation: EPA's weighted emissions metric (L-score) includes SO₂, NO_x, primary carbon, and primary crustal emissions. Here, primary carbon emissions have been separated into EC and OM. Inclusion of separate EC and OM emissions along with normalizing the county emissions by total CMAS + Non-CMSA emissions results in a revised equation for the L-score (Equation 2). This equation was used to perform our nonattainment analysis in the following section.

(4) Emissions Inventory: The 2005 CERR emission inventory is used for this analysis. This inventory includes fire emissions from DOD military bases.

(5) Distance-Weighted L-Score: L-scores were calculated using distance-weighted emissions. County-level emissions are weighted by the inverse of distance from each county to the monitors violating the 24-hr PM_{2.5} standard (Equation 3). For the Atlanta MSA, the distance is the center of each county to the Forest Park FRM monitor.

(5) EGU Emission Controls: Growth and controls of Power Plants (EGUs) can significantly increased or decreased emissions by 2009. VISTAS 2009 Base G EGU projections were used to update the 2005 CERR emissions. Then, revised L-scores were recalculated for all counties.

$$\begin{aligned}
&= \left[\left(\frac{(SO2_tons)_i}{\sum_i (SO2_tons)_i} \right) * (\%_SO4_Daily_Increment) \right] \\
&+ \left[\left(\frac{(NOx_tons)_i}{\sum_i (NOx_tons)_i} \right) * (\%_NO3_Daily_Increment) \right] \\
&+ \left[\left(\frac{(EC_tons)_i}{\sum_i (EC_tons)_i} \right) * (\%_EC_Daily_Increment) \right] \\
&+ \left[\left(\frac{(OM_tons)_i}{\sum_i (OM_tons)_i} \right) * (\%_OM_Daily_Increment) \right] \\
&+ \left[\left(\frac{(crustal_tons)_i}{\sum_i (crustal_tons)_i} \right) * (\%_Crustal_Daily_Increment) \right] \quad (Eq. 2)
\end{aligned}$$

where i refers to counties in both CMSA and adjacent non-CMSA areas.

$$\begin{aligned}
&= \left[\left(\frac{(SO2_tons)_i \times \frac{1}{r_i}}{\sum_i (SO2_tons)_i \times \frac{1}{r_i}} \right) * (\%_SO4_Daily_Increment) \right] \\
&+ \left[\left(\frac{(NOx_tons)_i \times \frac{1}{r_i}}{\sum_i (NOx_tons)_i \times \frac{1}{r_i}} \right) * (\%_NO3_Daily_Increment) \right] \\
&+ \left[\left(\frac{(EC_tons)_i \times \frac{1}{r_i}}{\sum_i (EC_tons)_i \times \frac{1}{r_i}} \right) * (\%_EC_Daily_Increment) \right] \\
&+ \left[\left(\frac{(OM_tons)_i \times \frac{1}{r_i}}{\sum_i (OM_tons)_i \times \frac{1}{r_i}} \right) * (\%_OM_Daily_Increment) \right] \\
&+ \left[\left(\frac{(crustal_tons)_i \times \frac{1}{r_i}}{\sum_i (crustal_tons)_i \times \frac{1}{r_i}} \right) * (\%_Crustal_Daily_Increment) \right] \quad (\text{Eq. 3})
\end{aligned}$$

where i refers to counties in both CMSA and adjacent non-CMSA areas.

Application of Updated L-Score Equation

L-scores were calculated for the Atlanta MSA to evaluate which counties should be designated nonattainment. Overall, 42 counties were evaluated for the Atlanta MSA. Table 3 contains 2005 emissions, L-scores (using Equation 2), and the cumulative L-Score for Atlanta. Table 4 contains distance to monitor, distance-weighted 2005 emissions, L-Scores (using Equation 3), and the cumulative L-Scores for Atlanta. Table 5 contains 2005 emissions (updated with 2009 EGU emissions), L-Scores (using Equation 2), and the cumulative L-Scores for Atlanta. Table 6 contains distance to monitor, distance-weighted 2005 emissions (updated with 2009 EGU emissions), L-Scores (using Equation 3), and the cumulative L-Scores for Atlanta. We feel that the L-Scores calculated in Tables 6 is the most representative since it accounts for the distance from the violating monitor and any significant emissions controls that will be implemented by 2009.

FRM measurements at Forest Park and STN Measurements at South DeKalb are complete for the analysis period from 2004 to 2006. The speciated daily increments can vary drastically by quarter. The major species for the daily increments are sulfate and organic carbon.

Atlanta Nonattainment Area: Table 6 contains the L-Scores based on distance-weighted 2005 emissions (updated with 2009 EGU emissions) for the Atlanta MSA. It was determined that a threshold L-Score value of greater than 2.0 would result in a significant contributions to the 24-hour PM_{2.5} daily increment and those counties should be designated as nonattainment (Coweta, Bartow, Cobb, Fulton, Putnam, Heard, DeKalb, Clayton, Gwinnett, and Henry). Also, it was determined that a threshold L-Score value of less than 0.50 would result in an insignificant contributions to the 24-hour PM_{2.5} daily increment and those counties should be designated as attainment (Jackson, Morgan, Gordon, Butts, Clarke, Polk, Pike, Haralson, Lamar, Oconee, Pickens, Dawson, Habersham, White, Lumpkin, and Banks). For counties with an L-Score between 0.5 and 1.5, additional factors discussed in the next section will be analyzed to determine if a county should be designated attainment or nonattainment (Fayette, Floyd, Douglas, Cherokee, Carroll, Newton, Paulding, Hall, Forsyth, Walton, Jasper, Spalding, Rockdale, Meriwether, Troup, and Barrow).

ANALYSIS USING OTHER FACTORS

EPD further examined those counties that were analyzed using our revised L-Score method using the seven other factors as described in U.S. EPA's April 1, 2003, memorandum "Designations for the Fine Particle National Ambient Standards":

1. population density and degree of urbanization
2. traffic and commuting patterns
3. expected growth
4. meteorology
5. geography/topography
6. jurisdictional boundaries
7. level of control of emissions

For this particular analysis, EPD could not identify any areas where factors 4 (meteorology) was an issue for PM_{2.5} nonattainment. It was also determined that the topography portion of factor 5 was not an issue in any of the PM_{2.5} nonattainment areas analyzed.

The following data were used to determine whether or not a county met criteria 1, 2, or 3.

- A. Population Density – estimated 2006 population density from by U.S. Census Bureau
- B. Percent Population Growth - estimated population growth (percent growth and numerical growth) from 2000 to 2005 from the U.S. Census Bureau
- C. Percent Urbanization – percent urbanization considered by U.S. Census Bureau for 2000
- D. In Commutes – the in-commute into the five core counties in the Atlanta MSA (Fulton, De Kalb, Cobb, Clayton, and Gwinnett) was calculated based on data by U.S. Census

- Bureau for 2000
- E. Vehicle Registration – data are obtained from www.georgiastats.uga.edu/
 - F. Vehicular Miles Traveled (VMT) in county – data was based on HPMS data for 2006.

The specific values for each of these criteria for the counties analyzed are shown in Table 7. Geography, jurisdictional boundaries, and level of control of emissions are considered on a qualitative basis for each county.

Atlanta Nonattainment Area

Quantitative Criteria – The population density, population growth (percent and number of people), percent urbanization, in-commutes, vehicle registration, and VMT are summarized in Table 7. Tables 8 and 9 sort each factor in descending order. Since 42 counties were under consideration in this analysis, a threshold for each factor was determined somewhere near the 50% cutoff (top 21 counties). Natural break points in the data were identified to refine the thresholds (Tables 8 and 9). The results are summarized in Table 10. The counties that were examined in more detail based on the L-Scores were Fayette, Floyd, Douglas, Cherokee, Carroll, Newton, Paulding, Hall, Forsyth, Walton, Jasper, Spalding, Rockdale, Meriwether, Troup, and Barrow. Based on the number of criteria that was met by each county, counties have been added to the list of attainment or nonattainment counties. Specifically, if a county met five or more criteria out of seven, they were recommended as nonattainment (Fayette, Douglas, Cherokee, Carroll, Newton, Paulding, Hall, Forsyth, Walton, Spalding, Rockdale, and Barrow) and if they met four or fewer criteria out of seven, they were recommended as attainment (Floyd, Jasper, Meriwether, and Troup).

Geography - There are no geographical factors identified that affect the area.

Jurisdictional – Neither Jasper, Putnam, Heard, Hall, nor Troup were included in the June 30, 1999, Atlanta Metropolitan Statistical Area (MSA). Hall County became part of the single county Gainesville MSA in 2003. Jasper and Heard Counties became part of the Atlanta MSA in 2003. All counties are within Georgia and fall within the jurisdiction of Georgia EPD. There are no other jurisdictional issues associated with this area.

