Georgia
Unclassifiable Area Designations for the 2012 Primary Annual $PM_{2.5}$ National Ambient Air Quality Standards Technical Support Document

Summary of Intended Unclassifiable Designations in Georgia

In accordance with section 107(d) of the Clean Air Act (CAA), the EPA must promulgate designations for all areas of the country. In particular, the EPA must identify those areas that are violating a National Ambient Air Quality Standard (NAAQS) or contributing to a violation of the NAAQS in a nearby area. Additionally, through the designation process, the EPA identifies areas that are meeting the NAAQS and those areas without sufficient data for the Agency to make a determination. The EPA uses a designation category of "unclassifiable/attainment" for areas where air quality monitoring data indicate attainment of the NAAQS and for areas that do not have monitors but for which the EPA has reason to believe are likely to be in attainment and are not contributing to nearby violations. The EPA reserves the category of "unclassifiable" for areas where the EPA cannot determine based on available information whether the area is meeting or not meeting the NAAQS or where the EPA has not determined that the area contributes to a nearby violation. The EPA must complete the initial area designation process within 2 years of promulgating a new or revised NAAQS, or may do so within 3 years under certain circumstances.[1] This Technical Support Document (TSD) describes the EPA's intent to designate certain areas in Georgia as unclassifiable for the 2012 primary annual fine particle NAAQS (2012 annual $PM_{2.5}$ NAAQS).[2]

Under section 107(d), states are required to submit area designation recommendations to the EPA for the 2012 annual $PM_{2.5}$ NAAQS no later than 1 year following promulgation of the NAAQS, or by December 13, 2013. In December 2013, Georgia recommended that all counties in the State be designated as "unclassifiable/attainment" for the 2012 annual $PM_{2.5}$ NAAQS. In a letter dated May 30, 2014, Georgia submitted revised recommendations based upon certified $PM_{2.5}$ ambient monitoring data for 2013, again recommending that all counties in the state be designated as "unclassifiable/attainment." In a letter dated June 2, 2014, Georgia submitted additional technical analyses to support those revised recommendations. However, a recent EPA-

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[1] Section 107(d) of the CAA requires the EPA to complete the initial designation process within 2 years of promulgation of a new or revised NAAQS, unless the Administrator has insufficient information to make initial designation decisions in the 2-year time frame. In such circumstances, the EPA may take up to 1 additional year to make initial area designation decisions (i.e., no later than 3 years after promulgation of the standard).

[2] On December 14, 2012, the EPA promulgated a revised primary annual $PM_{2.5}$ NAAQS (78 FR 3086, January 15, 2013). In that action, the EPA revised the primary annual $PM_{2.5}$ standard, strengthening it from 15.0 micrograms per cubic meter ($\mu g/m^3$) to 12.0 $\mu g/m^3$.

conducted technical systems audit of Georgia's monitoring program revealed data completeness issues for several areas across the State.[3] Given these data completeness issues, the EPA cannot determine whether the counties with the incomplete monitoring data are meeting or not meeting the NAAQS. Because the EPA cannot make a final regulatory determination about whether a violation exists in those counties with incomplete data, in some cases the EPA is also not able to determine whether counties nearby to those counties with incomplete monitoring data contribute to a nearby violation. Where data completeness issues remain unresolved prior to the EPA Administrator's final determination on designations for the 2012 $PM_{2.5}$ NAAQS, the EPA intends to designate the affected areas as "unclassifiable."

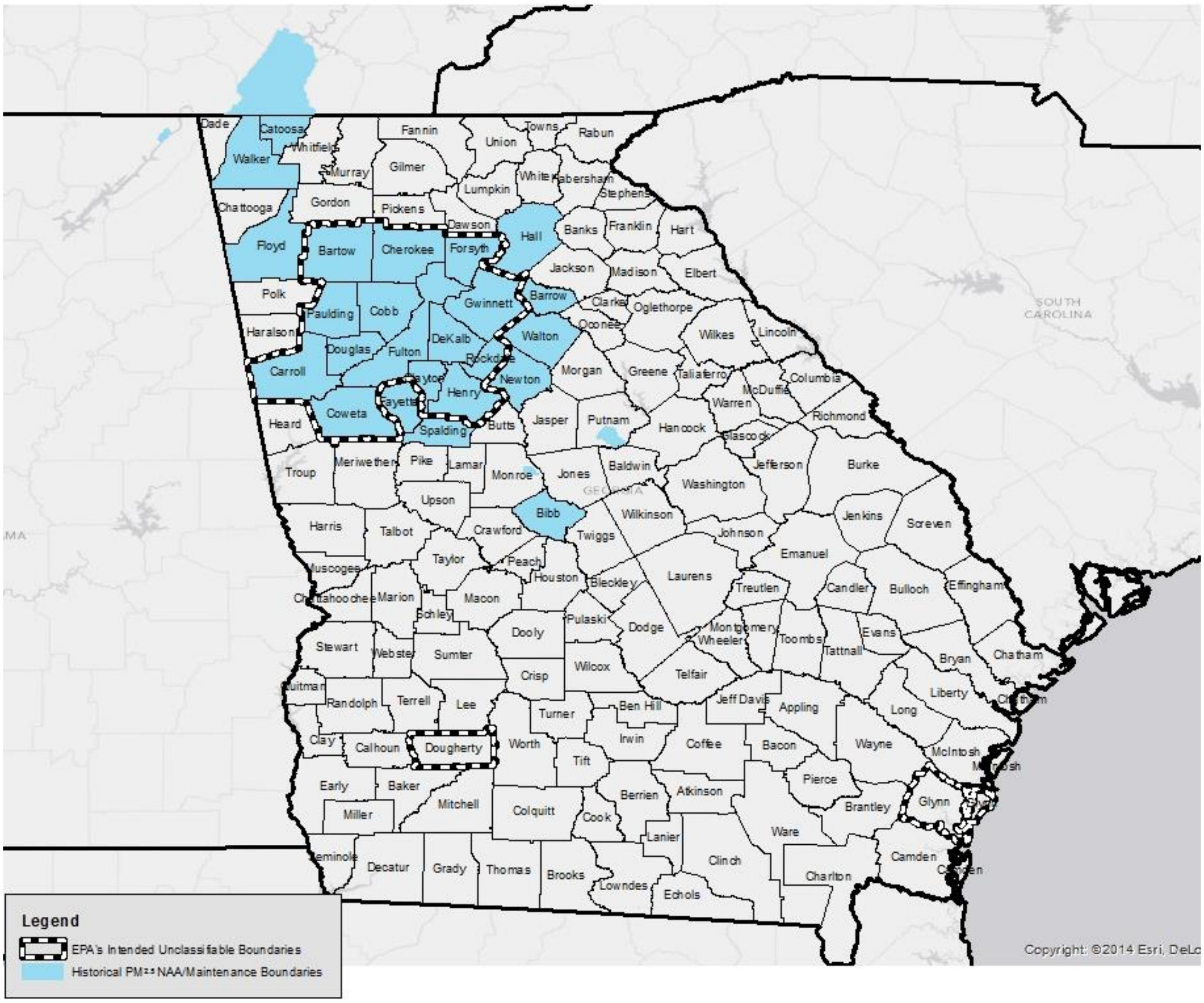
After considering Georgia's recommendations, and based on the EPA's assessment of available information as described in this TSD, the EPA intends to designate the areas identified in the following table as unclassifiable for the 2012 annual $PM_{2.5}$ NAAQS. Detailed analyses follow for each of the identified areas. The analysis for the Atlanta Area is more detailed than the analyses for the Albany and Brunswick Areas because: (1) the Atlanta Area was designated nonattainment during the last annual $PM_{2.5}$ NAAQS designations in 2005 (for the 1997 $PM_{2.5}$ NAAQS), while Albany and Brunswick were well-below that standard, and (2) the Atlanta Area has seven $PM_{2.5}$ monitoring stations, four of which are invalid for 2013, while the other areas have only one monitoring site each.

The EPA's Intended Unclassifiable Areas for the 2012 annual $PM_{2.5}$ NAAQS

Area	Georgia's Recommendations	The EPA's Intended Unclassifiable Counties
Atlanta, GA	Unclassifiable/Attainment	Bartow Clayton Cobb Coweta DeKalb Fulton Gwinnett Cherokee Henry Forsyth Paulding Douglas
Brunswick, GA	Unclassifiable/Attainment	Glynn
Albany, GA	Unclassifiable/Attainment	Dougherty

[3] Memorandum from Liz Naess, Group Leader, Air Quality Analysis Group, US EPA Office of Air Quality Planning and Standards, to the EPA Docket EPA-HQ-OAR-2012-0918, Air Quality Designations for the 2012 $PM_{2.5}$ Standards, titled, "Initial Area Designations for the 2012 Revised Primary Annual Final Particle National Ambient Air Quality Standard: Georgia Data Issues."

Map of the EPA's Intended Unclassifiable Area Boundaries for Georgia.



Georgia/Atlanta Area
Atlanta Core Based Statistical Area (CBSA)

1.0 Atlanta Area Summary

Atlanta-Sandy Springs-Roswell, GA is a 29-county CBSA in which 20 full counties and two partial counties were included in the nonattainment area designation for the 1997 annual $PM_{2.5}$ NAAQS. Based upon the EPA's analysis described in this TSD, the EPA's preliminary determination is that 12 full counties of this Area should be deemed unclassifiable for the 2012 annual $PM_{2.5}$ NAAQS. The following counties are considered unclassifiable due to existing $PM_{2.5}$ monitoring sites in these counties that have invalid design values for 2013: Fulton, Cobb, Gwinnett and Paulding. In addition, the following counties are considered unclassifiable due to their potential to contribute to a violating monitor, if there were one, at one of the invalid sites: Bartow, Cherokee, Clayton, Coweta, DeKalb, Douglas, Forsyth and Henry. The EPA believes the locations and historical trends of all the monitors and the overall weight of evidence for the Area support the intended unclassifiable boundary.

As shown in Figure 1, below, for 2013 in the Atlanta CBSA, there are two attaining monitors with complete data and four monitors with incomplete data. The EPA focused much of its analysis on the Fire Station #8 monitor because it was violating in 2012 and has historically been the highest reading monitor in Atlanta. The Fire Station #8 site is downwind and three miles from Ga Power Company - Plant McDonough/Atkinson and less than a mile away from a major rail hub. The only other monitor in the Atlanta Area that was violating in 2012, the Clayton County monitor, has a complete, valid 2013 design value that is below the standard at 11.1 micrograms per cubic meter ($\mu g/m^3$).

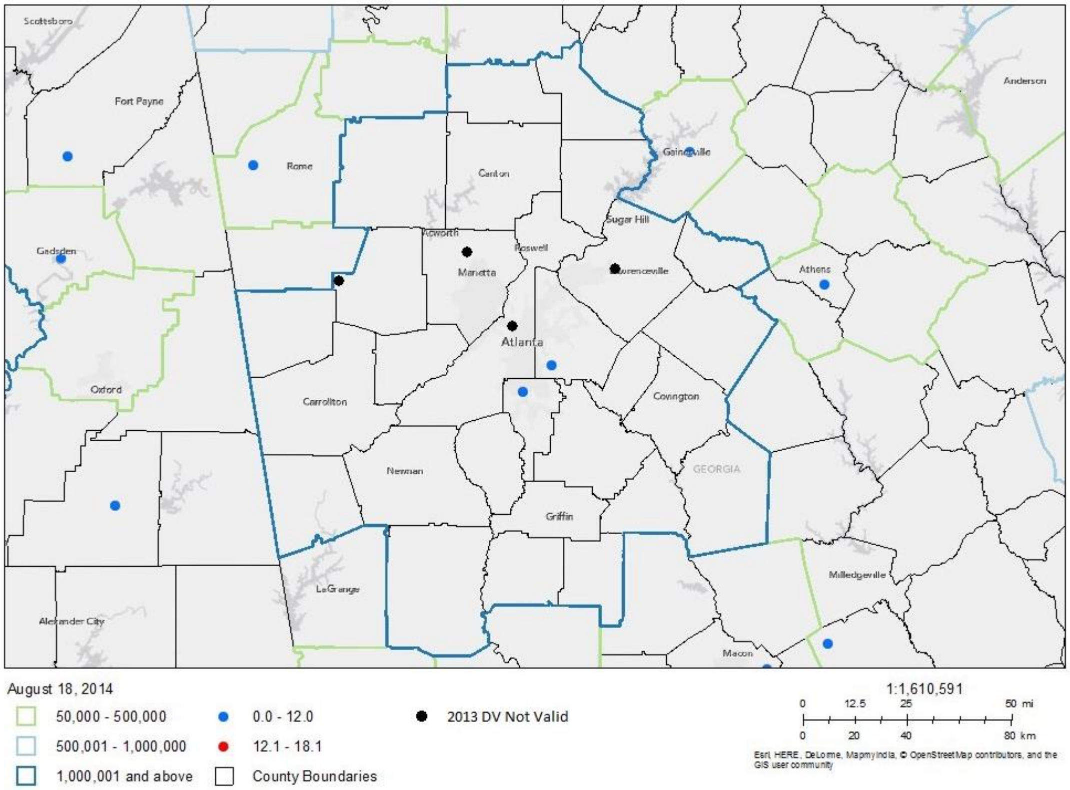
Most of the urbanized portion for the Atlanta Area is contained within five central counties. There are pockets of urbanization around these core counties that cover portions of adjacent counties. The EPA has made the preliminary determination that Cobb, Fulton, Gwinnett and Paulding Counties should be included in the unclassifiable area for Atlanta because these are the counties with incomplete data. Next, the EPA evaluated which counties in the CBSA could potentially contribute to a violation, if there were any, at the monitors with incomplete data in the Atlanta Area based on 2011-2013 data. The EPA has made the preliminary determination that eight counties (i.e., Bartow, Clayton, Coweta, DeKalb, Gwinnett, Cherokee, Henry, Forsyth, and Douglas) have a potential of contributing to violations at the monitors with incomplete data. It should be noted that both Clayton and DeKalb counties have valid attaining 2011-2013 design values but are being considered for inclusion in the unclassifiable area because these counties have high emissions. Generally, these counties have similar features with respect to high sulfur dioxide (SO_2) and PM emissions, point sources, high population and vehicle miles travelled (VMT), with respect to CBSA.

Significant emission reductions have been realized in the Atlanta Area since the last time the EPA evaluated the Area for the 1997 $PM_{2.5}$ standard. This is evident by the smaller footprint of recently violating monitors for this Area. Specifically, based on 2010-2012 data, only two monitors in the Atlanta Area (one in Fulton County and one in Clayton County) had violating data. In 2005, when the designations for the 1997 annual $PM_{2.5}$ NAAQS were finalized, there were five monitors scattered throughout the metropolitan area that were violating the standard. In contrast, there were only two monitors in the area with 2012 design values exceeding the 2012 annual $PM_{2.5}$ NAAQS, and these monitors are located just 14 miles apart.

It is important to note that the South DeKalb monitor (traditionally one of the higher reading monitors for this area) has complete data for the entire period as the data collected there was not impacted by a 2011 snow storm that impacted data completeness for other monitors in Georgia, and that for 2013 this monitor has a valid attaining design value of 10.5 $\mu g.m^3$, well below the 2012 standard. Also of note is that Hall County also has a valid attaining 2013 design value that is well below the 2012 standard at 9.5 $\mu g/m^3$. Hall County is not part of the Atlanta CBSA but is part of the existing nonattainment area for the 1997 $PM_{2.5}$ NAAQS.

For the purposes of this analysis, the EPA assumed that Fire Station #8, Cobb-Kennesaw, Gwinnett-Gwinnett Tech and Paulding-Yorkville all had the potential to violate since these monitors had incomplete data. The EPA notes that Cobb-Kennesaw, Gwinnett-Gwinnett Tech and Paulding-Yorkville all had steadily declining design values from 2008 through 2011 and recorded valid 2011 design values of 12.3, 12.1 and 11.0, respectively, so this assumption is very conservative. The EPA believes that Table 1 and Figure 4a, below, show that these three monitors were all clearly on a trajectory for attaining design values by the year 2011, notwithstanding the data completeness issues that led to invalid design values for 2011, 2012 and 2013.

Figure 1: Map of the Atlanta-Sandy Springs-Roswell CBSA.



2.0 Unclassifiable Area Analyses and Intended Boundary Determination

The EPA's general approach is to evaluate and determine the intended boundaries for each nonattainment area on a case-by-case basis considering the specific facts and circumstances unique to the area. In accordance with the CAA section 107(d), the EPA intends to designate as nonattainment not only the area with the monitoring sites that violate the 2012 annual $PM_{2.5}$ NAAQS, but also those nearby areas with emissions sources that contribute to the violation in the violating area. As described in the EPA guidance,[4] after identifying each monitoring site indicating a violation of the standard in an area, the EPA analyzed those areas with emissions contributing to that violating area by considering those counties in the entire metropolitan area (e.g., CBSA or Combined Statistical Area (CSA)) in which the violating monitoring site is located. The EPA also evaluated counties adjacent to the CBSA or CSA that have emission sources with the potential to contribute to the violation. The EPA uses the CBSA or CSA as a starting point for the contribution analysis because those areas are nearby for purposes of the $PM_{2.5}$ NAAQS. Based upon relevant facts and circumstances in each area, the designated

[4] The EPA issued guidance on April 16, 2013, that identified important factors that the EPA intended to evaluate, in making a recommendation for area designations and nonattainment boundaries for the 2012 annual $PM_{2.5}$ NAAQS. Available at *http://www.epa.gov/pmdesignations/2012standards/docs/april2013guidance.pdf*.

nonattainment area could be larger or smaller that the CBSA or CSA. The EPA's analytical approach is described in section 3 of this technical support document.

The Atlanta Area had invalid data at several monitoring sites in 2011. For the period 2010-2012, Atlanta had valid design values at five monitors, with two violating the standard (Clayton and Fulton Counties). For 2011-2013, the Area has only three valid design values, all attaining the standard; the remaining four monitors in operation have invalid data. Although the monitor readings have been trending downward, the EPA has preliminarily determined that the counties in the Area with invalid monitors and those nearby contributing areas will be included in the unclassifiable designation boundary for the Atlanta Area.

3.0 Technical Analysis

In this technical analysis, the EPA used the latest data and information available to the EPA (and to the states and tribes through the $PM_{2.5}$ Designations Mapping Tool[5] and the EPA PM Designations Guidance and Data web page[6]) and/or data provided to the EPA by states or tribes. This technical analysis identifies the areas with emissions that could contribute to a potential violation of the 2012 annual $PM_{2.5}$ standard. The EPA evaluated these areas and other nearby areas with emissions sources or activities that potentially contribute to ambient fine particle concentrations at the monitors with invalid 2013 design values in the area based on the weight of evidence of the five factors recommended in the EPA guidance and any other relevant information.

These five factors are:

Factor 1: Air Quality Data. The air quality data analysis involves examining available ambient $PM_{2.5}$ air quality monitoring data at, and in the proximity of, the violating monitoring locations. This includes reviewing the design values (DV) calculated for each monitoring location in the area based on air quality data for the most recent complete 3 consecutive calendar years of quality-assured, certified air quality data in the EPA's Air Quality System (AQS). In general, the EPA identifies violations using data from suitable Federal Reference Method (FRM), Federal Equivalent Method (FEM), and/or Approved Regional Method (ARM) monitors sited and operated in accordance with 40 CFR Part 58.[7] Procedures for using the air quality data to

[5] The EPA's $PM_{2.5}$ Designations Mapping Tool can be found at *http://geoplatform2.epa.gov/PM_MAP/index.html*.

[6] The EPA's PM Designations Guidance and Data web page can be found at *http://www.epa.gov/pmdesignations/2012standards/techinfo.htm*.

[7] Suitable monitors include all FEM and/or ARMs except those specific continuous FEMs/ARMs used in the monitoring agency's network where the data are not of sufficient quality such that data are not to be compared to the

determine whether a violation has occurred are given in 40 CFR part 50 Appendix N, as revised by a final action published in the Federal Register on January 15, 2013 (78 FR 3086).[8] In addition to reviewing data from violating monitor sites, the EPA also assesses the air quality data from other monitoring locations to help ascertain the potential contribution of sources in areas nearby to the monitoring sites with invalid data. Examples include using chemical speciation data to help characterize contributing emissions sources and the determination of nearby contributions through analyses that differentiate local and regional source contributions.

Factor 2: Emissions and emissions-related data. The emissions analysis examines identified sources of direct $PM_{2.5}$, the major components of direct $PM_{2.5}$ (primary organic carbon/organic mass, elemental carbon, crustal material (and/or individual trace metal compounds)), primary nitrate and primary sulfate, and precursor gaseous pollutants (e.g., SO_2, nitrogen oxides (NO_X), total volatile organic compounds (VOC), and ammonia (NH_3).) Emissions data are generally derived from the most recent National Emissions Inventory (NEI) (i.e., 2011 NEI version 1), and are given in tons per year (tpy). In some cases, the EPA may also evaluate emissions information from states, tribes, or other relevant sources that may not be reflected in the NEI. One example of "other information" could include an inventory or assessment of local/regional area sources that individually does not meet the current threshold for reporting to the NEI but collectively contributes to area $PM_{2.5}$ concentrations. Emissions data indicate the potential for a source to contribute to observed violations, making it useful in assessing boundaries of nonattainment areas.

