

US EPA ARCHIVE DOCUMENT



STATE OF MISSISSIPPI
PHIL BRYANT
GOVERNOR
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
TRUDY D. FISHER, EXECUTIVE DIRECTOR

February 28, 2012

Ms. Gwendolyn Keyes Fleming
Regional Administrator
U.S. Environmental Protection Agency
Region 4
61 Forsyth Street, S.W.
Atlanta, Georgia 30303

Re: Response to EPA Recommendation for Ozone Designations for the State of Mississippi

Dear Gwen:

I am writing this letter on behalf of Governor Phil Bryant in response to your letter dated December 8, 2011 to then Governor Haley Barbour, with EPA's recommendation for attainment designations for the various counties in Mississippi.

As stated in your letter, Mississippi DEQ based its recommendations on preliminary 2009-2011 air quality data. In your letter, you stated that for EPA to consider 2009-2011 air quality data in the final designation decisions for this area, Mississippi must submit certified, quality assured 2009-2011 air quality data by February 29, 2012. We are pleased to inform you that we sent you the certified data on February 1, 2012. Based on that data our recommendations made to you in our October 27, 2011 letter stands and we recommend that based on the 2009-2011 certified data, that EPA should designate all the counties in Mississippi as "Attainment".

Upon review of your December 8, 2011 letter, we agree with all your proposed recommendations except for the inclusion of the urbanized portion of DeSoto County in the Memphis TN-MS-AR Area. In your letter you stated that EPA has preliminarily concluded that the urbanized portion of DeSoto County, MS should be included as part of the Memphis non-attainment area. In the same letter, EPA did commit to continue to work with our state regarding the appropriate boundary for DeSoto County, MS in association with the Memphis TN-MS-AR Area. EPA, as specified in Section 107(d)(1)(B)ii of the Clean Air Act, also gave the state the opportunity to submit additional technical information to support the states recommendation by February 29, 2012.

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Due to the expedited review process, we realize that your staff did not have all the current data and technical information for making the recommendation on December 8, 2011. We very much appreciate your staff taking the time to have a detailed technical meeting with MS DEQ staff on January 12, 2012. MS DEQ staff had an opportunity to share the technical data and received valuable feedback to complete the detailed analysis included with this letter. Attached you will find the detailed "Technical Support Document" which we believe makes it clear that at this time the EPA should not include DeSoto County in the 'Memphis Non-Attainment Area' and the entire DeSoto County should be designated as "Attainment". The monitoring data shows that there has been a decline in concentration at the DeSoto County Monitor since 2007 and that DeSoto County has been attaining the 2008 standard for the last 2 years. Pursuant to the Clean Air Act, Section 107(d)(1)(B)(ii), EPA is only required to use the Metropolitan Statistical Area as the presumptive boundary if the area will be designated as a Serious, Severe, or Extreme Area. Based on EPA's proposed implementation rule, the Memphis Non-Attainment Area will likely be designated as Marginal. Therefore, EPA has discretion on the Memphis Non-Attainment Area boundary determinations.

In 2004, DeSoto County was excluded from the Memphis Non-Attainment Area as EPA determined that the county did not significantly contribute to ozone levels in the Memphis area. Since that time, ozone concentrations have dropped significantly for all of the monitors in the area and both Crittenden and Shelby Counties have subsequently attained the 1997 ozone standard. Therefore, this exclusion did not adversely effect the ozone concentrations. Since the ozone levels have declined and DeSoto County is attaining the standard, there is no reason to reverse the previous determination.

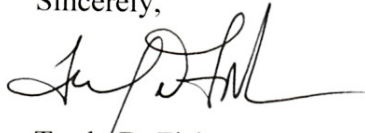
In accordance with EPA policy, there are nine factors to be considered in evaluating boundaries for designations of areas as non-attainment. In this report, MDEQ has analyzed each of the nine factors using the latest data and analysis. The analysis reveals overwhelmingly that DeSoto County does not contribute to violation of the ozone standard in neither Crittenden County, AR nor Shelby County, TN.

MS DEQ is committed to protecting the public health and welfare and we will continue to take an aggressive approach to better the air quality for the citizens of this state. We believe that we can do this more effectively through extensive outreach, public education, and voluntary measures without the burden of a non-attainment designation. Additionally, we have demonstrated our commitment in this regard through our proven track record in the last few years. With EPA having another opportunity to review the standard in 2013, MS DEQ strongly believes that EPA should not designate the DeSoto County as "Non-Attainment".

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We believe the attached Technical Document makes a strong case against including DeSoto County in the Memphis non-attainment boundary designations. If you or your staff have any questions, please contact me at 601-961-5000 or have a member of your staff contact Maya Rao of my staff at 601-961-5242.

Sincerely,

A handwritten signature in black ink, appearing to read 'Trudy D. Fisher', with a long horizontal flourish extending to the right.

Trudy D. Fisher
Executive Director

cc: Mississippi Governor Phil Bryant w/attachments
Senator Roger Wicker w/ attachments
Senator Thad Cochran w/ attachments
Congressman Alan Nunnelee w/ attachments
Michael Garriga, DeSoto County Administrator w/ attachments

2008 Ozone Standard Designation Recommendation for DeSoto County, Mississippi

Response to U.S. Environmental Protection Agency's 120 Day Letter



**Mississippi Department of Environmental Quality
Air Division
February 2012**

Summary

In 2004, DeSoto County was excluded from the Memphis Non-Attainment Area as EPA determined that the county did not significantly contribute to ozone levels in the Memphis area. Since that time, ozone concentrations have dropped significantly for all of the monitors in the area and both Crittenden and Shelby Counties have subsequently attained the 1997 ozone standard. Therefore, this exclusion did not adversely effect the ozone concentrations. Since the ozone levels have declined and DeSoto County is attaining the standard, there is no valid basis to reverse the previous determination.

Based on current monitoring data, the Governor of Mississippi recommended the designation of attainment for Desoto County. This recommendation is supported by current monitoring data, which shows that the Hernando monitor, located in DeSoto County, is attaining the standard of 75 ppb. The monitoring data shows that there has been a decline in concentration at the DeSoto County Monitor since 2007 and that DeSoto County has been attaining the 2008 standard for the last 2 years. Pursuant to the Clean Air Act, Section 107(d)(1)(B)(ii), EPA is only required to use the Metropolitan Statistical Area as the presumptive boundary if the area will be designated as a Serious, Severe, or Extreme Area. Based on EPA's proposed implementation rule, the Memphis Non-Attainment Area will likely be designated as Marginal. Therefore, EPA has discretion on the designation of the Memphis Non-Attainment Area.

On December 8, 2011 EPA recommended a partial non-attainment designation for DeSoto County. Due to the expedited review process, EPA relied on older data and completed only a five factor analysis for their boundary recommendation.

In accordance with EPA policy¹, there are nine factors to be considered in evaluating boundaries for designations of areas as non-attainment. In this report, MDEQ has analyzed each of the nine factors using the latest data and analysis. The analysis reveals overwhelmingly that DeSoto County does not contribute to violation of the ozone standard in neither Crittenden County, AR nor Shelby County, TN.

The first of the nine factors to consider is air quality data. Air monitoring data shows that DeSoto County has attained the standard for the last two years. Furthermore, all of the monitors in the proposed non-attainment designated area show a downward trend in ozone values. Accordingly, it is clear that DeSoto County does not contribute to the violations in Shelby or Crittenden counties based on analysis of this first factor.

The second factor to be considered is emissions data. DeSoto County has only three facilities which are classified as major sources of emissions, while Shelby and Crittenden counties have exponentially more emission sources. In addition, Shelby County has the Memphis International Airport, the number three rail center in the country and the International Port of Memphis. There are significant intermodal rail facilities in both Crittenden and Shelby counties. There are nine major truck centers in Crittenden County,

¹ Meyers Memorandum, *Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards*, Dec. 4, 2008



six in Shelby County, and only one in DeSoto County. EPA erred in attributing only population based and general traffic factors as indicators of contribution, as the proof is overwhelming that the commerce activity in these areas is a much higher contributor with the emissions in closer proximity to the violating monitors than the emissions in DeSoto County. Thus, the complete analysis of this factor clearly supports that DeSoto County does not contribute to the violations in Shelby or Crittenden Counties.

The third factor for consideration is population density and degree of urbanization. In support of its proposed designation, EPA states that DeSoto County has the second highest population in the area; however, a broader analysis reveals that DeSoto County is a very, very distant second compared to Shelby County. Further, the area of DeSoto County which is proposed to be included in the designated area is only moderately populated, and is a mere percentage of the total population and degree of urbanization of Shelby County. Based on this analysis, DeSoto County does not contribute to the violations of the ozone standard in Shelby County, Tennessee or Crittenden County, Arkansas.

The fourth factor for consideration is traffic and commuting patterns. An evaluation of commuter traffic and Vehicle Miles Traveled (VMT) reveals that DeSoto County pales in comparison to the commuting within Shelby County. Further, Shelby and Crittenden counties are both dissected by I-40, one of the busiest routes for heavy duty diesel trucks in the country. The percentage of traffic from heavy duty diesel trucks in Shelby County and Crittenden counties is almost two and three times, respectively, higher than that of DeSoto County. Significantly, the Shelby County Fraser monitor and the Crittenden County monitors are both in close proximity to I-40. When the level of commerce traffic is properly considered in evaluating this fourth factor, it is clear that DeSoto County does not contribute to the violations of the ozone standard in Shelby County, Tennessee or Crittenden County, Arkansas.

The fifth factor to be considered is growth rates and patterns. EPA cites a growth rate of 48% in Desoto County in the last decade, but the use of a percentage based rate of growth is misleading when looking at the total population in the entire Memphis MSA. Because of the relatively low 2000 population in Desoto County, even a 48% increase is still insignificant when compared to Shelby County and the entire Memphis MSA. Further, even while Desoto experienced this growth rate, the ozone values within the county, as well as the other monitors in the area, have steadily decreased. This plainly disproves EPA's reasoning that Desoto's growth rate contributes to violations of the ozone standard in Shelby and Crittenden counties.

The sixth factor to consider is meteorology. EPA relies in error on back trajectories to reach its determination that Desoto County should be included in the designated area; however, EPA failed to consider issues related to back trajectories specific to the Shelby County Fraser monitor. A more complete analysis reveals that light winds and distant monitoring of those light winds cause the back trajectory analysis to be unreliable. Available modeling from Crittenden County, as well as EPA itself, reveals that Desoto



County does not significantly contribute to ozone concentrations in Shelby County or Crittenden counties.

The seventh factor to be considered is geography and topography. Analysis of the geography in the area does not reveal any conditions which would affect the contribution of Desoto to the Shelby and Crittenden County monitors. The topography of the area ranges from the flat lowland of the Mississippi Delta in the west to rolling hills in the central and eastern part of the MSA. This factor does not appear to have a significant impact on the overall evaluation of the designation.

The eighth factor to be considered is jurisdictional boundaries. Desoto County is in a different state with different governances than Shelby County, TN and Crittenden County, AR. Since the emissions in Desoto County are such a small fraction of those in the other two counties, there is nothing Desoto County can do to impact violations in the other counties. If Desoto County were included in the designation area, Desoto County and the State of Mississippi would be significantly negatively impacted by a designation over which it has no control and over which it has no regulatory authority to impact in any way. Based on consideration of this factor, it would be an error to include Desoto in the non-attainment designation.

The ninth and final factor for consideration is the level of emission sources. Considering the low emissions in Desoto County, there are few measures that could be applied that would yield significant reductions. The few facilities in the county are well controlled. Further, both the county and the cities therein have already undertaken voluntary measures to reduce mobile and area source emissions, which measures have had a positive effect in lowering ozone in Desoto County. The EPA failed to examine the level of control of emissions in the area in making its proposed designation. MDEQ's thorough analysis of this factor reveals that in addition to industry meeting strict standards, the citizens and leadership of Desoto County have been proactive in reducing emissions. To now include Desoto in a non-attainment designation after all they have done to successfully reduce emissions would be counterproductive in every sense of the word.

MDEQ's more thorough evaluation of all nine factors which EPA is to consider in determining boundaries for areas of non-attainment reveals overwhelmingly that no part of Desoto County should be included in the designated area. Eight of the nine factors demonstrate powerfully that Desoto does not contribute to the violations of the standard in Crittenden and Shelby counties, and the ninth factor bears no impact either positively or negatively in the analysis. It would be an error to include Desoto County in the area designated for non-attainment.



Nine Factor Analysis

EPA recommends that the Metropolitan Statistical Area (MSA) or Combined Statistical Area (CSA) serve as the starting point for determining the geographic boundaries of an ozone non-attainment area. According to the Clean Air Act, Section 107(d)(1)(B)(ii), EPA is only required to use the Metropolitan Statistical Area as the presumptive boundary if the area will be designated as a Serious, Severe, or Extreme Area. Based in EPA's proposed implementation rule, the Memphis Non-Attainment Area will likely be designated as Marginal. Therefore, EPA has discretion on the designation of the Memphis Non-Attainment Area.

There are nine factors² that need to be evaluated in making the boundary determination. These factors are:

- Factor 1: Air quality data
- Factor 2: Emissions data (location of sources and contribution to ozone concentrations)
- Factor 3: Population density and degree of urbanization (including commercial development)
- Factor 4: Traffic and commuting patterns
- Factor 5: Growth rates and patterns
- Factor 6: Meteorology (weather/transport patterns)
- Factor 7: Geography/topography (mountain ranges or other air basin boundaries)
- Factor 8: Jurisdictional boundaries (e.g., counties, air districts, Reservations, metropolitan planning organizations)
- Factor 9: Level of control of emission sources

MDEQ has analyzed all factors using the latest data. Based on that analysis, eight of the nine factors clearly indicate that DeSoto County does not contribute to violation of the ozone standard in neither Crittenden County, AR nor Shelby County, TN. The analysis reveals that the ninth factor, Geography, gives no evidence of contribution and is not a significant factor in the analysis.

² See Footnote 1



Factor 1: Air quality data

Table 1 shows the 4th maximum concentrations for the 2008-2011 as well as the 2008-2010 and 2009-2011 design values. DeSoto County has attained the standard for the last two years. Figure 1 shows a downward trend in ozone values for all of the monitors in the area.

County	Site	4 th Annual Maximum 8-hour Ozone				3-Year Average 2008-2010	3-Year Average 2009-2011
		2008	2009	2010	2011		
DeSoto, MS	Hernando	74	71	76	73	73	73
Shelby, TN	Frayser	84	69	76	79	76	74
Shelby, TN	Orgill Park	77	70	73	77	73	73
Crittenden, AR	Marion	74	71	78	82	74	77

Table 1: Monitoring Data for the Memphis CSA³

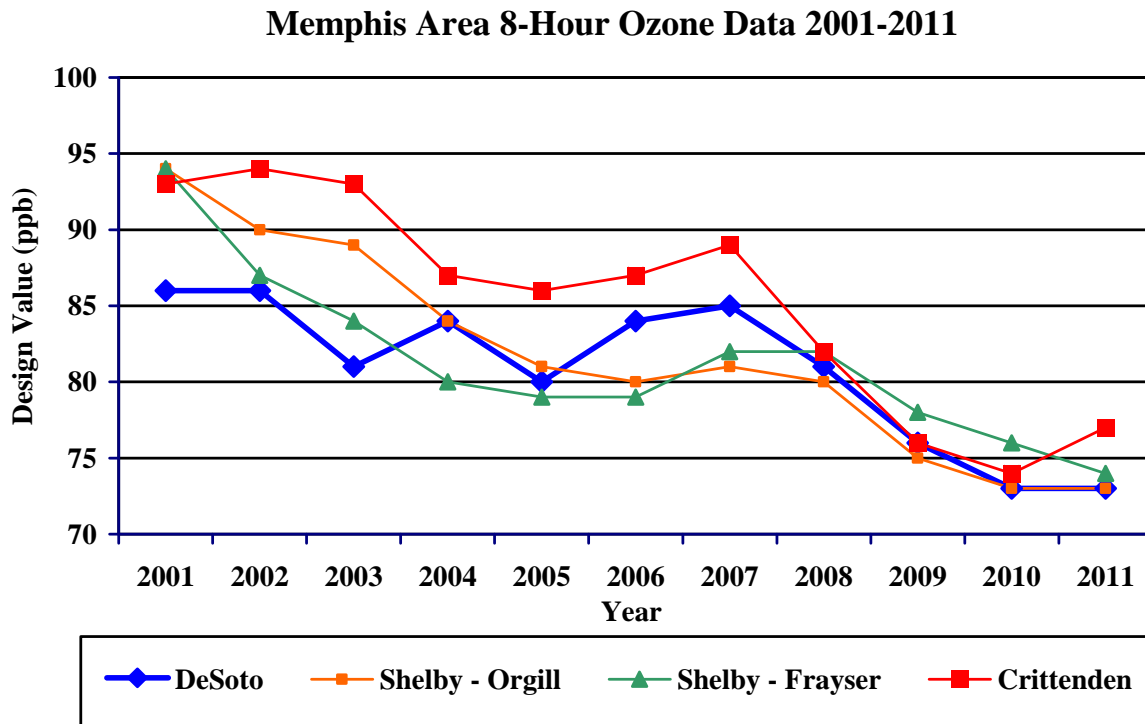


Figure 1: Ozone Design Value Trends for monitors in the Memphis CSA³

³ Mississippi Department of Environmental Quality, Shelby County Health Department, Arkansas Department of Environmental Quality



EPA's Technical Support Document (EPA-TSD), attached as Appendix 1, says that a county (or partial county) should be designated if it contributes to a violation in a nearby county. Several recent air quality modeling studies have shown that Mississippi counties do not significantly contribute to ozone concentrations in Shelby County, TN or Crittenden County, AR. The "Analysis of Three 2005 Crittenden County Ozone Study (CCOS) Episodes Using Air Quality Modeling Tools" (ADEQ, June 2007) report found that DeSoto County had an insignificant impact on the Shelby or Crittenden County Monitors.

Additionally, the analysis EPA performed for Clean Air Interstate Rule (CAIR) and Cross-State Air Pollution Rule (CSAPR) did not find any significant linkages for 8-hour ozone between Mississippi and Shelby County or Crittenden County. An analysis of the remaining factors also finds that DeSoto County does not contribute to the violations in Crittenden or Shelby Counties.

Since DeSoto County is attaining the current standards and an analysis of data relevant to the other factors finds that it does not contribute to the violations in Shelby or Crittenden counties, DeSoto County, or any part thereof, should not be included in the Memphis Non-Attainment Area.



Factor 2: Emissions data

Figure 2 is a detailed map of DeSoto, Shelby, and Crittenden Counties. Each of the four monitoring locations are marked with their corresponding ozone design values for 2008-2010 and 2009-2011. There is one monitor in DeSoto County which is reading in attainment of the 2008 ozone standard for both design values. There are two monitors in Shelby County. One monitor is in northern Shelby County and is reading in attainment for the 2008 ozone standard for both design values. The other monitor is within Memphis city limits near Interstate 240. This monitor is reading over the 2008 ozone standard for 2008-2010 but is under the limit for 2009-2011. The Crittenden County monitor is near the junction of Interstates 40 and 55 and meets the 2008 ozone standard for 2008-2010 but is over the standard for 2009 to 2011.

