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***Draft* Redesignation Request  
and Maintenance Plan**

**For**

**The Tennessee Portion of the  
Chattanooga, Tennessee-Georgia, PM<sub>2.5</sub> Nonattainment Area**

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## EXECUTIVE SUMMARY

The Chattanooga-Hamilton County Air Pollution Control Bureau (the Bureau) requests, by way of this document, that the United States Environmental Protection Agency (U.S. EPA) redesignate the Tennessee portion (Hamilton County) of the Chattanooga, Tennessee-Georgia, PM<sub>2.5</sub> (fine particulate matter) nonattainment area to attainment as a “maintenance area.” This request is warranted because air monitoring data for the three-year period from 2007 through 2009 was granted a “clean data determination” by the U.S. EPA for demonstrating attainment with the 1997 annual national ambient air quality standard for PM<sub>2.5</sub>. Furthermore, evidence is presented in this document that attainment of the standard is attributable to permanent, enforceable reductions in emissions of PM<sub>2.5</sub> and its significant precursors.

This document also includes the Bureau’s plan for maintaining attainment with the standard through at least the year 2025. The plan includes contingency measures to be taken if the standard is either exceeded or at risk of being exceeded as indicated by ambient air monitoring or emissions inventory trends. This maintenance plan is supported by projections through 2025 that show decreases in emissions of PM<sub>2.5</sub> and its significant precursors, nitrogen oxides (NO<sub>x</sub>) and sulfur dioxide (SO<sub>2</sub>), within Hamilton County. In addition, motor vehicle emissions budgets, in accordance with the U.S. EPA’s transportation “conformity” rule, are presented for emissions of PM<sub>2.5</sub> and NO<sub>x</sub> within Hamilton County.

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## 1.0 INTRODUCTION

This document contains technical support for the request by the Chattanooga-Hamilton County Air Pollution Control Bureau (the Bureau) that the Tennessee portion (Hamilton County) of the Chattanooga, Tennessee-Georgia, PM<sub>2.5</sub> nonattainment area be redesignated as an area that is in attainment with the 1997 annual PM<sub>2.5</sub> national ambient air quality standard (NAAQS), pursuant to Title I, Part A, §107(d)(3)(D) and (E) of the Clean Air Act. A plan for maintaining attainment with the standard is also included in this document. The redesignation request and maintenance plan were prepared in accordance with a September 4, 1992, guidance memorandum from the United States Environmental Protection Agency (U.S. EPA) entitled “Procedures for Processing Requests to Redesignate Areas to Attainment.” Furthermore, this document includes motor vehicle emissions budgets that are being proposed in accordance with the U.S. EPA’s transportation “conformity” rule.

### 1.1 Fine Particulate Matter (PM<sub>2.5</sub>)

PM<sub>2.5</sub>, or fine particulate matter, refers to airborne particles that have an aerodynamic diameter of 2.5 micrometers (µm) or less. These particles are treated as a single air pollutant, but they are composed of various compounds and come from many different sources. Inhalation of PM<sub>2.5</sub> can result in adverse respiratory and cardiovascular health effects. Children, older adults, and people with a chronic disease of the lungs or heart are particularly sensitive to PM<sub>2.5</sub> exposure.

PM<sub>2.5</sub> can be a solid, liquid, or solid core surrounded by liquid. Primary PM<sub>2.5</sub> is directly emitted to the atmosphere and retains the same chemical composition after it is released. Secondary PM<sub>2.5</sub> is formed through chemical reactions in the atmosphere involving precursors such as sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and organic gases from biogenic or anthropogenic sources. PM<sub>2.5</sub> constituents include:

- Sulfates;
- Nitrates;
- Ammonium ion;
- Elemental carbon;
- Primary organic compounds (generally from combustion);
- Secondary organic aerosols (SOA); and
- Inorganic crustal material (e.g., dust, metals, and sea salt).

Coal-fired power plants, other fuel combustion sources, motor vehicles, and industrial processes are among the most significant sources of emissions of PM<sub>2.5</sub> and its precursors. PM<sub>2.5</sub> can also be emitted into the air as windblown dust. These emissions are often transported over long

distances. PM<sub>2.5</sub> concentration levels in the ambient air are influenced by both meteorological conditions and geographic factors.

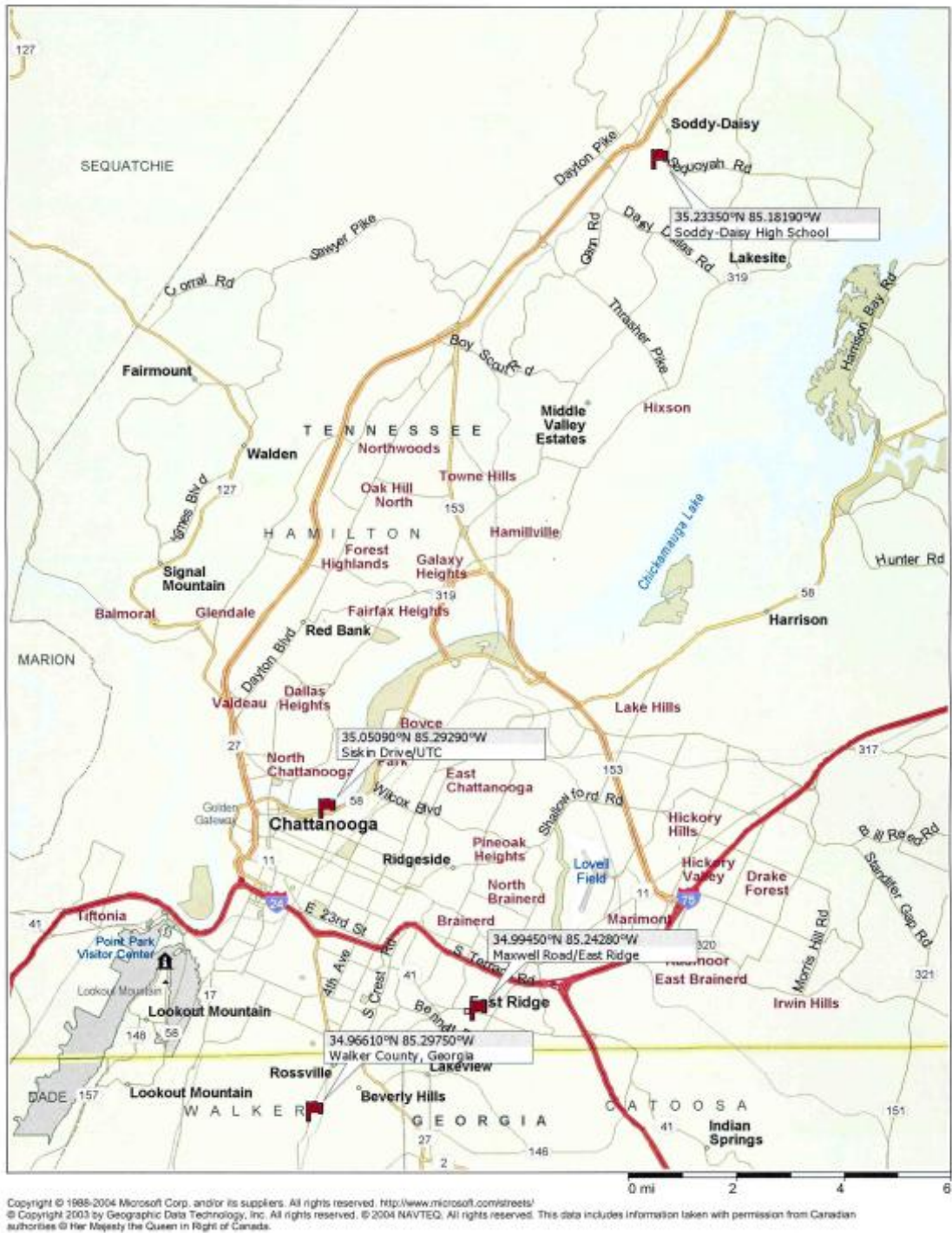
## **1.2 PM<sub>2.5</sub> National Ambient Air Quality Standards**

The U.S. EPA promulgated both 24-hour and annual NAAQS for PM<sub>2.5</sub> on July 18, 1997 (*Federal Register* Vol. 62, No. 138, pp. 38652–38760). The 24-hour standard was set at 65 micrograms per cubic meter (µg/m<sup>3</sup>) and the annual standard was set at 15.0 µg/m<sup>3</sup>. The 24-hour PM<sub>2.5</sub> NAAQS was subsequently revised to 35 µg/m<sup>3</sup> on October 17, 2006 (*Federal Register* Vol. 71, No. 200, pp. 61144–61233). The 2006 24-hour standard is met when the 98th percentile daily PM<sub>2.5</sub> monitored concentration (the value below which 98% of the values in a calendar year fall), as averaged over three consecutive years, is less than or equal to 35 µg/m<sup>3</sup>. The U.S. EPA designated Hamilton County as being in attainment with this 24-hour standard on November 13, 2009 (*Federal Register* Vol. 74, No. 218, pp. 58688–58781). The 1997 annual standard is met when the annual mean of daily PM<sub>2.5</sub> monitored concentrations (average of quarterly-average values in a calendar year), as averaged over three consecutive years, is less than or equal to 15.0 µg/m<sup>3</sup>.

## **1.3 PM<sub>2.5</sub> Federal Reference Method Monitors**

Daily concentrations of PM<sub>2.5</sub> in the ambient air, which are used in determining attainment with the 24-hour and annual PM<sub>2.5</sub> NAAQS, are obtained from data that is collected by Federal Reference Method (FRM) monitors. The Bureau operates three PM<sub>2.5</sub> FRM monitors in Hamilton County, Tennessee. A PM<sub>2.5</sub> FRM monitor in nearby Walker County, Georgia, is operated by the Air Protection Branch of the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources. The locations of these four monitors are mapped in Figure 1-1, which follows. (The Hamilton County monitor that is identified in the figure as being on Maxwell Road in East Ridge was relocated a distance of less than one mile to Tombras Avenue in East Ridge in 2007.)