Factor 3: Meteorology. Evaluating meteorological data helps to determine the effect on the fate and transport of emissions contributing to $PM_{2.5}$ concentrations and to identify areas potentially contributing to the violations at monitoring sites. The Factor 3 analysis includes assessing potential source-receptor relationships in the area identified for evaluation using summaries of air trajectories, wind speed, wind direction, and other meteorological data, as available.

Factor 4: Geography/topography. The geography/topography analysis includes examining the physical features of the land that might define the airshed and, therefore, affect the formation and distribution of $PM_{2.5}$ over an area. Mountains or other physical features may influence the fate

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NAAQS in accordance with 40 CFR part 58.10(b)(13) and approved by the EPA Regional Administrator per 40 CFR part 58.11(e).

[8] As indicated in Appendix N to 40 CFR part 50, Interpretation of the National Ambient Air Quality Standards for $PM_{2.5}$, section 3(a) indicates "Except as otherwise provided in this appendix, all valid FRM/FEM/ARM $PM_{2.5}$ mass concentration data produced by suitable monitors that are required to be submitted to AQS, or otherwise available to the EPA, meeting the requirements of part 58 of this chapter including appendices A, C, and E shall be used in the design value calculations. Generally, the EPA will only use such data if they have been certified by the reporting organization (as prescribed by § 58.15 of this chapter); however, data not certified by the reporting organization can nevertheless be used, if the deadline for certification has passed and the EPA judges the data to be complete and accurate."

and transport of emissions and $PM_{2.5}$ concentrations. Additional analyses may consider topographical features that cause local stagnation episodes via inversions, such as valley-type features that effectively "trap" air pollution, leading to periods of elevated $PM_{2.5}$ concentrations.

Factor 5: Jurisdictional boundaries. The analysis of jurisdictional boundaries identifies the governmental planning and organizational structure of an area that may be relevant for designations purposes. These jurisdictional boundaries provide insight into how the governing air agencies conduct or might conduct air quality planning and enforcement in a potential nonattainment area. Examples of jurisdictional boundaries include counties, air districts, areas of Indian country, CBSA or CSA, metropolitan planning organizations (MPOs), and existing nonattainment areas.

3.1 Area Background and Overview for the Atlanta CBSA

Figure 2: Map of EPA's Intended Unclassifiable Area Boundary for the Atlanta Area.

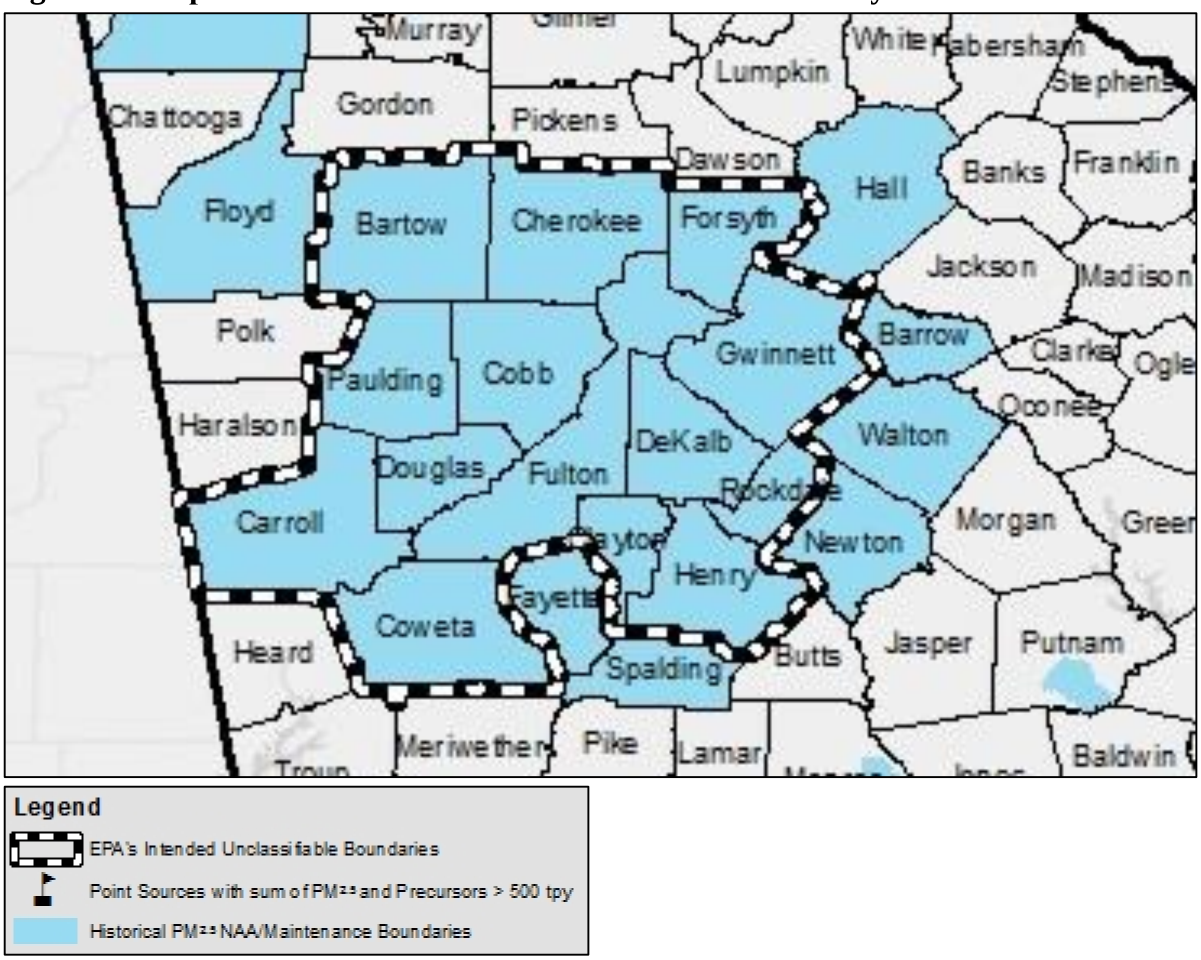

Figure 2 is a map of the EPA's intended nonattainment boundary for the Atlanta Area. For purposes of the 1997 annual $PM_{2.5}$ NAAQS, portions of this area were designated nonattainment.

The boundary for the nonattainment area for the 1997 annual $PM_{2.5}$ NAAQS included the entire counties of Barrow, Bartow, Carroll, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Hall,[9] Henry, Newton, Paulding, Rockdale, Spalding, Walton, and partial counties of Heard and Putnam.[10]

The EPA must designate as nonattainment areas that violate the NAAQS and nearby areas that contribute to the violation in the violating area. However, if the EPA does not have enough information to determine whether an area has violating monitor(s), the EPA must designate the area as unclassifiable. Because there are several monitors in the Area with invalid design values for 2012 and 2013, the EPA cannot determine whether those sites are meeting the standard and must, therefore, designate the Area as unclassifiable. The EPA evaluated each county of the Area and determined that the following counties either have operating $PM_{2.5}$ monitoring sites with invalid 2013 design values or would be likely contributors to any potentially violating monitor in the Area: Bartow, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Forsyth, Fulton, Gwinnett, Henry and Paulding Counties. The following sections describe the EPA's five-factor analysis of the Area. While the factors are presented individually, they are not independent. The five-factor analysis process carefully considers their interconnections and the dependence of each factor on one or more of the others.

Factor 1: Air Quality Data

All data collected during the year are important when determining contributions to an annual standard such as the 2012 annual $PM_{2.5}$ NAAQS. Compliance with an annual NAAQS depends on monitor readings throughout the year, including days with monitored ambient concentrations below the level of the NAAQS. For the 2012 annual $PM_{2.5}$ NAAQS, the annual mean is calculated as the mean of quarterly means. A high quarter can drive the mean for an entire year, which, in turn, can drive an elevated 3-year DV. Although all data are important, seasonal or episodic emissions can provide insight as to relative contributors to measured $PM_{2.5}$ concentrations. For these reasons, for the Factor 1 air quality analysis, the EPA assessed and characterized air quality at, and in the proximity of, the monitoring site locations with invalid data first, by evaluating trends and the spatial extent of measured concentrations at monitors in the area of analysis, and then, by identifying the conditions most associated with high average concentration levels of $PM_{2.5}$ mass in the area of analysis.

[9] Hall County is in the Gainesville, GA CBSA, which is part of the larger Atlanta-Athens-Clarke County-Sandy Springs, GA Combined Statistical Area.

[10] Putnam is not part of the Atlanta–Athens-Clarke County–Sandy Springs, GA Combined Statistical Area.

In most cases, the EPA assessed air quality data on a seasonal, or quarterly, basis.[11] The EPA also identified the spatial extent of these high $PM_{2.5}$ concentrations. The mass and composition at the design value location represents contributions from various emission sources including local, area-wide (which may comprise nearby urban and rural areas) and regional sources. To determine the source mix (by mass) at the design value monitoring site, the EPA examined the chemical composition of the monitored $PM_{2.5}$ concentrations by pairing each violating FRM/FEM/ARM monitoring site with a collocated or nearby Chemical Speciation Network (CSN) monitoring site or sites. Then, the EPA contrasted the approximated mass composition at the design value monitoring site with data collected at IMPROVE[12] and other monitoring locations whose data are representative of regional background.[13,14] This comparison of local/area-wide chemical composition data to regional chemical composition data derives an "urban increment," which helps differentiate the influence of more distant emissions sources

[11] Although compliance with the annual NAAQS depends on contributions from all days of the year, examining data on a quarterly or seasonal basis can inform the relationship between the temporal variability of emissions and meteorology and the resulting $PM_{2.5}$ mass and composition. In some areas of the country where there may be noticeable month-to-month variations in average $PM_{2.5}$, the quarterly averages may not adequately represent seasonal variability. In these areas, air quality data may be aggregated and presented by those months that best correspond to the local "seasons" in these areas.

[12] IMPROVE stands for Interagency Monitoring for Protected Visual Environments and is an aerosol monitoring network in mostly rural and remote areas.

[13] The "urban increment" analysis assesses and characterizes the increase in seasonal and annual average $PM_{2.5}$ mass and chemical constituents observed at violating monitoring site(s) relative to monitoring sites outside the area of analysis (which represent background concentrations). Developing the urban increment involves pairing a violating FRM/FEM/ARM monitor with a collocated monitor or nearby monitor with speciation data. The EPA made every effort to pair these data to represent the same temporal and spatial scales. However, in some cases, the paired violating and CSN "urban" monitoring locations were separated by some distance such that the included urban CSN site(s) reflect(s) a different mixture of emissions sources, which could lead to misinterpretations. To generally account for differences in $PM_{2.5}$ mass between the violating site and the nearby CSN site(s), the EPA determined material balance of the $PM_{2.5}$ composition at the violating site by assigning the extra measured $PM_{2.5}$ mass to the carbon components of $PM_{2.5}$. Where the general urban increment approach may be misleading, or in situations where non-carbonaceous emissions are believed to be responsible for a local $PM_{2.5}$ concentration gradient, the EPA used alternative analyses to reflect the mix of urban and rural sources contributing to the measured concentrations at violating monitoring sites.

[14] The urban monitors were paired with any rural sites within a 150 mile radius of an urban site to calculate spatial means of the quarterly averages of each species. If there were no rural sites within 150 miles, then the nearest rural site was used alone. That rural mean was then subtracted from the quarterly mean of the urban site to get the increment. Negative values were simply replaced with zeros.

from the influence of closer emissions sources, thus representing the portion of the measured potential violation that is associated with nearby emission contributions.[15,16,17]

<u>$PM_{2.5}$ Design Values and Total Mass Measurements</u> – The EPA examined ambient $PM_{2.5}$ air quality monitoring data represented by the DVs at the monitoring sites with invalid data and at other monitors in the area of analysis. The EPA calculated DVs based on air quality data for the most recent 3 consecutive calendar years of air quality data from suitable FEM/FRM/ARM monitoring sites in the EPA's Air Quality System (AQS). For this designations analysis, the EPA used data for the 2011-2013 period (i.e., the 2013 design value), which are the most recent years with air quality data. A monitor's DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2012 annual $PM_{2.5}$ NAAQS is met at a monitoring site when the 3-year average annual mean concentration is 12.0 $\mu g/m^3$ or less (e.g., 12.1 $\mu g/m^3$ or greater is a violation). A DV is only valid if minimum data completeness criteria are met or when other regulatory data processing provisions are satisfied (See 40 CFR part 50 Appendix N). Table 1 identifies the current design value(s) (i.e., the 2013 DV) and the most recent two design values based on all monitoring sites in the area of analysis for the Atlanta intended unclassifiable area.[18]

There is currently not enough verifiable data from the monitors in the Atlanta Area to obtain an accurate determination of air quality in the Atlanta CBSA. As noted in an August 8, 2014, memorandum from Gregg M. Worley, Chief of Region 4's Air Toxics & Monitoring Branch, to R. Scott Davis, Chief of Region 4's Air Planning Branch, the Atlanta area had less than 50 percent data completeness in the first quarter of 2011 and, therefore, does not meet the data

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[15] In most, but not all, cases, the violating design value monitoring site is located in an urban area. Where the violating monitor is not located in an urban area, the "urban increment" represents the difference between local and other nearby emission sources in the vicinity of the violating monitoring location and more regional sources.

[16] Hand, et. al. Spatial and Seasonal Patterns and Temporal Variability of Haze and its Constituents in the United States: Report V, June 2011. Chapter 7 – Urban Excess in $PM_{2.5}$ Speciated Aerosol Concentrations, *http://vista.cira.colostate.edu/improve/Publications/Reports/2011/PDF/Chapter7.pdf*

[17] US EPA, Office of Air Quality Planning and Standards, December 2004. (2004) Area Designations for 1997 Fine Particle ($PM_{2.5}$) Standards, Technical Support Document for State and Tribal Air Quality Fine Particle ($PM_{2.5}$) Designations, Chapter 3, Urban Excess Methodology. Available at *www.epa.gov/pmdesignations/1997standards/documents/final/TSD/Ch3.pdf*

[18] In certain circumstances, one or more monitoring locations within a monitoring network may not meet the network technical requirements set forth in 40 CFR 58.11(e), which states, "State and local governments must assess data from Class III $PM_{2.5}$ FEM and ARM monitors operated within their network using the performance criteria described in table C-4 to subpart C of part 53 of this chapter, for cases where the data are identified as not of sufficient comparability to a collocated FRM, and the monitoring agency requests that the FEM or ARM data should not be used in comparison to the NAAQS. These assessments are required in the monitoring agency's annual monitoring network plan described in §58.10(b) for cases where the FEM or ARM is identified as not of sufficient comparability to a collocated FRM…."

handling requirements of 40 CFR Part 58, Appendix N, 4.1(c)(ii), for conducting data substitution during the period 2011 through 2013.

Table 1. Air Quality Data Collected at Regulatory Monitors (all DV levels in μg/m^3)[a,b]

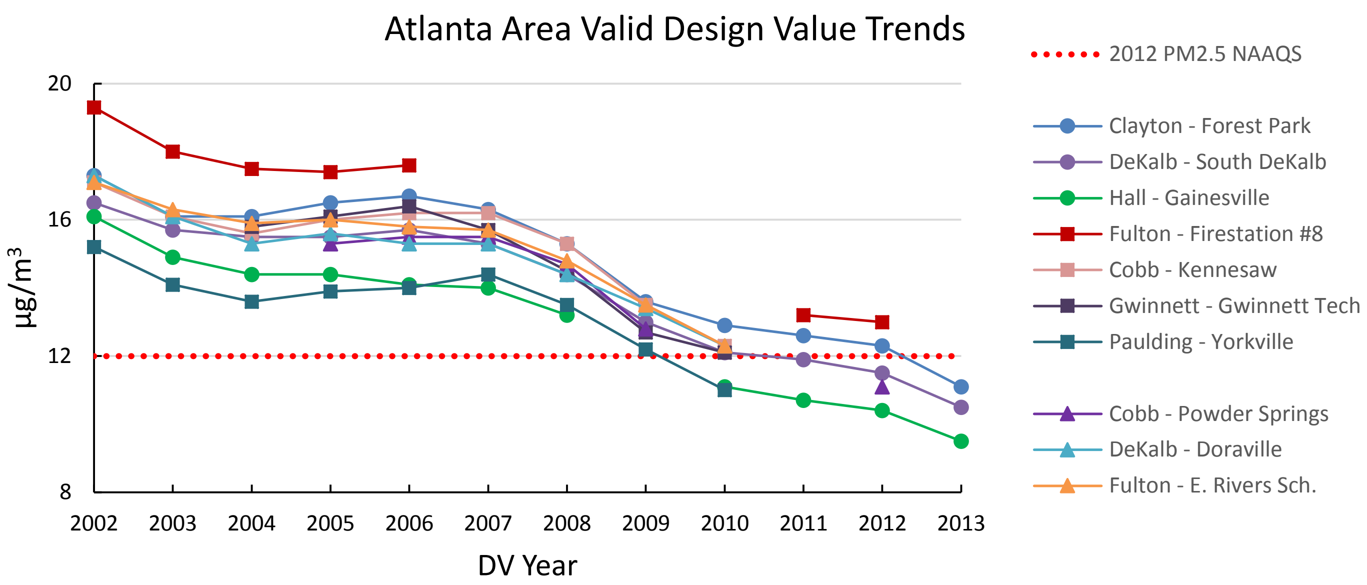
County - Site name	Monitor Site ID	06-08 DV	07-09 DV	08-10 DV	09-11 DV	10-12 DV	11-13 DV
Clayton-Forest Park	13-063-0091	15.3	13.6	12.9	12.6	12.3	11.1
DeKalb-South DeKalb	13-089-0002	14.4	13.0	12.1	11.9	11.5	10.5
Hall-Gainesville	13-139-0003	13.2	**NV**	11.1	10.7	10.4	9.5
Fulton-Fire Station #8	13-121-0039	**NV**	**NV**	**NV**	13.2	13.0	**NV**
Cobb-Kennesaw	13-067-0003	15.3	13.5	12.3	**NV**	**NV**	**NV**
Gwinnett-Gwinnett Tech	13-135-0002	14.5	12.7	12.1	**NV**	**NV**	**NV**
Paulding-Yorkville	13-223-0003	13.5	12.2	11.0	**NV**	**NV**	**NV**
Cobb - Powder Springs	13-067-0004	14.7	12.8	**NV**	**NV**	11.1	**-**
DeKalb – Doraville	13-089-2001	14.4	13.4	12.3	**NV**	**NV**	**-**
Fulton - E. Rivers Sch.	13-121-0032	14.8	13.5	12.3	**NV**	**NV**	**-**
NV: Not valid							

[a] This design value does not include data from Class III FEM monitors that are not eligible for comparison to the NAAQS, as approved by the EPA pursuant to 40 CFR 58.11(e).
[b] Site approved for shutdown during network plan review at the end of 2012.

The Figure 1 map, shown previously, identifies the Atlanta CBSA boundary and monitoring locations with 2013 attaining DVs and invalid DVs; there no valid violating DVs for 2013. The Fire Station #8 monitor has consistently been the highest DV in the region, including for the 1997 PM designation, except where valid data are not available for the site. There are a total of six monitors in the CBSA, and all but two have invalid DVs for 2013. There is also a monitor in Hall County, as shown, with a valid design value. Although not located within the Atlanta CBSA, Hall County was included in the nonattainment area for the 1997 PM designation.

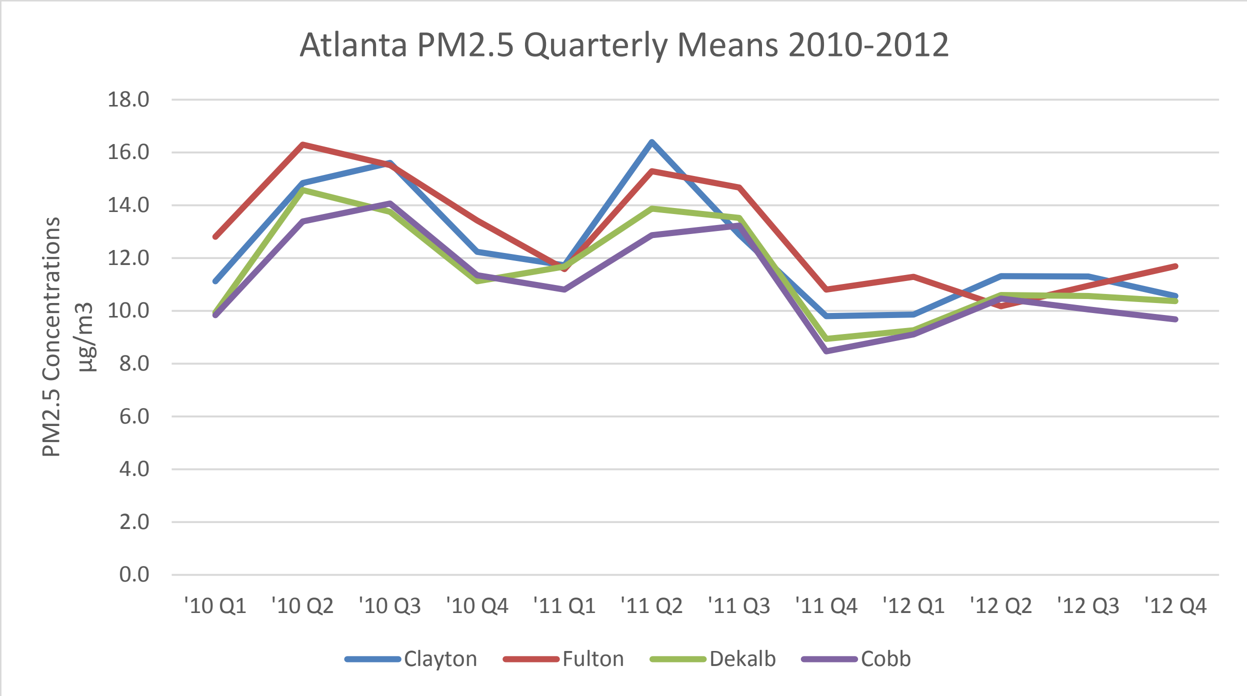
Figure 4a, below, shows the history of design values for the monitoring data that is available for the Atlanta Area since 2002. The Fire Station #8 monitor in Fulton County exceeded the 2012 $PM_{2.5}$ NAAQS in 2012, but for 2013 the design value is invalid due to incomplete data issues. In the years that Fire Station #8 site had valid design values, the site recorded the highest annual $PM_{2.5}$ design values in the Atlanta Area. (Note that the last three sites shown, Cobb-Powder Springs, DeKalb-Doraville and Fulton-E. Rivers School all ceased operation in 2012 in accordance with Georgia's approved monitoring plan.)