Level of Control of Emissions – All of the counties listed are either part of the Atlanta 1-hr ozone nonattainment area or have been designated as part of an area that contribute to the level of ozone in the Atlanta 1-hr ozone nonattainment area in accordance with Georgia Air Quality Control Rule 391-3-1-.03(8)(e). Therefore, the level of NO_x and VOC emissions controls in the counties is more stringent than in other areas of the state. (See Table 11 for the specific NO_x and VOC regulations that apply in these counties.) In addition to the existing rules, Georgia Power's Plants Scherer, Branch, Wansley, and Yates contain affected units under Phase II of the Regional NO_x SIP Call the Regional Haze Rule and are subject to the Clean Air Interstate Rule (CAIR). Several sources other than the four coal fired power plants in these counties will also be subject to Phase II of the NO_x SIP Call.

Conclusion – Based on the above factors and the revised L-Scores analysis conducted by EPD,

we recommend that the following counties be designated nonattainment under the 24-hr standard: Coweta, Bartow, Cobb, Fulton, Putnam (partial), Heard (partial), DeKalb, Clayton, Gwinnett, Henry, Fayette, Douglas, Cherokee, Carroll, Newton, Paulding, Hall, Forsyth, Walton, Spalding, Rockdale, and Barrow. Note that this list contains all the counties currently designated non-attainment for the annual PM2.5 in the Atlanta.

NEXT STEPS

These recommendations have been made based on 2004-2006 monitoring data. EPA will review these recommendations and evaluate 2005-2007 monitoring data before making their recommendations. It should be noted that it is highly likely that the Atlanta MSA will be in attainment based on 2005-2007 data since the highest values occur in 2004 (with a strong downward trend) at the violating site. Once the 2007 monitoring data is available, we will immediately update our recommendations and submit them to EPA.

RECOMMENDATIONS

The Air Protection Branch recommends the following areas in Georgia be designated nonattainment for the PM2.5 standard:

- Atlanta Nonattainment Area: Coweta, Bartow, Cobb, Fulton, Putnam (partial), Heard (partial), DeKalb, Clayton, Gwinnett, Henry, Fayette, Douglas, Cherokee, Carroll, Newton, Paulding, Hall, Forsyth, Walton, Spalding, Rockdale, and Barrow.
- The Putnam County partial county area is defined as follows: the area described by U.S.Census 2000 block group identifier 13-237-9603-1
- The Heard County partial county area is defined as follows: the northeast portion that extends north of 33 degrees 24 minutes (north) to the Carroll County border and east of 85 degrees 3 minutes (west) to the Coweta County border

Note that this recommended area is identical to the current Atlanta annual PM2.5 nonattainment area.

References

EPA (2004) *PM2.5 Designations: Evaluating Contribution of Multiple Pollutants Using the Weighted Emissions Score*, presentation to STAPPA/ALAPCO on May 5, 2004.

Rao V, Frank N., Rush A., and Dimmick F. (2003) Chemical Speciation of PM2.5 in Urban and Rural Areas, *National Air Quality and Emissions Trends Report, 2003 Special Studies*, S13-S24.

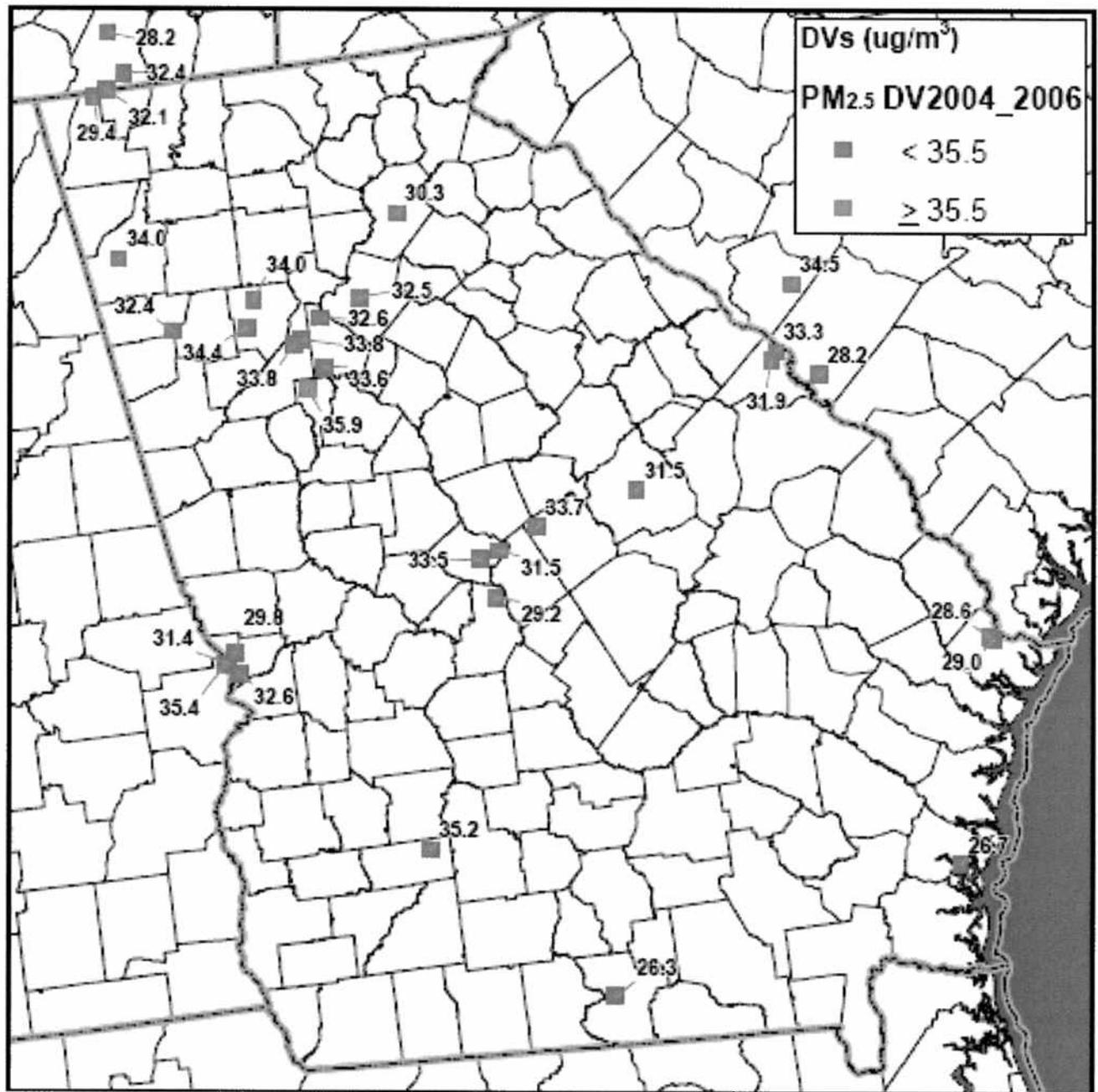


Figure 1. PM_{2.5} FRM Sites in and adjacent to Georgia with 2004-2006 Design Values.

Table 1. 98th Percentiles of 24-hr PM_{2.5} concentrations at FRM stations in Georgia during 2004, 2005 and 2006. 2004-2006 DVs larger than 35.5 µg/m³ are marked in bold.

AIRS_ID	County	Station Name	2004	2005	2006	2004-2006 DV
Atlanta MSA						
13-059-0002	Clarke	Athens College Station Rd.**	N/A	33.2	30.4	N/A
13-063-0091	Clayton	Forest Park	39.4	37.1	31.2	35.9
13-067-0003	Cobb	Kennesaw	32.8	36.2	33.1	34.0
13-067-0004	Cobb	Powder Springs, Macland	38.7	30.8	33.6	34.4
13-089-0002	De Kalb	South DeKalb	35.4	33.3	32.1	33.6
13-089-2001	De Kalb	Doraville	32.0	36.9	28.8	32.6
13-115-0005	Floyd	Rome	32.5	36.0	33.5	34.0
13-121-0032	Fulton	East Rivers School	35.0	34.3	32.0	33.8
13-121-0039	Fulton	Fire Station # 8	38.1	30.5	32.8	33.8
13-135-0002	Gwinnett	Gwinnett	35.1	31.7	30.7	32.5
13-139-0003	Hall	Gainesville	27.6	34.4	28.9	30.3
13-223-0003	Paulding	Yorkville	29.8	35.1	32.4	32.4
Chattanooga MSA						
13-295-0002	Walker	Rossville	28.3	32.6	27.3 (28.7)	29.4 (32.1)
47-065-0031	Hamilton, TN	1510 Maxwell Road	30.8	36.9	39.1 ^a	35.6^a
47-065-1011	Hamilton, TN	Soddy-Daisy High School	26.3	32.9	25.5	28.2
47-065-4002	Hamilton, TN	Riverside Substation	29.2	35.0	32.9	32.4
Macon MSA						
13-021-0007	Bibb	Macon Allied Chem.	38.4	32.6	29.6	33.5
13-021-0012	Bibb	Macon Forestry	34.8	32.1	27.5	31.5
13-153-0001	Houston	Warner Robins	33.6	27.9	26.0	29.2
13-319-0001	Wilkinson	Gordon	35.2	36.5	29.5	33.7
Columbus MSA						
13-215-0001	Muscogee	Columbus H.D.	37.4 (30.2)	29.1	27.8	31.4 (29.8)
13-215-0008	Muscogee	Columbus Airport*	48.5 ^b	29.7	29.5	35.9^b
13-215-0011	Muscogee	Columbus Cussetta Rd.	41.4 (38.0)	28.0	28.4	32.6 (35.4)
01-113-0001	Russell, AL	Phenix City	40.1 ^c	38.8	29.3	36.1^c
August MSA						
13-245-0005	Richmond	Augusta Medical College	38.5	31.5	29.9	33.3
13-245-0091	Richmond	Augusta Bungalow Rd.	35.8	30.8	29.2	31.9
45-003-0003	Aiken	Atomic Road	28.5	29.2	26.8	28.2
45-037-0001	Edgefield	Woodyard Road	36.6	39.0	27.8	34.5
Other Areas						
13-051-0017	Chatham	Savannah Market St.	28.7	30.6	27.6	29.0
13-051-0091	Chatham	Savannah Mercer	30.7	29.6	25.6	28.6
13-095-0007	Dougherty	Albany	36.2	34.9	34.6	35.2
13-127-0006	Glynn	Brunswick	27.6	26.2	26.4	26.7
13-185-0003	Lowndes	Valdosta	29.0	24.1	25.7	26.3
13-303-0001	Washington	Sandersville	33.0	31.6	29.8	31.5

^aThe 2004-2006 DV was revised after removing a flagged exceptional event in 2006.