**Figure 1-1. Locations of PM<sub>2.5</sub> Federal Reference Method Monitors**

## 1.4 Chattanooga, Tennessee-Georgia, PM<sub>2.5</sub> Nonattainment Area

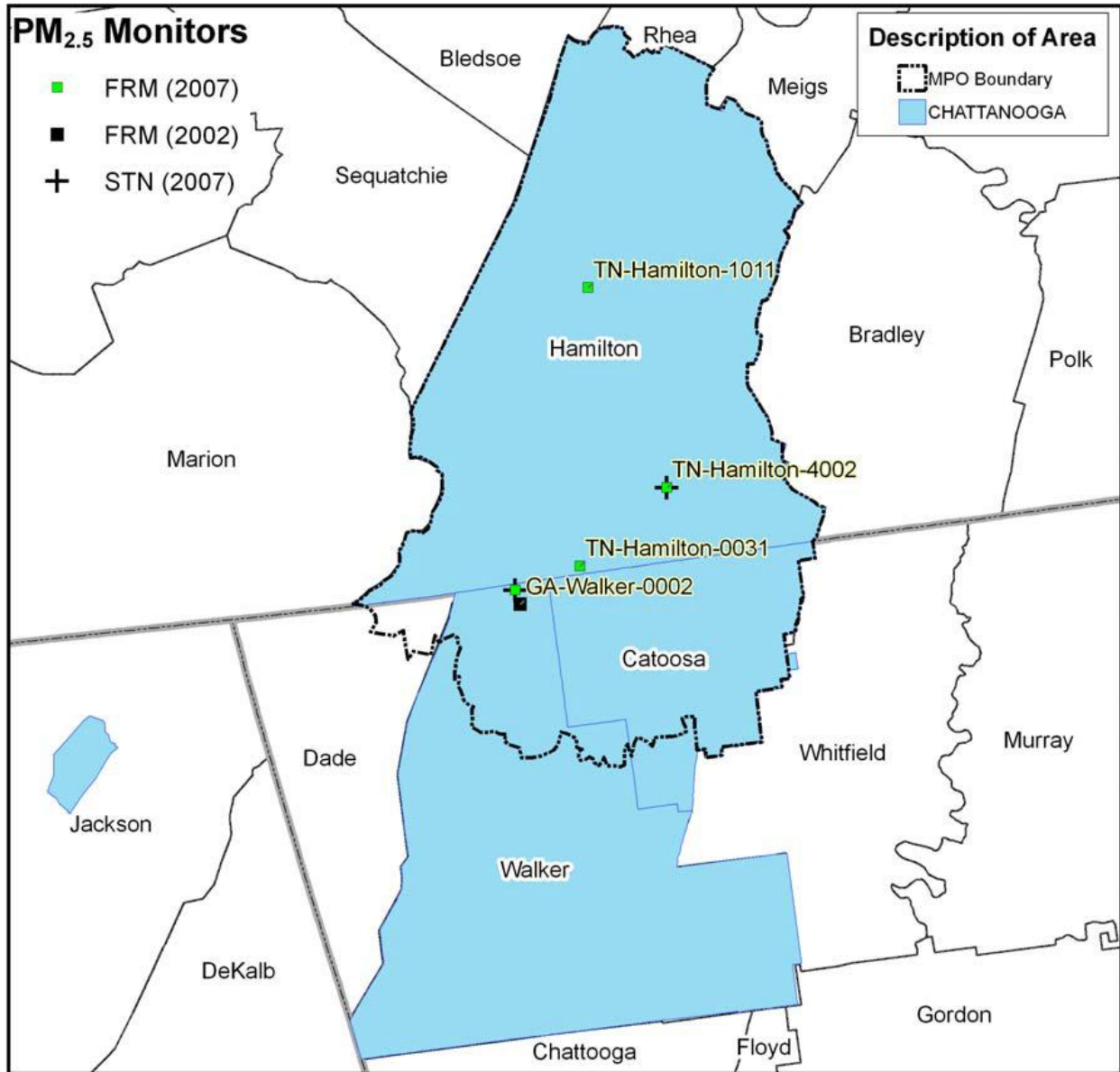
The annual mean PM<sub>2.5</sub> concentration (average of quarterly-average concentrations), based on quality-assured and certified data from an FRM monitor as averaged over three consecutive calendar years, is referred to as the monitor's annual PM<sub>2.5</sub> "design value" for that three-year period. Annual design values for each PM<sub>2.5</sub> FRM monitor are given below in Table 1-1. Exceedances of the 1997 annual PM<sub>2.5</sub> NAAQS of 15.0 µg/m<sup>3</sup> are demarcated in bold font in this table. The design values in the table were obtained from PM<sub>2.5</sub> design value reports that are available at the U.S. EPA website [www.epa.gov/airtrends/values.html](http://www.epa.gov/airtrends/values.html). Applicable portions of these reports are provided in Appendix A.

**Table 1-1. Annual PM<sub>2.5</sub> Design Values**

PM <sub>2.5</sub> Federal Reference Method Monitor	Annual PM <sub>2.5</sub> Design Value (µg/m <sup>3</sup> )									
	2001–2003	2002–2004	2003–2005	2004–2006	2005–2007	2006–2008	2007–2009	2008–2010	2009–2011	2010–2012
Siskin Drive (UTC) (ID #470654002)	<b>15.2</b>	14.7	15.0	15.0	<b>15.2</b>	14.3	12.7	11.6	11.1	10.9
Tombras Avenue, East Ridge (ID #470650031)	<b>16.1</b>	<b>15.7</b>	<b>16.1</b>	<b>15.3</b>	<b>15.1</b>	13.8	12.6	11.6	11.2	11.1
Soddy-Daisy High School (ID #470651011)	14.1	13.8	13.8	13.4	13.7	12.9	11.7	11.4	11.0	11.2
Maple Street, Rossville, GA (ID #132950002)	<b>15.5</b>	<b>15.2</b>	<b>15.8</b>	<b>15.2</b>	14.9*	13.5*	12.3*	10.6	10.1*	10.0*

\*Data from the Rossville, Georgia, monitor for 2007 and 2011 did not meet completeness criteria

Data from three of the four PM<sub>2.5</sub> FRM monitors in the Chattanooga area for the period from 2001 through 2003 showed an exceedance of the 1997 annual PM<sub>2.5</sub> NAAQS. Based on the 2001–2003 monitoring data, the U.S. EPA designated the Chattanooga, Tennessee-Georgia, area as being in nonattainment with the annual standard on January 5, 2005 (*Federal Register* Vol. 70, No. 3, pp. 944–1019). The U.S. EPA readdressed this designation on April 14, 2005 (*Federal Register* Vol. 70, No. 71, pp. 19846 and 19847), but made no change to it. The Chattanooga nonattainment area consists of Hamilton County in Tennessee, Catoosa and Walker Counties in Georgia, and an interior portion of Jackson County in Alabama that is described as U.S. Census 2000 Block Group Identifier 01-071-9503-1. The nonattainment area is depicted in Figure 1-2, which follows. (PM<sub>2.5</sub> FRM monitor locations that are shown in this figure are approximate and are less precise than those indicated in the preceding Figure 1-1.)



**Figure 1-2. Chattanooga, Tennessee-Georgia, PM<sub>2.5</sub> Nonattainment Area**

### 1.5 Redesignation Request Requirements

Title I, Part A, §107(d)(3)(E) of the Clean Air Act requires that the following conditions be met in order for the Tennessee portion of the Chattanooga nonattainment area to be redesignated as an area in attainment with the 1997 annual PM<sub>2.5</sub> NAAQS:

- A determination by the U.S. EPA that the annual PM<sub>2.5</sub> NAAQS has been attained;
- A determination by the U.S. EPA that the improvement in air quality that resulted in attainment of the standard is due to permanent and enforceable reductions in emissions;
- Full approval by the U.S. EPA of the state implementation plan (SIP) for the Tennessee portion of the nonattainment area under Title I, Part A, §110(k) of the Clean Air Act;
- Attainment of all applicable requirements for the Tennessee portion of the nonattainment area under Title I, Part A, §110 and Title I, Part D of the Clean Air Act; and
- Full approval by the U.S. EPA of a maintenance plan, including contingency measures, for the Tennessee portion of the nonattainment area as required by Title I, Part D, §175A of the Clean Air Act.

## **1.6 Maintenance Plan Requirements**

The required maintenance plan must provide for the continued attainment of the 1997 annual PM<sub>2.5</sub> NAAQS for a period of at least ten years after the U.S. EPA has formally redesignated the Tennessee portion of the Chattanooga nonattainment area to attainment as a “maintenance area.” The plan must demonstrate that future attainment of the standard is expected to continue, it must indicate how continued attainment of the standard will be verified, and it must include contingency measures to be implemented if the standard is either exceeded or determined to be at risk of being exceeded.

## 2.0 REDESIGNATION REQUEST

The Bureau formally requests that the U.S. EPA redesignate the Tennessee portion of the Chattanooga, Tennessee-Georgia, PM<sub>2.5</sub> nonattainment area to a maintenance area in attainment with the 1997 annual PM<sub>2.5</sub> NAAQS, pursuant to Title I, Part A, §107(d)(3)(D) and (E) of the Clean Air Act. Technical support for the request is provided in this section of the document, including demonstrations that the standard has been met as a result of permanent and enforceable emissions reductions and that applicable requirements of the Clean Air Act have been complied with.

### 2.1 Attainment of the Annual PM<sub>2.5</sub> NAAQS

Annual mean PM<sub>2.5</sub> concentrations (averages of quarterly-average concentrations) for each PM<sub>2.5</sub> FRM monitor, based on quality-assured and certified data, are given below in Table 2-1. The concentrations in the table were obtained from PM<sub>2.5</sub> design value reports that are available at the U.S. EPA website [www.epa.gov/airtrends/values.html](http://www.epa.gov/airtrends/values.html), and applicable portions of these reports are provided in Appendix A.

