South Carolina

2008 8-Hour Ozone
Second 10-Year Maintenance Plan

For the Portion of York County, South Carolina
Within the Rock Hill-Fort Mill Area Transportation Study
Metropolitan Planning Organization

Part of the
Charlotte-Gastonia-Rock Hill, NC-SC
8-Hour Ozone Maintenance Area

Prepared by
South Carolina Department of Health and Environmental Control
Bureau of Air Quality

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Acronyms

µg/m^3 – micrograms per cubic meter
2017 TSD – the EPA's 2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document
AERR – Air Emissions Reporting Requirements
AP-42 – the EPA's Compilation of Air Pollutant Emission Factors, Fifth Edition
APUs – auxiliary power units
AQS – Air Quality System
AT – air taxis
AvGas – aviation gasoline
BACT – best available control technology
BTU/hour – British thermal units per hour
CAA – Clean Air Act
CAIR – Clean Air Interstate Rule
CARB – California Air Resources Board
CBECS – Commercial Building Energy Consumption Survey
CDOT – Charlotte Department of Transportation
CEC – Commission on Environmental Cooperation
CEFM – Cattle Enteric Fermentation Model
CFR – Code of Federal Regulations
Charlotte Area – Charlotte-Gastonia-Rock Hill, NC-SC area
CI – compression ignition
CMA – cold mix asphalt
CMU – Carnegie Mellon University
CO – carbon monoxide
CO_2 – carbon dioxide
CRDs – Crop Reporting Districts
CSAPR – Cross-State Air Pollution Rule
D&B – Dun & Bradstreet
Department – South Carolina Department of Health and Environmental Control
EGUs – electric generating units
EIA – U.S. Energy Information Administration
EIIP – Emission Inventory Improvement Program
EIS – Emissions Inventory System
EPA – U.S. Environmental Protection Agency
EPest – estimated pesticide use
FTP – Federal Test Procedure
GA – general aviation
GHG – greenhouse gas
GSE – ground support equipment
HAPs – hazardous air pollutants
HC – hydrocarbons
HCl – hydrochloric acid
HMA – hot mix asphalt
HPBA – Hearth, Patio, and Barbecue Association
ICEs – internal combustion engines
ICI – Industrial, Commercial, and Institutional
kg – kilograms
kg/OSD – kilograms per ozone season day
LPG – liquefied petroleum gas
LRTP – Long-Range Transportation Plan
LTO – landing and takeoff
MACT – Maximum Available Control Technology
Maintenance Area – York County, South Carolina portion within the Rock Hill-Fort Mill Area Transportation Study Metropolitan Planning Organization redesignated to attainment, effective January 11, 2016
MATS – Mercury and Air Toxics Standards
MECS – Manufacturing Energy Consumption Survey
MOVES – Motor Vehicle Emissions Simulator
MPO – Metropolitan Planning Organization
MVEB – motor vehicle emission budget
NAAQS – National Ambient Air Quality Standards
NAICS – North American Industry Classification System
NASS – National Agricultural Statistics Service
NC – North Carolina

NCDEQ – North Carolina Department of Environmental Quality
NEC – not elsewhere classified
NEI – National Emissions Inventory
NESCAUM – Northeast States for Coordinated Air Use Management
NESHAP – National Emission Standards for Hazardous Air Pollutants
NG – natural gas
NH_3 – ammonia
NHTSA – National Highway Traffic Safety Administration
NMIM – National Mobile Inventory Model
NMOG – non-methane organic gases
NOMAD – Nonpoint Method Advisory Committee
NO_X – oxides of nitrogen
NSPS – New Source Performance Standards
NSR – New Source Review
OAP – Office of Atmospheric Programs
OAQPS – the EPA's Office of Air Quality Planning and Standards
OSD – ozone season day
PAD – Petroleum Administration for Defense
PFC – portable fuel containers
PM – particulate matter
$PM_{2.5}$ – fine particulate matter (particles measuring 2.5 microns or less in diameter)
ppm – parts per million
PSD – Prevention of Significant Deterioration
QA – quality analysis
QA/QC – quality assured / quality controlled
RACM – reasonably available control measures
RACT – reasonably available control technology
RFATS – Rock Hill-Fort Mill Area Transportation Study
RFP – reasonable further progress
RHW – residential household waste
RICE – reciprocating internal combustion engine
RVP – Reid vapor pressure
RWC – residential wood combustion
Rx – prescribed
SAFE – Safer Affordable Fuel-Efficient
SC – South Carolina
SCAQMD – South Coast Air Quality Management District
SCC – source classification code
SCDMV – South Carolina Department of Motor Vehicles
SCDOT – South Carolina Department of Transportation
SEDS – State Energy Data System
SF2/B2 – SMARTFIRE2
SFTP – Supplemental Federal Test Procedure
SI – spark ignition
SIP – State Implementation Plan
SO_2 – sulfur dioxide
SUVs – sport utility vehicles
TIP – Transportation Implementation Plan
USDA – U.S. Department of Agriculture
UST – underground storage tank
VHT – vehicle hours traveled
VMT – vehicle miles traveled
VOCs – volatile organic compounds
WF – wildfire
WLFs – wildland fires
WMA – warm mix asphalt

Executive Summary

2008 8-Hour Ozone Second 10-Year Maintenance Plan
Rock Hill-Fort Mill Area Transportation Study
Metropolitan Planning Organization

A. Background Information

The 2008 8-hour ozone national ambient air quality standard (NAAQS) is 0.075 parts per million (ppm). A violation of this NAAQS occurs when the three-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration is greater than 0.075 ppm. This three-year average is termed the "design value" for the ambient air quality monitoring site. The design value for a nonattainment area is the highest monitoring site design value in the area. On May 21, 2012, based on 2008-2010 ambient air monitoring data from several monitoring sites in the North Carolina (NC) portion of the Charlotte-Gastonia-Rock Hill, NC-SC area (Charlotte Area), the U.S. Environmental Protection Agency (EPA) designated and classified a portion of York County, South Carolina (SC) within the Rock Hill-Fort Mill Area Transportation Study (RFATS) Metropolitan Planning Organization (MPO) area as a marginal nonattainment area for the 2008 8-hour ozone NAAQS. Effective January 11, 2016 (80 FR 76865), the EPA redesignated the York County, SC portion within the RFATS MPO area (Maintenance Area) to attainment for the 2008 8-hour ozone NAAQS. As part of the redesignation action, the SC Department of Health and Environmental Control (Department) adopted, and the EPA approved, a maintenance plan for the Maintenance Area which demonstrated continued attainment of the 2008 8-hour ozone NAAQS, as required under Clean Air Act (CAA) section 175A.

B. Current Air Quality Standing

The Department currently operates one ozone monitoring site in the central part of York County, SC, just west of the Maintenance Area. The ozone data collected at this site, in addition to all of the ozone monitoring sites located in the NC portion of the Charlotte Area, demonstrates that the Maintenance Area is continuing to attain the 2008 8-hour ozone NAAQS with recorded concentrations well below the 0.075 ppm level. This data can be seen within Table 2 of this document.

In addition to the collection of ozone concentration data, the State of South Carolina has implemented several state rules that have resulted in permanent and enforceable reductions in ozone precursor emissions statewide. These actions include a regulation to control oxides of nitrogen (NO_X) (Regulation 61-62.5, Standard 5.2) and an open burning ban during the ozone season (Regulation 61-62.2). Additionally, there are several federal actions that have resulted in lower emissions throughout the eastern portion of the country. These federal actions include the Tier 2 and Tier 3 vehicle standards, heavy-duty gasoline and diesel highway vehicles standards, and the large non-road diesel engines rule. This combination of state and federal actions has resulted in cleaner air in the Maintenance Area, and the anticipated future benefits from these programs are expected to result in the continued maintenance of the 2008 8-hour ozone NAAQS.

The Department further demonstrates continued maintenance of the 2008 8-hour ozone NAAQS by comparing expected emissions inventories for ozone precursors, NO_X and volatile organic compounds (VOCs). A base year emissions inventory for NO_X and VOCs was developed for 2018. Future year emissions inventories were developed for the interim year 2026, and final year emissions inventories were developed for 2036. The total man-made future year emissions, as shown in Table 9, were lower than the 2018 emissions. This demonstrates that the Maintenance Area is expected to maintain compliance with the 2008 8-hour ozone NAAQS through at least 2036. The Maintenance Area is also in compliance with Section 110 and Part D requirements of the CAA.

C. Conclusion

The ozone monitoring data demonstrates that the Charlotte Area has attained the 2008 8-hour ozone NAAQS and maintained the NAAQS every year after redesignation. This maintenance demonstration shows that the future emissions inventories are expected to be lower than the 2018 base year inventory through the implementation of the various control measures listed and the Maintenance Area is expected to continue to attain the NAAQS for the following 10-year period.

Section I. Introduction to the 8-Hour Ozone NAAQS

A. NAAQS

The CAA requires the EPA to set NAAQS for pollutants that are considered harmful to public health and the environment. Primary and secondary NAAQS under Section 109 of the CAA are set forth in Title 40 of the Code of Federal Regulations (CFR), Part 50. NAAQS are subject to revision and additional primary and secondary standards may be promulgated as the EPA deems necessary to protect 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 criteria air 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, damage to animals, crops, vegetation, and buildings.

B. 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 oxygen atoms, one more than the common oxygen molecule 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 or sometimes called smog. Ozone is not emitted directly by the combustion of fuels but is rather formed in the atmosphere by the reaction of VOCs and 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 nonpoint 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, can be transported to an area from pollution sources found hundreds of miles upwind.

C. 2008 8-Hour Ozone NAAQS

In 2008, the EPA revised the NAAQS for ground-level ozone, setting the standard at 0.075 ppm averaged over an 8-hour period. At every ozone monitoring site, 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, or applicable ozone season. Both South Carolina's and North Carolina's

ozone seasons run from March 1 through October 31 each 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 NAAQS requires the annual fourth highest daily maximum 8-hour concentration to be used in the design value calculation. The design value is the three-year average, using the three most recent, consecutive calendar years, of fourth highest daily maximum 8-hour concentrations. A violation of the 2008 8-hour ozone NAAQS occurs when the computed design value is greater than 0.075 ppm.

D. 2008 8-Hour Ozone Designations

The CAA requires the EPA to designate areas as attainment, nonattainment, or unclassifiable following the promulgation of a new or revised NAAQS. Once an area's designation is finalized, specific requirements, as required by the CAA, must be followed, depending on an area's attainment status. The EPA area designations for the 2008 8-hour ozone NAAQS were generally based on air quality monitoring data collected during the 2008, 2009, and 2010 ozone seasons. The highest monitoring site design value in an area was used to determine its designation.

At the time of designation, several monitors in the NC portion of the Charlotte Area had design values above the 2008 8-hour ozone NAAQS. The monitoring site located in York County, SC had a design value of 0.067 ppm, which is below the 2008 8-hour ozone NAAQS. Due to the EPA's belief that a portion of York County, SC, within the RFATS MPO area, was contributing to ozone nonattainment in the Charlotte Area, the area was designated as nonattainment. The Charlotte Area was classified as a Subpart 2 marginal nonattainment area.

E. CAA Redesignation & Maintenance Plan Requirements

On August 22, 2014, the Department submitted its required State Implementation Plan (SIP) for the RFATS MPO 2008 8-hour ozone NAAQS nonattainment area. On April 17, 2015, the Department submitted a redesignation request and first 10-year maintenance plan for the RFATS MPO. On December 11, 2015, the EPA published (80 FR 76865) a final rule approving the redesignation of the RFATS MPO area to attainment, effective January 11, 2016.

According to the CAA section 175A(b), states must submit a revision to the first maintenance plan eight years after redesignation to provide for maintenance of the NAAQS for ten additional years following the end of the first ten-year period. This document comprises this required SIP revision.

Section II. Charlotte-Gastonia-Rock Hill, NC-SC (Charlotte Area) Air Quality

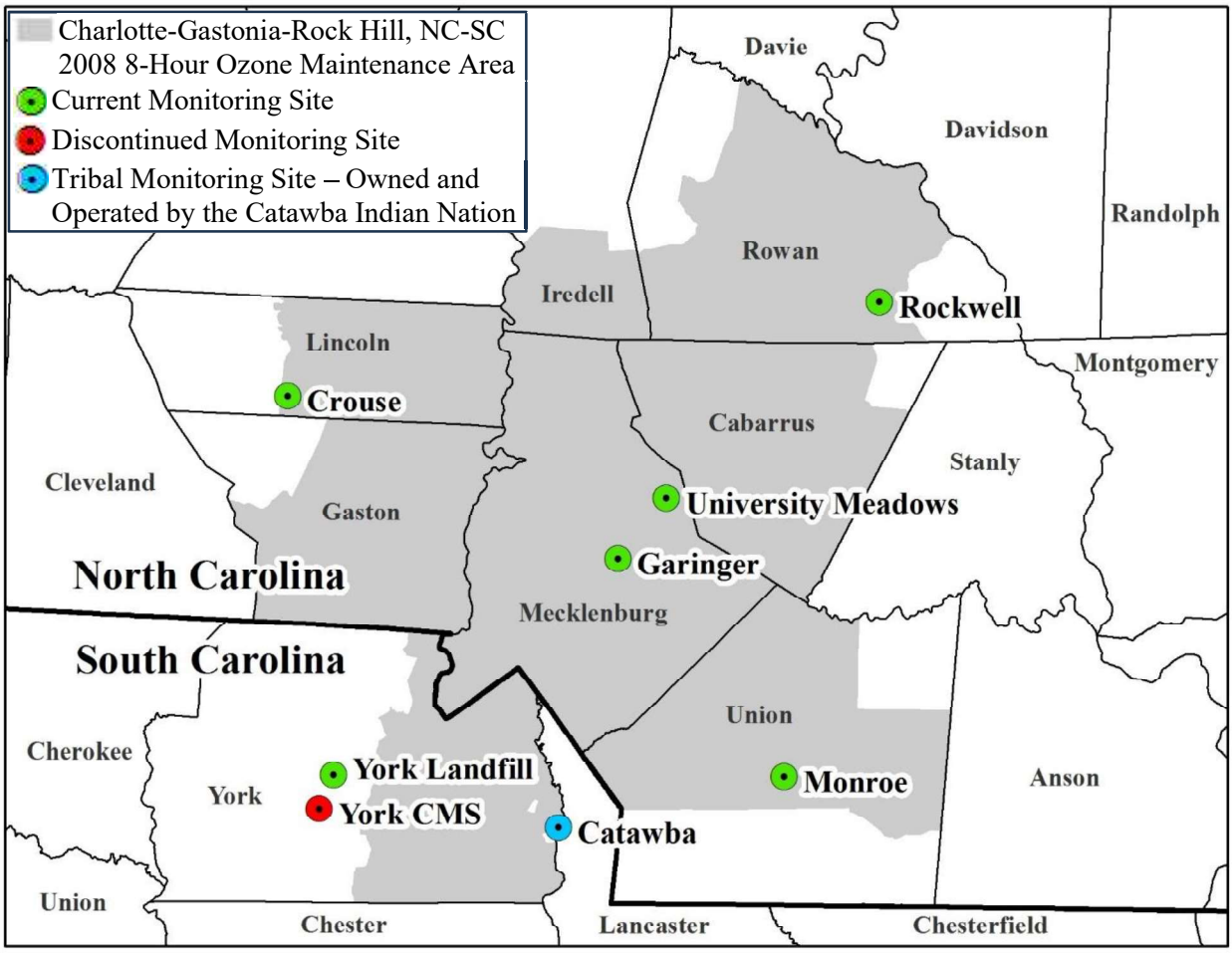
A. Monitoring Sites in the Charlotte Area

The Department is currently operating one monitoring site in the SC portion of the Charlotte Area. This monitoring site, York Landfill (45-091-0008) Monitoring Site, is located in central York County, just west of the Maintenance Area, and began operation in 2017. Prior to 2017, the Department ran the York CMS (45-091-0006) Monitoring Site. The Department's ozone data collected from 2008-2016 was collected from the York CMS Monitoring Site. Both of these sites have played a critical role in forecasting ozone concentrations in the Maintenance Area.

There is also a tribal monitoring site located on the Catawba Indian Nation Reservation. This tribal monitoring site is situated on land surrounded by the Maintenance Area, but the Catawba Indian Nation Reservation is not part of the Maintenance Area. This tribal monitoring site is not operated or maintained by the Department. The ozone data is reported to the national Air Quality System (AQS), the same system to which the Department's monitors report, and the tribal monitoring site is subject to the same data quality standards as the Department's monitoring sites.

The NC portion of the Charlotte Area contains five ozone monitoring sites. Two of the monitoring sites, Garinger (37-119-0041) Monitoring Site and University Meadows (37-119-0046) Monitoring Site, are operated by Mecklenburg County Air Quality and the remaining three monitoring sites, Crouse (37-109-0004) Monitoring Site, Rockwell (37-159-0021) Monitoring Site, and Monroe (37-179-0003) Monitoring Site, are operated by the North Carolina Department of Environmental Quality (NCDEQ). Figure 1 on the following page displays all of the ozone monitoring site locations.

Figure 1 – Ozone Monitoring Sites in the Charlotte Area



B. Historic Air Quality (2010-2022)

The fourth highest daily maximum 8-hour ozone concentrations, listed in Table 1, as well as the design values, listed in Table 2, were obtained from AQS. AQS calculates the design values in accordance with the procedures found in 40 CFR Appendix I to Part 50. Design values were calculated from the 2010-2012 design value period through the 2020-2022 design value period for each monitor in the Charlotte Area. All of the data listed in the tables on the following pages has been certified and submitted to the EPA. As shown in Table 2, the design values at both the York CMS Monitoring Site and the York Landfill Monitoring Site have not violated the 2008 8-hour ozone NAAQS since it was promulgated.

Table 1 – Historic 4th Highest 8-Hour Ozone Values (ppm) for the Charlotte Area

Monitoring Site	AQS ID	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Crouse	37-109-0004	0.072	**0.077**	**0.076**	0.064	0.064	0.068	0.069	0.064	0.063	0.065	0.054	0.066	0.064
Garinger	37-119-0041	**0.082**	**0.088**	**0.080**	0.067	0.065	0.073	0.070	0.066	0.070	0.074	0.059	0.067	0.068
University Meadows	37-119-0046	**0.082**	**0.083**	**0.085**	0.066	0.068	0.069	0.074	0.068	0.069	0.072	0.060	0.067	0.067
Rockwell	37-159-0021	**0.077**	**0.077**	**0.080**	0.062	0.064	0.066	0.066	0.062	0.060	0.066	0.058	0.063	0.064
Monroe	37-179-0003	0.071	0.074	0.075	0.062	0.067	0.067	0.070	0.066	0.070	0.070	0.051	0.066	0.067
York CMS[1]	45-091-0006[1]	0.065	0.065	0.065	0.061	0.056	0.061	0.061						
York Landfill[1]	45-091-0008[1]								0.065	—[2]	—[2]	0.053	0.063	0.061
Catawba Indian Nation[3]	45-091-8801[3]							0.066	0.060	0.066	0.068	0.054	0.065	0.062

Dark-grey filled cells indicate no operation during the year.

Values displayed in bold represent exceedances of the 2008 8-hour ozone NAAQS.

[1] The York CMS Monitoring Site was relocated to the York Landfill Monitoring Site in 2017. With the EPA's approval, the data is now reported under one AQS code – 45-091-0008.

[2] The EPA retroactively invalidated portions of the Department's ozone data collected in 2018 and 2019. The monitoring data collected during these years is not included within this document.

[3] The Catawba Indian Nation Monitoring Site is not operated by the Department. This monitoring site is owned and operated by the Catawba Indian Nation (Tribal Code: 032).