^bThe 2004-2006 DV was revised using data substitution for missing data in 2004.

^cThe 2004-2006 DV was revised after removing a flagged exceptional event in 2004.

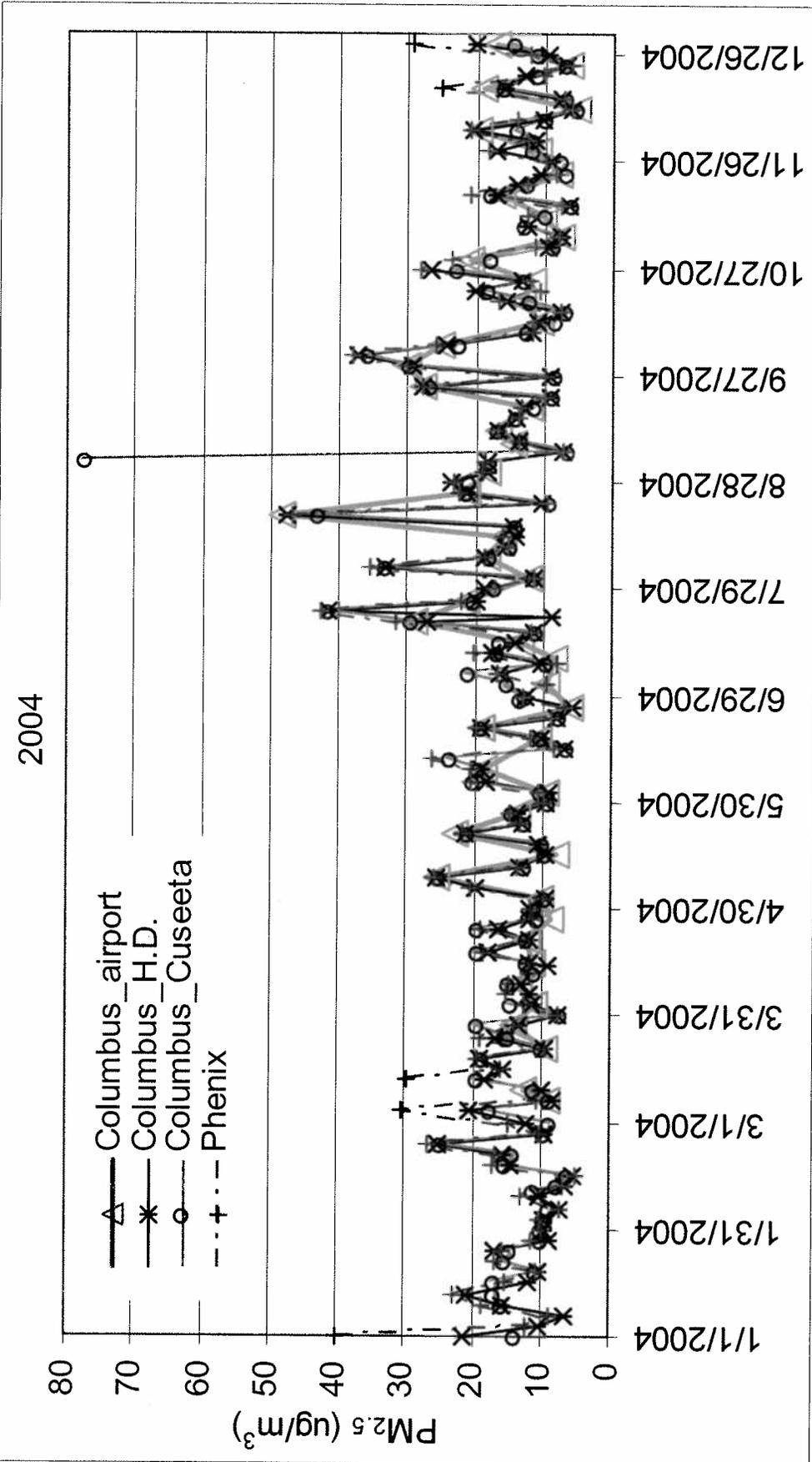


Figure 2a. 24-hr PM_{2.5} concentrations at different monitors in the Columbus MSA during 2004.

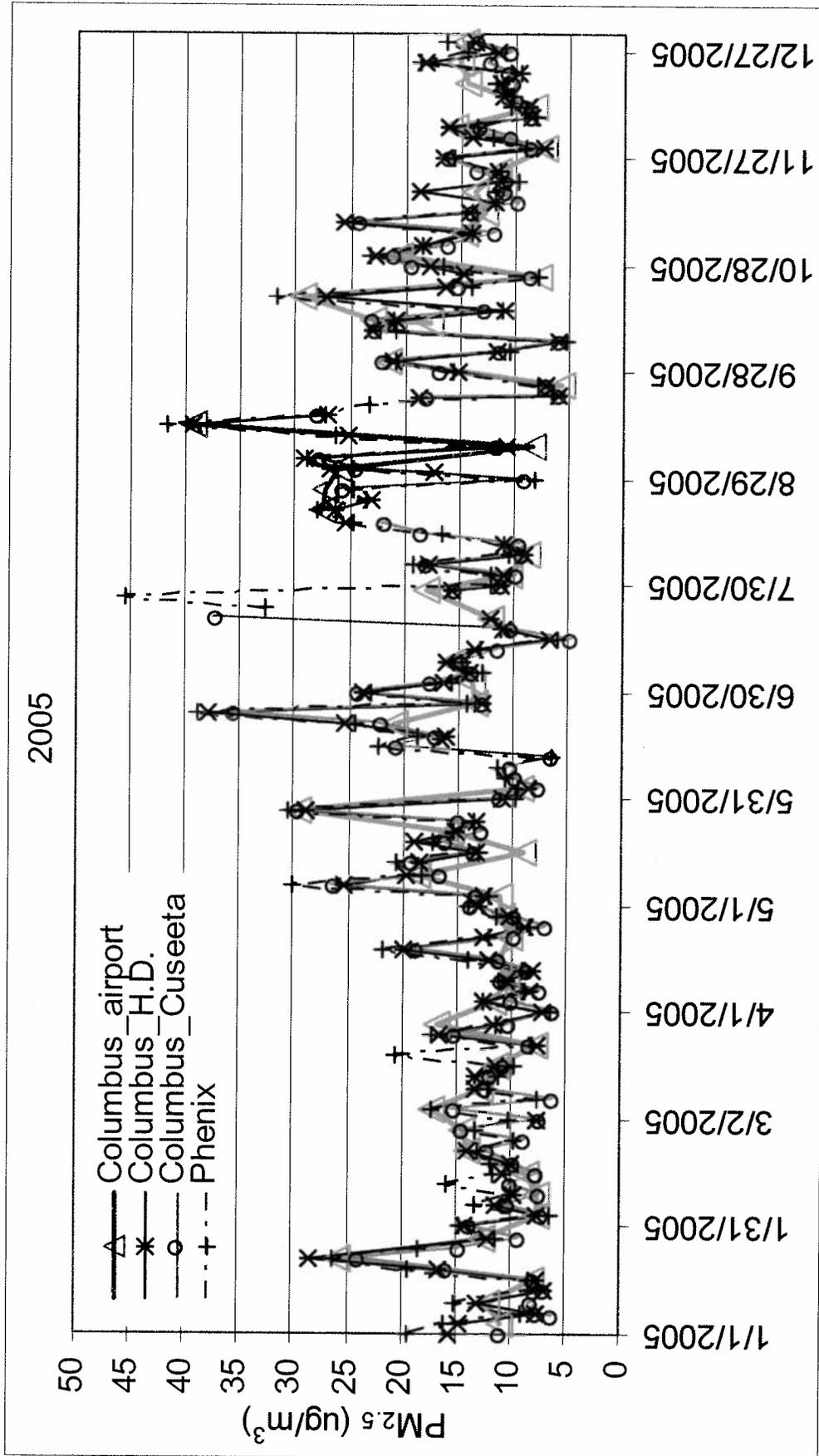


Figure 2b. 24-hr PM_{2.5} concentrations at different monitors in the Columbus MSA during 2005.

