MISSISSIPPI COMMISSION ON ENVIRONMENTAL QUALITY
MISSISSIPPI DEPARTMENT OF ENVIROMENTAL QUALITY
NOTICE OF PUBLIC HEARING
PUBLIC NOTICE START DATE: October 6, 2015
DEADLINE FOR COMMENTS November 5, 2015

PLEASE TAKE NOTE that the Mississippi Commission on Environmental Quality ("Commission") is considering adopting a Revision to the State Implementation Plan for Control of Air Pollution (SIP Revision) for purposes of a Redesignation Request and Maintenance Plan for DeSoto County, Mississippi.

I. Substance of the proposed action:

The Mississippi Department of Environmental Quality is considering the adoption of a SIP Revision for the purposes of a redesignation request and maintenance plan for the portion of DeSoto County, Mississippi that is designated as nonattainment for the 2008 National Ambient Air Quality Standard (NAAQS) for ground-level ozone. The Department plans to request that the U.S. Environmental Protection Agency redesignate the aforementioned portion of DeSoto County, Mississippi as attainment for the 2008 ozone NAAQS pursuant to Section 107(d)(3) of the 1990 Clean Air Act Amendments (CAA).

II. Manner By Which the Public May Comment.

Copies of the proposed SIP Revision may be obtained by calling Mr. Keith Head at 601-961-5577 or writing to Mississippi Department of Environmental Quality, Air Division, P.O. Box 2261, Jackson, Mississippi 39201. For persons with internet access, the proposed SIP Revision may be found on the Mississippi Department of Environmental Quality's website at http://www.deq.state.ms.us under Programs/Air Quality/New Information. Also, the proposed SIP Revision will be available for public review through November 5, 2015 in the main branches of the public libraries in Hernando and Tupelo, Mississippi. The proposed SIP Revision may also be reviewed in the offices of the Mississippi Department of Environmental Quality, 515 E. Amite Street, Jackson, Mississippi. Please contact Mr. Lorenzo Boddie at (601) 961-5171 to schedule an appointment.

Members of the public may present verbal or written comments at the public hearing described below. Also, written statements regarding the proposed SIP Revision will be made part of the public hearing record if delivered by 5:00 p.m., Thursday, November 5, 2015, to the attention of Mr. Dallas Baker at the address shown above.

III. Notice of Public Hearing.

A public hearing to receive comments regarding the proposed SIP Revision will be held on Thursday, November 5, 2015, 1:30 p.m. in the DeSoto County Administration Building, Board of Supervisors Meeting Room, Third Floor, 365 Losher Street, Hernando, MS 38632.

IV. Additional Information.

For additional information, please contact Mr. Keith Head at 601-961-5577.

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF POLLUTION CONTROL

PROPOSED
STATE IMPLEMENTATION PLAN (SIP) REVISION

FOR PURPOSES OF A

REDESIGNATION REQUEST AND MAINTENANCE PLAN
FOR
DESOTO COUNTY, MISSISSIPPI

PUBLIC COMMENT PERIOD STARTS OCTOBER 6, 2015
PUBLIC COMMENT PERIOD ENDS NOVEMBER 5, 2015

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1.61 Introduction: State Implementation Plan (SIP) Revision.

The Mississippi Department of Environmental Quality, representing the Governor of the State of Mississippi formally requests the portion of DeSoto County, Mississippi that was designated as nonattainment for the 2008 National Ambient Air Quality Standard (NAAQS) for ozone (O3) be redesignated to attainment pursuant to Section 107(d)(3) of the 1990 Clean Air Act Amendments (CAA).

In 2008, the EPA revised the NAAQS for ground-level ozone, setting the standard at 0.075 parts per million (ppm) averaged over an 8-hour period. Hourly average concentrations are recorded in ppm. Running 8-hour averages are computed from the hourly ozone concentration data for each hour of the year. The daily maximum 8-hour concentration for a given calendar day is the highest of the 24 possible 8-hour average concentrations computed for that day. The design value is the statistic to compare the 2008 8-hour ozone NAAQS and is a three-year average using the three most recent, consecutive calendar years of monitoring data. A violation of the 2008 8-hour ozone NAAQS occurs when the computed design value is greater than 0.075 ppm.

CAA requires the EPA to designate areas as attaining or not attaining that NAAQS. The EPA area designations were generally based on air quality monitoring data collected during the 2009, 2010, and 2011 ozone seasons. The highest monitor design value in an area was used to determine its designation. The CAA then specifies requirements for areas based on whether such areas are or are not attaining the NAAQS.

Because of EPA's belief that it was contributing to ozone nonattainment for the Memphis area, that portion of DeSoto County, Mississippi within the Memphis Urban Area Metropolitan Planning Organization (MPO) was designated nonattainment. At that time, the monitor in the Crittenden County, Arkansas had a design value above the 2008 8-hour ozone NAAQS. However, the monitor located in DeSoto County had a design value of 0.073 ppm, which is below the 2008 8-hour ozone NAAQS. The TN-MS-AR Nonattainment Area for the 2008 Ozone NAAQS was classified as a Subpart 2 marginal nonattainment area.

Section 107(d)(3)(E) of the CAA, as amended, states an area can be redesignated to attainment if the following conditions are met:

- The EPA has determined that the NAAQS have been attained. For ozone, the areas must show that the average of the 4th highest 8-hour ozone values from three (3) complete, consecutive calendar years of quality-assured air quality monitoring data must be equal to or below 0.075 ppm.

- The applicable implementation plan has been fully approved by the EPA under section 110(k).

- The EPA has determined that the improvement in air quality is due to permanent and enforceable reductions in emissions. To demonstrate this, the State should estimate the percent reduction (from the year used to determine the design value for designation and classification) achieved from federal, state, and local measures.

- The EPA has fully approved a maintenance plan, including a contingency plan, for the areas under section 175A.

- The State has met all applicable requirements for the area under section 110 and Part D.

Appendix V contains the technical data necessary to show that the portion of DeSoto County, Mississippi within the Memphis MPO designated as a moderate nonattainment area for the 2008 8-hour ozone NAAQS as part of the TN-MS-AR Marginal Nonattainment Area has attained and is expected to maintain the 2008 8-hour ozone NAAQS, and has met the requirements for redesignation set forth above.

1.62 Notification of Public Comment Period for the SIP Revision.

Public participation for the Redesignation Request and Maintenance Plan SIP Revision will be achieved by a public comment period that begins on October 6, 2015 and ends on November 5, 2015 on which date a public hearing will be held to receive comments. The public notice will be published consistent with procedures approved by EPA.

The notice of public comment period will be published on October 6, 2015, in daily newspapers in the cities of Jackson, and Tupelo, Mississippi as well as in a twice-weekly newspaper in Hernando, Mississippi. The notice of public hearing, and the draft SIP , were made available for public review in the main branches of the public libraries in Hernando and Tupelo, Mississippi and at the Mississippi Department of Environmental Quality, 515 E. Amite St., Jackson, Mississippi, 39201 and will also be made available on the Department's website http://www.deq.state.ms.us.

The public notice follows this page.

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IV. Additional Information.

For additional information, please contact Mr. Keith Head at 601-961-5577.

3.28 Legal Authority for the SIP Revision

No legislative actions are needed concerning this SIP revision. The State of Mississippi Air & Water Pollution Control Law, Section 49-17-1 to 49-17-43, Mississippi Code of 1972, gives the Commission on Environmental Quality the necessary legal authority to adopt and implement this SIP revision. The State act (as of July 1, 2011) Mississippi Code Annotated, Section 49-17-13(3) designates the Commission as the State air pollution control agency for all purposes of the federal pollution control legislation and programs and take all actions necessary thereto. The state air pollution control law as of July 1, 2011, is included in Appendix A-9 of the Mississippi State Implementation Plan.

5.26 Control Strategy for the SIP Revision

Appendix V contains the technical analysis for any needed control strategies.

6.30 Control Regulations for the SIP Revision

No amendments to state regulations are required for this SIP revision.

14.1.25 Health Effects of the SIP Revision

No adverse health effects are expected to be caused by this SIP revision.

14.3.25 Economics Effects of the SIP Revision

No adverse economic effects due to this SIP revision are foreseen.

14.5.25 Social Effects of the SIP Revision

No adverse social effects are foreseen as a result of this SIP revision.

14.6.25 Air Quality Effects of the SIP Revision

Appendix V contains the technical analysis for air quality effects of this SIP Revision.

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF POLLUTION CONTROL

STATE IMPLEMENTATION PLAN REVISION

APPENDIX V

REDESIGNATION REQUEST AND MAINTENANCE PLAN FOR DESOTO COUNTY, MISSISSIPPI

9/29/2015

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Redesignation Request and Maintenance Plan for DeSoto County, Mississippi

For the Portion of DeSoto County, Mississippi included in the TN-MS-AR Marginal Nonattainment Area for the 2008 Ozone NAAQS

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INTRODUCTION

Request for Redesignation

The Mississippi Department of Environmental Quality, representing the Governor of the State of Mississippi formally requests the portion of DeSoto County, MS that was designated as nonattainment for the 2008 National Ambient Air Quality Standard (NAAQS) for ozone (O_3) be redesignated to attainment pursuant to Section 107(d)(3) of the 1990 Clean Air Act Amendments (CAA).

Ground-Level (Tropospheric) Ozone

Ozone is a colorless gas that occurs naturally in the atmosphere and can be found in the air we breathe. Ozone is composed of three atoms of oxygen, one more than the common oxygen molecule (O_2) we need to breathe to sustain life. The additional oxygen atom makes ozone extremely reactive. Ozone in the Earth's upper atmosphere, known as stratospheric ozone, shields the Earth from the harmful effects of the sun's ultraviolet rays. Ozone found in the atmosphere closer to the Earth's surface (tropospheric ozone) is considered a harmful air pollutant due to its adverse impacts on human health and welfare.

Tropospheric ozone is commonly referred to as ground-level ozone and sometimes called smog. Ozone is not emitted directly by the combustion of fuels. Ozone is formed in the atmosphere by the reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_X) in the presence of sunlight. These air pollutants, often referred to as ozone precursors, are emitted by many types of pollution sources, including on-road and off-road motor vehicles and engines, power plants and industrial facilities, and smaller sources, collectively referred to as area sources. Ozone is predominately a summertime air pollutant. Changing weather patterns contribute to yearly differences in ozone concentrations from region to region. Ozone and the pollutants that form ozone also can be transported into an area from pollution sources found hundreds of miles upwind.

National Ambient Air Quality Standards (NAAQS)

The Clean Air Act (CAA) requires the United States Environmental Protection Agency (EPA) to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. National primary and secondary ambient air quality standards under Section 109 of the CAA are set forth in Title 40 of the Code of Federal Regulations, Part 50. NAAQS are subject to revision, and additional primary and secondary standards may be promulgated as the EPA deems necessary to protect the public health and welfare. The EPA has promulgated primary and secondary NAAQS for carbon monoxide (no secondary standard for carbon monoxide), lead, nitrogen dioxide, particulate matter, sulfur oxides, and ground-level ozone. The EPA calls these pollutants "criteria" air pollutants because it regulates them by developing human health-based and/or environmentally-based criteria (science-based guidelines) for setting permissible levels. For each pollutant, a health-based or "primary" standard has been set to protect public health in general, and a welfare-based or “secondary” standard may be set to protect quality of life and the environment. Primary standards set limits to protect public health, including the health of “sensitive” populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

2008 8-Hour Ozone NAAQS

In 2008, the EPA revised the NAAQS for ground-level ozone, setting the standard at 0.075 parts per million (ppm) averaged over an 8-hour period. Hourly average concentrations are recorded in ppm. Running 8-hour averages are computed from the hourly ozone concentration data for each hour of the year. The daily maximum 8-hour concentration for a given calendar day is the highest of the 24 possible 8-hour average concentrations computed for that day. The design value is the statistic to compare the 2008 8-hour ozone NAAQS and is a three-year average using the three most recent, consecutive calendar years of monitoring data. A violation of the 2008 8-hour ozone NAAQS occurs when the computed design value is greater than 0.075 ppm.

2008 8-Hour Ozone Designations

CAA requires the EPA to designate areas as attaining or not attaining that NAAQS. The EPA area designations were generally based on air quality monitoring data collected during the 2009, 2010, and 2011 ozone seasons. The highest monitor design value in an area was used to determine its designation. The CAA then specifies requirements for areas based on whether such areas are or are not attaining the NAAQS.

Because of EPA’s belief that it was contributing to ozone nonattainment for the Memphis area, that portion of DeSoto County, Mississippi within the Memphis Urban Area Metropolitan Planning Organization (MPO) was designated nonattainment. At that time, the monitor in the Crittenden County, Arkansas had a design value above the 2008 8-hour ozone NAAQS. However, the monitor located in DeSoto County had a design value of 0.073 ppm, which is below the 2008 8-hour ozone NAAQS. The TN-MS-AR Nonattainment Area for the 2008 Ozone NAAQS was classified as a Subpart 2 marginal nonattainment area.