Table 2 – Historic 8-Hour Ozone Design Values (ppm) for the Charlotte Area

Monitoring Site	AQS ID	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Crouse	37-109-0004	0.075	0.072	0.068	0.065	0.067	0.067	0.065	0.064	0.060	0.061	0.061
Garinger	37-119-0041	**0.083**	**0.078**	0.070	0.068	0.069	0.069	0.068	0.070	0.067	0.066	0.064
University Meadows	37-119-0046	**0.083**	**0.078**	0.073	0.067	0.070	0.070	0.070	0.069	0.067	0.066	0.064
Rockwell	37-159-0021	**0.078**	0.073	0.068	0.064	0.065	0.064	0.062	0.062	0.061	0.062	0.061
Monroe	37-179-0003	0.073	0.070	0.068	0.065	0.068	0.067	0.068	0.068	0.063	0.062	0.061
York CMS[1]	45-091-0006[1]	0.065	0.063	0.060	0.059	0.059						
York Landfill[1]	45-091-0008[1]						0.062	—[2]	—[2]	—[2]	—[2]	0.059
Catawba Indian Nation[3]	45-091-8801[3]					—[4]	—[4]	0.064	0.064	0.062	0.062	0.060

Dark-grey filled cells indicate no operation during the year.

Values displayed in bold represent violations of the 2008 8-hour ozone NAAQS.

[1] The York CMS Monitoring Site was relocated to the York Landfill Monitoring Site in 2019. With the EPA's approval, the data is now reported under one AQS code – 45-091-0008.

[2] The EPA retroactively invalidated portions of the Department's ozone data collected in 2018 and 2019. The Department does not have design values for the years between 2018 and 2021 as a result of this decision.

[3] The Catawba Indian Nation Monitoring Site is not operated by the Department. This monitoring site is owned and operated by the Catawba Indian Nation (Tribal Code: 032).

[4] This monitoring site began operation in 2016 and did not have a valid design value until 2018.

C. Current Design Values (2020-2022)

The most recent three years of ozone monitoring data (2020-2022) for the Charlotte Area demonstrates compliance with the 2008 8-hour ozone NAAQS. Table 3, 2022 Design Values, lists the annual fourth highest daily maximum 8-hour average ozone concentrations and calculated design values for all of the monitors within the Charlotte Area. Consistent with the requirements of 40 CFR 58.15, the 2022 8-hour ozone monitoring data for SC has been certified and was officially submitted to the EPA on May 1, 2023.

Table 3 – 2022 Design Values

Monitor	AQS ID	4th Highest 8-Hour Ozone Value (ppm)			2022 Design Value
		2020	2021	2022	
Crouse	37-109-0004	0.054	0.066	0.064	0.061
Garinger	37-119-0041	0.059	0.067	0.068	0.064
University Meadows	37-119-0046	0.060	0.067	0.067	0.064
Rockwell	37-159-0021	0.058	0.063	0.064	0.061
Monroe	37-179-0003	0.051	0.066	0.067	0.061
York Landfill	45-091-0008	0.053	0.063	0.061	0.059
Catawba Indian Nation[1]	45-091-8801[1]	0.054	0.065	0.062	0.060

[1] The Catawba Indian Nation Monitoring Site is not operated by the Department. This monitoring site is owned and operated by the Catawba Indian Nation (Tribal Code: 032).

D. Permanent and Enforceable Emissions Reductions

There are federal and state measures that have been enacted in recent years that are resulting in permanent and enforceable emissions reductions. A list of those measures that contributed to the permanent and enforceable emissions reductions are listed below and more fully described in Section III.

The federal measures that have been implemented include:

Motor Vehicle Emissions and Fuel Standards: Tier 2 and Tier 3 Vehicle Standards;

Heavy-Duty Gasoline and Diesel Highway Vehicle Standards & Ultra Low Sulfur Diesel Rule;

Medium- and Heavy-Duty Vehicle Fuel Consumption & Greenhouse Gas (GHG) Standards;

Large Nonroad Diesel Engines Rule & Ultra Low Sulfur Diesel Rule;

Nonroad Spark-Ignition Engines and Recreational Engines Standard;

National Program for Greenhouse Gas Emissions and Fuel Economy Standards;

NO_X SIP Call and Cross-State Air Pollution Rule (CSAPR);

Major and Area Source Boiler National Emission Standards for Hazardous Air Pollutants (NESHAP) and New Source Performance Standards (NSPS) Rules;

Utility Mercury and Air Toxics Standards (MATS) & NSPS Rules; and

Major and Area Source Reciprocating Internal Combustion Engine (RICE) NESHAP, Stationary Compression Ignition Internal Combustion Engines NSPS, and Stationary Spark Ignition Internal Combustion Engines NSPS.

The state measures that have been implemented include:

Celanese Acetate Celriver Plant Closure: The Celanese Acetate Celriver Plant closed in 2006. This facility, which included six coal-fired boilers, the largest of which was rated at 320 million British thermal units per hour (BTU/hour), was the largest stationary source of NO_X in the Maintenance Area. As a result, 2,493 tons of NO_X and 1,686 tons of VOCs were retired. There are no remaining coal-fired electrical generating units (EGUs) in York County, or the bordering South Carolina counties.

Prohibition of Open Burning: Effective in 2004, the revision of Regulation 61-62.2, Prohibition of Open Burning, includes a ban of certain open burning during the ozone season for additional control of NO_X emissions.

Control of Oxides of Nitrogen: Effective in 2004, Regulation 61-62.5, Standard 5.2 – Control of Oxides of Nitrogen (NO_X), applies to new and existing stationary sources that emit or have the potential to emit NO_X generated from fuel combustion. This regulation sets standards for new construction based on Best Available Control Technology (BACT) standards from the national RACT/BACT/LAER Clearinghouse. For new sources, the regulation is primarily directed at smaller sources that fall below the Prevention of Significant Deterioration (PSD) thresholds and, therefore, would otherwise be exempt from NO_X controls altogether.

Idling Restrictions for Commercial Diesel Vehicles: Effective in 2008, SC Code Title 56, Section 35 forbids extended idling of diesel engines unless covered by specific exemptions having to do with health, safety, and refrigeration of perishables.

The above-mentioned state controls and programs have been included in the federally approved South Carolina Air Quality SIP.

South Carolina's two neighboring states, North Carolina and Georgia, have also adopted measures to improve regional air quality. North Carolina has implemented measures in their portion of the Charlotte Area including the state-wide Clean Smokestacks Act. This legislation sets a cap on NO_X and sulfur dioxide (SO_2) emissions, which public utilities cannot meet by purchasing emission credits. Georgia is covered by CSAPR for both fine particles (SO_2 and annual NO_X) and ozone

season NO_X. Georgia is part of the Group 1 trading program for ozone season NO_X and part of the Group 2 trading program for SO_2.

South Carolina utilities retired 12 coal/oil fired EGUs between 2012 and 2018, and two others switched to natural gas operation.

South Carolina believes that the improvement in air quality in the Maintenance Area is due to real, permanent, and enforceable reduction in NO_X emissions resulting from state and federal measures.

Section III. Maintenance Plan

A. Concept of SC's Maintenance Plan

The Department's plan for maintaining compliance with 2008 8-hour ozone NAAQS in the SC portion of the Charlotte Area includes three major parts: established control measures, a maintenance demonstration, and a contingency plan. The established control measures consist 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.

The Department has implemented programs that will remain enforceable and are hereby submitted as the plan to ensure that maintenance of the 2008 8-hour ozone NAAQS will continue. Sources are prohibited from reducing emission controls (anti-backsliding) unless such a change is first approved by the EPA as a revision to the South Carolina SIP that is consistent with Section 110(l) of the CAA.

For the maintenance demonstration, the Department has identified a base year, an interim year, and a final year for which emissions inventories will be compared. The base year of 2018 was selected because it is one of the more recent years for which the Charlotte Area has clean air quality for the 2008 8-hour ozone NAAQS. Additionally, the selection of 2018 as the base year avoids the potential underrepresentation of emissions the response to the COVID-19 pandemic may have caused beginning in early 2020. Future year emissions inventories were developed for the interim year of 2026, and final year emissions inventories were developed for 2036. The maintenance demonstration consists of a comparison between the 2018 base emissions inventory and the projected emissions inventories (for 2026 and 2036), which consider economic and population growth. The comparison shows that the total emissions in the interim year 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 SC contingency plan involves tracking and triggering mechanisms to determine when contingency measures are needed and a process of implementing appropriate control measures. A quality assured/quality controlled (QA/QC) design value that exceeds the 2008 8-hour ozone NAAQS at any monitor within the Charlotte Area will trigger evaluation of the contingency plan. In conjunction with the SC maintenance plan, the North Carolina Department of Environmental Quality (NCDEQ) has developed its own separate maintenance plan for the NC portion of the Charlotte Area.

B. Established Control Measures

1. Federal Control Measures

a. Tier 2 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 and was completely phased in 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 South Carolina 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.

b. Tier 3 Vehicle Standards

The Tier 3 program sets new vehicle emissions standards and lowers the sulfur content of gasoline in order to reduce air pollution from passenger cars and trucks, with implementation beginning in 2017 and phasing in through 2025. Tailpipe and evaporative emissions will be reduced for passenger cars, light-duty trucks, medium-duty passenger vehicles, and some heavy-duty vehicles. The Tier 3 vehicle standards for light-duty vehicles, light-duty trucks, and medium-duty passenger vehicles will be 0.03 grams of NO_X per mile as measured on the Federal Test Procedure (FTP), and 0.05 grams of NO_X per mile as measured on the Supplemental Federal Test Procedure (SFTP). The Tier 3 vehicle standards for heavy-duty pick-ups and vans will be 0.178 grams of NO_X per mile for Class 2b vehicles and 0.630 grams of NO_X per mile for Class 3 vehicles, as measured on the FTP. The Tier 3 gasoline sulfur standard requires federal gasoline to meet an annual average standard of 10 ppm of sulfur by January 1, 2017. The Tier 3 tailpipe standards for light-duty vehicles will reduce the fleet average standards for the sum of non-methane organic gases (NMOG) and NO_X, NMOG+NO_X, by approximately 80 percent from the current fleet average standards, and will reduce the per-vehicle particulate matter (PM) standards by 70 percent. The Tier 3 program for heavy-duty vehicles will reduce the fleet average standards for NMOG+NO_X and PM by approximately 60 percent from the current fleet average standards. The Tier 3 program is also reducing the evaporative VOCs by approximately 50 percent from the current standards, and these standards apply to all light-duty and on-road gasoline-powered heavy-duty vehicles.

c. Heavy-Duty Gasoline and Diesel Highway Vehicles Standards & Ultra Low Sulfur Diesel Rule

EPA standards designed to reduce NO_X and VOC emissions from heavy-duty gasoline and diesel highway vehicles (14,001 pounds or more) 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 achieves 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.

d. Medium- and Heavy-Duty Vehicle Fuel Consumption & Greenhouse Gas (GHG) Standards

In September 2011, the EPA and the National Highway Traffic Safety Administration (NHTSA) promulgated joint rules to reduce GHG emissions and improve fuel efficiency of combination tractors (semi-trucks), heavy-duty pickup trucks and vans, and vocational vehicles beginning with model year 2014 and applying to all model years by 2018. The standards for combination tractors will reduce carbon dioxide (CO_2) emissions and fuel consumption by 9 percent to 23 percent over the 2010 baselines. The standards for heavy-duty pickup trucks and vans will reduce CO_2 emissions by 17 percent for diesel vehicles and 12 percent for gasoline vehicles, on average per vehicle over the 2010 baselines, and will reduce fuel consumption by 15 percent for diesel vehicles and 10 percent for gasoline vehicles, on average per vehicle compared to a common baseline. The standards for vocational vehicles will reduce CO_2 emissions and fuel consumption by 6 percent to 9 percent over the 2010 baselines. The decreased fuel consumption due to the Heavy-Duty National Program will result in decreased NO_X emissions from vehicles as the fleet turns over.

e. Large Nonroad Diesel Engines Rule & Ultra Low Sulfur Diesel Rule

In May 2004, the EPA promulgated new rules for large nonroad diesel engines, such as those used in construction, agricultural, and industrial equipment, to be phased in between 2008 and 2014. The nonroad diesel rules also reduced the allowable sulfur in nonroad diesel fuel by over 99 percent. At that time, nonroad diesel fuel averaged about 3,400 ppm in sulfur. The rule limited nonroad 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 nonroad diesel engines by over 90 percent.

f. Nonroad 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 nonroad engines. The standard applies to all new engines imported into or sold within the United States after these standards began. It applies to 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. Tier 1 of this standard was implemented in 2004, and Tier 2 in 2007. Like the large spark-ignition, recreational vehicles contribute to ozone formation and ambient CO and PM levels. For all model-year 2006 off-highway motorcycles and all-terrain-vehicles, the new exhaust emissions standard was phased-in at 50 percent; for model years 2007 and later, the standard was phased-in at 100 percent. 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.

As of 2020, all of the nonroad spark-ignition engines and recreational engines standards are fully implemented. Estimates of overall reductions of 72 percent in HC, 80 percent in NO_X, and 56 percent in CO emissions are documented in the rule text. These controls help reduce ambient concentrations of ozone, CO, and fine PM.

g. National Program for GHG and Fuel Economy Standards

The EPA and the NHTSA jointly developed the federal GHG and fuel economy standards for light-duty cars and trucks in model years 2012- 2016 (phase 1) and 2017-2025 (phase 2). The EPA also aligned implementation of the Tier 3 program with the second phase of the EPA and NHTSA federal GHG and fuel economy standards program, beginning in model year 2017. The final GHG and fuel economy standards were estimated to give an average industry fleet-wide level of 163 grams of CO_2 per mile in model year 2025, equivalent to 54.5 miles per gallon if achieved exclusively through fuel economy improvements. This program reduces the precursors of ambient ozone from light duty vehicles in the EPA's Motor Vehicle Emissions Simulator (MOVES) by improving fuel economy thus reducing the amount of emissions released.

The Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule was issued on March 20, 2020, by the EPA as an update to Phase 2 of the federal GHG and fuel economy standards for light-duty cars and trucks. The new standard sets tough, but feasible, fuel economy and carbon dioxide standards that increase 1.5 percent in stringency each year from model years 2021 through 2026. These standards apply to both passenger cars and light trucks. On December 30, 2021, the EPA revised the GHG emissions standards for light-duty vehicles to be more stringent than the SAFE rule standards in each model year from 2023 through 2026.

h. NO_X SIP Call, Clean Air Interstate Rule (CAIR), and Cross-State Air Pollution Rule (CSAPR)

In October 1998, the EPA issued the "Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone" (63 FR 57356; October 27, 1998), commonly called the "NO_X SIP Call." The NO_X SIP Call created the NO_X Budget Trading Program, an emissions allowance trading program designed to reduce the amount of ozone that crosses state lines by limiting NO_X emissions from utilities and large industrial sources in the eastern United States. The NO_X Budget Trading Program was effective in reducing NO_X emissions, including those from local sources.

In 2005, the EPA issued the CAIR (70 FR 25162; May 12, 2005), which was intended to supplant the NO_X SIP Call. The DC Court of Appeals subsequently remanded CAIR without vacatur, leaving it in place pending further EPA regulatory action. The EPA promulgated the CSAPR to replace the CAIR and address the good neighbor provisions for the 1997 ozone NAAQS (76 FR 48208; August 8, 2011). CSAPR requires large EGUs in eastern states, including South Carolina, to meet annual and ozone season NO_X emission budgets and annual SO_2 emission budgets implemented through new trading programs.

In developing the CSAPR Update rule (81 FR 74504), the EPA's air quality modeling projected that South Carolina would not contribute significantly to nonattainment or interfere with maintenance in downwind areas for either the 1997 ozone NAAQS or the 2008 ozone NAAQS as of 2017. The EPA determined that the EGUs in the state therefore are no longer subject to a NO_X ozone season trading program under either CSAPR or the CSAPR Update. On March 8, 2019, the EPA revised the original NO_X SIP Call regulations to give states greater flexibility in the NO_X

emissions monitoring requirements that the states must include in their SIPs for certain emissions sources. The revision made part 75 monitoring, recordkeeping, and reporting optional, and allowed states to establish alternative monitoring requirements for NO_X SIP Call budget units that meet the general requirements of 40 CFR 51.121(f)(1) and (i)(1). Because South Carolina's EGUs and non-EGUs no longer participate in any CSAPR or CSAPR Update trading program for ozone season NO_X emissions, the Department addressed the NO_X SIP Call requirements, and anti-backsliding provisions at 40 CFR 51.905(f) and 40 CFR 51.1105(e), by reinstating applicable NO_X SIP Call requirements at Regulation 61-62.96, ''Nitrogen Oxides (NO_X) Budget Program''. These regulations became state effective upon publication in the SC *State Register* on January 25, 2019. On July 11, 2019, the Department submitted a SIP revision to remove CAIR and incorporate NO_X SIP Call requirements for EGUs and large non-EGUs. South Carolina's NO_X SIP Call state budget for EGUs is 16,199 tons, and the non-EGU budget is 3,479 tons. The SIP submission, which was approved by the EPA on July 29, 2020 (85 FR 45541), included a demonstration under CAA section 110(l) demonstrating that the SIP revision does not interfere with any applicable CAA requirements. and as shown by the technical analysis of potential to emit and historical emissions, NO_X ozone season emissions from South Carolina's covered EGUs and large non-EGUs have remained well below budgeted levels.

The monitoring requirements for each source are specified as NO_X SIP Call permit conditions in federally enforceable Title V operating permits. The Department requires facilities with large non-EGUs requesting the alternative monitoring to calculate the NO_X mass emissions (tons) for each ozone season and report the total to the Department following each ozone season, annually. In addition, the Department conducts an annual review of its emission inventory data for both EGUs and large non-EGUs, including any new applicable unit emissions, to ensure that the total emissions remain below the NO_X budgets. Should the total emissions from covered EGUs and large non-EGUs for the control period exceed their respective NO_X budgets, the Department will, within one year of determining the exceedance of the NO_X budget, submit a revised state implementation plan to the EPA which compensates for the exceedance and ensures the NO_X budget is met in future years.

In the CSAPR Update, the EPA relieved EGUs in South Carolina from the obligation to participate in the original CSAPR NO_X ozone season trading program for purposes of addressing the good neighbor requirements for the 1997 ozone NAAQS and did not require the EGUs to participate in the new CSAPR Update trading program for purposes of addressing the 2008 ozone NAAQS. (40 CFR 52.38(b)(2)(ii)–(iii)). EGUs in South Carolina remained subject to CSAPR obligations for annual NO_X and SO_2 emissions, for purposes of addressing interstate transport requirements for the 1997 Annual Fine Particulate Matter ($PM_{2.5}$) NAAQS. The Department addressed the CSAPR obligations by adding state trading program rules codified in South Carolina Regulation 61-62.97 "Cross-State Air Pollution Trading Program" that were adopted into the State's SIP. (82 FR 47936). Regulation 61-62.97 requires EGUs to participate in the South Carolina CSAPR state trading programs for annual NO_X and SO_2 emissions. South Carolina retained the EPA's default allowance allocation methodology, with the trading budgets for NO_X annual and SO_2 Group 2, and the EPA remains the implementing authority for administration of the trading program. The EPA approved these portions of the SIP revision on October 13, 2017 (82 FR 47936).

i. Major and Area Source Boiler National Emission Standards for Hazardous Air Pollutants (NESHAP) and New Source Performance Standards (NSPS) Rules

On March 21, 2011, the EPA issued final emission standards to reduce emissions of toxic air pollutants from industrial, commercial, and institutional boilers located at area source facilities (40 CFR Part 63 Subpart JJJJJJ). An area source facility emits or has the potential to emit less than 10 tons per year of any single air toxic or less than 25 tons per year of any combination of air toxics. The final rule covers boilers located at area source facilities that burn coal, oil, or biomass, but not boilers that burn only gaseous fuels or any solid waste. The rule establishes standards to address emissions of mercury, particulate matter (as a surrogate for non-mercury metals), and carbon monoxide (as a surrogate for organic air toxics).