Figure 3a. Atlanta $PM_{2.5}$ Valid Design Values for 2002-2013



Seasonal variation can highlight those conditions most associated with high average concentration levels of $PM_{2.5}$. Figure 3b, below, shows quarterly mean $PM_{2.5}$ concentrations for the 3-year period 2010-2012 for the highest DV monitoring site and the other, non-violating, monitoring sites in each county within the area of analysis. This graphical representation is particularly relevant when assessing air quality data for an annual standard, such as the 2012 annual $PM_{2.5}$ NAAQS, because, as previously stated, the annual mean is calculated as the mean of quarterly means and a high quarter can drive the mean for an entire year, which, in turn, can drive an elevated 3-year DV.

Figure 3b. Atlanta $PM_{2.5}$ Quarterly Means for 2010-2012

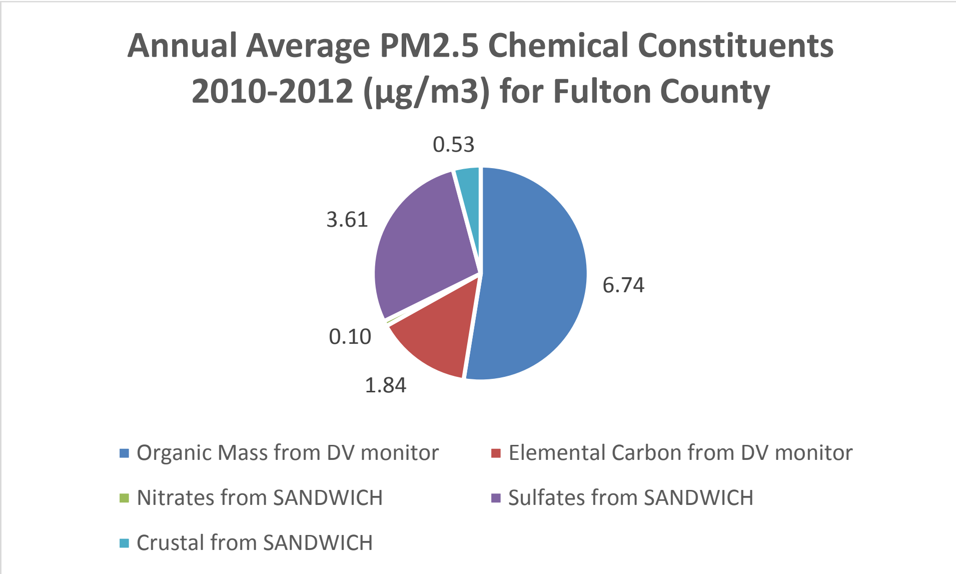


As shown, Quarterly values across the period have peaked in Q2. Overall, the monitor is trending down at the all sites.

<u>$PM_{2.5}$ Composition Measurements</u> - To assess potential emissions contributions for each monitoring location with invalid data, the EPA determined the various chemical species comprising total $PM_{2.5}$ to identify the chemical constituents over the analysis area, which can provide insight into the types of emission sources impacting the monitored concentration. To best describe the $PM_{2.5}$ at the monitoring sites that were violating in 2012 (none of the three monitoring sites with valid 2013 design values are violating), the EPA first adjusted the chemical speciation measurement data from a monitoring location at or near the violating FRM monitoring sites using the SANDWICH approach to account for the amount of $PM_{2.5}$ mass constituents

retained in the FRM measurement.[19,20,21,22] In particular, this approach accounts for losses in fine particle nitrate and increases in sulfate mass associated with particle bound water. Figure 4a, below, illustrates the fraction of each $PM_{2.5}$ chemical constituent at the Fulton (131210039) monitoring site based on annual averages for the years 2010-2012.

Figure 4a. Atlanta Annual Average $PM_{2.5}$ Chemical Constituents (2010-2012)



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[19] SANDWICH stands for measured **S**ulfate, **A**djusted **N**itrate, **D**erived **W**ater, **I**nferred **C**arbonaceous mass **H**ybrid Material Balance Approach." The SANDWICH adjustment uses an FRM mass construction methodology that results in reduced nitrates (relative to the amount measured by routine speciation networks), higher mass associated with sulfates (reflecting water included in gravimetric FRM measurements) and a measure of organic carbonaceous mass derived from the difference between measured $PM_{2.5}$ and its non-carbon components. This characterization of $PM_{2.5}$ mass also reflects crustal material and other minor constituents. The resulting characterization provides a complete mass closure for the measured FRM $PM_{2.5}$ mass, which can be different than the data provided directly by the speciation measurements from the CSN network.

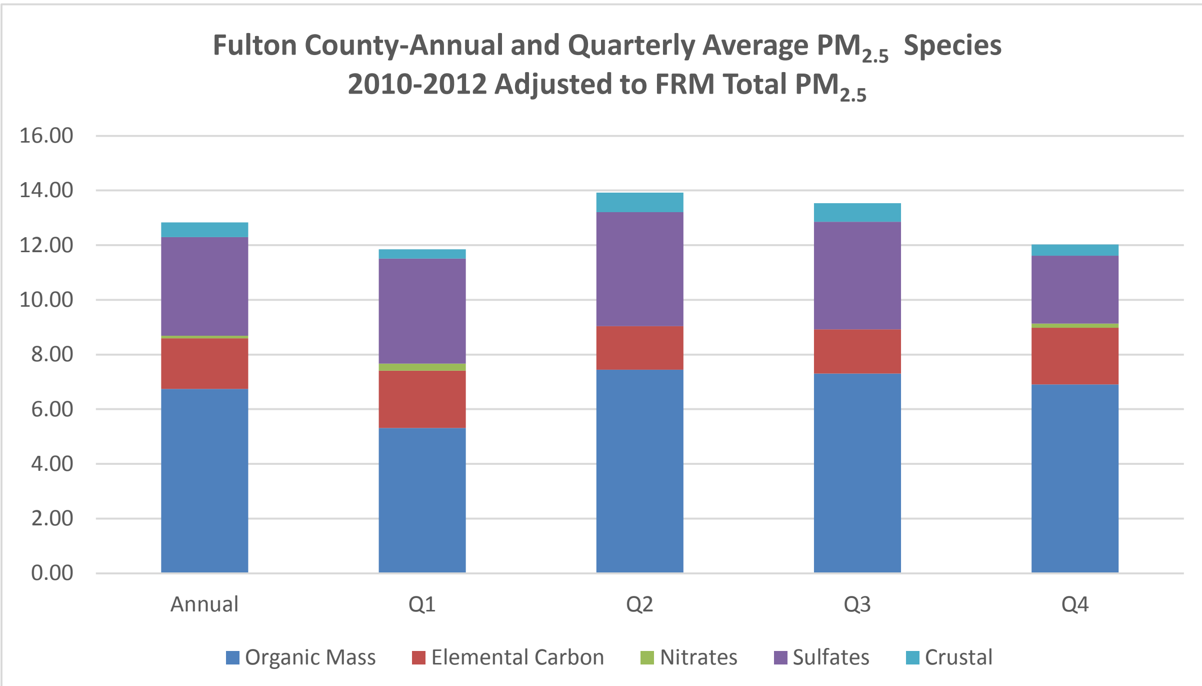
[20] Frank, N. H., SANDWICH Material Balance Approach for $PM_{2.5}$ Data Analysis, National Air Monitoring Conference, Las Vegas, Nevada, November 6-9, 2006. *http://www.epa.gov/ttn/amtic/files/2006conference/frank.pdf*.

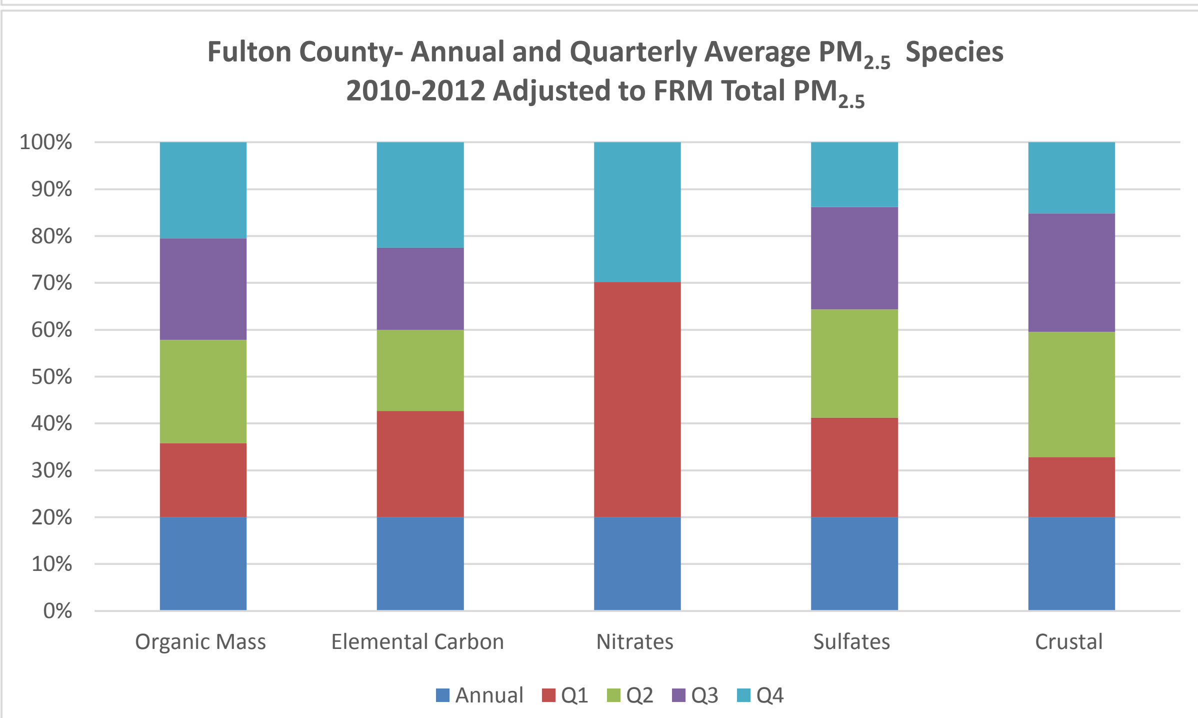
[21] Frank, N. H., The Chemical Composition of $PM_{2.5}$ to support PM Implementation, the EPA State /Local/Tribal Training Workshop: $PM_{2.5}$ Final Rule Implementation and 2006 $PM_{2.5}$ Designation Process, Chicago IL, June 20-21, 2007, *http://www.epa.gov/ttn/naaqs/pm/presents/pm2.5_chemical_composition.pdf*.

[22] Frank, N. H. *Retained Nitrate, Hydrated Sulfates, and Carbonaceous Mass in Federal Reference Method Fine Particulate Matter for Six Eastern U.S. Cities*. J. Air & Waste Manage. Assoc. 2006 56:500–511.

Figure 4b shows annual and quarterly chemical composition profiles and illustrates any seasonal or episodic contributors to $PM_{2.5}$ mass. This "increment analysis," combined with the other factor analyses, can provide additional insight as to which sources or factors may contribute at a greater level. Simply stated, this analysis can help identify nearby sources of emissions that contribute to the violation at the violating monitoring site.

Figure 4b. Atlanta Annual and Quarterly Average $PM_{2.5}$ Species (2010-2012)[a]





[a] *Adjusted to FRM Total $PM_{2.5}$* indicates that the speciation profile and total mass depicted in this figure are the result of the urban increment calculation for the particular FRM monitor.

Figures 4a and 4b show that sulfate and OM are the predominant species overall. Crustal and elemental carbon comprise a small percentage in all four quarters. Sulfate peaks in the third quarter. Nitrate is a relatively small component, but is slightly higher in the first quarter. It is likely that the large sulfate component is caused by SOx emissions from large electric generating units in the area. High levels of organic mass are typically associated with mobile sources, wood or biomass burning and localized combustion sources.[23]

The EPA assessed seasonal and annual average $PM_{2.5}$ constituents at monitoring sites within the area relative to monitoring sites outside of the analysis area to account for the difference between regional background concentrations of $PM_{2.5}$, and the concentrations of $PM_{2.5}$ in the area of analysis, also known as the "urban increment." This analysis differentiates between the influences of emissions from sources in nearby areas and in more distant areas on the violating monitor. Estimating the urban increment in the area helps to illuminate the amount and type of particles at the violating monitor that are most likely to be the result of sources of emissions in nearby areas, as opposed to impacts of more distant or regional sources of emissions. 5a, below, includes pie charts showing the annual and quarterly chemical mass constituents of the urban increment. The quarterly pie charts correspond to the high-concentration quarters identified in Figure 4b. Evaluating these high concentration quarters can help identify composition of $PM_{2.5}$ during these times. Note that in these charts, sulfates and nitrates have been adjusted to represent their mass in measured $PM_{2.5}$.

[23] The EPA Guidance Memorandum, "Initial Area Designations for the 2012 Revised Primary Annual Fire Particulate National Ambient Air Quality Standard," dated April 16, 2013, Attachment 3.

Figure 5a. Atlanta CBSA Urban Increment Analysis for 2010-2012.

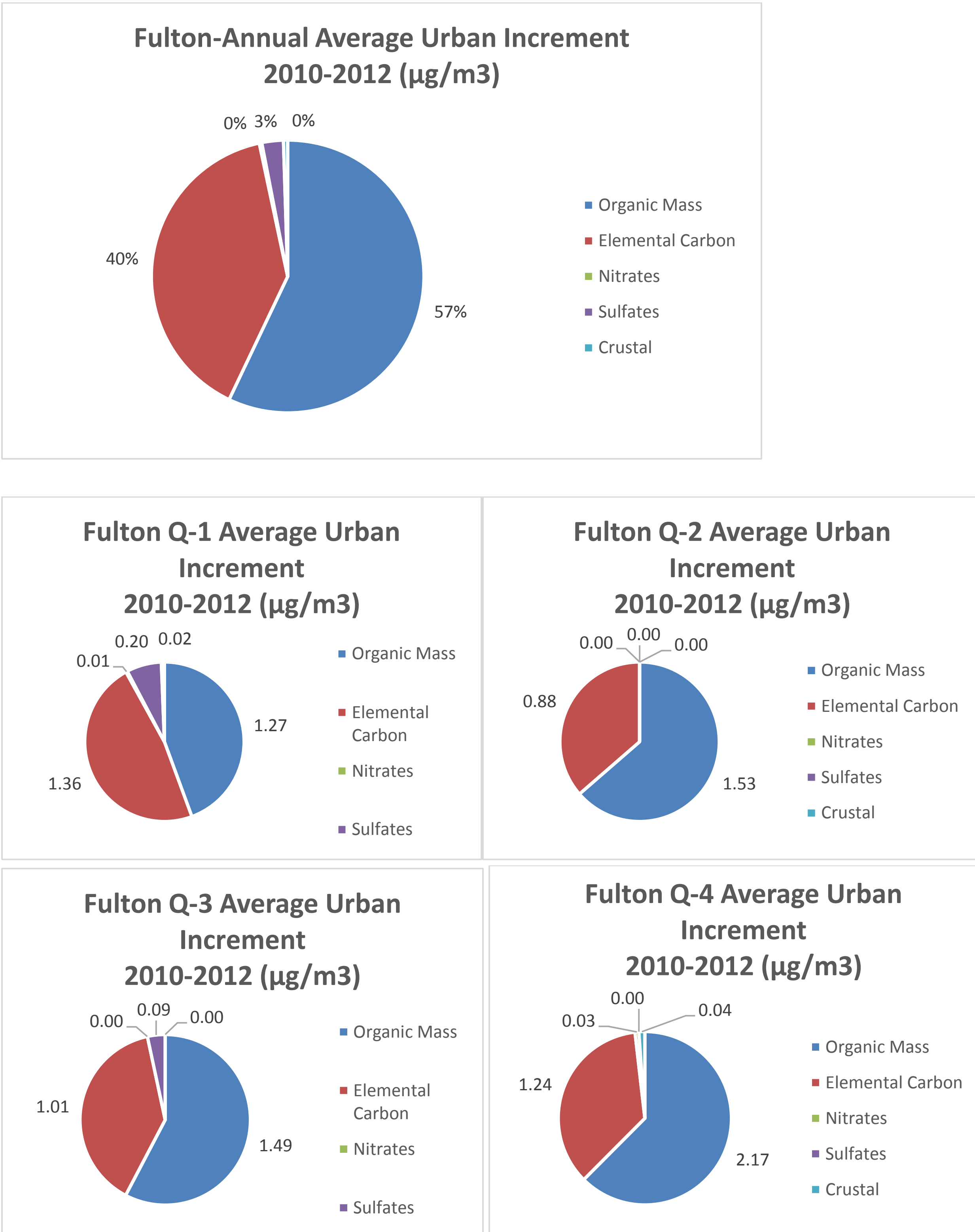
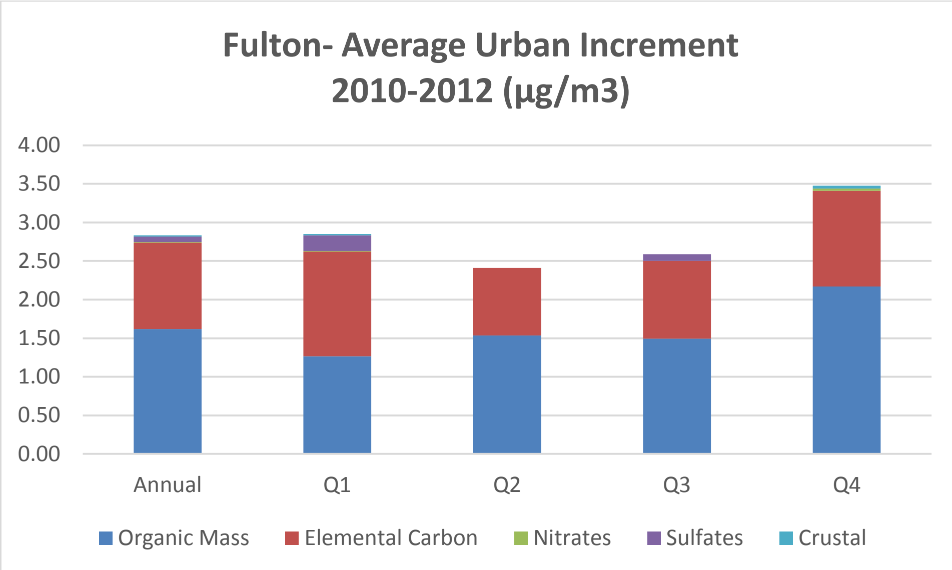


Figure 5b. Atlanta CBSA Average Urban Increment Analysis for 2010-2012.



For 2012, Clayton County and Fulton County each had one monitoring site with a DV exceeding the NAAQS. For 2013, the Clayton County design value is below the standard at 11.1 µg/m^3, however, the Fulton County monitor has an invalid design value.

A comparison of the average urban increment to the total measured $PM_{2.5}$ for the Atlanta area indicates that the urban increment is less than one-third of the total. This indicates a significant contribution from regional sources. In addition, Fulton and adjoining counties have clear seasonal peaks in ambient $PM_{2.5}$ concentrations in quarters 1 and 4. Looking at speciated components of the urban increment for the Fulton County monitor, the organic mass component appears to have the largest urban contribution for quarters 2, 3 and 4. Elemental carbon is the second highest urban increment component and peaks during Q1. Carbonaceous mass (Organic Carbon + Elemental Carbon) is typically associated with mobile sources, wood or biomass combustion, and localized combustion sources. The relatively high elemental carbon component could be an indicator of contribution from diesel combustion sources in the area. This analysis points to contribution from both regional and local $PM_{2.5}$ sources.