Clean Air Act Redesignation Criteria

Section 107(d)(3)(E) of the CAA, as amended, states an area can be redesignated to attainment if the following conditions are met:

- The EPA has determined that the NAAQS have been attained. For ozone, the areas must show that the average of the 4th highest 8-hour ozone values from three (3) complete, consecutive calendar years of quality-assured air quality monitoring data must be equal to or below 0.075 ppm.
- The applicable implementation plan has been fully approved by the EPA under section 110(k).

- The EPA has determined that the improvement in air quality is due to permanent and enforceable reductions in emissions. To demonstrate this, the State should estimate the percent reduction (from the year used to determine the design value for designation and classification) achieved from federal, state, and local measures.
- The EPA has fully approved a maintenance plan, including a contingency plan, for the areas under section 175A.
- The State has met all applicable requirements for the area under section 110 and Part D.

In the sections to follow, the MDEQ will provide the technical data necessary to show that the portion of DeSoto County, MS within the Memphis MPO designated as a moderate nonattainment area for the 2008 8-hour ozone NAAQS as part of the TN-MS-AR Marginal Nonattainment Area has attained and is expected to maintain the 2008 8-hour ozone NAAQS, and has met the requirements for redesignation set forth above.

AIR QUALITY

Geography and Topography

The Mississippi counties in the Memphis Metropolitan Statistical Area (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. Therefore, geography and topography should not have a significant effect on DeSoto County contribution to violations of the ozone standard in Shelby County, TN or Crittenden County, AR.

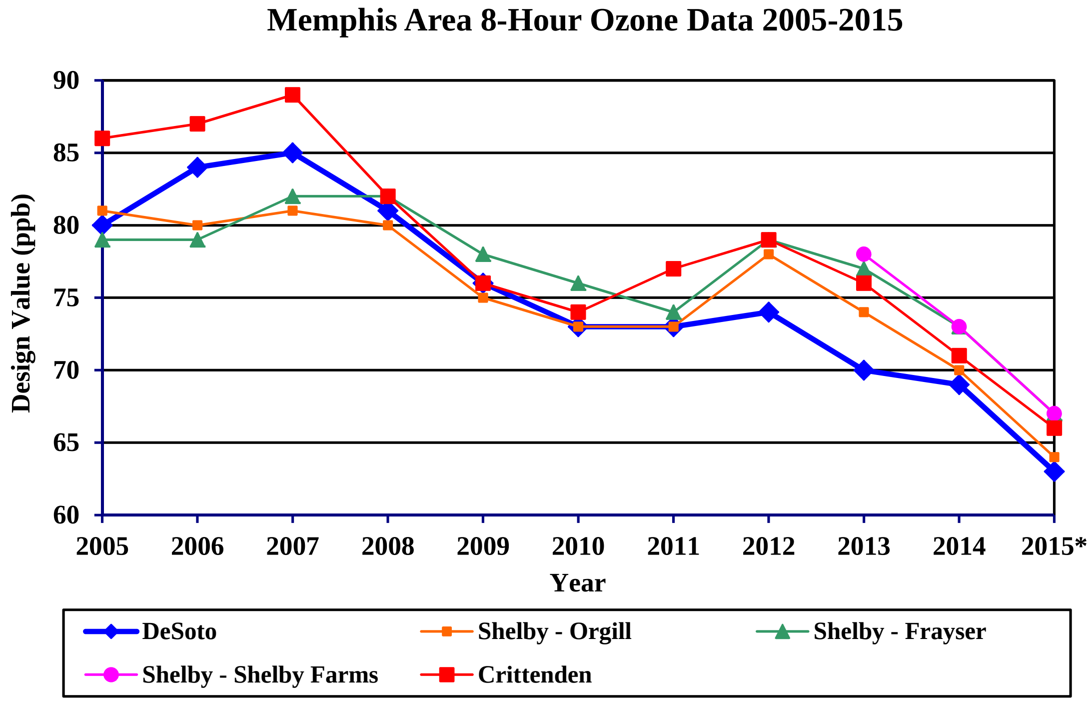
Ozone Design Value Trend

Table 1 shows the 4th maximum concentrations for the years of 2011-2014, as well as the 2011-2013 and 2012-2014 design values. DeSoto County has attained the standard for the last five years. Figure 1 shows a downward trend in ozone values for all of the monitors in the area. Figure 2 shows the annual emissions for the entire TN-MS-AR Marginal Nonattainment Area for the years 2005, 2008 and 2011, which are the last three years that complete emissions inventory data is available. Lower ozone design values have coincided with lower emissions throughout the non-attainment area.

County	Site	4th Annual Maximum 8-hour Ozone					3-Year Average 2011-2013	3-Year Average 2012-2014	3-Year Average 2013-2015*
		2011	2012	2013	2014	2015*			
DeSoto, MS	Hernando	73	75	65	67	59	70	69	63
Shelby. TN	Frayser	79	83	69	67	65	77	73	67
Shelby, TN	Orgill Park	77	84	63	65	64	74	70	64
Shelby, TN	Shelby Farms	81	86	69	66	66	78	73	67
Crittenden, AR	Marion	82	79	67	67	66	76	71	66

* Incomplete Data

Table 1: Ozone Monitoring Data for the Memphis Metropolitan Statistical Area



*** Incomplete Data**

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

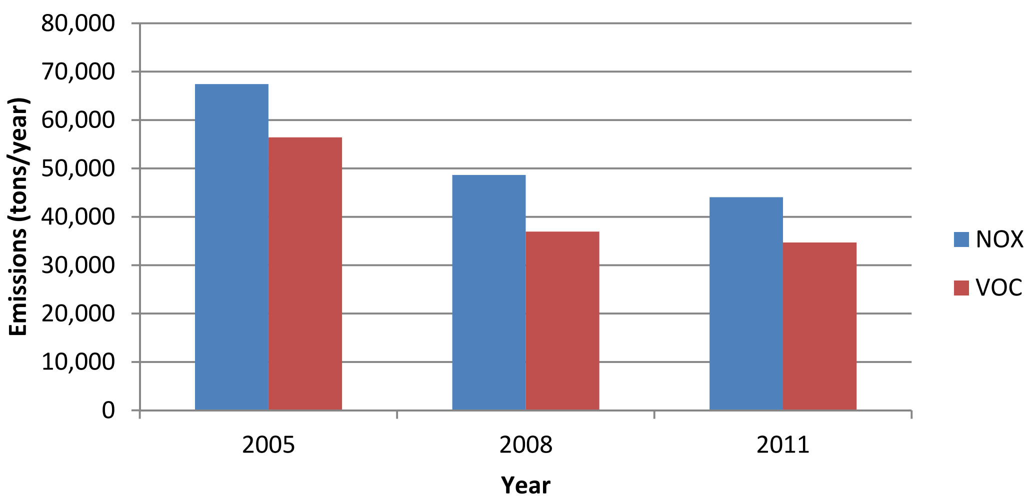


Figure 2: Total NO_X and VOC Emissions for TN-MS-AR Marginal Nonattainment Area

Meteorology

Weather is inextricably linked to emissions in the production of ground level ozone. The Department conducted an analysis intended to compare the design value attainment years (2012-2014) to the 30-year average for the area to determine if any unusual weather patterns could have had an unexpected influence in producing lower O_3 concentrations. Weather conditions that have been linked to high levels of ground-level ozone concentrations include high temperatures, increased solar radiation, low humidity, and light winds. Comparable weather conditions have generally continued to occur in the area while ozone concentrations have fallen. As shown in Table 2, 2012 average monthly highs and lows were over 2 degrees F higher than the 30-year averages. In addition, Tables 3, 4, and 5 show 2013, 2014, and 2015 monthly highs and lows near 30-year averages. Because these average temperatures are not significantly lower than long-term averages, this could not explain reduced ozone concentrations. Also, Figure 3 shows the long-term average wind rose for the period of 1970 – 2014. A comparison of Figures 4, 5, 6, and 7 shows that average wind speeds for those years were lower than the long-term average. Thus, the average temperatures were near the long-term averages and the wind speeds were below the long-term average. Therefore, analyses of the temperature and wind data indicate that meteorology has not had a significant role in the steady decline in ozone concentrations witnessed in the area, but that the primary reason is due to reductions in precursor emissions.

2012	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Seasonal Average
30 Year Average Monthly High	64	73	81	89	92	91	85	74	81.125
30 Year Average Monthly Low	44	53	62	70	74	73	65	54	61.875
2012 Monthly High	75.2	76.5	86	91	95	92.7	84.7	71.4	84
2012 Monthly Low	54.5	55.5	66	70	76	72.7	65.9	51.4	64.025
Temp. Diff. High	**11.2**	**3.5**	**5.4**	**1.6**	**2.5**	**1.7**	**-0.3**	**-2.6**	**2.875**
Temp. Diff. Low	**10.5**	**2.5**	**4.1**	**-0.1**	**2.2**	**-0.3**	**0.9**	**-2.6**	**2.15**

Table 2: 2012 Departures from Daily Average Temperature

2013	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Seasonal Average
30 Year Average Monthly High	64	73	81	89	92	91	85	74	81.125
30 Year Average Monthly Low	44	53	62	70	74	73	65	54	61.875
2013 Monthly High	57.8	71.7	79	89	89	89.6	87.4	73.7	79.6125
2013 Monthly Low	39.2	50.6	61	71	72	72.5	68.9	55.6	61.225
Temp. Diff. High	**-6.2**	**-1.3**	**-2.3**	**-0.1**	**-2.9**	**-1.4**	**2.4**	**-0.3**	**-1.5125**
Temp. Diff. Low	**-4.8**	**-2.4**	**-1.4**	**0.6**	**-2.2**	**-0.5**	**3.9**	**1.6**	**-.065**

Table 3: 2013 Departures from Daily Average Temperature

2014	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Seasonal Average
30 Year Average Monthly High	64	73	81	89	92	91	85	74	81.125
30 Year Average Monthly Low	44	53	62	70	74	73	65	54	61.875
2014 Monthly High	60.6	72.3	81	88	87	91.7	85.6	75.7	80.0875
2014 Monthly Low	38.4	51.7	62	71	70	73.4	66.7	55.3	61.0125
Temp. Diff. High	**-3.4**	**-0.7**	**-0.2**	**-1.5**	**-5.5**	**0.7**	**0.6**	**1.7**	**-1.0375**
Temp. Diff. Low	**-5.6**	**-1.3**	**0**	**1.1**	**-4.5**	**0.4**	**1.7**	**1.3**	**-0.8625**

Table 4: 2014 Departures from Daily Average Temperature

2015	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Seasonal Average
30 Year Average Monthly High	64	73	81	89	92	91	NA	NA	81.67
30 Year Average Monthly Low	44	53	62	70	74	73	NA	NA	62.67
2015 Monthly High	62.4	74.5	81.6	89.9	92.7	90.4	NA	NA	81.9
2015 Monthly Low	43.0	55.8	64.1	71.5	76.4	71.0	NA	NA	63.6
Temp. Diff. High	**-1.6**	**1.5**	**0.6**	**0.9**	**0.7**	**-0.6**	**NA**	**NA**	**0.23**
Temp. Diff. Low	**-1.0**	**2.8**	**2.1**	**1.5**	**2.4**	**-2**	**NA**	**NA**	**0.93**