The NESHAP for industrial, commercial, and institutional boilers (40 CFR Part 63 Subpart DDDDD) is projected to reduce VOC emissions. This NESHAP applies to boilers and process heaters located at major sources of hazardous air pollutants (HAPs) that burn natural gas, fuel oil, coal, biomass, refinery gas, or other gas. The compliance deadline for existing boilers was January 31, 2016. The NESHAP includes work practice standards, such as regular boiler tune-ups and a one-time energy assessment, emission limitations for pollutants, including filterable PM, hydrochloric acid (HCl), mercury, and CO, and operating limitations for control devices. The emission limits and operating limits only apply to larger boilers of at least 10 million BTU/hour that burn fuels other than natural gas, refinery gas, or other gas 1 fuels (gaseous fuel containing no more than 10 micrograms per cubic meter ($\mu g/m^3$) mercury)

j. Utility Mercury and Air Toxics Standards (MATS) & NSPS Rules

On February 16, 2012, the EPA published final rules for both the (1) MATS for new and existing coal- and oil-fired EGUs and (2) NSPS for fossil-fuel fired electric utility, industrial-commercial-institutional, and small industrial-commercial-institutional steam generating units. The MATS reduce emissions of mercury and other toxic air pollutants from EGUs larger than 25 megawatts that burn coal or oil for the purpose of generating electricity for sale and distribution through the national electric grid to the public. For the NSPS, the EPA revised the standards that new coal- and oil-fired power plants must meet for NO_X, SO_2, and PM.

k. Major and Area Source Reciprocating Internal Combustion Engine (RICE) NESHAP, Stationary Compression Ignition Internal Combustion Engines NSPS, and Stationary Spark Ignition Internal Combustion Engines NSPS

The NESHAP for reciprocating internal combustion engines (40 CFR Part 63 Subpart ZZZZ) is projected to reduce VOC emissions. The RICE NESHAP applies to existing, new, or reconstructed stationary RICE located at major or area sources of HAP, excluding stationary RICE being tested at a stationary RICE test cell/stand. The compliance date for existing stationary RICE, excluding existing non-emergency stationary compression ignition (CI) RICE, with > 500 brake HP located at a major source of HAP emissions was June 15, 2007. The compliance date for existing non-emergency stationary CI RICE with > 500 brake HP located at a major source of HAP, existing stationary CI RICE with ≤ 500 brake HP located at a major source of HAP, or existing stationary CI RICE located at an area source of HAP was May 3, 2013. The compliance date for existing

stationary spark ignition (SI) RICE with ≤ 500 brake HP located at a major source of HAP emissions, or an existing stationary SI RICE located at an area source of HAP emissions was October 19, 2013. The NESHAP contains work practice standards such as engine maintenance, fuel requirements, regular performance testing, operating limitations, and emission limitations for pollutants including formaldehyde and CO.

The Stationary Compression Ignition Internal Combustion Engines NSPS (40 CFR Part 60 Subpart IIII) limit emissions of NO_X, PM, SO_2, CO, and hydrocarbons from stationary diesel internal combustion engines to the same stringent levels required by the EPA's nonroad diesel engine regulations. The standards apply to engines whose construction, modification, or reconstruction commenced after July 11, 2005. This NSPS rule also introduced low sulfur fuel requirements for stationary compression ignition internal combustion engines consistent with those for mobile nonroad engines and marine engines.

The Spark Ignition Internal Combustion Engines NSPS (40 CFR Part 60 Subpart JJJJ), adopted in 2008, established emission requirements for spark ignition engines depending on the engine maximum power, fuel, application, and other factors. This NSPS rule serves to control emissions of NO_X, CO, and VOCs.

2. State Control Measures

a. New Source Review Regulations

On December 31, 2002, the EPA finalized revisions to the New Source Review (NSR) program. The major NSR program is a preconstruction review and permitting program applicable to new or modified major stationary sources of air pollutants. In areas not meeting health-based NAAQS, the program is referred to as the Prevention of Significant Deterioration (PSD) program. Collectively, these programs are commonly referred to as the major NSR program.

In accordance with the EPA's final rule revisions, state agency programs must adopt and submit revisions to their SIPs to include the minimum program elements outlined in the final rules. States may choose to adopt provisions that differ from the final rules; however, to be approvable under the SIP, the state must show that the regulations are at least as stringent as the EPA's amendments.

After a lengthy stakeholder process, the Department submitted revisions to the Legislature in January 2005 to comply with the EPA requirements. The revisions adopted by the Department differ from the federal revisions in several key respects and have the effect of being more stringent than the federal rules. These revisions were approved by the General Assembly and became state-effective upon publication in the State Register on June 24, 2005. The final regulations promulgated amendments to Regulation 61-62.1, Definitions and General Requirements, and Regulation 61-62.5, Standard No. 7, Prevention of Significant Deterioration, and also promulgated a new regulation, Regulation 61-62.5, Standard No. 7.1, Nonattainment New Source Review.

South Carolina Air Pollution Control Regulation 61-62.1, Definitions and General Requirements, Section II - Permit Requirements

This regulation implements a program for the minor NSR permitting program, which enhances the state's PSD of air quality initiatives.

South Carolina Air Pollution Control Regulation 61-62.5, Standard No. 7 - Prevention of Significant Deterioration

This regulation implements a program for the PSD of air quality for sources located in or whose construction is proposed in an unclassifiable/attainment area of the state.

South Carolina Air Pollution Control Regulation 61-62.5, No. 7.1 - Nonattainment New Source Review

This regulation implements a program whereby sources located in or whose construction is proposed in nonattainment areas are subject to the requirements of R. 61-62.5, Standard No. 7.1.

b. NO_X Regulations

These regulations specify the requirements for controlling NO_X and for demonstrating compliance with NO_X limitations.

South Carolina Air Pollution Control Regulation 61-62.5, Standard No. 2 - Ambient Air Quality Standards

This regulation contains the state of South Carolina ambient air quality standards, which include the 8-hour ozone standards.

South Carolina Air Pollution Control Regulation 61-62.5, Standard No. 5.2 - Control of Oxides of Nitrogen (NO_X)

This regulation contains the NO_X control standards applicable to affected stationary sources that emit or have the potential to emit NO_X generated from fuel combustion.

South Carolina Air Pollution Control Regulation 61-62.96 - Nitrogen Oxides (NO_X) Budget Program

This regulation contains South Carolina's adoption of federal NO_X SIP Call requirements.

South Carolina Air Pollution Control Regulation 61-62.99 - Nitrogen Oxides Budget Program Requirements for Stationary Sources Not in the Trading Program

This regulation details requirements for controlling NO_X emissions from cement manufacturing.

South Carolina Air Pollution Control Regulation 61-62.2 - Prohibition of Open Burning

This regulation includes a ban of certain open burning during the ozone season for additional control of NO_X emissions.

c. VOC Regulations

South Carolina Air Pollution Control Regulation 61-62.5, Standard No. 5 - Volatile Organic Compounds

This regulation contains requirements for controlling VOCs.

d. Emissions Inventory

South Carolina Regulation 61-62.1, Definitions and General Requirements, Section III - Emissions Inventory

This regulation requires the submittal of emissions inventory information by affected sources.

e. Reasonably Available Control Measures (RACM)

Reasonably Available Control Measures is a broadly defined term referring to technologies and other measures that can be used to control pollution, including Reasonably Available Control Technology and other measures. Pursuant to section 172(c)(1) of the CAA and "[t]o ensure compliance with the Act, EPA will review each attainment demonstration submission for the ozone NAAQS to determine whether it provides for all RACM necessary to attain the standard as expeditiously as practicable and provides for implementation of those measures as expeditiously as practicable." ("Guidance on the Reasonably Available Control Measures (RACM) Requirement and Attainment Demonstration Submissions for Ozone Nonattainment Areas." John S. Seitz, Director, Office of Air Quality Planning and Standards (OAQPS), November 30, 1999). In addition, the EPA's RACM policy indicates that areas should consider all candidate measures that are potentially available, including any that have been suggested for the particular nonattainment area. Although areas should consider all available measures, areas need only adopt measures if they are both economically and technologically feasible and will contribute to timely attainment or are necessary for reasonable further progress (RFP). Measures that might be available but would not advance attainment or contribute to RFP need not be considered RACM. A number of emissions controls programs were implemented in South Carolina following the CAA Amendments of 1990, and substantial further emissions reductions have since occurred in the state as well as the Maintenance Area. The Department intends to continue to investigate and, where appropriate, adopt additional measures that would reduce emissions of ozone precursors even further. Such measures may help the state in the future as it maintains the 2008 8-hour ozone NAAQS. The source categories emitting the vast preponderance of ozone precursor emissions in the state are already subject to control requirements.

C. Emissions Inventory

There are two basic approaches used to demonstrate continued maintenance. The first is the comparison of a projected emissions inventory with a base emissions inventory. The second approach involves complex analysis using gridded dispersion modeling. The approach used by the Department is the comparison of emissions inventories for the years 2018, 2026, and 2036.

For the maintenance demonstration, the base year of 2018 was chosen because it is one of the more recent years for which the Charlotte Area has clean air quality for the 2008 8-hour ozone NAAQS. Additionally, the selection of 2018 as the base year avoids the potential underrepresentation of emissions the response to the COVID-19 pandemic may have caused beginning in early 2020. The maintenance demonstration is made by comparing the 2018 base emissions inventory to the 2026 and 2036 projected emissions inventories. The base emissions inventory represents an emission level for a period when the ambient air quality standard was not violated, 2016-2018. If the projected emissions remain at or below the base 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, the interim year is compared to the 2018 base 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 five major types of sources: point, nonpoint, on-road mobile, nonroad mobile, and events. 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 Department's span of control.

The NCDEQ has developed a maintenance plan for the North Carolina portion of the Charlotte Area. For emissions summaries for the North Carolina portion of the Charlotte Area, refer to the Maintenance Plan submitted by NCDEQ.

1. Emission Inventories

There are five different man-made emission inventory source classifications: (1) point, (2) nonpoint, (3) on-road mobile, (4) nonroad mobile, and (5) events sources.

Point sources are those larger industrial or commercial stationary facilities that must have Title V permits issued by the Department. These sources have the potential to emit more than 100 tons of NO_X or VOCs. 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. Growth rates for the industrial point sources were calculated via the EPA 2016v2 modeling platform data. A complete description of how these inventories were developed is discussed in detail in Appendix A.

Nonpoint sources are those stationary sources whose emissions are relatively small but due to the large number of these sources, the collective emissions could be significant (i.e., smaller industrial facilities, dry cleaners, service stations, etc.). For nonpoint 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 Emission Inventory Improvement Program (EIIP) Tech Reports, the Procedures document or the EPA's Compilation of Air Pollutant Emission Factors, Fifth Edition (AP-42), and the Nonpoint Method

Advisory Committee (NOMAD) 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 discussed in detail in Appendix B.

For on-road mobile sources, the EPA mobile model MOVES3.1 is used to generate emissions. MOVES3.1 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 done within the model. The activity level used by MOVES3.1 is vehicle miles traveled (VMT). For the future years' inventories, the MOVES3.1 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 C.

Nonroad 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 nonroad part of the EPA's MOVES3.1 mobile model. Railroad locomotive line haul emissions are not included in the nonroad portion of the MOVES3.1 model, so the emissions need to be calculated differently. A complete description of how these inventories were developed is given in detail in Appendix D.

Events sources are generally defined as any non-structural fire that occurs in wild lands. Events include wildfires and prescribed fires. Emissions estimates were calculated by the EPA using the SMARTFIRE2 (SF2/B2) system, along with state provided inputs. The Department provided the EPA with a list of all York County wildland fires (WLFs) and prescribed fires in 2017. A complete description of how these inventories were developed is discussed in Appendix E.

2. Summary of Emissions

The tables below contain the estimated emissions from all of the emission source sectors, i.e., point, nonpoint, on-road mobile, nonroad mobile, and events for the Maintenance Area. All emissions are reported in tons per ozone season day (OSD). Additionally, the sum total of these emissions for the Maintenance Area is tabulated in Table 9. For emissions summaries for the North Carolina portion of the Charlotte Area, refer to the Maintenance Plan submitted by NCDEQ.

Table 4 – Point Source Emissions

	2018	2026	2036
VOC Emissions (tons/OSD)	3.38	3.38	3.39
NO_X Emissions (tons/OSD)	4.13	4.22	4.37

Table 5 – Nonpoint Source Emissions

	2018	2026	2036
VOC Emissions (tons/OSD)	9.54	10.15	10.76
NO_X Emissions (tons/OSD)	1.03	1.05	1.06

Table 6 – On-Road Mobile Source Emissions

	2018	2026	2036
VOC Emissions (tons/OSD)	2.82	1.72	1.38
NO_X Emissions (tons/OSD)	6.86	3.47	2.51

Table 7 – Nonroad Mobile Source Emissions

	2018	2026	2036
VOC Emissions (tons/OSD)	1.35	1.21	1.26
NO_X Emissions (tons/OSD)	1.49	0.94	0.85

Table 8 – Event Source Emissions – Wildfires and Prescribed Fires

	2018	2026	2036
VOC Emissions (tons/OSD)	0.18	0.18	0.18
NO_X Emissions (tons/OSD)	0.02	0.02	0.02

Table 9 – Total Emissions

	2018	2026	2036
VOC Emissions (tons/OSD)	17.27	16.64	16.97
NO_X Emissions (tons/OSD)	13.53	9.70	8.81

3. Maintenance Demonstration

As discussed above, maintenance is demonstrated when the future years' total man-made emissions are less than the 2018 base emissions. The following table summarizes the VOC and NO_X emissions for the Maintenance Area. The difference between the base year (2018) and the final year (2036) illustrates that the continued maintenance of the 2008 8-hour ozone NAAQS is expected.

Table 10 – Maintenance Demonstration

	VOC (tons/OSD)	NO_X (tons/OSD)
2018	17.27	13.53
2036	16.97	8.81
Difference from 2018 to 2036	-0.30	-4.72

The amount by which the total projected emissions from all man-made sources are less than the attainment level of emissions (2018) from all man-made sources in the Maintenance Area is considered the "safety margin." The safety margin for each projected year is listed below in Table 11.

Table 11 – Safety Margin

	VOC (tons)	NO_X (tons)
2018	N/A	N/A
2026	0.63	3.83
2036	0.30	4.72

D. Contingency Plan

1. Overview

Section 175A(d) of the CAA requires that the maintenance plan include provisions for contingency measures that would promptly be implemented by the state to correct any violation of the 8-hour ozone NAAQS. Contingency measures are intended to provide further emission reductions if violations of the 8-hour ozone NAAQS occur after redesignation to attainment. Consistent with this plan, the Department agrees to adopt and implement, as expeditiously as practicable, the necessary corrective actions for attainment of the standard.

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

2. Contingency Plan Trigger

The primary trigger of the contingency plan will be a certified design value that exceeds the 2008 8-hour ozone NAAQS at any ozone monitoring site within the Charlotte Area. If the certified data indicates a violating design value for the 2008 8-hour ozone NAAQS, the trigger date will be the date of the design value violation, not the final certification date. If initial monitoring data indicates a possible design value violation but later certification indicates that a NAAQS violation did not occur, a triggering event will not have occurred, and contingency measures will not need to be implemented.

3. Action Resulting from Trigger Activation

In the event that the primary trigger is activated, the Department 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. The Department will implement a contingency measure(s) within 24 months of a violation trigger to bring the area back into attainment.

The following schedule for adoption, implementation, and compliance applies to the contingency measures concerning the option of implementing regulatory requirements in South Carolina:

Verification through quality assurance and certification of the monitored ozone data, via the ambient air quality monitor(s) in the Charlotte Area;

Analysis of available data regarding the air quality, meteorology, transport, and related activities in the area to determine the possible cause of the violation; and

If deemed necessary, selection of a contingency measure within three months after verification of a violation of the 2008 8-hour ozone NAAQS at any monitor within the Charlotte Area.

As per the requirements established in the South Carolina Administrative Procedures Act, selection of a measure and development and implementation of necessary regulations would be expected to be completed within 24 months of activating the primary trigger. If it is determined that a longer schedule is required to implement specific contingency measures, then, upon selection of the appropriate measures, the Department will seek concurrence with 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.

4. Contingency Measures

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

Reasonably Available Control Technology (RACT) for NO_X on existing stationary sources not subject to existing requirements;

Implementation of diesel retrofit programs, including incentives for performing retrofits for fleet vehicle operations;

Alternative fuel programs for fleet vehicle operations;

Gas can and lawnmower replacement programs;

Voluntary engine idling reduction programs; and

Other measures deemed appropriate at the time as a result of advances in control technologies.

Some programs, such as diesel retrofitting, may be dependent on the availability of federal funding.

5. Tracking for Ongoing Maintenance

In addition to the measures listed above, the Department will continue to update its emissions inventory, including York County, at least once every three years. The emissions inventory base year of 2018, along with the final year of 2036 and interim year of 2026, 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, the Department will review the assumptions made for the purpose of the maintenance demonstration concerning projected growth of activity levels.

The Department will monitor periodic emissions inventory updates during the triennial National Emissions Inventory and compare them to projected emissions. If actual emissions exceed by more than 10 percent the projected emissions in this maintenance plan, the Department will investigate the differences and develop an appropriate strategy for addressing these differences. Furthermore, the Department will continue operation of an appropriate air quality monitoring network in accordance with 40 CFR Part 58, Ambient Air Quality Surveillance, and associated appendices. The Department 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.

Further, the Department 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 South Carolina, 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.

Section IV. Motor Vehicle Emissions Budget

A. Transportation Conformity

The purpose of transportation conformity is to ensure that federal transportation actions occurring in nonattainment and maintenance areas do not hinder the area from attaining and maintaining the 8-hour ozone NAAQS. The level of emissions estimated by RFATS for the Transportation Implementation Plan (TIP) and Long-Range Transportation Plan (LRTP) must not exceed the motor vehicle emission budget (MVEB) as defined in this maintenance plan. The MVEBs within this maintenance plan are intended to replace the MVEBs from the first 10-year maintenance plan for the Maintenance Area.

B. Safety Margin

The amount by which the total projected emissions from all man-made sources are less than the base level of emissions (2018) from all man-made sources in the Maintenance Area is considered to be the "safety margin." The safety margin for each projected year is listed in both tons and kilograms (kg) for VOC and NO_X below in Table 12.

Table 12 – Safety Margin in Tons and Kilograms Per Ozone Season Day

Year	VOC (tons)	VOC (kg)	NO_X (tons)	NO_X (kg)
2018	N/A	N/A	N/A	N/A
2026	0.63	571.53	3.83	3474.55
2036	0.30	272.16	4.72	4281.96

C. Motor Vehicle Emission Budgets

According to Section 93.118 of the aforementioned Transportation Conformity Rule Amendments, a maintenance plan must establish MVEBs for the last year of the maintenance plan, in this case, 2036.

The MVEBs will be set in terms of kilograms per ozone season day. During the preparation of the York nonattainment area attainment demonstration in 2007, it was determined through interagency consultation that kg per day would be the most appropriate unit to use for MVEBs and transportation conformity.

In South Carolina, refueling emissions are included in the nonpoint source inventory and, therefore, are not included in the MOVES3.1 runs used to estimate on-road mobile emissions. Refueling emissions calculated as part of the nonpoint source inventory are shown in Appendix B for informational purposes.