Factor 2: Emissions and emissions-related data

In this designations process, for each area with a violating monitoring site or a monitoring site with invalid data, the EPA evaluated the emissions data from nearby areas using emissions related-data for the relevant counties to assess each county's potential contribution to $PM_{2.5}$ concentrations at the monitoring sites in the area under evaluation. Similar to the air quality analysis, these data were examined on a seasonal basis. The EPA examined emissions of identified sources or source categories of direct $PM_{2.5}$, the major components of direct $PM_{2.5}$ (organic mass, elemental carbon, crustal material (and/or individual trace metal compounds)), primary nitrate and primary sulfate, and precursor gaseous pollutants (i.e., SO_2, NO_X, total VOC, and NH_3). The EPA also considered the distance of those sources of emissions from the violating monitoring site. While direct $PM_{2.5}$ emissions and its major carbonaceous components are generally associated with sources near violating $PM_{2.5}$ monitoring sites, the gaseous precursors tend to have a more regional influence (although the EPA is mindful of the potential local NO_X and VOC emissions contributions to $PM_{2.5}$ from mobile and stationary sources) and transport from neighboring areas can contribute to higher $PM_{2.5}$ levels at the violating monitoring sites.

Emissions Data

For this factor, the EPA reviewed data from the 2011 National Emissions Inventory (NEI) version 1 (see *http://www.epa.gov/ttn/chief/net/2011inventory.html*). For each county in the area of analysis, the EPA examined the magnitude of county-level emissions reported in the NEI. These county-level emissions represent the sum of emissions from the following general source categories: point sources, non-point (i.e., area) sources, nonroad mobile, on-road mobile, and fires. The EPA also looked at the geographic distribution of major point sources of the relevant pollutants.[24] Significant emissions levels from sources in a nearby area indicate the potential for the area to contribute to monitored violations.

To further analyze area emissions data, the EPA also developed a summary of direct $PM_{2.5}$, components of direct $PM_{2.5}$, and precursor pollutants, which is available at *http://www.epa.gov/pmdesignations/2012standards/docs/nei2011v1pointnei2008v3county.xlsx*. When considered with the urban increment analysis in Factor 1, evaluating the components of direct $PM_{2.5}$ and precursor gases can help identify specific sources or source types contributing to elevated concentrations at potentially violating monitoring sites and thus assist in identifying appropriate area boundaries. In general, directly emitted particulate organic carbon (POC) and VOCs[25] contribute to $PM_{2.5}$ organic mass (OM); directly emitted EC contributes to $PM_{2.5}$ EC; NO_X, NH_3 and directly emitted nitrate contribute to $PM_{2.5}$ nitrate mass; SO_2, NH_3 and directly emitted sulfate contribute to $PM_{2.5}$ sulfate mass; and directly emitted crustal material and metal oxides contribute to $PM_{2.5}$ crustal matter. [26,27] The EPA believes that the quantities of those nearby emissions as potential contributors to the $PM_{2.5}$ monitors with invalid data are somewhat

[24] For purposes of this designations effort, “major” point sources are those whose sum of PM precursor emissions ($PM_{2.5}$ + NOx + SO_2 + VOC + NH_3) are greater than 500 tons per year based on NEI 2011v1.

[25] As previously mentioned, nearby VOCs are presumed to be a less important contributor to $PM_{2.5}$ OM than POC.

[26] *See*, Seinfeld J. H. and Pandis S. N. (2006) *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change*, 2nd edition, J. Wiley, New York. See also, Seinfeld J. H. and Pandis S. N. (1998) *Atmospheric Chemistry and Physics: From Air Pollution to Climate Change*, 1st edition, J. Wiley, New York.

[27] USEPA Report (2004), The Particle Pollution Report: Current Understanding of Air Quality and Emissions through 2003, found at: *http://www.epa.gov/airtrends/aqtrnd04/pm.html*.

proportional to the $PM_{2.5}$ chemical constituents in the estimated urban increment. Thus, directly emitted POC is more important per ton than SO_2, partially because POC emissions are already $PM_{2.5}$ whereas SO_2 must convert to $PM_{2.5}$ and not all of the emitted SO_2 undergoes this conversion.

Table 2a, below, provides a county-level emissions summary (i.e., the sum of emissions from the following general source categories: point sources, non-point (i.e., area) sources, nonroad mobile, on-road mobile, and fires) of directly emitted $PM_{2.5}$ and precursor species for the county with the monitoring sites with invalid data and nearby counties considered for inclusion in the Atlanta CBSA area. Table 2b summarizes the directly emitted components of $PM_{2.5}$ for the same counties in the area of analysis for the Atlanta CBSA. This information will be paired with the Urban Increment composition previously shown in Figures 5a and 5b.

Table 2a. County-Level Emissions of Directly Emitted $PM_{2.5}$ and Precursors (tons/year)

County	Total NH_3	Total NOx	Total Direct $PM_{2.5}$	Total SO_2	Total VOC	Total
Coweta	277	10,545	1,615	47,614	3,053	63,104
Cobb	430	17,404	1,859	19,127	15,837	54,657
Fulton	706	24,444	2,614	607	20,237	48,608
Gwinnett	477	16,271	1,504	234	17,862	36,348
DeKalb	466	14,240	1,348	247	14,595	30,895
Bartow	1,200	13,988	2,147	6,716	4,085	28,137
Clayton	180	10,045	550	621	6,232	17,629
Henry	187	7,477	580	76	4,448	12,769
Carroll	2,136	4,085	645	98	3,714	10,678
Cherokee	539	4,530	505	61	4,464	10,098
Heard	786	3,429	1,561	3,116	635	9,526
Forsyth	713	3,737	435	73	4,340	9,297
Newton	147	3,067	663	65	3,170	7,113
Douglas	104	3,006	294	38	2,812	6,254
Walton	583	2,556	480	25	2,482	6,125
Paulding	265	2,332	340	25	2,306	5,267
Barrow	549	2,172	351	25	1,927	5,024
Fayette	85	2,057	275	31	2,402	4,850
Rockdale	89	2,181	253	72	1,915	4,509
Spalding	178	1,642	405	36	1,780	4,042
Butts	69	1,505	256	26	856	2,713
Dawson	1,169	718	191	8	722	2,809
Haralson	397	1,452	320	19	1,678	3,866

County	Total NH_3	Total NOx	Total Direct $PM_{2.5}$	Total SO_2	Total VOC	Total
Jasper	321	593	651	38	828	2,432
Lamar	694	847	247	10	762	2,559
Meriwether	223	1,691	948	70	1,294	4,226
Morgan	1,129	2,256	598	55	1,335	5,373
Pickens	1,212	1,017	389	12	1,088	3,717
Pike	279	574	384	17	808	2,062

Table 2b. County-Level Emissions for Components of Directly Emitted $PM_{2.5}$ (tons/year) [28]

County	POM	EC	PSO4	PNO3	Crustal	Residual	Total Direct
Fulton	1,111	628	50	9	299	517	2,614
Bartow	268	196	132	3	683	865	2,147
Cobb	582	344	62	3	381	487	1,859
Coweta	463	180	73	4	392	503	1,615
Heard	257	153	111	7	446	587	1,561
Gwinnett	708	440	17	3	130	206	1,504
DeKalb	611	337	19	3	170	208	1,348
Meriwether	637	117	11	6	45	132	948
Newton	207	89	9	2	91	266	663
Jasper	449	76	11	5	24	86	651
Carroll	255	115	10	2	108	155	645
Morgan	334	95	8	4	54	103	598
Henry	200	178	11	2	87	102	580
Clayton	211	216	7	1	51	64	550
Cherokee	201	131	5	1	76	90	505
Walton	205	76	6	2	80	111	480
Forsyth	157	105	5	1	76	91	435
Spalding	192	56	5	1	60	91	405
Pickens	105	36	14	1	79	154	389
Pike	228	42	4	2	39	69	384
Barrow	129	60	4	1	50	107	351
Paulding	149	72	4	1	48	66	340

[28] Data are based on the 2011 and 2018 Emissions Modeling Platform Data Files and Summaries (*ftp://ftp.epa.gov/EmisInventory/2011v6/v1platform*) available at: *http://www.epa.gov/ttn/chief/emch/index.html#2011* (accessed 02/26/14).

County	POM	EC	PSO4	PNO3	Crustal	Residual	Total Direct
Haralson	159	55	4	1	35	65	320
Douglas	117	74	4	1	47	51	294
Fayette	99	57	3	1	55	61	275
Butts	115	55	3	1	35	47	256
Rockdale	91	60	3	1	46	52	253
Lamar	126	38	3	1	28	51	247
Dawson	94	28	2	1	27	40	191

Table 2b breaks down the direct $PM_{2.5}$ emissions value from Table 2a into its components. These data will also be compared with the previously presented Urban Increment composition.

Using the previously described relationship between directly emitted and precursor gases and the measured mass to evaluate data presented in Tables 2a and 2b, the EPA identified the following components warranting additional review: POM, EC and SO_2. The EPA then looked at the contribution of these constituents of interest from each of the counties included in the area of analysis as shown in Tables 3 a-c.

Table 3a. County-Level [POM] Emissions (tons/year)

	Emissions in average tons/yr		
County	POM	Pct.	Cumulative %
Fulton	1,111	13%	13%
Gwinnett	708	8%	22%
Meriwether	637	8%	29%
DeKalb	611	7%	36%
Cobb	582	7%	43%
Coweta	463	5%	49%
Jasper	449	5%	54%
Morgan	334	4%	58%
Bartow	268	3%	61%
Heard	257	3%	64%
Carroll	255	3%	67%
Pike	228	3%	70%
Clayton	211	2%	72%
Newton	207	2%	75%
Walton	205	2%	77%

Cherokee	201	2%	80%
Henry	200	2%	82%
Spalding	192	2%	84%
Haralson	159	2%	86%
Forsyth	157	2%	88%
Paulding	149	2%	90%
Barrow	129	2%	91%
Lamar	126	1%	93%
Douglas	117	1%	94%
Butts	115	1%	95%
Pickens	105	1%	97%
Fayette	99	1%	98%
Dawson	94	1%	99%
Rockdale	91	1%	100%

Table 3b. County-Level [EC] Emissions

	Emissions in average tons/yr		
County	**EC**	**Pct.**	**Cumulative %**
Fulton	628	15%	15%
Gwinnett	440	11%	26%
Cobb	344	8%	34%
DeKalb	337	8%	43%
Clayton	216	5%	48%
Bartow	196	5%	53%
Coweta	180	4%	57%
Henry	178	4%	61%
Heard	153	4%	65%
Cherokee	131	3%	68%
Meriwether	117	3%	71%
Carroll	115	3%	74%
Forsyth	105	3%	76%
Morgan	95	2%	79%
Newton	89	2%	81%
Walton	76	2%	83%
Jasper	76	2%	85%
Douglas	74	2%	86%
Paulding	72	2%	88%

	Emissions in average tons/yr		
County	**EC**	**Pct.**	**Cumulative %**
Rockdale	60	1%	90%
Barrow	60	1%	91%
Fayette	57	1%	92%
Spalding	56	1%	94%
Butts	55	1%	95%
Haralson	55	1%	96%
Pike	42	1%	98%
Lamar	38	1%	98%
Pickens	36	1%	99%
Dawson	28	1%	100%

Table 3c. County-Level [SO2] Emissions

	Emissions in average tons/yr		
County	**SO2**	**Pct.**	**Cumulative %**
Coweta	47,614	60%	60%
Cobb	19,127	24%	84%
Bartow	6,716	8%	93%
Heard	3,116	4%	97%
Clayton	621	1%	98%
Fulton	607	1%	98%
DeKalb	247	0%	99%
Gwinnett	234	0%	99%
Carroll	98	0%	99%
Henry	76	0%	99%
Forsyth	73	0%	99%
Rockdale	72	0%	99%
Meriwether	70	0%	99%
Newton	65	0%	99%
Cherokee	61	0%	100%
Morgan	55	0%	100%
Jasper	38	0%	100%
Douglas	38	0%	100%
Spalding	36	0%	100%
Fayette	31	0%	100%
Butts	26	0%	100%

	Emissions in average tons/yr		
County	**SO2**	**Pct.**	**Cumulative %**
Barrow	25	0%	100%
Paulding	25	0%	100%
Walton	25	0%	100%
Haralson	19	0%	100%
Pike	17	0%	100%
Pickens	12	0%	100%
Lamar	10	0%	100%
Dawson	8	0%	100%

In addition to reviewing county-wide emissions of $PM_{2.5}$ and $PM_{2.5}$ precursors in the area of analysis, the EPA also reviewed emissions from major point sources located in the area of analysis. The magnitude and location of these sources can help inform nonattainment boundaries. Table 4 provides facility-level emissions of direct $PM_{2.5}$, components of direct $PM_{2.5}$, and precursor pollutants (given in tons per year) from major point sources located in the area of analysis for the Atlanta CBSA area. Table 4 also shows the distance from the facility to the DV monitor for the respective county.

Table 4. NEI 2011 v1 Point Source Emissions (tons/year)

County	Facility Name (Facility ID)	Distance to monitor (miles)	NEI 2011 v1 Emissions - Tons/Year					
			NH3	NOx	$PM_{2.5}$	SO2	VOC	Total
Bartow	Chemical Products Corporation	31	1	23	25	557	2	607
Bartow	Ga Power Company - Plant Bowen	36	15	8,371	1,161	5,889	188	15,623
Clayton	The William B Hartsfield International Airport	11	-	4,316	90	537	788	5,731
Cobb	Caraustar Industries Inc	12	-	176	44	564	15	799
Cobb	Ga Power Company - Plant McDonough/Atkinson	3	14	3,162	424	18,307	27	21,934
Coweta	Ga Power Company - Plant Yates	36	7	6,763	626	47,530	61	54,987
Fulton	Owens Brockway Glass Container Inc.	9	1	350	84	214	3	654
Hall	Cargill Inc	49	-	108	16	557	199	880
Heard	Ga Power Company - Plant Wansley	44	216	2,831	1,017	3,097	141	7,303

County	Facility Name (Facility ID)	Distance to monitor (miles)	NEI 2011 v1 Emissions - Tons/Year					
			NH3	NOx	$PM_{2.5}$	SO2	VOC	Total
Henry	Transcontinental Gas Pipe Line Company, LLC - Compressor Station 120	19	-	2,259	59	-	404	2,722
Morgan	Georgia-Pacific Wood Products LLC (Madison Plywood)	60	-	207	139	16	199	562
Putnam	Ga Power Company - Plant Branch	78	34	12,083	840	55,180	67	68,205

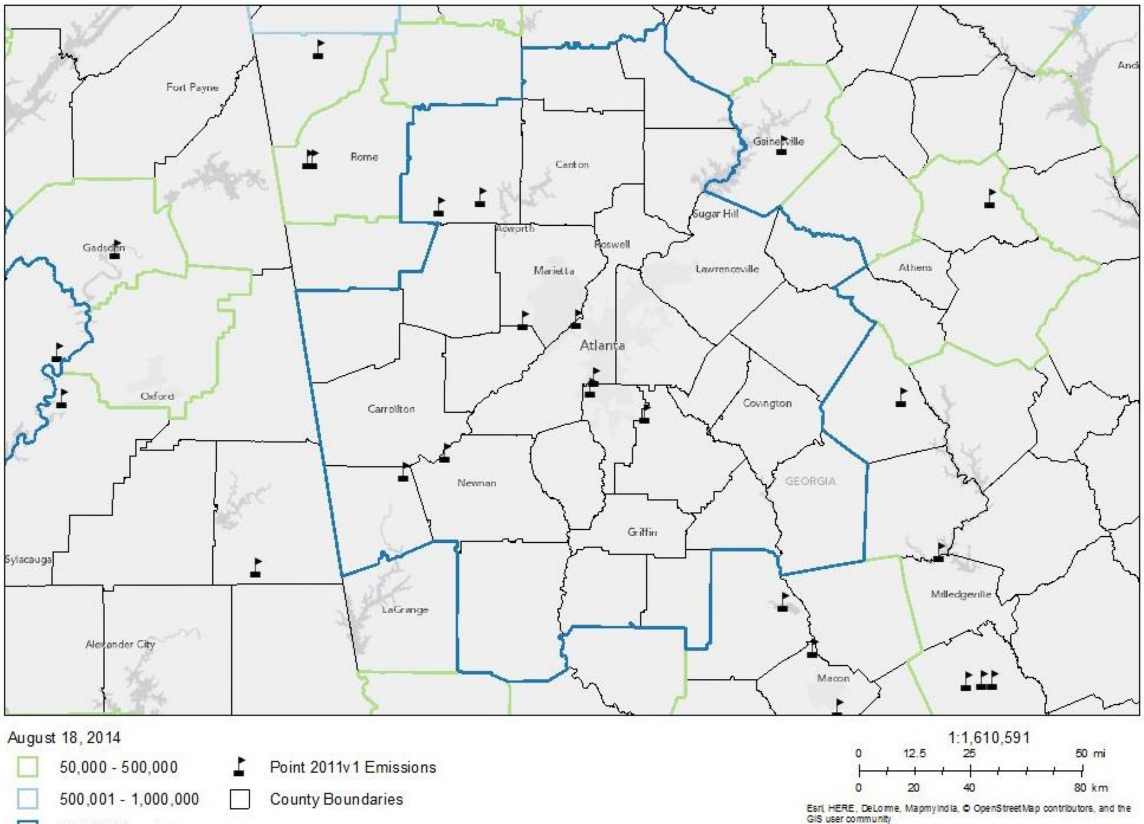
Figure 6, below, shows the major point source emissions (from the 2011 NEI in tons per year) in the area of analysis for the Atlanta CBSA and the relative distances of these sources from the monitoring location(s) with invalid data, as depicted by blue dots. The actual distance from the point sources to the DV monitoring location is presented in Table 4). The distance from the monitoring location with invalid data is particularly important for directly emitted $PM_{2.5}$. The influence of directly emitted $PM_{2.5}$ on ambient $PM_{2.5}$ diminishes more than that of gaseous precursors as a function of distance.[29]

As indicated in Figure 6, there are 12 point sources located within 60 miles of the highest reading invalid monitor (i.e., Fire Station #8). Plant Wansley in Heard County had SO_2 and $PM_{2.5}$ emissions of 75,650 tpy and 3,823 tpy, respectively, at the time of the 1997 $PM_{2.5}$ designation. Since Georgia Power installed emissions control technology beginning in 2002, SO_2 and $PM_{2.5}$ emissions have decreased by 96 percent and 73 percent, respectively. Morgan County has one point source located 60 miles away from the Fire Station #8 monitor, and SO_2 and $PM_{2.5}$ emissions from the source are low. Plant Branch in Putnam County, which is not part of the Atlanta CSA, is 78 miles from the highest reading invalid monitor, and there is an attaining monitor (Clayton County) in between that source and the closest invalid monitor. There have been reductions in SO_2 and $PM_{2.5}$ emissions at Plant Branch since the 1997 $PM_{2.5}$ designation of 65,517 tpy (16 percent) and 3,356 tpy (75 percent), respectively.

Overall, Hall County emissions have decreased by 31 percent to 717 tpy for SO_2 and 67 percent to 762 tpy for $PM_{2.5}$. There is one point source, Cargill Inc, and emissions of SO_2 and $PM_{2.5}$ have dropped by 63 tpy (10 percent) and 59 tpy (79 percent), respectively. Cargill Inc comprises 78 percent of SO_2 and 2 percent of $PM_{2.5}$ to the overall emissions in Hall County.

[29] Baker, K. R. and K. M. Foley. *A nonlinear regression model estimating single source concentrations of primary and secondarily formed $PM_{2.5}$*. Atmospheric Environment. 45 (2011) 3758-3767.

Figure 6. Major Point Source Locations in the Atlanta Area of Analysis.



Population density and degree of urbanization

In this part of the factor analysis, the EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. Rapid population growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that it may be appropriate to include the county associated with area source and mobile source emissions as part of the nonattainment area. Table 5 shows the 2000 and 2010 population, population growth since 2000, and population density for each county in the area.

Table 5. Population Growth and Population Density.