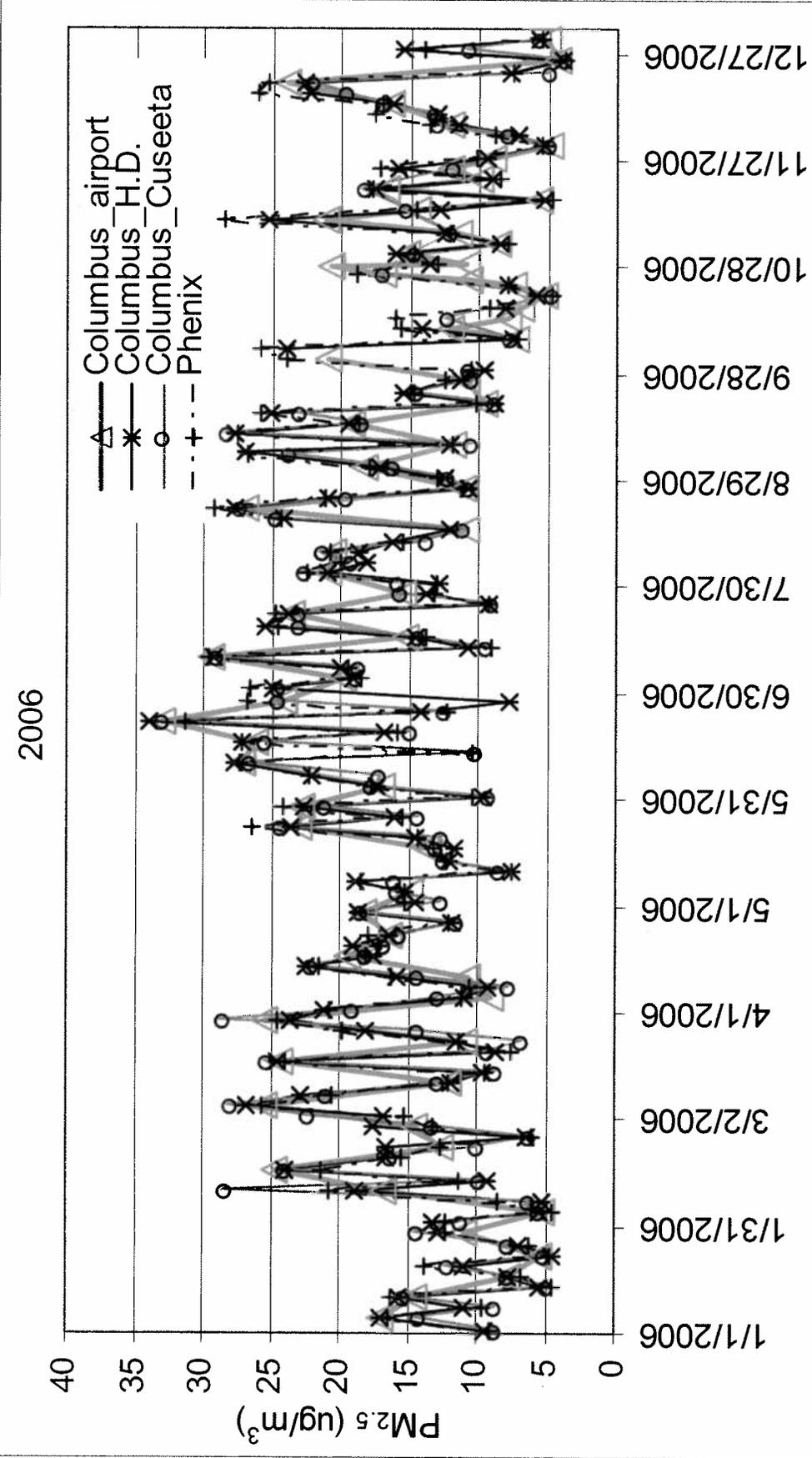


Figure 2c. 24-hr PM_{2.5} concentrations at different monitors in the Columbus MSA during 2006

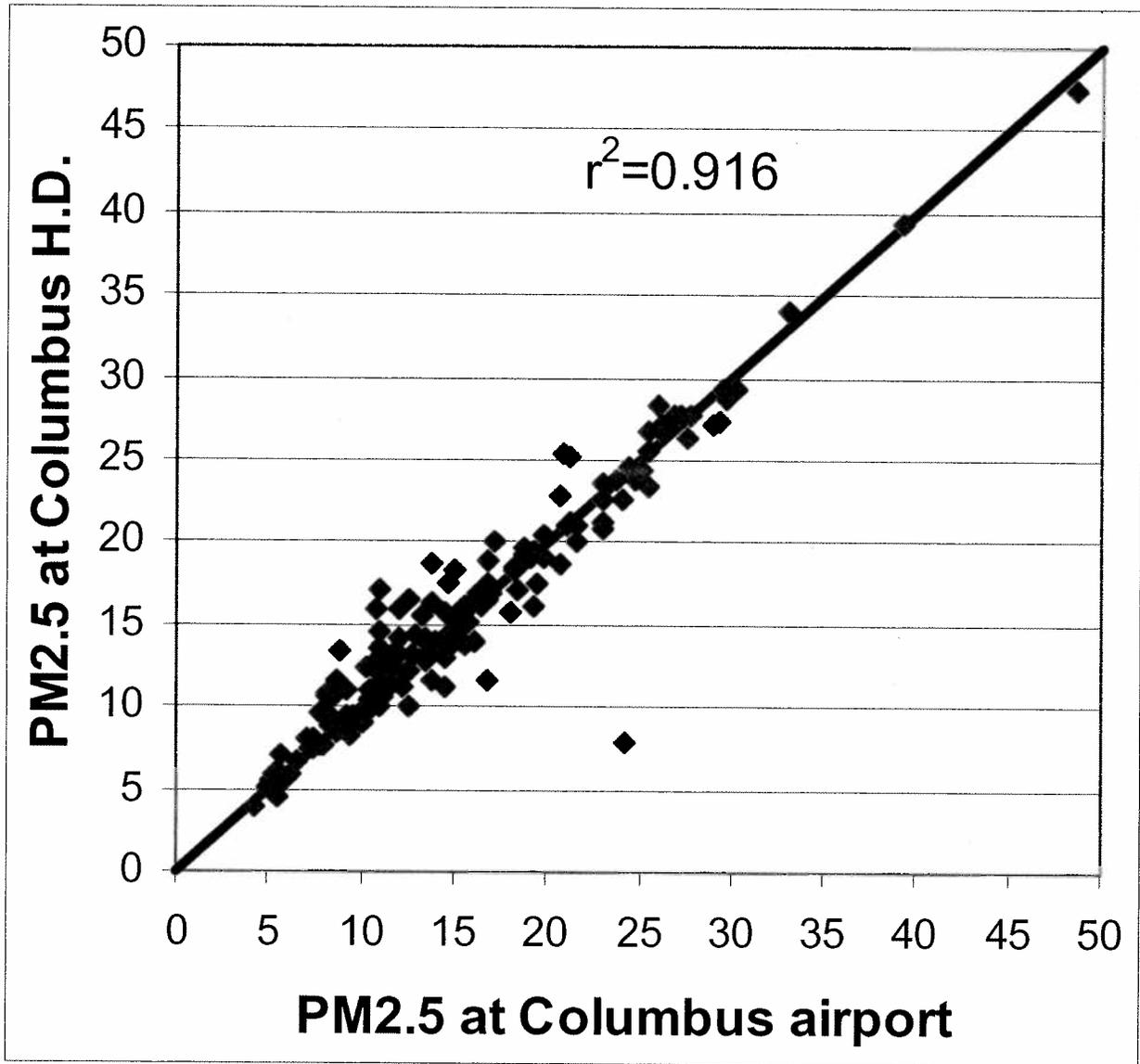


Figure 3. Scatter Plot of 24-hr PM2.5 concentrations at Columbus Airport vs. Columbus Health Department during 2004-2006 (measurements of 0.0 mg/m³ were removed from plot).