The Memphis International Airport located approximately three miles south of the central business district of Memphis and is home to the main FedEx Express global "SuperHub", which processes a significant portion of the freight carrier's packages. The airport also serves as a hub for Delta Airlines. Memphis is the number three rail center in the United States with significant intermodal rail facilities in both Crittenden and Shelby Counties.

The International Port of Memphis is 4th largest inland Port in the United States. The International Port of Memphis covers the Tennessee and Arkansas sides of the Mississippi River. The boundaries of the International Port of Memphis include the McKeller Lake/Presidents Island complex, the West Memphis Harbor, the Rivergate Harbor, the Wolf River Harbor downtown, and Fullen dock and harbor north of downtown.

Major air emission sources for each county are represented on the map as well as major truck centers (truck stops). As shown by the map, there are significantly more sources of emissions in Shelby County and in Crittenden County than in DeSoto County. There are nine truck centers in Crittenden County, six in Shelby County, and one in DeSoto County. All of the truck centers in Crittenden County are located within five miles of the ozone monitor. There are two locations in Crittenden County where major truck centers are too close to be accurately represented by separate markers. In these cases, the number of truck centers located at those points are labeled on top of the marker.



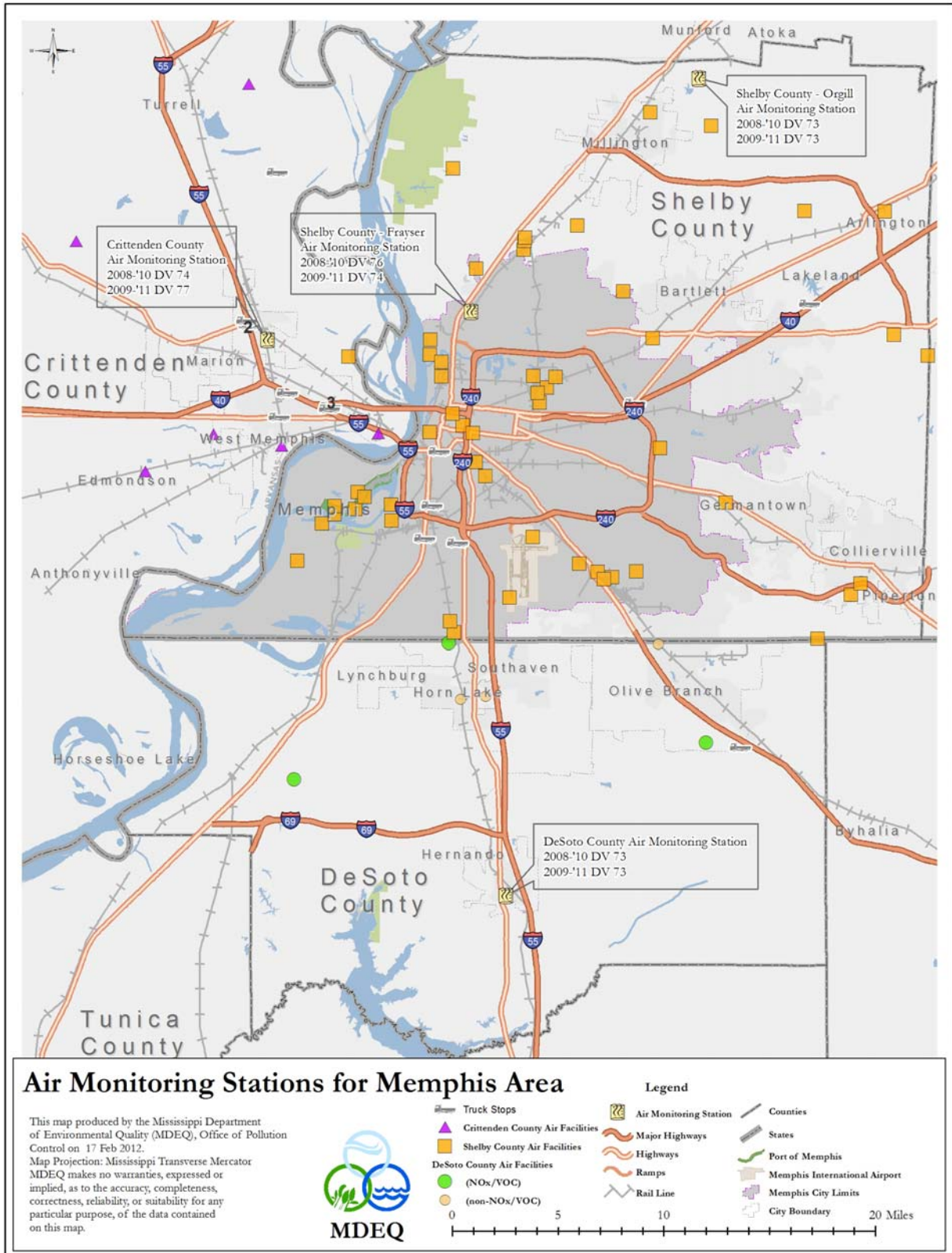


Figure 2: Monitor Locations in the Memphis CSA and Major Emission Sources

DeSoto County has a small number of major emission sources as shown in Figure 2. DeSoto County currently has two facilities that are classified as major sources of Nitrogen Oxides (NOx) and one facility classified as major sources of Volatile Organic Compounds (VOCs). Charts 1 and 2 show the NOx and VOC emissions from all source categories in DeSoto, Shelby, and Crittenden Counties. These charts demonstrate that the total emissions from DeSoto County are small in comparison to those from Shelby County.

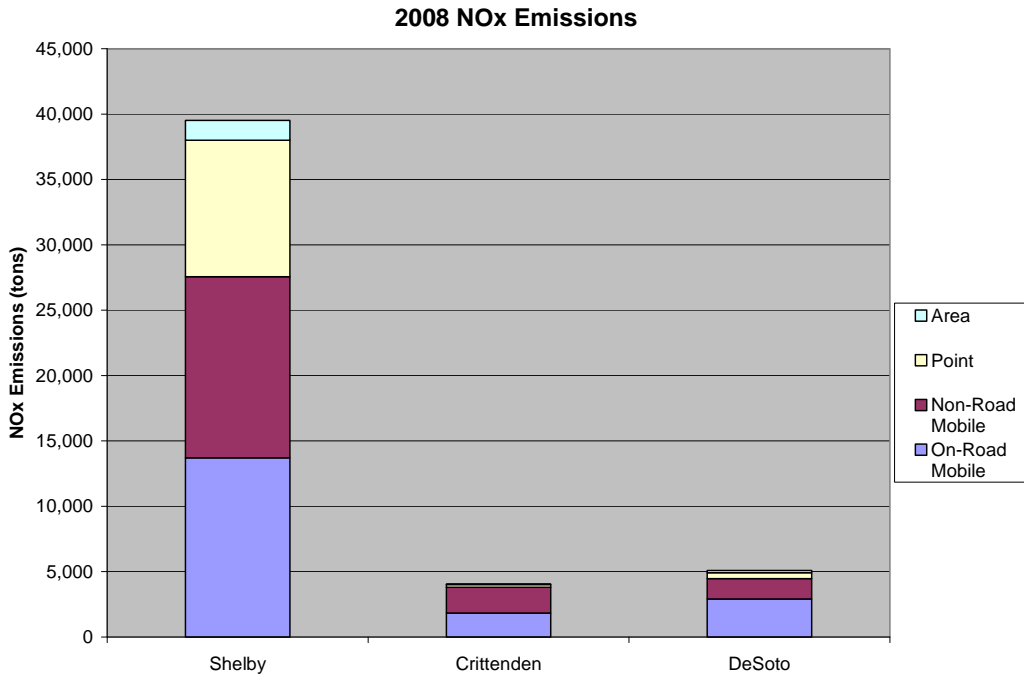


Chart 1: NOx and VOC Emission Comparison for Memphis CSA⁴

⁴ U.S. Environmental Protection Agency, 2008 National Emissions Inventory (NEI)



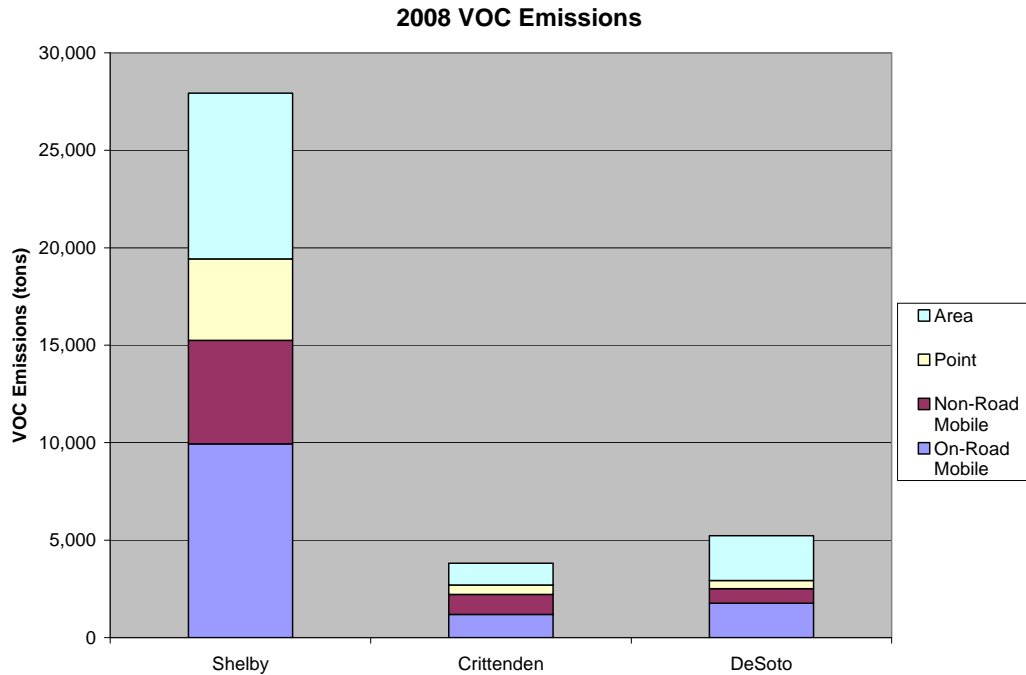


Chart 2: NOx and VOC Emission Comparison for Memphis CSA⁵

The EPA-TSD identifies that mobile and area source emissions are the primary contributors of ozone precursors in the area. However, it incorrectly identified population based and general traffic factors as the indicators of contribution. The Memphis area is a very busy freight hub that results in a high level of commerce based emissions. Interstate 40 runs through Shelby and Crittenden Counties and is one of the busiest interstates in the nation for heavy duty diesel truck traffic.

The Memphis/ West Memphis area is the number three rail center in the United States with significant intermodal rail facilities in both Crittenden and Shelby Counties. West Memphis Arkansas also has the highest diesel sales in the nation with nine truck centers. Many of the truck centers are grouped together and in close proximity to the Crittenden County monitor. Note from Figure 2 the proximity of the violating monitors to Interstate 40 and railroad lines. In addition, the Mississippi River carries a high volume of barge traffic that generates emissions and runs between Shelby and Crittenden Counties, both of which have river ports. The Memphis Airport is also the number one freight airport in the nation that has aircraft related emissions and generates a lot of truck traffic. Emissions from these sectors are not population based and are not centered in DeSoto County. This commerce activity is a much higher contributor with the emissions in closer proximity to the violating monitors than emissions in DeSoto County.

The overwhelming evidence of the emissions data demonstrates that DeSoto County does not contribute to violations of the ozone standard in Shelby County, TN or Crittenden County, AR and should not be included in the Memphis Ozone Non-Attainment Area.

⁵ See Footnote 5



Factor 3: Population density and degree of urbanization

The EPA-TSD states that “areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions that may contribute to ozone formation.” DeSoto County is also cited as having the second highest in population in the area. Chart 3 and 4 show the population density and degree of urbanization for DeSoto, Shelby and Crittenden Counties. While DeSoto County is second, it is a very, very distant second compared to Shelby County. As noted in Chart 3, DeSoto County is not densely populated. The southern portion of the county is largely rural with the northern portion being a moderately populated suburban area.

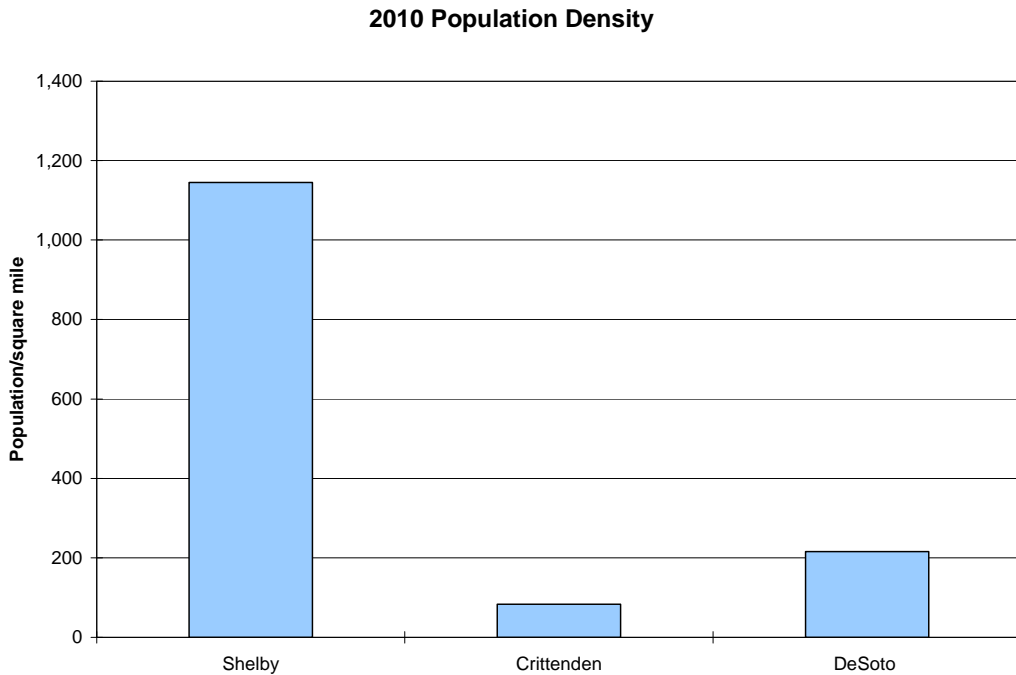


Chart 3: Population Density of Memphis CSA⁶

⁶ 2010 U.S. Census



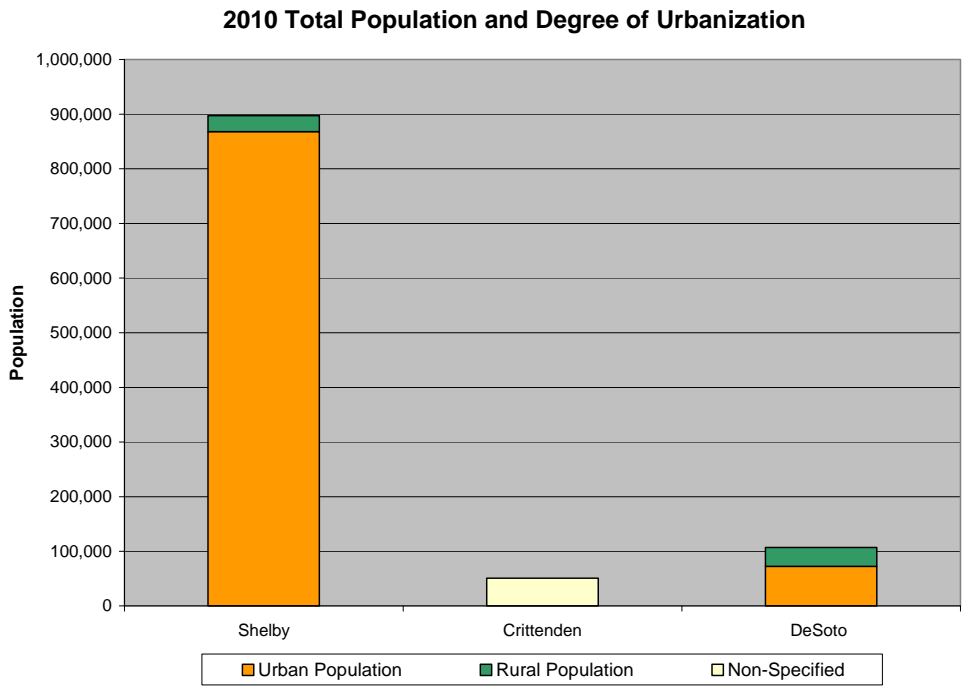


Chart 4: Total Population and Degree of Urbanization for Memphis CSA⁷

Based on the analysis of the population density and degree of urbanization, DeSoto County does not contribute to violations of the ozone standard in Shelby County, TN or Crittenden County, AR and should not be included in the Memphis Ozone Non-Attainment Area.

⁷ See Footnote 7



Factor 4: Traffic and commuting patterns

The overall amount of traffic from Mississippi Counties in the CSA is much smaller than that of Shelby County. Likewise, the number of commuters from the Mississippi Counties is much less than those from Shelby County. The amount of traffic is measured in Vehicle Miles Traveled (VMT) and is developed by the Mississippi and Tennessee Departments of Transportation. Chart 5 compares the traffic data for the Counties in the Memphis CSA.