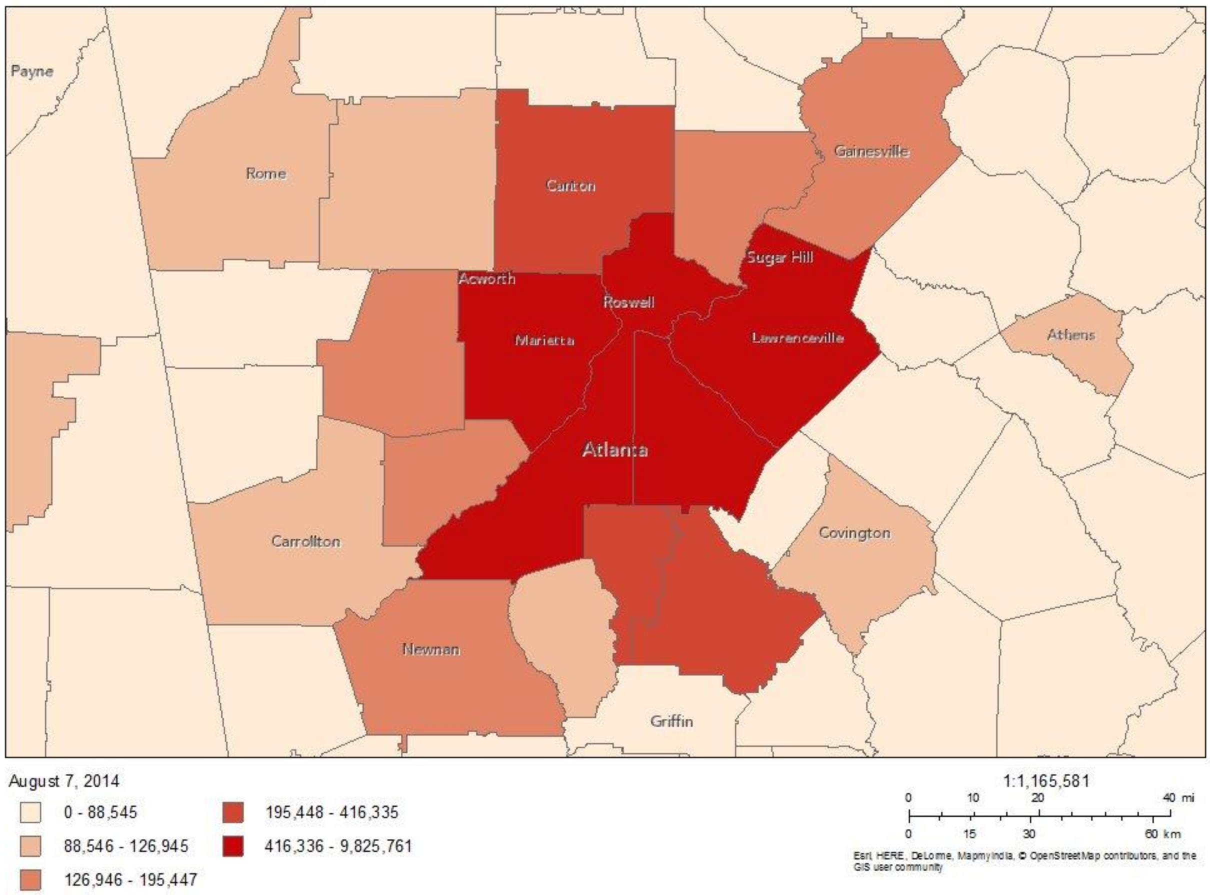
County	Population 2000	Population 2010	% Change from 2000	Land Area (Sq. Miles)	Population Density (per Sq. Mile)	%	Cumul. %
Fulton	816,006	926,119	13.5%	529	1,752	17%	17%
Gwinnett	588,448	808,409	37.4%	433	1,868	15%	33%
DeKalb	665,865	692,546	4.0%	268	2,582	13%	46%
Cobb	607,751	689,695	13.5%	340	2,028	13%	59%

Clayton	236,517	259,832	9.9%	143	1,822	5%	64%
Cherokee	141,903	215,248	51.7%	424	508	4%	68%
Henry	119,341	205,283	72.0%	323	636	4%	72%
Forsyth	98,407	176,820	79.7%	226	783	3%	75%
Paulding	81,678	142,788	74.8%	313	456	3%	78%
Douglas	92,174	132,646	43.9%	199	666	3%	80%
Coweta	89,215	127,906	43.4%	443	289	2%	83%
Carroll	87,268	110,723	26.9%	499	222	2%	85%
Fayette	91,263	107,064	17.3%	197	543	2%	87%
Bartow	76,019	100,161	31.8%	459	218	2%	89%
Newton	62,001	100,130	61.5%	276	362	2%	90%
Rockdale	70,111	85,400	21.8%	131	654	2%	92%
Walton	60,687	84,092	38.6%	329	255	2%	94%
Barrow	46,144	69,732	51.1%	162	430	1%	95%
Spalding	58,417	64,111	9.7%	198	324	1%	96%
Pickens	22,983	29,454	28.2%	232	127	1%	97%
Haralson	25,690	28,786	12.1%	282	102	1%	97%
Butts	19,522	23,756	21.7%	187	127	<1%	98%
Dawson	15,999	22,304	39.4%	211	106	<1%	98%
Meriwether	22,534	21,846	-3.1%	503	43	<1%	98%
Lamar	15,912	18,250	14.7%	185	99	<1%	99%
Pike	13,688	17,905	30.8%	218	82	<1%	99%
Morgan	15,457	17,901	15.8%	350	51	<1%	100%
Jasper	11,426	13,900	21.7%	370	38	<1%	100%
Heard	11,012	11,858	7.7%	296	40	<1%	100%
Total	**4,263,438**	**5,304,665**					

Source: U.S. Census Bureau population estimates for 2000 and 2010

The most densely populated counties are in and adjacent to the monitors with invalid data. Clayton, Cobb, DeKalb, Fulton and Gwinnett Counties had the highest population density (over 1,700 persons per square mile). Barrow, Cherokee, Coweta, Douglas, Forsyth, Henry, Newton and Paulding have seen substantial growth (over 40 percent) since 2000.

Figure 7. 2010 County-Level Population in the Area of Analysis for the Atlanta CBSA Area.



Traffic and VMT

High VMT and/or a high number of commuters associated with a county is generally an indicator that the county is an integral part of an urban area. Mobile source emissions of NOx, VOC, and direct PM may contribute to ambient particulate matter that contributes to potential monitored violations of the NAAQS in the area. In combination with the population/population density data and the location of main transportation arteries, an assessment of VMT helps identify the probable location of nonpoint source emissions that contribute to violations in the area. Comparatively high VMT in a county outside of the CBSA or CSA signifies integration with the core urban area contained within the CSA or CBSA, and indicates that a county with the high VMT may be appropriate to include in the unclassifiable area because emissions from mobile sources in that county contribute to potential violations in the area. Table 6 shows 2011

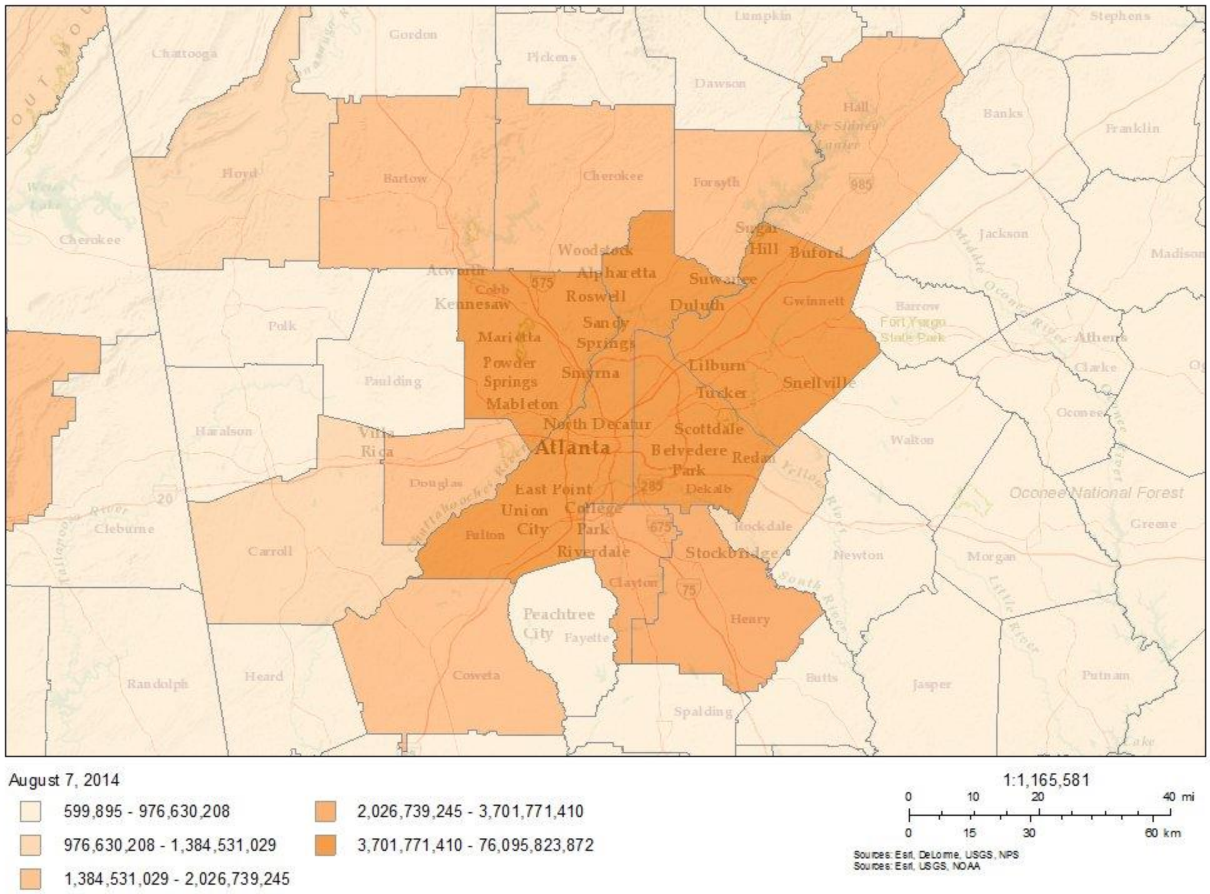
VMT while Figure 8 overlays 2011 county-level VMT with a map of the transportation arteries. This data is from the Federal Highway Administration.

Table 6. 2011 VMT for the Atlanta CBSA Area.

County	**Total 2011 VMT**	**Percent**	**Cumulative %**
Fulton	12,221,928,709	22%	22%
DeKalb	7,644,333,957	13%	35%
Gwinnett	7,421,564,338	13%	48%
Cobb	6,617,102,885	12%	60%
Clayton	2,881,122,333	5%	65%
Henry	2,214,706,881	4%	69%
Cherokee	1,872,284,829	3%	72%
Forsyth	1,689,888,438	3%	75%
Bartow	1,651,438,196	3%	78%
Douglas	1,587,530,332	3%	81%
Coweta	1,459,781,612	3%	83%
Carroll	1,249,251,642	2%	85%
Rockdale	984,757,532	2%	87%
Paulding	940,307,960	2%	89%
Fayette	887,949,158	2%	90%
Newton	869,539,158	2%	92%
Barrow	703,578,903	1%	93%
Walton	697,510,275	1%	94%
Spalding	550,494,314	1%	95%
Morgan	464,799,942	1%	96%
Haralson	343,417,806	1%	97%
Butts	333,055,273	1%	97%
Pickens	315,317,952	1%	98%
Meriwether	296,860,449	1%	98%
Lamar	248,137,330	0%	99%
Dawson	220,141,830	0%	99%
Pike	167,900,073	0%	100%
Jasper	135,538,407	0%	100%
Heard	124,143,180	0%	100%
Total	**56,794,383,694**		

http://www.census.gov/hhes/commuting/data/commuting.html

Figure 8. Overlay of 2011 County-level VMT with Transportation Arteries.



Cherokee, Clayton, Cobb, DeKalb, Fulton, Gwinnett, and Henry Counties had the largest VMT. More than half of all the VMT in the CBSA are in Cobb, DeKalb, Fulton, and Gwinnett. It is reasonable to infer that a substantial amount of the traffic is due to inter-county commuters, mainly from the inner core and highly urbanized counties, most of it adjacent to the monitors with invalid data.

Cherokee, Clayton, Cobb, DeKalb, Douglas, Forsyth, Fulton, Gwinnett, Henry, and Paulding Counties consistently rank highest in direct $PM_{2.5}$/key precursor emissions (VMT and population). Bartow, Clayton, Cobb, Coweta, and Fulton Counties have large $PM_{2.5}$ precursor emissions from stationary sources in the CBSA. Carroll, Newton, and Rockdale Counties are mid-ranked in emissions and mid-ranked for population and VMT. Barrow, Butts, Dawson, Fayette, Haralson, Heard, Jasper, Lamar, Meriwether, Morgan, Pickens, Pike, Spalding, and Walton Counties have relatively low emissions and relatively low VMT/population counts, and lack large singular point source contributors.

Factor 3: Meteorology

The EPA evaluated available meteorological data to determine how meteorological conditions, including, but not limited to, weather, transport patterns, and stagnation conditions, could affect the fate and transport of directly emitted particulate matter and precursor emissions from sources in the area of analysis. The EPA used two primary tools for this assessment: wind roses and kernel density estimation (KDE). When considered in combination with area $PM_{2.5}$ composition and county-level and facility emissions source location information, wind roses and KDE can help to identify nearby areas contributing to violations at violating monitoring sites.

Wind roses are graphic illustrations of the frequency of wind direction and wind speed. Wind direction can indicate the direction from which contributing emissions are transported; wind speed can indicate the force of the wind and thus the distance from which those emissions are transported. The EPA constructed wind roses from hourly observations of wind direction and wind speed using 2009-2012 data from National Weather Service locations archived at the National Climate Data Center.[30] When developing these wind roses, the EPA also used wind observations collected at meteorological sampling stations collocated at air quality monitoring sites, where these data were available. Figure 9 shows wind roses that the EPA generated from data relevant in the Atlanta CBSA area.

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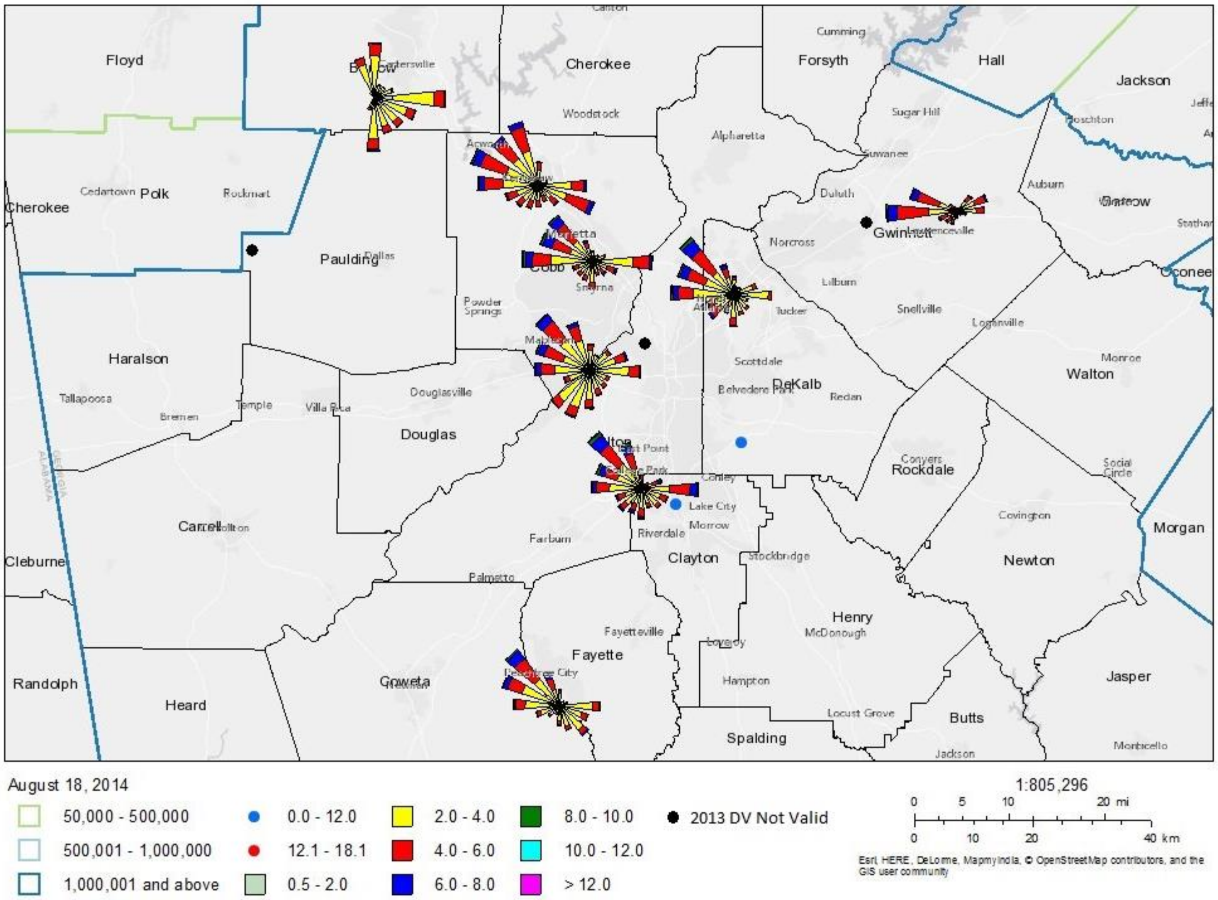
[30] *ftp.ncdc.noaa.gov/pub/data/noaa* or *http://gis.ncdc.noaa.gov/map/viewer/#app=cdo&cfg=cdo&theme=hourly&layers=1&node=gis* Quality assurance of the National Weather Service data is described here: *http://www1.ncdc.noaa.gov/pub/data/inventories/ish-qc.pdf*

Figure 9. Wind Roses in the Atlanta Area of Analysis.



As shown in Figure 9, there is a pattern across the CBSA of predominantly northwest winds and a smaller component of east winds, mostly at mid-level speeds of 4 to 10 meters per second, suggesting that potential emission sources in the north-through-west upwind direction and to a lesser extent in the east upwind direction should be considered for analysis.

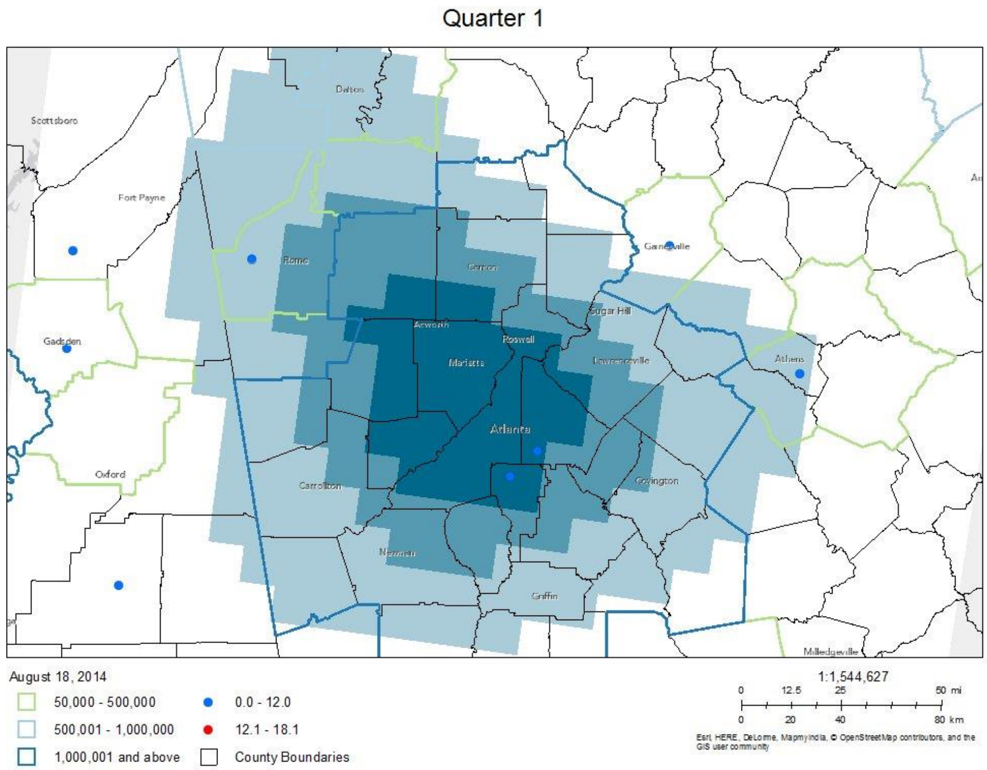
In addition to wind roses, the EPA also generated KDE plots to represent the frequency of HYSPLIT (HYbrid Single-Particle Lagrangian Integrated Trajectory) backward trajectories at monitoring sites with invalid data.[31,32] These KDEs are graphical statistical estimations to determine the density of trajectory endpoints at a particular location represented by a grid cell. The EPA used KDEs to characterize and analyze the collection of individual HYSPLIT backward trajectories.[33] Higher density values, indicated by darker blue colors, indicate a greater frequency of observed trajectory endpoints within a particular grid cell. Figure 10 shows HYSPLIT KDE plots for the Atlanta area summarized by calendar quarter for the 2010-2012 period. The HYSPLIT KDE is weighted in the northwesterly direction, indicating a greater frequency of trajectories passing over grid cells to the northwest, but the plots also indicate a high frequency of trajectories passing over the primary metro-Atlanta counties as well.

[31] In some past initial area designations efforts, the EPA has used HYSPLIT backward trajectories to assist in determining nonattainment area boundaries. A HYSPLIT backward trajectory is usually depicted on a standard map as a single line, representing the centerline of an air parcel's motion, extending in two dimensional (x,y) space from a starting point and regressing backward in time to a point of origin. Backward trajectories may be an appropriate tool to assist in determining an air parcel's point of origin on a day in which a short-term standard, such as an 8-hour standard or a 24-hour standard, was exceeded. However, for an annual standard, such as the 2012 annual $PM_{2.5}$ NAAQS, every trajectory on every day is important. Plotting a mass of individual daily (e.g., 365 individual back trajectories), or more frequent, HYSPLIT trajectories may not be helpful as this process is likely to result in depicting air parcels originating in all directions from the violating monitoring site.