Table 5: 2015 Departures from Daily Average Temperature

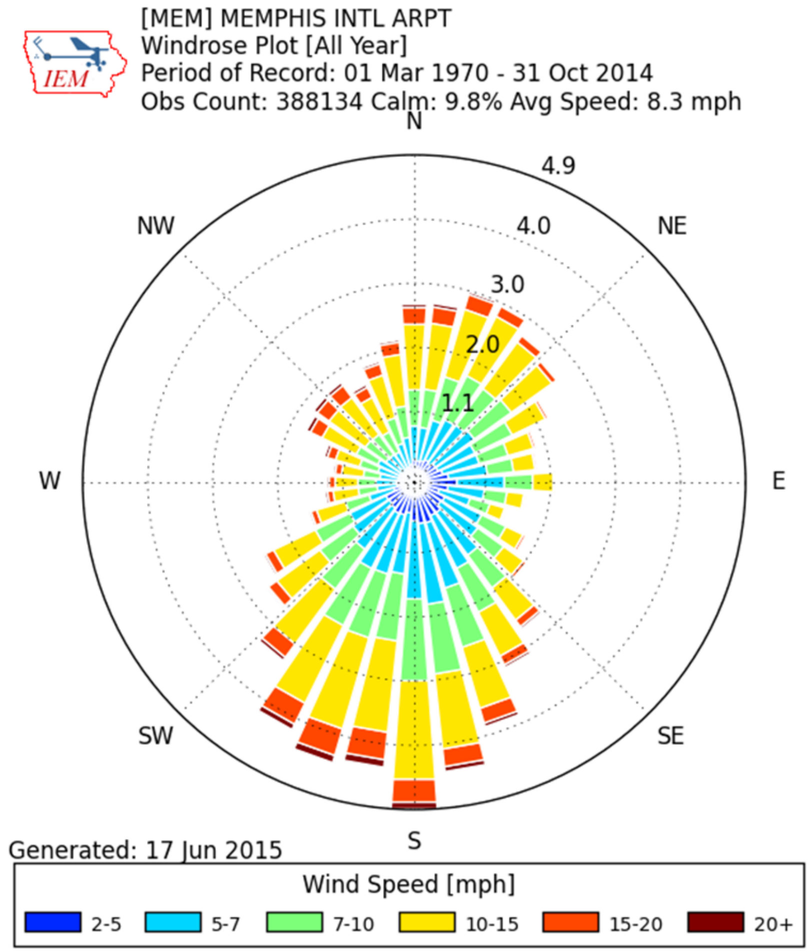


Figure 3: Average Wind Roses for Memphis International Airport

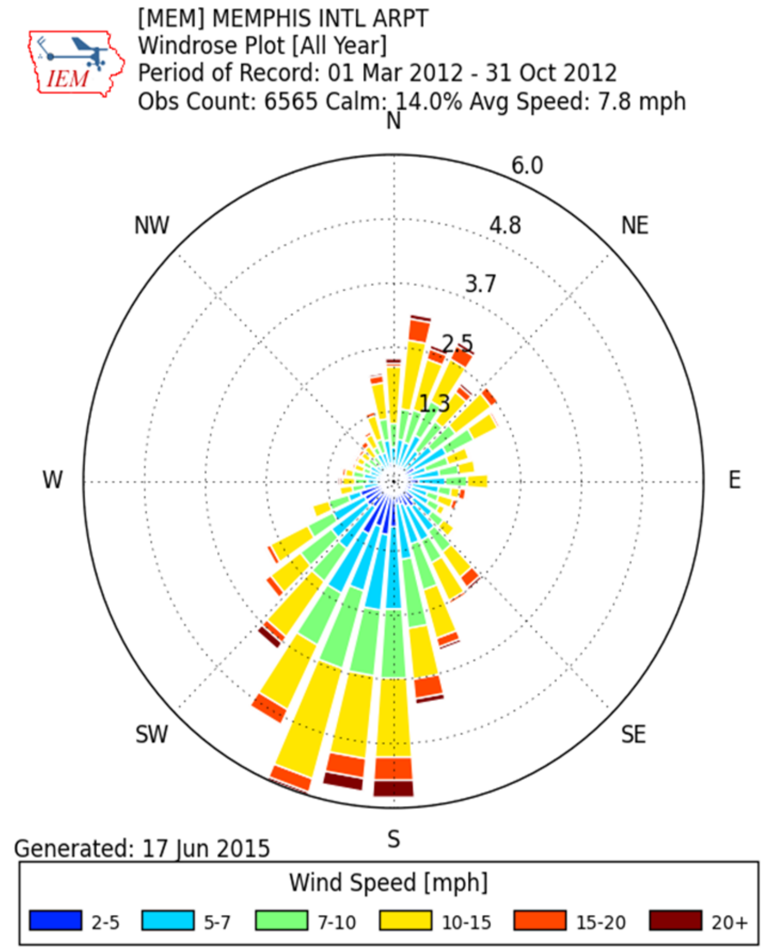


Figure 4: 2012 Ozone Season Wind Roses for Memphis International Airport

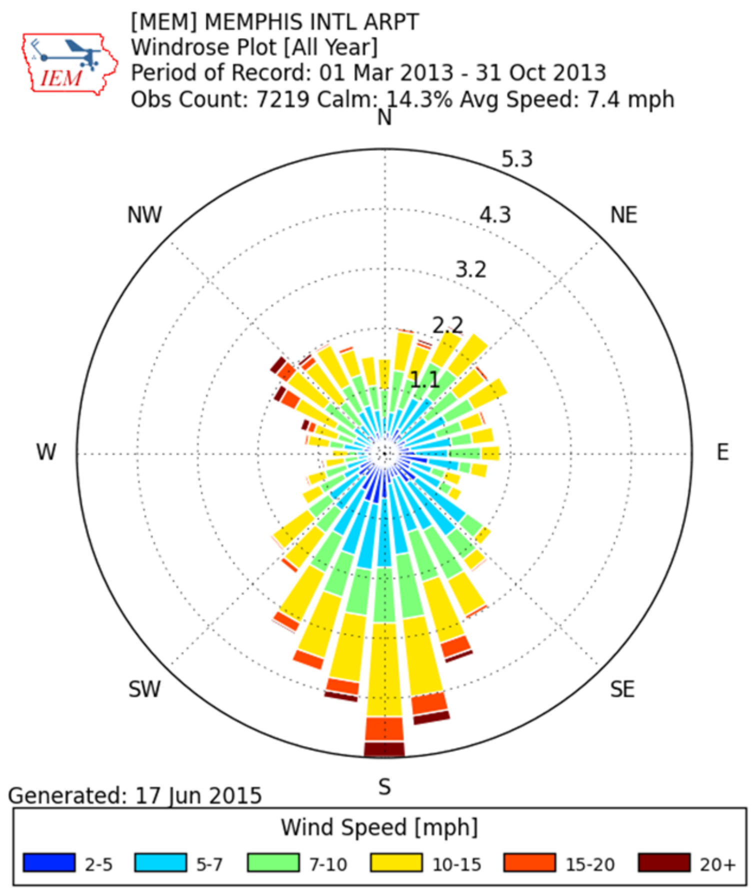


Figure 5: 2103 Ozone Season Wind Roses for Memphis International Airport

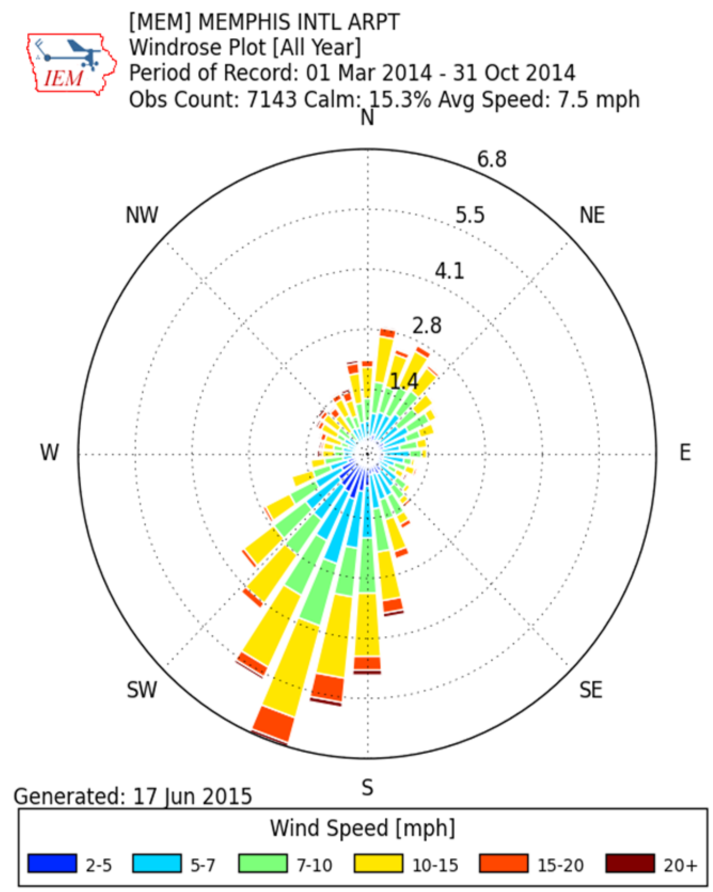


Figure 6: 2014 Ozone Season Wind Roses for Memphis International Airport

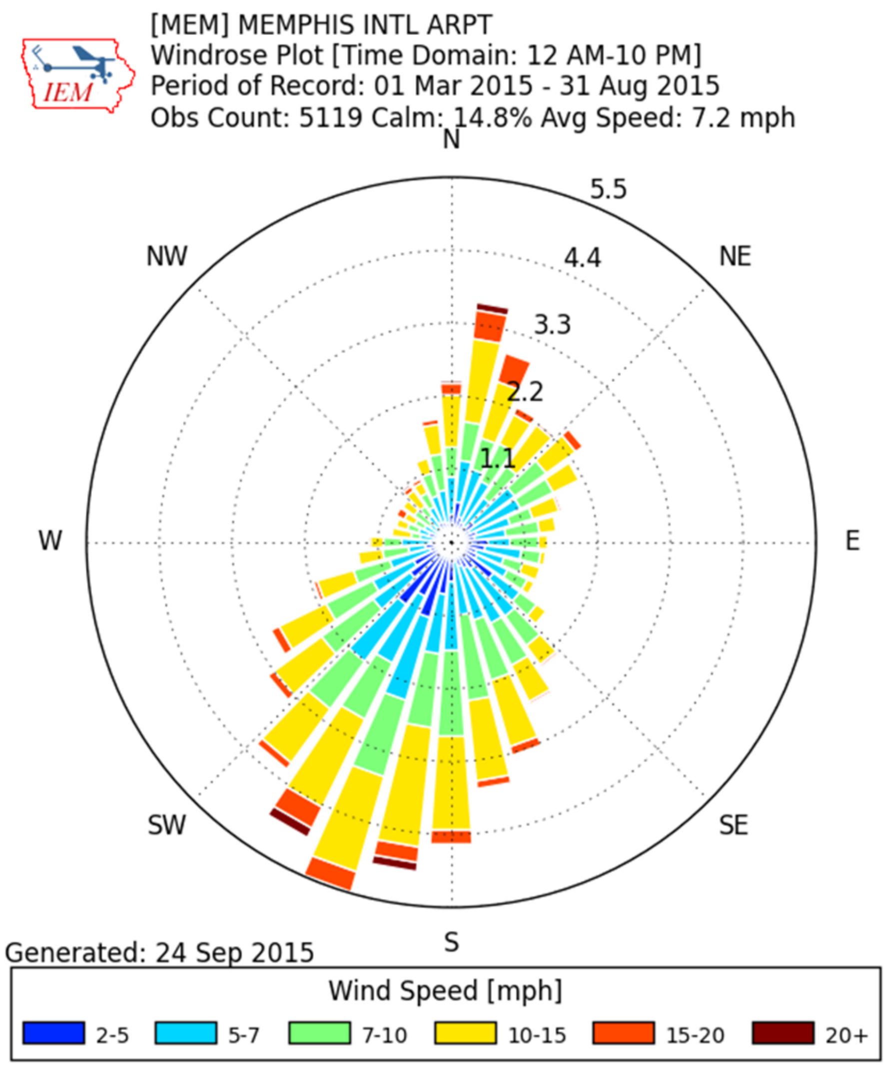


Figure 7: 2015 Ozone Season Wind Roses for Memphis International Airport

PERMANENT AND ENFORCEABLE REDUCTIONS IN EMISSIONS

Federal measures have been enacted in recent years that are resulting in permanent and enforceable emissions reductions. A list of those measures are stated below and more fully described in the Maintenance Plan section.

- Tier 2 vehicle standards: Implementation began in 2004 and will require all passenger vehicles in any manufacturer's fleet to meet an average standard of 0.07 grams of NO_X per mile. The Tier 2 rule also reduced the sulfur content of gasoline to 30 ppm starting in January of 2006. Tier 3 standards apply beginning in model year 2017 and are phased in through 2025. Sulfur content of gasoline will be further reduced to 10 ppm by January 1, 2017, and NO_X emissions are estimated to be reduced by 25% by 2030 relative to 2014 levels.

- Heavy-duty gasoline and diesel highway vehicle standards: EPA standards designed to reduce NO_X and VOC emissions from heavy-duty gasoline and diesel highway vehicles commenced implementation in 2004. A second phase of standards and testing procedures, which began in 2007, is reducing particulate matter from heavy-duty highway engines and has reduced highway diesel fuel sulfur content to 15 ppm. In addition, the Heavy-Duty National Program reduces criteria pollutant emissions as a co-benefit of lower CO_2 emissions. This program applies to the 2014-2018 model years, and will be further extended beyond model year 2018.

- Light Heavy-Duty OBD: Established OBD monitoring requirements for heavy-duty chassis certified vehicles and for engines certified for use in heavy-duty vehicles between 8,500 and 14,000 pounds gross vehicle weight rating (GVWR) beginning in 2004.

- Heavy-Duty Engines OBD Rule: New OBD monitoring requirements for engines certified for use in heavy-duty vehicles above 14,000 pounds GVWR began in 2010.

- Light-duty National Program for greenhouse gas emissions and fuel standards: The first phase applies to model years 2012-2016 and is being extended to the second phase applicable to model years 2017-2025. By 2025, these programs are expected to increase the industry fleet-wide level to an equivalent of 54.5 miles per gallon if achieved exclusively through fuel economy requirements. As with the Heavy-Duty National Program, the reduction in ozone-forming criteria pollutants such as NO_X is a co-benefit of the CO_2 reductions targeted by the regulation.

- Non-road spark-ignition (SI) engines: Became effective in 2003 and will reduce NO_X and hydrocarbon emissions. For non-road compression-ignition engines, Tier 4 exhaust emission standards will apply to the largest engines (>900 kW) beginning in 2015.