Table 13 shows the Maintenance Area on-road mobile NO_X and VOC emissions expressed in kilograms per day with the corresponding tons per day values for base year 2018 and the last year of the maintenance plan, 2036. These emissions were calculated using MOVES3.1, which outputs

values in terms of kilograms per day. A conversion factor of 1 kg = 0.00110231 tons was then used to convert the values to tons per day.

Table 13 – On-road Mobile Source VOC and NOx Emissions

	2018		2036	
Pollutant	**tons**	**kg**	**tons**	**kg**
VOC	2.82	2555.02	1.38	1256.15
NOx	6.86	6224.03	2.51	2273.63

The Department has decided to allocate the safety margin to the MVEBs to allow for unanticipated growth in VMT, changes to vehicle mix assumptions, etc., that will influence the emission estimates. Upon the EPA's affirmative adequacy finding for the partial county MVEBs, as shown in Table 14, they will become the applicable MVEBs for the Maintenance Area. The Department is requesting that the 2014 and 2026 MVEBs from the first 10-year maintenance plan for the Maintenance Area no longer apply for transportation conformity purposes as the new 2018 and 2036 MVEBs, as shown in Table 14 below, will replace the previous budgets.

Table 14 – VOC and NOx MVEBs for 2018 and 2036 Maintenance Area

VOC Emissions (kg/OSD)		
	2018	**2036**
Base Emissions	2555.02	1256.15
Safety Margin Allocated to MVEB	N/A	272.16
VOC Conformity MVEB	2555.02	1528.31
NOx Emissions (kg/OSD)		
	2018	**2036**
Base Emissions	6224.03	2273.63
Safety Margin Allocated to MVEB	N/A	4281.96
NOx Conformity MVEB	6224.03	6555.59

Section V. State Implementation Plan Approval

A. Introduction

For an area to have an approved maintenance plan, the SIP must include evidence of compliance with the rules relied on to show maintenance of the standard. This section provides the evidence of compliance with such rules for the Maintenance Area.

B. Evidence of Compliance

The rules in the table below regulating the emissions of VOCs and NO_X, except as noted, have been approved, or have been submitted for approval, by the EPA into the state SIP.

Table 15 – South Carolina Regulations Pertaining to the Control of VOCs and NO_X

South Carolina Regulations	
61-62.1	Definitions and General Requirements
61-62.2	Prohibition of Open Burning
61-62.3	Air Pollution Episodes
61-62.4	Hazardous Air Pollution Control Conditions
61-62.5	Air Pollution Control Standards
Standard 1	Emissions from Fuel Burning Operations
Standard 2	Ambient Air Quality Standards
Standard 4	Emissions from Process Industries
Standard 5	Volatile Organic Compounds
Standard 5.2	Control of Oxides of Nitrogen (NO_X)
Standard 7	Prevention of Significant Deterioration
Standard 7.1	Nonattainment New Source Review (NSR)
61-62.6	Control of Fugitive Particulate Matter
61-62.7	Good Engineering Practice Stack Height
***61-62.60**	South Carolina Designated Facility Plan and New Source Performance Standards
***61-62.61**	National Emission Standards for Hazardous Air Pollutants (NESHAP)
***61-62.63**	National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories
61-62.96	Nitrogen Oxides (NO_X) Budget Program
61-62.97	Cross-State Air Pollution Rule (CSAPR) Trading Program
61-62.99	Nitrogen Oxides (NO_X) Budget Program Requirements for Stationary Sources not in the Trading Program
* Standards incorporated in Regulation 61-62.60, SC Designated Facility Plan and New Source Performance Standards, R.61-62.61, National Emission Standards for Hazardous Air Pollutants (NESHAP), and R.61-62.63, National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories, also control the emissions of VOCs and NO_X, but have not been submitted to the EPA for SIP approval. The state does, however, have authority to enforce these standards automatically once promulgated by the federal government.	

Regulation 61-62.5 Standard No. 2, Ambient Air Quality Standards, serves to establish emission limits for ozone, while Regulation 61-62.1, Definitions and General Requirements, addresses some required control measures, means, and techniques for a source to certify compliance. Regulation 61-62.5 Standards No. 1, No. 4, No. 5, and No. 5.2, R.61-62.6, R. 61-62.7, R.61-62.96, R.61-62.97 and R.61-62.99 all provide for direct or indirect control of VOCs and NO_X emissions for particular source categories and processes.

Regulation 61-62.1, Definitions and General Requirements, R.61-62.5, Standard No. 7, Prevention of Significant Deterioration, and R.61-62.5, Standard No. 7.1, Nonattainment New Source Review, provide for the enforcement of all SIP measures, the regulation of construction of new or modified stationary sources, and apply to the construction of any new major and some minor stationary sources or any project at existing major or some minor stationary sources in areas designated as attainment, unclassifiable, or nonattainment. These regulations meet federal PSD and nonattainment NSR requirements.

Regulation 61-62.3, Air Pollution Episodes, and R.61-62.4, Hazardous Air Pollution Conditions, include provisions for the curtailment of processes which contribute to air pollution levels which are a substantial and imminent threat to public health. Regulation 61-62.2, Prohibition of Open Burning, prohibits open burning in certain instances which may be detrimental to air quality and includes a ban of certain open burning during the ozone season for additional control of NO_X emissions.

40 CFR Section 52.2133 General Conformity was adopted into the South Carolina State Implementation Plan on June 16, 1997 (62 FR 32537), and incorporates by reference 40 CFR Part 51, subpart W, Determining Conformity of General Federal Actions to State or Federal Implementation Plans, which will continue to apply to the Maintenance Area. On July 28, 2009 (74 FR 37168), the EPA approved the South Carolina Transportation Conformity SIP submittal which consists of transportation conformity criteria and procedures related to interagency consultation and enforceability of certain transportation-related control measures and mitigation measures. This updated the transportation conformity criteria and procedures in the South Carolina SIP.

Section 48-1-50(23) of the 1976 South Carolina Code of Laws, as amended, provides the Department with the statutory authority to "Adopt emission and effluent control regulations, standards and limitations that are applicable to the entire State, that are applicable only within specified areas or zones of the State, or that are applicable only when a specified class of pollutant is present."

Section VI. State Compliance with CAA Requirements

Section 175(A)(b) of the CAA states: "8 years after redesignation of any area as an attainment area under section 107(d), the State shall submit to the Administrator an additional revision of the applicable State implementation plan for maintaining the national primary ambient air quality standard for 10 years after the expiration of the 10-year period referred to in subsection (a)." The Department's first maintenance plan for the Maintenance Area is set to cover through 2026. This additional SIP revision will ensure the continued maintenance of the 2008 ozone NAAQS in the Maintenance Area through 2036.

The contingency provisions contained in this SIP revision, as outlined in Section III, D. Contingency Plan, assure that the Department will promptly correct any violation of the NAAQS in the Maintenance Area through the final year of 2036, as required by Section 175(A)(d) of the CAA. The Department will implement all measures with respect to the control of NO_X, VOCs, and ozone which were contained in the SIP for the Maintenance Area before the area was redesignated as an attainment area.

Monitoring is one of the requirements of Section 110. The Department will continue operation of the York Landfill (45-091-0008) Monitoring Site in compliance with 40 CFR Part 58, Ambient Air Quality Surveillance. No plans are currently underway to discontinue operation or otherwise affect the integrity of the ambient monitoring network in place. Changes will only be made if they are consistent with 40 CFR Part 58 and associated appendices and included in the Department's Annual Ambient Air Monitoring Network Plan.

Section VII. Conclusion

The most recent three years (2020-2022) of ozone monitoring data for the Maintenance Area demonstrate continuing compliance with the 2008 8-hour ozone NAAQS. Since the 1990's, there have been many major programs enacted in South Carolina that have led to significant actual, enforceable emissions reductions, which have led to improvements in the air quality in the Maintenance Area. Additionally, the maintenance plan demonstrates that the projected total emissions for 2036, the final year of the maintenance plan, as well as the interim year, 2026, are less than the base year, 2018, total emissions. This SIP revision demonstrates that maintenance of the 2008 8-hour ozone NAAQS has been achieved for the Maintenance Area and will continue through the second 10-year period.

Appendix A

Point Source Emissions Inventory Documentation

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Section I. Introduction and Scope

The point source inventory consists of emissions from larger industrial facilities and airports/ helipads. Primarily, the larger industrial facilities are those that must have Title V permits issued by the Department and send in regularly scheduled air emission inventories to the Department.

Although the Department's emission inventories include all the criteria pollutants and a large number of toxic pollutants, only the NO_X and VOCs are reported within this maintenance plan since they are important for ozone formation. The emissions in this report represent 2018 (the base year) and are projected to the future years 2026 and 2036.

The point source inventories detailed in this section have been developed for the portion of York County, SC within the RFATS MPO area (Maintenance Area) that was redesignated to attainment for the 2008 8-hour ozone NAAQS. All emissions are calculated on a ton per summer day basis.

Section II. Overall Methodology

All large, permitted sources defined as Inventory Type A sources under the EPA Air Emissions Reporting Rule are required to report emissions annually. All other Title V sources are required to report emissions every three years to the Department. Additionally, the EPA requires the Department to submit this data to the EPA Emissions Inventory System (EIS) on the same schedule. New-Indy Catawba, LLC, reported emissions data in 2018 and Cytec Engineered Materials, reported emissions data in 2017. Additionally, for the airports and helipads, 2017 National Emissions Inventory (NEI) data was used. Each set of data was projected to a base year of 2018, and to future years 2026 and 2036.

A. Source Identification

All York County industrial sources whose coordinates fell within the boundaries of the Maintenance Area are included in this document. Only two industrial sources are located within this area:

NEW-INDY CATAWBA LLC (Permit # 2440-0005), formerly Resolute FP US INC, herein referred to as “New-Indy”

CYTEC ENGINEERED MATERIALS INC (Permit # 2440-0097), formerly Cytec Carbon Fibers Rock Hill, herein referred to as “Cytec”

In addition to the industrial sources, the airports and helipads were mapped and sources within the Maintenance Area were identified.

No railyards were identified within the Maintenance Area.

B. Calculation of Growth Factors

Growth rate projections, from the EPA's 2016v2 modeling platform, were calculated and were the basis for the growth used in this inventory. These rates were based on a 2016 base year with future years 2026 (10-year growth) and 2032 (16-year growth). These growth rates needed to be adjusted, as the Department needed to grow 2017 NEI data to the 2018 base year (1-year growth), 2026 interim year (9-year growth), and 2036 final year (19-year growth).

Underlying assumptions:

1) Growth rate is a linear measure and can be arithmetically scaled.

2) Growth rate for 2016-2032 can be scaled for the period 2018-2036, that is, the growth rate line will have the same slope when extrapolated beyond 2032.

For a 10-year growth rate, the first step is to calculate the change:

$R_{10} - 1.0 = \Delta R_{10}$

To adjust to an 8-year period, for example, multiply by 8/10:

$8/10 * \Delta R_{10} = \Delta R_8$

The resulting value is added to unity to produce the estimated 8-year growth rate:

$\Delta R_8 + 1.0 = R_8$

The principle remains the same for other time periods, for example 12 years, but in these cases the assumption is made that the growth rate can be extrapolated beyond the 10-year period for which it was calculated.

Some data, such as the airports, helipads, and Cytec data, was only available for 2017. As a result, this data was grown to the 2018 base year and 2026 and 2036 future years using the growth factors located in section B, Calculation of Growth Factors, and C, Industrial Source Emission Estimation Approach, within the Overall Methodology section of this document.

C. Industrial Source Emission Estimation Approach

This section details the development of the 2018 base year inventory for industrial point sources. The development of the point source inventory by the Department began with the collection of the most current actual emission estimates from the stationary sources, in the Maintenance Area, that are subject to Title V permitting program. Sources required to send in inventory data are determined in accordance with the Air Emissions Reporting Rule. Every inventory received was reviewed by the Department's staff to ensure that the correct procedures were followed in developing the inventory and to ensure that appropriate emission factors were used. The Department's staff rely on the EPA-approved methodology and use preferred methods over less preferred methods where available when performing or accepting calculations. For example, Department-approved stack testing emission factors are preferred over AP-42 emission factors.

When available, however, continuous emission monitor data is used preferentially over stack test data. The order of preferred methods from most to least desirable are:

1) mass balance calculations,

2) continuous emissions monitor data,

3) Department approved and reviewed stack test emission factors,

4) AP-42 or FIRE emission factors,

5) in-house stack test, and

6) other.

Emission sources are assigned a source classification code (SCC), which identifies the type of source it is. Emissions are linked to the SCC.

New-Indy had a 2018 annual inventory as a basis, while Cytec had a 2017 annual inventory. For Cytec, it was necessary to use the growth factor estimation technique outlined in section B, Calculation of Growth Factors, to grow the reported 2017 emissions to the 2018 base year starting point.

To estimate the average summer day emissions for industrial point sources, the Department used quarterly throughput percentages provided by the facilities. Both of the Title V facilities operate continuously through the year, with 25% of their output in each quarter. Given that operation at the facilities is reported to be constant, ozone season daily emissions were calculated by scaling the annual emissions by 1/365.

The growth rates were assigned to the Maintenance Area industrial sources by their SCC code. Industrial source base data was grown to 2018, 2026, and 2036.

Using the estimation method in section B, Calculation of Growth Factors, 2018/2026 and 2018/2036 growth rates were developed based on the EPA's 2016v2 modeling platform 2016/2026 growth rates.

Table 1 – SCC Codes and Growth Factors for the Maintenance Area Point Sources

SCC Code	Description	2016/2026	2018/2026	2018/2036
10200401	Fuel Comb #6 Oil	1.36432939	1.29146351	1.587815159
10200402	Fuel Comb – Residual Oil	1.36432939	1.29146351	1.587815159
10200405	Residual Oil Cogeneration	1.36432939	1.29146351	1.587815159
10200601	Fuel Comb - NG	0.9506549	0.960523917	0.931119326

SCC Code	Description	2016/2026	2018/2026	2018/2036
10200603	Fuel Comb – NG <10 MMbtu/hr	0.9506549	0.960523917	0.931119326
10200604	NG Comb Cogeneration	0.9506549	0.960523917	0.931119326
10200901	Bark-fired Boiler	1.05455336	1.04364269	1.132481835
10201502	Tire-derived fuel combustion	Missing	1.0 assumed	1.0 assumed
3070XXXX	Pulp Paper Mfg	1.0	1.0	1.0
40688801	Petroleum Fugitive Emiss.	1.0	1.0	1.0
30102499	Carbon and Graphite Product Manufacturing	1.0	1.0	1.0
39000699	In-Process Fuel, NG General	1.0	1.0	1.0

D. 2018 Airport Point Source Inventory Development

The aircraft sector includes all aircraft types used for public, private, and military purposes. This includes four types of aircraft: (1) Commercial, (2) Air Taxis (AT), (3) General Aviation (GA), and (4) Military. A critical detail is whether each aircraft is turbine- or piston-driven, which allows the emissions estimation model to assign the fuel used, jet fuel or aviation gas, respectively. The fraction of turbine- and piston-driven aircraft is either collected or assumed for all aircraft types. Commercial aircraft include those used for transporting passengers, freight, or both. Commercial aircraft tend to be larger aircraft powered with jet engines. Air Taxis carry passengers, freight, or both, but usually are smaller aircraft and operate on a more limited basis than the commercial aircraft. General Aviation includes most other aircraft used for recreational flying and personal transportation. Finally, military aircraft are associated with military purposes, and they sometimes have activity at non-military airports.

The national AT and GA fleet includes both jet- and piston-powered aircraft. Most of the AT and GA fleet are made up of larger piston-powered aircraft, though smaller business jets can also be found in these categories. Military aircraft cover a wide range of aircraft types such as training aircraft, fighter jets, helicopters, and jet-powered and piston-powered planes of varying sizes.

The inventory also includes emission estimates for aircraft auxiliary power units (APUs) and aircraft ground support equipment (GSE) typically found at airports, such as aircraft refueling vehicles, baggage handling vehicles, and equipment, aircraft towing vehicles, and passenger buses.

The base source of airport/helipad point source emissions data was the 2017 NEI. The EPA developed emissions estimates associated with aircrafts' landing and takeoff (LTO) cycle. The cycle begins when the aircraft approaches the airport on its descent from cruising altitude, lands, taxis to the gate, and idles during passenger deplaning. It continues as the aircraft idles during passenger boarding, taxis back out onto the runway for subsequent takeoff, and ascent (climb-out) to cruising altitude. Thus, the five specific operating modes in an LTO are: (1) approach, (2)

taxi/idle-in, (3) taxi/idle-out, (4) takeoff, and (5) climb-out. The LTO cycle provides a basis for calculating aircraft emissions. During each mode of operation, an aircraft engine operates at a fairly standard power setting for a given aircraft category. Emissions for one complete cycle are calculated using emission factors for each operating mode for each specific aircraft engine combined with the typical period of time the aircraft is in the operating mode. Please refer to the *2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document*, Section 3.2 for more detail on preparing the LTO data.

Only airports found within the Maintenance Area were included in this submittal.

To estimate the average summer day emission for the airport related point emissions, the Department started with the EPA generated 2017 annual emissions. The Department had no actual activity data from these sources, so the exact amount of activity that occurred during the ozone season months could not be ascertained. Therefore, it was assumed that these sources operated at a constant rate throughout all months of the year (8.333% activity for each month). As above, daily ozone season emissions were estimated by scaling the annual emissions by 1/365.

Once the airport/helipad 2017 average ozone season daily emissions for the Maintenance Area were determined, the values were grown to years 2018, 2026, and 2036. The table below contains the calculated growth rates.

Table 2 – Airport/Helipad Point Source Growth Rates

SCC Code	2017-2018 Growth Rate	2017-2026 Growth Rate	2017-2036 Growth Rate
2275001000	1.00	1.00	1.00
2275050011	1.00835	1.07515	1.163875

Section III. Quality Assurance

The emission inventory has undergone a number of quality assurance checks so that it meets the standards for submitting the annual inventory to the EPA. The state emissions inventory database program helps ensure that important data elements are present. Where the program performs calculations, the database program helps avoid math errors. In addition, the Department works closely with all Title V sources to ensure that all tons-per-year emissions reported are accurate.

Section IV. Total Point Sources Emissions

In the following sections, the total point source emissions for the Maintenance Area are totaled. The emissions by SCC and facility have also been provided for years 2018, 2026, and 2036.

A. Maintenance Area Summary

Table 3 – Total NO_X Emissions in Tons per Day

	2018	2026	2036
Maintenance Area	4.134	4.216	4.369

Table 4 – Total VOC Emissions in Tons per Day

	2018	2026	2036
Maintenance Area	3.379	3.384	3.394

B. Summary of Emissions by Facility and SCC

Table 5 – Summary of NO_X Emissions by Facility and SCC

Name	NAICS1	SCC	Pollutant	2018 tons/day	2026 tons/day	2036 tons/day
Cytec	335991	30102499	NO_X	0.1254	0.1254	0.1254
		39000699	NO_X	0.0154	0.0154	0.0154
New-Indy	322110	10200401	NO_X	0.0164	0.0212	0.0260
		10200402	NO_X	0.0946	0.1221	0.1502
		10200405	NO_X	0.0055	0.0071	0.0088
		10200601	NO_X	0.3549	0.3409	0.3305
		10200603	NO_X	0.0279	0.0268	0.0260
		10200604	NO_X	0.0055	0.0053	0.0051
		10200901	NO_X	1.4598	1.5235	1.6531
		10201502	NO_X	0.0234	0.0234	0.0234
		30700105	NO_X	0.0218	0.0218	0.0218
		30700106	NO_X	0.2579	0.2579	0.2579
		30700110	NO_X	1.3475	1.3475	1.3475
		30700117	NO_X	0.3730	0.3730	0.3730
Bethel-Lake Wylie	Airport/ Helipad	2275050011	NO_X	8.98E-08	9.57E-08	1.04E-07
Falls Landing	Airport/ Helipad	2275050011	NO_X	8.52E-06	9.08E-06	9.83E-06
Piedmont Medical Center	Airport/ Helipad	2275050011	NO_X	1.64E-05	1.75E-05	1.89E-05
Rock Hill/York Co./Bryan*	Airport/ Helipad	2275001000	NO_X	4.81E-03	4.81E-03	4.81E-03
*The SCC Code for Rock Hill/York Co./Bryan Airport (2275001000) is for Mobile Sources – Aircraft – Military Aircraft and was assigned by the EPA. The other SCC Code for airport facilities, 2275050011, is for Mobile Sources – Aircraft – General Aviation.						