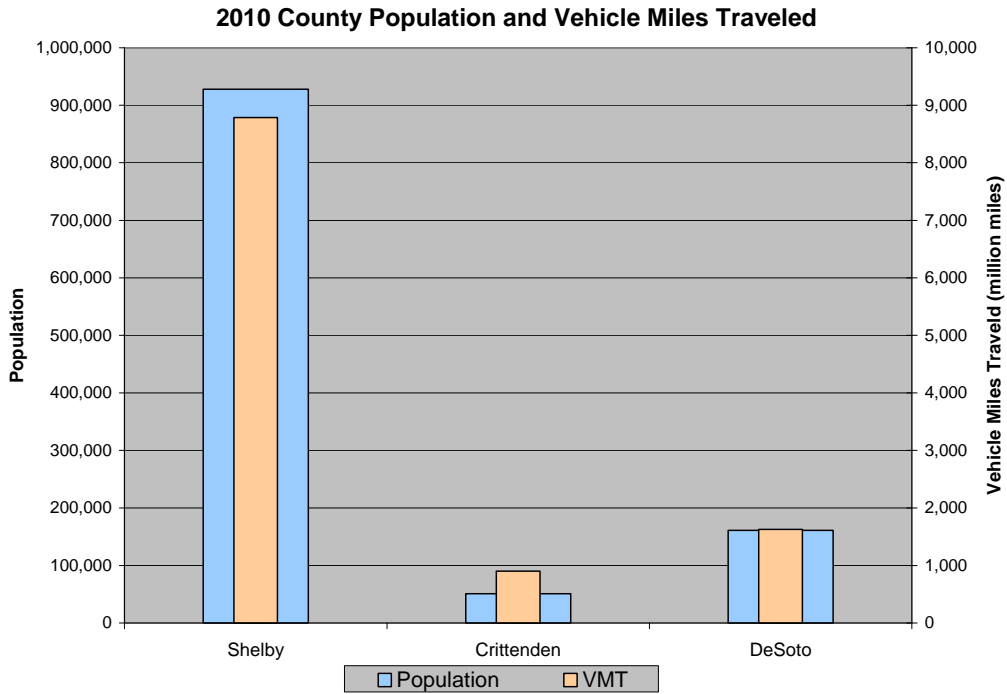


Chart 5: 2010 Population and Traffic Data^{8, 9}

⁸ See Footnote 7

⁹ U.S. Department of Transportation, Federal Highways Administration, Highway Performance Monitoring System



Commuting Patterns

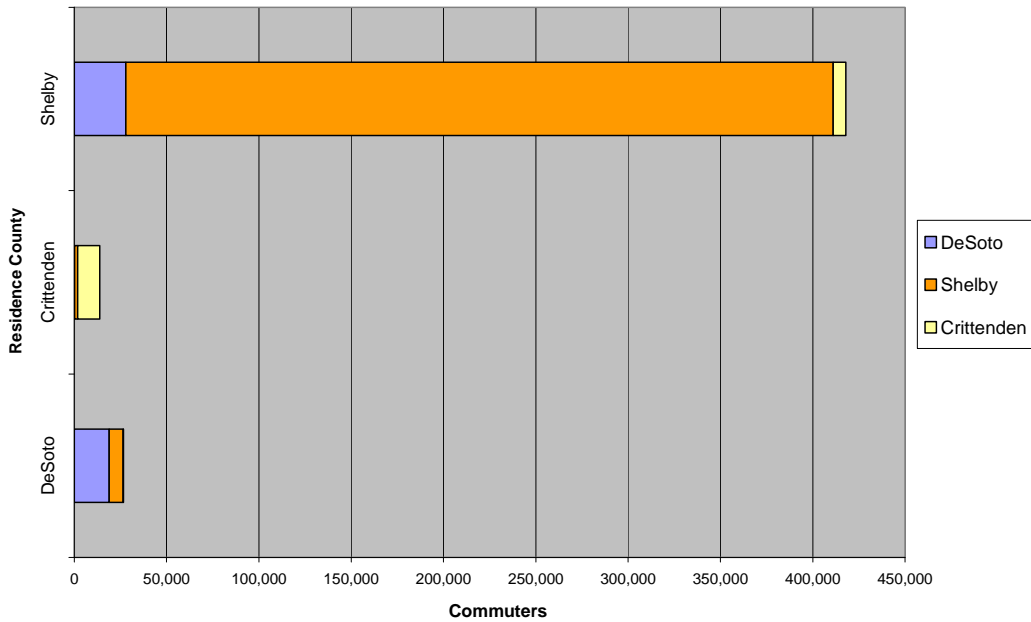


Chart 6: Commuting Patterns for Memphis CSA¹⁰

Because commuting data is not yet available for the 2010 census, data from the 2000 census was used to determine the commuting patterns. Chart 6 summarizes this information and shows that while there is some commuting between the Mississippi Counties and Shelby County, it pales in comparison to the commuting within Shelby County. The majority of all commuters remain in their perspective counties for their travel.

¹⁰ 2000 U.S. Census



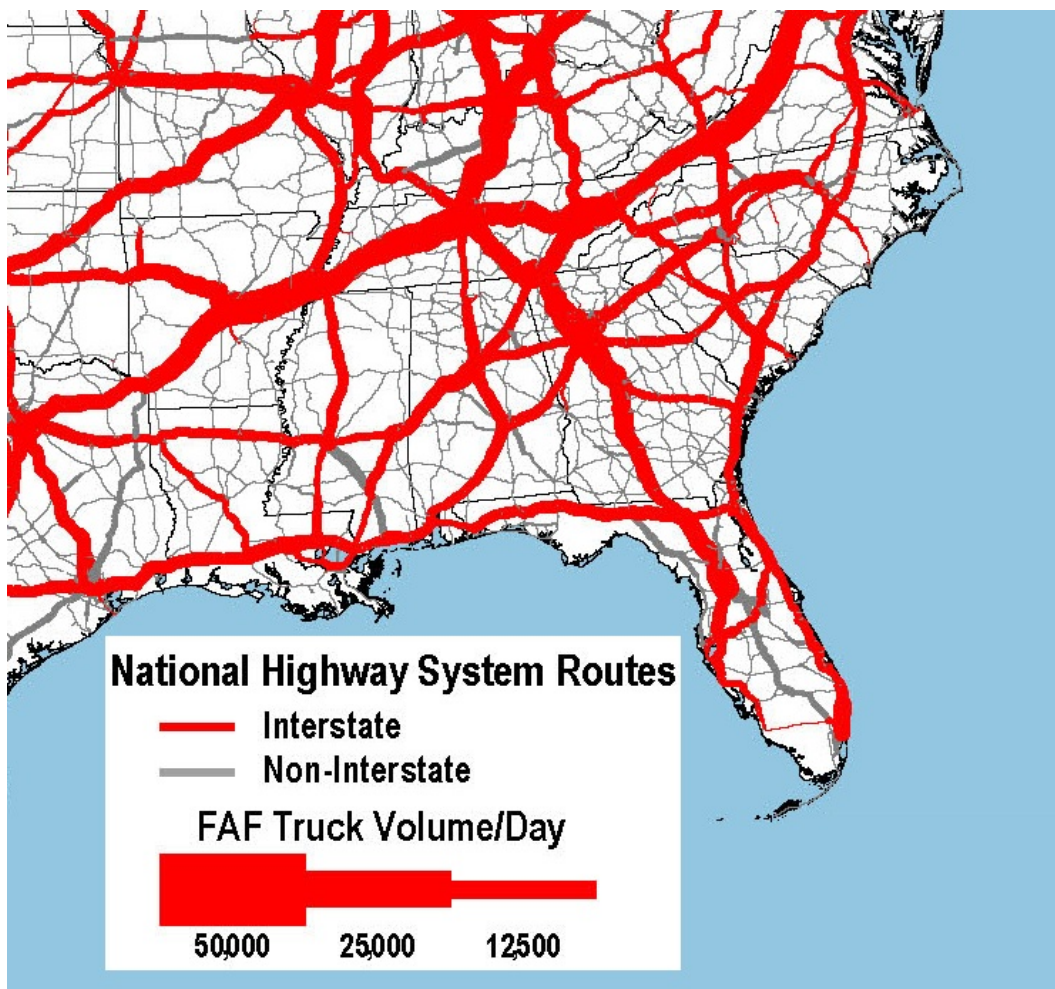


Figure 3: Average Daily Heavy Duty Diesel Truck Traffic (2007)¹¹

Of particular significance is the concentration of heavy duty diesel truck in Shelby and Crittenden Counties versus that of DeSoto County. Heavy duty diesel truck emissions are a significant source of NOx emissions. Figure 3 shows the truck traffic along the interstates across the southeast portion of the country.

Interstate 40 traverses from Wilmington, NC, across Tennessee and Arkansas (including Shelby and Crittenden Counties), to the west coast. I-40 is one of the busiest routes for heavy duty diesel truck traffic in the nation. Along I-40 over 50% of the traffic in Crittenden County¹² and 35% in Shelby County¹³ is from heavy duty diesel trucks. In DeSoto County¹⁴, 18% of the rural interstate traffic along I-55 is from heavy duty diesel trucks, which is slightly below the national rural interstate average¹⁴ of 19%. It should be

¹¹ U.S. Department of Transportation, Federal Highways Administration, Office of Freight Management, *Average Daily Long-Haul Truck Traffic on National Highway System, 2007*

¹² Arkansas State Highway and Transportation Department, *2010 Truck Percentages on the State Highway System Map*

¹³ Memphis MPO, Travel Demand Model

¹⁴ U.S. Department of Transportation, Federal Highways Administration, *Highway Statistics*

noted that, as seen in Figure 2, the Shelby County - Frayser monitor and the Crittenden County Monitor are both in close proximity to Interstate 40.

There are few local controls that can significantly reduce vehicle emissions. However, national vehicle emissions standards that EPA has implemented are resulting in significant reductions. MDEQ contracted with a consultant to model 2010 and 2020 peak hour on-road mobile emissions for DeSoto, Shelby and Crittenden Counties. The final report for the modeling is attached in Appendix 2 and the results are presented in Table 2. It is projected that there will be in an approximately 64% reduction in on-road mobile NOx emissions and a 56% reduction from on-road mobile VOC emissions across the three counties due to road and traffic improvement and emission reductions from tighter vehicle emission standards and fleet turnover. These reductions will result in decreases in ozone levels in the future and are independent of the ozone designations.

County	2010 to 2020 NOx Reductions (%)	2010 to 2020 VOC Reductions (%)
Shelby	63.68	56.26
Crittenden	65.63	58.40
DeSoto	63.55	55.25

Table 2: Projected Peak-Hour On-Road Mobile-Source Emissions Reductions¹⁵

Based on the analysis of the traffic and commuting patterns, DeSoto County does not contribute to violations of the ozone standard in Shelby County, TN or Crittenden County, AR and should not be included in the Memphis Ozone Non-Attainment Area.

¹⁵ Mississippi Department of Environmental Quality, Neel-Schaffer, Inc., *On-Road Mobile-Source Emissions Forecast For Desoto County, Mississippi (2010 to 2020)*, 2012



Factor 5: Growth rates and patterns

DeSoto County has experienced moderate growth, approximately 5% per year since 2000. However, the growth rate has slowed significantly since 2006. The EPA-TSD cites a growth rate of 48% over the last decade, but using a percentage based rate is misleading because of the counties relatively low 2000 population. The real increase in numbers is 53,000 people over the last decade. Compared to the population of Shelby County (927,000) or the entire Memphis MSA (1,316,000), the growth is not significant.

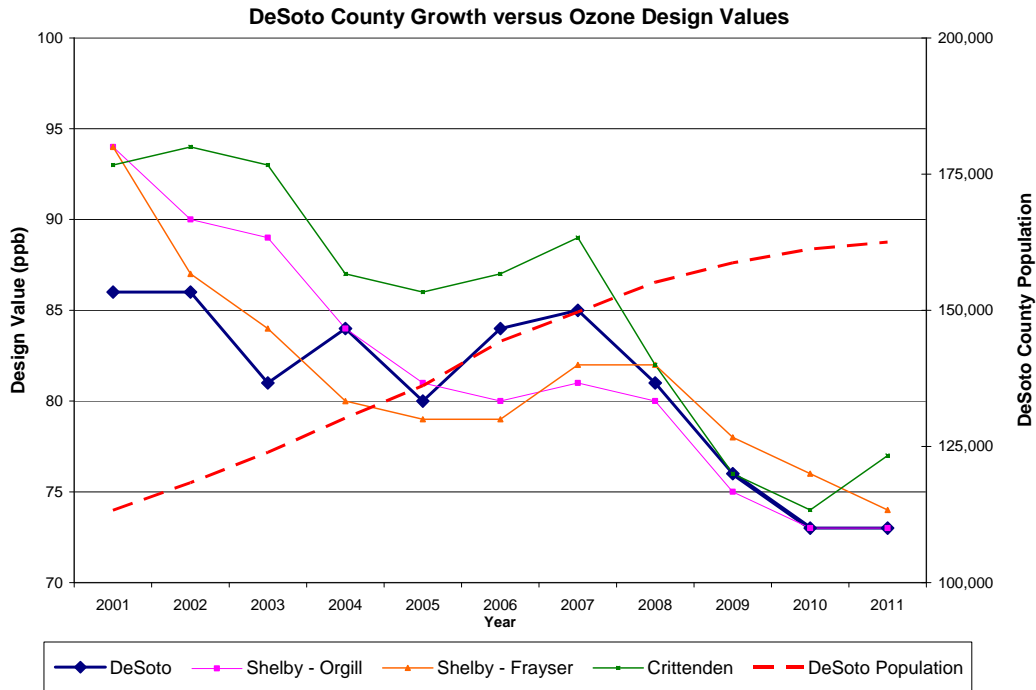


Chart 7: DeSoto County Growth versus Ozone Design Values¹⁶

In addition, while DeSoto County has experienced this growth, the ozone values in the County, as well as other monitors in the area, have steadily decreased. Chart 7 shows the growth trend and the ozone values since 2000. If the growth and population in DeSoto County were a contributing factor, then it be evidenced by increased ozone readings by the DeSoto County monitor.

Based on the analysis of the growth rate and patterns, DeSoto County does not contribute to violations of the ozone standard in Shelby County, TN or Crittenden County, AR and should not be included in the Memphis Ozone Non-Attainment Area.

¹⁶ See Footnotes 3 and 7



Factor 6: Meteorology (weather and transport)

Back Trajectories

In the EPA Technical Support Document, EPA used the NOAA HYSPLIT model to run 24-hour and 72-hour back trajectories at the Frayser – Shelby County ozone monitoring site during ozone exceedance days for the period of 2006 – 2010. The results seemed to indicate that many of the back trajectory centerlines passed through DeSoto County. However, the following issues should have been considered when performing such an analysis:

- On most days, 24-hour back trajectories were less than 200 miles long for the Frayser site during the period of 2006-2010.
- This indicates that the average wind speeds were less than 8 mph.
- When there is a light wind regime wind directions can vary significantly at the surface.
- HYSPLIT uses surface and upper air wind conditions to calculate back trajectories. In this case, surface winds from the Memphis NWS station were used, but the closest upper-air wind data site is located in Little Rock, Arkansas - ~130 miles from Memphis.
- HYSPLIT is not accurate under light wind conditions because of the light wind direction variability.

Because of these issues, a back trajectory analysis is unreliable in determining if transport was occurring on the ozone exceedance days. Therefore, it should not have been used as a factor in the determination of the Memphis Non-Attainment Area boundary.

Modeling

In the past, there have been air quality modeling studies that show that Mississippi counties do not significantly contribute to ozone concentrations in Shelby County, TN or Crittenden County, AR. The “Analysis of Three 2005 Crittenden County Ozone Study (CCOS) Episodes Using Air Quality Modeling Tools” (ADEQ, June 2007) report found that DeSoto County had an insignificant impact on the Shelby or Crittenden County Monitors. This can be seen in Chart 8.



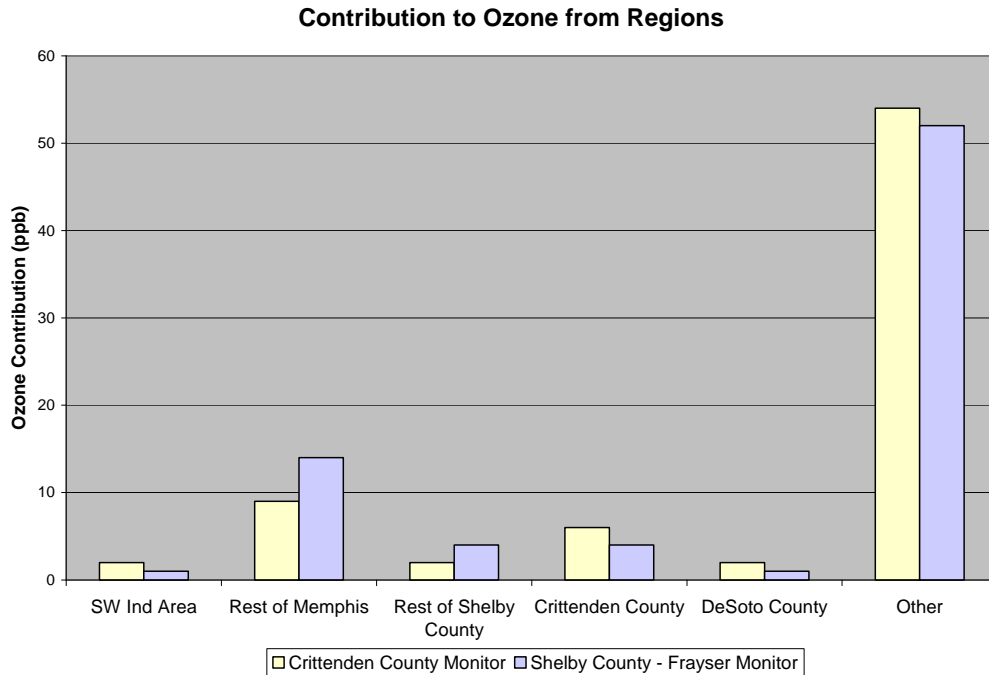


Chart 8: Contribution to Ozone from Regions¹⁷

In addition, the analysis that EPA performed for Clean Air Interstate Rule (CAIR) and Cross-State Air Pollution Rule (CSAPR) did not find any significant linkages for 8-hour ozone between Mississippi and Shelby County or Crittenden County. These rules were developed to particularly address the contribution of emissions from upwind states to downwind non-attainment or maintenance areas. While the rules address the emissions from Electric Generating Units, the analysis to determine contribution included emissions from all source categories.

Therefore, the available modeling data indicates that DeSoto County does not significantly contribute to ozone concentrations in Shelby County or Crittenden County. Based on the analysis of the meteorology, back trajectories, and modeling, DeSoto County does not contribute to violations of the ozone standard in Shelby County, TN or Crittenden County, AR and should not be included in the Memphis Ozone Non-Attainment Area.

¹⁷ Arkansas Department of Environmental Quality, *Analysis of Three 2005 Crittenden County Ozone Study (CCOS) Episodes Using Air Quality Modeling Tools*, June 2007



Factor 7: Geography and topography

The Mississippi counties in the Memphis MSA are located in northwestern Mississippi. DeSoto and Tunica counties border the Mississippi River. DeSoto and Marshall Counties border Tennessee while Tate is directly south of DeSoto County. The topography of the area ranges from the flat lowland of the Mississippi Delta in the west to rolling hills in the central and eastern part of the MSA. Analysis of the geography and topography does not show a DeSoto County contribution to violations of the ozone standard in Shelby County, TN or Crittenden County, AR and should not be factored in to include DeSoto County in the Memphis Ozone Non-Attainment Area.

Factor 8: Jurisdictional boundaries

DeSoto County is in a separate state with different governances than Shelby or Crittenden County. The DeSoto County monitor is attaining the standard. The emissions in the County are a small fraction of those in Shelby County and the evidence indicates that they are not contributing the violations in other counties. If Desoto County were included in the non-attainment area, neither DeSoto County nor Mississippi would be able to impact the monitors by controlling emissions and would have no authority to control emissions in the other states. DeSoto County and the State of Mississippi would be significantly negatively impacted by a designation over which it has no control and over which it has no regulatory authority to impact in any way.