**Table 2-1. Monitored Annual Mean PM<sub>2.5</sub> Concentrations**

PM <sub>2.5</sub> Federal Reference Method Monitor	Annual Mean PM <sub>2.5</sub> Concentration (µg/m <sup>3</sup> )						
	2006	2007	2008	2009	2010	2011	2012
Siskin Drive (UTC) (ID #470654002)	15.039	15.046	12.707	10.471	11.726	11.073	10.010
Tombras Avenue, East Ridge (ID #470650031)	14.258	14.933	12.289	10.475	12.025	11.056	10.073
Soddy-Daisy High School (ID #470651011)	13.081	14.222	11.388	9.520	13.290	10.290	9.992
Maple Street, Rossville, GA (ID #132950002)	14.453	13.689*	12.482	10.704	8.690	10.772*	10.541

\*Data from the Rossville, Georgia, monitor for 2007 and 2011 did not meet completeness criteria

The annual mean PM<sub>2.5</sub> concentration, as rounded to one decimal place, from any of the four monitors in the Chattanooga area has been no greater than 15.0 µg/m<sup>3</sup> from 2006 onwards. Furthermore, the annual PM<sub>2.5</sub> design value for each monitor and for each three-year period, beginning with 2006–2008, has been below the annual PM<sub>2.5</sub> NAAQS of 15.0 µg/m<sup>3</sup>, as shown in the preceding Table 1-1. Accordingly, the U.S. EPA granted a “clean data determination” to the ambient air monitoring data from the four PM<sub>2.5</sub> FRM monitors for the period from 2007 through 2009 and determined that the Chattanooga nonattainment area has attained the 1997

annual PM<sub>2.5</sub> NAAQS as of the publication date of May 31, 2011 (*Federal Register* Vol. 76, No. 104, pp. 31239–31241).

## 2.2 Emissions Reduction Measures

In order for the Chattanooga nonattainment area to be redesignated to attainment, the decrease in monitored ambient PM<sub>2.5</sub> concentrations through 2009, which resulted in a clean data determination for monitoring data for the three-year period ending in 2009, must be demonstrated to be due to permanent and enforceable reductions in emissions of PM<sub>2.5</sub> and/or its significant precursors. These reductions are required to have resulted from measures implemented after 2003 since the nonattainment designation was based upon monitoring data for the three-year period that continued through 2003.

### 2.2.1 Speciated Ambient PM<sub>2.5</sub> Concentrations

PM<sub>2.5</sub> constituents include many components from varying sources. A PM<sub>2.5</sub> speciation monitor is located adjacent to the PM<sub>2.5</sub> FRM monitor at the Siskin Drive (UTC) site in Hamilton County and is a part of the U.S. EPA speciation trends network (STN). It provides ambient air concentrations of sulfates, nitrates, ammonium ion, potassium, sodium, elemental carbon, organic carbon, and specific metals, all of which are speciated PM<sub>2.5</sub> components. Annual mean concentrations of major components of PM<sub>2.5</sub> from the STN monitor are from U.S. EPA Air Quality System raw data reports and are given below in Table 2-2.

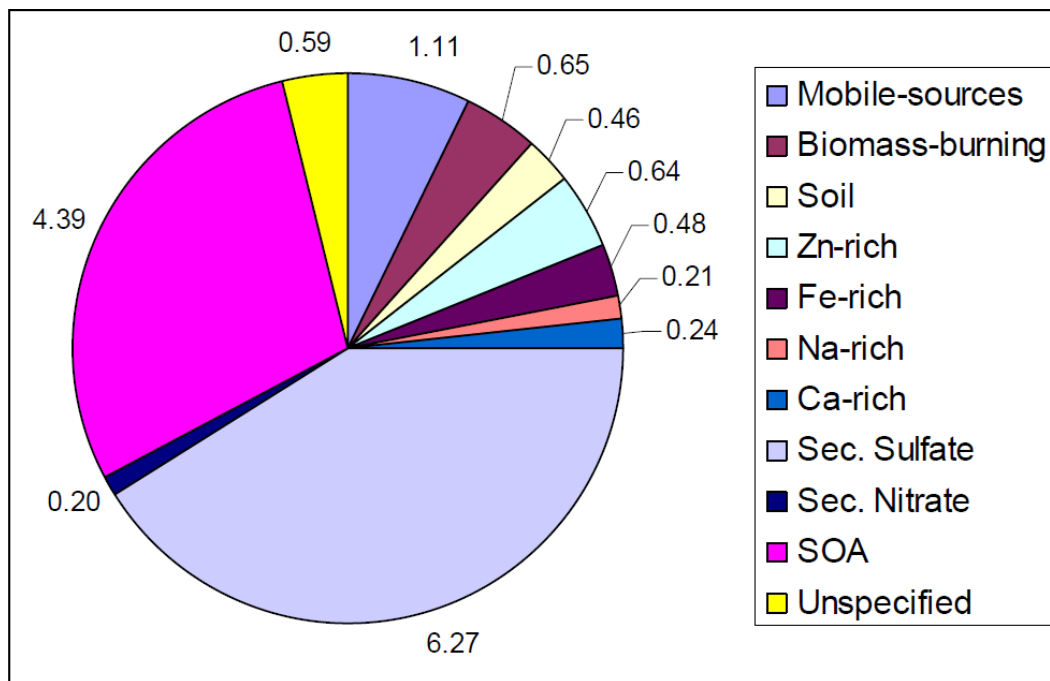
**Table 2-2. Monitored Annual Mean Concentrations of Speciated PM<sub>2.5</sub> Components**

Speciated PM <sub>2.5</sub> Component	Annual Mean Concentration ( $\mu\text{g}/\text{m}^3$ )										
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Sulfates	5.2	5.2	4.9	5.4	4.0	4.8	4.0	2.4	3.1	2.8	2.1
Nitrates	1.0	1.2	1.0	1.0	1.0	1.1	0.8	0.7	0.9	0.5	0.7
Ammonium Ion	1.7	1.8	1.6	1.9	1.5	1.9	1.5	0.9	1.1	0.8	0.6

### 2.2.2 Source Apportionment of Ambient PM<sub>2.5</sub> Concentrations

The Georgia EPD conducted a source apportionment analysis of speciated PM<sub>2.5</sub> component concentrations that were obtained from the Hamilton County PM<sub>2.5</sub> STN monitor from 2002 through 2006. The analysis was conducted using EPA-PMF1.1 (Positive Matrix Factorization), which is the U.S. EPA's model for distinguishing correlation patterns among speciated PM<sub>2.5</sub> concentrations in a given location. The results of the analysis are included in a document

entitled “Source Apportionment of PM<sub>2.5</sub> in Georgia,” which is provided in Appendix B, and are diagrammed in Figure 2-1, which follows.



**Figure 2-1. 2002–2006 Average Contributions to Ambient PM<sub>2.5</sub> Concentrations (µm<sup>3</sup>)**

According to the source apportionment analysis, the greatest contribution to ambient PM<sub>2.5</sub> concentrations in the Chattanooga area is from secondary sulfates, which are formed from atmospheric reactions with SO<sub>2</sub>. Three coal (fossil fuel)-fired electric power plants are the largest industrial point-sources of SO<sub>2</sub> emissions that significantly impact the area. These three plants also result in considerable emissions of NO<sub>x</sub>. One of these plants, the Tennessee Valley Authority (TVA) Widows Creek power plant, is located in the Alabama portion of the Chattanooga nonattainment area in Jackson County. The other two facilities are located nearby in Northwest Georgia — Georgia Power’s Bowen power plant in Bartow County and Hammond power plant in Floyd County. Bartow County is a part of the extensive Atlanta PM<sub>2.5</sub> nonattainment area, and Floyd County comprises a separate PM<sub>2.5</sub> nonattainment area.

Secondary organic aerosols are shown to be the second largest contributor to ambient PM<sub>2.5</sub> in the Chattanooga area, but precursor emissions for these aerosols are considered to mostly result from biogenic sources and are thus not readily controlled. Primary PM<sub>2.5</sub> emissions from mobile sources and from biomass burning also significantly affect area PM<sub>2.5</sub> concentrations, as indicated by the analysis. Most industrial sources of primary PM<sub>2.5</sub> emissions within Hamilton County have long been controlled or subject to emission limitations. Contributions to PM<sub>2.5</sub> in the ambient air from all other source categories appear to be of less consequence.

### 2.2.3 Industrial-Source Emissions Reduction Measures

Annual emissions of SO<sub>2</sub> and NO<sub>x</sub> from each of the Widows Creek, Bowen, and Hammond power plants, along with those from the combined industrial point sources within Hamilton County, are given below in Tables 2-3 and 2-4, respectively. The emissions from the three power plants are from U.S. EPA Clean Air Markets Division facility emissions trends reports and are provided in Appendix C. The emissions from the combined Hamilton County point sources are from annual reports generated from the Bureau's Emissions Inventory System for all applicable years except 2007. These reports are provided in Appendix D. Point source emissions for 2007 are from the 2005 National Emissions Inventory (NEI) download for Hamilton County, as adjusted to 2007, that is provided in Appendix E, and these emissions are tabulated in spreadsheets provided in Appendix G.