Table 6 – Summary of VOC Emissions by Facility and SCC

Name	NAICS1	SCC	Pollutant	2018 tons/day	2026 tons/day	2036 tons/day
Cytec	335991	30102499	VOC	0.0999	0.0999	0.0999
		39000699	VOC	0.0008	0.0008	0.0008
New-Indy	322110	10200401	VOC	0.0003	0.0003	0.0004
		10200402	VOC	0.0005	0.0006	0.0008
		10200405	VOC	0.0001	0.0002	0.0002
		10200601	VOC	0.0070	0.0067	0.0065
		10200603	VOC	0.0015	0.0015	0.0014
		10200604	VOC	0.0003	0.0003	0.0003
		10200901	VOC	0.1128	0.1177	0.1277
		30700101	VOC	0.0209	0.0209	0.0209
		30700103	VOC	0.0052	0.0052	0.0052
		30700105	VOC	0.0272	0.0272	0.0272
		30700106	VOC	0.0096	0.0096	0.0096
		30700110	VOC	0.1524	0.1524	0.1524
		30700114	VOC	0.1200	0.1200	0.1200
		30700115	VOC	0.0007	0.0007	0.0007
		30700117	VOC	0.1591	0.1591	0.1591
		30700121	VOC	0.6995	0.6995	0.6995
		30700122	VOC	0.0621	0.0621	0.0621
		30700124	VOC	0.0582	0.0582	0.0582
		30700132	VOC	0.1440	0.1440	0.1440
		30700133	VOC	0.0331	0.0331	0.0331
		30700135	VOC	0.8556	0.8556	0.8556
		30700199	VOC	0.3450	0.3450	0.3450
		30700234	VOC	0.0035	0.0035	0.0035
		30701220	VOC	0.3110	0.3110	0.3110
		30701399	VOC	0.1397	0.1397	0.1397
		40688801	VOC	0.0008	0.0008	0.0008
Bethel-Lake Wylie	Airport/ Helipad	2275050011	VOC	2.08E-07	2.22E-07	2.40E-07
Falls Landing	Airport/ Helipad	2275050011	VOC	1.97E-05	2.10E-05	2.28E-05
Piedmont Medical Center	Airport/ Helipad	2275050011	VOC	3.52E-05	3.75E-05	4.06E-05
Rock Hill/York Co/Bryan	Airport/ Helipad	2275001000	VOC	8.18E-03	8.18E-03	8.18E-03

Appendix B

Nonpoint Source Emissions Inventory Documentation

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Section I. Introduction and Scope

Nonpoint sources represent a collection of many small, unidentified points of air pollution emissions within a specified geographical area, emitting less than the minimum level prescribed for point sources. Because these sources are too small and/or too numerous to be surveyed and characterized individually, all nonpoint source activities are collectively estimated. The county is usually the geographic area for which emissions from nonpoint sources are compiled, primarily because counties are the smallest areas for which data used for estimating emissions is readily available.

The nonpoint source inventories detailed in this section have been developed for York County as well as the Maintenance Area. All emissions are calculated on a ton per summer day basis.

Section II. Overall Methodology

A. Baseline Emissions Inventory

The baseline emission inventory for this document is the York County, SC inventory taken from the 2017 NEI The 2017 NEI was developed by the EPA, with input from the Department, and was developed per the Air Emissions Reporting Requirements (AERR). While the 2020 NEI became available during the development of this document, the response to the COVID-19 pandemic, beginning in early 2020, resulted in a noticeable decrease of emissions. As such, the Department believes the 2017 NEI serves as the most recent NEI that most accurately reflects post-pandemic emissions inventories. The EPA developed 2017 emission estimates for many nonpoint sectors in collaboration with a consortium of state agencies and regional planning organizations called the Nonpoint Method Advisory Committee.

B. Emission Estimation Approach

Nonpoint source emissions are typically estimated by multiplying an emission factor by some known indicator of collective activity for each source category within the inventory area. An indicator is any parameter associated with the activity level of a source that can be correlated with the air pollutant emissions from that source, such as production, number of employees, or population.

In general, one of the following emissions estimation approaches is used to calculate the nonpoint source emissions: per capita emission factors, employment-related emission factors, commodity consumption-related emission factors, or level of activity-based emission factors. The emission factors used were obtained from the EIIP Tech Reports, the Procedures document or the EPA's AP-42 Compilation of Air Pollutant Emission Factors, Fifth Edition, referred to as AP-42, and the NOMAD collaboration.

There are several methods for estimating the activity level for a specific nonpoint source category. These include treating nonpoint sources as point sources, surveying local activity levels, apportioning national or statewide activity totals to local inventory areas, and using population or employment data. The details of how the 2017 NEI was developed can be found in the EPA’s

"2017 National Emissions Inventory: January 2021 Updated Release, Technical Support Document" (2017 TSD).

For certain categories, there can be an overlap between the point source emissions and the nonpoint source emissions calculated with emission factors. The 2017 point source emissions in these categories were identified so that they could be subtracted where appropriate.

Table 1 – EPA-Estimated Emissions Sources in York County Expected to be Exclusively Nonpoint

EPA-Estimated Emissions Source	EIS Sector(s)	2017 TSD Section	Name of Supporting Documentation
Agricultural Pesticide Application	Solvent –Consumer & Commercial Solvent Use	4.23	Agricultural Pesticides NEMO 2017 FINAL_4-2 update.docx
Animal Husbandry	Agriculture - Livestock Waste	4.5	Agricultural Livestock NEMO 2017 FINAL.docx
Asphalt Paving	Solvent –Consumer & Commercial Solvent Use	4.24	Asphalt NEMO 2017 FINAL_4-2 update.docx
Aviation Gasoline Distribution Stage 1	Gas Stations	4.7	Aviation Gasoline Distribution Stage 1 NEMO 2017 DRAFT_v2_4-2 update.docx
Aviation Gasoline Distribution Stage 2	Gas Stations	4.7	Aviation Gasoline Distribution Stage 2 NEMO 2017 DRAFT_4-2 update.docx
Commercial Cooking	Commercial Cooking	4.8	Commercial Cooking NEMO FINAL_4-2 update.docx
Composting	Miscellaneous Non-Industrial Not Elsewhere Classified (NEC)	4.26	Composting NEMO 2017 FINAL_4-2 update.docx
Human and Animal Cremation	Waste Disposal	4.18	Cremation NEMO 2017 FINAL_4-2 update.docx
Open Burning, Land Clearing Debris	Waste Disposal	4.27	Open Burning Land Clearing Debris NEMO 2017 DRAFT_4-2.docx
Open Burning, Yard Waste Debris	Waste Disposal	4.27	Open Burning Yard Waste NEMO 2017 FINAL_4-2 update.docx
Open Burning, Residential	Waste Disposal	4.27	Open Burning RHW NEMO 2017 FINAL_4-2 update.docx

EPA-Estimated Emissions Source	EIS Sector(s)	2017 TSD Section	Name of Supporting Documentation
Household Waste			
Portable Fuel Containers	Miscellaneous Non-Industrial NEC	4.20	Portable Fuel Container Inventory 2017_v1.docx
Residential Charcoal Grilling	Miscellaneous Non-Industrial NEC	4.19	Residential Barbecue Grilling NEMO FINAL_4-2 update.docx
Residential Heating, Non-Wood	Fuel Comb - Residential - Natural Gas, Fuel Comb - Residential - Oil, Fuel Comb - Residential - Other	4.14	Residential Heating NEMO 2017 FINAL_4-2 update.docx
Residential Wood Combustion	Fuel Comb - Residential - Wood	4.15	Residential Wood Combustion_DRAFT.DOCX
Mobile Sources	Highway Vehicles-Gasoline Refueling	6.8	
Mobile Sources	Highway Vehicles-Diesel Refueling	6.8	
Mobile Sources	Highway Vehicles-Ethanol Refueling	6.8	

Table 2 – Emissions Sources in York County with Potential Nonpoint and Point Contribution

EPA-Estimated Emissions Source	EIS Sector(s)	2017 TSD Section	Name of Supporting Documentation
Industrial and Commercial/Institutional Fuel Combustion	Fuel Comb - Industrial Boilers, Internal Combustion Engines (ICEs) - All Fuels, Fuel Comb - Commercial/Institutional - All Fuels	4.13	ICI NEMO FINAL_4-2 updated.docx
Nonpoint Gasoline Distribution	Bulk Gasoline Terminals, Gas Stations, Industrial Processes – Storage and Transfer	4.7	Stage I Gasoline Distribution NEMO FINAL_7-18-2019_4-2 updated.docx
Publicly Owned Treatment Works (POTWs)	Waste Disposal	4.28	POTWs NEMO FINAL_4-2 updated.docx
Solvent Utilization	Solvent - Consumer & Commercial Solvent Use, Solvent - Degreasing, Solvent - Dry Cleaning, Solvent - Graphic Arts, Solvent - Industrial	4.25	Solvent NEMO 2017 FINAL_7-8-2019_4-2 updated.docx

EPA-Estimated Emissions Source	EIS Sector(s)	2017 TSD Section	Name of Supporting Documentation
	Surface Coating & Solvent Use, Solvent - Non-Industrial Surface Coating		

C. Nonpoint Average Summer Day Emissions Estimated

The Department does not have ozone season emissions data for the Maintenance Area, so the entire York County annual emissions from the EPA's 2017 NEI were used as the starting point. The next step was to allocate the annual emissions down to an average ozone season day. In the first maintenance SIP, no known ozone season day allocation factors were known, so the average ozone season day was assumed to be the same as an average day and the annual emissions were divided by 365. For this second maintenance plan, EPA's 2016v2 modeling data is available. This data has county monthly sector summaries, which were used to calculate ozone season day allocation ratios.

D. Allocation to the Maintenance Area

The NEI nonpoint source inventory contains emissions at the county-level. The ratio of the Maintenance Area population to the county population was used to estimate emissions for the Maintenance Area. Table 3 contains the 2020 population for York County, taken from the U.S. Census, and population projections as determined by the RFATS MPO. The population of the Maintenance Area is also provided, as well as the percentage of the Maintenance Area to the entire county. This percentage was used to allocate the county-level emissions to the Maintenance Area for the base year and all future years.

Table 3 – 2020 Population Data

	Maintenance Area Population	Entire York County Population	% Population in Maintenance Area
Year 2020	222,667	282,090	78.9%

E. Emissions Projections to Future Years

The county-level emissions inventory was allocated down to the ozone season day, then to the Maintenance Area, and then projected to future years. The EPA's 2016v2 modeling platform was used to determine the growth rates by SCC and by pollutant.

Growth rate projections, from the EPA's 2016v2 modeling platform, were calculated and were the basis for the growth used in this effort. These rates were based on a 2016 base year with future years 2026 (10-year growth) and 2032 (16-year growth). These growth rates needed to be adjusted, as the Department needed to grow 2017 NEI data to the base year of 2018 (1-year growth) and to the future years of 2026 (9-year growth) and 2036 (19-year growth).

Underlying assumptions:

1) Growth rate is a linear measure and can be arithmetically scaled.

2) Growth rate for 2016-2032 (2016v2 modeling data) can be scaled for the period 2018-2036, that is, the growth rate line will have the same slope when extrapolated beyond 2032.

For a 10-year growth rate, the first step is to calculate the change:

$R_{10} - 1.0 = \Delta R_{10}$

To adjust to an 8-year period, for example, multiply by 8/10:

$8/10 * \Delta R_{10} = \Delta R_8$

The resulting value is added to unity to produce the estimated 8-year growth rate:

$\Delta R_8 + 1.0 = R_8$

The principle remains the same for other time periods, for example 19 years, but in these cases the assumption is made that the growth rate can be extrapolated beyond the 10-year period for which it was calculated.

Example 1:

The 2016-2026 growth rate for SCC 2103006000 (Commercial NG Combustion) for NO_X is 0.960837907. We want to calculate the growth rate for the 1-year period from 2017-2018. Because the growth rate is negative, begin by subtracting 1.0:

0.960837907 – 1.0 = -0.0391621

Now that we have the negative growth rate over a 10-year period, we need to scale this down to a 1-year period. To accomplish this, we will multiple the negative growth rate by 0.1, or one tenth of the time frame:

0.1 * -0.0391621= -0.00391621

By adding 1.0 to our negative growth rate, we can calculate the growth rate.

1.0 + (-0.00391621) = 0.99608379

The estimated 1-year growth rate for the period from 2017-2018 is 0.99608379.

The above approach is the same if the 10-year growth rate is positive. The difference is the adjusted growth rate will also be positive, only less.

Example 2:

The growth rates from the EPA's 2016v2 modeling platform cover a 16-year period from 2016 to 2032. The time period selected by the Department for this demonstration covers a 19-year period from 2017 to 2036. As such, growth rates need to be adjusted by a different factor:

19/16 = 1.1875

For the SCC and pollutant in Example 1, the 2016-2032 growth rate is 0.889717221. Following the same steps previously provided, the estimated 19-year growth rate is calculated as follows:

0.889717221 – 1.0 = -0.11028278

1.1875 * -0.11028278 = -0.1309608

1.0 + (-0.1309608) = 0.8690392

The estimated 19-year growth rate for the period from 2017 to 2036 is 0.8690392.

Table 4 below contains the growth factors for each of the source categories and pollutants. Most of the growth rates were calculated based on emissions data from the EPA's 2016v2 modeling platform. The SCCs 2201000062 (Highway Vehicle Gasoline Refueling), 2202000062 (Highway Vehicle Diesel Refueling), and 2205000062 (Highway Vehicle E-95 Refueling) were not present in the nonpoint files of the 2016v2 modeling data. Growth rates for these SCCs were developed by using the Maintenance Area VMT.

Table 4 – Growth Factors

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
2102001000	Industrial Anthracite Coal- Boilers	NO_X	1 *	1 *	1 *
2102001000	Industrial Anthracite Coal- Boilers	VOC	1 *	1 *	1 *
2102002000	Industrial Bitum/Sub-Bitum Coal- Boilers	NO_X	1 *	1 *	1 *
2102002000	Industrial Bitum/Sub-Bitum Coal- Boilers	VOC	1 *	1 *	1 *
2102004001	Industrial Distillate Oil-All Boilers	NO_X	1	1	1
2102004001	Industrial Distillate Oil-All Boilers	VOC	1	1	1
2102004002	Industrial Distillate Oil-All IC Engines	NO_X	1.025	1.225	1.296875
2102004002	Industrial Distillate Oil-All IC Engines	VOC	1.025	1.225	1.296875

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
2102005000	Industrial Residual Oil-Boilers	NO_X	1	1	1
2102005000	Industrial Residual Oil-Boilers	VOC	1	1	1
2102006000	Industrial NG- Boilers and IC Engines	NO_X	1 *	1 *	1 *
2102006000	Industrial NG- Boilers and IC Engines	VOC	1 *	1 *	1 *
2102007000	Industrial LPG- Boilers	NO_X	1 *	1 *	1 *
2102007000	Industrial LPG- Boilers	VOC	1*	1 *	1 *
2102008000	Industrial Wood- Boilers	NO_X	1.00429304	1.038637356	1.08777197
2102008000	Industrial Wood- Boilers	VOC	1.00429304	1.038637356	1.08777197
2102011000	Industrial Kerosene-Boilers	NO_X	1 *	1 *	1 *
2102011000	Industrial Kerosene-Boilers	VOC	1 *	1 *	1 *
2103001000	Commercial/Institutional Anthracite Coal- Boilers	NO_X	1 *	1 *	1 *
2103001000	Commercial/Institutional Anthracite Coal- Boilers	VOC	1 *	1 *	1 *
2103002000	Commercial/Institutional Bitum/Sub-Bit Coal-Boilers	NO_X	1 *	1 *	1 *
2103002000	Commercial/Institutional Bitum/Sub-Bitum Coal-Boilers	VOC	1 *	1 *	1 *
2103004001	Commercial/Institutional Distillate Oil- Boilers	NO_X	1 *	1 *	1 *
2103004001	Commercial/Institutional Distillate Oil- Boilers	VOC	1 *	1 *	1 *
2103004002	Commercial/Institutional Distillate Oil- IC Engines	NO_X	1 *	1 *	1 *
2103004002	Commercial/Institutional Distillate Oil- IC Engines	VOC	1 *	1 *	1 *
2103005000	Commercial/Institutional Residual Oil- Boilers	NO_X	1	1	1
2103005000	Commercial/Institutional Residual Oil- Boilers	VOC	1	1	1
2103006000	Commercial/Institutional NG- Boilers and IC Engines	NO_X	0.996083791	0.964754116	0.8690392

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
2103006000	Commercial/Institutional NG- Boilers and IC Engines	VOC	1.015819637	1.142376729	1.211367431
2103007000	Commercial/Institutional LPG- All Combustor types	NO_X	1	1	1
2103007000	Commercial/Institutional LPG- All Combustor Types	VOC	1	1	1
2103008000	Commercial/Institutional Wood- Boilers	NO_X	1	1	1
2103008000	Commercial/Institutional Wood- Boilers	VOC	1	1	1
2103011000	Commercial/Institutional Kerosene- All Combustors	NO_X	1	1	1
2103011000	Commercial/Institutional Kerosene- All Combustors	VOC	1	1	1
2104001000	Residential Anthracite Coal- All Combustors	NO_X	1	1	1
2104001000	Residential Anthracite Coal- All Combustors	VOC	1	1	1
2104002000	Residential Bitum/Sub-Bitum Coal- All Combustors	NO_X	1	1	1
2104002000	Residential Bitum/Sub-Bitum Coal- All Combustors	VOC	1	1	1
2104004000	Residential Distillate Oil-All Combustors	NO_X	1	1	1
2104004000	Residential Distillate Oil-All Combustors	VOC	1	1	1
2104006000	Residential NG- All Combustors	NO_X	1	1	1
2104006000	Residential NG- All Combustors	VOC	1	1	1
2104007000	Residential LPG- All Combustors	NO_X	1	1	1
2104007000	Residential LPG- All Combustors	VOC	1	1	1
2104008100	Residential Wood-Fireplace	NO_X	1.010289	1.092601	1.195864577

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
2104008100	Residential Wood-Fireplace	VOC	1.010289	1.092601	1.195864577
2104008210	Residential Wood-Woodstove_Fireplace inserts_non-EPA certified	NO_X	0.982031	0.838279	0.786618125
2104008210	Residential Wood-Woodstove_Fireplace inserts_non EPA certified	VOC	0.982031	0.838279	0.786618125
2104008220	Residential Wood-Woodstove_Fireplace inserts_EPA certified_non-catalytic	NO_X	1.010284	1.092556	1.1221225
2104008220	Residential Wood-Woodstove_Fireplace inserts_EPA certified_non-catalytic	VOC	1.010284	1.092556	1.1221225
2104008230	Residential Wood-Woodstove_Fireplace inserts_EPA certified_catalytic	NO_X	1.015274	1.137466	1.18137875
2104008230	Residential Wood-Woodstove_Fireplace inserts_EPA certified_catalytic	VOC	1.015274	1.137466	1.18137875
2104008310	Residential Wood-Woodstove_Freestanding _non-EPA certified	NO_X	0.984276	0.858484	0.8132775
2104008310	Residential Wood-Woodstove_Freestanding _non-EPA certified	VOC	0.984276	0.858484	0.8132775
2104008320	Residential Wood-Woodstove_Freestanding _EPA certified_non-catalytic	NO_X	1.010284	1.092556	1.1221225
2104008320	Residential Wood-Woodstove_Freestanding _EPA certified_non-catalytic	VOC	1.010284	1.092556	1.1221225
2104008330	Residential Wood-Woodstove_Freestanding _EPA certified_catalytic	NO_X	1.015274	1.137466	1.18137875