- Construction and Agriculture
  - Tier 3/Interim Tier 4: Established more stringent emission standards for engines between 37 and 560 kilowatts (50 and 750 hp), beginning in 2006.
  - Tier 4 Non-road Diesel Rule: Established more stringent emissions standards for all engines greater than 19 kilowatts (25 hp) and lowered non-road diesel fuel sulfur to 15 ppm maximum, beginning in 2010.

- Marine Diesel: Control of emissions from SI engines and equipment, beginning in 2010. Established first federal exhaust emission standards for stern-drive and inboard marine SI engines and increased the stringency of exhaust emission standards for outboard and personal watercraft engines. It also established new evaporative emission standards for all marine SI engines.

MAINTENANCE PLAN

DeSoto County, Mississippi Maintenance Plan

Mississippi's plan for maintaining compliance with the 2008 8-hour ozone NAAQS in the DeSoto County, Mississippi portion of the TN-MS-AR Marginal Nonattainment Area includes three major parts: established control measures, a maintenance demonstration, and a contingency plan. The established control measures consists of the current federal and state control measures already in effect, as well as the future benefits of the cleaner engine programs, and Transport Rule.

For the maintenance demonstration, the base year of 2012 was chosen since it is one of the most recent 3 years (2012, 2013 and 2014) for which the Memphis area has clean air quality data for the 2008 8-hour ozone NAAQS. The interim years chosen are 2017 and 2020. The final year of the maintenance demonstration is 2027, since the CAA requires maintenance for at least ten years after redesignation. The maintenance demonstration consists of a comparison between the 2012 baseline emissions inventory and the projected emissions inventories (for 2017, 2020, and 2027), which consider economic and population growth. The comparison shows that the total emissions in each of the interim years and the final year will be lower than in the base year, demonstrating maintenance of the 2008 8-hour ozone NAAQS. The reductions in emissions are due to the established control measures outlined below.

The Mississippi contingency plan involves tracking and triggering mechanisms to determine when contingency measures are needed and a process of implementing appropriate control measures. In conjunction with the Mississippi maintenance plan, the Shelby County Health Department has developed its own separate maintenance plan for the Shelby County portion of the TN-MS-AR Marginal Nonattainment Area.

Established Control Measures

Federal Control Measures

Tier 2 and Tier 3 Vehicle Standards

Federal Tier 2 vehicle standards require all passenger vehicles in a manufacturer's fleet, including light duty trucks and sport utility vehicles (SUVs), to meet an average standard of 0.07 grams of NO_X per mile.

Implementation began in 2004, with full compliance required by 2007. The Tier 2 standards also cover passenger vehicles over 8,500 pounds gross vehicle weight rating (the larger pickup trucks and SUVs), which were not covered by Tier 1 regulations. For these vehicles, the standards were phased in beginning in 2008, with full compliance in 2009. The new standards require vehicles to be 77 percent to 95 percent cleaner than those made prior to these dates. The Tier 2 rule also reduced the sulfur content of gasoline to 30 ppm starting in January of 2006. Most gasoline sold in Mississippi prior to January 2006 had a sulfur content of about 300 ppm. Sulfur occurs naturally in gasoline but interferes with the operation of catalytic converters on vehicles, resulting in higher NO_X emissions. Lower-sulfur gasoline is necessary to achieve the Tier 2 vehicle emission standards. Tier 3 standards apply beginning in model year 2017 and are phased in through 2025. Sulfur content of gasoline will be further reduced to 10 ppm by January 1, 2017, and NO_X emissions are estimated to be reduced by 25 percent by 2030 relative to 2014 levels. EPA is setting new tailpipe standards for the sum of non-methane organic gases (NMOG) and nitrogen oxides (NO_X), presented as NMOG+NO_X, and for particulate matter (PM) that apply to all light-duty vehicles and some heavy-duty vehicles. Tier 3 standards also reduce evaporative emissions thus lowering VOCs.

Heavy-Duty Gasoline and Diesel Highway Vehicles Standards

New EPA standards designed to reduce NO_X and VOC emissions from heavy-duty gasoline and diesel highway vehicles commenced implementation in 2004. A second phase of standards and testing procedures, which began in 2007, reduces particulate matter from heavy-duty highway engines and has reduced highway diesel fuel sulfur content to 15 ppm. The total program for these new engines using ultra-low sulfur diesel is expected to achieve a 90 percent reduction in PM emissions and a 95 percent reduction in NO_X emissions (as compared to existing engines using higher-content sulfur diesel). Gradual fleet turnover has caused many engines built before these rules were in place to be retired and replaced with newer, less emitting engines. This fleet turnover will inevitably continue throughout the region.

Large Non-road Diesel Engines Rule

In May 2004, the EPA promulgated new rules for large non-road diesel engines (such as those used in construction, agricultural, and industrial equipment) to be phased in between 2008 and 2014.

The non-road diesel rules also reduce the allowable sulfur in non-road diesel fuel by over 99 percent. At that time, non-road diesel fuel averaged about 3,400 ppm in sulfur. The rule limited non-road diesel sulfur content to 500 ppm in 2006 and 15 ppm in 2010. The combined engine and fuel rules have reduced NO_X and PM emissions from large non-road diesel engines by over 90 percent. For non-road diesel engines, Tier 4 exhaust emission standards will apply to the largest engines (>900 kW) beginning in 2015.

Non-road Spark-Ignition Engines and Recreational Engines Standard

This standard, effective in July 2003, regulates NO_X, hydrocarbons (HC), and carbon monoxide (CO) for groups of previously unregulated non-road engines. Tier 1 of this standard was implemented in 2004, and Tier 2 in 2007. It applies to all new engines imported into or sold within the United States after implementation and regulates large spark-ignition engines (e.g. forklifts and airport ground service equipment), recreational vehicles (e.g. off-highway motorcycles and all-terrain-vehicles), and recreational marine engines. The regulation varies based upon the type of engine or vehicle.

The large spark-ignition engines contribute to ozone formation and ambient CO and PM levels in urban areas. Like the large spark-ignition, recreational vehicles contribute to ozone formation and ambient CO and PM levels. Recreational marine diesel engines over 37 kilowatts (used in yachts, cruisers, and other types of pleasure craft) contribute to ozone formation and PM levels, especially in marinas. For certain recreational marine diesel engine sizes, the standard began to be phased-in in 2006.

When all of the non-road spark-ignition engines and recreational engines standards are fully implemented, overall reductions of 72 percent in HC, 80 percent in NO_X, and 56 percent in CO emissions are expected by 2020. These controls will help reduce ambient concentrations of ozone, CO, and fine PM.

Emissions Inventory

There are two basic approaches used to demonstrate continued maintenance. The first is the comparison of a projected emissions inventory with a baseline emissions inventory. The second approach involves complex analysis using gridded dispersion modeling. The approach used by the MDEQ is the comparison of emissions inventories for the years 2012 and 2027.

The maintenance demonstration is made by comparing the 2012 baseline emissions inventory to the 2027 projected emissions inventory. The base year of 2012 was chosen since it is a year that falls within the attaining design value period of 2012-2014, and some emissions inventory data was already developed for this year. The baseline emissions inventory represents an emission level for a period when the ambient air quality standard was not violated, 2012-2014. If the projected emissions remain at or below the baseline emissions, continued maintenance is demonstrated and the ambient air quality standard should not be violated in the future. In addition to comparing the final year of the plan, all of the interim years are compared to the 2012 baseline to demonstrate that these years are also expected to show continued maintenance of the 2008 8-hour ozone NAAQS.

The emissions inventories are comprised of four major types of sources: point, non-point, on-road mobile, and non-road mobile. The projected emissions inventories have been estimated using projected rates of growth in population, traffic, economic activity, and other parameters. Naturally occurring, or biogenic, emissions are not included in the emissions inventory comparison, as these emissions are outside the State's span of control.

The Shelby County Health Department has developed a maintenance plan for the Tennessee portion of the Memphis nonattainment area. For emissions summaries for the Tennessee portion of the Memphis nonattainment area, refer to the Redesignation Demonstration and Maintenance Plan submitted by Shelby County Health Department.

Types of Emission Inventories

There are four different man-made emission inventory source classifications: (1) Point, (2) Non-Point, (3) On-Road Mobile, and (4) Non-Road Mobile sources.

Point sources are those larger industrial or commercial stationary facilities, including those that must have Title V permits issued by the MDEQ Air Division. These sources have the potential to emit more than 100 tons of NO_X or VOC. The source emissions are tabulated from data collected by direct on-site measurements of emissions or mass balance calculations utilizing approved emission factors. There are usually several emission sources for each facility. Emission data is collected for each point source at a facility and the data is entered into an in-house database system. For the projected year's inventory, point sources are adjusted by growth factors based on NAICS codes. A complete description of how these inventories were developed is given in detail in Appendix A.

Non-Point sources are those stationary sources whose emissions are relatively small, but due to the large quantities, the collective emissions could be significant (i.e., smaller industrial facilities, dry cleaners, service stations, etc.). For these sources, emissions are estimated by multiplying an emission factor by some known indicator of collective activity such as production, number of employees, or population. The emission factors used were obtained from the EIIP Tech Reports, the Procedures document or the USEPA's AP 42 Compilation of Air Pollutant Emission Factors, Fifth Edition, referred to as AP 42, and the ERTAC collaboration. These types of emissions are estimated on the county level. Various sources of data, such as population growth, energy consumption by sector, and county business patterns from the Census, were used to determine the growth projections. A complete description of how these inventories were developed is given in detail in Appendix B.

Non-road mobile sources are equipment that can move but do not use the roadways, i.e., lawn mowers, construction equipment, agricultural equipment, etc. The emissions from this category are calculated using the non-road part of EPA's MOVES2014 mobile model. Railroad locomotive emissions are not calculated included in the non-road portion of the MOVES2014 model, so the emissions need to be calculated differently. A complete description of how these inventories were developed is given in detail in Appendix C. The MOVES2014 model expresses VOC emissions as Total Gaseous Hydrocarbons (TGH).

For on-road mobile sources, the EPA mobile model MOVES2014 is used to generate emissions. MOVES can be used to estimate exhaust and evaporative emissions as well as brake and tire wear emissions from all types of on-road vehicles. The estimation of emissions involves multiplying an activity level by an emission factor, and is all done within the model. The activity level used by MOVES2014 is vehicle miles traveled (VMT). For the future year inventories, the MOVES 2014 mobile model takes into consideration expected federal tailpipe standards, fleet turnover, and new fuels. A complete description of how these inventories were developed is discussed in detail in Appendix D.

Maintenance Demonstration

As discussed above, maintenance is demonstrated when the future years total man-made emissions are less than the 2012 baseline emissions. The following table summarizes the VOC and NO_X emissions for the DeSoto County portion of the TN-MS-AR Marginal Nonattainment Area for the 2008 Ozone NAAQS. The difference between the base year (2012) and the final year (2027) illustrates that the continued maintenance of the 2008 8-hour ozone NAAQS is expected.

Summary of Emissions

Table 5 contains the estimated NO_X emissions from all of the emission source sectors for the DeSoto County portion of the TN-MS-AR Marginal Nonattainment Area for the 2008 Ozone NAAQS.

NO_x Average Summer Day Emissions (tons)				
	2012	*2017*	*2020*	*2027*
Point Source	1.78	1.81	1.83	1.89
Non-Point Source	1.24	1.25	1.25	1.24
On-Road Mobile	8.66	5.34	3.53	2.74
Non-Road Mobile	2.89	2.29	2.06	1.78
Total Emissions	**14.57**	**10.68**	**8.67**	**7.65**

Table 6: Average Summer Day Nitrogen Oxide Emissions for DeSoto County

Table 6 lists the estimated VOC emissions from all emission source sectors for the DeSoto County portion of the TN-MS-AR Marginal Nonattainment Area.

VOC Average Summer Day Emissions (tons)				
	2012	*2017*	*2020*	*2027*
Point Source	0.84	0.77	0.77	0.79
Non-Point Source	6.49	6.57	6.59	6.54
On-Road Mobile	5.75	3.92	2.51	2.54
Non-Road Mobile	1.86	1.41	1.33	1.28
Total Emissions	**14.94**	**12.67**	**11.19**	**11.15**

Table 7: Average Summer Day Volatile Organic Compounds Emissions for DeSoto County

Figure 6 shows the estimated NO_X emissions trends for the duration of the 10-year maintenance plan.