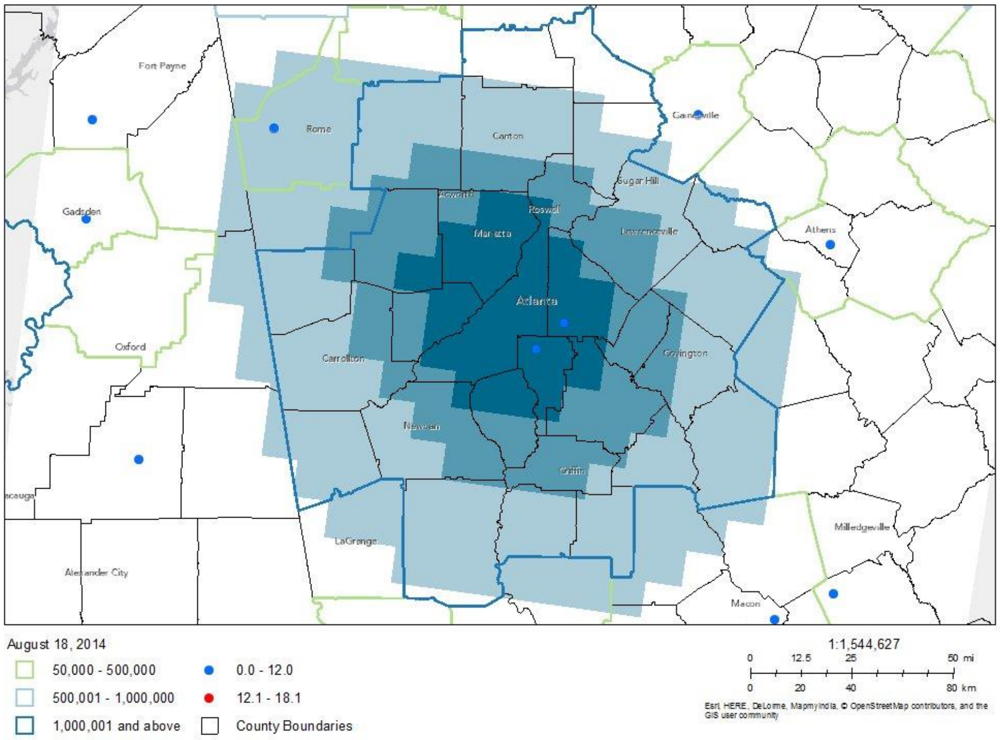
[32] HYSPLIT - Hybrid Single Particle Lagrangian Integrated Trajectory Model, *http://www.arl.noaa.gov/HYSPLIT_info.php*

[33] The KDEs graphically represent the aggregate of HYSPLIT backward trajectories for the years 2010-2012, run every third day (beginning on the first day of monitoring), four times each day, and ending at four endpoint heights.

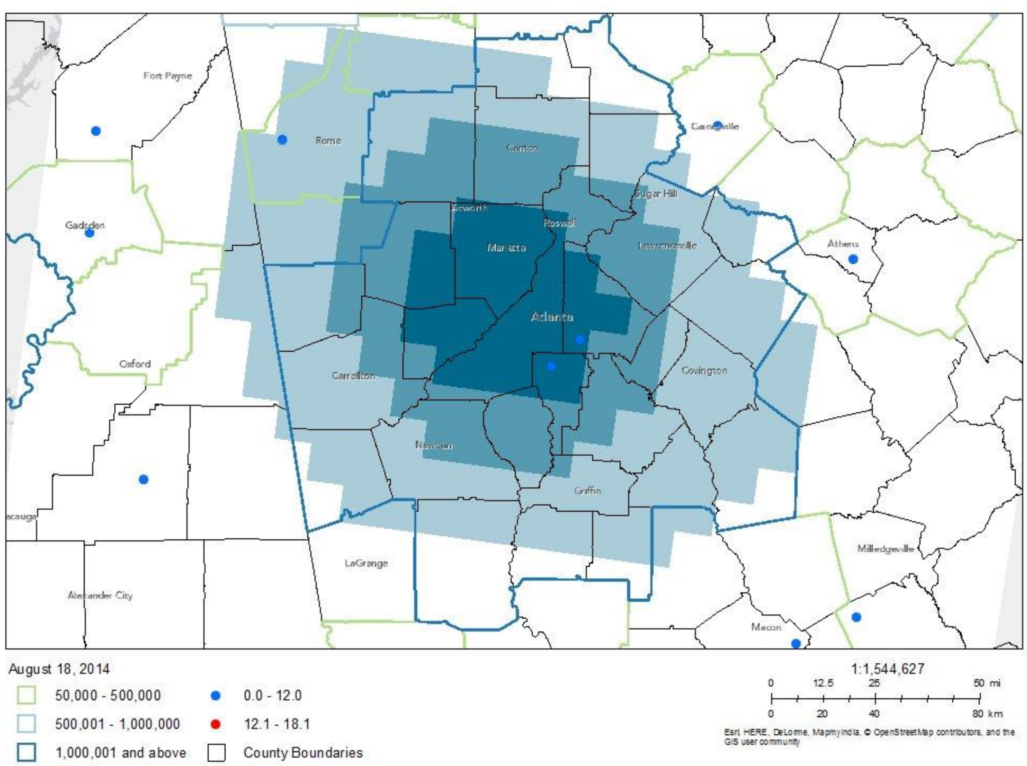
Figure 10. HYSPLIT Kernel Density Estimation Plots for the Atlanta CBSA Area.

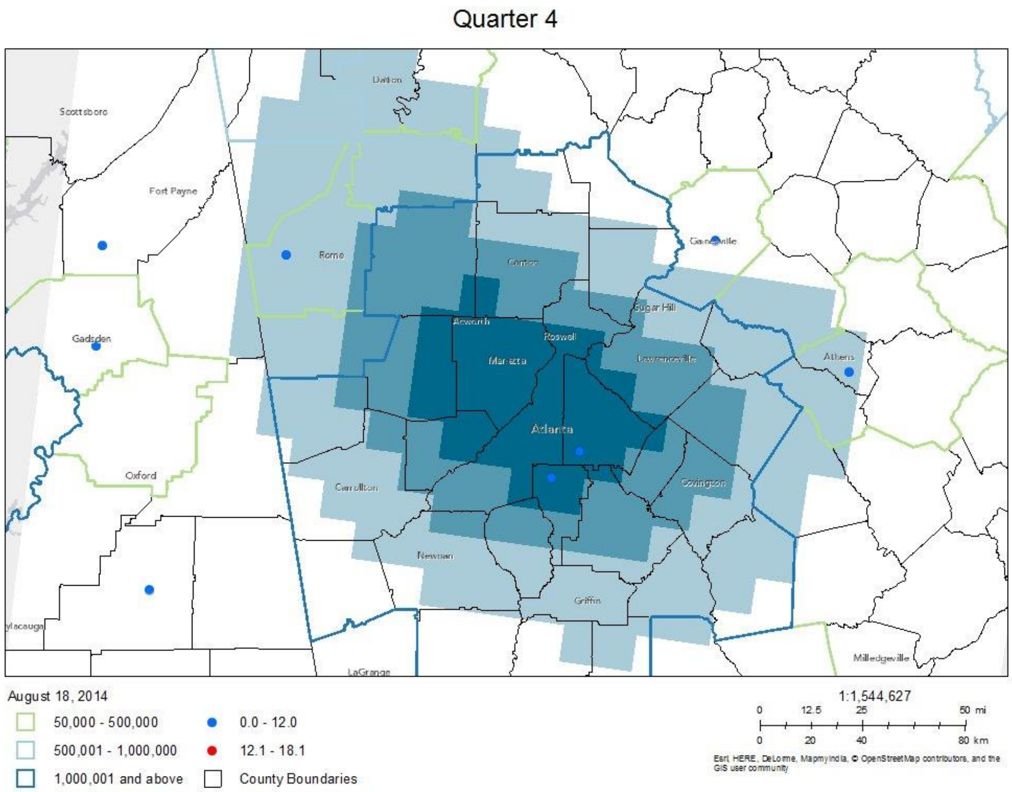


Quarter 2



Quarter 3





In summary, for the monitors with invalid data in the Atlanta Area, the HYPSPLIT KDE plots and wind roses suggest greatest potential contribution of emissions from Clayton, Cobb, DeKalb, Douglas, and Paulding.

Factor 4: Geography/topography

To evaluate the geography/topography factor, the EPA assessed physical features of the area of analysis that might define the airshed and thus affect the formation and distribution of $PM_{2.5}$ concentrations over the area. The Atlanta-Sandy Springs-Roswell CBSA does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional boundaries

In defining the boundaries of the intended Atlanta unclassifiable area, the EPA considered existing jurisdictional boundaries, which can provide easily identifiable and recognized boundaries for purposes of implementing the NAAQS. Existing jurisdictional boundaries often signify the state, local governmental organization with the necessary legal authority for carrying out air quality planning and enforcement functions for the intended area. Examples of such jurisdictional boundaries include existing/prior nonattainment area boundaries for particulate matter, county lines, air district boundaries, township boundaries, areas covered by a metropolitan planning organization, state lines, and Reservation boundaries, if applicable. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, the EPA considered other clearly defined and permanent landmarks or geographic coordinates for purposes of identifying the boundaries of the intended designated areas.

The Atlanta Area has a previously established nonattainment boundary associated with the 1997 annual $PM_{2.5}$ NAAQS. The boundary for the nonattainment area for the 1997 annual $PM_{2.5}$ NAAQS included the entire counties of Barrow, Bartow, Carroll, Cherokee, Clayton, Cobb, Coweta, Dekalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Hall, Henry, Newton, Paulding, Rockdale, Spalding, Walton, and partial counties of Heard and Putnam

Conclusion for the EPA's Intended Atlanta Unclassifiable Area

Speciation and urban increment data show high OM and sulfur content. Organic Compounds and SOx components are the most important portions of the total $PM_{2.5}$ mass throughout the year. Organic Compounds are predominately attributed to biogenic emissions sources. The predominant source of SOx and PM emission are point sources. VMT has slightly decreased when compared to the 1997 designation.

Based on the assessment of factors described above, both individually and in combination, the EPA has preliminarily concluded that the following counties of Georgia should be included as part of the Atlanta unclassifiable area because there are incomplete design values with the surrounding monitors and based on analysis of the five factors the EPA concludes that these areas could contribute to potential violations: Bartow, Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Forsyth, Fulton, Gwinnett, Henry, and Paulding Counties. These counties were also included in the Atlanta nonattainment area for the 1997 annual $PM_{2.5}$ NAAQS.

Bartow County – This nearby county does not have a monitoring site, but has the second highest $PM_{2.5}$ emissions in the CBSA with 2,147 tpy and third highest SO_2 emissions in the CBSA with 6,716 tpy. There are two point sources with significant source of SO_2 emissions- Ga Power Company - Plant Bowen (5,889 tpy), and Chemical Products Corporation (557 tpy). Predominant winds blow in the direction from Bartow County toward the monitors with invalid data.

Cherokee County – This nearby county does not have a monitoring site, but has the fifth largest population growth, 51 percent increase since 2000. The County has the seventh largest VMT (over 1.8 billion miles).

Clayton County – This nearby county has an attaining monitoring site, but the EPA has preliminarily concluded that the County contributes to the particulate matter concentrations at monitors with invalid data in the Atlanta Area through emissions from its point source (Hartsfield-Jackson International Airport).

Cobb County – This county invalid data for 2011-2013. Additionally, Cobb County has the third highest $PM_{2.5}$ emissions in the CBSA with 1,859 tpy and the second highest SO_2 emissions in the CBSA with 19,127 tpy. There are two point sources with significant source of SO_2 emissions- Ga Power Company - Plant McDonough/Atkinson (18,307 tpy), and Caraustar Industries Inc (564 tpy). Predominant winds blow in the direction from Cobb County toward monitors with invalid data.

Coweta County – This nearby county does not have a monitoring site, but has the highest SO_2 emissions in the CBSA with 47,614 tpy, and fourth highest $PM_{2.5}$ emissions in the CBSA with 1,615 tpy. There is one point source with significant source of SO_2 and $PM_{2.5}$ emissions- Ga Power Company - Plant Yates (47,530 and 626 tpy, respectively). The EPA has preliminarily determined that Coweta be included primarily due to the contribution of SO_2 emissions from this large point source.

DeKalb County – This nearby county has a valid attaining design value. However, the EPA has preliminarily concluded that the County contributes to the particulate matter concentrations to monitors with invalid data through emissions from non-point sources (e.g., area sources) and from mobile source emissions. The County has the seventh highest level of $PM_{2.5}$ emissions in the CBSA with 1,348 tpy and second largest VMT (7.6 billion miles). The County is highly urbanized and has 13 percent of the CBSA population, and is 12 miles from the highest reading invalid monitor.

Douglas County – This nearby county does not have a monitoring site, but the EPA has preliminarily concluded that the County contributes to the particulate matter concentrations to monitors with invalid data through emissions from non-point sources (e.g., area sources) and from mobile source emissions. The County is the seventh fastest population growth (43 percent). Predominant winds blow in the direction from Douglas County toward the highest reading invalid monitor.

Forsyth County – This nearby county does not have a monitoring site, but the EPA has preliminarily concluded that the County contributes to the particulate matter concentrations in violation of the 2012 annual $PM_{2.5}$ NAAQS through emissions from non-point sources (e.g., area sources) and from mobile source emissions. The County is the fastest population growth (79 percent) and eighth largest VMT (over 1.6 billion miles).

Fulton County – This county invalid data for 2011-2013. Plant McDonough/Atkinson power plant is less than three miles from the Fulton County monitor. In addition, there is a major rail yard within a mile of the monitor. The County has the highest $PM_{2.5}$ emissions with 2,614 tpy. There is one moderate point source- Owens Brockway Glass Container Inc with 84 tpy of SO_2 emission. Predominant winds blow in the direction from Fulton County toward monitors with invalid data.

Gwinnett County – This county invalid data for 2011-2013. Additionally, Gwinnett County has the sixth highest level of $PM_{2.5}$ emissions in the CBSA with 1,504 tpy and third largest VMT (7.4 billion miles). The County is highly urbanized and has 15 percent of the CBSA population.

Henry County – This nearby county does not have a monitoring site, but the EPA has preliminarily concluded that the County contributes to the particulate matter concentrations in violation of the 2012 annual $PM_{2.5}$ NAAQS through emissions from non-point sources (e.g., area sources) and from mobile source emissions. The County has the third largest population growth (72 percent), sixth largest VMT (2.2 billion miles). The County is highly urbanized as part of the Atlanta metropolitan area.

Paulding County – This county invalid data for 2011-2013. Additionally, Paulding County has the second largest population growth (74 percent). The County is highly urbanized as part of the Atlanta metropolitan area. Predominant winds blow from the direction of Paulding County toward monitors with invalid data.

The EPA has made the preliminary determination that eight whole counties and two partial counties that were included in the 1997 $PM_{2.5}$ nonattainment area should not be included in the intended unclassifiable boundary for the 2012 $PM_{2.5}$ NAAQS. Discussed as follows, these counties include: Barrow, Carroll, Fayette, Hall, Heard (partial), Newton, Putnam (partial), Rockdale, Spalding and Walton.

Barrow County – There are low emissions; low population; low VMT. SO_2 and PM emissions have decreased 80 percent and 50 percent, respectively, since 2001. The County is mostly rural, no major emission sources and is 44 miles away from the highest reading monitor.

Carroll County – There are low emissions; moderate population growth; moderate VMT and commuters. SO_2 and PM emissions have decreased 88 percent and 75 percent, respectively since 2001. The County is predominately rural, no major emission sources and is 27 miles away from the highest reading monitor.

Fayette County – There are low emissions; moderate population growth; moderate VMT and commuters in this county. SO_2 and PM emissions have decreased 67 percent and 60 percent, respectively, since 2001. The County is partially urbanized, no major emission sources and it is 40 miles away from the highest reading monitor with invalid data.

Hall County – This County has a valid attaining design value for 2011-2013 of 9.5 µg/m^3 that is well below the 2012 $PM_{2.5}$ NAAQS. An analysis of the meteorology indicates a very low frequency of winds blowing from Hall County toward the monitors with invalid data. Also, when Hall County was included in the Atlanta nonattainment area for the 1997 $PM_{2.5}$ NAAQS, the County had a design value of 14.9 µg/m^3, which was just below the standard. Hall County was also recommended by the State for inclusion in that nonattainment area designation.

Heard County (partial) – This partial county was included in the previous nonattainment area in 2005 because of emissions from Plant Wansley. Plant Wansley had SO_2 scrubber controls installed in early 2008, 96 percent SO_2 reduction; low population; and low VMT.

Newton County – There are low emissions; moderate VMT and low commuters. SO_2 and PM emissions have decreased 71 percent and 42 percent, respectively, since 2001. The County is predominately rural, no major emission sources and is 37 miles away from the highest reading monitor.

Putnam County (partial) – Plant Branch satellite boundary. An analysis of the meteorology indicates a very low frequency of winds blowing from the facility toward the monitors with invalid data. The plant is 78 miles east of the highest reading monitor. Emissions high but scaled down operations have decreased emissions the past several years.

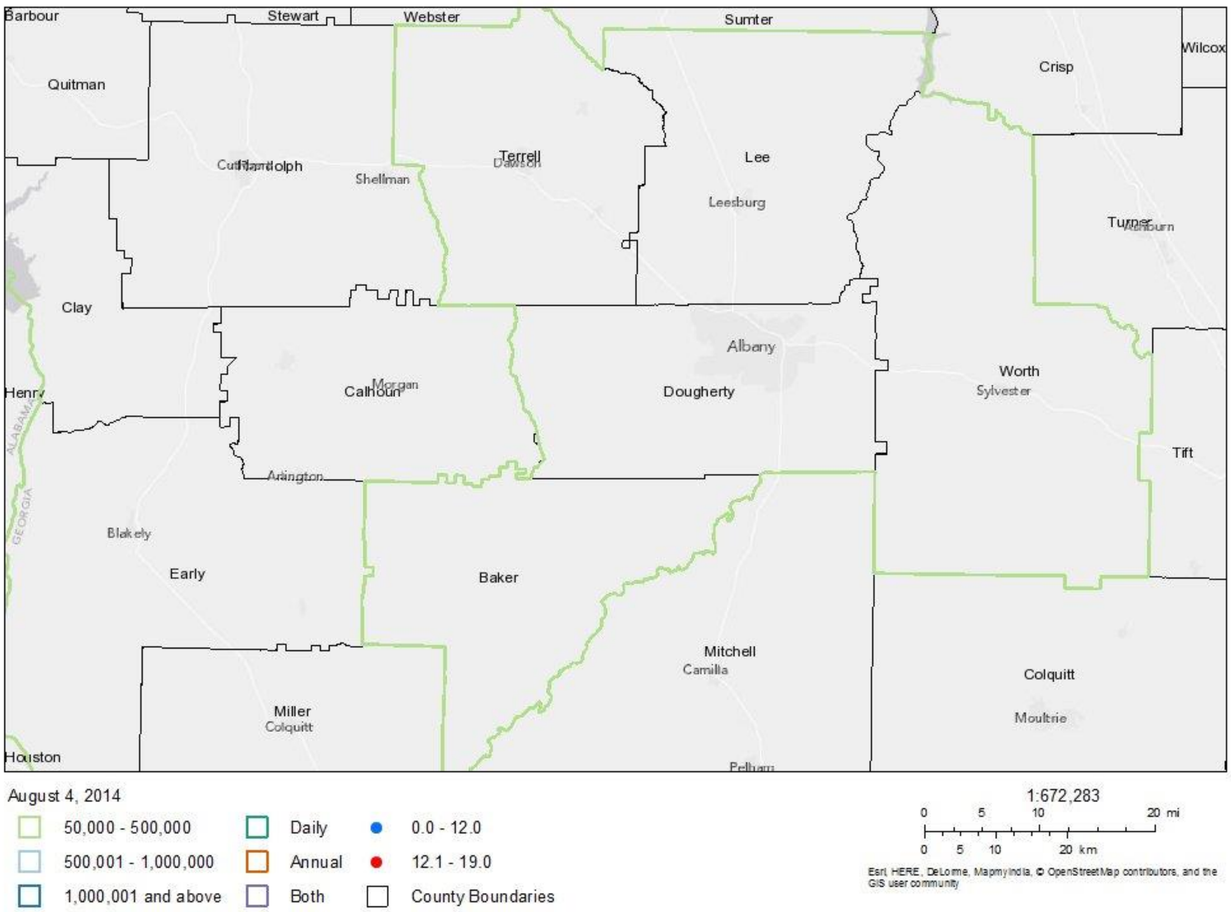
Rockdale County – There are relatively low emissions; moderate population growth; moderate VMT and low commuters. SO_2 and PM emissions have decreased 68 percent and 67 percent, respectively, since 2001. The County is partially urbanized, no major emission sources and is 26 miles away from the highest reading invalid monitor.

Spalding County – There are low emissions; low population; and low VMT. SO_2 and PM emissions have decreased 80 percent and 49 percent, respectively, since 2001. The county is mostly rural, no major emission sources and is 39 miles away from the highest reading invalid monitor.

Walton County – There are low emissions; low population; and low VMT. SO_2 and PM emissions have decreased 86 percent and 48 percent, respectively, since 2001. The County is mostly rural, no major emission sources and it is 40 miles away from the highest reading monitor with invalid data and is adjacent to DeKalb County which has a valid attaining design value for 2011-2013.