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
2104008330	Residential Wood-Woodstove_Freestanding_EPA certified_catalytic	VOC	1.015274	1.137466	1.18137875
2104008400	Residential Wood-Woodstove_Freestanding_EPA certifiedWoodstove_pellet-fired_general	NO_X	1.033851	1.304659	1.401980625
2104008400	Residential Wood-Woodstove_Freestanding_EPA certifiedWoodstove_pellet-fired_general	VOC	1.033851	1.304659	1.401980625
2104008510	Residential Wood-Furnace_Indoor cordwood_non EPA certified	NO_X	0.915222	0.236998	-0.00673875
2104008510	Residential Wood-Furnace_Indoor cordwood_non EPA certified	VOC	0.915111	0.235999	-0.008056875
2104008530	Residential Wood-Furnace_Indoor_pellet fired general	NO_X	1.033851	1.304659	1.401980625
2104008530	Residential Wood-Furnace_Indoor_pellet fired general	VOC	1.033851	1.304659	1.401980625
2104008610	Residential Wood-Hydronic heater_outdoor	NO_X	0.9987	0.9883	0.9845625
2104008610	Residential Wood-Hydronic heater_outdoor	VOC	0.9987	0.9883	0.9845625
2104008620	Residential Wood-Hydronic heater_indoor	NO_X	0.9987	0.9883	0.9845625
2104008620	Residential Wood-Hydronic heater_indoor	VOC	0.9987	0.9883	0.9845625
2104008630	Residential Wood-Hydronic heater_pellet fired	NO_X	0.9987	0.9883	0.9845625
2104008630	Residential Wood-Hydronic heater_pellet fired	VOC	0.9987	0.9883	0.9845625

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
2104008700	Residential Wood-Outdoor wood burning device_NEC	NO_X	1.009255	1.083295	1.109903125
2104008700	Residential Wood-Outdoor wood burning device_NEC	VOC	1.009255	1.083295	1.109903125
2104009000	Residential Firelog- All Combustors	NO_X	1.009255	1.083295	1.109903125
2104009000	Residential Firelog- All Combustors	VOC	1.009255	1.083295	1.109903125
2104011000	Residential Kerosene-All heaters	NO_X	1	1	1
2104011000	Residential Kerosene-All Heater Types	VOC	1	1	1
2201000062	Highway Vehicles – Gasoline Refueling	VOC	1.019877031	1.223616599	1.419174728
2202000062	Highway Vehicles – Diesel Refueling	VOC	1.019877031	1.223616599	1.419174728
2205000062	Highway Vehicles - Ethanol (E-85) Refueling	VOC	1.019877031	1.223616599	1.419174728
2302002100	Commercial Cooking-Charbroiling	VOC	1.017860599	1.160745393	1.296977619
2302002200	Commercial Cooking-Charbroiling	VOC	1.017860599	1.160745393	1.296977619
2302003000	Commercial Cooking-Deep fat frying	VOC	1.017860599	1.160745393	1.296977619
2302003100	Commercial Cooking-Deep Fat Frying	VOC	1.017860599	1.160745393	1.296977619
2302003200	Commercial Cooking-Clamshell Griddle Frying	VOC	1.017860599	1.160745393	1.296977619
2401001000	Surface Coating-Architectural	VOC	1.017860599	1.160745393	1.296977619
2401005000	Surface Coating- Auto Refinishing	VOC	1	1	1
2401008000	Surface Coating- Traffic Markings	VOC	1	1	1
2401015000	Surface Coating- Factory Finished Wood	VOC	1	1	1
2401020000	Surface Coating- Wood Furniture	VOC	1	1	1
2401025000	Surface Coating- Metal Furniture	VOC	1	1	1

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
2401055000	Surface Coating- Machinery and Equipment	VOC	1	1	1
2401060000	Surface Coating- Large Appliances	VOC	1	1	1
2401065000	Surface Coating- Electronic and other Electrical	VOC	1	1	1
2401070000	Surface Coating- Motor Vehicles	VOC	1	1	1
2401075000	Surface Coating- Aircraft	VOC	1	1	1
2401080000	Surface Coating- Marine	VOC	1	1	1
2401090000	Surface Coating- Misc Mfg	VOC	1	1	1
2401100000	Surface Coating- Industrial Maintenance	VOC	1.017860599	1.160745393	1.296977619
2401200000	Surface Coating- Other Special Purpose Coatings	VOC	1	1	1
2415000000	Degreasing- All Processes/All Industries	VOC	1	1	1
2420000000	Dry Cleaning	VOC	1	1	1
2425000000	Graphic Arts	VOC	1.017860599	1.160745393	1.296977619
2460100000	Non-industrial: Consumer and Commercial Personal Care Products	VOC	1.017860599	1.160745393	1.296977619
2460200000	Non-industrial: Consumer and Commercial All Household Products	VOC	1.017860599	1.160745393	1.296977619
2460400000	Non-industrial: Consumer and Commercial-All Automotive Aftermarket Products	VOC	1	1	1
2460500000	Non-industrial: Consumer and Commercial- All Coatings and Related Products	VOC	1.017860599	1.160745393	1.296977619
2460600000	Non-industrial: Consumer and	VOC	1.017860599	1.160745393	1.296977619

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
	Commercial- All Adhesives and Sealants				
2460800000	Miscellaneous Non-industrial: Consumer and Commercial- All FIFRA related Products	VOC	1	1	1
2460900000	Miscellaneous Non-industrial: Consumer and Commercial- Miscellaneous (NEC)	VOC	1.017860599	1.160745393	1.296977619
2461021000	Miscellaneous Non-industrial: Commercial- Cutback Asphalt	VOC	0	0	0
2461022000	Miscellaneous Non-industrial: Commercial- Emulsified Asphalt	VOC	0	0	0
2461850000	Miscellaneous Non-industrial: Commercial- Agricultural Pesticide	VOC	1	1	1
2501011011	Residential Portable Gas Cans- Permeation	VOC	1.017860599	1.160745393	1.296977619
2501011012	Residential Portable Gas Cans- Evaporation	VOC	1.017860599	1.160745393	1.296977619
2501011013	Residential Portable Gas Cans- Spillage During Transport	VOC	1.017860599	1.160745393	1.296977619
2501011014	Residential Portable Gas Cans- Refilling at the Pump_Vapor Displacement	VOC	1.017860599	1.160745393	1.296977619
2501011015	Residential Portable Gas Cans- Refilling at the Pump_Spillage	VOC	1.017860599	1.160745393	1.296977619
2501012011	Commercial Portable Gas Cans- Permeation	VOC	1.017860599	1.160745393	1.296977619
2501012012	Commercial Portable Gas Cans- Evaporation	VOC	1.017860599	1.160745393	1.296977619
2501012013	Commercial Portable Gas Cans- Spillage During Transport	VOC	1.017860599	1.160745393	1.296977619
2501012014	Commercial Portable Gas Cans- Refilling at	VOC	1.017860599	1.160745393	1.296977619

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
	the Pump_Vapor Displacement				
2501012015	Commercial Portable Gas Cans- Refilling at the Pump_Spillage	VOC	1.017860599	1.160745393	1.296977619
2501050120	Gasoline Bulk Terminals: All Evaporative Losses	VOC	0.982393004	0.841537037	0.730694874
2501055120	Gasoline Bulk Plants: All Evaporative Losses	VOC	0.982393004	0.841537037	0.730694874
2501060051	Gasoline Service Stations- Stage 1_Submerged Filling	VOC	0.982393004	0.841537037	0.730694874
2501060052	Gasoline Service Stations- Stage 1_Splash Filling	VOC	0	0	0
2501060053	Gasoline Service Stations- Stage 1_Balanced Submerged Filling	VOC	0.982393004	0.841537037	0.730694874
2501060201	Gasolline Service Stations- Underground Tank_Breathing and Emptying	VOC	0.982393004	0.841537037	0.730694874
2501080050	Airports- Aviation Gasoline_Stage 1 Total	VOC	1	1	1
2501080100	Airports- Aviation Gasoline_Stage 2 Total	VOC	1	1	1
2505030120	Gasoline Transport-Truck	VOC	0.982393004	0.841537037	0.730694874
2505040120	Gasoline Transport-Pipeline	VOC	0.982393004	0.841537037	0.730694874
2610000100	Open Burning- Yard Waste_Leaf Species	NO_X	1	1	1
2610000100	Open Burning- Yard Waste_Leaf Species	VOC	1	1	1
2610000400	Open Burning- Yard Waste_Brush	NO_X	1	1	1
2610000400	Open Burning- Yard Wast_Brush	VOC	1	1	1
2610000500	Open Burning- Land Clearing Debris	NO_X	1	1	1

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
	(excludes Logging Debris)				
2610000500	Open Burning- Land Clearing Debris (excludes Logging Debris)	VOC	1	1	1
2610030000	Open Burning- Residential Household Waste	NO_X	1	1	1
2610030000	Open Burning- Residential Household Waste	VOC	1	1	1
2630020000	Wastewater Treatment- POTW	VOC	0	0	0
2680003000	Composting- 100% Green Waste	VOC	1	1	1
2805002000	Agriculture Production – Livestock_Beef Cattle	VOC	1.000608406	1.005475654	1.017952632
2805007100	Agriculture Production – Livestock_Poultry layers with dry manure mgt systems	VOC	1.01530544	1.137748962	1.274485875
2805009100	Agriculture Production – Livestock_Poultry broilers_confinement	VOC	1.015014258	1.135128321	1.252165487
2805010100	Agriculture Production – Livestock_Turkeys_confinement	VOC	1.00279662	1.025169579	1.054297514
2805018000	Agriculture Production – Livestock_Dairy cattle	VOC	1.001280016	1.011520142	1.02567432
2805025000	Agriculture Production – Livestock_ Swine	VOC	1.016756512	1.150808609	1.23184712
2805035000	Agriculture Production – Livestock_ Horses and Ponies Waste	VOC	1	1	1
2805040000	Agriculture Production – Livestock_Sheep and Lambs Waste	VOC	1	1	1
2805045000	Agriculture Production – Livestock_Goats Waste	VOC	1	1	1
2810025000	Residential Grilling (see 23-02-002-xxx for Commercial)	NO_X	1	1	1

SCC	SCC Description	Pollutant Code	2018 Growth Rate	2026 Growth Rate	2036 Growth Rate
2810025000	Residential Grilling (see 23-02-002-xxx for Commercial)	VOC	1.017860599	1.160745393	1.296977619
2810060100	Cremation- Human	NO_X	1.017860599	1.160745393	1.296977619
2810060100	Cremation- Human	VOC	1.017860599	1.160745393	1.296977619
2810060200	Cremation- Animals	NO_X	1	1	1
2810060200	Cremation- Animals	VOC	1	1	1
1 * - 2017 NEI emissions were zero. All future emissions were assumed to be zero, regardless of any available growth rates from the 2016v2 modeling.					

F. Example of Nonpoint Source Emissions Calculation

The tons per day emissions were calculated as follows, and an example NO_X calculation for SCC 2102008000 Industrial Wood Combustion is included with each step.

Step 1 - Full County Ozone Season Day (OSD) Emissions:

The entire York County NO_X emissions are ratioed to the OSD emissions.

Average OSD Ratio = 0.00261374840099139
2017 York County Emissions = 201.0204 tons

201.0204 tons * 0.00261374840099139 = 0.525416749 tons per OSD

Step 2 - OSD Emissions are Allocated to Maintenance Area:

The York County OSD emissions for NO_X were multiplied by the population ratio to allocate to the Maintenance Area of York County.

York County Population = 282,090
Maintenance Area Population = 222,667

222,667 / 282,090 = 0.789

2017 tons per OSD (entire York County) = 0.525416749
Population Ratio = 0.789

0.5254167492 * 0.789 = 0.4145538 tons per OSD (Maintenance Area)

Step 3 - Grow Maintenance Area OSD Emissions to Future Years:

The Maintenance Area OSD emissions were then projected to the future year 2018:

2017 tons per OSD (Maintenance Area) = 0.4145538
2017-2018 growth factor = 1.00429304

0.4145538 * 1.00429304 = 0.416334 tons per 2018 OSD of NO_X (Maintenance Area)

Section III. Nonpoint Sectors and Emissions Methodologies

The following sections contain summaries of all the sectors accounted for in the 2017 NEI nonpoint inventory for York County. The 2017 NEI was the basis for the Maintenance Area OSD emissions projections. Unless otherwise stated, the EPA default 2017 NEI emissions estimates were used for all the nonpoint sectors. More details of the 2017 NEI inventory can be found in the 2017 TSD.

A. Agriculture-Livestock Waste

The emissions from this category are primarily from domesticated animals intentionally reared to produce food, fiber, or other goods or for the use of their labor. The livestock included in the EPA-estimated emissions include beef cattle, dairy cattle, goats, horses, poultry, sheep, turkeys, and swine. Domestic and wild animal waste emissions are not included for every state and are not estimated by the EPA.

1. EPA Developed Emissions

VOCs emitted by livestock can be defined as any compound of carbon (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate) that may participate in atmospheric photochemical reactions and is emitted by livestock. Livestock are domesticated farm animals raised in an agricultural setting for home use or profit. Following the model-development work of Carnegie Mellon University (CMU), the following livestock were evaluated as part of the model: dairy cattle, beef cattle, swine, and poultry (layers and broilers). For the 2017 NEI, the EPA also estimated ammonia (NH_3) (and VOC) emissions for goats, sheep, turkeys, and horses. For these animals, emissions were estimated using a nationwide emission factor multiplied by the appropriate animal count as described below.

The general approach to calculating NH_3 emissions due to livestock is to multiply the emission factor (in kg per year per animal) by the number of animals in the county. VOC emissions were estimated by multiplying a national VOC/NH_3 emissions ratio (VOC = 8% of NH_3 emissions) by the county NH_3 emissions.

In the 2017 NEI, the EPA methodology for NH_3 emissions that results from the use of the CMU model includes all processes from the housing, grazing, storage, and application of manure from beef cattle, dairy cattle, swine, broiler chicken, and layer chicken production.

The activity data for this source category is based on livestock counts (average annual number of standing head) and population information by state and county used to develop the EPA's GHG Inventory. This data set is derived from multiple data sets from the U.S. Department of Agriculture (USDA), particularly the National Agricultural Statistics Service (NASS) survey and census. The

USDA NASS survey dataset, which represents latest available 2017 national livestock data, is used to obtain the livestock counts for as many counties as possible across the United States. This is a new and more robust method that has been introduced into the 2017 NEI for this category for estimating population counts. There are several improvements in this animal counting procedure, including better accounting of the dairy and beef cattle counts by relying on the EPA's Office of Atmospheric Programs (OAP) Cattle Enteric Fermentation Model (CEFM) that is used in developing the EPA's official GHG inventory livestock population dataset for cattle.

Generally, counties not specifically included in the NASS survey data set (e.g., due to business confidentially reasons) were gap-filled based on the difference in the reported state total animal counts and the sum of all county-level reported animal counts. State-level data on animal counts from the GHG inventory were distributed to counties based on the proportion of animal counts in those counties from the 2012 NASS census.

To develop emissions factors for the 2017 NEI for the CMU-based animals, the CMU model was modified to use hourly meteorological data and two runs were performed using 2014 and 2017 meteorological data. The ratio of the 2017 to 2014 CMU model values were then applied to the 2014 back calculated state-level emissions factors to develop emissions factors for the 2017 NEI.

Table 5 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Agriculture Livestock Waste

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2805002000	Agriculture Production – Livestock_Beef Cattle	VOC	0.01667	0.01675	0.01695
2805007100	Agriculture Production – Livestock_Poultry layers with dry manure mgt systems	VOC	0.00021	0.00024	0.00027
2805009100	Agriculture Production – Livestock_Poultry broilers_confinement	VOC	2.0E-05	2.0E-05	3.0E-05
2805010100	Agriculture Production – Livestock_Turkeys_confinement	VOC	0.12128	0.12398	0.12750
2805018000	Agriculture Production – Livestock_Dairy cattle	VOC	0.00828	0.00837	0.00849
2805025000	Agriculture Production – Livestock_ Swine	VOC	0.01967	0.02226	0.02383
2805035000	Agriculture Production – Livestock_ Horses and Ponies Waste	VOC	0.00986	0.00986	0.00986

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2805040000	Agriculture Production – Livestock_Sheep and Lambs Waste	VOC	0.00047	0.00047	0.00047
2805045000	Agriculture Production – Livestock_Goats Waste	VOC	0.00154	0.00154	0.00154

B. Nonpoint Gasoline Distribution

This section includes discussion of all nonpoint sources in the sectors: Bulk Gasoline Terminals, Gas Stations, and Industrial Processes – Storage and Transfer. Many of the sources in these sectors include sources reported to the point inventory as well. As such, the EPA nonpoint survey is useful to avoid double-counting state-reported point emissions with the EPA-estimated nonpoint emissions. The sources are broken into two categories: those sources related to stage 1 gasoline distribution and those related to aviation gasoline.

1. Stage 1 Gasoline Distribution

Stage 1 gasoline distribution is covered by the 2017 NEI in both the point and nonpoint data categories. In general terms, Stage 1 gasoline distribution is the emissions associated with gasoline handling excluding emissions from refueling activities. Stage I gasoline distribution includes the following gasoline emission points: 1) bulk terminals, 2) pipeline facilities, 3) bulk plants, 4) tank trucks, and 5) unloading at service stations. Emissions from Stage I gasoline distribution occur as gasoline vapors are released into the atmosphere. These Stage I processes are subject to the EPA's Maximum Available Control Technology (MACT) standards for gasoline distribution.

Emissions from gasoline distribution at bulk terminals and bulk plants take place when gasoline is loaded into a storage tank or tank truck, from working losses (for fixed roof tanks), and from working losses and roof seals (for floating roof tanks). Working losses consist of both breathing and emptying losses. Breathing losses are the expulsion of vapor from a tank vapor space that has expanded or contracted because of daily changes in temperature and barometric pressure. These emissions occur in the absence of any liquid level change in the tank. Emptying losses occur when the air that is drawn into the tank during liquid removal saturates with hydrocarbon vapor and expands, thus exceeding the fixed capacity of the vapor space and overflowing through the pressure vacuum valve.

Emissions from tank trucks in transit occur when gasoline vapor evaporates from: (1) loaded tank trucks during transportation of gasoline from bulk terminals/plants to service stations, and (2) empty tank trucks returning from service stations to bulk terminals/plants. Pipeline emissions result from the valves and pumps found at pipeline pumping stations and from the valves, pumps, and storage tanks at pipeline breakout stations. Stage I gasoline distribution emissions also occur when gasoline vapors are displaced from storage tanks during unloading of gasoline from tank trucks at service stations (Gasoline Service Station Unloading) and from gasoline vapors

evaporating from service station storage tanks and from the lines going to the pumps (Underground Storage Tank Breathing and Emptying).