DeSoto County was excluded from the Memphis Non-Attainment Area in 2004 because it was determined that the county did not significantly contribute to ozone levels in the Memphis area. Ozone concentrations have dropped significantly for all of the monitors in the area since the designation and both Crittenden and Shelby Counties have subsequently attained the 1997 ozone standard. Therefore, this exclusion did not adversely effect the ozone concentrations. Since the ozone levels have declined and DeSoto County is attaining the standard, there is no valid basis to reverse the previous determination.

Based on the precedence set by EPA in 2004 and the fact that DeSoto County has no control or authority over emissions impacting other monitors, it is illogical to include DeSoto County in the Memphis Non-Attainment Area. Therefore, DeSoto County should be excluded from the non-attainment designation.



Factor 9: Level of control of emission sources

Considering the low air emissions in DeSoto County, there are few measures that could be applied that would yield significant reductions. Overall, the few facilities in Mississippi are well controlled. Southaven Power is a newer gas cogeneration plant that meets BACT standards, Rexam Beverage Can has VOC capture and control devices to control emissions beyond NSPS requirements, and Texas Gas has voluntarily opted to include operational restrictions in its permit that reduces NO_x emissions during Ozone Season.

There have also been measures taken to reduce mobile and area source emissions in DeSoto County. Mississippi has revised the Air Pollution Regulations to prohibit all open burning on Ozone Action Days. Open Burning is banned on all days in Hernando. Also, DeSoto County and the cities within the county have enacted strict idle reduction policies to reduce mobile source emissions from the county. The program to develop Idle Reduction Policies in DeSoto County and sample policies from within the county are shown in Appendix 2.

Additionally, ninety-three of DeSoto County's school buses have been retrofitted with diesel oxidation catalysts (DOC). All of DeSoto County's buses have either DOCs installed or other technologies to meet current diesel emission standards. In the surrounding counties, MDEQ has retrofitted an additional 57 buses with DOCs. Furthermore, there have been nine MDEQ Diesel Emission Reduction Projects reflecting 35 pieces of diesel equipment in and around DeSoto County. Private companies have spent over \$100,000 of their own money as matching funds for these projects.

The DeSoto Planning Commission began the Ozone Action Group to engage public and private groups in finding emission reductions and providing public outreach. This group meets monthly to promote and encourage behavior by the general public that will result in beneficial emission reductions. MDEQ, DeSoto County Ozone Action Group, and the DeSoto County Planning Commission have engaged in numerous outreach events throughout the county. A puppet show was also developed as an additional outreach tool for schools and public outreach. Outreach activities are listed in Appendix 4.

The Mississippi Department of Transportation (MDOT) has spent over \$1 million in the Safe Routes to School program, sidewalks, and bike path improvements in DeSoto County and has conducted an I-69 Corridor Alternatives Analysis to study preferred mass transit options for DeSoto County.

The EPA-TSD fails to examine the level of control of emissions in the area. A proper examination of this factor shows that in addition to industry that meets strict standards, the citizens and leadership of DeSoto County have also been proactive in reducing emissions.

As shown in this section, DeSoto County, MDEQ, and their strategic partners have been proactive in reducing emissions in the county. An arbitrary decision by EPA to include



DeSoto County in a non-attainment area would hinder these efforts. Therefore, DeSoto County should be excluded from the Memphis Non-Attainment Area.

Conclusion

Based on the analysis of the nine factors specified by EPA to be considered in determining the boundaries of the area to be designated as non-attainment, the evidence is overwhelming that Desoto does not contribute to the violation of standards in Crittenden County, AR, and Shelby County, TN. Eight of the nine factors fall in favor of excluding Desoto County from the area of non-attainment, and the ninth factor bears no impact on the analysis. Desoto was properly excluded from the designation in 2004, and since that time, has only improved upon its efforts to control and reduce emissions in the county. EPA should re-evaluate its decision in light of the additional information provided in this report, and should exclude Desoto County from the designated area.



Appendix 1: EPA's Technical Support Document -
Mississippi Area Designations for the 2008 Ozone
National Ambient Air Quality Standards



Mississippi Area Designations for the 2008 Ozone National Ambient Air Quality Standards

The table below identifies the areas and associated counties or parts of counties in Mississippi that EPA intends to designate as nonattainment for the 2008 ozone national ambient air quality standards (2008 ozone NAAQS). In accordance with section 107(d) of the Clean Air Act, EPA must designate an area (county or part of a county) “nonattainment” if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. The technical analyses supporting the boundaries for the individual nonattainment areas are provided below.

Intended Nonattainment Areas in Mississippi

Area	Mississippi’s Recommended Nonattainment Counties	EPA’s Intended Nonattainment Counties
Memphis, TN-MS-AR*	None	DeSoto(partial)

*Memphis, TN-MS-AR is a multi-state nonattainment area. Table 1 below identifies the counties in the other states that EPA intends to designate as part of the nonattainment area.

EPA intends to designate the remaining counties in Mississippi that are not listed in the table above as “unclassifiable/attainment” for the 2008 ozone NAAQS.

The analysis below provides the basis for intended nonattainment area boundaries. It relies on our analysis of whether and which monitors are violating the 2008 ozone NAAQS, based on certified air quality monitoring data from 2008-2010 and an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight of evidence analysis considering the factors identified below and other relevant information. EPA issued guidance on December 4, 2008 that identified these factors as ones EPA would consider in determining nonattainment area boundaries and recommended that states consider these factors in making their designations recommendations to EPA.¹

1. Air quality data (including the design value calculated for each Federal Reference Method monitors or Federal Equivalent Method (FEM) monitor in the area);
2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography and topography (mountain ranges or other basin boundaries);
5. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))

Ground-level ozone generally is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. Because NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards, EPA believes it is important to consider whether there are contributing emissions from a broad geographic area. Accordingly, EPA chose to examine the 5 factors with respect

¹ The December 4, 2008 guidance memorandum “Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards” refers to 9 factors. In this technical support document we have grouped the emissions-related factors together under the heading of “Emissions and Emissions-Related Data,” which results in 5 categories of factors.

to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) associated with the violating monitor(s).² All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by states or tribes.

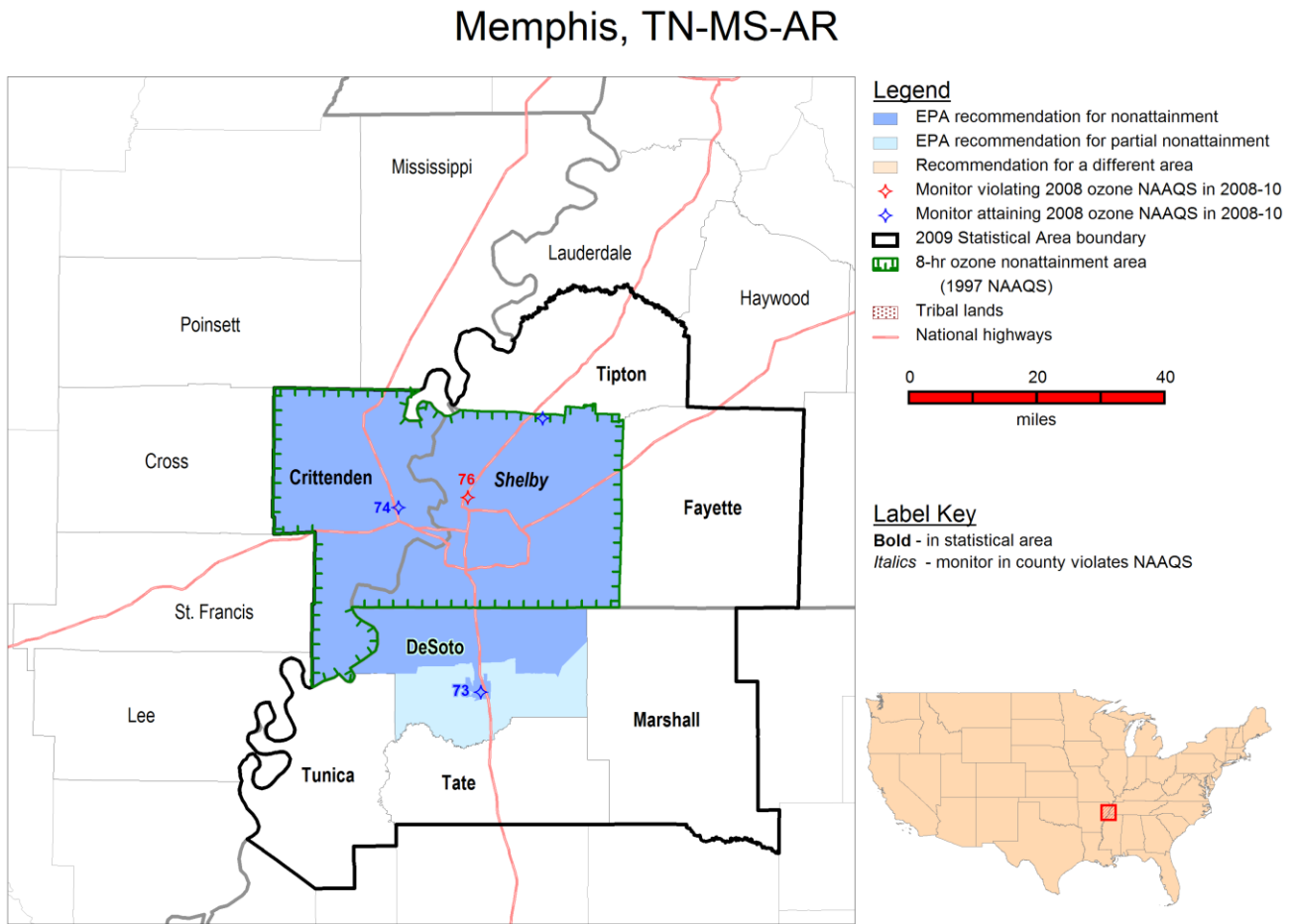
In EPA's designations guidance for the 2008 ozone NAAQS EPA recommended examining CSA/CBSAs because certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. Congress required a similar approach in 1990 for areas classified as serious or above for the 1-hour ozone standard and EPA used the same basic approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's guidance recommended using the boundary of the county containing the violating monitor as the starting point for considering the nonattainment area's boundary.

² Lists of CBSAs and CSAs and their geographic components are provided at www.census.gov/population/www/metroareas/metrodef.html. The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

Technical Analysis for Memphis, TN-MS-AR

Figure 1 is a map of the Memphis, TN-MS-AR intended nonattainment area. The map provides other relevant information including the locations and design values of air quality monitors, county and other jurisdictional boundaries, relevant statistical area boundaries, the nonattainment area boundary for 1997 ozone NAAQS, and major transportation arteries.

Figure 1. TN-MS-AR Nonattainment Area



For purposes of the 1997 8-hour ozone NAAQS, portions of this area were designated nonattainment. The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire counties of Crittenden County, Arkansas, and Shelby County, Tennessee.

In March 2009, Mississippi recommended that DeSoto County, Mississippi be designated as a nonattainment area separate from the Memphis nonattainment area for the 2008 ozone NAAQS based on air quality data from 2006-2008. Mississippi provided an update to the original recommendation in October 2011 based on air quality data from 2008-2010, and preliminary data from 2009-2011. In its updated recommendation, Mississippi recommended that all counties in the State be designated

attainment for the 2008 ozone NAAQS. Letter from Haley Barbour, Governor of the State of Mississippi to A. Stanley Meiburg, Acting Regional Administrator, US EPA Region 4 (March 3, 2009) and Gwendolyn Keyes Fleming, Regional Administrator US EPA Region 4 (October 27, 2011) (on file with US EPA Region 4). Also, in March 2009, Tennessee recommended that Shelby County be designated “nonattainment” for the 2008 8-hour ozone standard based on air quality data from 2006-2008. Letter from James H. Fyke, Commissioner, State of Tennessee Department of Environment and Conservation to A. Stanley Meiburg, Acting Regional Administrator, US EPA Region 4 (March 10, 2009) (on file with US EPA Region 4). Tennessee provided an update to its original recommendation in November 2011 based on preliminary 2009-2011 air quality data. In Tennessee’s updated recommendation, the state did not provide a specific update to its 2009 recommendation for the Memphis TN-MS-AR but stated that all other counties (with the exception of those recommended for Knoxville) should be designated unclassifiable/attainment. Letter from Robert J. Martineau Jr, Commissioner, State of Tennessee Department of Environment and Conservation to Gwendolyn Keyes Fleming, Regional Administrator, US EPA Region 4 (November 8, 2011) (on file with US EPA Region 4).

Additionally, in March 2009, Arkansas recommended that Crittenden County, Arkansas be designated nonattainment based on 2006-2008 air quality data. Arkansas did not update its 2009 ozone recommendation. These data are from FEM monitors sited and operated in accordance with 40 CFR Part 58. Letter from Mike Beebe, Governor of the State of Arkansas to Lawrence E. Starfield, Acting Regional Administrator, US EPA Region 6 (March 10, 2009) (on file with US EPA Region 6).

After considering these recommendations and based on EPA's technical analysis described below, EPA intends to designate one county in Arkansas, one county (partial) in Mississippi, and one county in Tennessee (identified in Table 1 below) as nonattainment for the 2008 ozone NAAQS as part of the Memphis, TN-MS-AR multi-state nonattainment area.

Table 1. State's Recommended and EPA’s Intended Designated Nonattainment Counties for Memphis, TN-MS-AR.

Memphis, TN-MS-AR	State-Recommended Nonattainment Counties	EPA Intended Nonattainment Counties
Arkansas	Crittenden	Crittenden
Mississippi	None	DeSoto (partial)
Tennessee	None	Shelby

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in parts per billion (ppb)) for air quality monitors in counties in the Memphis, TN-MS-AR area based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with fully-certified air quality data. A monitor’s DV is the metric or statistic that indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 75 ppb or less. A DV is only valid if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the DV for the county or area is determined by the monitor with the highest level.

The 2010 DVs for the ozone NAAQS for counties in the Memphis and nearby surrounding area are shown in Table 2.

Table 2. Air Quality Data³.

County	State Recommended Nonattainment?	2008-2010 Design Value (ppb)
Crittenden, AR	Yes	74
DeSoto, MS	No	73
Shelby, TN	No	76

Shelby County, Tennessee shows a violation of the 2008 ozone NAAQS, therefore this county is included in the nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area. Each county without a violating monitor that is located near a county with a violating monitor has been evaluated, as discussed below, based on the five factors and other relevant information to determine whether it contributes to the nearby violation.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NO_x and VOC) and other emissions-related data that provide information on areas contributing to violating monitors.

Emissions Data

EPA evaluated county-level emission data for NO_x and VOC derived from the 2008 National Emissions Inventory (NEI), version 1.5. This is the most recently available NEI. (See <http://www.epa.gov/ttn/chief/net/2008inventory.html>) Significant emissions levels in a nearby area indicate the potential for the area to contribute to observed violations. We will also consider any additional information we receive on changes to emissions levels that are not reflected in recent inventories. These changes include emissions reductions due to permanent and enforceable emissions controls that will be in place before final designations are issued and emissions increases due to new sources. The precursor emission source-category percentages used below and throughout the document were derived from emissions data from the 2008 NEI version 1.5 referenced above.

Table 3 shows emissions of NO_x and VOC (given in tons per year (tpy)) for violating and nearby counties that we considered for inclusion in the Memphis, TN-MS-AR area.

Table 3. Total 2008 NO_x and VOC Emissions.

County	State Recommended Nonattainment	NO _x (tpy)	VOC (tpy)
Crittenden, AR	Yes	4,047	3,805
DeSoto, MS	No	5,080	5,222
Fayette, TN	No	2,385	1,406
Marshall, MS	No	1,769	1,527

³ Only counties in the Memphis CBSA that have ozone monitors are included in this table.

Shelby, TN	No	39,519	27,929
Tate, MS	No	3,102	1,392
Tipton, TN	No	2,119	2,251
Tunica, MS	No	1,598	1,096
Areawide:		59,619	44,628

*Counties that EPA intends to designate as nonattainment are shown in bold.

DeSoto County contributes about 9 percent NOx and 12 percent VOC precursor emissions in the CBSA. The County’s 5,080 NOx emissions are mostly comprised of 45 percent area sources, 35 percent mobile sources. DeSoto County’s total VOC emissions include 44 percent area sources and 34 percent mobile sources.

Shelby County contributes about 66 percent of the NOx and 63 percent of the VOC precursor emissions in the CBSA. Shelby makes up 23 percent of the entire CBSA NOx emissions and 22 percent of the area’s VOC emissions. Of the county’s 39,519 NOx emissions, 35 percent are from point and mobile emissions and 20 percent from area source emissions. The County’s 27, 929 VOC emissions include 36 percent mobile sources and 32 percent area sources.

Crittenden County contributes less than 10 percent of the precursor CBSA emissions. Of the County’s total NOx emissions listed in Table 1, 45 percent are from mobile sources and 34 percent from area sources. The County’s total VOC emissions include 35 percent from area sources and 31 percent from mobile sources. Only 5 percent of the County’s NOx emissions are from point sources. Both Crittenden and DeSoto Counties represent less than 1 percent of the entire area’s NOx and VOC point source emissions

Fayette and Tipton Counties in Tennessee and Marshall, Tate, and Tunica counties in Mississippi all contribute 5 percent or less NOx and VOC precursor emissions in the CBSA.

Together, Crittenden, DeSoto and Shelby Counties account for 82 percent of the NOx emissions and 83 percent of the VOC emissions for the 8-county area. The emissions from Fayette and Tipton Counties in Tennessee and Marshall, Tate and Tunica Counties in Mississippi are not thought to contribute to the violations of the 2008 ozone NAAQS that have been observed by monitors in Shelby County, Tennessee and Crittenden County, Arkansas.

Population density and degree of urbanization

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. These include ozone-creating emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions that may contribute to ozone formation. Rapid population or VMT growth (see below) 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 area associated with the area source and mobile source emissions as part of the nonattainment area. Table 4 shows the population, population density, and population growth information for each county in the area.

Table 4. Population and Growth.

County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Crittenden, AR	Yes	50,902	0.08	(75)	<1%
DeSoto, MS	No	161,252	0.32	52,584	+48%
Fayette, TN	No	38,413	0.05	9,313	+32%
Marshall, MS	No	37,144	0.05	2,093	+6%
Shelby, TN	No	927,644	1.18	29,393	+3%
Tate, MS	No	28,886	0.07	3,444	+14%
Tipton, TN	No	61,081	0.13	9,545	+19%
Tunica, MS	No	10,778	0.02	1,557	+17%
Areawide:		1,316,100	0.28	107,854	+9%

*Counties that EPA intends to designate as nonattainment are shown in bold.

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011

(http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTP_L2.STO5&prodType=table)

DeSoto County, Mississippi is moderately populated in the northern portion of the county and mostly rural in the remaining portion of the County. DeSoto County contains 12 percent of the CBSA population, but experienced 48 percent growth from 2000-2010. Tate, Tunica and Marshall Counties in Mississippi all make up 3 percent or less of the CBSA population and are sparsely populated.