**Table 2-3. Annual Industrial Point-Source Emissions of SO<sub>2</sub>**

Source	SO <sub>2</sub> Emissions (tons/year)							
	2003	2004	2005	2006	2007	2008	2009	2010
Hamilton County Point Sources	1,920	1,788	1,779	1,397	919	892	559	788
Widows Creek Plant (Alabama)	44,046	31,396	34,380	33,507	32,723	27,903	12,861	10,982
Bowen Plant (Georgia)	164,884	165,914	186,470	206,442	196,841	148,149	54,811	7,618
Hammond Plant (Georgia)	35,923	37,696	39,548	40,579	47,809	12,465	894	2,427

**Table 2-4. Annual Industrial Point-Source Emissions of NO<sub>x</sub>**

Source	NO <sub>x</sub> Emissions (tons/year)							
	2003	2004	2005	2006	2007	2008	2009	2010
Hamilton County Point Sources	2,841	2,758	2,748	2,653	2,437	2,140	1,716	1,738
Widows Creek Plant (Alabama)	24,615	19,843	18,154	17,184	17,620	15,100	3,526	2,996
Bowen Plant (Georgia)	24,960	24,770	26,246	28,636	18,478	24,070	6,947	7,257
Hammond Plant (Georgia)	7,437	6,183	6,750	5,783	7,782	6,096	3,164	3,163

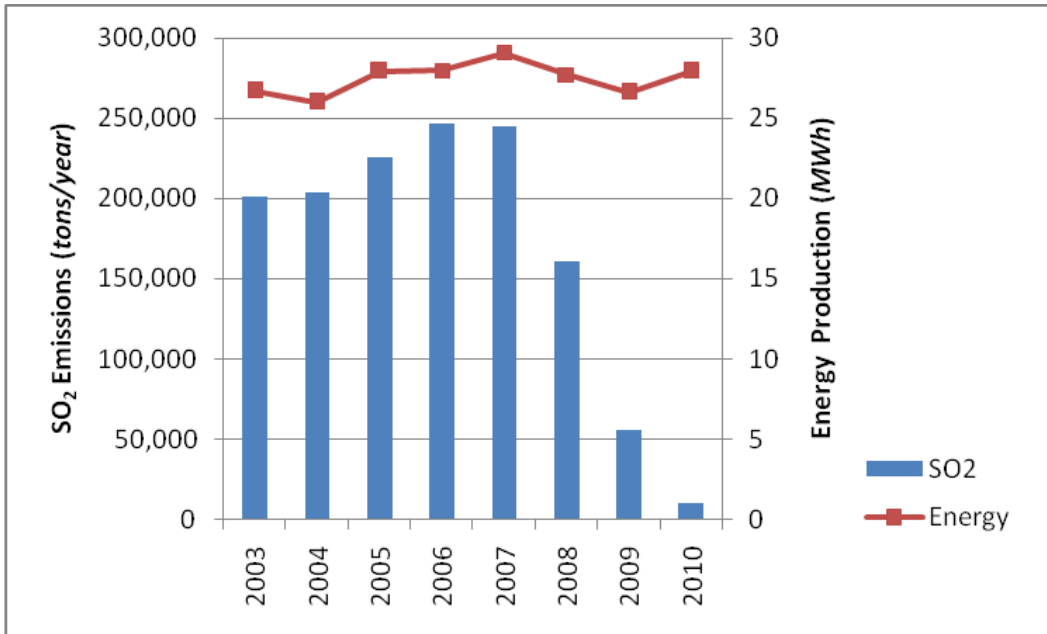


As shown in the preceding tables, annual emissions of both SO<sub>2</sub> and NO<sub>x</sub> from each of the three power plants are considerably greater than the respective emissions from all of the industrial point sources in Hamilton County combined prior to 2009. In 2003, emissions from the Widows Creek, Bowen, and Hammond power plants combined were greater than emissions from the combined Hamilton County point sources by factors of 127.5 times for SO<sub>2</sub> and 20.1 times for NO<sub>x</sub>. Furthermore, emissions from the three power plants combined were reduced from 2003 to 2009 by 72.0% for SO<sub>2</sub> and 76.1% for NO<sub>x</sub>.

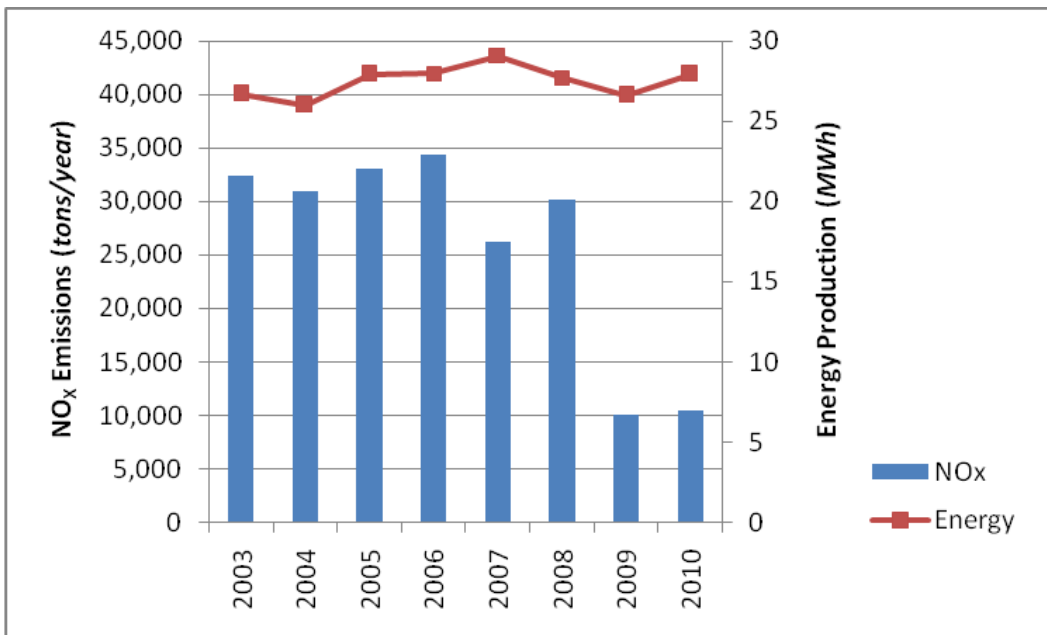
While flue-gas desulfurization scrubbers for each of the eight coal-fired units at the Widows Creek power plant were installed prior to 2002, the scrubber controlling SO<sub>2</sub> emissions from Unit 8 was upgraded in 2004. In addition, selective catalytic-reduction equipment to control NO<sub>x</sub> emissions was installed in 2003 for Unit 7 and in 2004 for Unit 8 in accordance with Federal Facilities Compliance Agreement, Docket No. CAA-04-2010-1760, between the U.S. EPA and TVA. This agreement is both permanent and enforceable. Furthermore, Units 1–6 at the Widows Creek plant were permanently removed from service as of October 1, 2011, in early compliance with the agreement. Operation of Units 1–6 began to be scaled back in 2009.

The Bowen and Hammond power plants are both subject to “Multipollutant Control of Electric Utility Steam Generating Units” [Georgia Rule 391-3-1-.02(2)(sss)], which requires flue gas desulfurization to control SO<sub>2</sub> emissions and selective catalytic reduction for the control of NO<sub>x</sub> emissions. The rule was promulgated in 2007 to reduce mercury deposition and to lower ambient ozone and PM<sub>2.5</sub> concentrations through the control of precursor emissions. Although the rule’s compliance date was December 31, 2008, the required controls at both facilities began to be used in the first half of 2008. “SO<sub>2</sub> Emissions from Electric Utility Steam Generating Units” [Georgia Rule 391-3-1-.02(2)(uuu)] is a companion rule that requires a 95% reduction in SO<sub>2</sub> emissions from the majority of Georgia’s coal-fired power plants. This requirement is being phased in from 2010 through 2016.

Annual emissions of SO<sub>2</sub> and NO<sub>x</sub> from the Bowen and Hammond power plants combined, along with the annual quantity of electrical energy generated from the two combined plants, are graphically presented in the following Figures 2-2 and 2-3, respectively. The energy production data was furnished by the Georgia EPD.



**Figure 2-2. Annual SO<sub>2</sub> Emissions and Energy Production from Combined Bowen and Hammond Plants**



**Figure 2-3. Annual NO<sub>x</sub> Emissions and Energy Production from Combined Bowen and Hammond Plants**

The preceding figures indicate that annual energy generation from the Bowen and Hammond power plants combined was stable. In fact, electrical energy production from the combined plants was 26.7 megawatt hours (MWh) in 2003 and 26.6 MWh in 2009, which is relatively unchanged. This demonstrates that the reductions in SO<sub>2</sub> and NO<sub>x</sub> emissions from the two plants are due to the implementation of permanent and enforceable regulations rather than to any decrease in energy output.

#### **2.2.4 Mobile-Source Emissions Reduction Measures**

“Control of Emissions from New and In-Use Highway Vehicles and Engines” (the Tier 2 standards, Title 40 *Code of Federal Regulations* Part 86) was initiated in 2004 and were mostly phased in by 2007. For passenger vehicles with a gross weight of over 8,500 pounds, the Tier 2 standards were phased in beginning in 2008 with full compliance in 2009. The standards require all passenger vehicles in a manufacturer’s fleet, including light-duty trucks and sport utility vehicles, to emit no more than 0.07 grams of NO<sub>x</sub> per mile, on average. The standards also require that subject vehicles emit at least 77% less NO<sub>x</sub> than passenger vehicles in operation prior to the standards adoption. A second phase of these standards, which began to be implemented in 2007, resulted in an estimated 90% reduction in particulate matter emissions from heavy-duty engines used in highway vehicles.

In addition, the Tier 2 standards required a lowering of the sulfur content of gasoline to 30 parts per million (ppm), beginning in January of 2006. Prior to this, the typical sulfur content of gasoline available in the Chattanooga area was about 340 ppm. Furthermore, “Regulation of Fuels and Fuel Additives” (Title 40 *Code of Federal Regulations* Part 80) became effective in 2004. This rule required sulfur content reductions to 15 ppm for onroad diesel fuel, 500 ppm for nonroad diesel fuel by 2006, and 15 ppm for nonroad diesel fuel by 2010. Nonroad diesel fuel in the area had an average sulfur content of about 3,400 ppm before 2006. Sulfur, which occurs naturally in gasoline and diesel fuel, interferes with the operation of catalytic converters that are used on vehicles to control NO<sub>x</sub> emissions. Reducing the content of sulfur in these fuels also served to proportionally decrease motor vehicle emissions of SO<sub>2</sub>.

“Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines” (Title 40 *Code of Federal Regulations* Part 1039) was promulgated in 2004 with a phase-in period from 2008 to 2014. This regulation applies to emissions of particulate matter and NO<sub>x</sub> from engines used in construction, agricultural, and industrial equipment. Full implementation of the rule is anticipated to reduce particulate matter emissions from large nonroad diesel-fuel engines by over 90%.

“Control of Emissions from New, Large Nonroad Spark-Ignition Engines,” (Title 40 *Code of Federal Regulations* Part 1048) regulates NO<sub>x</sub> and other pollutants emitted from engines that are used in vehicles such as forklift trucks and airport ground service equipment. The first

phase of this rule was implemented in 2004 and the second phase commenced in 2007. “Control of Emissions from Recreational Engines and Vehicles” (Title 40 *Code of Federal Regulations* Part 1051) pertains to emissions of NO<sub>x</sub> and other pollutants from such sources as off-highway motorcycles, all-terrain-vehicles, and recreational motor boats, and phase-in of this rule commenced in 2006. It is estimated that these two rules will result in an 80% overall reduction in NO<sub>x</sub> emissions from subject sources when fully implemented.

### **2.2.5 PM<sub>2.5</sub> and Ozone Transport Rules**

In October 1998, the U.S. EPA made a finding of significant contribution to ozone formation due to NO<sub>x</sub> emissions from certain states and published the “NO<sub>x</sub> Budget Trading Program for State Implementation Plans” (the NO<sub>x</sub> SIP Call, Title 40 *Code of Federal Regulations* Part 96, Subparts A–I), which set ozone-season NO<sub>x</sub> emission budgets for the purpose of reducing regional transport of ozone. This rule called for NO<sub>x</sub> emission budgets to be established for twenty-two eastern states (and the District of Columbia), including Tennessee, Georgia, and Alabama. Each subject state was required to develop rules requiring the control of NO<sub>x</sub> emissions from utility and industrial boilers that would allow the state to meet its budget by 2004. Furthermore, a NO<sub>x</sub> emission trading program was established that allows sources to buy credits to meet the applicable budget as opposed to installing NO<sub>x</sub> emission control equipment.

The U.S. EPA promulgated the “Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone [Clean Air Interstate Rule (CAIR)]” on May 12, 2005 (*Federal Register* Vol. 70, No. 91, pp. 25162–25405). This rule established a requirement for states to regulate emissions of NO<sub>x</sub> and SO<sub>2</sub> from fossil-fuel fired electric generation units with capacities in excess of 25 megawatts. Annual limits on state-wide emissions of NO<sub>x</sub> and SO<sub>2</sub> were to be set in phases beginning in 2009 and continuing through 2015.

On July 11, 2008, the U.S. Court of Appeals for the District of Columbia Circuit vacated CAIR and remanded it to the U.S. EPA. A rehearing of the Court’s decision was requested and granted. On December 23, 2008, the Court remanded CAIR to the U.S. EPA without vacatur (i.e., the rule was still in place). The U.S. EPA was directed to correct the deficiencies in CAIR that were identified in the Court’s decision.

To replace CAIR, the U.S. EPA promulgated the “Transport Rule” [Cross-State Air Pollution Rule (CSAPR)] on August 8, 2011 (*Federal Register* Vol. 76, No. 152, pp. 48208–48483). This rule was to impose restrictions on emissions of NO<sub>x</sub> and SO<sub>2</sub> from states identified as having significant impacts on ozone and/or PM<sub>2.5</sub> NAAQS attainment or as interfering with maintenance of these standards in downwind states. The requirements of CSAPR were to become effective in 2012 and 2014. However, the U.S. Court of Appeals for the District of Columbia Circuit issued respective rulings on December 30, 2011, and August 21, 2012, at first to stay CSAPR,

pending judicial review, and then to vacate it. Regardless of the timing of any transition from CAIR to a replacement transport rule, emissions of NO<sub>x</sub> and SO<sub>2</sub> affecting the Chattanooga nonattainment area have declined significantly and are expected to continue to decrease due, in large part, to the continuation of the Federal Facilities Compliance Agreement between the U.S. EPA and TVA and Georgia Rules 391-3-1-.02(2)(sss) and (uuu) that apply to coal-fired electric power plants.

### **2.2.6 Other Emissions Reduction Measures**

In 2005, a seasonal open-burning ban was instituted in Hamilton County. Furthermore, the City of Chattanooga no longer operates an air-curtain destructor for brush burning, with the exception of operation to dispose of debris from major storms. Permits issued for open burning in Hamilton County numbered 7,131 in calendar year 1994 and 5,510 during the open burning season from October 1, 2006, through April 30, 2007, a decrease of 22.7%. Emissions from open burning include elemental carbon, organic carbon, and direct PM<sub>2.5</sub>.

“Pollution Solution” is a public outreach and education program of the Bureau. The goal of the program is to reduce air pollution by voluntary actions. The program is activated on air quality alert days when the concentration of either PM<sub>2.5</sub> or ozone in the ambient air is projected to be above the “moderate” range for health effects. On such days, pertinent information is sent to select individuals, government employees, hospitals, health care facilities, child daycare centers, schools, gyms, and emergency responders, in addition to television, radio, and print media outlets.

### **2.3 Requirements of Title I, Part A, Section 110 and Title I, Part D of the Clean Air Act**

Title I, Part A, §110 of the Clean Air Act contains requirements for SIPs that provide for the implementation, maintenance, and enforcement of applicable NAAQS. Title I, Part D, Subpart 1 (§171–179) of the Clean Air Act contains general requirements for areas that have been designated as nonattainment for a NAAQS. Following designation by the U.S. EPA of the Chattanooga area as being in nonattainment with the 1997 annual PM<sub>2.5</sub> NAAQS in 2005, the Bureau submitted a PM<sub>2.5</sub> NAAQS SIP for the Tennessee portion of the Chattanooga nonattainment area in accordance with Part D.

With the determination by the U.S. EPA in 2011 that the Chattanooga nonattainment area has attained the 1997 annual PM<sub>2.5</sub> NAAQS, the area is no longer subject to nonattainment requirements of Part A, §110 and Part D. Accordingly, the following was published on May 31, 2011 (*Federal Register* Vol. 76, No. 104, p. 31241):

“EPA has determined, as of May 31, 2011, the Chattanooga, Tennessee, nonattainment area has attaining data for the 1997 annual PM<sub>2.5</sub> NAAQS. This determination, in

accordance with 40 CFR 52.1004(c), suspends the requirements for this area to submit an attainment demonstration, associated reasonably available control measures, a reasonable further progress plan, contingency measures, and other planning SIPs related to attainment of the standard for as long as this area continues to meet the 1997 annual PM<sub>2.5</sub> NAAQS.”

All other requirements of Part A, §110 and Part D pertaining to the Chattanooga area have previously been approved or are currently subject to approval by the U.S. EPA.

### **3.0 MAINTENANCE PLAN**

The Bureau's plan for maintaining attainment with the 1997 annual PM<sub>2.5</sub> NAAQS within the Tennessee portion of the Chattanooga, Tennessee-Georgia, PM<sub>2.5</sub> maintenance area is detailed in this section of the document. The maintenance plan demonstrates continued attainment of the standard and includes procedures for verification of future attainment. In addition, this plan incorporates contingency measures to be implemented if the verification procedures indicate that the standard is no longer being attained or close to not being attained.

#### **3.1 Maintenance Demonstration**

The Bureau is demonstrating maintenance of the 1997 annual PM<sub>2.5</sub> NAAQS by showing that future annual emissions of PM<sub>2.5</sub> and its significant precursors from sources within the Tennessee portion (Hamilton County) of the Chattanooga maintenance area will not exceed the respective emissions for the "attainment year."

##### **3.1.1 Attainment Year Emissions Inventory**

Ambient air monitoring data from all four FRM monitors in the Chattanooga area indicated attainment with the 1997 annual PM<sub>2.5</sub> NAAQS for the three-year period from 2007 through 2009, and this data was accordingly granted a clean data determination by the U.S. EPA. Furthermore, the annual mean PM<sub>2.5</sub> concentration (average of quarterly-average concentrations), rounded to one decimal place, from each monitor was no greater than 15.0 µg/m<sup>3</sup> for each of the three years in this period, based on quality-assured and certified monitoring data. These concentrations were previously given in Table 2-1. The Bureau has therefore chosen to use 2007, the first year of the three-year attainment period, as the attainment, or base, year for Hamilton County. 2007 was also selected as the attainment year by the Georgia EPD for the Georgia portion (Catoosa and Walker Counties) of the maintenance area.

Emissions of PM<sub>2.5</sub> and its significant precursors, NO<sub>x</sub> and SO<sub>2</sub>, occur from point, area, onroad mobile, and nonroad mobile sources within Hamilton County. Emissions of these pollutants that occurred during 2007 from the combined sources within Hamilton County represent emission levels that are consistent with attainment of the standard.

Point sources are certain industrial, commercial, and institutional stationary sources. The attainment year emissions from point sources are from the 2005 NEI download for Hamilton County, as adjusted to 2007, that is provided in Appendix E. These emissions are tabulated in spreadsheets provided in Appendix G. The original source for most of these emissions is the Bureau's Emissions Inventory System, which is a database wherein annual emissions from sources that are permitted by the Bureau are recorded. These emissions were determined from

direct measurement, calculated using material balances, estimated using emission factors from sources such as the U.S. EPA's *Compilation of Air Pollutant Emission Factors (AP-42)*, or estimated by other methods. The Emissions Inventory System is updated continually and archived for each calendar year.