2. Aviation Gasoline Distribution – Stage 1 and 2

Aviation gasoline (AvGas) is the only aviation fuel that contains lead as a knock-out component for small reciprocating, piston-engine crafts in civil aviation. Commercial and military aviation rarely use this fuel. AvGas is shipped to airports and is filled into bulk terminals, and then into tanker trucks. These processes fall under the definition of stage 1, displacement vapors during the transfer of gasoline from tank trucks to storage tanks, and vice versa. Stage 2 involves the transfer of fuel from the tanker trucks into general aviation aircraft.

3. Sources of Data

Sources in the EIS sectors for Bulk Gasoline Terminals, Gas Stations, and Industrial Processes – Storage and Transfer do not focus solely on gasoline. For the purposes of developing the NEI, however, these SCCs are the only ones that the EPA estimates in these sectors. The EPA does not develop calculation tools that estimate emissions from transfer of naphtha, distillate oil, inorganic chemicals, kerosene, residual oil, or crude oil.

4. EPA-Developed Emissions

a. Bulk Terminals

The calculations for estimating VOC emissions from bulk terminals involve first multiplying the 1998 national VOC emissions developed in support of the Gasoline Distribution MACT standard by the ratio of the national volume of wholesale gasoline supplied between 1998 and 2017. National VOC emissions are allocated to states using data on refinery, bulk terminal, and natural gas plant stocks of motor gasoline in each state. State-level VOC emissions are then allocated to each county based on employment at petroleum bulk stations and terminals from the US Census County Business Patterns data for North American Industry Classification System (NAICS) 42471 (Petroleum Bulk Stations and Terminals).

b. Pipelines

The calculations for estimating VOC emissions from pipelines involve first multiplying the 1998 national VOC emissions developed in support of the Gasoline Distribution MACT standard by the ratio of the national volume of wholesale gasoline supplied between 1998 and 2017. National VOC emissions are allocated to Petroleum Administration for Defense (PAD) District using data on the movement of finished motor gasoline in PAD District. PAD District-level VOC emissions are then allocated to each county based on employment at petroleum bulk stations and terminals from the U.S. Census County Business Patterns data for NAICS 42471 (Petroleum Bulk Stations and Terminals).

c. Bulk Plants

The calculations for estimating VOC emissions from bulk plants involve first calculating bulk plant gasoline throughput in the U.S. based on data from the U.S. Energy Information Administration (EIA). National bulk plant gasoline throughput is then allocated to each county based on the number of petroleum bulk stations and terminals from the U.S. Census County Business Patterns data for NAICS 42471. The number of petroleum bulk stations and terminals by county is multiplied by the emissions factor for VOC to estimate VOC emissions from bulk plants.

d. Tank Trucks in Transit

The calculations for estimating VOC emissions from tank trucks in transit involve first calculating county-level total gasoline consumption by summing on-road gasoline consumption and nonroad gasoline consumption in each county. County-level gasoline consumption is multiplied by the emissions factor for VOC to estimate VOC emissions from tank trucks in transit.

e. Underground Storage Tank (UST) Breathing and Storing

The calculations for estimating VOC emissions from UST breathing and storing involve first calculating county-level gasoline consumption by summing on-road gasoline consumption and nonroad gasoline consumption in each county. County-level gasoline consumption is multiplied by the emissions factor for VOC to estimate VOC emissions from UST breathing and storing.

f. Gasoline Service Station Unloading

The calculations for estimating VOC emissions from gasoline service station unloading involve first calculating county-level total gasoline consumption by summing monthly on-road gasoline consumption and nonroad gasoline consumption in each county by fuel subtype. Monthly county-level gasoline consumption is then allocated to submerged, splash, and balanced filling technologies based on assumptions about the percentage of each filling technology used in each county. True vapor pressure is calculated for each county, month, and fuel subtype. Uncontrolled loading loss of liquid is calculated using true vapor pressure, temperature, molecular weight, and a saturation factor for the filling technology. Uncontrolled loading loss of liquid loaded is multiplied by monthly county-level gasoline consumption by fuel type to estimate VOC emissions from loading loss. Controlled VOC emissions are calculated by multiplying VOC emissions from loading loss by a control efficiency value. Controlled VOC emissions are subtracted from VOC emissions from loading loss to estimate monthly county-level VOC emissions by fuel subtype. Total county-level VOC emissions are calculated by summing monthly county-level VOC emissions by fuel subtype.

g. Aviation Gasoline Stage 1

The calculations for estimating emissions from stage 1 aviation gasoline distribution involve first estimating the amount of aviation gasoline consumed in each county based on state-level aviation gasoline consumption data from the EIA. State-level aviation gasoline consumption is distributed to the counties based on the proportion of LTOs. The total amount of gasoline consumed is used to estimate non-fugitive and fugitive VOC emissions.

h. Aviation Gasoline Stage 2

The calculations for estimating emissions from stage 2 aviation gasoline distribution involve first estimating the amount of aviation gasoline consumed in each county based on state-level aviation gasoline consumption data from the EIA. State-level aviation gasoline consumption is distributed to the counties based on the proportion of LTOs. The total amount of gasoline consumed is used to estimate VOC emissions.

Table 6 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Nonpoint Gasoline Distribution

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2501050120	Gasoline Bulk Terminals: All Evaporative Losses	VOC	0.18461	0.15814	0.13731
2501055120	Gasoline Bulk Plants: All Evaporative Losses	VOC	0.00006	0.00005	0.00004
2501060051	Gasoline Service Stations-Stage 1_Submerged Filling	VOC	0.71735	0.61449	0.53355
2501060052	Gasoline Service Stations-Stage 1_Splash Filling	VOC	0	0	0
2501060053	Gasoline Service Stations-Stage 1_Balanced Submerged Filling	VOC	0.02768	0.02371	0.02059
2501060201	Gasolline Service Stations- Underground Tank_Breathing and Emptying	VOC	0.13109	0.11230	0.09751
2501080050	Airports- Aviation Gasoline_Stage 1 Total	VOC	0.03474	0.03474	0.03474
2501080100	Airports- Aviation Gasoline_Stage 2 Total	VOC	0.00006	0.00006	0.00006
2505030120	Gasoline Transport- Truck	VOC	0.00857	0.00734	0.00638
2505040120	Gasoline Transport-Pipeline	VOC	0.12985	0.11123	0.09658

C. Commercial Cooking

Commercial cooking refers to the cooking of meat, including steak, hamburger, poultry, pork, and seafood, and french fries on five different cooking devices: chain-driven (conveyorized) charbroilers, underfired charbroilers, deep-fat fryers, flat griddles, and clamshell griddles.

The calculations for estimating the emissions from commercial cooking involve first estimating the amount of meat and french fries cooked on various cooking devices in each county. These data are estimated using the number of restaurants, by specific restaurant type, from the Dun & Bradstreet (D&B) Hoovers Database and assumptions concerning the percent of those restaurants with specific cooking devices, the number of devices per restaurant, and the amount of meat cooked per device from a California Air Resources Board (CARB) sponsored survey. The amount of french fries cooked by the foodservice industry is from a report prepared for Potatoes USA. The total amount of meat or french fries cooked on each device is multiplied by emissions factors.

The number of restaurants by type in each county, pulled from the D&B Hoovers database, is then multiplied by the percentage of restaurants by type with commercial cooking equipment in order to calculate the number of restaurants with the specific cooking devices in each county. The total number of cooking devices in each county is used to determine the amount of meat cooked in that county.

The amount of french fries cooked in each county is calculated based on the amount of frozen potatoes used in the foodservice industry. According to a report prepared for Potatoes USA, 5,977 million pounds of frozen potatoes were used in the food service industry in 2017. Frozen potatoes used in limited-service restaurants account for approximately 74% of the total, and those used in full-service restaurants account for the remaining 26%.

In 2017, 5,977 million pounds of frozen potatoes were used in limited and full-service restaurants in the U.S. In order to allocate this value to the county-level, fractions of the number of limited and full-service restaurants in each county are used. To create these fractions, it is assumed that limited-service restaurants are D&B classified fast food restaurants and full services restaurants are represented by all other D&B restaurant codes. County-level fast food and other restaurants are summed, and then divided by the national number of fast food or other restaurants in order to develop the county-level fractions.

Emissions factors are taken from the article *Emissions from Charbroiling and Grilling of Chicken and Beef*, and a South Coast Air Quality Management District (SCAQMD) Report and can be found in the "Commercial Cooking NEMO Final" document on the 2017 NEI Supplemental Data FTP site.

Table 7 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Commercial Cooking

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2302002100	Industrial Processes_Commercial Cooking - Charbroiling_Food and Kindred Products: SIC 20 Conveyorized Charbroiling	VOC	0.00697	0.00794	0.00888

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2302002200	Industrial Processes_Commercial Cooking - Charbroiling_Food and Kindred Products: SIC 20_Under-fired Charbroiling	VOC	0.01959	0.02234	0.02496
2302003000	Industrial Processes_Commercial Cooking - Frying_Food and Kindred Products: SIC 20_Deep Fat Frying	VOC	0.00481	0.00548	0.00613
2302003100	Industrial Processes_Commercial Cooking - Frying_Food and Kindred Products: SIC 20_Flat Griddle Frying	VOC	0.00253	0.00288	0.00322
2302003200	Industrial Processes_Commercial Cooking - Frying_Food and Kindred Products: SIC 20_Clamshell Griddle Frying	VOC	0.00016	0.00018	0.00021

D. Fuel Combustion – Industrial and Commercial/Institutional Boilers and ICEs – Various Fuels

Industrial, Commercial, and Institutional (ICI) fuel combustion sources are a significant portion of the total emissions inventory for many areas and include emissions from boilers, engines, and other combustion sources from the industrial, commercial, and institutional sectors that are not reported as point sources. This source category includes emissions from combustion of coal, distillate fuel oil, residual fuel oil, kerosene, liquefied petroleum gas (LPG), natural gas, and wood. Unless all ICI combustion emission sources are provided in a point inventory submittal, it is necessary for inventory preparers to estimate ICI combustion nonpoint source emissions.

The EIS sectors documented in this section include the following nonpoint emissions from ICI fuel combustion:

Fuel Comb - Industrial Boilers, ICEs - Biomass
Fuel Comb - Industrial Boilers, ICEs - Coal
Fuel Comb - Industrial Boilers, ICEs - Natural Gas
Fuel Comb - Industrial Boilers, ICEs - Oil
Fuel Comb - Industrial Boilers, ICEs - Other
Fuel Comb - Comm/Institutional - Biomass
Fuel Comb - Comm/Institutional - Coal
Fuel Comb - Comm/Institutional - Natural Gas
Fuel Comb - Comm/Institutional - Oil
Fuel Comb - Comm/Institutional - Other

All sectors in this section had emissions estimated via the "ICI Tool" module. The Department submitted point inventory activity data in order to compute the "remaining" nonpoint emissions component to these sectors.

The calculations for estimating emissions from the ICI sectors include estimating the total fuel consumption by sector, using data from the EIA State Energy Data System (SEDS). Total fuel consumption is adjusted to account for fuel consumed by mobile sources in each sector and fuel used as an input to industrial processes but is not combusted. Fuel consumption from nonpoint sources in each state is determined by subtracting fuel consumption from point sources from total fuel consumption. Estimated nonpoint source fuel consumption is distributed to the county level based on the proportion of employment in the industrial and commercial sectors.

The activity data for this source category is total fuel consumption in the industrial, commercial, and institutional sectors. The default data for this category are obtained from the total 2017 state-level fuel consumption in each sector from EIA SEDS for all fuel types except distillate. Distillate fuel consumption is taken from EIA's Form 821 data, which reports distillate sales by state and sector for 2016. State, local, and tribal agencies are expected to submit state-level fuel consumption data from point sources in these sectors. The state-level point source fuel consumption is subtracted from the total fuel consumption to estimate the fuel consumption from nonpoint sources.

Total fuel consumption is adjusted to account for the fraction of fuel consumed by nonroad mobile sources, whose emissions are included in the nonroad inventory. This fraction is based on results from the National Mobile Inventory Model (NMIM), a precursor to the EPA's MOVES model. This adjustment is particularly important for distillate fuel oil consumption. The ICI tool uses distillate consumption data from Form 821 rather than SEDS because Form 821 reports more detailed data by sector, and the ICI tool uses different stationary source fuel consumption assumptions by sector, including the industrial, commercial, farm, off-highway, and oil company sectors. Note that fuel consumption in the farm, off-highway, and oil company sectors are mapped to the industrial sector in the ICI tool.

The total fuel consumption is also adjusted to account for fuel used as an input to industrial processes where it is not combusted. These assumptions are based on the EIA Manufacturing Energy Consumption Survey (MECS), which reports both total fuel consumption and non-combustion use of fuel by Census region. In some cases, EIA withholds the regional-level data on non-combustion use of fuel because it is less than 0.5 million barrels. In these cases, a value of 0.25 million barrels is used as the amount of regional-level non-combustion use of fuels. Note that the stationary source adjustment is performed for fuel consumption from both the industrial and commercial/institutional sectors, while the non-combustion use of fuel adjustment is performed only for fuel consumption in the industrial sector.

The SEDS data anthracite and bituminous/subbituminous coal consumption, so it must be split into consumption of anthracite and bituminous/subbituminous coal. The ratio of each fuel is developed from state-level coal distribution data for 2006.

The NEI requires data separately on consumption by boilers and engines, because there are substantially different emissions factors for distillate boilers and engines. The ICI tool uses

assumptions based on the EIA MECS and the EIA Commercial Building Energy Consumption Survey (CBECS). These data sources suggest that in the industrial sector, 60 percent of distillate consumption is by boilers and 40 percent by engines, and in the commercial sector, 95 percent is by boilers and 5 percent is by engines.

The total fuel consumption data is also adjusted to subtract fuel consumption from point sources, which is accounted for in the point source inventory. Point source fuel consumption data by fuel type and sector is submitted by state, local, and tribal agencies. The point source subtraction step is performed at the state level, and it is done before the allocation procedure and before the emissions calculations.

1. Allocation Procedure

SEDS data are reported at the state level. Following the adjustments to the state level fuel consumption and the point source subtraction, the estimated state-level nonpoint source activity data is distributed to the county level based on employment in the industrial or commercial sector from the Census Bureau's County Business Patterns. The adjusted nonpoint fuel consumption is distributed to the county based on the proportion of employment in each county in each sector to the total employment at the state level in each sector.

The emissions factors for ICI sectors are from AP-42 and a spreadsheet developed in 2010 by the EPA and the Eastern Regional Technical Advisory Committee.

Table 8 – Projected NO_X Emissions (tons per OSD) for the Maintenance Area – Industrial and Commercial/Institutional Combustion

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2102001000	Industrial Anthracite Coal- Boilers	NO_X	0	0	0
2102002000	Industrial Bitum/Sub-Bitum Coal- Boilers	NO_X	0	0	0
2102004001	Industrial Distillate Oil- All Boilers	NO_X	0.00088	0.00088	0.00088
2102004002	Industrial Distillate Oil- All IC Engines	NO_X	0.01811	0.02165	0.02292
2102005000	Industrial Residual Oil- Boilers	NO_X	0	0	0
2102006000	Industrial NG- Boilers and IC Engines	NO_X	0	0	0
2102007000	Industrial LPG- Boilers	NO_X	0	0	0
2102008000	Industrial Wood- Boilers	NO_X	0.41633	0.43057	0.45094
2102011000	Industrial Kerosene- Boilers	NO_X	0	0	0

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2103001000	Commercial/Institutional Anthracite Coal- Boilers	NO_X	0	0	0
2103002000	Commercial/Institutional Bitum/Sub-Bit Coal- Boilers	NO_X	0	0	0
2103004001	Commercial/Institutional Distillate Oil- Boilers	NO_X	0	0	0
2103004002	Commercial/Institutional Distillate Oil- IC Engines	NO_X	0	0	0
2103005000	Commercial/Institutional Residual Oil- Boilers	NO_X	0.00094	0.00094	0.00094
2103006000	Commercial/Institutional NG- Boilers and IC Engines	NO_X	0.09478	0.09179	0.08269
2103007000	Commercial/Institutional LPG- All Combustor types	NO_X	0.01696	0.01696	0.01696
2103008000	Commercial/Institutional Wood- Boilers	NO_X	0.00619	0.00619	0.00619
2103011000	Commercial/Institutional Kerosene- All Combustors	NO_X	0.00004	0.00004	0.00004

Table 9 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Industrial and Commercial/Institutional Combustion

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2102001000	Industrial Anthracite Coal- Boilers	VOC	0	0	0
2102002000	Industrial Bitum/Sub-Bitum Coal- Boilers	VOC	0	0	0
2102004001	Industrial Distillate Oil- All Boilers	VOC	0.00001	0.00001	0.00001
2102004002	Industrial Distillate Oil- All IC Engines	VOC	0.00147	0.00176	0.00187
2102005000	Industrial Residual Oil- Boilers	VOC	0	0	0
2102006000	Industrial NG- Boilers and IC Engines	VOC	0	0	0
2102007000	Industrial LPG- Boilers	VOC	0	0	0
2102008000	Industrial Wood- Boilers	VOC	0.03766	0.03895	0.04079
2102011000	Industrial Kerosene- Boilers	VOC	0	0	0

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2103001000	Commercial/Institutional Anthracite Coal- Boilers	VOC	0	0	0
2103002000	Commercial/Institutional Bitum/Sub-Bitum Coal- Boilers	VOC	0	0	0
2103004001	Commercial/Institutional Distillate Oil- Boilers	VOC	0	0	0
2103004002	Commercial/Institutional Distillate Oil- IC Engines	VOC	0	0	0
2103005000	Commercial/Institutional Residual Oil- Boilers	VOC	0.00002	0.00002	0.00002
2103006000	Commercial/Institutional NG- Boilers and IC Engines	VOC	0.00622	0.00700	0.00742
2103007000	Commercial/Institutional LPG- All Combustor Types	VOC	0.00073	0.00073	0.00073
2103008000	Commercial/Institutional Wood- Boilers	VOC	0.00056	0.00056	0.00056
2103011000	Commercial/Institutional Kerosene- All Combustors	VOC	0	0	0

E. Fuel Combustion – Residential – Natural Gas, Oil, and Other

Residential heating includes the combustion of fuel, including coal, distillate oil, kerosene, natural gas (NG), and liquefied propane gas. These fuels are used for residential hot water heaters, grills, dryers, space heaters, cooking, etc.

NG and liquefied propane gas usage is influenced strongly by seasonal temperatures. During the summer months usage will generally be for cooking and operating appliances, such as water heaters and clothes dryers. In the first Maintenance SIP inventory, it was assumed that during the summer months no residential oil or coal were used, since these are normally used only for residential heating. Since the Ozone Season now encompasses non-summer months, where some heating may still be necessary, any emissions from these fuels were maintained in this inventory.

The general approach to calculating emissions for these sources is to take state-level fuel consumption from the EIA SEDS and allocate it to the county level based on data from the Census Bureau on the number of homes in each county that use each type of fuel type. County-level fuel consumption is multiplied by emissions factors to calculate emissions.

Note that SEDS no longer includes data on residential coal consumption, as it is assumed to be near zero, and therefore emissions will be nonexistent for residential coal consumption.

All emissions factors for VOC and NO_X are from AP-42.