Shelby County, Tennessee is densely populated containing 70 percent of the CBSA population. From 2000-2010, the County only had 3 percent growth in population. Fayette and Tipton County in Tennessee had moderate growth from 2000-2010 but are sparsely populated.

Crittenden County, Arkansas had less than 1 percent population growth from 2000-2010 and contains only 4 percent of the CBSA population. The County is mostly rural with little urbanization.

The attachment to this document contains Figure 2, Memphis Area Ozone and Ozone Precursor Monitoring Network, and Figure 3, Population Density Change Percentage Between 2000 and 2010 Census for Memphis Ozone and Ozone Precursor Monitoring Network, which present graphical information on population density and growth for the Memphis area.

Traffic VMT Data and Commuting Patterns

EPA evaluated the total VMT for each county in the Memphis CBSA. In combination with the population/population density data and the location of main transportation arteries (see above), this information helps identify the probable location of non-point source emissions. A county with high VMT is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that the associated area source and mobile source emissions may be appropriate to include in the nonattainment area. Table 5 shows total 2008 VMT for each county.

Table 5. Traffic and VMT Data

County	State Recommended Nonattainment?	2008 VMT (million miles)
Crittenden, AR	Yes	903
DeSoto, MS	No	1,629
Fayette, TN	No	573
Marshall, MS	No	725
Shelby, TN	No	8,789
Tate, MS	No	376
Tipton, TN	No	401
Tunica, MS	No	337
Areawide:		13,733

*Counties that EPA intends to designate as nonattainment are shown in bold.

* MOBILE model VMTs are those inputs into the NEI version 1.5.

DeSoto County has the second highest VMT in the Memphis CBSA (12% of the total Memphis CBSA). Additionally, DeSoto County has a 48 percent growth in population from 2000-2010 with approximately 35 and 34 percent of the County's NOx and VOC emissions (respectively) deriving from mobile sources.

Shelby County is the only county in the Memphis CBSA violating the 2008 ozone NAAQS with 2008-2010 air quality data and is considered the core CBSA county, with 64 percent of the VMT in the Memphis CBSA; Approximately 35 percent of Shelby County's NOx emissions and 34 percent VOC emissions are from mobile sources.

Crittenden County, has less than 10 percent of the CBSA VMT (third highest in the Memphis CBSA). From 2000-2010, Crittenden County had less than 1 percent population growth with 45 percent and 31 percent of the County's NOx and VOC emissions(respectively) deriving from mobile sources.

The remaining counties in the Memphis CBSA all have low total population and population growth with little urbanization and low precursor emission contribution suggesting negligible contribution of population-based emissions.

Factor 3: Meteorology (weather/transport patterns)

For this factor, EPA analyzed 30-years of National Weather Service (NWS) wind speed and wind direction data collected at the Memphis International Airport (NWS Station 13893) to help determine transport patterns and source contributions. EPA assessed wind direction and speed for the 2008-2010 “ozone season” (March through October) in the Memphis CBSA as well as on days when area ozone monitors exceeded the 2008 ozone NAAQS. Additionally, EPA evaluated wind back trajectories (which are an analysis of meteorological patterns) specifically on days when the current ozone design value monitor in Shelby County (Frayser monitor) exceeded the 2008 NAAQS. These analyses were conducted to better understand the fate and transport of precursor emissions contributing to ozone formation.

EPA’s analysis of the NWS data indicate predominate south and south-southwest component for the Memphis CBSA. However, an examination on days when monitors in DeSoto County (Hernando) exceeded the 2008 ozone NAAQS suggested a northerly component. Additionally, on days when monitors in Shelby County exceeded the 2008 NAAQS, the data indicated a southerly wind component.

Figure 2, Memphis Area Ozone and Ozone Precursor Monitoring Network, and Figure 4 present graphical information on 24-hour back trajectories for exceedances in 2008-2010 at the Frayser monitor, locations of major stationary sources, and locations of ambient monitors with their design values. An examination of the meteorological data indicates that, for the 2008-2010 days with ozone concentrations above 75 ppb at the Memphis 2008-2010 Design Value site (Frayser monitor), the wind back trajectories primarily go back through Shelby County, TN (on 10 out of 10 days) and DeSoto County, MS (on 7 out of 10 days), with back trajectories going back through Crittenden County, AR on only 1 out of 10 days. As mentioned in Factor 1, the Shelby County monitor is the only monitor in the Memphis CBSA with a 2008-2010 violation of the 2008 ozone NAAQS.

Since the 2008-2010 data is only for three years and has only 10 exceedance days, we evaluated more years to better understand the meteorological transport conditions that exist during ozone exceedances. Normally when we are developing a conceptual model understanding of what yields ozone exceedances in an area we will evaluate 5 to 10 years worth of meteorological data. Therefore we decided to evaluate all days that had ozone exceedances at the Design Value monitor (Frayser) for the 2006-2010 period. The 2006 and 2007 years had more meteorology that was conducive for ozone formation than the years of 2008, 2009, and 2010. Figure 5 in the attachment to this document includes 72-hour back trajectories for 2006-2010 ozone exceedances at the Frayser monitor using the National Oceanic and Atmospheric Administration Hybrid Single Particle Lagrangian Integrated Trajectory Model (NOAA HYSPLIT). To further understand the meteorological transport conditions within the regional area around Memphis, we also evaluated 24-hour back trajectories for the 2006-2010 time-periods using the NOAA HYSPLIT model. The results of these back trajectories are included in the attachment to this document as Figure 6 with a further zoom in view in Figure 7.

Evaluation of Figures 6 and 7 further supports our previous conclusions based on the 2008-2010 back trajectories when the Memphis area Frayser monitor has ozone exceedances. The 2006-2010 data further supports that most of the centerlines of the back trajectories passes through Shelby County TN, and many of the back trajectory centerlines pass through DeSoto county in northern Mississippi with smaller percentage passing through Crittenden County, Arkansas.

EPA’s meteorological assessment of the area monitors ozone exceedances and specifically the wind back trajectory analysis at the Frayser monitor indicate that Shelby County is likely an emission

contributor to exceedances of the 2008 NAAQS at the Frayser monitor. Furthermore, the assessment also suggests that DeSoto and Crittenden Counties should be considered for potential inclusion in the intended Memphis nonattainment area.

Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

The geography/topography analysis evaluates the physical features of the land that might affect the airshed and, therefore, the distribution of ozone over the area.

The Memphis area does not have any geographical or topographical barriers limiting air pollution transport within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional boundaries

Once we identified the general areas we anticipated we would recommend for nonattainment, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing/prior nonattainment area boundaries for ozone or other urban-scale pollutants, county lines, air district boundaries, township boundaries, area covered by an MPO, state lines, Reservation boundaries, and urban growth boundaries. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The Memphis Area MPO is comprised of two study areas; the Memphis Urban Area MPO and the West Memphis MPO. Both organizations are considered multi-jurisdictional agencies responsible for the implementation and coordination of urban transportation planning and establishing transportation conformity infrastructure within their respective boundaries. The Memphis Urban jurisdiction is comprised of all of Shelby County, Tennessee, the western four miles of Fayette County, Tennessee and the northern twelve miles of DeSoto County. The portion of the Memphis Urban MPO in DeSoto County captures the more urbanized portion of the county that has experience continuous growth as well as the ozone air quality monitor. The West Memphis jurisdiction is comprised of the current and potential future urbanized portion of Crittenden County (including the ozone air quality monitor) with the following legal description:

That area west from the Mississippi River along the southern right of way line of County Road 18 (Miller Road and Caldwell Road) to the western right of way line of County Road 205 (Hinkley Road); then north along said right of way line and continuing north to the intersection of the southern right of way line of the St. Louis-Southwestern Railroad; then in a southwesterly direction along said right of way line to the intersection of eastern right of way line of State Highway 147; then north along said right of way to the intersection of the southern right of way line of State Highway 131; then west along said right of way line to the western right of way line of County Road 51 (Eubank Road); then north along said right of way line to U.S. 70; then continuing north along the western right of way line of County Road 25 (Katie Goodhope) to the northern right of way line of County Road 12 (Buck Lake Road); then east along said northern right of way line to State Road 306; then continuing east along the northern right of way line of State Road 306 to the western right of way line of County Road 165; then north along said right of way line to the northern right of way line of County Road 168; then northeasterly along said

right of way line to the intersection of the northern right of way of County Road 172; then east along said right of way line to the intersection of the western right of way line of County Road 5; then north along said right of way line to the intersection of the northern right of way line of James Mill Road; then east along said northern right of way line to the Mississippi River being the eastern boundary of the study area.

Memphis, TN-MS-AR Area has previously established nonattainment boundaries associated with both the 1-hour ozone and 1997 8-hour ozone NAAQS. The Memphis nonattainment boundary for the 1-hour ozone NAAQS included Shelby County, Tennessee in its entirety. Whereas the Memphis nonattainment boundary for the 1997 8-hour ozone NAAQS included Crittenden County, Arkansas and Shelby County, Tennessee in their entireties. Tennessee has recommended a different boundary for the 2008 ozone NAAQS for their portion of this Area. Arkansas recommended the same as the previous boundary for their portion of this Area. In addition, there is current infrastructure for meeting the transportation conformity requirements in Shelby County and the urbanized portions of DeSoto County and Crittenden County since both the Memphis Urban area and West Memphis MPO are currently implementing these requirements for the 1997 8-hour ozone standard.

Even though, DeSoto and Crittenden Counties do not have violating monitors for the 2008 ozone NAAQS based on air quality data from 2008-2010, our analysis suggest that both are likely contributing to the violation in Shelby County due to potential population-based emissions from mobile sources (VMT) and area source, meteorology and population growth.

Conclusion

Based on the assessment of the factors described above, EPA has preliminarily concluded that the following counties should be included as part of the intended Memphis nonattainment area because they are either violating the 2008 ozone NAAQS or contributing to a violation in a nearby area: Crittenden County, Arkansas, and Shelby County, Tennessee in their entireties, and the portion of DeSoto County that is included in the Memphis MPO boundary. Two of these counties (i.e., Crittenden County, Arkansas and Shelby County, Tennessee) are included in the Memphis nonattainment area for the 1997 ozone NAAQS. One of the air quality monitors in Shelby County indicates violation of the 2008 ozone NAAQS based on 2010 DVs, therefore this county is preliminarily included in the nonattainment area. Crittenden County, Arkansas, and DeSoto County, Mississippi are nearby counties that do not have monitors indicating a violation of the standard based on 2010 DVs. However, EPA has preliminarily concluded that these counties (or portions thereof) contribute to the ozone concentrations in violation of the 2008 ozone NAAQS through population-based emissions from mobile and area sources (e.g., vehicles and other small area sources) and county VMT.

Source category emissions data indicate that mobile sources and area sources are the primary contributors to ozone formation in the Memphis CBSA. Thus, population-based emissions such as total population or population growth, and precursor emission transport would indicate a county with contribution in the Memphis Area.

The population in DeSoto County, Mississippi has grown steadily from 2000-2010 (particularly the northern portion) with a 48 percent increase, even though it only makes up 12 percent of the total population in the CBSA. The County also has the CBSA's second highest VMT. More than 30 percent of the County's NOx and VOC emissions are from mobile sources and over 40 percent from area

sources. In addition, meteorology suggests that DeSoto County is likely contributing to the violation in Shelby County due to potential southerly transport of mobile and area emissions.

Shelby County, Tennessee dominates the CBSA in terms of urbanization, precursor emission contribution and transport which indicate population-based emission (mobile and area sources) contribution to its own violating monitor. Although the County population growth was less than 5 percent from 2000-2010, it is densely populated with 70 percent of the CBSA population and five times DeSoto County's population. Shelby County makes up over 60 percent of the Area's NOx and VOC emissions. The County's has over 30 percent of the County's NOx and VOC emission coming from mobile sources and point sources. Meteorological analysis also indicates that Shelby County is contributing to its own violation as well as other monitors in the Memphis CBSA.

Crittenden County, Arkansas makes up less than 5 percent of the CBSA population with less than a 1 percent population growth from 2000-2010. Crittenden County is mostly rural with the least urbanization compared to Shelby and DeSoto Counties. The County contributes less than 10 percent of the CBSA NOx and VOC precursor emissions. However, Crittenden County has over 40 percent of its NOx emission deriving from area sources which is considered a primary contributor to the formation of ozone in the Memphis area. EPA is proposing to include all of Crittenden County in the 2008 ozone Memphis nonattainment area because the county was included in its entirety in the 1997 ozone Memphis nonattainment area and because Arkansas recommended inclusion of the county in its entirety.

The remaining Tennessee (Tipton, Fayette) and Mississippi (Marshall, Tate, and Tunica) counties all have low population and urbanization, and precursor emission contribution and transport suggesting negligible contribution to the violating county. With the exception of those counties that comprise the Memphis, TN-MS-AR 1997 8-hour ozone boundary and the portion of DeSoto County, Mississippi discussed in this TSD for inclusion, EPA preliminarily concludes that the remainder of the counties in the CBSA do not contribute to the violations at the monitors in the CBSA and therefore are not being considered as part of the nonattainment area.

ATTACHMENTS

Figure 2. Memphis Ozone and Ozone Precursor Monitoring Network, with Population Density.

Figure 3. Population Density Change Percentage Between 2000 and 2010 Census for Memphis Ozone and Ozone Precursor Monitoring Network.

Figure 4. Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the Frayser monitor for the 2008-2010 period.

Figure 5. NOAA HYSPLIT MODEL 72-Hour Back Trajectory Frayser Exceedances (2006-10).

Figure 6. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Frayser Exceedances (2006-10).

Figure 7. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Frayser Exceedances (2006-10) - Zoom View.

Figure 2. Memphis Ozone and Ozone Precursor Monitoring Network, with Population Density

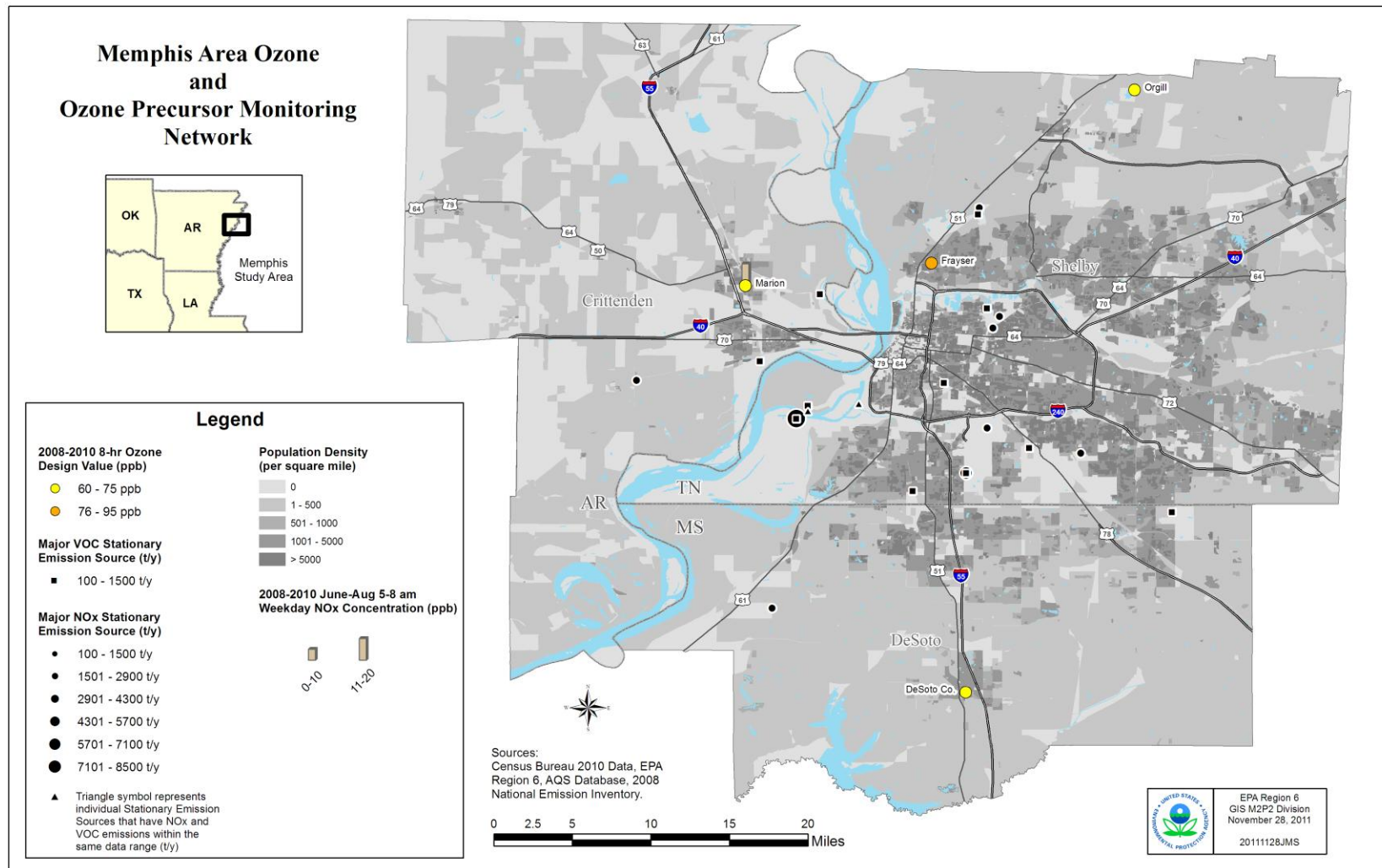


Figure 3. Population Density Change Percentage Between 2000 and 2010 Census for Memphis Ozone and Ozone Precursor Monitoring Network

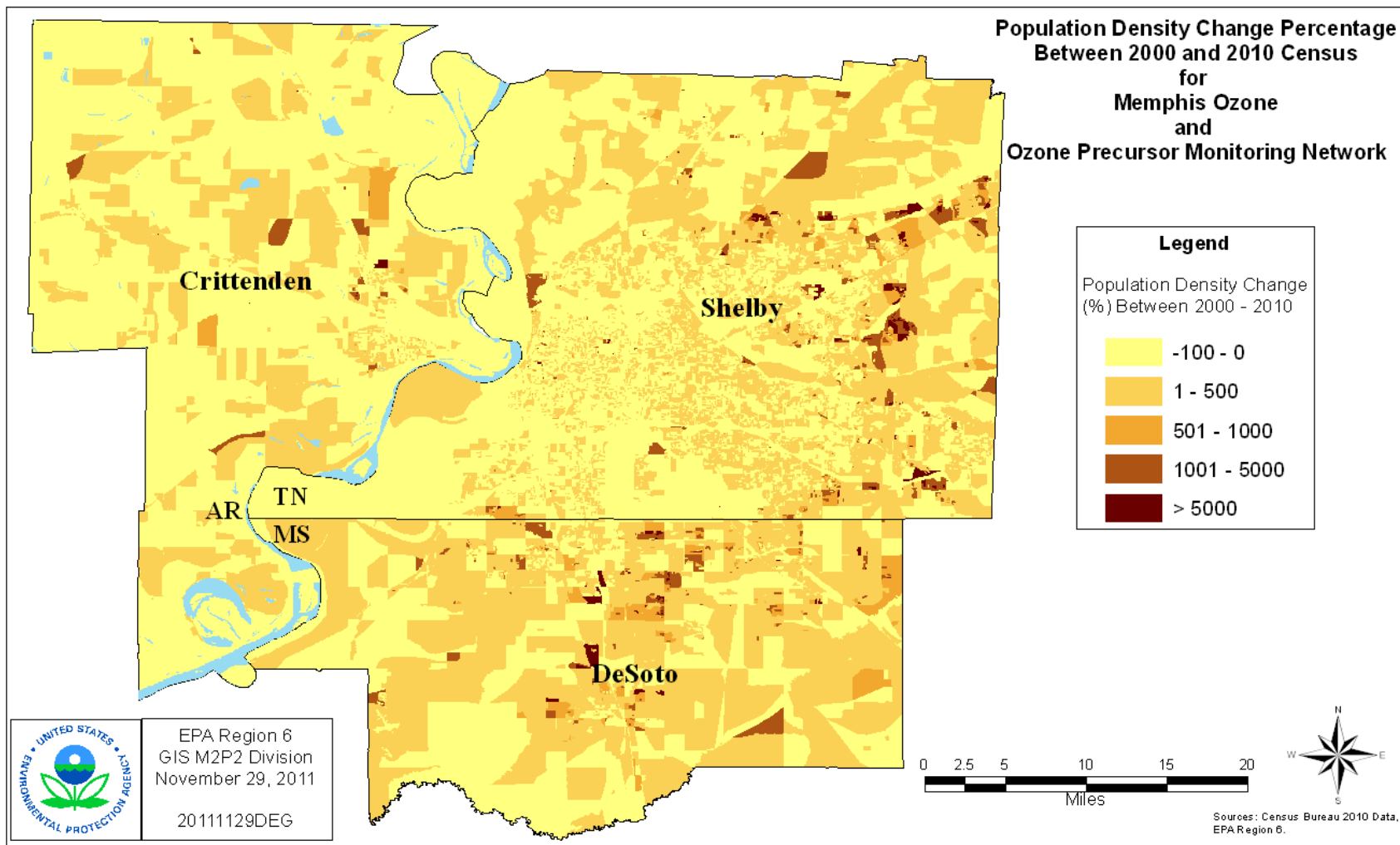


Figure 4 - Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the Frayser monitor for the 2008-2010 period.