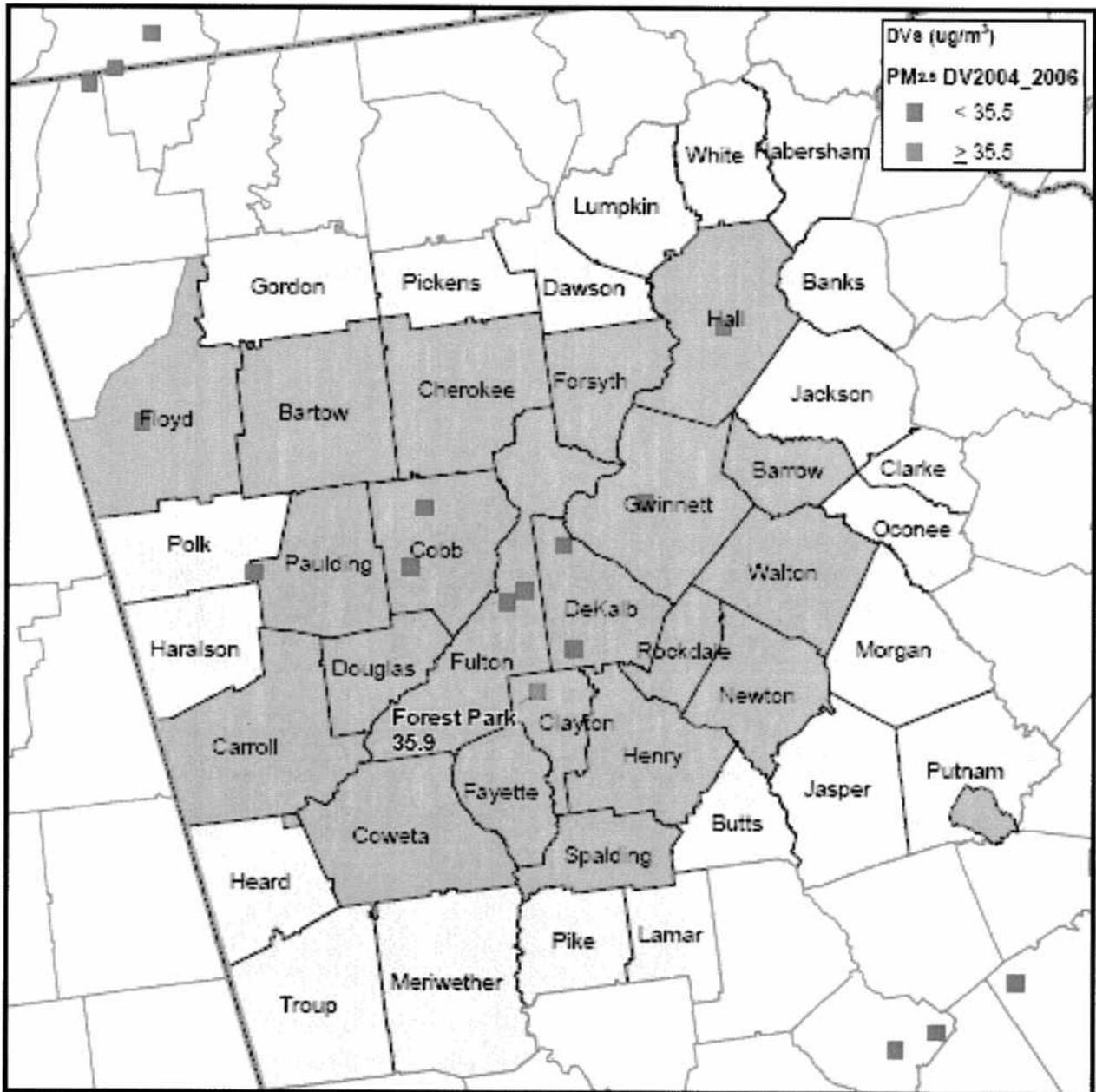


Figure 4. Site Map with counties under considered for the Atlanta 24-hour PM_{2.5} nonattainment area. Counties currently in Atlanta's and Floyd County's nonattainment area for the annual PM_{2.5} standard are marked in green.

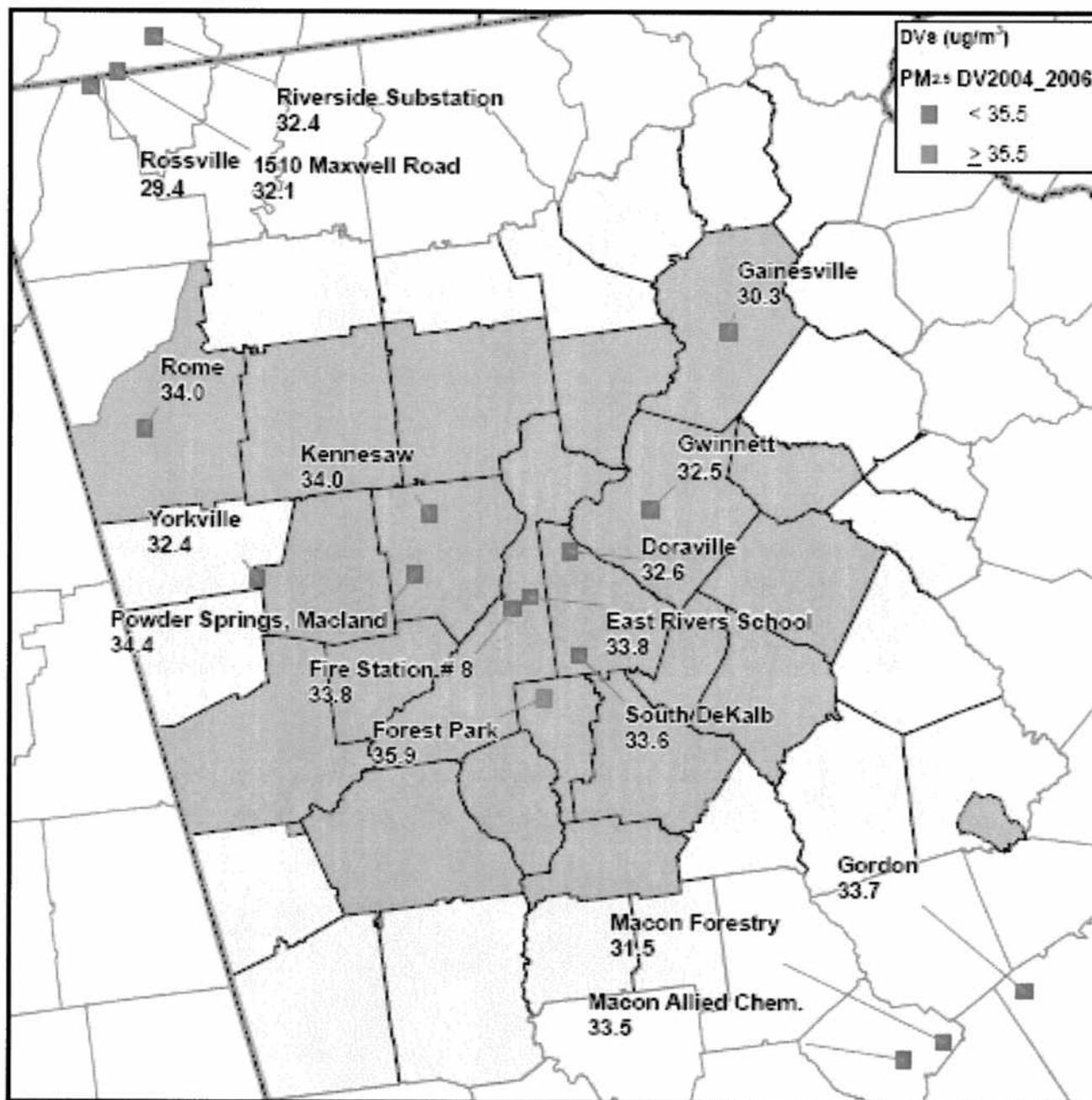


Figure 5. PM_{2.5} FRM Sites in the Atlanta and nearby areas with 2004-2006 DVs. Counties marked in green are currently parts of the Atlanta and Floyd county nonattainment areas for the annual PM_{2.5} standard.

Table 2. Daily PM_{2.5} increments by quarters in the Atlanta MSA

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	All
Forest park, FRM					
NO. of observations on high days	1	3	8	3	15
PM _{2.5} concentrations on high days, $\mu\text{g}/\text{m}^3$	32.2	38.6	35.5	35.9	36.0
NO. of observations on low days	83	83	78	81	325
PM _{2.5} concentrations on low days, $\mu\text{g}/\text{m}^3$	13.0	16.4	19.2	14.9	15.8
Daily increment, $\mu\text{g}/\text{m}^3$	19.2	22.2	16.4	21.0	20.2
South De kalb, STN					
NO. of observations on high days	1	3	8	3	15
NO. of observations on low days	79	75	73	77	304
% Sulfate Daily Increment	31.5	62.5	51.2	52.5	56.3
% Nitrate Daily Increment	37.3	-0.8	0.9	-4.0	0.1
% OM Daily Increment	32.3	28.7	36.2	35.8	32.3
% EC Daily Increment	-0.8	4.6	10.6	10.3	7.9
% Crustal Daily Increment	-0.2	5.0	1.1	5.3	3.4

Table 3. Emissions, L-scores, and cumulative L-scores for the Atlanta MSA. County names in bold represent Atlanta nonnattainment counties under the annual PM2.5 standard.