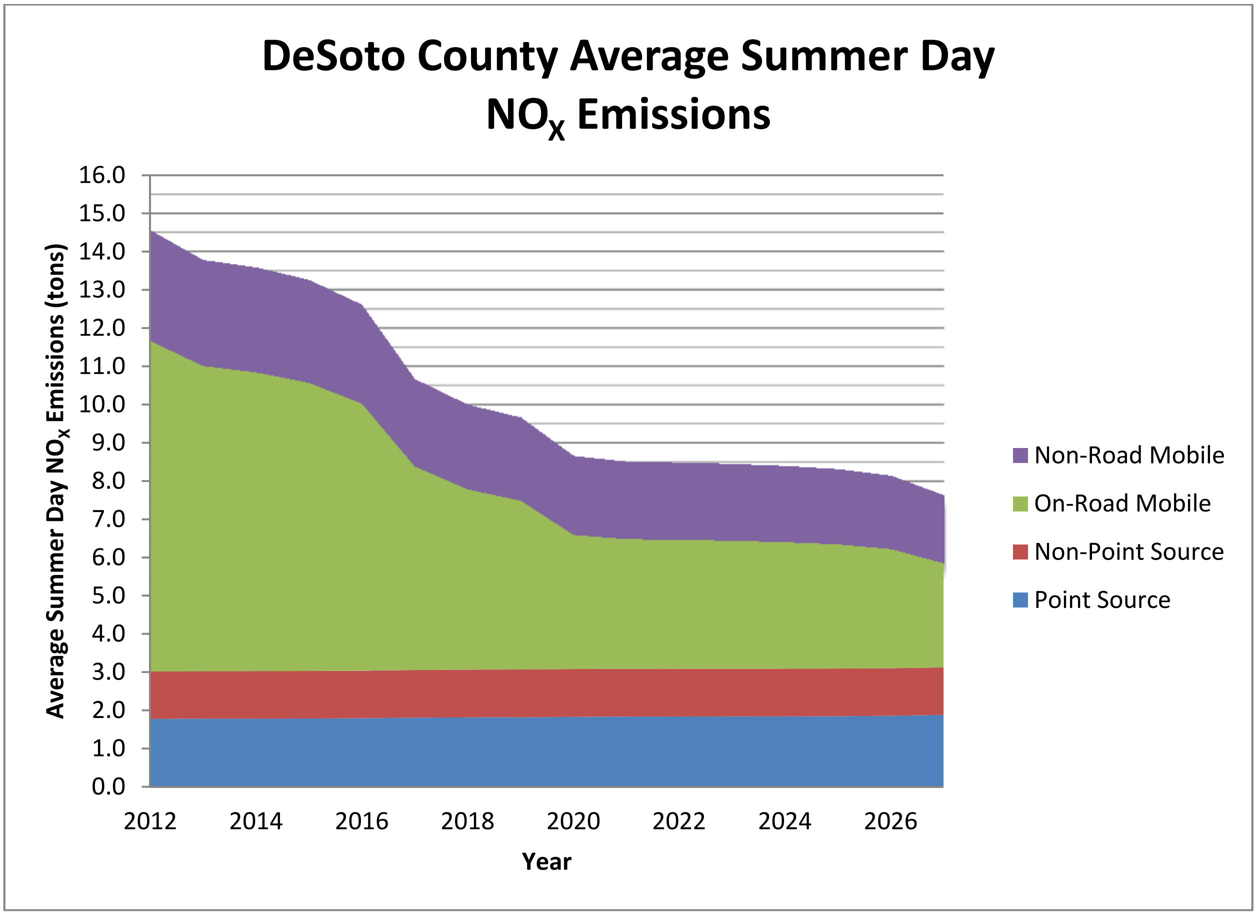


Figure 8: Average Summer Day Nitrogen Oxide Emissions for DeSoto County

Figure 7 shows the estimated VOC emissions trends for the duration of the 10-year maintenance plan.

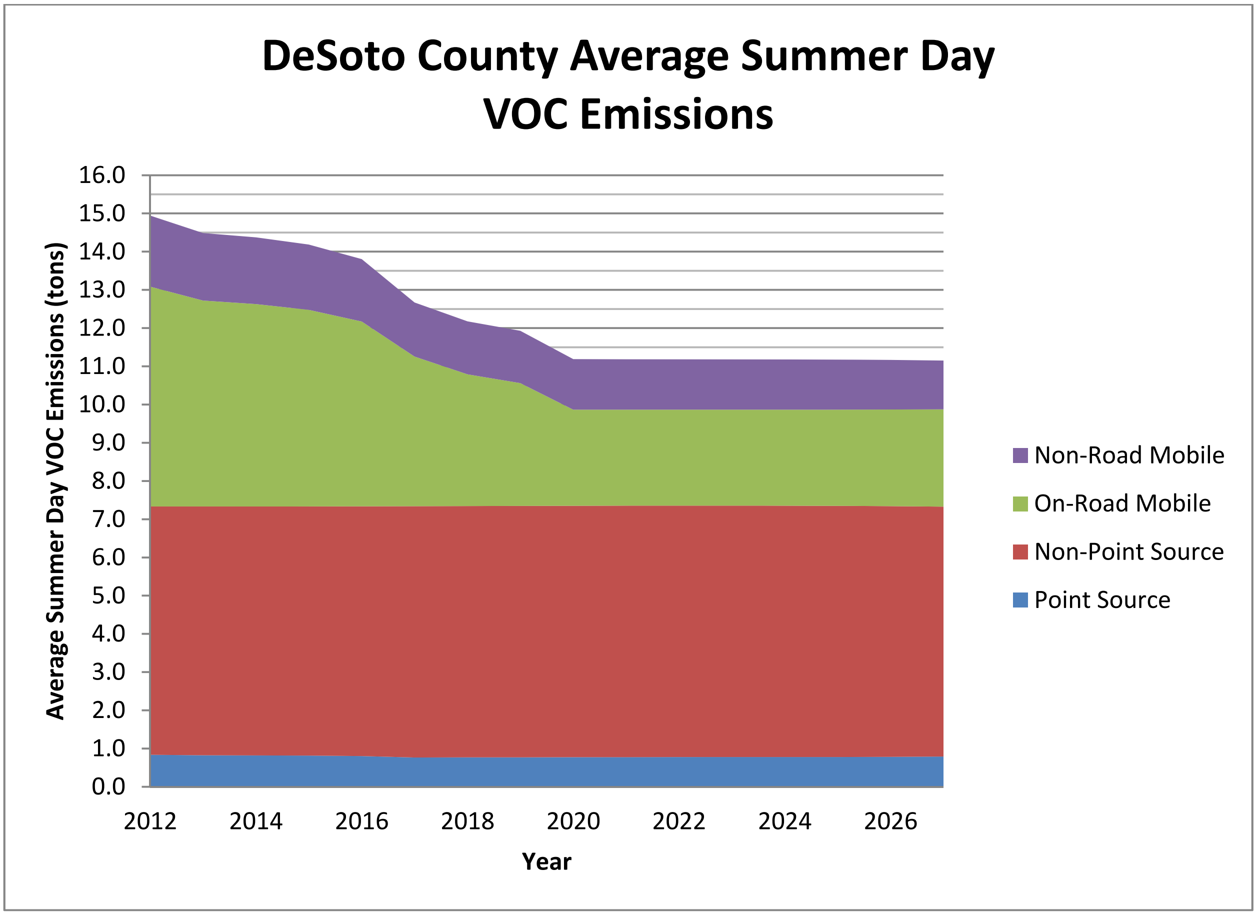


Figure 9: Average Summer Day Volatile Organic Compounds Emissions for DeSoto County

For emissions summaries for the Tennessee portion of the Memphis nonattainment area, refer to the Redesignation Demonstration and Maintenance Plan submitted by Shelby County Health Department.

Contingency Plan

Overview

The two main elements of the Mississippi contingency plan are tracking and triggering mechanisms to determine when contingency measures are needed and a process of developing and adopting appropriate control measures.

Contingency Plan Trigger

The primary trigger for evaluation of the contingency plan will be a quality assured/quality controlled (QA/QC) design value that exceeds the 2008 8-hour ozone NAAQS at any monitor within the Memphis nonattainment area. If the QA/QC data indicates a violating design value for the 2008 8-hour ozone NAAQS, then the triggering event will be the date of the design value violation, and not the final QA/QC date. However, if initial monitoring data indicates a possible design value violation but later QA/QC indicates that a NAAQS violation did not occur, then a triggering event will not have occurred, and contingency measures will not need to be implemented. In addition, MDEQ will monitor periodic emissions inventory updates and compare to projected emissions.

MDEQ has been and will continue proactive efforts including reviewing monitoring data and evaluating trends in an effort to identify possible violations as early as possible.

Contingency Measures

The measures that will be considered for adoption upon a trigger of the contingency plan include:

Trigger	Contingency Measure
MDEQ forecasts ozone levels above the 2008 Ozone NAAQS	All open burning permits within the county shall be suspended until the forecast shows improvement. During the summer season, holders of such permits are required to contact the office on a daily basis to determine if burning will be allowed.
Ozone Design Value for DeSoto County exceeds the 2008 Ozone NAAQS	Implementation of diesel retrofit programs, including incentives for performing retrofits for fleet vehicle operations (Programs such as diesel retrofitting may be dependent on the availability of federal funding).
	Voluntary engine idling reduction programs.
	MDEQ will work with MDOT to have air quality alerts posted on the Intelligent Transportation System boards located in DeSoto County encouraging motorists to take actions to reduce emissions when forecasted ozone levels will exceed the 2008 Ozone NAAQS.
	Other measures deemed appropriate at the time as a result of advances in control technologies.

Table 8: List of Contingency Measures for DeSoto County

Action Resulting from Trigger Activation

In the event that the trigger is activated, the MDEQ will begin analyses to include emissions inventory assessment to determine those emission control measures that will be necessary for attaining or maintaining the 2008 8-hour ozone NAAQS. MDEQ will notify EPA Region 4 of the proposed schedule and provide sufficient information to demonstrate that the proposed measures are a prompt correction of the triggering event. Contingency measures will be implemented within 18–24 months (after QA/QC of the monitored data) of the ozone design value for DeSoto County exceeding the 2008 ozone NAAQS.

Tracking for Ongoing Maintenance

As part of a statewide monitoring network, there is one monitoring site which is located in central DeSoto County. This site was established as a downwind background monitor and is important for forecasting ozone concentrations in the TN-MS-AR Marginal Nonattainment Area. In addition to measuring ozone, this site also measures wind speed and wind direction. Mississippi will continue operation of an appropriate air quality monitoring network in accordance with 40 CFR Part 58, Ambient Air Quality Surveillance and associated appendices.

Mississippi will continue to update its emissions inventory, including DeSoto County, at least once every three years. In addition to the emissions inventory for 2012, the emissions inventory base year, and the last year of the maintenance plan, 2027, interim years of 2017 and 2020 were selected to show a trend analysis for maintenance of the 2008 8-hour ozone NAAQS. Tracking the progress of the maintenance plan also includes performing reviews of the updated emissions inventories for the area using the latest emissions factors, models, and methodologies. For these periodic inventories, MDEQ will review the assumptions made for the purpose of the maintenance demonstration concerning projected growth of activity levels.

In addition, MDEQ will continue the commitment to work with local stakeholders to maintain the NAAQS as required. These stakeholders continue to pursue actions that improve air quality in general, focusing on multi-pollutant efforts that reduce emissions contributing to ozone and particulate matter and that also reduce air toxics and greenhouse gas emissions. Local stakeholders continue to be more engaged than ever in air quality issues and understanding how the decisions made locally impact air quality. As proven in Mississippi, by taking early action, states may be able to prevent any actual violations of the NAAQS and, therefore, eliminate the need on the part of the EPA to redesignate an area to nonattainment.

Motor Vehicle Emissions Budgets and Safety Margin

Safety Margin

Under 40 CFR 93.101, the term "safety margin" is the difference between the attainment level (from all sources) and the projected level of emissions (from all sources) in the maintenance plan. The attainment level of the emission is the level of emissions during one of the years in which the area met the NAAQS for the pollutant of concern. The safety margin, or portion of the safety margin, can be allocated to the transportation sector; however, the total emissions must remain at or below the attainment level. Attainment level emissions are shown in Tables 5 and 6 in the Maintenance Demonstration section. The safety margin for each projected year is listed below in Table 8.

Safety Margin (tons per day)		
Year	NO_X	VOC
2012	n/a	n/a
2017	3.89	2.27
2020	5.90	3.75
2027	6.92	3.79

Table 9: Safety Margin for an Average Summer Day for DeSoto County

Motor Vehicle Emissions Budgets

The transportation conformity rule found in 40 CFR Part 93 requires specific emission budgets to be defined for the on-road mobile sources portion of the DeSoto County emission inventory. These budgets are to be used by transportation authorities to assure that transportation plans, programs, and projects are consistent with, and conform to, the maintenance of acceptable air quality in DeSoto County throughout the term of the maintenance plan. Section 93.118(b) states in part:

> Consistency with the motor vehicle emissions budget(s) must be demonstrated for each year for which the applicable (and/or submitted) implementation plan specifically establishes motor vehicle emissions budget(s), for the attainment year (if it is within the timeframe of the transportation plan), for the last year of the transportation plan's forecast period, and for any intermediate years as necessary so that the years for which consistency is demonstrated are no more than ten years apart, …

If necessary to balance out expected increases and decreases in source category emissions, different MVEBs (Motor Vehicle Emissions Budgets) may be set for other years over the course of the maintenance to ensure that no total inventory will exceed the base year attainment inventory. However, this is not necessary as the expected significant reductions in total emissions ensure this will not occur. The MVEBs for VOC and NO_X for 2027 are presented below in Table 10.