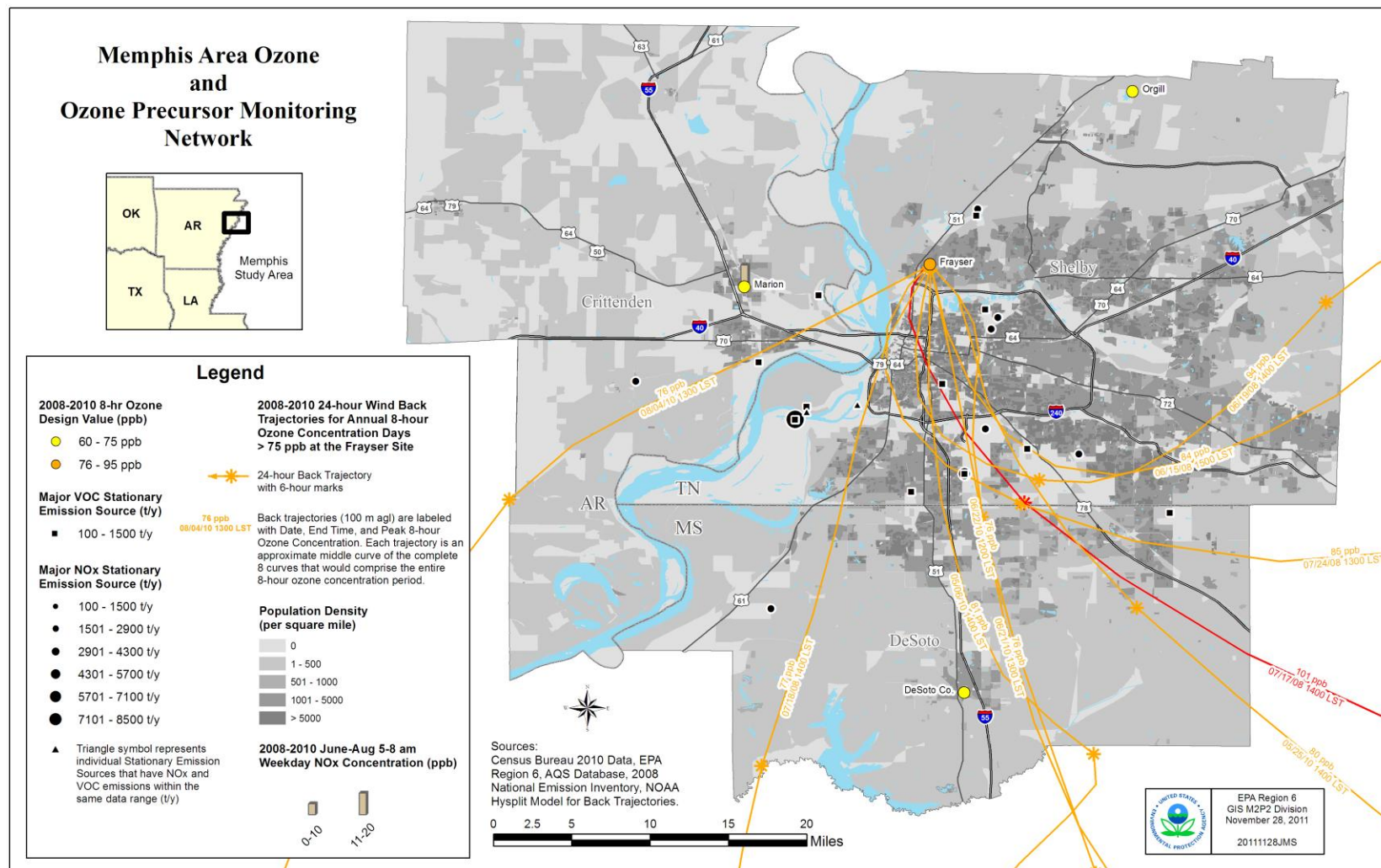


Figure 5. NOAA HYSPLIT MODEL 72-Hour Back Trajectory Frayser Exceedances (2006-10)

NOAA HYSPLIT MODEL
Backward trajectory ending at 2000 UTC 09 Jun 06
EDAS Meteorological Data

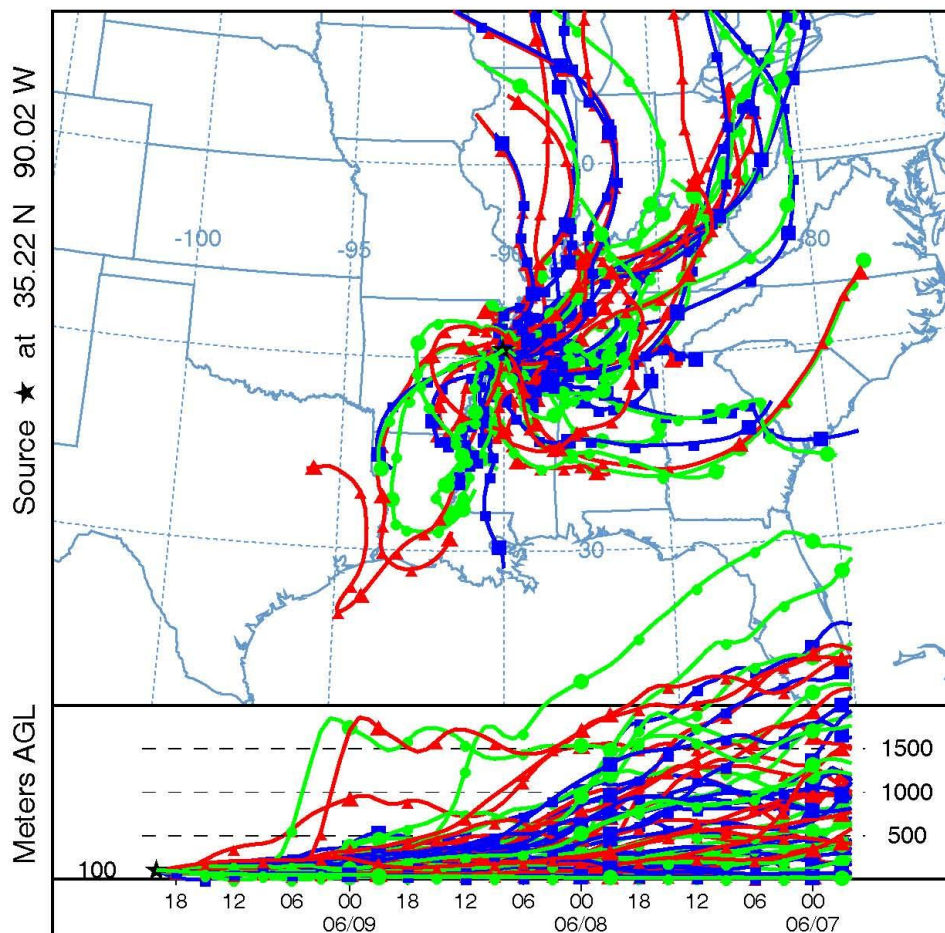


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NOAA HYSPLIT MODEL
Backward trajectory ending at 2000 UTC 09 Jun 06
EDAS Meteorological Data

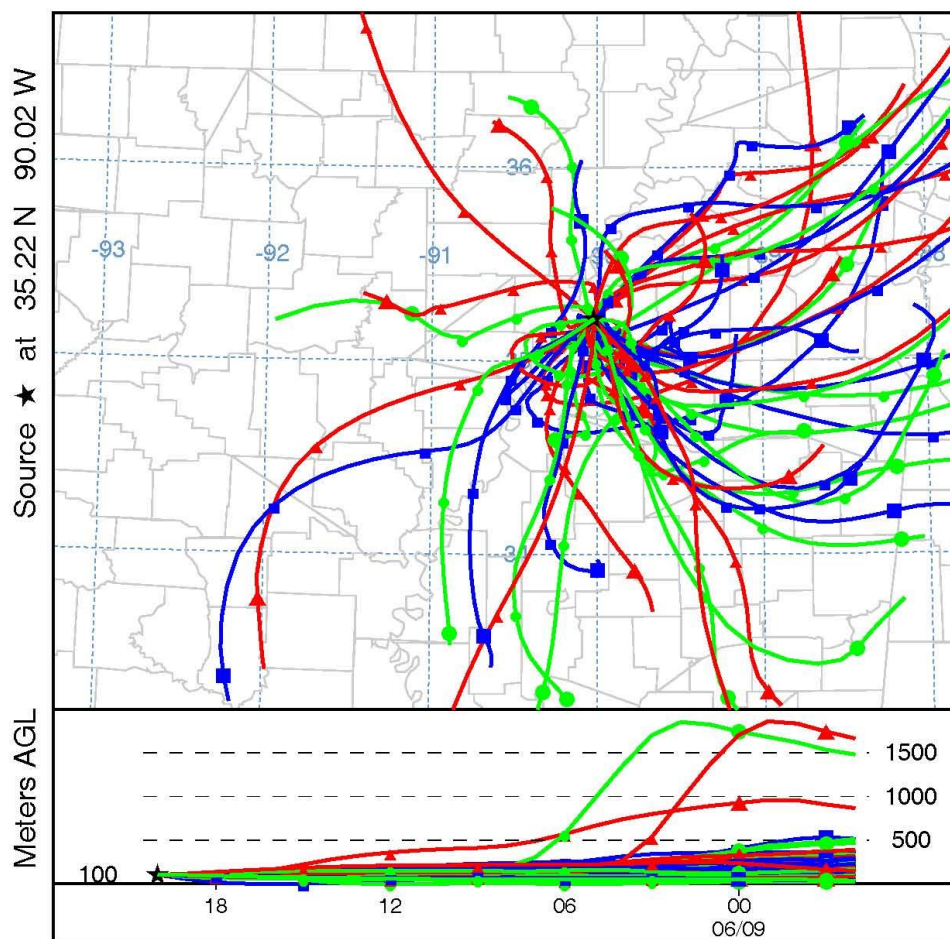
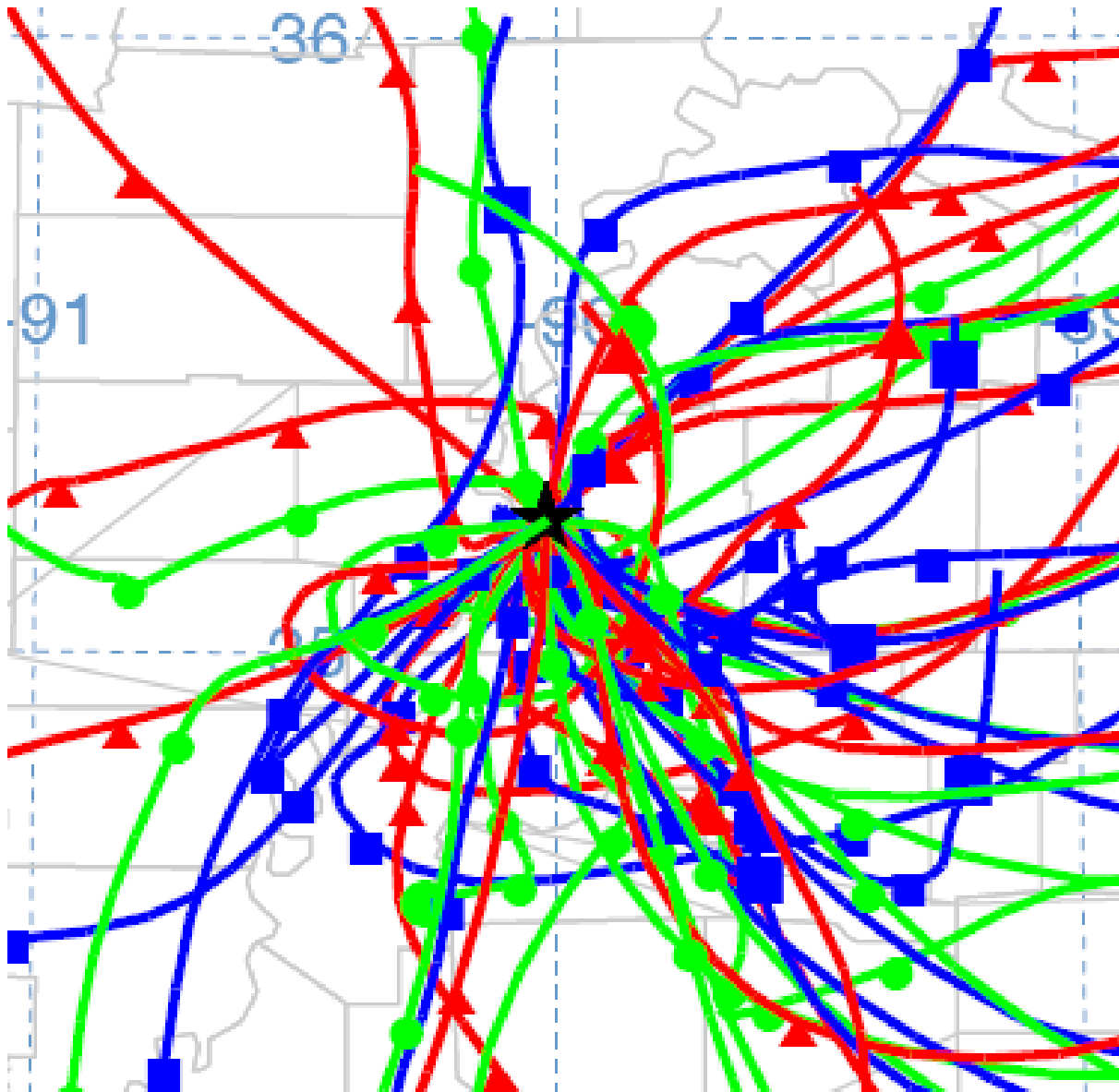


Figure 7. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Frayser Exceedances (2006-10) - Zoom View



Appendix 2: Mississippi Department of
Environmental Quality, Neel-Schaffer, Inc.: On-Road
Mobile-Source Emissions Forecast For Desoto
County, Mississippi (2010 to 2020)



**ON-ROAD MOBILE-SOURCE EMISSIONS
FORECAST
FOR DESOTO COUNTY, MISSISSIPPI
2010 to 2020**

*Prepared for
Mississippi Department of Environmental Quality
by Neel-Schaffer, Inc.
February 2012*

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February 2012

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ON-ROAD MOBILE-SOURCE EMISSIONS FORECAST FOR DESOTO COUNTY, MISSISSIPPI: 2010 TO 2020

1. Background and Purpose

At the request of the Mississippi Department of Environmental Quality (MDEQ), Neel-Schaffer, Inc. (NSI) undertook a forecast of on-road mobile-source emissions for DeSoto County, Mississippi and two adjacent counties in the Memphis Metropolitan Area for the year 2020. The other counties included in the forecast were Shelby County, Tennessee and Crittenden County, Arkansas (see Figure 1). The U. S. Environmental Protection Agency (EPA) has recommended that the Memphis Nonattainment Area, with respect to the 2008 standard for ozone established under the National Ambient Air Quality Standards (NAAQS), be expanded to include a portion of DeSoto County in addition to all of the other two counties. The portion of DeSoto County recommended for inclusion in the nonattainment area is that which lies within the Memphis Metropolitan Planning Organization (MPO) study area boundary as it existed prior to adoption of the *2030 Long-Range Transportation Plan*. (The updated regional transportation plan expanded the study area to include all of DeSoto County.) This northern portion of DeSoto County, located immediately south of Memphis and Shelby County, includes the municipalities of Southaven, Horn Lake, Olive Branch, Walls and Hernando.