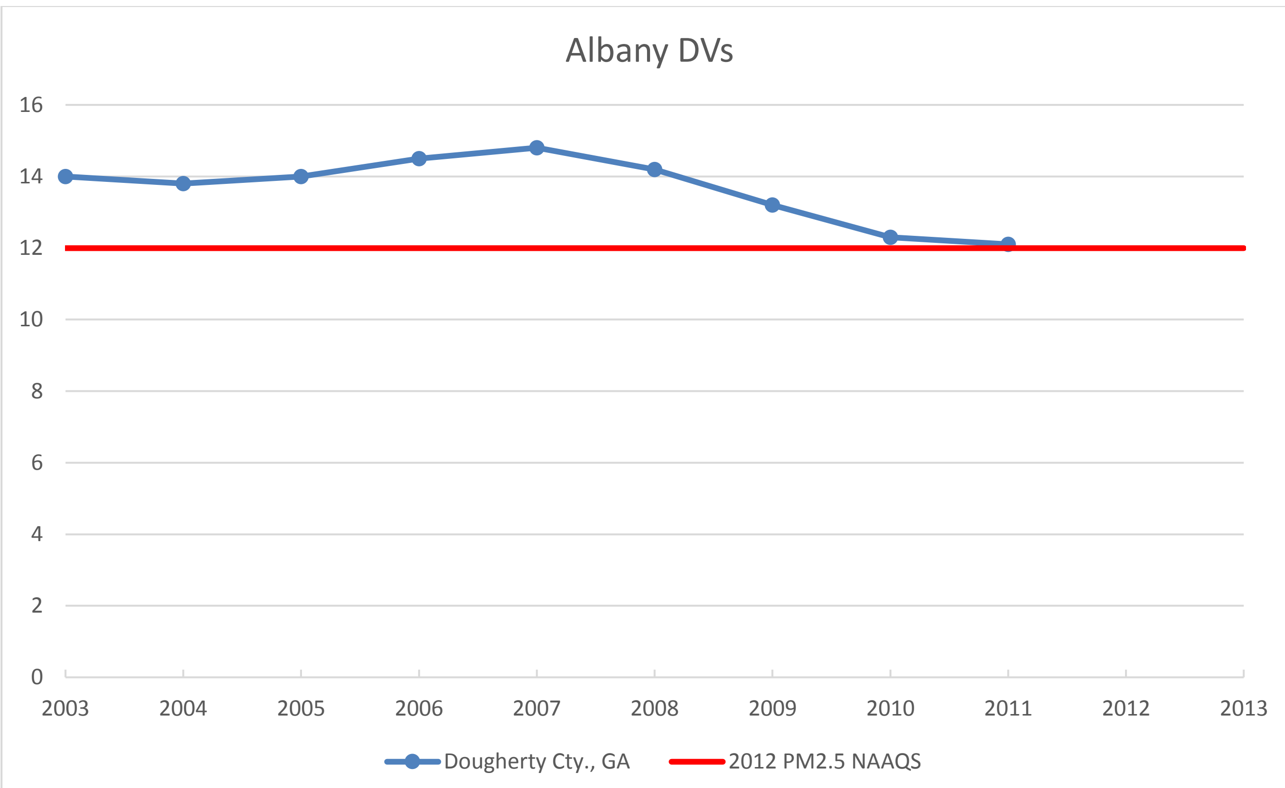
Georgia/Albany Area
Albany Core Based Statistical Area (CBSA)

Figure 1: Map of the Albany, Georgia Area.



Factor 1: Air Quality Data

All data collected during the year are important when determining contributions to an annual standard such as the 2012 annual $PM_{2.5}$ NAAQS. Compliance with an annual NAAQS depends on monitor readings throughout the year, including days with monitored ambient concentrations below the level of the NAAQS. For the 2012 annual $PM_{2.5}$ NAAQS, the annual mean is calculated as the mean of quarterly means. A high quarter can drive the mean for an entire year, which, in turn, can drive an elevated 3-year design value. Although all data are important, seasonal or episodic emissions can provide insight as to relative contributors to measured $PM_{2.5}$ concentrations. For these reasons, for the Factor 1 air quality analysis, the EPA assessed and characterized air quality at, and in the proximity of, the monitoring site locations first, by evaluating trends and the spatial extent of measured concentrations at monitors in the area of analysis, and then, by identifying the conditions most associated with high average concentration levels of $PM_{2.5}$ mass in the area of analysis. There is currently not enough verifiable data from the monitor in the Albany Area to obtain an accurate determination of air quality in the Albany CBSA. As noted in an August 8, 2014, memorandum from Gregg M. Worley, Chief of Region 4's Air Toxics & Monitoring Branch, to R. Scott Davis, Chief of Region 4's Air Planning Branch, the Albany area had less than 50 percent data completeness in the first quarter of 2011 and, therefore, does not meet the data handling requirements of 40 CFR Part 58, Appendix N, 4.1(c)(ii), for conducting data substitution during the period 2011 through 2013. However, the chart below shows a trend for the monitoring data that was available for this area.



Factor 2: Emissions and emissions-related data

In this designations process, for each area with a violating monitoring site or for where there may be uncertainty about the data at a monitoring site, the EPA evaluated the emissions data from nearby areas using emissions related data for the relevant counties to assess each county's potential contribution to $PM_{2.5}$ concentrations at the monitoring site in the area under evaluation. The EPA examined emissions of identified sources or source categories of direct $PM_{2.5}$, the major components of direct $PM_{2.5}$ (organic mass, elemental carbon, crustal material (and/or individual trace metal compounds)), primary nitrate and primary sulfate, and precursor gaseous pollutants (e.g., sulfur dioxide (SO_2), nitrogen oxides (NOx), total volatile organic compounds (VOC), and ammonia (NH_3)). The EPA also considered the distance of those sources of emissions from the monitoring site. While direct $PM_{2.5}$ emissions and its major carbonaceous components are generally associated with sources near $PM_{2.5}$ monitoring sites, the gaseous precursors tend to have a more regional influence (although the EPA is mindful of the potential local NOx and VOC emissions contributions to $PM_{2.5}$ from mobile and stationary sources) and transport from neighboring areas can contribute to higher $PM_{2.5}$ levels at the monitoring sites.

The Albany Area has three major point sources, all of which are in Dougherty County: MillerCoors, LLC, Procter & Gamble Paper Products Co., and GA Power Company Plant Mitchell. Other sources include county level emissions from non-point sources, nonroad mobile, on-road mobile, fires and local traffic. As can be seen in Table 1a below, Dougherty County has the largest SO_2 emissions (1703 tpy) and NOx emissions (4962 tpy) of any of the counties in the CBSA and a large amount of direct PM2.5 emissions (2183 tpy). The highest category of emissions from the other counties in the CBSA are total direct $PM_{2.5}$, with Worth County having the highest level at (3027 tpy). A further evaluation of the direct $PM_{2.5}$ emissions for Baker, Lee, Terrell and Worth counties indicates that the majority of these emissions are contributed by fires, and most of the fire emissions are from prescribed fires. Summary information on emissions and population density can be found in the tables below.

Table 1a. County-Level Emissions of Directly Emitted $PM_{2.5}$ and Precursors (tons/year)

County	Total NH_3	Total NOx	Total Direct $PM_{2.5}$	Total SO_2	Total VOC	Total
Dougherty	302	4,962	2,183	1,703	4,157	13,307
Worth	829	1,625	3,027	145	2,592	8,218
Lee	340	1,246	1,718	116	1,708	5,128
Baker	560	704	1,958	138	1,458	4,818
Terrell	423	933	1,741	105	1,451	4,653

Table 1b. County-Level Emissions for Components of Directly Emitted $PM_{2.5}$ (tons/year)

County	POM	EC	PSO4	PNO3	Pcrustal	Residual	Total Direct
Worth	1,919	287	22	20	343	436	3,027
Dougherty	1,453	236	58	17	148	271	2,183
Baker	1,460	196	8	18	135	142	1,959
Terrell	1,174	171	10	13	148	225	1,741
Lee	1,187	175	10	14	148	185	1,719

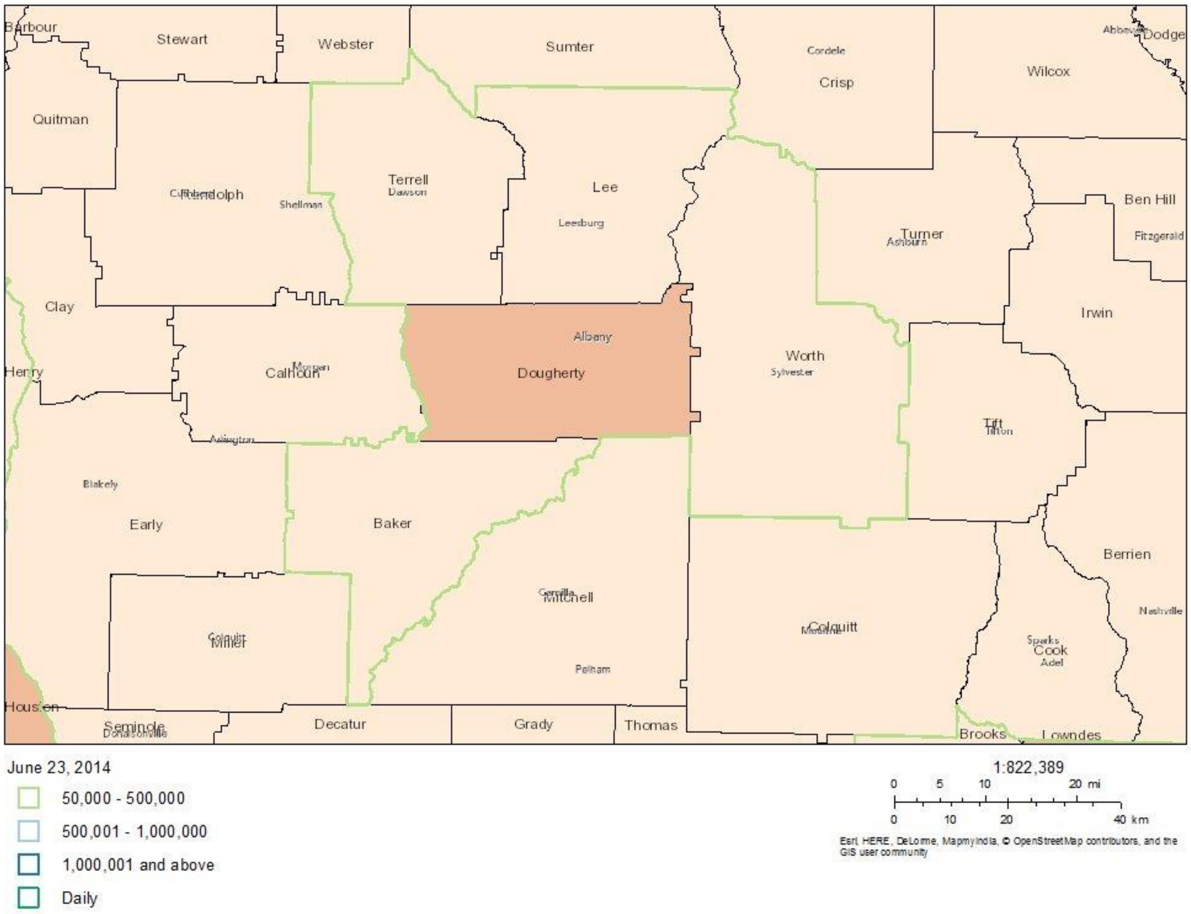
Table 2. 2011 Vehicle Miles Travelled for the Albany Area.

County	Total 2011 VMT	Percent	Cumulative %
Dougherty	955,647,015	54	54
Worth	310,324,496	18	72
Lee	277,863,696	16	88
Terrell	156,955,366	9	97
Baker	58,629,183	3	100
Total	**1,759,419,756**		

Table 3. Population Growth and Population Density.

County	Population 2000	Population 2010	% Change from 2000	Land Area (Sq. Miles)	Population Density (per Sq. Mile)	%	Cumulative %
Dougherty	96,065	94,755	-1	330	287	60	60
Lee	24,757	28,440	15	356	80	16	76
Worth	21,967	21,626	-2	570	38	14	90
Terrell	10,970	9,322	-15	335	28	8	98
Baker	4,047	3,437	-16	343	10	2	100
Total	**157,806**	**157,580**					

Figure 2. 2010 County-Level Population in the Area of Analysis for the Albany Area.



Factor 3: Meteorology/Transport Patterns

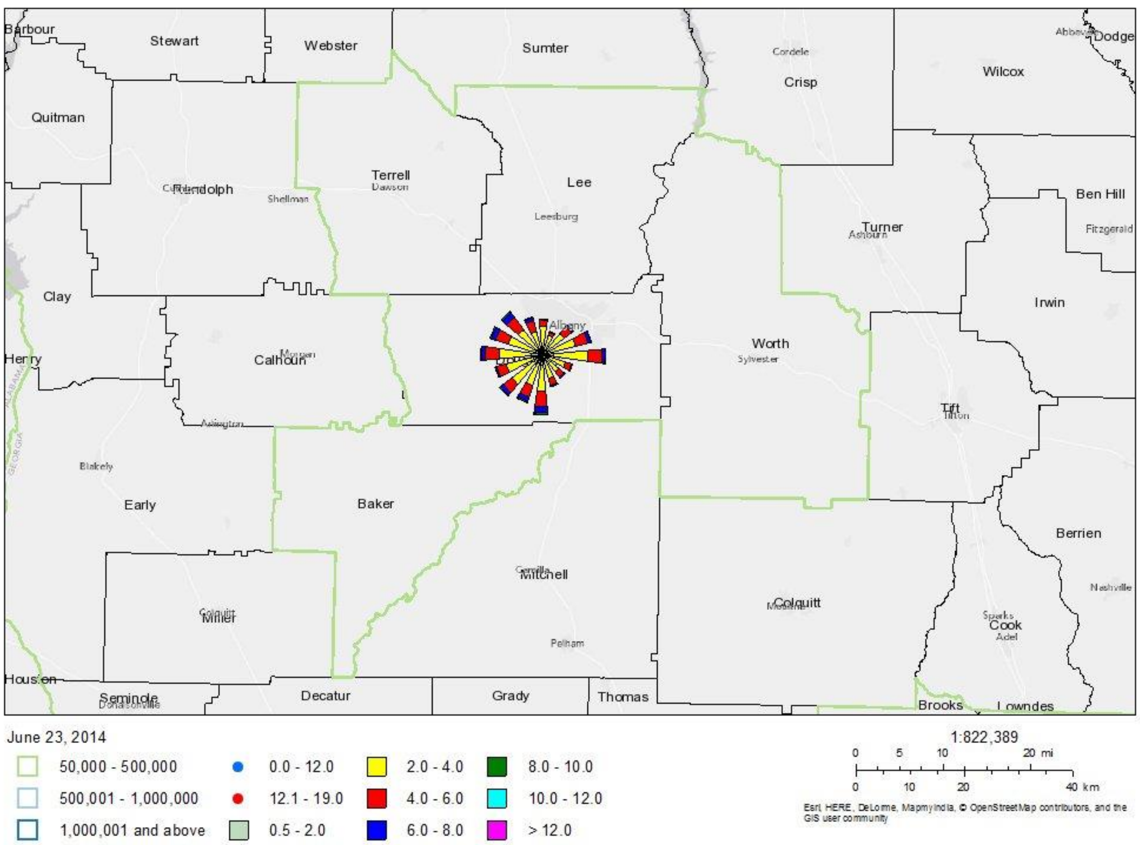
The EPA evaluated available meteorological data to determine how meteorological conditions, including, but not limited to, weather, transport patterns, and stagnation conditions, could affect the fate and transport of directly emitted particulate matter and precursor emissions from sources in the area of analysis. The EPA used wind roses as the primary tool for this assessment. When considered in combination with area $PM_{2.5}$ composition and county-level and facility emissions source location information, wind roses can help to identify nearby areas contributing to violations at violating monitoring sites.

Wind roses are graphic illustrations of the frequency of wind direction and wind speed. Wind direction can indicate the direction from which contributing emissions are transported; wind speed can indicate the force of the wind and thus the distance from which those emissions are transported. The EPA constructed wind roses from hourly observations of wind direction and wind speed using 2009-2012 data from National Weather Service locations archived at the

National Climate Data Center.[34] When developing these wind roses, the EPA also used wind observations collected at meteorological sampling stations collocated at air quality monitoring sites, where these data were available. Figure 3 shows wind rose that the EPA generated from data relevant in the Albany Area.

As shown in Figure 3, there is a pattern across the CBSA of predominantly south to northwest winds and a smaller component of east winds, mostly at mid-level speeds of 2 to 6 meters per second, suggesting that potential emission sources in the south-through-northwest upwind direction and the east upwind direction should be considered for analysis.

Figure 3. Wind Rose in the Area of Analysis for the Albany Area



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[34] *ftp.ncdc.noaa.gov/pub/data/noaa* or *http://gis.ncdc.noaa.gov/map/viewer/#app=cdo&cfg=cdo&theme=hourly&layers=1&node=gis* Quality assurance of the National Weather Service data is described here: *http://www1.ncdc.noaa.gov/pub/data/inventories/ish-qc.pdf*

For the Albany monitor with invalid 2011-2013 data, the wind rose data support greatest potential contributions from Dougherty, Mitchell, Baker, Morgan, Terrell, and Worth counties. Lee County is directly north of the monitor.

Factor 4: Geography/Topography

The Albany Area does not have any geographical or topographical barriers significantly limiting air pollution transport from the surrounding counties.

Factor 5: Jurisdictional boundaries

In defining the boundary of the intended Albany unclassifiable area, the EPA considered existing jurisdictional boundaries, which can provide easily identifiable and recognized boundaries for purposes of implementing the NAAQS. Existing jurisdictional boundaries often signify the state, and local governmental organization with the necessary legal authority for carrying out air quality planning and enforcement functions for the intended area. Examples of such jurisdictional boundaries include existing/prior nonattainment area boundaries for particulate matter, county lines, air district boundaries, township boundaries, areas covered by a metropolitan planning organization, state lines, and Reservation boundaries, if applicable. Where existing jurisdictional boundaries were not adequate or appropriate to describe the area, the EPA considered other clearly defined and permanent landmarks or geographic coordinates for purposes of identifying the boundaries of the intended designated areas.

The Albany monitor is in Dougherty County, which is part of the Albany CBSA along with Baker, Lee, Terrell and Worth counties. The EPA uses the CBSA, where there is one, as a starting point for the contribution analysis because those areas are nearby for purposes of the $PM_{2.5}$ NAAQS. Figure 1 above is a map of the area with the adjacent CBSA counties included.

Conclusion

The EPA intends to designate Dougherty County in the Albany Area as “unclassifiable” for the 2012 annual $PM_{2.5}$ NAAQS because current data from monitoring sites are incomplete. For this reason, the EPA cannot determine based on available information whether the area is meeting or not meeting the NAAQS.

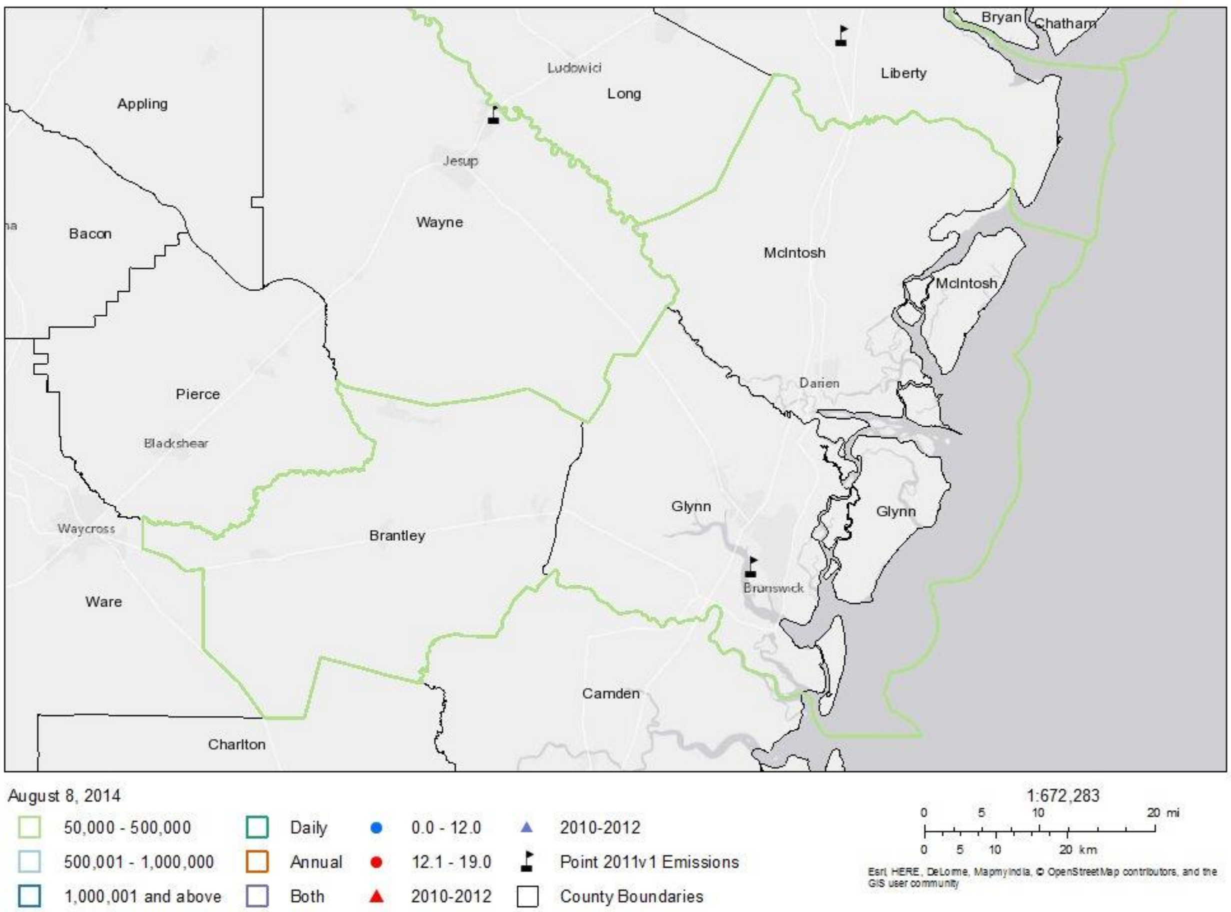
Based upon an evaluation of the five factors discussed above, EPA has determined that the other counties in the CBSA are not likely to be contributing to any potential violation of the annual $PM_{2.5}$ NAAQS and do not need to be included in the area being designated as unclassifiable. The population, VMT and emissions in Baker, Lee, Terrell and Worth Counties are relatively low when compared to Dougherty County. The following discussion further explains EPA's rationale for this conclusion.