	NO_X (tons/day)	VOC (tons/day)
2012 Mobile Emissions	8.66	5.75
2027 Mobile Emissions	2.74	2.54
2027 Safety Margin	6.92	3.79
Safety Margin applied to 2027 Emissions	5.26	2.46
Remaining 2027 Safety Margin	1.66	1.33
2027 Motor Vehicle Emissions Budget	**8.00**	**5.00**

Table 10: On-road Motor Vehicle Emission Budgets for DeSoto County

The MVEBs are consistent with the plan for maintaining total emissions from all source categories at or below the 2012 NOx and VOC emissions levels through the year 2027. Inter-agency consultation was utilized to develop the 2027 MVEBs. For future conformity determinations, transportation authorities should rely on the above MVEB unless this maintenance plan is revised.

APPENDIX A: POINT SOURCE EMISSIONS

Point Sources

Point sources are those larger industrial or commercial stationary facilities, including those that must have Title V permits issued by the MDEQ Air Division. These sources have the potential to emit more than 100 tons of NO_X or VOC. The source emissions are tabulated from data collected by direct on-site measurements of emissions or mass balance calculations utilizing approved emission factors. There are usually several emission sources for each facility. Emission data is collected for each point source at a facility and the data is entered into an in-house database system. For the projected year's inventory, point sources are adjusted by growth factors based on NAICS codes.

Table 10 lists the NO_X emissions for facilities within the DeSoto County portion of the TN-MS-AR Marginal Nonattainment Area. Table 11 similarly lists VOC emissions from point sources within the county. The data in the 2012 column was obtained using the 2012 emission inventory numbers. The 2012 emissions are the actual emissions reported as point source emissions from the facility. These emissions and supporting documents are submitted for Title V Fee purposes. The 2012 Airport emission numbers were obtained using the 2011 data.

For the 2017 projected growth for facilities, the recent transport rule inventory NODA was used to develop the emission projections. The 2012 and 2017 data were extrapolated to get the 2020 and 2027 estimated emissions. The same approach was used to determine 2020 and 2027 emission projections for the airports. Guardian Fiberglass shutdown and the Title V permit was revoked in 2015.

Facility Name	2012	2017	2020	2027
Davis Field	8.82E-06	8.83E-06	8.83E-06	8.85E-06
Delta Flying Service Inc.	1.36E-05	1.36E-05	1.37E-05	1.37E-05
Double O Ranch	8.82E-06	8.83E-06	8.83E-06	8.85E-06
Eagles Ridge	9.42E-06	9.43E-06	9.44E-06	9.45E-06
Guardian Fiberglass Inc*	7.58E-03	0.00E+00	0.00E+00	0.00E+00
Hernando Village Airpark Inc.	2.78E-04	2.79E-04	2.79E-04	2.79E-04
JT Shannon Lumber Company	3.78E-02	4.74E-02	5.32E-02	6.68E-02
Olive Branch Airport	8.27E-03	9.22E-03	9.79E-03	1.11E-02
Rexam Beverage Can Company Inc.	1.49E-02	1.49E-02	1.49E-02	1.49E-02
Rite Hite Products	1.94E-04	1.94E-04	1.94E-04	1.94E-04
Texas Gas Transmission LLC	1.03E+00	1.04E+00	1.05E+00	1.06E+00
TVA Southaven Combined Cycle plant	6.75E-01	6.94E-01	7.06E-01	7.33E-01
Vaiden Landing	8.82E-06	8.83E-06	8.83E-06	8.85E-06
NOx Total tons/day	**1.78**	**1.81**	**1.83**	**1.89**

Table 11: Average Summer Day Nitrogen Oxide Emissions for DeSoto County

Facility Name	2012	2017	2020	2027
Davis Field	2.04E-05	2.04E-05	2.05E-05	2.05E-05
Delta Flying Service Inc.	3.16E-05	3.16E-05	3.16E-05	3.17E-05
Double O Ranch	2.04E-05	2.04E-05	2.05E-05	2.05E-05
Eagles Ridge	2.18E-05	2.18E-05	2.18E-05	2.19E-05
Guardian Fiberglass Inc*	8.25E-02	0.00E+00	0.00E+00	0.00E+00
Hernando Village Airpark Inc.	6.10E-04	6.11E-04	6.11E-04	6.12E-04
JT Shannon Lumber Company	4.00E-02	4.15E-02	4.24E-02	4.45E-02
Olive Branch Airport	1.67E-02	1.83E-02	1.92E-02	2.14E-02
Rexam Beverage Can Company Inc.	5.30E-01	5.30E-01	5.30E-01	5.30E-01
Rite Hite Products	7.06E-02	7.06E-02	7.06E-02	7.06E-02
Texas Gas Transmission LLC	5.13E-02	5.56E-02	5.81E-02	6.40E-02
TVA Southaven Combined Cycle plant	4.57E-02	5.00E-02	5.26E-02	5.86E-02
Vaiden Landing	2.04E-05	2.04E-05	2.05E-05	2.05E-05
VOC Total tons/day	**0.84**	**0.77**	**0.77**	**0.79**

Table 12: Average Summer Day Volatile Organic Compounds Emissions for DeSoto County

*Guardian Fiberglass shutdown and the Title V permit was revoked in 2015.

APPENDIX B: NON-POINT SOURCE EMISSIONS

Non-Point Sources

Non-Point sources are those stationary sources whose emissions are relatively small, but due to the large quantities, the collective emissions could be significant (i.e., smaller industrial facilities, dry cleaners, service stations, etc.). For these sources, emissions are estimated by multiplying an emission factor by some known indicator of collective activity such as production, number of employees, or population. Non-Point source emission data is estimated using an assumed growth factor for the area's population. In general, one of the following emissions estimation approaches is used to calculate the area source emissions: per capita emission factors, employment-related emission factors, commodity consumption related emission factors, and level of activity based emission factors. The emission factors used were obtained from the EIIP Tech Reports, the Procedures document or the USEPA's AP 42 Compilation of Air Pollutant Emission Factors, Fifth Edition, referred to as AP 42, and the ERTAC collaboration. Below the emissions are categorized into one of eight groups. These values are extrapolations based on the 2011 data for DeSoto County, Mississippi.

Source	2012	2017	2020	2027
Miscellaneous Area Sources	0.049079	0.049306	0.049541	0.049726
Mobile Sources	0.750354	0.736188	0.703286	0.662463
Natural Sources	0.575564	0.654621	0.73661	0.801038
Stationary Source Fuel Combustion	0.361831	0.394634	0.428654	0.455387
Waste Disposal, Treatment, and Recovery	0.122751	0.126613	0.130618	0.133766
Total NO_X (tons/day)	**1.859579**	**1.961361**	**2.048709**	**2.102379**

Table 13: Average Summer Day Nitrogen Oxide Non-Point Emissions for DeSoto County

Source	2012	2017	2020	2027
Industrial Processes	0.017069	0.019414	0.021845	0.023756
Miscellaneous Area Sources	0.086746	0.086746	0.086747	0.086748
Mobile Sources	0.030486	0.030758	0.030432	0.029675
Solvent Utilization	3.19219	3.31349	3.439578	3.537147
Stationary Source Fuel Combustion	0.015402	0.017518	0.019712	0.021436
Storage and Transport	2.919173	2.86946	2.750749	2.602268
Waste Disposal, Treatment, and Recovery	0.232449	0.23422	0.236057	0.237501
Total VOC (tons/day)	**6.493515**	**6.571606**	**6.58512**	**6.538531**

Table 14: Average Summer Day Volatile Organic Compounds Non-Point Emissions for DeSoto County

APPENDIX C: NON-ROAD MOBILE EMISSIONS

Non-Road Mobile Sources

This section includes NO_X and VOC emissions for non-road sources in DeSoto County. These emissions are from agricultural equipment, airport equipment, commercial equipment, construction equipment, industrial equipment, lawn and garden equipment, locomotives, logging equipment, oil field equipment, pleasure craft, railroad maintenance equipment, recreational vehicles, and underground mining equipment. The emission numbers were obtained from the MOVES2014 model using the non-road mobile source feature. MOVES2014 was used to estimate the emissions for years 2012, 2017, 2020, and 2027.

MOVES2014 non-road feature does not give emissions for locomotives. The locomotive data is based off of the 2011 EPA National Emissions Inventory. The current emissions were extrapolated based on the population increase in DeSoto County from 2011 through 2027.

MOVES Model Inputs

Below are the inputs used in the MOVES2014 model.

Scale

- *Model*
    - *Nonroad*
- *Domain/Scale*
    - *National*
- *Calculation Type*
    - *Inventory*

TIME SPANS

- *Time Aggregation Level*
    - *Hour*
- *Years*
    - *2012, 2017, 2020, 2027*
- *Months*
    - *July*
- *Days*
    - *Weekdays*

GEOGRAPHIC BOUNDS

- *Region*
    - *County*
- *State*
    - *Mississippi*
- *County*
    - *DeSoto County*

VEHICLES/ EQUIPTMENT

- *All fuels and Sector combinations were selected*

ROAD TYPE

POLLUTANTS AND PROCESSES

- *Total Gaseous Hydrocarbons (VOC)*
- *Oxides of Nitrogen (NOx)*

STRATEGIES

- *Rate-of-progress*

OUTPUT

- *General Output*
    - *Mass Units: U.S. Ton*
    - *Energy Units: Million BTU*
    - *Distance Units: Miles*
- *Output Emission*
    - *Always: 24 Hour Day by County*
    - *Vehicle/ Equipment Categories: Model Year, Fuel Type, and Emission Process*
    - *Off Road: SCC, Sector, Engine Tech, and HP Class*

Classification	2012	2017	2020	2027
Agricultural Equipment	.45511	.34553	.28223	.17439
Airport Equipment	.00013	.00009	.00006	.00003
Commercial Equipment	.07950	.06460	.05896	.05115
Construction Equipment	1.38810	.91452	.70377	.47684
Industrial Equipment	.20164	.11809	.10331	.10493
Lawn and Garden Equipment	.17499	.14135	.13851	.13972
Locomotives	.53412	.60748	.68357	.74335
Logging Equipment	.00093	.00037	.00019	.00012
Pleasure Craft	.04805	.08555	.08429	.07955
Railroad Maintenance Equipment	.00796	.00643	.00548	.00362
Recreational	.00368	.00324	.00331	.00346
NOx Total (tons/day)	**2.89421**	**2.28725**	**2.06368**	**1.77716**

Table 15: Average Summer Day Nitrogen Oxide Non-Road Mobile Emissions for DeSoto County

Classification	2012	2017	2020	2027
Agricultural Equipment	.04841	.03716	.03224	.02619
Airport Equipment	.00001	.00001	.00001	.00001
Commercial Equipment	.11167	.08679	.08670	.09363
Construction Equipment	.19359	.15484	.14174	.12792
Industrial Equipment	.05823	.02334	.01842	.01808
Lawn and Garden Equipment	.82747	.68234	.69642	.76507
Locomotives	.02574	.02927	.03284	.03582
Logging Equipment	.00076	.00078	.00081	.00091
Pleasure Craft	.57468	.38214	.30026	.19318
Railroad Maintenance Equipment	.00166	.00126	.00110	.00086
Recreational	.01493	.01425	.01455	.01524
VOC Total (tons/day)	**1.85715**	**1.41218**	**1.32509**	**1.27691**

Table 16: Average Summer Day Volatile Organic Compounds Non-Road Mobile Emissions for DeSoto County

APPENDIX D: ON-ROAD MOBILE EMISSIONS

DESOTO COUNTY MOBILE SOURCE EMISSIONS ANALYSIS IN SUPPORT OF THE STATE IMPLEMENTATION PLAN (SIP) DEVELOPMENT

FOR THE

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

PREPARED BY:

KIMLEY-HORN AND ASSOCIATES, INC.

Kimley»Horn

JULY 29, 2015

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Introduction

On May 21, 2012 the United States Environmental Protection Agency (EPA) designated the portion of DeSoto County, MS within the Memphis metropolitan area boundary as a marginal 8-hour ozone moderate non-attainment area (77 FR 30088). The 8-hour ozone area designation was effective on July 20, 2012. The State of Mississippi appealed this finding, but a ruling posted in 78 FR 925 (January 7, 2013) stated that appeal was formally denied by the EPA. The non-attainment portion of DeSoto County was classified as a marginal area, meaning they must reach attainment status within three years.

The purpose of this emissions analysis is to provide information about anticipated mobile source emissions to help establish emissions budgets in the SIP for the precursors of ozone. The emissions analysis was performed according to procedures prescribed by the following federal, state and local regulations: 69 FR 40004, 40 CFR Parts 51 and 93 (i.e. Transportation Conformity Rule Requirements); the Mississippi Transportation Conformity Rules; and Metropolitan Planning Organization (MPO) Planning Regulations (23 CFR 450) implementing MAP-21 Requirements. Results of this emissions analysis are found in Table 3 of this report.