County	NOx	SO2	EC	OM	Crustal	L-score	Cumul. Score
Bartow	31,780	189,381	318	518	8,231	21.70	21.70
Heard	15,102	101,628	128	235	3,642	11.39	33.09
Putnam	20,940	90,790	137	308	3,928	10.55	43.64
Coweta	16,487	67,307	199	402	2,970	8.46	52.10
Floyd	14,638	45,502	157	367	1,968	6.02	58.11
Cobb	29,422	31,959	484	592	1,997	5.74	63.85
Fulton	43,646	7,399	779	938	1,218	4.59	68.44
Gwinnett	23,650	3,905	506	588	852	2.83	71.28
DeKalb	25,810	3,362	445	565	664	2.62	73.89
Cherokee	5,440	677	214	467	743	1.76	75.65
Henry	8,488	611	227	444	794	1.71	77.36
Carroll	4,162	1,124	143	389	753	1.49	78.85
Hall	5,401	2,901	149	315	954	1.48	80.33
Jasper	738	168	67	384	344	1.24	81.57
Forsyth	3,919	737	150	313	695	1.23	82.80
Paulding	2,603	251	133	320	519	1.17	83.97
Newton	2,589	647	112	271	510	1.04	85.00
Douglas	5,115	470	133	264	379	1.02	86.02
Walton	2,234	362	100	278	442	1.01	87.03
Jackson	3,131	559	99	225	407	0.87	87.90
Clayton	15,015	1,475	175	163	262	0.88	88.77
Troup	3,434	1,197	82	194	384	0.82	89.59
Fayette	2,876	640	97	199	462	0.81	90.40
Gordon	3,258	1,092	80	187	428	0.79	91.19
Barrow	1,958	383	74	211	421	0.78	91.97
Meriwether	1,434	300	67	221	269	0.78	92.75
Morgan	1,487	238	58	212	234	0.73	93.48
Clarke	4,242	1,132	73	145	359	0.66	94.14
Polk	1,588	347	50	154	276	0.57	94.71
Habersham	1,573	517	52	138	279	0.54	95.25
Spalding	1,915	633	52	128	349	0.53	95.78
White	693	108	40	136	191	0.47	96.25
Oconee	1,399	171	50	120	237	0.45	96.70
Pickens	944	180	43	122	249	0.45	97.15
Dawson	647	88	39	124	171	0.43	97.58
Haralson	1,268	258	37	106	193	0.40	97.98
Rockdale	3,432	823	59	73	302	0.40	98.38
Butts	1,229	174	41	102	167	0.38	98.76
Lumpkin	803	126	36	98	158	0.36	99.11
Pike	475	45	28	98	156	0.34	99.45
Lamar	715	183	29	85	148	0.31	99.76
Banks	793	140	25	62	139	0.24	100.00
TOTAL	316,473	559,990	5,967	11,261	37,844	100	

Table 4. Distance-weighted Emissions, L-scores, and cumulative L-scores for the Atlanta MSA. County names in bold represent Atlanta nonattainment counties under the annual PM2.5 standard.

County	Distance	NOx	SO2	EC	OM	Crustal	L-score	Cumul. Score
Bartow	82	388	2,313	4	6	101	17.56	17.56
Coweta	44	373	1,521	4	9	67	12.35	29.91
Heard	76	199	1,341	2	3	48	10.02	39.93
Fulton	25	1,729	293	31	37	48	9.21	49.15
Cobb	39	749	813	12	15	51	8.67	57.82
Putnam	102	205	891	1	3	39	6.84	64.65
DeKalb	27	969	126	17	21	25	4.91	69.56
Clayton	12	1,202	118	14	13	21	3.54	73.11
Floyd	109	135	419	1	3	18	3.53	76.64
Gwinnett	51	461	76	10	11	17	2.77	79.41
Henry	31	274	20	7	14	26	2.69	82.10
Fayette	24	120	27	4	8	19	1.68	83.78
Douglas	37	140	13	4	7	10	1.36	85.14
Cherokee	70	78	10	3	7	11	1.24	86.38
Carroll	67	62	17	2	6	11	1.11	87.48
Paulding	57	46	4	2	6	9	1.00	88.48
Newton	52	50	13	2	5	10	0.99	89.48
Forsyth	70	56	11	2	4	10	0.88	90.35
Jasper	72	10	2	1	5	5	0.84	91.19
Walton	60	37	6	2	5	7	0.82	92.01
Hall	95	57	31	2	3	10	0.82	92.83
Spalding	40	47	16	1	3	9	0.67	93.50
Rockdale	35	97	23	2	2	9	0.59	94.09
Meriwether	70	21	4	1	3	4	0.55	94.63
Barrow	77	25	5	1	3	5	0.50	95.13
Troup	87	40	14	1	2	4	0.48	95.62
Jackson	95	33	6	1	2	4	0.45	96.07
Morgan	83	18	3	1	3	3	0.43	96.50
Gordon	109	30	10	1	2	4	0.37	96.87
Butts	53	23	3	1	2	3	0.35	97.23
Clarke	100	43	11	1	1	4	0.34	97.57
Polk	85	19	4	1	2	3	0.33	97.90
Pike	59	8	1	0	2	3	0.28	98.18
Haralson	77	16	3	0	1	2	0.25	98.43
Lamar	64	11	3	0	1	2	0.24	98.68
Oconee	92	15	2	1	1	3	0.24	98.92
Pickens	95	10	2	0	1	3	0.23	99.15
Dawson	97	7	1	0	1	2	0.22	99.36
Habersham	137	11	4	0	1	2	0.20	99.56
White	129	5	1	0	1	1	0.18	99.74
Lumpkin	113	7	1	0	1	1	0.15	99.90
Banks	114	7	1	0	1	1	0.10	100.00
TOTAL		7,834	8,183	142	231	635	100	

Table 5. EGU emission controls by 2009. Emissions, L-scores, and cumulative L-scores for the Atlanta MSA. County names in bold represent Atlanta nonattainment counties under the annual PM2.5 standard.

County	NOx	SO2	EC	OM	Crustal	L-score	Cumul. Score
Bartow	14,536	91,228	184	1,031	3,029	18.86	18.86
Putnam	24,517	70,648	67	473	1,101	13.48	32.34
Coweta	17,870	58,231	153	518	1,137	11.62	43.96
Heard	5,793	41,680	42	544	1,080	8.70	52.66
Cobb	29,409	26,884	459	630	986	7.00	59.65
Fulton	43,646	7,399	779	938	1,218	4.97	64.63
Floyd	14,551	9,668	135	467	1,135	3.21	67.83
Gwinnett	23,650	3,905	506	588	852	3.03	70.86
DeKalb	25,810	3,362	445	565	664	2.77	73.63
Cherokee	5,427	674	214	467	743	1.73	75.36
Henry	8,488	611	227	444	794	1.69	77.05
Hall	5,401	2,901	149	315	954	1.66	78.71
Carroll	4,158	1,123	143	389	753	1.51	80.22
Forsyth	3,919	737	150	313	695	1.25	81.46
Jasper	738	168	67	384	344	1.17	82.63
Paulding	2,603	251	133	320	519	1.13	83.76
Newton	2,589	647	112	271	510	1.04	84.81
Douglas	5,115	470	133	264	379	1.01	85.81
Walton	2,234	362	100	278	442	0.99	86.80
Clayton	15,015	1,475	175	163	262	0.96	87.76
Troup	3,434	1,197	82	194	384	0.88	88.64
Jackson	3,047	558	97	224	406	0.87	89.51
Gordon	3,258	1,092	80	187	428	0.84	90.35
Fayette	2,876	640	97	199	462	0.83	91.18
Barrow	1,958	383	74	211	421	0.78	91.96
Meriwether	1,434	300	67	221	269	0.76	92.71
Morgan	1,487	238	58	212	234	0.70	93.42
Clarke	3,743	883	73	145	358	0.68	94.10
Polk	1,588	347	50	154	276	0.57	94.67
Spalding	1,915	633	52	128	349	0.56	95.23
Habersham	1,573	517	52	138	279	0.56	95.79
Rockdale	3,432	823	59	73	302	0.46	96.24
White	693	108	40	136	191	0.45	96.70
Oconee	1,399	171	50	120	237	0.44	97.14
Pickens	944	180	43	122	249	0.44	97.59
Dawson	647	88	39	124	171	0.42	98.00
Haralson	1,268	258	37	106	193	0.40	98.40
Butts	1,229	174	41	102	167	0.38	98.78
Lumpkin	803	126	36	98	158	0.35	99.12
Pike	475	45	28	98	156	0.32	99.45
Lamar	715	183	29	85	148	0.31	99.76
Banks	793	140	25	62	139	0.24	100.00
TOTAL	294,179	331,508	5,581	12,502	23,575	100	

Table 6. EGU emission controls by 2009. Distance-weighted Emissions, L-scores, and cumulative L-scores for the Atlanta MSA. County names in bold represent Atlanta nonattainment counties under the annual PM2.5 standard.