Area (nonpoint) sources are residential stationary sources and those industrial, commercial, and institutional stationary sources that are not classified as point sources. Emissions from area sources are estimated for entire source categories (e.g., residential natural-gas combustion) rather than for individual emission points. The attainment year emissions from area sources are from the 2005 NEI download for Hamilton County, as adjusted to 2007, that is provided in Appendix H. Emissions from aircraft, marine vessels, and railroads are also being listed as area sources and are from the 2005 NEI download for Hamilton County (unadjusted) that is provided in Appendix I. These emissions are tabulated in spreadsheets provided in Appendix K.

Onroad mobile sources include passenger cars and trucks, commercial trucks, buses, motorcycles, and motor homes. The attainment year emissions for onroad sources within Hamilton County were determined by using MOVES2010b (Motor Vehicle Emission Simulator), dated March 2012, which is the U.S. EPA's current model for estimating emissions from onroad sources. The resulting emissions from this model are provided in Appendix L and are tabulated in spreadsheets provided in Appendix M. Inputs to the model include the number of vehicles of each type, "vehicle miles travelled" by vehicle type and hour of day, vehicle age distribution, and road type distribution. These inputs were supplied by the Chattanooga Metropolitan Planning Organization (MPO). In addition, since the Tennessee Automobile Inspection and Maintenance (I/M) Program has been in effect in Hamilton County since April 1, 2005, the model input option for an I/M program was selected.

Nonroad mobile sources include construction equipment, agricultural equipment, and lawn care equipment. The attainment year emissions for nonroad sources within Hamilton County were determined by using NONROAD2008a, dated 2009, which is the U.S. EPA's current model for estimating emissions from nonroad sources. The resulting emissions from this model are provided in Appendix N. Inputs for the model were supplied by the U.S. EPA.

The emissions of PM<sub>2.5</sub>, NO<sub>x</sub>, and SO<sub>2</sub> from the various source types within Hamilton County during the attainment year are given in Table 3-1, which follows.



**Table 3-1. Attainment Year Emissions from Combined Sources in Hamilton County**

Source Type	2007 Emissions (tons/year)		
	PM <sub>2.5</sub>	NO <sub>x</sub>	SO <sub>2</sub>
Point	160.2	2,437.2	919.2
Area	875.4	3,415.1	332.6
Onroad	395.1	11,465.2	87.6
Nonroad	153.6	1,792.1	99.3
<b>Total</b>	<b>1,584.3</b>	<b>19,109.5</b>	<b>1,438.8</b>

### 3.1.2 Projected Emissions Inventory

Demonstration of future maintenance of the 1997 annual PM<sub>2.5</sub> NAAQS is required for a period of ten years following the presumed date of redesignation, which should end no later than 2025. This demonstration is being made by showing that projected emissions of each applicable pollutant (PM<sub>2.5</sub>, NO<sub>x</sub>, and SO<sub>2</sub>) for each of the years 2010, 2013, 2016, 2019, 2022, and 2025 from all sources combined within Hamilton County will not exceed the respective emissions of that pollutant for the attainment year of 2007.

The projected annual emissions from point sources were determined by applying Economic Growth Analysis System (EGAS) Version 5.0 factors for Hamilton County to the respective attainment year emissions. These growth factors are for point sources as grouped by North American Industry Classification System (NAICS) codes and are provided in Appendix F. The resulting emissions are tabulated in spreadsheets provided in Appendix G.

Three coal-fired boilers at the INVISTA, S.à r.l., LLC, plant in Hamilton County are subject to Consent Decree, Case No. 1:09-cv-00244-GMS, between the U.S. et al. and INVISTA. This consent decree established emission limitations for the combined boilers of at most 194 tons of NO<sub>x</sub> per year and 530 tons of SO<sub>2</sub> per year with an effective date of January 28, 2015. As a result, these maximum emissions are being ascribed to the boilers for years following 2015. Emissions of PM<sub>2.5</sub> were unaffected by the consent decree. During 2007, the combined boilers resulted in point-source emissions of 24.3 tons of PM<sub>2.5</sub>, 280.1 tons of NO<sub>x</sub>, and 566.8 tons of SO<sub>2</sub>.

Caraustar Mill Group, Inc., (doing business as Chattanooga Paperboard) previously operated two residual-oil-fired boilers and one natural-gas-fired boiler at their plant in Hamilton County. All operations at this plant ceased on July 22, 2008, and no emissions are therefore being ascribed to the boilers for years following 2008. During 2007, the combined boilers resulted in point-source emissions of 4.6 tons of PM<sub>2.5</sub>, 41.6 tons of NO<sub>x</sub>, and 122.5 tons of SO<sub>2</sub>.

The projected annual emissions from area sources were determined by applying EGAS Version 5.0 factors for Hamilton County to the respective attainment year emissions. These growth factors are for area sources as grouped by source classification codes (SCC) and are provided in Appendix J. The resulting emissions are tabulated in spreadsheets provided in Appendix K.

Projected emissions from onroad mobile sources within Hamilton County for 2025 were determined by using the MOVES2010b model. The resulting emissions from this model are provided in Appendix L and are tabulated in spreadsheets provided in Appendix M. Inputs for the model were supplied by the Chattanooga MPO. In addition, the model input option for an I/M program was not selected since the future status of the Tennessee I/M Program cannot be known. (The model run for 2025 results in 6.0% greater emissions of NO<sub>x</sub> and no change in the emissions of PM<sub>2.5</sub> and SO<sub>2</sub> when the I/M program option is not selected.) Emissions for the years 2010, 2013, 2016, 2019, and 2022 were calculated by linear interpolation between the respective emissions for 2007 and 2025.

The projected annual emissions from nonroad mobile sources within Hamilton County were determined by using the NONROAD2008a model. The resulting emissions from this model are provided in Appendix N. Inputs for the model were supplied by the U.S. EPA.

Projected annual emissions of PM<sub>2.5</sub>, NO<sub>x</sub>, and SO<sub>2</sub> from the various source types within Hamilton County are given in respective Tables 3-2, 3-3, and 3-4, which follow.

**Table 3-2. Projected Annual Emissions of PM<sub>2.5</sub> from Sources in Hamilton County**

Source Type	PM <sub>2.5</sub> Emissions ( <i>tons/year</i> )						
	2007	2010	2013	2016	2019	2022	2025
Point	160.2	156.3	158.2	169.2	180.7	193.1	205.8
Area	875.4	916.6	955.8	1,001.2	1,042.6	1,083.6	1,121.9
Onroad	395.1	342.0	288.9	235.8	182.7	129.6	76.5
Nonroad	153.6	141.6	123.7	101.0	82.4	70.4	63.5
<b>Total</b>	<b>1,584.3</b>	<b>1,556.5</b>	<b>1,526.6</b>	<b>1,507.3</b>	<b>1,488.4</b>	<b>1,476.7</b>	<b>1,467.8</b>

**Table 3-3. Projected Annual Emissions of NO<sub>x</sub> from Sources in Hamilton County**

Source Type	NO <sub>x</sub> Emissions (tons/year)						
	2007	2010	2013	2016	2019	2022	2025
Point	2,437.2	2,484.1	2,575.6	2,650.6	2,811.6	2,982.2	3,154.6
Area	3,415.1	3,638.0	3,835.2	4,089.8	4,348.5	4,609.0	4,880.6
Onroad	11,465.2	9,972.4	8,479.7	6,986.9	5,494.2	4,001.5	2,508.7
Nonroad	1,792.1	1,562.6	1,264.3	1,003.4	833.6	730.8	675.2
<b>Total</b>	<b>19,109.5</b>	<b>17,657.2</b>	<b>16,154.7</b>	<b>14,730.8</b>	<b>13,487.9</b>	<b>12,323.4</b>	<b>11,219.1</b>

**Table 3-4. Projected Annual Emissions of SO<sub>2</sub> from Sources in Hamilton County**

Source Type	SO <sub>2</sub> Emissions (tons/year)						
	2007	2010	2013	2016	2019	2022	2025
Point	919.2	797.5	808.1	798.0	819.4	842.1	865.6
Area	332.6	346.7	363.2	382.9	401.1	420.6	441.1
Onroad	87.6	77.1	66.5	56.0	45.5	34.9	24.4
Nonroad	99.3	25.9	15.2	14.2	14.7	15.3	15.9
<b>Total</b>	<b>1,438.8</b>	<b>1,247.2</b>	<b>1,253.2</b>	<b>1,251.1</b>	<b>1,280.7</b>	<b>1,312.9</b>	<b>1,346.9</b>

### 3.1.3 Safety Margins

The safety margin for each pollutant is the difference between the attainment year (2007) emissions from all categories (i.e., point, area, onroad mobile, and nonroad mobile) and the projected year 2025 emissions from all source categories. The safety margins are given below in Table 3-5.

**Table 3-5. Projected Annual Emissions from Combined Sources in Hamilton County**

Pollutant	Emissions (tons/year)		
	2007	2025	Safety Margin
PM <sub>2.5</sub>	1,584.3	1,467.8	<b>116.4</b>
NO <sub>x</sub>	19,109.5	11,219.1	<b>7,890.4</b>
SO <sub>2</sub>	1,438.8	1,346.9	<b>91.8</b>

The projected emissions decreases from 2007 to 2025 are 7.3% for PM<sub>2.5</sub>, 41.3% for NO<sub>x</sub>, and 6.4% for SO<sub>2</sub>.