This report documents the process used by Kimley Horn for the air quality analysis associated with the Desoto County SIP development. EPA's MOVES2014 model was used to derive emission factors as required by the EPA[1]. The MOVES input files were created and modified as discussed in the preconsensus analysis. The emissions factors are based on a number of inputs including temperature, relative humidity, and presence of inspection and maintenance programs, vehicle source type mix, vehicle age distribution, temporal distributions, and other roadway attributes. Emissions estimates are the product of aggregating the results from the emission rate development with average daily vehicle miles traveled (VMT), source type populations, hourly distribution, road type distribution, and average speed distribution as part of the MOVES inventory analysis.

The Memphis and Shelby County MPO Travel Demand Model was used to obtain VMT estimates for the portion of DeSoto County in the non-attainment area. For more information on the methodology and assumptions utilized in the development of the Travel Demand Model, please refer to the Model Documentation in the Memphis MPO Direction 2040 Long Range Transportation Plan (LRTP), Appendix G.

Latest Planning Assumptions

The Memphis and Shelby County MPO Travel Demand Model was developed with consultation and input from state and local transportation agencies and the USDOT. The 2040 LRTP provides the appropriate level of detail required by 40 CFR 93.106 of the conformity regulations. The highway projects in the 2040 LRTP are financially constrained for the entire plan and for each horizon year in terms of capital, operations and maintenance costs (See LRTP Chapter 8 – Implementation Plan). The emissions analysis is based on assumptions derived from estimates of current and future population, employment, travel, and congestion. As part of the 2040 LRTP conformity determination, past assumptions have been discussed with various local, state and federal

[1] Using MOVES to Prepare Emission Inventories in State Implementation Plans and Transportation Conformity: Technical Guidance for MOVES2014, EPA, January 2015.

agencies for their continued validity and updated whenever necessary. Detailed planning assumptions are presented in Section 2 of this report.

Latest Emissions Estimation Model

Mobile source emissions estimates for the ozone season (summer) were developed using EPA's Motor Vehicle Emission Simulator, MOVES2014, and travel estimates from the latest Memphis MPO Travel Demand Model. The Mississippi Department of Transportation (MDOT), and Tennessee Department of Transportation (TDOT), Tennessee Department of Environment and Conservation (TDEC), and the Memphis MPO provided the most current data available for emissions calculations. Information from the Federal Highway Administration (FHWA) and EPA's Air Planning Branch in Atlanta were used as well.

Methodology

The emissions inventory development and emissions projection discussion below identifies procedures used to obtain emissions. Table 16 summarizes the settings used in the MOVES run specification file. Table 17 lists the assumptions used in the MOVES County Data Manager. Further details on the use of MOVES are found in the following sections.

Table 17 – MOVES Runspec Parameters	
MOVES Runspec Parameter	**Settings**
MOVES2014	
Scale	County, Inventory Mode
Time Span	Time aggregation = Hour 1 month representing summer conditions (July) All hours of the day selected Weekdays only
Geographic Bounds	One partial county (DeSoto County, MS)
Vehicles/Equipment	All valid source types, gasoline and diesel
Road Type	All road types including off-network
Pollutants and Processes	Oxides of Nitrogen (NOx) and Volatile Organic Compounds (VOC)
General Output	Units = grams, joules, miles
Output Emissions	Time = hour, location =county, on-road emissions by road type and source use type
Advanced Performance	None

Table 17: MOVES Runspec Parameters

Table 18 – MOVES County Data Manager Parameters	
County Data Manager Input	**Data Source**
Meteorology Data	Local information obtained from NOAA data at the Memphis International Airport. TDEC provided three-year average data for the month of July, including hourly temperatures and humidity. This analysis will assume the meteorological data at this location can be applied to the entire modeled area.
Source Type Population	Local and state information is currently under development and as such is unavailable at this time. As a result, default data was used as a starting point for all source type. The MOVES Technical Guidance provides guidance on how to adjust default data with local VMT data, a methodology that was referenced for all analysis years.
Age Distribution	Use Shelby County, TN-specific data obtained from the UT paper "Methodology for Developing Input Datasets for the MOVES Model," August 2014.
Vehicle Type VMT – HPMS Vehicle Type VMT	Local data obtained from Memphis Travel Demand Model.
Vehicle Type VMT – Monthly VMT Fraction	Local data is unavailable; therefore, the analysis uses Shelby County, TN-specific data obtained from the UT paper "Methodology for Developing Input Datasets for the MOVES Model," August 2014.
Vehicle Type VMT – Daily VMT Fraction	Local data is unavailable; therefore, the analysis uses Shelby County, TN-specific data obtained from the UT paper "Methodology for Developing Input Datasets for the MOVES Model," August 2014.
Vehicle Type VMT – Hourly VMT Fraction	Local data obtained from Memphis Travel Demand Model.
Average Speed Distribution	DeSoto County data obtained from the Memphis Travel Demand Model.
Road Type Distribution	DeSoto County data obtained from the Memphis Travel Demand Model.
Ramp Fraction	DeSoto County data obtained from the Memphis Travel Demand Model.
Fuel Supply/Fuel Formulation	Default data for DeSoto County (obtained from the MOVES program)
Alternative Fuel Vehicle Types	There are no fixed-route transit buses operating in DeSoto County at this time. The default AVFT data will be modified to reflect only standard fuel types.
I/M Programs	No data entered.

Table 18: MOVES County Data Manager Parameters

MOVES

The Clean Air Act (CAA) requires US EPA to regularly update its mobile source emission models. US EPA continuously collects data and measures vehicle emissions to make sure the Agency has the best possible understanding of mobile source emissions. This assessment, in turn, informs the development of US EPA's mobile source emission models. MOVES2014, which represents the Agency's most up-to-date assessment of on-road mobile source emissions, was used for this analysis.

Travel Demand Modeling

The Memphis Urban Area travel demand model boundary includes all of DeSoto County and Shelby County, as well as portions of Tipton, Fayette, and Marshall Counties. Figure 8 shows the DeSoto County Non-Attainment Area. Although model approval is a joint process between the MPO and the appropriate state review agencies, the Tennessee Department of Transportation (TDOT) was the primary agency responsible for approval of the travel demand model for use in developing the Long Range Transportation Plan (LRTP). The travel demand model used for the air quality conformity analysis was reviewed and approved for use for long range plan and air quality conformity analysis purposes.

The Memphis Urban Area Travel Demand Model is a four step model. Trip generation, trip distribution, mode choice, and trip assignment components are included in the model. The base year of the travel demand model used in the development of the Direction 2040 LRTP is 2004. Socioeconomic data was forecasted to the year 2040 as a part of the most recent LRTP. Appendix G of the Direction 2040 LRTP contains the assumptions and methodology used to develop the travel demand model.

Model Data Adjustments

At the outset of this process, it was important to compare the information in the travel demand model to raw data obtained through traffic counts. The 2004 Highway Performance Monitoring System (HPMS) data was obtained from the Mississippi Department of Transportation (MDOT) for DeSoto County. The annual VMT shown in the HPMS data was compared to the total 2004 DeSoto County VMT shown in the travel demand model. This comparison yielded a HPMS/TDM ratio that was used to scale the VMT output from the model to more closely match documented conditions. This scaled VMT was used in the development of the HPMS vehicle type VMT.

The adjusted annual vehicle miles traveled by MOVES vehicle source type for the study area are shown in Table 18.

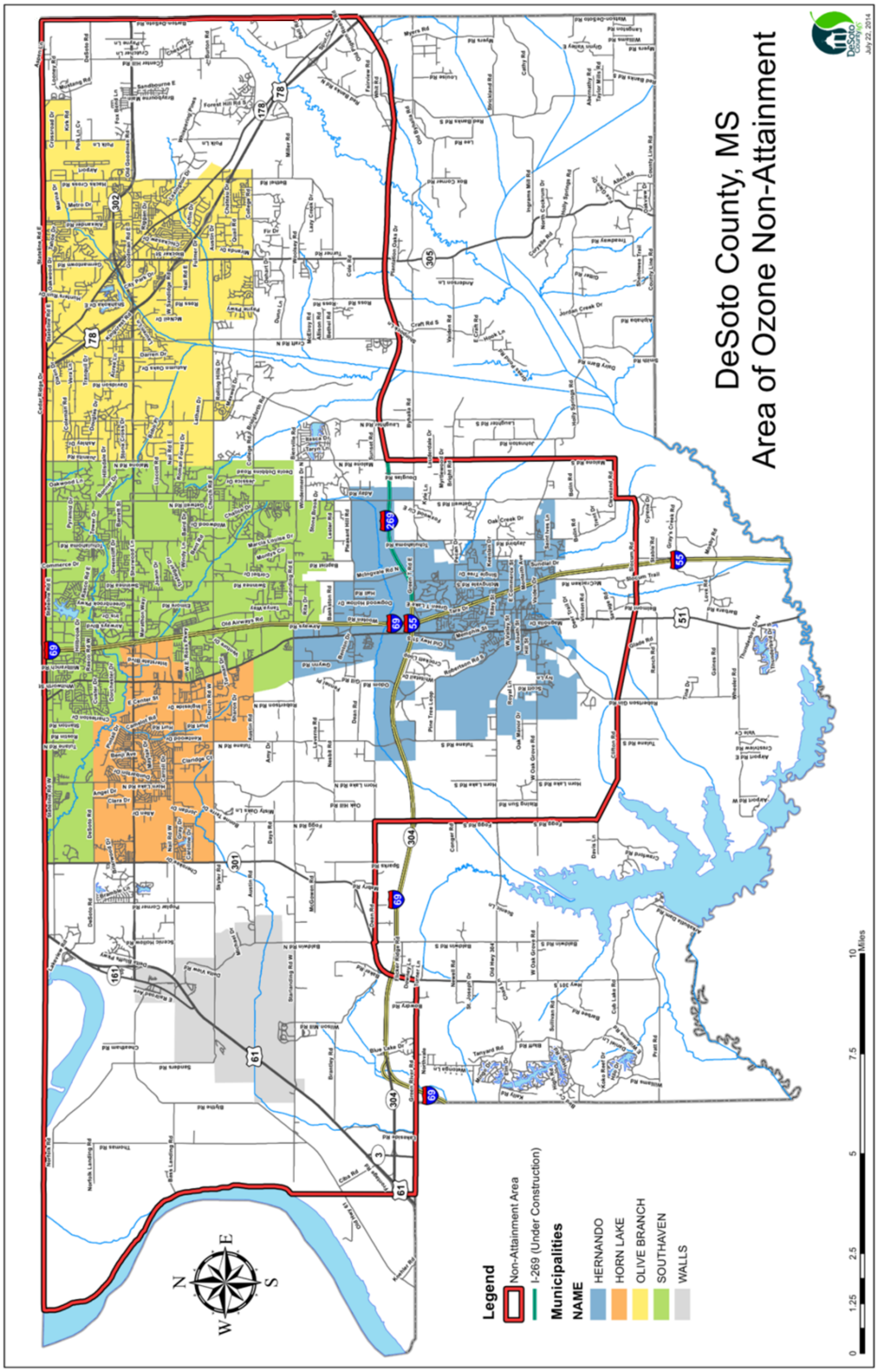


Figure 10: DeSoto County Ozone Non-Attainment Area

Table 19- Annual VMT by Year, DeSoto County Non-Attainment Area

Source Type	Source Type ID	Source Type VMT				
		2010	2012	2017	2020	2027
Motorcycle	11	3,198,812	3,494,901	4,072,686	4,590,142	5,606,377
Passenger Car	21	818,344,363	894,091,969	1,041,905,439	1,174,284,834	1,434,265,965
Passenger Truck	31	223,469,257	245,192,227	284,900,845	321,025,867	392,036,012
Light Commercial Truck	32	58,026,203	62,359,021	73,495,527	82,906,590	101,325,188
Intercity Bus	41	348,218	124,887	145,684	176,339	218,455
Transit Bus	42	127,666	222,520	251,026	304,317	375,870
School Bus	43	452,953	693,037	807,924	978,149	1,203,468
Refuse Truck	51	1,431,042	1,648,785	1,873,808	2,246,818	2,757,364
Single Unit Short-haul Truck	52	31,658,583	35,456,326	41,064,973	49,772,288	61,417,522
Single Unit Long-haul Truck	53	1,841,695	1,937,017	2,306,018	2,874,735	3,582,270
Motor Home	54	1,145,330	1,369,384	1,543,973	1,767,080	2,070,255
Combination Short-haul Truck	61	10,362,744	10,334,958	12,943,953	19,523,012	23,810,842
Combination Long-haul Truck	62	34,075,288	36,302,999	40,270,029	56,513,753	65,554,100
Total		1,184,482,156	1,293,228,028	1,505,581,886	1,716,963,924	2,094,223,688

Table 19: Annual VMT by Year, DeSoto County Non-Attainment Area

Pre-Processing

Information was gathered from the travel demand model to generate the average speed distribution, road type distribution, hourly VMT distribution, HPMS vehicle type VMT, and ramp fraction. To streamline this process, a pre-processor was developed. The pre-processor performed many of the calculations and disaggregations needed to produce MOVES-ready spreadsheets for each input. MOVES spreadsheet templates for each input type were developed for the identified model years. Following this, a script was developed to pull the needed data from the model and perform any needed calculations. MOVES files generated through this exercise could then be applied directly in the County Data Manager. Additional information on the data sources used and needed data manipulation is contained in Sections 3 and 4.