County	Distance	NOx	SO2	EC	OM	Crustal	L-score	Cumul. Score
Coweta	44	404	1,316	3	12	26	15.84	15.84
Bartow	82	178	1,114	2	13	37	13.84	29.68
Cobb	39	748	684	12	16	25	10.21	39.89
Fulton	25	1,729	293	31	37	48	10.13	50.03
Putnam	102	241	693	1	5	11	8.06	58.08
Heard	76	76	550	1	7	14	6.90	64.98
DeKalb	27	969	126	17	21	25	5.28	70.25
Clayton	12	1,202	118	14	13	21	3.94	74.19
Gwinnett	51	461	76	10	11	17	3.01	77.20
Henry	31	274	20	7	14	26	2.71	79.91
Fayette	24	120	27	4	8	19	1.76	81.67
Floyd	109	134	89	1	4	10	1.66	83.32
Douglas	37	140	13	4	7	10	1.37	84.70
Cherokee	70	78	10	3	7	11	1.24	85.94
Carroll	67	62	17	2	6	11	1.15	87.08
Newton	52	50	13	2	5	10	1.02	88.11
Paulding	57	46	4	2	6	9	0.99	89.09
Hall	95	57	31	2	3	10	0.93	90.02
Forsyth	70	56	11	2	4	10	0.90	90.92
Walton	60	37	6	2	5	7	0.82	91.74
Jasper	72	10	2	1	5	5	0.81	92.56
Spalding	40	47	16	1	3	9	0.72	93.28
Rockdale	35	97	23	2	2	9	0.68	93.96
Meriwether	70	21	4	1	3	4	0.55	94.50
Troup	87	40	14	1	2	4	0.53	95.03
Barrow	77	25	5	1	3	5	0.51	95.54
Jackson	95	32	6	1	2	4	0.46	96.00
Morgan	83	18	3	1	3	3	0.43	96.43
Gordon	109	30	10	1	2	4	0.40	96.83
Butts	53	23	3	1	2	3	0.36	97.19
Clarke	100	38	9	1	1	4	0.35	97.55
Polk	85	19	4	1	2	3	0.34	97.88
Pike	59	8	1	0	2	3	0.27	98.15
Haralson	77	16	3	0	1	2	0.26	98.42
Lamar	64	11	3	0	1	2	0.25	98.66
Oconee	92	15	2	1	1	3	0.24	98.91
Pickens	95	10	2	0	1	3	0.23	99.14
Dawson	97	7	1	0	1	2	0.21	99.35
Habersham	137	11	4	0	1	2	0.21	99.56
White	129	5	1	0	1	1	0.18	99.74
Lumpkin	113	7	1	0	1	1	0.16	99.89
Banks	114	7	1	0	1	1	0.11	100.00
TOTAL		7,559	5,328	137	247	435	100	

Table 7. Other factors for the Atlanta MSA

County	Pop. Density	Pop. Growth Rate	Pop. Growth Persons	% Urban.	In Commutes	Vehicle Registration	VMT
Coweta	260	29.2	26,076	54	14,499	99,511	3,838,815
Bartow	199	20.1	15,247	59	10,062	96,203	4,862,195
Fulton	1,816	17.7	144,188	98	363,026	568,399	31,348,328
Cobb	1,997	11.8	71,574	100	301,751	555,355	17,635,493
Putnam	58	5.9	1,118	25	420	25,511	797,968
Heard	39	4.2	460	0	454	13,721	354,020
DeKalb	2,698	8.6	57,545	100	325,679	458,290	20,799,679
Clayton	1,902	14.7	34,723	99	99,057	222,356	7,510,406
Gwinnett	1,750	28.7	168,656	98	288,779	592,260	18,362,753
Henry	552	49.2	58,689	72	36,191	152,086	6,274,682
Fayette	541	16.9	15,408	78	23,962	105,123	2,893,390
Floyd	186	5.3	4,757	65	1,526	88,144	2,998,613
Douglas	600	29.6	27,313	80	25,857	98,196	4,130,670
Cherokee	461	37.6	53,424	75	41,597	172,777	5,287,380
Carroll	215	23.0	20,057	47	7,042	99,771	3,400,990
Newton	331	47.5	29,450	56	8,177	86,310	2,904,677
Paulding	388	48.9	39,922	60	24,665	100,132	2,554,469
Forsyth	669	53.4	52,561	66	25,844	131,890	3,971,261
Hall	440	24.4	33,941	67	11,604	160,944	4,791,347
Walton	241	30.8	18,701	42	12,218	81,561	2,188,905
Jasper	37	19.2	2,198	0	717	16,266	496,063
Spalding	314	6.5	3,768	60	5,071	58,730	1,912,287
Rockdale	615	14.6	10,221	85	14,338	68,129	2,692,141
Meriwether	45	1.6	353	17	859	25,676	932,101
Troup	153	7.6	4,466	57	855	58,357	2,638,714
Barrow	393	38.1	17,558	47	10,565	61,964	1,814,468
Jackson	163	34.1	14,189	12	3,230	56,689	2,832,079
Morgan	51	15.9	2,451	23	486	21,028	1,366,463
Gordon	145	16.6	7,315	34	689	52,340	2,322,100
Butts	126	20.5	4,012	23	1,740	26,547	987,455
Clarke	934	11.1	11,298	91	2,190	72,397	2,744,500
Polk	132	7.8	2,964	48	1,406	41,313	1,138,610
Pike	77	22.7	3,113	0	1,067	21,962	519,336
Haralson	101	11.4	2,926	17	1,733	30,236	1,151,664
Lamar	90	4.8	767	43	851	18,724	756,629
Oconee	166	17.7	4,633	50	740	32,418	1,307,085
Pickens	128	29.0	6,657	22	2,183	32,261	1,046,058
Dawson	98	29.0	4,644	0	2,143	24,579	625,284
Habersham	148	14.5	5,214	35	608	42,507	1,375,509
White	102	24.0	4,794	0	508	28,951	609,275
Lumpkin	90	21.3	4,476	14	1,073	27,470	731,077
Banks	70	14.0	2,023	6	376	21,126	893,139

Table 8. Other factors for the Atlanta MSA and threshold values

County	Pop. Density	County	Pop. Growth Rate	County	Pop. Growth	County	% Urban
DeKalb	2,698	Forsyth	53.4	Gwinnett	168,656	Cobb	100
Cobb	1,997	Henry	49.2	Fulton	144,188	DeKalb	100
Clayton	1,902	Paulding	48.9	Cobb	71,574	Clayton	99
Fulton	1,816	Newton	47.5	Henry	58,689	Fulton	98
Gwinnett	1,750	Barrow	38.1	DeKalb	57,545	Gwinnett	98
Clarke	934	Cherokee	37.6	Cherokee	53,424	Clarke	91
Forsyth	669	Jackson	34.1	Forsyth	52,561	Rockdale	85
Rockdale	615	Walton	30.8	Paulding	39,922	Douglas	80
Douglas	600	Douglas	29.6	Clayton	34,723	Fayette	78
Henry	552	Coweta	29.2	Hall	33,941	Cherokee	75
Fayette	541	Dawson	29	Newton	29,450	Henry	72
Cherokee	461	Pickens	29	Douglas	27,313	Hall	67
Hall	440	Gwinnett	28.7	Coweta	26,076	Forsyth	66
Barrow	393	Hall	24.4	Carroll	20,057	Floyd	65
Paulding	388	White	24	Walton	18,701	Spalding	60
Newton	331	Carroll	23	Barrow	17,558	Paulding	60
Spalding	314	Pike	22.7	Fayette	15,408	Bartow	59
Coweta	260	Lumpkin	21.3	Bartow	15,247	Troup	57
Walton	241	Butts	20.5	Jackson	14,189	Newton	56
Carroll	215	Bartow	20.1	Clarke	11,298	Coweta	54
Bartow	199	Jasper	19.2	Rockdale	10,221	Oconee	50
Floyd	186	Fulton	17.7	Gordon	7,315	Polk	48
Oconee	166	Oconee	17.7	Pickens	6,657	Carroll	47
Jackson	163	Fayette	16.9	Habersham	5,214	Barrow	47
Troup	153	Gordon	16.6	White	4,794	Lamar	43
Habersham	148	Morgan	15.9	Floyd	4,757	Walton	42
Gordon	145	Clayton	14.7	Dawson	4,644	Habersham	35
Polk	132	Rockdale	14.6	Oconee	4,633	Gordon	34
Pickens	128	Habersham	14.5	Lumpkin	4,476	Putnam	25
Butts	126	Banks	14	Troup	4,466	Morgan	23
White	102	Cobb	11.8	Butts	4,012	Butts	23
Haralson	101	Haralson	11.4	Spalding	3,768	Pickens	22
Dawson	98	Clarke	11.1	Pike	3,113	Meriwether	17
Lamar	90	DeKalb	8.6	Polk	2,964	Haralson	17
Lumpkin	90	Polk	7.8	Haralson	2,926	Lumpkin	14
Pike	77	Troup	7.6	Morgan	2,451	Jackson	12
Banks	70	Spalding	6.5	Jasper	2,198	Banks	6
Putnam	58	Putnam	5.9	Banks	2,023	Heard	0
Morgan	51	Floyd	5.3	Putnam	1,118	Jasper	0
Meriwether	45	Lamar	4.8	Lamar	767	Pike	0
Heard	39	Heard	4.2	Heard	460	Dawson	0
Jasper	37	Meriwether	1.6	Meriwether	353	White	0
Threshold	200		20.0		10,000		50