On-road mobile-source emissions were modeled at the county level using the *MOVES2010A* software developed by EPA for use in the preparation of State Implementation Plans and Transportation-Air Quality Conformity documents. Emissions modeling was limited to the criteria pollutants commonly referred to as *ozone precursors* – oxides of nitrogen (NOx) and volatile organic compounds (VOC) – since it is their interaction in the presence of sunlight that produces ground-level ozone. The 2008 ozone standard is met “when the annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years is 75 ppb [parts per billion] or less” (U. S. Environmental Protection Agency, “Mississippi Area Designations for the 2008 Ozone National Ambient Air Quality Standards”). The following ozone levels were recorded for the three counties recommended for inclusion in the Memphis Nonattainment Area during the three-year period from 2008 through 2010:

Crittenden County	--	74 ppb
DeSoto County	--	73 ppb
Shelby County	--	76 ppb

While the value for Crittenden County falls below the 75 ppb threshold, EPA elected to recommend the county’s inclusion in the nonattainment area, largely because it was previously included and because the State of Arkansas recommended its designation. DeSoto County is a different story: While falling even farther below the ozone threshold, it was neither included in the nonattainment area in the past nor recommended for inclusion now by the State of Mississippi. Nevertheless, after analyzing other

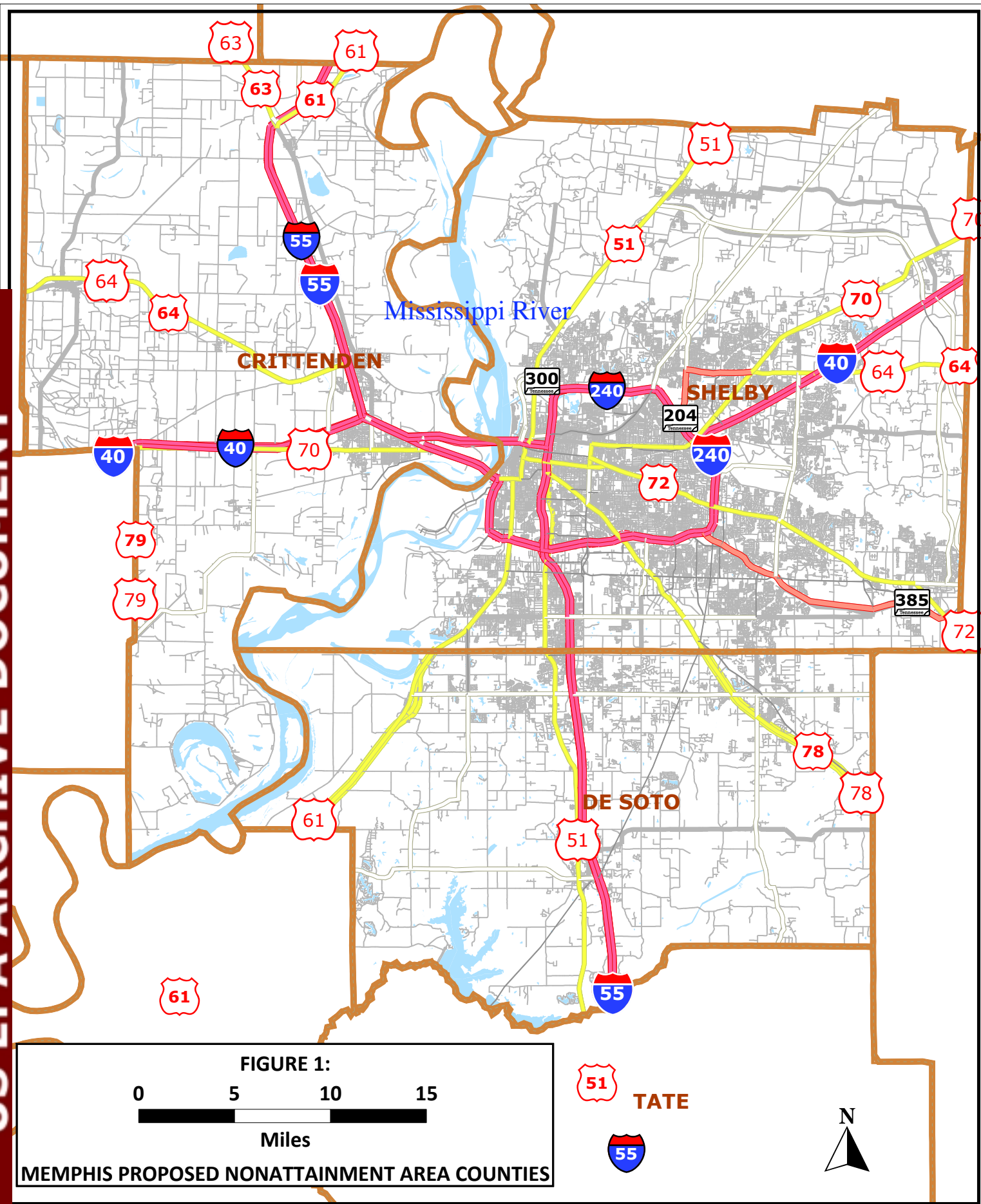


FIGURE 1:



MEMPHIS PROPOSED NONATTAINMENT AREA COUNTIES

factors (i.e., population density and degree of urbanization, traffic conditions and commuting patterns, meteorological conditions, geography and topography, and jurisdictional considerations), EPA decided to recommend DeSoto be included on the grounds that it contributes to the violation (however slight) in Shelby County.

The purpose of the analysis undertaken for MDEQ was to determine how these marginal ozone levels are likely to be affected by street and highway vehicle emissions during the period between 2010 and the year 2020. Before examining the results of that analysis it will be useful to consider the larger picture, including the contribution of on-road mobile-source emissions to the overall level of ozone in the three-county area, projected population growth and the travel forecast for the region.

2. 2008 Emissions Summary

The 2008 EPA emissions summary indicates total oxides of nitrogen from all sources amounting to 48,646 tons in the three-county area (see Table 1). Crittenden County and DeSoto County together accounted for 9,127 tons or less than 19 percent of NO_x emissions from all sources, whether mobile or stationary. Shelby County alone accounted for over 39,500 tons or more than 81 percent of the areawide total. On-road mobile-source emissions generated by motor vehicles amounted to 18,415 tons and represented 37.9 percent of all NO_x output in the area. Nearly 10 percent of the three-county total was attributable to vehicles on Crittenden County roads, more than 15 percent to vehicles on DeSoto County streets and highways. The balance – 13,690 tons or 74.3 percent – was associated with traffic in Shelby County.

**Table 1:
2008 MEMPHIS PROPOSED NONATTAINMENT AREA
OXIDES OF NITROGEN AND VOLATILE ORGANIC COMPOUNDS EMISSIONS BY COUNTY (TONS)**

COUNTY	NO _x (ALL SOURCES)	PCT OF TOTAL (ALL SOURCES)	NO _x (ON-ROAD MOBILE)	PCT OF TOTAL (ON-ROAD MOBILE)
Crittenden AR	4,047	8.32	1,827	9.92
DeSoto MS	5,080	10.44	2,898	15.74
Shelby TN	39,519	81.24	13,690	74.34
TOTAL	48,646	100.00	18,415	100.00

COUNTY	VOC (ALL SOURCES)	PCT OF TOTAL (ALL SOURCES)	VOC (ON-ROAD MOBILE)	PCT OF TOTAL (ON-ROAD MOBILE)
Crittenden AR	3,805	10.30	1,189	9.23
DeSoto MS	5,222	14.13	1,762	13.68
Shelby TN	27,929	75.57	9,933	77.10
TOTAL	36,956	100.00	12,884	100.00

Source: U. S. Environmental Protection Agency, "State and County Emission Summaries" (online data resource).

The numbers for volatile organic compounds were comparable. Of the total tonnage from all sources (36,956), nearly 28,000 tons, or better than 75 percent, were attributable to sources in Shelby County. The remainder, amounting to less than 25 percent of the total, was split between Crittenden and DeSoto counties. On-road mobile-source emissions totaled 12,884 tons or 34.9 percent of all VOC. Of that total, more than 9,900 tons were attributable to vehicles operating in Shelby County. That represents more than 77 percent of on-road mobile-source VOC emissions, compared to a little more than nine percent in Crittenden County and 13.7 percent in DeSoto County.

3. Population Forecast

Much of the population growth in the Memphis area in recent years has taken place in DeSoto County, and EPA apparently infers from this that emissions in the Mississippi county will figure more prominently in air quality calculations for the metropolitan area in the future. Population in the three-county area increased by only eight percent between 2000 and 2010, but the number of people living in DeSoto County grew by 50 percent (see Table 2). There was almost no change in Crittenden County, and growth in Shelby County was sluggish. The Memphis MPO has projected that strong growth will continue in DeSoto County, with population increasing by another 44 percent between 2010 and 2020. Increased population growth is projected for Crittenden County, but very little change is expected in Shelby County. The result of this trend would be that the Shelby County share of total population in the three-county area would decline from 85 percent in 2000 to 75 percent in 2020. The DeSoto County share would increase from 10 to nearly 19 percent.

4. Projected Traffic

The way in which these demographic trends affect the distribution of traffic in the region will have a significant impact on emission levels in individual counties. Based on output from the Memphis MPO travel demand forecasting model, vehicles traveling on streets and highways in Shelby County during the base year (2004) logged just over 21,459,000 vehicle-miles traveled (VMT) on a typical weekday (see Table 3). That represented approximately 676,000 vehicle-hours traveled (VHT) of which some 188,000, or nearly 28 percent, were vehicle-hours of delay (VHD) resulting from traffic congestion. (*Delay* is the difference in travel time between that which would be required to make a trip under conditions of unimpeded flow and the time required to make the same trip under the less than optimal conditions resulting from congestion.) These figures dwarf those for DeSoto County: 3,358,160 vehicle-miles traveled, 82,418 vehicle-hours traveled and only 15,678 hours of delay. No data are available for Crittenden County, since it is not included in the Memphis MPO model area.

The substantial growth projected for DeSoto County during the current decade will not reduce the absolute difference in vehicle-miles and vehicle-hours but will affect the relative distribution somewhat. Based on the figures noted in the preceding paragraph, traffic in DeSoto County accounted for approximately 13.5 percent of vehicle-miles in 2004, 10.9 percent of vehicle-hours and 7.7 percent of delay in the two-county area. However, VMT is projected to increase by nearly 80 percent between 2004 and 2020, VHT by more than 80 percent and VHD by over 120 percent.

**Table 2:
MEMPHIS PROPOSED NONATTAINMENT AREA POPULATION BY COUNTY:
2000-2020 (PROJECTED)**

COUNTY	2000 POPULATION	PERCENT OF TOTAL
Crittenden	50,866	4.82
DeSoto	107,199	10.16
Shelby	897,472	85.03
TOTAL	1,055,537	100.00
COUNTY	2010 POPULATION	PERCENT OF TOTAL
Crittenden	50,902	4.47
DeSoto	161,252	14.15
Shelby	927,644	81.39
TOTAL	1,139,798	100.00
COUNTY	2000-2010 POPULATION CHANGE	PERCENT CHANGE
Crittenden	36	0.07
DeSoto	54,053	50.42
Shelby	30,172	3.36
TOTAL	84,261	7.98
COUNTY	2020 PROJECTED POPULATION	PERCENT OF TOTAL
Crittenden	57,617	4.66
DeSoto	232,678	18.83
Shelby	945,549	76.51
TOTAL	1,235,844	100.00
COUNTY	2010-2020 POPULATION CHANGE	PERCENT CHANGE
Crittenden	6,715	13.19
DeSoto	71,426	44.29
Shelby	17,905	1.93
TOTAL	96,046	8.43

Source: U. S. Census Bureau, "Census 2000 Demographic Profiles" and "2010 Census Interactive Population Search" (online data resources); Memphis Metropolitan Planning Organization (2011): 2020 population projections from regional travel demand forecasting model developed for 2040 Long-Range Transportation Plan.

5. Emissions Model Inputs

In order to project how these changes in population and traffic are likely to affect future on-road mobile-source emissions associated with the formation of ozone, the EPA MOVES2010A model was used to generate peak-hour emissions for oxides of nitrogen and volatile organic compounds for each of the three counties proposed for nonattainment status. Inputs to the emissions model include annual VMT by type of vehicle as defined by the Federal Highway Administration's Highway Performance Monitoring System (HPMS); the distribution of VMT by month, day and hour; the distribution of VMT by type of road; the distribution of vehicles by type of vehicle; the distribution of vehicles by age; the distribution

**Table 3:
2004 ESTIMATED AND 2020 PROJECTED VEHICLE-MILES AND VEHICLE-HOURS OF TRAVEL
AND VEHICLE-HOURS OF DELAY IN SHELBY COUNTY AND DESOTO COUNTY**

YEAR	COUNTY		VMT	VHT	VHD
2004	Shelby County	<i>Estimated</i>	21,459,007	676,154	188,495
2004	DeSoto County	<i>Estimated</i>	3,358,160	82,418	15,678
2020	Shelby County	<i>Projected</i>	26,284,742	778,783	216,062
2020	DeSoto County	<i>Projected</i>	5,996,943	150,806	35,098
2004-2020	Shelby County	<i>Absolute Change</i>	4,825,735	102,629	27,567
2004-2020	DeSoto County	<i>Absolute Change</i>	2,638,783	68,388	19,420
2004-2020	Shelby County	<i>Percent Change</i>	22.49	15.18	14.62
2004-2020	DeSoto County	<i>Percent Change</i>	78.58	82.98	123.87

Source: Memphis Metropolitan Planning Organization (2011): Summary output data from regional travel demand forecasting model.

of vehicles by average operating speed; fuel supply and fuel formulation; and basic meteorological data (average temperature and relative humidity). Printouts of the actual input files may be found in Appendix A. Notes on the development of those files will be found in Appendix B. Data from the Memphis MPO model were used to calculate average speeds for 2010 and 2020 for DeSoto and Shelby counties. The values for DeSoto County were also used for Crittenden County, since no model data were available for the Arkansas county. Data from the EPA publication documenting development of the emissions model (*MOVES2010 Highway Vehicle Population and Activity Data*, U. S. Environmental Protection Agency, November 2010) were used for the distribution of VMT by hour, day and month of the year, vehicle type, age of vehicle and type of road for all three counties. VMT and vehicle fleet data were based on HPMS and other available data for 2010, and both output and input data from the travel demand forecasting model were used for projecting vehicle miles and vehicles in future years. Fuel supply and formulation data were exported from the *MOVES2010A* model itself and represent conditions associated with fuel standards and fuel efficiency requirements mandated by EPA now and for the future. Meteorological data were taken from an EPA database providing average temperature and relative humidity by month and hour collected over a period of 30 years by the National Oceanic and Atmospheric Administration.

6. Emissions Model Outputs

In order to establish a basis for comparison, emissions were generated for a designated one-hour period from 3:00 p.m. until 4:00 p.m. on a weekday afternoon in July for both years, 2010 and 2020. Aggregate emissions for each of the criteria pollutants, under the conditions associated with each alternative, are presented in Table 4. It will immediately be noted that projected future emissions are significantly lower than those associated with the recent past. Oxides of nitrogen are reduced by more than 63 percent over the 10-year period, and volatile organic compounds are reduced by 56 percent. These dramatic reductions in on-road mobile-source emissions are attributable to higher fuel standards and

**Table 4:
2010 ESTIMATED AND 2020 PROJECTED PEAK-HOUR ON-ROAD MOBILE-SOURCE EMISSIONS BY COUNTY**

2010 Estimated Oxides of Nitrogen (NOx) and Volatile Organic Compounds (VOC)

COUNTY	1-HOUR (GRAMS)		PERCENT OF TOTAL	
	NOx	VOC	NOx	VOC
Crittenden	211,227	65,318	6.14	8.68
DeSoto	684,850	194,509	19.90	25.85
Shelby	2,546,100	492,722	73.97	65.47
TOTAL	3,442,177	752,549	100.00	100.00

2020 Projected Oxides of Nitrogen (NOx) and Volatile Organic Compounds (VOC)

COUNTY	1-HOUR (GRAMS)		PERCENT OF TOTAL	
	NOx	VOC	NOx	VOC
Crittenden	72,606	27,172	5.82	8.24
DeSoto	249,649	87,050	20.02	26.40
Shelby	924,819	215,508	74.16	65.36
TOTAL	1,247,074	329,730	100.00	100.00

2010 to 2020 Projected Change in Oxides of Nitrogen (NOx) and Volatile Organic Compounds (VOC)

COUNTY	1-HOUR (GRAMS)		PERCENT CHANGE	
	NOx	VOC	NOx	VOC
Crittenden	-138,621	-38,146	-65.63	-58.40
DeSoto	-435,201	-107,459	-63.55	-55.25
Shelby	-1,621,281	-277,214	-63.68	-56.26
TOTAL	-2,195,103	-422,819	-63.77	-56.18

fuel efficiency requirements already scheduled or anticipated to take effect in 2012 and subsequent years. The previously noted increase in the aggregate amount of travel, measured in miles (VMT) and hours (VHT), is more than offset by the decrease in emissions generated per mile or hour. Summary reports, containing the output data for each of the three study area counties, may be found in Appendix C.

7. Conclusion

The results of the emissions modeling effort are graphically represented in figures 2 and 3. These portray the very substantial decreases in emissions projected for both pollutants modeled. As noted earlier, on-road mobile sources account for a substantial share of total ozone precursor output in the three-county area: approximately 35 percent of all NOx emissions and 38 percent of all VOC emissions. Given the fact that current ozone levels in the three counties proposed for inclusion in the Memphis Nonattainment Area are either slightly above or slightly below the NAAQS threshold level (75 ppb) it

seems reasonable to suggest that the projected reductions in traffic-related NOx and VOC emissions could greatly enhance efforts to maintain or achieve attainment status in the years ahead.