As indicated in the Factor 2 Emissions discussion above, the highest category of emissions from the other counties in the CBSA are direct $PM_{2.5}$. In general, the carbonaceous fractions of direct emissions of $PM_{2.5}$ (i.e., particulate organic carbon and particulate elemental carbon) are an important "local" contributor to ambient $PM_{2.5}$ concentrations. In the southern parts of Georgia and some nearby areas of southeast Alabama and northern Florida, several counties show large amounts of direct $PM_{2.5}$ emissions. A large portion of these emission are associated with prescribed and managed fires which can be an annual activity. Although these emission totals are higher than direct $PM_{2.5}$ emissions in other parts of the country, emissions associated with such fires are different than emissions from stationary and mobile sources. In general, these fires are only allowed to occur during conditions and times of the year that minimize their air quality impact and therefore these emissions effectively have lower ambient $PM_{2.5}$ potential than their total tons imply. Most prescribed fires are low-intensity fires that are performed in accordance with burn permits issued by the Georgia Forestry Commission and are limited to "good smoke dispersion conditions." Therefore, the potential for large quantities of smoke (direct $PM_{2.5}$ emissions) to be transported long distances and to contribute to potential violations at the monitor in Albany is low.

In addition, the potential for violations of an air quality standard also depends on the regional and area-wide background of $PM_{2.5}$ on top of which the local emission contributions are added. In Southern GA and adjacent areas, the "regional" contributions of $PM_{2.5}$ and corresponding SO_2/ NOx emission sources are lower than other areas of the Eastern US whose monitoring data currently show violations of the 2012 $PM_{2.5}$ NAAQS. This further explains why the relatively large number of total tons of directly emitted $PM_{2.5}$ in these counties by itself is not a sufficient reason to consider those counties as a likely contributor to a violation of the annual $PM_{2.5}$ NAAQS.

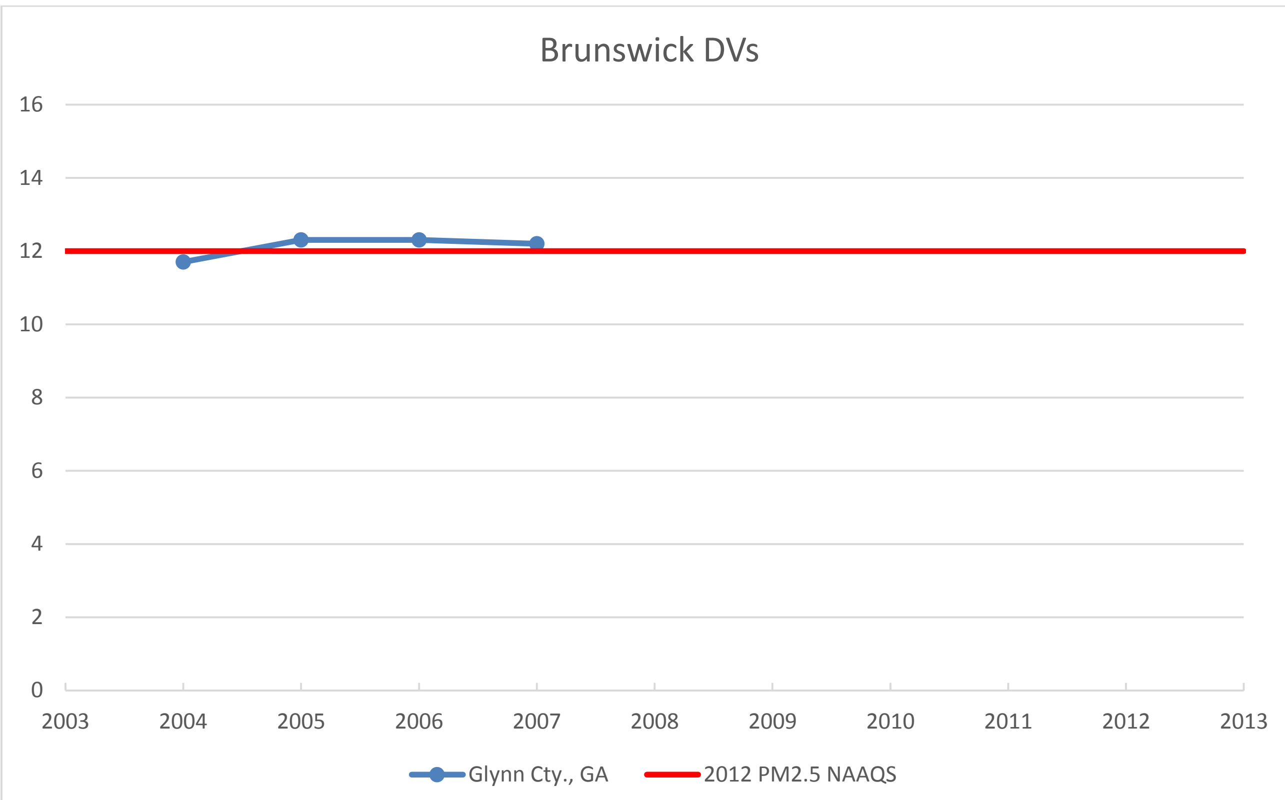
Georgia/Brunswick Area
Brunswick Core Based Statistical Area (CBSA)

Figure 1: Map of the Brunswick, Georgia Area



Factor 1: Air Quality Data

All data collected during the year are important when determining contributions to an annual standard such as the 2012 annual $PM_{2.5}$ NAAQS. Compliance with an annual NAAQS depends on monitor readings throughout the year, including days with monitored ambient concentrations below the level of the NAAQS. For the 2012 annual $PM_{2.5}$ NAAQS, the annual mean is calculated as the mean of quarterly means. A high quarter can drive the mean for an entire year, which, in turn, can drive an elevated 3-year design value. Although all data are important, seasonal or episodic emissions can provide insight as to relative contributors to measured $PM_{2.5}$ concentrations. For these reasons, for the Factor 1 air quality analysis, the EPA assessed and characterized air quality at, and in the proximity of, the violating monitoring site locations first, by evaluating trends and the spatial extent of measured concentrations at monitors in the area of analysis, and then, by identifying the conditions most associated with high average concentration levels of $PM_{2.5}$ mass in the area of analysis. There is currently not enough verifiable data from the monitor in the Brunswick Area to obtain an accurate determination of Brunswick's air quality. As noted in an August 8, 2014, memorandum from Gregg M. Worley, Chief of Region 4's Air Toxics & Monitoring Branch, to R. Scott Davis, Chief of Region 4's Air Planning Branch, the Brunswick area had less than 50 percent data completeness in the first quarter of 2011 and, therefore, does not meet the data handling requirements of 40 CFR Part 58, Appendix N, 4.1(c)(ii), for conducting data substitution during the period 2011 through 2013. However, the chart below shows a trend for the monitoring data that was available for this area.



Factor 2: Emissions and emissions-related data

In this designations process, for each area with a violating monitoring site or for where there may be uncertainty about the data at a monitoring site, the EPA evaluated the emissions data from nearby areas using emissions-related data for the relevant counties to assess each county's potential contribution to $PM_{2.5}$ concentrations at the monitoring site in the area under evaluation. The EPA examined emissions of identified sources or source categories of direct $PM_{2.5}$, the major components of direct $PM_{2.5}$ (organic mass, elemental carbon, crustal material (and/or individual trace metal compounds)), primary nitrate and primary sulfate, and precursor gaseous pollutants (e.g., sulfur dioxide (SO_2), nitrogen oxides (NOx), total volatile organic compounds (VOC), and ammonia (NH_3)). The EPA also considered the distance of those sources of emissions from the monitoring site. While direct $PM_{2.5}$ emissions and its major carbonaceous components are generally associated with sources near $PM_{2.5}$ monitoring sites, the gaseous precursors tend to have a more regional influence (although the EPA is mindful of the potential local NOx and VOC emissions contributions to $PM_{2.5}$ from mobile and stationary sources) and transport from neighboring areas can contribute to higher $PM_{2.5}$ levels at the monitoring sites.

The City of Brunswick, in Glynn County, Georgia, has one major point source – Brunswick Cellulose Inc. Other sources include county level emissions from non-point sources, nonroad mobile, on-road mobile, fires and local traffic. Brantley and McIntosh counties are the other counties in the Brunswick CBSA. The emissions in these counties are much less in comparison to Glynn County. Additionally, most of the population in the CBSA is concentrated in Glynn County. Summary information on emissions and population density can be found in the tables below.

Table 1a. County-Level Emissions of Directly Emitted $PM_{2.5}$ and Precursors (tons/year)

County	Total NH_3	Total NOx	Total Direct $PM_{2.5}$	Total SO_2	Total VOC	Total
Glynn	174	5,983	1,013	647	5,636	13,453
Brantley	216	746	686	41	822	2,521
McIntosh	47	2,219	373	18	2,100	4,757

Table 1b. County-Level Emissions for Components of Directly Emitted $PM_{2.5}$ (tons/year)

County	POM	EC	PSO4	PNO3	Pcrustal	Residual	Total Direct
Glynn	264	101	180	3	166	300	1,014
Brantley	456	73	8	2	43	105	687
McIntosh	159	59	4	1	67	83	373

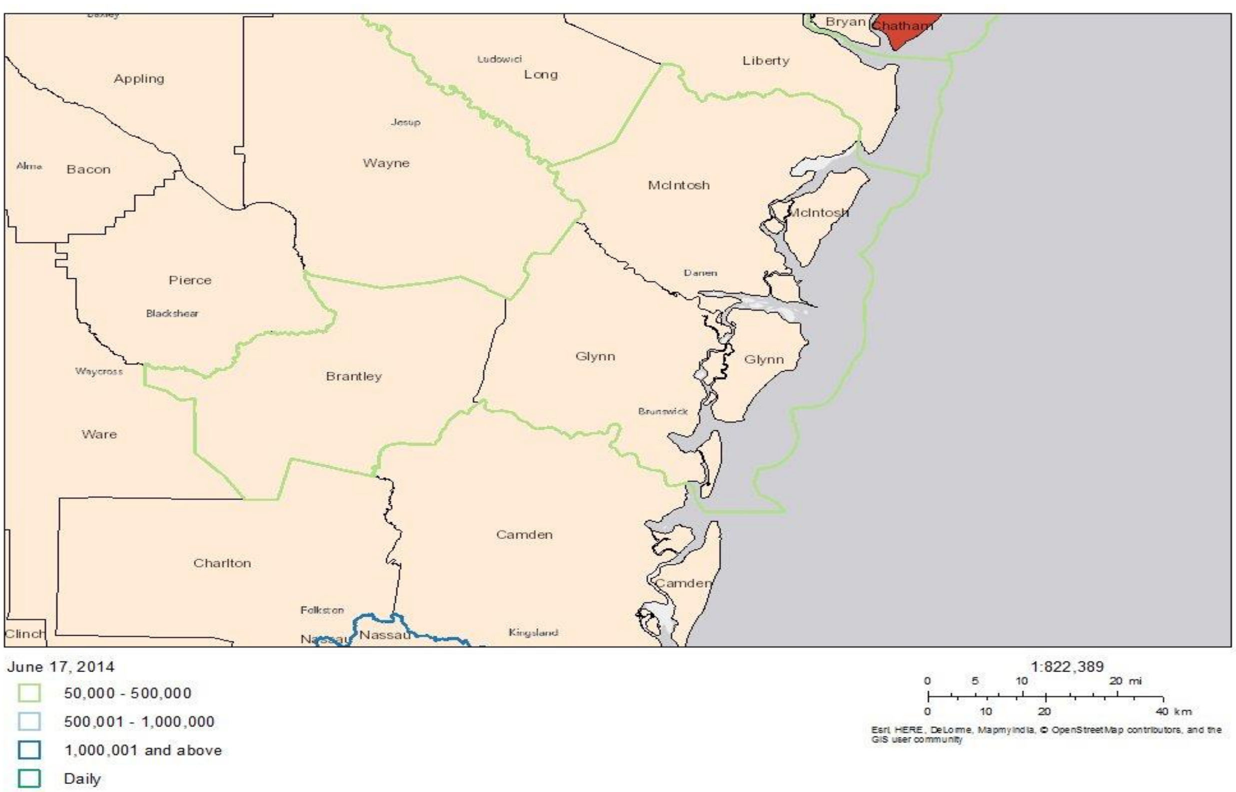
Table 2. 2011 Vehicle Miles Travelled for the Brunswick Area.

County	Total 2011 VMT	Percent	Cumulative %
Glynn	1,046,335,280	63	63
McIntosh, GA	441,009,608	27	90
Brantley, GA	166,580,562	10	100
Total	**1,653,925,450**		

Table 3. Population Growth and Population Density.

County	Populatio n 2000	Popul ation 2010	% Change from 2000	Land Area (Sq. Miles)	Population Density (per Sq. Mile)	%	Cumulative %
Glynn	67,568	79,863	18	422	189	71	71
Brantley	14,629	18,487	26	444	42	16	87
McIntosh	10,847	14,287	32	433	33	13	100
Total	**93,044**	**112,63**					

Figure 2. 2010 County-Level Population in the Area of Analysis for the Brunswick Area.



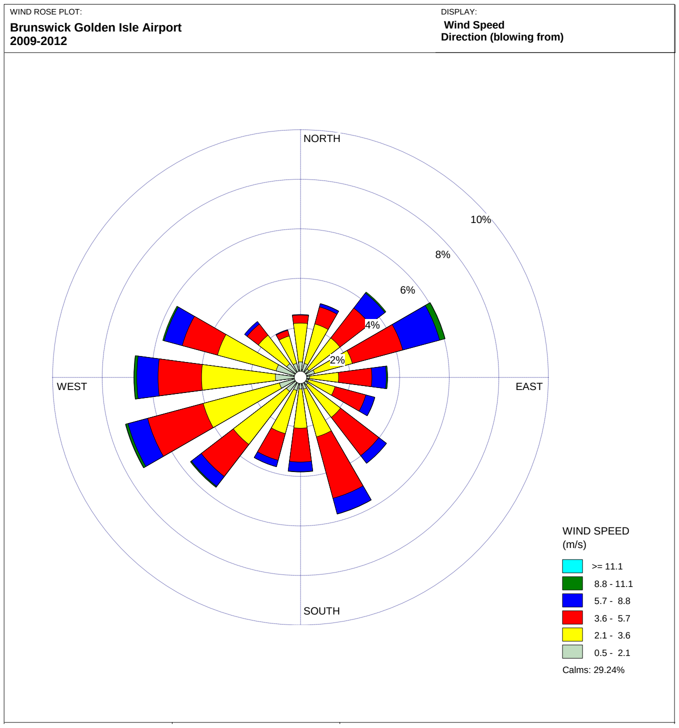
Factor 3: Meteorology/Transport Patterns

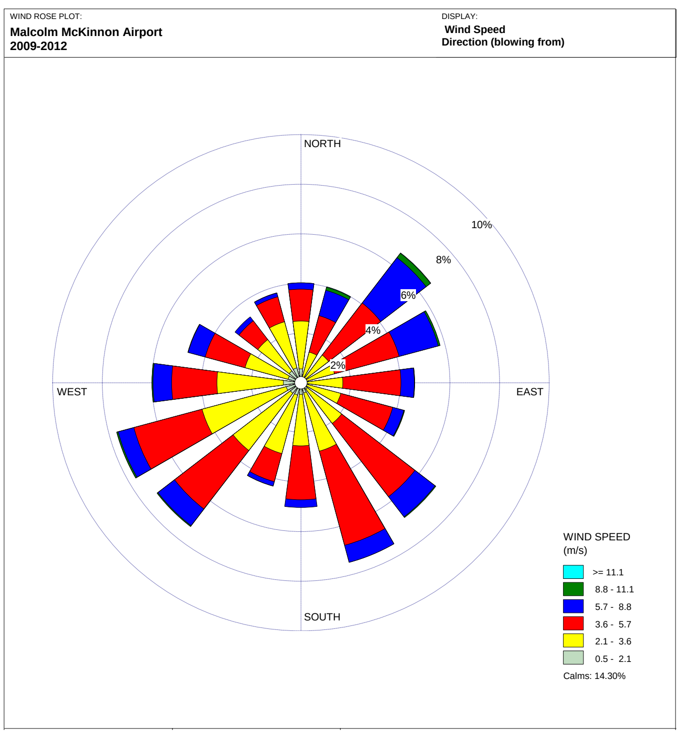
The EPA evaluated available meteorological data to determine how meteorological conditions, including, but not limited to, weather, transport patterns, and stagnation conditions, could affect the fate and transport of directly emitted particulate matter and precursor emissions from sources in the area of analysis. The EPA used wind roses as the primary tools for this assessment. When considered in combination with area $PM_{2.5}$ composition and county-level and facility emissions source location information, wind roses and KDE can help to identify nearby areas contributing to violations at violating monitoring sites.

Wind roses are graphic illustrations of the frequency of wind direction and wind speed. Wind direction can indicate the direction from which contributing emissions are transported; wind speed can indicate the force of the wind and thus the distance from which those emissions are transported. The EPA constructed wind roses from hourly observations of wind direction and wind speed using 2009-2012 data from National Weather Service locations archived at the National Climate Data Center.[35] When developing these wind roses, the EPA also used wind observations collected at meteorological sampling stations collocated at air quality monitoring sites, where these data were available. Figure 8 shows wind roses that the EPA generated from data relevant in the Brunswick Area.

[35] *ftp.ncdc.noaa.gov/pub/data/noaa* or *http://gis.ncdc.noaa.gov/map/viewer/#app=cdo&cfg=cdo&theme=hourly&layers=1&node=gis* Quality assurance of the National Weather Service data is described here: *http://www1.ncdc.noaa.gov/pub/data/inventories/ish-qc.pdf*

Figure 3. Wind Roses in the Area of Analysis for the Brunswick Area





As shown in Figure 3, there are two airports near the Brunswick area, Brunswick Golden Isles Airport and Malcolm McKinnon Airport, with available surface level wind speed and direction data. The wind roses indicate that there is a pattern across the CBSA of predominantly winds

blowing from the west-southwest, southeast and northeast, mostly at low to mid-level speeds of 2 to 6 meters per second, suggesting that potential emission sources generally in the southwest, southeast and northeast upwind directions should be considered for analysis.
For the Brunswick area monitor with invalid 2011-2013 data, the wind rose data support greatest potential contributions from Glynn, Brantley and Camden Counties.

Factor 4: Geography/Topography

The Brunswick Area does not have any geographical or topographical barriers significantly limiting air pollution transport from the Brantley or McIntosh counties within the CBSA or surrounding Camden or Wayne counties.

Factor 5: Jurisdictional boundaries

In defining the boundary of the intended Brunswick unclassifiable area, the EPA considered existing jurisdictional boundaries, which can provide easily identifiable and recognized boundaries for purposes of implementing the NAAQS. Existing jurisdictional boundaries often signify the state, and local governmental organization with the necessary legal authority for carrying out air quality planning and enforcement functions for the intended area. Examples of such jurisdictional boundaries include existing/prior nonattainment area boundaries for particulate matter, county lines, air district boundaries, township boundaries, areas covered by a metropolitan planning organization, state lines, and Reservation boundaries, if applicable. Where existing jurisdictional boundaries were not adequate or appropriate to describe the area, the EPA considered other clearly defined and permanent landmarks or geographic coordinates for purposes of identifying the boundaries of the intended designated areas.

The Brunswick monitor is in Glynn County, which is part of the Brunswick CBSA along with Brantley and McIntosh counties. The EPA uses the CBSA, where there is one, as a starting point for the contribution analysis because those areas are nearby for purposes of the $PM_{2.5}$ NAAQS. Figure 1 above is a map of the area with the adjacent CBSA counties included.

Conclusion

The EPA intends to designate Glynn County in the Brunswick Area as "unclassifiable" for the 2012 annual $PM_{2.5}$ NAAQS because current data from monitoring sites are incomplete. For this reason, the EPA cannot determine based on available information whether the area is meeting or not meeting the NAAQS. Based upon an evaluation of the five factors discussed above, the EPA has determined that the other counties in the CBSA are not likely to be contributing to a violation of the annual $PM_{2.5}$ NAAQS and do not need to be included in the area being designated as unclassifiable. The emissions, VMT and population in Brantley and McIntosh counties are relatively low when compared to Glynn County. See tables above for more information. Additionally, the wind roses do not support contribution of emissions from McIntosh County.