Table 9. Other factors for the Atlanta MSA and threshold values

County	In Commutes	County	Vehicle Registration	County	VMT
Fulton	363,026	Gwinnett	592,260	Fulton	31,348,328
DeKalb	325,679	Fulton	568,399	DeKalb	20,799,679
Cobb	301,751	Cobb	555,355	Gwinnett	18,362,753
Gwinnett	288,779	DeKalb	458,290	Cobb	17,635,493
Clayton	99,057	Clayton	222,356	Clayton	7,510,406
Cherokee	41,597	Cherokee	172,777	Henry	6,274,682
Henry	36,191	Hall	160,944	Cherokee	5,287,380
Douglas	25,857	Henry	152,086	Bartow	4,862,195
Forsyth	25,844	Forsyth	131,890	Hall	4,791,347
Paulding	24,665	Fayette	105,123	Douglas	4,130,670
Fayette	23,962	Paulding	100,132	Forsyth	3,971,261
Coweta	14,499	Carroll	99,771	Coweta	3,838,815
Rockdale	14,338	Coweta	99,511	Carroll	3,400,990
Walton	12,218	Douglas	98,196	Floyd	2,998,613
Hall	11,604	Bartow	96,203	Newton	2,904,677
Barrow	10,565	Floyd	88,144	Fayette	2,893,390
Bartow	10,062	Newton	86,310	Jackson	2,832,079
Newton	8,177	Walton	81,561	Clarke	2,744,500
Carroll	7,042	Clarke	72,397	Rockdale	2,692,141
Spalding	5,071	Rockdale	68,129	Troup	2,638,714
Jackson	3,230	Barrow	61,964	Paulding	2,554,469
Clarke	2,190	Spalding	58,730	Gordon	2,322,100
Pickens	2,183	Troup	58,357	Walton	2,188,905
Dawson	2,143	Jackson	56,689	Spalding	1,912,287
Butts	1,740	Gordon	52,340	Barrow	1,814,468
Haralson	1,733	Habersham	42,507	Habersham	1,375,509
Floyd	1,526	Polk	41,313	Morgan	1,366,463
Polk	1,406	Oconee	32,418	Oconee	1,307,085
Lumpkin	1,073	Pickens	32,261	Haralson	1,151,664
Pike	1,067	Haralson	30,236	Polk	1,138,610
Meriwether	859	White	28,951	Pickens	1,046,058
Troup	855	Lumpkin	27,470	Butts	987,455
Lamar	851	Butts	26,547	Meriwether	932,101
Oconee	740	Meriwether	25,676	Banks	893,139
Jasper	717	Putnam	25,511	Putnam	797,968
Gordon	689	Dawson	24,579	Lamar	756,629
Habersham	608	Pike	21,962	Lumpkin	731,077
White	508	Banks	21,126	Dawson	625,284
Morgan	486	Morgan	21,028	White	609,275
Heard	454	Lamar	18,724	Pike	519,336
Putnam	420	Jasper	16,266	Jasper	496,063
Banks	376	Heard	13,721	Heard	354,020
Threshold	5,000		50,000		1,500,000

Table 10. Summary of counties meeting threshold values for additional factors in the Atlanta MSA

County	Pop. Density	Pop. Growth		% Urban.	In Commutes	Vehicle Registration	VMT
		Rate	Persons				
Coweta	X	X	X	X	X	X	X
Bartow		X	X	X	X	X	X
Fulton	X		X	X	X	X	X
Cobb	X		X	X	X	X	X
Putnam							
Heard							
DeKalb	X		X	X	X	X	X
Clayton	X		X	X	X	X	X
Gwinnett	X	X	X	X	X	X	X
Henry	X	X	X	X	X	X	X
Fayette	X		X	X	X	X	X
Floyd				X		X	X
Douglas	X	X	X	X	X	X	X
Cherokee	X	X	X	X	X	X	X
Carroll	X	X	X		X	X	X
Newton	X	X	X	X	X	X	X
Paulding	X	X	X	X	X	X	X
Forsyth	X	X	X	X	X	X	X
Hall	X	X	X	X	X	X	X
Walton	X	X	X		X	X	X
Jasper							
Spalding	X			X	X	X	X
Rockdale	X		X	X	X	X	X
Meriwether							
Troup				X		X	X
Barrow	X	X	X		X	X	
Jackson		X	X			X	X
Morgan							
Gordon						X	X
Butts		X					
Clarke	X		X	X		X	X
Polk							
Pike		X					
Haralson							
Lamar							
Oconee				X			
Pickens		X					
Dawson		X					
Habersham							
White		X					
Lumpkin		X					
Banks							

Table 11. County-Specific NOx, VOC, and SO2 Control Regulations as They Apply to Evaluated Counties.

The following regulations are more stringent than air quality regulations that apply to the entire state of Georgia. They apply to specific counties in the state as specified in the rules. These rules apply to the counties included in the “Other Criteria” analysis as shown below. These rules also apply to other counties in Georgia not included in this analysis.

County	VOC RACT – Gasoline Plants (VOC)	VOC RACT – Gasoline Transport (VOC)	VOC RACT – 6 Source Categories (VOC)	Consumer & Commercial Products (VOC)	Case-by-Case VOC RACT (VOC)	Case-by-Case NOx RACT (NOx)	Electric Utility Boilers (NOx)	New Boilers (NOx)	Stationary Engines & Small Turbines (NOx)	Large Stationary Gas Turbines (NOx)	Stage I Vapor Control (VOC)	Stage II Vapor Control (VOC)	Georgia Gasoline (NOx & VOC)	Open Burning Restrictions (NOx & VOC)	Vehicle I/M (NOx & VOC)	Severe Nonattainment NSR (NOx & VOC)	BACT/Offset – All Sources (NOx and VOC)	BACT/Offset - Electric Utilities (NOx)	Multipollutant Rule (NOx and SO2)
Barrow								X	X	X			X	X				X	
Bartow			X		X	X	X	X	X	X			X	X			X		X
Carroll			X		X	X		X	X	X			X	X			X		
Cherokee	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
Coweta	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X			X
Douglas	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
Fayette	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
Floyd							X												X
Forsyth	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
Hall			X		X	X		X	X	X			X	X			X		
Heard							X	X	X	X			X	X				X	X
Henry	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
Jackson								X	X	X			X	X				X	
Jasper								X	X	X			X	X				X	
Madison								X	X	X			X	X				X	
Meriwether								X	X	X			X	X				X	
Monroe							X	X	X	X			X	X				X	X
Muscogee																			
Newton			X		X	X		X	X	X			X	X			X		
Paulding	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
Putnam							X	X	X	X			X	X				X	X
Rockdale	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X			
Spalding			X		X	X		X	X	X			X	X			X		
Troup								X	X	X			X	X				X	
Walton			X		X	X		X	X	X			X	X			X		

Key to Rules in Table 13:

VOC RACT – Gasoline Plants – GA Rule 391-3-1-.02(2)(pp) – Bulk Gasoline Plants

VOC RACT – Gasoline Transfer - GA Rule 391-3-1-.02(2)(ss) – Gasoline Transport Vehicles and Vapor Collection Systems

VOC RACT – 6 Source Categories - GA Rules 391-3-1-.02(2)(vv) – Volatile Organic Liquid Handling and Storage, (ccc) – VOC Emissions from Bulk Mixing Tanks, (ddd) – VOC

Emissions from Offset Lithography, (eee) – VOC Emissions from Expanded Polystyrene

Products Manufacturing, (hhh) – Wood Furniture Finishing and Cleaning Operations, and (qqq)

– Extruded Polystyrene Products Manufacturing Utilizing a Blowing Agent

Consumer & Commercial Products - GA Rule 391-3-1-.02(2)(aaa) – Consumer and Commercial Products
Case-by-Case VOC RACT - GA Rule 391-3-1-.02(2)(tt) – VOC Emissions from Major Sources
Case-by-Case NOx RACT - GA Rule 391-3-1-.02(2)(yy) – Emissions of Nitrogen Oxides from Major Sources
Electric Utility Boilers - GA Rule 391-3-1-.02(2)(jjj) – NOx Emissions from Electric Utility Steam Generating Units
New Boilers - GA Rule 391-3-1-.02(2)(lll) – NOx Emissions from Fuel-burning Equipment
Stationary Engines & Small Turbines – GA Rule 391-3-1-.02(2)(mmm) - NOx Emissions from Stationary Gas Turbines and Stationary Engines Used to Generate Electricity
Large Stationary Gas Turbines - GA Rule 391-3-1-.02(2)(nnn) – NOx Emissions from Large Stationary Gas Turbines
Stage I Vapor Control – GA Rule 391-3-1-.02(2)(rr) – Gasoline Dispensing Facility – Stage I
Stage II Vapor Control – GA Rule 391-3-1-.02(2)(zz) – Gasoline Dispensing Facilities – Stage II
Georgia Gasoline - GA Rule 391-3-1-.02(2)(bbb) – Gasoline Marketing
Open Burning Restrictions – GA Rule 391-3-1-.02(5)(b)1. & 2.
Vehicle I/M – GA Rule 391-3-20 – Rules for Enhanced Inspection and Maintenance
Severe Nonattainment NSR – GA Rule 391-3-1-.03(8)(c)13.
BACT/Offset - All Sources – GA Rule 391-3-1-.03(8)(c)14.
BACT/Offset - Electric Utilities – GA Rule 391-3-1-.03(8)(c)15.
Multipollutant Rule – GA Rule 391-3-1-.02(2)(sss).