Post-Processing

The analysis was performed using the inventory method. As a result, post-processing of the data was not required to arrive at the overall emissions output. The resulting information was summarized by pollutant type for the portion of DeSoto County being analyzed to generate the overall emissions in tons per year. Sections 3 and 4 provide additional detail on the data sources gathered, modeling assumptions, and post-processing steps.

MOVES Runspec

The MOVES2014 software was released by the Environmental Protection Agency in October 2014. This software uses a graphical user interface with a set of input categories. A Runspec can be developed that stores the input values for these categories. The values and information included in the Runspecs developed for this analysis are explained in more detail in the following sections.

Description

The information in this category is used to distinguish the individual Runspecs. For this analysis, the description is used to introduce the purpose for the analysis, the area being studied, and the year of analysis (i.e. 2010, 2012, 2017, 2020, and 2027).

Scale

This input window is used to detail the information needed for the domain/scale of the analysis as well as the calculation type. The county level was selected as the domain for this effort, since it is the appropriate level for use in SIP and regional conformity analysis. The inventory method was chosen for the calculation type.

Time Spans

The Time Spans input window has a variety of different timescale inputs that are used for understanding the level of temporal aggregation being used in the analysis. The time aggregation level was specified as hours, based on guidance from EPA/FHWA for the preferred aggregation level for conformity runs. The years 2010, 2012, 2017, 2020, and 2027 were chosen for the analysis years. Each year was done within a different Runspec. Since the pollutant analysis being conducted is for the 8-hour ozone standard, July was chosen as the month to best represent summer conditions. Weekdays were selected as the representative day type since they are considered to be the worst-case type when compared with weekends. All hours of the day were included in the analysis to represent conditions over a full 24-hour period.

Geographic Bounds

This analysis consisted of a portion of DeSoto County. This input window also asks for the name of the domain input database. A total of five input databases were created during this process, reflecting the appropriate Runspec and input data for the analysis years 2010, 2012, 2017, 2020, and 2027.

Vehicles/Equipment

This input window allows the user to specify which fuel and vehicle types are present within the transportation network. There are thirteen different vehicle classes (referred to as source use types) and five different fuel types. This analysis considers the diesel and gas fuel types only. This was partly to reflect the lack of compressed natural gas and liquefied petroleum gas vehicles in the population, and also to allow for default fuel formulation and fuel supply information to be used in the study area. Within this, all possible vehicle and fuel types were considered. Diesel motorcycles, gas combination long-haul trucks, and gas intercity buses were removed since they are not represented in the vehicle population.

Road Type

The MOVES software incorporates five different roadway types: off-network, rural restricted access, rural unrestricted access, urban restricted access, and urban unrestricted access. Expressways and freeways in the region are considered as restricted access facilities. For this analysis, all five roadway types were considered. Off-network emissions are intended to account for vehicle starts and evaporative emissions for parked vehicles. While these emissions are not captured through the information in the regional travel demand models, default values can be used to assess their impacts.

Pollutants and Processes

This input window allows the user to specify different pollutants and processes that are desired for modeling. Since the purpose of this analysis is to assess emissions relating to the 8-hour ozone standard, the Runspec includes Oxides of Nitrogen (NO_x) and Volatile Organic Compounds (VOC).

Miscellaneous Strategies

The MOVES software includes input windows where provisions can be specified for specific strategies such as on-road retrofit and rate of progress emissions. Since these strategies are not being applied in this location, no information was entered for this section.

Output

Output for the MOVES program is stored in a user-created database. Output databases were created for each of the 5 different Runspec conditions. The unit of measure used in the output database were grams, joules, and miles. Based on the parameters already established in these Runspecs, the time measurement for this analysis was set as hourly, and the location was automatically set for the link level.

County Data Manager

Once all of the base parameters have been established for a given MOVES Runspec, the County Data Manager can be used to enter locally-specific data. Input provided in Excel spreadsheet format can be referenced using this tool, which converts the data to MySQL format and incorporates it into the MOVES analysis. For the DeSoto County portion of the non-attainment area, locally-specific data could consist of data used for the entire region, statewide, or county-level data. The following sections detail these input criteria, and the methodology and assumptions used to arrive at the information entered for each.

Meteorology Data Importer

Local information was obtained from NOAA data at the Memphis International Airport. TDEC provided three-year average data for the month of July, including hourly temperatures and humidity. This analysis assumes the meteorological data at this location can be applied to the entire modeled area.

Source Type Population Importer

This importer provides the user with the opportunity to enter vehicle population data sorted by the 13 MOVES vehicle source types. The Pre-Analysis Consensus Memorandum indicated that local and state information is currently under development and as such is unavailable at this time. As a result, default data was used as a starting point for all source types. The MOVES Technical Guidance offers guidance on how to leverage default population and VMT data alongside local VMT data to arrive at an estimate of the local population. This methodology was applied for all analysis years. A growth rate was not applied, since growth is inherently built in through this methodology.

Age Distribution Importer

The Age Distribution Importer allows the user to provide vehicle age distribution data sorted by the MOVES vehicle source types. Vehicle age distribution is divided into 30 years based on vehicle model years. For each vehicle type, the sum of all age distributions will equal one. Local data was not available; therefore, data was obtained from a study conducted by the University of Tennessee – Knoxville. This data was specific to Shelby County, and as such can be reasonably transferred to DeSoto County.

Vehicle Type VMT and VMT Fractions

This data importer asks the user for the VMT in the study area by HPMS vehicle class type, hourly VMT distributions, daily VMT distributions, and monthly VMT distributions. The HPMS vehicle class VMT is asked for an annual basis. To determine this information, data can be pulled from available travel demand models or from regional HPMS data.

HPMS Vehicle Class VMT

The HPMS vehicle class VMT was determined using the pre-processor developed within the travel demand model. The travel demand model classifies vehicles into automobiles, single unit trucks, and combination unit trucks. The three vehicle classes in the model were divided into the five HPMS vehicle class types through the pre-processor. The five HPMS vehicle class types are motorcycles, light duty vehicles, buses, single unit trucks, and combination unit trucks. Since the travel demand model produces daily weekday volumes, the EPA conversion tool was used to convert these daily VMT numbers to annual values.

Daily VMT Fraction

Daily VMT Fraction information was obtained from a study conducted by the University of Tennessee – Knoxville. This data was specific to Shelby County, and as such can be reasonably transferred to DeSoto County.

Monthly VMT Fraction

Monthly VMT Fraction information was obtained from a study conducted by the University of Tennessee – Knoxville. This data was specific to Shelby County, and as such can be reasonably transferred to DeSoto County.

Hourly VMT Fraction

The hourly VMT fraction was determined using the pre-processor developed within the travel demand model. To produce the information needed for the MOVES input file, the three vehicle classes in the model were expanded to the 13 MOVES vehicle source types. In addition, the four time of day periods in the model were expanded to represent each hour of the day. The default mix of off-network hourly distribution percentages was used for all vehicle classes.

Average Speed Distribution Importer

This importer gives the user the opportunity to enter locally specific average speed data, disaggregated by vehicle source type, road type, weekday/weekend, and hour of the day. The MOVES model uses 16 speed bins, dividing speed distributions into a fraction of driving within each speed bin for each of the criteria listed previously. The average speed distribution was determined using the pre-processor developed within the travel demand model. The vehicle classes in the model were expanded to the 13 MOVES vehicle source types, and the hourly distribution was expanded from the four time periods in the model to each hour of the day.

Road Type Distribution Importer

The road type distribution importer can be used to incorporate locally-specific roadway distribution information. The average speed distribution was determined using the pre-processor developed within the travel demand model. The vehicle classes in the model were expanded to the 13 MOVES vehicle source types.

Ramp Fraction Importer

This importer allows the user to input the percentage of traffic on urban restricted and rural restricted roadways that is traveling on ramp facilities. The ramp fractions were determined using the pre-processor developed within the travel demand model.

Fuel Formulation and Fuel Supply Importer

The fuel formulation and fuel supply importers are used to input locally-specific fuel properties into the model. The pre-analysis consensus memorandum specified that default values would be used for this category.

Fuel Type and Technologies Importer

This importer value considers the alternative vehicle fuels and technologies (AVFT). If no information is entered for AVFT, MOVES assumes a default mix of alternative fuels. The MOVES default mix assumes a small percentage of compressed natural gas (CNG) transit buses. Since there are no alternative fuel vehicles in the transit fleet for DeSoto County, the default value for this file was modified to reflect only diesel and gasoline fuel types.

Inspection and Maintenance (I/M) Importer

This importer would allow local inspection and maintenance data to be entered for the study area. The DeSoto County portion of the non-attainment area has no I/M program in place. When default data is exported for this, the file indicates there are no I/M programs in place for the area. Since this is an accurate representation of the I/M program in the area, no further data was entered.

Summary Results and Conclusions

Output tables from the MOVES runs were opened in MySQL and exported to spreadsheet form. Results from this analysis are summarized in **Table 19**. Additional detail on the total emissions has been provided in **Tables 20** and **21**. These tables show total emissions for each analysis year by the 13 MOVES vehicle source types.

Table 20 – Summary of Total Mobile Source Emissions					
Pollutant	**Emissions (tons/day)**				
	2010	**2012**	**2017**	**2020**	**2027**
Volatile Organic Compounds (VOC)	6.277	5.754	3.918	2.506	2.544
Oxides of Nitrogen (NO_x)	9.720	8.660	5.339	3.529	2.741

Table 20: Summary of Total Mobile Source Emissions

Based on the results from the MOVES analysis, the trend is a general reduction in emissions of VOC and NO_x. There is a slight increase in VOC between 2020 and 2027. The reason for this slight increase in VOC in the out analysis year is that the Motor Vehicle Emission Simulator (MOVES) air quality model developed by EPA recognizes a benefit in advancing technology to reduce mobile source emissions over time. So, if there were no change in VMT, there would be a reduction in emissions over time until it leveled out at some minimum level in the future. Because VMT is increasing over time, the benefit of emissions reductions due to improved technology is eventually overcome by the increase in VMT.

Table 21 – Total NO_x Emissions (grams) by Source Type and Analysis Year						
Source Type	**Source Type ID**	**Analysis Year**				
		2010	**2012**	**2017**	**2020**	**2027**
Motorcycle	11	8,923	9,273	9,987	10,835	12,743
Passenger Car	21	3,561,709	3,245,427	1,901,864	990,692	816,399
Passenger Truck	31	1,778,368	1,647,034	947,857	442,008	375,346
Light Commercial Truck	32	357,680	313,817	178,213	139,494	75,477
Intercity Bus	41	17,815	5,071	3,053	3,676	1,213
Transit Bus	42	5,595	7,453	4,263	2,413	1,804
School Bus	43	12,079	15,601	12,416	2,325	6,961
Refuse Truck	51	58,490	52,273	31,665	13,397	16,698
Single Unit Short-haul Truck	52	599,504	532,496	309,740	264,426	187,696
Single Unit Long-haul Truck	53	33,564	28,698	16,677	12,584	10,052
Motor Home	54	21,592	21,540	15,243	14,126	9,817
Combination Short-haul Truck	61	544,144	405,436	213,934	201,445	126,483
Combination Long-haul Truck	62	1,818,282	1,572,092	1,198,692	1,104,125	846,013
Total NO_x Emissions		8,817,745	7,856,212	4,843,603	3,201,546	2,486,702

Table 21: Total NO_x Emissions (grams) by Source Type and Analysis Year

Table 22 – Total VOC Emissions (grams) by Source Type and Analysis Year						
Source Type	**Source Type ID**	**Analysis Year**				
		2010	**2012**	**2017**	**2020**	**2027**
Motorcycle	11	40,240	41,884	41,630	39,688	49,189
Passenger Car	21	3,555,709	3,246,568	2,245,261	1,462,338	1,531,601
Passenger Truck	31	1,455,286	1,351,788	856,394	424,777	453,107
Light Commercial Truck	32	232,193	203,763	131,672	108,936	68,893
Intercity Bus	41	1,268	391	233	247	104
Transit Bus	42	443	665	398	153	171
School Bus	43	2,506	3,040	2,047	403	1,214
Refuse Truck	51	4,131	3,949	2,615	1,810	2,006
Single Unit Short-haul Truck	52	157,985	149,648	96,852	75,038	71,797
Single Unit Long-haul Truck	53	8,496	7,750	5,129	3,971	4,123
Motor Home	54	13,730	14,669	11,765	11,061	8,544
Combination Short-haul Truck	61	33,306	25,966	14,238	13,316	10,610
Combination Long-haul Truck	62	189,491	170,180	145,840	131,345	106,817
Total VOC Emissions		5,694,782	5,220,260	3,554,073	2,273,084	2,308,175

Table 22: Total VOC Emissions (grams) by Source Type and Analysis Year