Figure 2:
2010 ESTIMATED AND 2020 PROJECTED PEAK-HOUR ON-ROAD MOBILE-SOURCE EMISSIONS BY COUNTY
FOR PROPOSED MEMPHIS NONATTAINMENT AREA: OXIDES OF NITROGEN (NOx) (GRAMS)

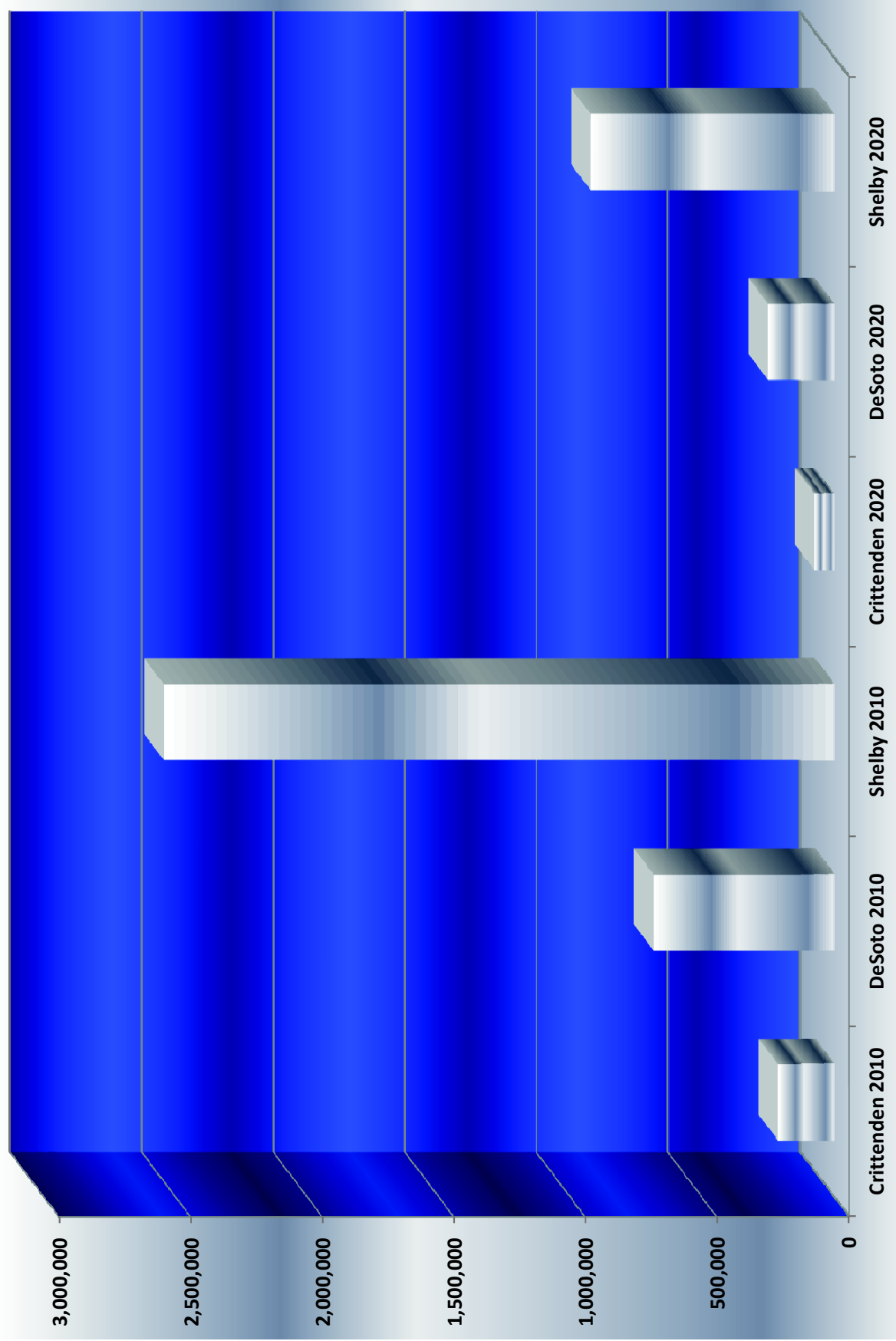
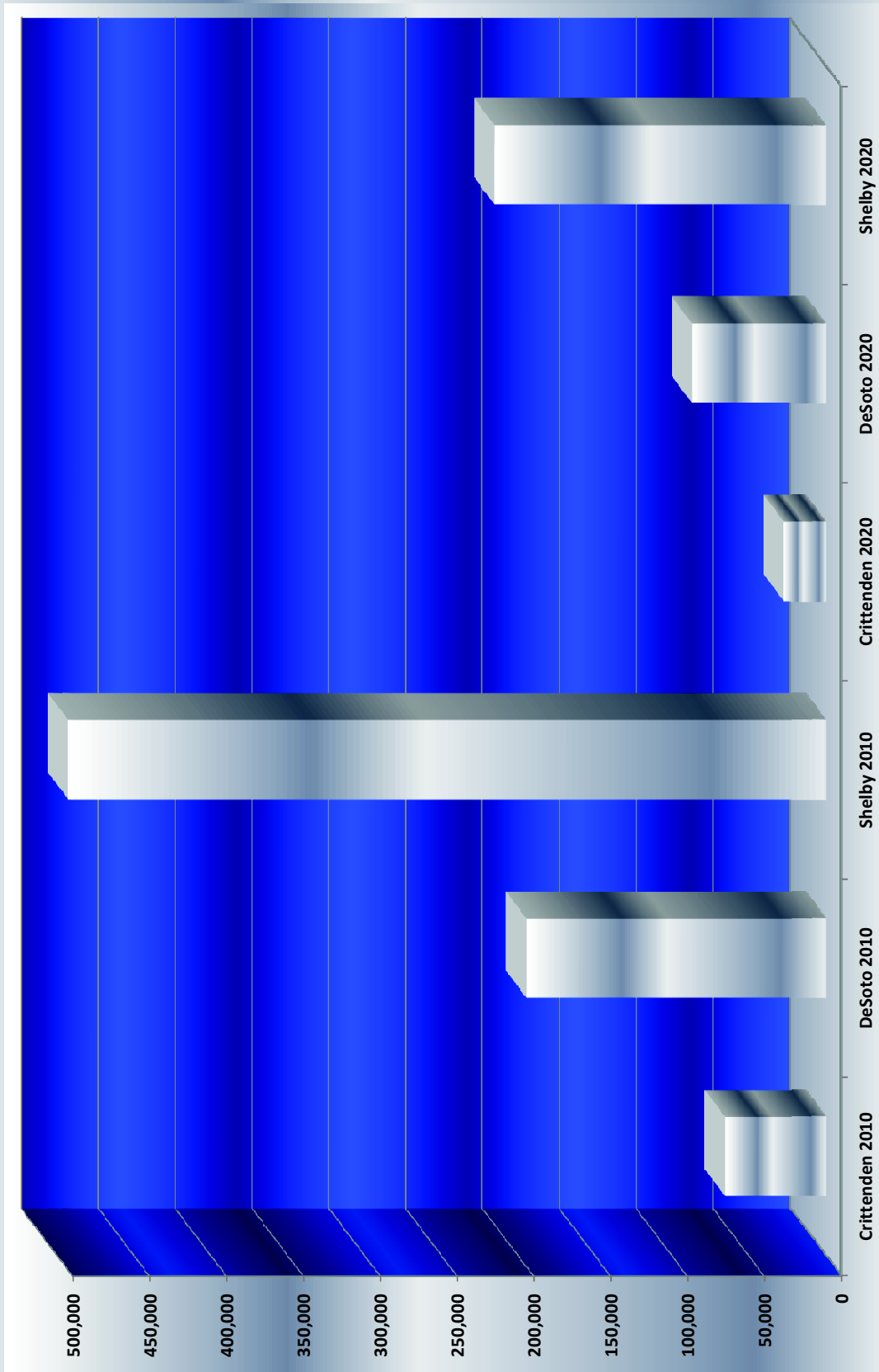


Figure 3:
2010 ESTIMATED AND 2020 PROJECTED PEAK-HOUR ON-ROAD MOBILE-SOURCE EMISSIONS BY COUNTY
FOR PROPOSED MEMPHIS NONATTAINMENT AREA: VOLATILE ORGANIC COMPOUNDS (VOC (GRAMS))



Appendix 3: Idle Reduction Policies in
DeSoto County



DeSoto County Anti-Idling Program

Proposal

The purpose of the DeSoto County Anti-Idling Program is to protect public health and the environment in DeSoto County by voluntarily restricting the amount of time that county and municipal non-emergency vehicles, school buses, and commercial vehicles idle. Vehicles that require unavoidable idling to provide a service or function would be exempt.

The DeSoto County Anti-Idling Program is a unique collaborative effort to reduce vehicle emissions while conserving fuel and lessen vehicle wear and tear. Any current anti-idling policies in the county or municipalities could be integrated into the DeSoto County Anti-Idling Program. The Mississippi Department of Environmental Quality will partner in this program and provide any assistance needed. Additionally, EPA is actively promoting anti-idling programs and will collaborate with this program.

Background

The United States Environmental Protection Agency sets National Ambient Air Quality Standards (NAAQS) for the protection and well being of human health and the environment. DeSoto County is currently designated as attainment of all Environmental Protection Agency's NAAQS. However, efforts must be made for DeSoto County to continue to enjoy good air quality.

Vehicle emissions have a significant impact on human health and our environment. Vehicle emissions contain nitrogen oxides and volatile organics compounds which contribute to ozone formation as well as fine particulates. Vehicles contribute one third of the nitrogen oxides and one fourth of the volatile organics emissions in Mississippi. Reducing emissions from vehicles are important to assure NAAQS continue to be met. Limiting the amount of time in which vehicles idle is one of the tools to lower emissions. A vehicle can use up to one gallon per hour when idling and produce up to 135 grams per hour of nitrogen oxides and 6.5 grams per hour of volatile organics.

An anti-idling program would provide an easy, cost-effective policy to assist in maintaining the air quality of DeSoto County and to reduce the exposure of people to the potential health impacts of vehicle emissions. It would also reduce fuel consumption and vehicle wear and tear which would create a cost savings for the county and municipalities. EPA is actively promoting anti-idling programs.

Goal

The goal is for all county and municipal governments, school bus fleets, and commercial fleets participating in the DeSoto County Anti-Idling Program to voluntarily adopt a policy restricting non-emergency vehicles from unnecessary idling. Vehicles that require unavoidable idling to provide a service or function would be exempt.



DeSoto County Anti-Idling Policy

1.0 Purpose:

DeSoto County, Mississippi is committed to reducing unnecessary county and municipal vehicle/equipment idling as a means of reducing air pollution and fuel expense.

The purpose of this policy is to establish guidelines for unnecessary idling of county and municipal vehicles and equipment. Limiting idling times reduces air pollution and contributes to healthier work environments and the efficient use of county/municipality resources.

2.0 Scope:

This policy applies to all staff operating vehicles and equipment owned or leased by DeSoto County and the municipalities within the county.

3.0 Definitions:

3.1 Idling:

the operation of a vehicle or equipment while they are not in motion and not being used to operate auxiliary equipment that is essential to the operation of the vehicle or equipment.

3.2 Fuels:

includes all vehicles or equipment that run on fossil fuels which include gasoline, diesel, propane, hydrogen, and natural gas.

3.3 Vehicles:

any self-propelled mechanized equipment that is used for transporting persons or commodities on public roads utilizing fossil fuels.

4.0 Procedures:

4.1 Manufacturer's Guidelines (Recommendations):

Always follow the manufacturer's guidelines and recommendations for idling unless otherwise specified.

4.2 Initial Warm-Up:

Idle times up to three (3) minutes are allowed for vehicles during their initial shift warm up and at subsequent times when the vehicle is being restarted after a prolonged period of shut down that results in vehicle conditions similar to those prior to initial shift warm up.

4.3 Operation of Equipment in the Field:



4.3.1 Gasoline and Alternative Fuel Vehicles

No operator shall idle the engine of a gasoline-fueled vehicle in excess of one (1) minute if the vehicle is stopped for a foreseeable period of time. Operators making multiple or frequent stops that require their vehicle to be stationary for time periods of several minutes may idle up to three (3) minutes in such circumstances.

4.3.2 Diesel-Fueled Vehicles/Equipment

No operator shall idle the engine of a diesel-fueled vehicle in excess of three (3) minutes if the vehicle is stopped for a foreseeable period of time. Diesel-fueled vehicles/equipment should only be turned off after enough time has passed to allow the proper circulation and cooling of the engine oil, coolant, and turbochargers, not to exceed three (3) minutes.

4.3.3 When engines must be left running for any reason, the operator must remain with the vehicle.

5.0 **Exceptions:**

This policy does not apply to the following vehicles, equipment, or situations. Operators must use their own discretion in certain situations.

- 5.1 Emergency vehicles and equipment are exempted while engaged in operational activities such as fire, police, or ambulance services.
- 5.2 Vehicles assisting in an emergency activity are exempt.
- 5.3 Where engine power is necessary for an associated power need such as, but not limited to, electrical power, compressed air, and various power take-off devices such as auxiliary hydraulics.
- 5.4 Vehicles may idle for the purpose of defogging, defrosting, or deicing windows. Idling must end when fog, frost, or ice conditions have been eliminated. When window ice or frost conditions are present, attempts to remove snow, ice, or frost from the windows with a scraper must be attempted before idling.
- 5.5 This policy does not apply to vehicles being serviced or inspected.
- 5.6 Where safety may be compromised by shutting down the engine, vehicles/equipment may idle at the discretion of the operator.



**CITY OF OLIVE BRANCH
Engine and Equipment Idling Policy
January 23, 2006**

Idling of fleet vehicles and equipment contributes to poor air quality, consumes fuel unnecessarily, and is harmful to engines. It is the responsibility of all city personnel to operate fleet equipment in an environmentally and economically sound manner.

City fleet vehicles and equipment shall not be parked with their engine operating for more than five minutes unless it is essential for performance of work. When engines must be left operating, for any reason other than public safety concerns, the operator must remain with the vehicle/equipment. Violators are subject to disciplinary action.



The City of Southaven Anti-Idling Policy

October 16, 2007

1.0 Purpose:

The City of Southaven, Mississippi is committed to reducing unnecessary municipal vehicle/equipment idling as a means of reducing air pollution and fuel expense.

The purpose of this policy is to establish guidelines for unnecessary idling of county and municipal vehicles and equipment. Limiting idling times reduces air pollution and contributes to healthier work environments and the efficient use of county/municipality resources.

2.0 Scope:

This policy applies to all staff operating vehicles and equipment owned or leased by the City of Southaven only.

3.0 Definitions:

3.1 Idling:

the operation of a vehicle or equipment while they are not in motion and not being used to operate auxiliary equipment that is essential to the operation of the vehicle or equipment.

3.2 Fuels:

includes all vehicles or equipment that run on fossil fuels which include gasoline, diesel, propane, hydrogen, and natural gas.

3.3 Vehicles:

any self-propelled mechanized equipment that is used for transporting persons or commodities on public roads utilizing fossil fuels.



Appendix 4: DeSoto County Report Card
and Table of Air Outreach Events



DeSoto County Report Card

EPA Region 4 staff and MDEQ – Air Division Staff held an Air Quality Workshop in Hernando, MS on June 20, 2007. The purpose of the meeting was to provide information and tools to DeSoto County citizens and officials to lower emissions across the county. Local citizens, elected officials, and MDEQ went above and beyond the recommendations given at the workshop. Currently, there is momentum in DeSoto County to continue steps to reduce Ozone precursor emissions. By continuing to focus resources toward outreach and ozone action planning, MDEQ can continue the efforts to reduce emissions.

DeSoto County Air Quality Workshop

Meeting Date: June 20, 2007

Attendees: EPA – Region 4, MDEQ, DeSoto County Officials, Local Elected Officials, and Public

EPA Recommendations	MDEQ / DeSoto County Responses
Ozone Action Program	DeSoto County Ozone Action Group <ul style="list-style-type: none"> • The DeSoto Planning Commission began the Ozone Action Group to engage public and private groups in finding emission reductions and providing public outreach.
Outreach	DeSoto County Ozone Action Group <ul style="list-style-type: none"> • The DeSoto Planning Commission began the Ozone Action Group to engage public and private groups in finding emission reductions and providing public outreach. This group meets regularly and brainstorms creative approaches and outreach ideas to reduce emissions. • MDEQ, DeSoto County Ozone Action Group, and the DeSoto County Planning Commission have engaged in numerous outreach events throughout the county. A puppet show was also developed as an additional outreach tool for schools and public outreach.
Idle Reduction	DeSoto County Anti-Idling Program <ul style="list-style-type: none"> • DeSoto County and all municipalities within the county adopted idle reduction policies and procedures for all county and municipal fleets.
Diesel Emission Reduction Projects	MS School Bus Retrofit Project <ul style="list-style-type: none"> • MDEQ retrofitted 93 DeSoto County school buses with diesel oxidation catalysts. In the surrounding counties, MDEQ retrofitted an additional 57 buses with DOCs.

Additional Projects and Efforts:

- All open burning is banned on Ozone Action Days. Open Burning is banned on all days in Hernando.
- Texas Gas Transmission voluntarily added permit conditions to reduce the load on several compressor engines to 90%. This reduction creates a 50% NOx reduction from those engines.



- MDEQ and DeSoto County have had additional outreach to companies to develop Ozone Action Plans.
- DeSoto County has adopted a Greenways Master to create and enhance a comprehensive network of greenways, conservation trails, and natural areas. The county employs a County Greenways Coordinator to grow the greenways network within DeSoto County to preserve natural amenities, waterways, and environmental systems. The greenway system will connect our citizens with a variety of outdoor recreational opportunities and encourage the use of alternative modes of transportation including bicycle, pedestrian, canoe and kayak, and horseback to improve and maintain our air quality and the health of our citizens.
- In 2011, DeSoto County received Two Globe certification from the Green Building Initiative as a result of upgrades to existing County-owned buildings to meet energy efficiency standards and reduce. Green Globes certified/rated buildings, like the DeSoto County Administration building, are committed to using less energy, conserving water resources, emitting fewer pollutants, and providing a healthier indoor environment for occupants.
- There are currently nine MDEQ Diesel Emission Reduction Projects reflecting 35 pieces of diesel equipment in and around DeSoto County. Private companies have spent over \$106,000 of their own money on these projects. MDEQ received 28 application in January 2012 for the 2011/2012 state grant
- MDOT has spent over \$1 million in Safe Routes to School, sidewalks and bike path improvements in DeSoto County and conducted an I-69 Corridor Alternatives Analysis to study preferred mass transit options for DeSoto County.



Table of Air Outreach Events

Date	Event	Estimated Attendance
April 2009	Safe & Healthy Schools Summit	150
April 21, 2009	Great Green Expo-Keesler AFB	400
April 24, 2009	DeSoto County Outdoor Day-Olive Branch	250
May 2009	MS Asthma Coalition	85
June 17, 2009	MS Association of Supervisors-Gulf Coast Convention Center-Biloxi	1,700
June 23, 2009	Agri-Science Summer Campers-Career Development Center, Jackson, MS	20
July 15, 2009	MS Municipal League-Gulf Coast Convention Center-Biloxi	1,700
September 11, 2009	Mississippi Asthma Summit	125
September 23, 2009	Arkabutla Day - DeSoto County	700
September 25 to October 4, 2009	Mid South State Fair - DeSoto County	1,000
October 2, 2009	Renewable Energy Day - Agriculture Museum	400
November 2009	MDA Greening Local Communities Statewide (4 events)	400
January 30, 2010	Moss Point Going Green Rally	200
April 17, 2010	Waterfest - Reservoir	300
April 22, 2010	Earth Day at the Navy Battalion - Gulfport	500
April 24, 2010	Health Fair - Clinton	350
May 2010	MS Asthma Coalition	75
May 1, 2010	Moss Point Outreach Event	200
June 23, 2010	Jackson Career Development Center Agriscience	20
September 2010	Mississippi Asthma Summit	125
September 22, 2010	Arkabutla Day - DeSoto County	950
October 15, 2010	Odyssey Day - Biloxi	100
October 16, 2010	Romp on the River - Tunica	5000
March 19, 2011	North Mississippi Green Festival	500
April 16, 2011	Waterfest - Reservoir	300
April 30, 2011	Earth Day - Hernando	625
May 2011	MS Asthma Coalition	75
May 2011	MS Department of Health Presentation	25
August 2011	Center for Advance Vehicle Systems	100
September 14, 2011	Arkabutla Day - DeSoto County	950
October 2011	State Port Leadership Group	30
October, 2011	DeSoto County Board of Supervisors	25
October, 7 2011	Renewable Energy Day - Agricultural Museum	400
November 2011	State Port Leadership Group	30