### 3.1.4 Regulatory Programs

The Bureau, the Tennessee Department of Environment and Conservation, the Georgia EPD, and the U.S. EPA have previously implemented enforceable requirements that will facilitate maintenance with the annual PM<sub>2.5</sub> NAAQS. Regulatory programs that will remain in place for the Chattanooga maintenance area and nearby areas include the following:

- Chattanooga Air Pollution Air Pollution Control Ordinance;
- Hamilton County Air Pollution Control Regulation;
- Collegedale Air Pollution Control Ordinance;
- East Ridge Air Pollution Control Ordinance;
- Lakesite Air Pollution Control Ordinance;
- Lookout Mountain Air Pollution Control Ordinance;
- Red Bank Air Pollution Control Ordinance;
- Ridgeside Air Pollution Control Ordinance;
- Signal Mountain Air Pollution Control Ordinance;
- Soddy-Daisy Air Pollution Control Ordinance;
- Walden Air Pollution Control Ordinance;
- Seasonal open burning ban;
- “Standards of Performance for New Stationary Sources,” Title 40 *Code of Federal Regulations* Part 60;
- “National Emission Standards for Hazardous Air Pollutants,” Title 40 *Code of Federal Regulations* Part 61;
- “National Emission Standards for Hazardous Air Pollutants for Source Categories,” Title 40 *Code of Federal Regulations* Part 63;
- “Regulation of Fuels and Fuel Additives,” Title 40 *Code of Federal Regulations* Part 80;
- “Control of Emissions from New and In-Use Highway Vehicles and Engines” (Tier 2 standards), Title 40 *Code of Federal Regulations* Part 86;
- “NO<sub>x</sub> Budget Trading Program for State Implementation Plans” (NO<sub>x</sub> SIP Call), Title 40 *Code of Federal Regulations* Part 96, Subparts A–I;
- “Control of Emissions from New and In-Use Nonroad Compression-Ignition Engines,” Title 40 *Code of Federal Regulations* Part 1039;
- “Control of Emissions from New, Large Nonroad Spark-Ignition Engines,” Title 40 *Code of Federal Regulations* Part 1048;
- “Control of Emissions from Recreational Engines and Vehicles,” Title 40 *Code of Federal Regulations* Part 1051;

- Consent Decree, Case No. 1:09-cv-00244-GMS, between the U.S. et al. and INVISTA, S.à r.l., LLC
- Federal Facilities Compliance Agreement, Docket No. CAA-04-2010-1760, between the U.S. EPA and TVA;
- “Multipollutant Control of Electric Utility Steam Generating Units,” Georgia Rule 391-3-1-.02(2)(sss); and
- “SO<sub>2</sub> Emissions from Electric Utility Steam Generating Units,” Georgia Rule 391-3-1-.02(2)(uuu).

### 3.2 Verification of Continued Attainment

Continued attainment of the Chattanooga maintenance area with the 1997 annual PM<sub>2.5</sub> NAAQS shall be verified through operation of the four existing PM<sub>2.5</sub> FRM monitors in the area and through periodic emissions inventory updates. The three such monitors in Hamilton County are maintained and operated by the Bureau, and maintenance and operation of the monitor in Walker County is performed by the Georgia EPD. All of these monitors are operated in accordance with applicable provisions of “Ambient Air Quality Surveillance” (Title 40 *Code of Federal Regulations* Part 58). Required data from the four PM<sub>2.5</sub> FRM monitors is submitted quarterly to the U.S. EPA pursuant to §58.16 of Part 58.

Emissions from industrial, commercial, and institutional point sources that are permitted by the Bureau are updated continually and archived annually in the Bureau’s Emissions Inventory System. These emissions from point and nonpoint sources, as applicable, are reported to the NEI in accordance with the submittal schedule outlined in the “Air Emissions Reporting Requirements (AERR)” [Title 40 *Code of Federal Regulations* Part 51, Subpart A (§51.1–50)]. In addition, emissions of area, onroad mobile, and nonroad mobile sources are updated in the NEI every three years as required by the AERR. The most recent complete emissions inventory was submitted to the NEI in 2012 for calendar year 2011. The next complete emissions inventory, which will cover calendar year 2014, is due for submittal to the NEI in 2015.

### 3.3 Contingency Measures

§175A(d) of the Clean Air Act requires that the maintenance plan include contingency measures to be implemented, as necessary, to promptly correct any exceedance of the applicable NAAQS that might occur in the maintenance area. The Bureau has identified the following possible means for providing further reductions in emissions of PM<sub>2.5</sub> and/or its significant precursors as contingency measures for emission sources within Hamilton County:

- Reasonably available control technology (RACT) for point sources of PM<sub>2.5</sub> emissions not already covered by RACT, best available control technology (BACT), or reasonable and proper emission limitations;

- Reasonably available control measures (RACM) for area sources of PM<sub>2.5</sub> emissions;
- RACT for major point-sources of NO<sub>x</sub> emissions;
- RACT for minor point-sources of NO<sub>x</sub> emissions;
- RACM for area sources of NO<sub>x</sub> emissions;
- RACT for major point-sources of SO<sub>2</sub> emissions;
- RACT for minor point-sources of SO<sub>2</sub> emissions;
- RACM for area sources of SO<sub>2</sub> emissions; and
- Additional PM<sub>2.5</sub>, NO<sub>x</sub>, and/or SO<sub>2</sub> emissions reduction measures yet to be identified.

### 3.3.1 Contingency Measure Triggers

An exceedance of the 1997 annual PM<sub>2.5</sub> NAAQS of 15.0 µg/m<sup>3</sup> at any FRM monitor in the Chattanooga maintenance area, based on quality-assured and certified monitoring data as averaged over three consecutive calendar years, will “trigger” an evaluation to determine if contingency measures should be implemented. Furthermore, such an evaluation will also be triggered by the occurrence of any of the following conditions that may forewarn of a potential exceedance of the annual PM<sub>2.5</sub> NAAQS:

- An annual mean PM<sub>2.5</sub> concentration (average of quarterly-average concentrations) of **greater than or equal to 16.5 µg/m<sup>3</sup>** for the previous calendar year at any FRM monitor in the Chattanooga maintenance area, based on quality-assured and certified monitoring data;
- An annual mean PM<sub>2.5</sub> concentration (average of quarterly-average concentrations) of **greater than or equal to 15.5 µg/m<sup>3</sup>** for each of the previous two consecutive calendar years at any FRM monitor in the Chattanooga maintenance area, based on quality-assured and certified monitoring data;
- Total emissions of PM<sub>2.5</sub> in the most recent NEI for Hamilton County of **greater than 2,059 tons**, which is thirty percent more than the corresponding emissions for 2007 (the attainment year);
- Total emissions of NO<sub>x</sub> in the most recent NEI for Hamilton County of **greater than 24,842 tons**, which is thirty percent more than the corresponding emissions for 2007; and
- Total emissions of SO<sub>2</sub> in the most recent NEI for Hamilton County of **greater than 1,870 tons**, which is thirty percent more than the corresponding emissions for 2007.

### 3.3.2 Procedures for Adoption and Implementation of Contingency Measures

Upon occurrence of a contingency measure trigger, the Bureau will conduct a comprehensive evaluation to determine the cause(s) of the elevated ambient PM<sub>2.5</sub> concentrations or emissions inventory increase, to determine if an exceedance of the annual PM<sub>2.5</sub> NAAQS is likely to occur

or continue, and to determine whether or not the adoption and implementation of appropriate contingency measures is required for the further reduction of emissions of PM<sub>2.5</sub> and/or its significant precursors within Hamilton County. The evaluation will examine:

- Severity of the trigger condition;
- Potentially contributing emissions from sources within Hamilton County;
- Potentially contributing emissions resulting from regional or long-range transport;
- Potentially contributing meteorological conditions, if applicable;
- Emission trends for all source types;
- Future emissions reductions from any adopted or planned regulations or initiatives;
- Current and recently identified emission control technologies applicable to considered contingency measures;
- Emissions reduction potential of considered contingency measures;
- Technical and economic feasibility of considered contingency measures;
- Possible geographic limitations of considered contingency measures; and
- Implementation timeline of considered contingency measures.

The comprehensive evaluation will be completed and submitted to the U.S. EPA as expeditiously as practical, but no later than nine months after the contingency measure trigger occurs. If the Bureau determines, through the comprehensive evaluation, that the implementation of contingency measures is required for maintenance of the annual PM<sub>2.5</sub> NAAQS, any necessary rules for the implementation of these measures will be adopted within eighteen months following the date on which the trigger condition occurs. Furthermore, the appropriate contingency measures will be implemented within 24 months after the occurrence of the trigger condition. The Bureau will submit a revised implementation schedule to the U.S. EPA if it is determined that technical or economic considerations warrant additional time to fully implement the contingency measures. Adoption of any rules for the implementation of contingency measures is subject to necessary administrative and legal processes. No such rule will be adopted without providing an opportunity for full public participation through the issuance of public notices, the solicitation of input from interested and affected persons in the area, and the holding of a public hearing.

## 4.0 MOTOR VEHICLE EMISSIONS BUDGETS

“Conformity to State or Federal Implementation Plans of Transportation Plans, Programs, and Projects Developed, Funded or Approved Under Title 23 U.S.C. or the Federal Transit Laws” [the transportation conformity rule, Title 40 *Code of Federal Regulations* Part 93, Subpart A (§93.100–129)] requires that proposed, non-exempt highway and transit projects within the maintenance area conform to air quality goals before they can be federally funded. One requirement for a determination of conformity to be made is that, for each applicable pollutant, an intended project cannot result in annual emissions in excess of a pertinent motor vehicle emissions budget (MVEB). The MVEB for each pollutant applies to the final year covered by the maintenance plan and subsequent years. The Bureau is proposing MVEBs, applicable to 2025 and later, for all onroad mobile sources combined within Hamilton County. Similarly, MVEBs for the combined onroad mobile sources within Catoosa and Walker Counties have been proposed by the Georgia EPD that also cover years commencing with 2025.

### 4.1 Applicable Pollutants

Pollutants that must be addressed for transportation conformity purposes in PM<sub>2.5</sub> maintenance areas are identified in §93.119(f)(7) through (10) of the transportation conformity rule. These pollutants are:

- PM<sub>2.5</sub> [§93.119(f)(7)];
- Reentrained road dust *if* the U.S. EPA Regional Administrator or the director of the State air agency has made a finding that emissions from reentrained road dust within the area are a significant contributor to PM<sub>2.5</sub> nonattainment and has so notified the pertinent MPO and Department of Transportation (DOT) [§93.119(f)(8)];
- NO<sub>x</sub> *unless* the U.S. EPA Regional Administrator and the director of the State air agency have made a finding that emissions of NO<sub>x</sub> within the area are *not* a significant contributor to PM<sub>2.5</sub> nonattainment and have so notified the MPO and DOT [§93.119(f)(9)]; and
- VOCs, SO<sub>2</sub>, and/or ammonia *if* the U.S. EPA Regional Administrator or the director of the State air agency has made a finding that emissions of any such precursor within the area are a significant contributor to PM<sub>2.5</sub> nonattainment and has so notified the MPO and DOT [§93.119(f)(10)].

NO<sub>x</sub> must be addressed because no finding has been made that emissions of NO<sub>x</sub> are not a significant contributor to PM<sub>2.5</sub> nonattainment in the Chattanooga maintenance area. Reentrained road dust, VOCs, and ammonia are *not* required to be addressed because no finding has been made that emissions from reentrained road dust, emissions of VOCs, or emissions of ammonia are a significant contributor to PM<sub>2.5</sub> nonattainment in the maintenance area. Although SO<sub>2</sub> is a significant PM<sub>2.5</sub> precursor, it is *not* required to be addressed because



onroad mobile sources result in only 1.8% (24.4 tons) of the total projected SO<sub>2</sub> emissions for 2025 within Hamilton County.

Accordingly, the pollutants for which MVEBs will be established for onroad mobile sources within Hamilton County are PM<sub>2.5</sub> and NO<sub>x</sub>. These are also the two pollutants for which MVEBs were proposed by the Georgia EPD for onroad mobile sources within Catoosa and Walker Counties.

#### 4.2 Motor Vehicle Emissions Budgets Determination

The MOVES2010b model was used to estimate emissions of PM<sub>2.5</sub>, NO<sub>x</sub>, and SO<sub>2</sub> from onroad mobile sources within Hamilton County for 2025 and 2040 using both normal and “worst case” input scenarios. The worst-case input assumptions that were employed are:

- A ten percent increase in vehicle miles traveled for all vehicle types;
- A doubled rate of increase in population (and corresponding number of vehicles) from the population in 2010; and
- A two-year increase in the age of all vehicles.

Output data from the model runs is provided in Appendix L. The resulting emissions are calculated in spreadsheets provided in Appendix M and are given below in Table 4-1. The listed emissions for 2025, using normal input conditions, were previously included in Tables 3-2 (for PM<sub>2.5</sub>), 3-3 (for NO<sub>x</sub>), and 3-4 (for SO<sub>2</sub>). (The relatively low emissions of SO<sub>2</sub> throughout Table 4-1 substantiate that an MVEB for SO<sub>2</sub> is not necessary.)

**Table 4-1. Projected Annual Emissions from Onroad Sources in Hamilton County**

Pollutant	Emissions ( <i>tons/year</i> )			
	2025	2025 Worst Case	2040	2040 Worst Case
PM <sub>2.5</sub>	76.5	95.8	81.2	97.4
NO <sub>x</sub>	2,508.7	3,198.5	2,343.4	2,771.1
SO <sub>2</sub>	24.4	27.4	27.2	30.0

For 2025, using the worst-case input scenario rather than the normal input conditions results in emissions that are greater by 19.3 tons/year (25.2%) for PM<sub>2.5</sub> and 689.8 tons/year (27.5%) for NO<sub>x</sub>. These substantial differences between worst case and normal case emissions are much less than the respective safety margins, which were previously given in Table 3-5.

The worst case emissions of PM<sub>2.5</sub> for 2025 are only 1.6 tons/year lower than the worst-case PM<sub>2.5</sub> emissions for 2040 and are *higher* than the corresponding normal-case emissions for 2040 by 18.0% (14.6 tons/year). For NO<sub>x</sub>, the 2025 worst case emissions are both *higher* than the worst case emissions for 2040 by 15.4% (427.4 tons/year) and considerably *higher* than the normal case emissions for 2040 by 36.5% (855.1 tons/year). In addition, demonstration of future maintenance of the annual PM<sub>2.5</sub> NAAQS is required for a period of ten years following the presumed date of redesignation, which should end no later than 2025. Therefore, the projected 2025 worst case emissions of 100.0 tons/year for PM<sub>2.5</sub> and 3,200.0 tons/year for NO<sub>x</sub>, as rounded to the nearest “ten” with two significant figures then added, are being proposed as MVEBs for onroad mobile sources within Hamilton County. Incidentally, the projected 2040 worst case emissions for PM<sub>2.5</sub> also round to 100.0 tons/year, with the subsequent addition of significant figures. (For comparison, the Georgia EPD has proposed MVEBs for onroad mobile sources within Catoosa and Walker Counties combined of 44.2 tons/year for PM<sub>2.5</sub> and 1,386.5 tons/year for NO<sub>x</sub>.)

### 4.3 Safety Margin Allotments

The safety margin for each pollutant is the quantitative decrease in the combined point, area, onroad, and nonroad source emissions from 2007 (the attainment year) to 2025. For each pollutant, the amount of the proposed MVEB that exceeds the 2025 (normal case) emissions from onroad mobile sources must be provided by the available safety margin. The portion of each safety margin that is being allocated for its respective MVEB is given below in Table 4-2.

**Table 4-2. Safety Margin Allotments to Proposed Motor Vehicle Emissions Budgets**

Pollutant	Proposed MVEB <i>tons/year</i>	Safety Margin <i>tons/year</i>	Portion of Safety Margin Allocated for Proposed MVEB	
			<i>tons/year</i>	<i>percentage</i>
PM <sub>2.5</sub>	<b>100.0</b>	116.4	23.5	20.2%
NO <sub>x</sub>	<b>3,200.0</b>	7,890.4	691.3	8.8%

Allocating 23.5 tons/year of the PM<sub>2.5</sub> safety margin to the proposed MVEB for PM<sub>2.5</sub> emissions from onroad mobile sources still leaves 92.9 tons/year, or 79.8%, of the safety margin available to allow for potential PM<sub>2.5</sub> emission increases from other source types. The situation is even better for NO<sub>x</sub>, in which designating 691.3 tons/year of its safety margin to its proposed MVEB sets 7,199.1 tons/year, or 91.2%, of the NO<sub>x</sub> safety margin in reserve for potential increases from other sources of NO<sub>x</sub> emissions.

## 5.0 CONCLUSION

This document demonstrates that all requirements have been achieved in order for the Tennessee portion (Hamilton County) of the Chattanooga, Tennessee-Georgia, PM<sub>2.5</sub> nonattainment area to be redesignated by the U.S. EPA to attainment of the 1997 annual PM<sub>2.5</sub> NAAQS as a maintenance area. The U.S. EPA determined that the Chattanooga area has attained the 1997 annual PM<sub>2.5</sub> NAAQS as of May 31, 2011, based on quality-assured and certified monitoring data for the 2007–2009 period. Ample evidence is given in this document that attainment of the standard is due to permanent and enforceable reductions in emissions of PM<sub>2.5</sub> and its significant precursors, NO<sub>x</sub> and SO<sub>2</sub>. The Bureau's plan for maintaining attainment of the standard within Hamilton County is also presented in the document. This plan uses projected emissions to demonstrate future attainment, and it makes use of ambient air monitoring and emission inventories to verify continued attainment. Included in the plan are contingency measures for emission sources within Hamilton County that can be implemented, if necessary, to preclude the maintenance area exceeding the standard or to return the area to attainment. In addition, motor vehicle emissions budgets, as required by the U.S. EPA's transportation conformity rule, are contained in this document for onroad mobile source emissions of PM<sub>2.5</sub> and NO<sub>x</sub> within Hamilton County.

## **Appendix A**

Annual PM<sub>2.5</sub> Design Values and Annual Mean PM<sub>2.5</sub> Concentrations

Applicable Portions of PM<sub>2.5</sub> Design Value Reports  
from *[www.epa.gov/airtrends/values.html](http://www.epa.gov/airtrends/values.html)*

## **Appendix B**

“Source Apportionment of PM<sub>2.5</sub> in Georgia”

## **Appendix C**

### Power Plant Emissions Data

Facility Emissions Trends Reports  
from the U.S. EPA Clean Air Markets Division  
for Widows Creek, Bowen, and Hammond Power Plants

## **Appendix D**

### **Point Source Emissions Data**

Chattanooga-Hamilton County Air Pollution Control Bureau  
2003, 2004, 2005, 2006, 2008, 2009, and 2010 Emissions Inventory System Reports

## **Appendix E**

### 2007 Point Source Emissions Data

2005 National Emissions Inventory (NEI) Download  
for Hamilton County, Tennessee – Adjusted to 2007



## **Appendix F**

### **Point Source Emission Growth Factors**

Economic Growth Analysis System (EGAS) Version 5.0 Output  
by North American Industry Classification System (NAICS) Codes  
for Hamilton County, Tennessee – 2007 Base Year

## **Appendix G**

Point Source Emission Calculation Spreadsheets

## **Appendix H**

### 2007 Area Source Emissions Data

2005 National Emissions Inventory (NEI) Download  
for Hamilton County, Tennessee – Adjusted to 2007

## **Appendix I**

2005 Aircraft, Marine, and Railroad Source Emissions Data

2005 National Emissions Inventory (NEI) Download  
for Hamilton County, Tennessee

## **Appendix J**

### Area Source Emission Growth Factors

Economic Growth Analysis System (EGAS) Version 5.0 Output  
by Source Classification Codes (SCC)  
for Hamilton County, Tennessee – 2007 Base Year

## **Appendix K**

Area Source Emission Calculation Spreadsheets

## **Appendix L**

### **Onroad Source Emissions Data**

**MOVES2010b (Motor Vehicle Emission Simulator) Output  
for Hamilton County, Tennessee**

## **Appendix M**

Onroad Source Emission Calculation Spreadsheets



## **Appendix N**

### Nonroad Source Emissions Data

NONROAD2008a Emission Inventory Model Output  
for Hamilton County, Tennessee