Table 10 – Projected NO_X Emissions (tons per OSD) for the Maintenance Area – Residential Combustion

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2104001000	Residential Anthracite Coal- All Combustors	NO_X	0	0	0
2104002000	Residential Bitum/Sub-Bitum Coal- All Combustors	NO_X	0	0	0
2104004000	Residential Distillate Oil- All Combustors	NO_X	0.00331	0.00331	0.00331
2104006000	Residential NG- All Combustors	NO_X	0.24997	0.24997	0.24997
2104007000	Residential Liquefied Propane Gas- All Combustors	NO_X	0.01850	0.01850	0.01850
2104011000	Residential Kerosene- All Combustors	NO_X	0.00132	0.00132	0.00132

Table 11 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Residential Combustion

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2104001000	Residential Anthracite Coal- All Combustors	VOC	0	0	0
2104002000	Residential Bitum/Sub-Bitum Coal- All Combustors	VOC	0	0	0
2104004000	Residential Distillate Oil- All Combustors	VOC	0.00015	0.00015	0.00015
2104006000	Residential NG- All Combustors	VOC	0.01712	0.01712	0.01712
2104007000	Residential Liquefied Propane Gas- All Combustors	VOC	0.00084	0.00084	0.00084
2104011000	Residential Kerosene- All Combustors	VOC	0.00006	0.00006	0.00006

F. Fuel Combustion – Residential – Wood

Residential wood combustion (RWC) appliances, such as fireplaces, fireplace inserts, woodstoves, central heaters (indoor furnaces and hydronic heaters), and other outdoor wood-burning devices, are significant sources of air pollution in the United States, especially during winter months. We further differentiate freestanding woodstoves and fireplace inserts into three categories: conventional (not EPA-certified), EPA-certified catalytic, and EPA-certified non-catalytic.

Generally, the conventional units were produced before 1988. Units constructed after 1988 had to meet the EPA emission standards. In addition, characterize central heaters by fuel type (cordwood vs pellet-fired) and location (indoor vs outdoor for hydronic heaters).

To improve estimates in this sector, the EPA, along with the Commission on Environmental Cooperation (CEC), the Northeast States for Coordinated Air Use Management (NESCAUM), and Abt Associates, conducted a national survey of wood-burning activity in 2018. The activity data for this category is the amount of wood burned in each county, which is based on data from the CEC survey on the fraction of homes in each county that use each wood-burning appliance and the average amount of wood burned in each appliance. These assumptions are used with the number of occupied homes in each county to estimate the total amount of wood burned in each county, in cords for cordwood appliances and tons for pellet appliances. Cords of wood are converted to tons using county-level density factors from the U.S. Forest Service. Emissions are calculated by multiplying the tons of wood burned by emissions factors.

Appliance fractions and burn rates are calculated at the county-level. There is no need to allocate data to the county level for this category.

In the first Maintenance SIP inventory, it was assumed that during the summer months no residential wood was combusted, since these are normally used only for residential heating. Since the Ozone Season now encompasses non-summer months, where some heating may still be necessary, any emissions from these fuels were maintained in this inventory.

Emissions factors for RWC come primarily from AP-42 and Houck and Eagle (2006), but also from Houck et al. (2001).

Table 12 – Projected NO_X Emissions (tons per OSD) for the Maintenance Area – Residential Combustion

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2104008100	Residential Wood- Fireplace	NO_X	0.00322	0.00348	0.00381
2104008210	Residential Wood-Woodstove_Fireplace inserts_non-EPA certified	NO_X	0.00112	0.00096	0.00090
2104008220	Residential Wood-Woodstove_Fireplace inserts_EPA certified_non-catalytic	NO_X	0.00092	0.00100	0.00102
2104008230	Residential Wood-Woodstove_Fireplace inserts_EPA certified_catalytic	NO_X	0.00056	0.00063	0.00065

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2104008310	Residential Wood-Woodstove_Freestanding_non-EPA certified	NO_X	0.00187	0.00163	0.00154
2104008320	Residential Wood-Woodstove_Freestanding_EPA certified_non-catalytic	NO_X	0.00153	0.00165	0.00170
2104008330	Residential Wood-Woodstove_Freestanding_EPA certified_catalytic	NO_X	0.00093	0.00104	0.00108
2104008400	Residential Wood-Woodstove_Freestanding_EPA certifiedWoodstove_pellet-fired_general	NO_X	0.00086	0.00108	0.00116
2104008510	Residential Wood-Furnace_Indoor cordwood_non EPA certified	NO_X	0.00029	0.00008	0.00000
2104008530	Residential Wood-Furnace_Indoor_pellet fired general	NO_X	0.00069	0.00087	0.00094
2104008610	Residential Wood- Hydronic heater_outdoor	NO_X	0.00034	0.00034	0.00034
2104008620	Residential Wood- Hydronic heater_indoor	NO_X	0.00022	0.00022	0.00022
2104008630	Residential Wood- Hydronic heater_pellet fired	NO_X	0.00002	0.00002	0.00002
2104008700	Residential Wood- Outdoor wood burning device_NEC	NO_X	0.00261	0.00280	0.00286
2104009000	Residential Firelog- All Combustors	NO_X	0.00113	0.00121	0.00124

Table 13 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Residential Combustion

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2104008100	Residential Wood- Fireplace	VOC	0.02313	0.02501	0.02738
2104008210	Residential Wood-Woodstove_Fireplace inserts_non EPA certified	VOC	0.02104	0.01796	0.01686

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2104008220	Residential Wood-Woodstove_Fireplace inserts_EPA certified_non-catalytic	VOC	0.00480	0.00519	0.00533
2104008230	Residential Wood-Woodstove_Fireplace inserts_EPA certified_catalytic	VOC	0.00414	0.00464	0.00482
2104008310	Residential Wood-Woodstove_Freestanding_non-EPA certified	VOC	0.03495	0.03049	0.02888
2104008320	Residential Wood-Woodstove_Freestanding_EPA certified_non-catalytic	VOC	0.00795	0.00859	0.00883
2104008330	Residential Wood-Woodstove_Freestanding_EPA certified_catalytic	VOC	0.00687	0.00769	0.00799
2104008400	Residential Wood-Woodstove_Freestanding_EPA certifiedWoodstove_pellet-fired_general	VOC	0.00049	0.00062	0.00067
2104008510	Residential Wood-Furnace_Indoor cordwood_non EPA certified	VOC	0.00187	0.00048	-0.00002
2104008530	Residential Wood-Furnace_Indoor_pellet fired general	VOC	0.00040	0.00050	0.00054
2104008610	Residential Wood- Hydronic heater_outdoor	VOC	0.01141	0.01129	0.01125
2104008620	Residential Wood- Hydronic heater_indoor	VOC	0.00729	0.00721	0.00719
2104008630	Residential Wood- Hydronic heater_pellet fired	VOC	0.00001	0.00001	0.00001
2104008700	Residential Wood- Outdoor wood burning device_NEC	VOC	0.01872	0.02009	0.02058
2104009000	Residential Firelog- All Combustors	VOC	0.00572	0.00614	0.00630

G. Miscellaneous Non-Industrial NEC – Cremation – Human and Animal

The calculations for estimating emissions from human cremation involve estimating the number of deaths in each age group in each county, using data from the Centers for Disease Control and Prevention. The number of deaths is multiplied by the average weight by age group and the state-

level cremation rate from the National Funeral Directors Association to estimate the total amount of cremations in each county in terms of mass.

The calculations for estimating emissions from animal cremation involve determining the number of cremated animals nationally and distributing this number to each county based on population. The number of cremated animals is multiplied by average weights for cats and dogs to determine the amount of cremations in each county in terms of mass.

Table 14 – Projected NO_X Emissions (tons per OSD) for the Maintenance Area – Human and Animal Cremation

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2810060100	Miscellaneous Area Sources_Cremation_Other Combustion_Humans	NO_X	0.00030	0.00034	0.00038
2810060200	Miscellaneous Area Sources_Cremation_Other Combustion_Animals	NO_X	0	0	0

Table 15 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Human and Animal Cremation

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2810060100	Miscellaneous Area Sources_Cremation_Other Combustion_Humans	VOC	0.00003	0.00003	0.00004
2810060200	Miscellaneous Area Sources_Cremation_Other Combustion_Animals	VOC	0	0	0

H. Miscellaneous Non-Industrial NEC – Residential Charcoal Grilling

Residential barbecue grilling emissions include emissions from the burning of charcoal (including the use of lighter fluid) and emissions from all types of meat cooked on charcoal, gas, and electric grills. Combustion emissions from gas barbecue grills are not included.

The 2017 NEI emissions for York County were EPA-generated. Sources of emissions include burning charcoal and using lighter fluid in charcoal grills, and cooking meat on charcoal, gas, and electric grills. To perform the relevant calculations data are needed on activities and emissions

factors for those activities. Activity data includes information about total charcoal sold, total meat cooked, and total amount of lighter fluid used.

There are three types of activity data for this source category: (1) amount of meat cooked on charcoal grills, 2) amount of meat cooked on gas and electric grills, and (3) number of grilling events using lighter fluid. Each of these types of activity data is discussed in the subsections below.

1. Meat Cooked on Charcoal Grills

This source category includes emissions from the amount of charcoal burned and the amount of meat cooked. The total amount of charcoal sold in the United States is based on data from the Hearth, Patio, and Barbecue Association (HPBA), which is distributed to each county based on the proportion of 1–4-unit homes in each county, from the U.S. Census Bureau. We assume that all charcoal sold is burned. The amount of meat cooked is determined based on assumptions about the amount of meat cooked per pound of charcoal sold. This calculation assumes 17.64 charcoal briquettes per pound of charcoal sold and 0.033 pounds of meat cooked per briquette. These numbers are multiplied together to calculate a value of 0.588 pounds of meat cooked per pound of charcoal sold.

2. Meat Cooked on Gas and Electric Grills

The amount of meat cooked on gas grills is calculated based on assumptions about the ratio of gas grilling to charcoal grilling. Charcoal grills represent 41 percent of grills and gas/electric grills represent 59 percent. Charcoal grills are used 27 times per year and gas/electric grills are used 45 times per year. This calculation results in an estimated ratio of 2.398, meaning that for every pound of meat cooked on a charcoal grill an additional 2.398 pounds of meat are cooked on a gas or electric grill. These values are used with national data on the amount of charcoal sold from the HPBA to estimate the total amount of meat cooked on charcoal, gas, and electric grills.

3. Grilling Events Using Lighter Fluid

This calculation is based on the percentage of homes that have a grill (80 percent), the percentage of grills that are charcoal grills (41 percent), the percentage of charcoal grills that use lighter fluid (37 percent), and the number of times per year that charcoal grills are used (27 times). This results in a value of approximately 3.28 grilling events per household per year where lighter fluid is used.

All types of national level activity data are distributed to the counties based on the proportion of occupied 1-4-unit homes in each county.

Table 16 – Projected NO_X Emissions (tons per OSD) for the Maintenance Area – Miscellaneous Non-Industrial NEC – Residential Charcoal Grilling

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2810025000	Residential Charcoal Grilling	NO_X	0.00289	0.00289	0.00289

Table 17 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Miscellaneous Non-Industrial NEC – Residential Charcoal Grilling

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2810025000	Residential Charcoal Grilling	VOC	0.00914	0.01043	0.01165

I. Miscellaneous Non-Industrial NEC – Portable Gas Cans

There are several sources of emissions associated with portable fuel containers (PFC) used for storage of gasoline. These sources include vapor displacement and spillage while refueling the gas can at the pump, spillage during transport, permeation and evaporation from the gas can during transport and storage, and vapor displacement and spillage while refueling equipment. This section describes how other types of PFC emissions are accounted for in the NEI.

For the 2017 NEI, EPA-developed emissions were used, which relied on an inventory developed for the Tier 3 motor vehicle and fuel standards rule. This inventory assumed all fuel dispensed from PFCs was E10, with an average Reid Vapor Pressure (RVP) of 8.7 psi. Use of ethanol in gasoline fuels can increase evaporative emissions from PFCs, relative to E0, for several reasons. First, if E10 fuels have higher volatility than corresponding E0 fuels, that can increase evaporation and vapor displacement. Second, ethanol in gasoline increases permeation of fuel through gas can materials. Finally, the lower energy content of ethanol fuels leads to more frequent refueling, and, thus, greater emissions from spillage and displacement while filling the gas can at the pump.

As part of the 2007 regulation controlling emissions of hazardous pollutants from mobile sources (MSAT2 rule), the EPA promulgated requirements to control VOC emissions from gas cans. The methodology we used to develop emission inventories for gas cans was developed for that regulation and is described in the regulatory impact analysis for the rule and in an accompanying technical support document. While that regulation included estimates for spillage emissions that occur when refueling equipment, most of these emissions are already included in the nonroad equipment inventory. The Department did not include these emissions in the PFC inventory for the NEI. Vapor displacement for nonroad equipment container refueling was also subtracted from vapor displacement in the PFC inventory to avoid double counting these emissions.

Emissions had to be separated into commercial and residential fuel container emissions. Total state-level PFC emissions were allocated to the categories by using national level residential and commercial emission splits from the MSAT2 rule for each of the categories.

Table 18 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Misc Non-Industrial NEC – Portable Gas Cans

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2501011011	Residential Portable Gas Cans-Permeation	VOC	0.01446	0.01648	0.01842
2501011012	Residential Portable Gas Cans-Evaporation (includes diurnal loss)	VOC	0.01622	0.01850	0.02067
2501011013	Residential Portable Gas Cans-Spillage during transport	VOC	0.02088	0.02381	0.02660
2501011014	Residential Portable Gas Cans-Refilling at the Pump (vapor displacement)	VOC	0.00499	0.00569	0.00636
2501011015	Residential Portable Gas Cans-Refilling at the Pump (spillage)	VOC	0.00060	0.00068	0.00076
2501012011	Commercial Portable Gas Cans-Permeation	VOC	0.00063	0.00072	0.00080
2501012012	Commercial Portable Gas Cans-Evaporation (includes diurnal loss)	VOC	0.00052	0.00059	0.00066
2501012013	Commercial Portable Gas Cans-Spillage during transport	VOC	0.02848	0.03248	0.03629
2501012014	Commercial Portable Gas Cans-Refilling at the Pump (vapor displacement)	VOC	0.01439	0.01641	0.01833
2501012015	Commercial Portable Gas Cans-Refilling at the Pump (spillage)	VOC	0.00115	0.00131	0.00146

J. Solvents – Consumer and Commercial Solvent Use – Agricultural Pesticides

While Agricultural Pesticide Application is part of Consumer and Commercial Solvents sector, the nature of its methodology is significantly different from most of the other sources in this sector. Pesticides are substances used to control nuisance species and can be classified by targeted pest group: weeds (herbicides), insects (insecticides), fungi (fungicides), and rodents (rodenticides). They can be further described by their chemical characteristics: synthetics, non-synthetics (petroleum products), and inorganics. Different pesticides are made through various combinations of the pest-killing material, also called the active ingredient, and various solvents (which serve as carriers for the active ingredient). Both types of ingredients contain VOC that may be emitted to the air during application or after application as a result of evaporation.

Approximately 68 to 75 percent of pesticides used in the United States are applied to agricultural lands, both cropland and pasture. Agricultural pesticides continue to be a cost-effective means of

controlling weeds, insects, and other threats to the quality and yield of food production. Since application rates for a particular pesticide may vary from region to region, the regional application rates should be considered when estimating potential VOC emissions.

The EPA-developed emissions were used for the 2017 NEI. The activity for pesticide application is the pounds of active ingredient applied per pesticide at the county level for the years 2016 and 2017, from the USGS preliminary county-level pesticide use estimates which gives county-level pesticide data in terms of kg of active ingredient applied. The data estimate preliminary annual county-level pesticide use for 387 herbicides, insecticides, and fungicides applied to agricultural crops grown in the conterminous U.S. during 2016 and 2017. Pesticide-use data are compiled from proprietary surveys of farm operations located within U.S. Department of Agriculture Crop Reporting Districts (CRDs). Surveyed pesticide-use data are used in conjunction with county annual harvested-crop acres reported by the U.S. Department of Agriculture 2012 Census of Agriculture and the 2013 County Agricultural Production Survey to calculate use rates per harvested-crop acre, or an "estimated pesticide use" (EPest) rate, for each crop by year. County-use estimates are then calculated by USGS by multiplying EPest rates by harvested-crop acres for each pesticide crop combination.

The VOC emissions factors are derived for each active ingredient based on the pesticide profiles database maintained by the California DPR Pesticide Use Reports. This database contains the chemical formulation for pesticide products registered in the State of California and provides key inputs for the development of VOC emissions factors, including the mass fraction of the active ingredient and the emission potential of registered pesticide products.

Table 19 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Consumer and Commercial Solvent Use – Agricultural Pesticides

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2461850000	Agricultural Pesticide	VOC	0.03119	0.03119	0.03119

K. Solvents – Consumer and Commercial Solvent Use – Asphalt Paving

Asphalt paving is the process of applying asphalt concrete to seal or repair the surface of roads, parking lots, driveways, walkways, or airport runways. Asphalts for paving are mainly used in two ways. They are either mixed with aggregates at plants and hauled to the paving site and then compacted on the road, or they are sprayed in relatively thin layers with or without aggregates. Plant mixed asphalt products are called asphalt concrete mix.

Note that these source categories do not include emissions from the use of hot mix asphalt (HMA) or warm mix asphalt (WMA). Only Cold Mix Asphalt (CMA) is considered. Estimates of emissions of VOC from asphalt paving are based on the amount of cutback and emulsified asphalt used.

Table 20 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Consumer and Commercial Solvent Use – Asphalt Paving

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2461021000	Cutback Asphalt	VOC	0	0	0
2461022000	Emulsified Asphalt	VOC	0	0	0

L. Solvents – All Other Solvents

Solvent utilization includes a variety of industrial, commercial and residential applications of solvents that are not captured in the point source inventory. Estimates of emissions of VOC from solvent utilization are based on national-level estimates of solvent usage from the Freedonia Group.

The EPA's solvent category includes architectural surface coatings, industrial surface coatings, degreasing, graphic arts, dry cleaning, consumer and commercial (includes personal care products and household products), automotive aftermarket, adhesives and sealants, and FIFRA related products (pesticides excluding those for agricultural use). The emissions from solvent use are calculated based on national-level data on solvent use from the Freedonia Group. This data is used to develop emissions factors per capita, per employee, or per lane mile of highway, depending on the SCC. The emissions factors are used to estimate VOC emissions in each county. Because the data from Freedonia is for total solvent use, point source emissions must be subtracted to estimate the nonpoint source emissions.

The activity data for solvent utilization varies by SCC; it is based on population data from the U.S. Census Bureau, lane miles data from the Federal Highway Administration, or employment data from the U.S. Census Bureau.

Table 21 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Consumer and Commercial Solvent Use – Other Solvents

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2401001000	Surface Coating- Architectural	VOC	0.79037	0.90132	1.00710
2401005000	Surface Coating- Auto Refinishing	VOC	0.10872	0.10872	0.10872
2401008000	Surface Coating- Traffic Markings	VOC	0.06505	0.06505	0.06505
2401015000	Surface Coating- Factory Finished Wood	VOC	0.00276	0.00276	0.00276

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2401020000	Surface Coating- Wood Furniture	VOC	0.01316	0.01316	0.01316
2401025000	Surface Coating- Metal Furniture	VOC	0.33053	0.33053	0.33053
2401055000	Surface Coating- Machinery and Equipment	VOC	0.07296	0.07296	0.07296
2401060000	Surface Coating- Large Appliances	VOC	0.00139	0.00139	0.00139
2401065000	Surface Coating- Electronic and other Electrical	VOC	0.00120	0.00120	0.00120
2401070000	Surface Coating- Motor Vehicles	VOC	0.24112	0.24112	0.24112
2401075000	Surface Coating- Aircraft	VOC	0.00104	0.00104	0.00104
2401080000	Surface Coating- Marine	VOC	0.00209	0.00209	0.00209
2401090000	Surface Coating- Misc Mfg	VOC	0.02566	0.02566	0.02566
2401100000	Surface Coating- Industrial Maintenance	VOC	0.12206	0.13919	0.15553
2401200000	Surface Coating- Other Special Purpose Coatings	VOC	0.00193	0.00193	0.00193
2415000000	Degreasing- All Processes/All Industries	VOC	0.36958	0.36958	0.36958
2420000000	Dry Cleaning	VOC	0.00275	0.00275	0.00275
2425000000	Graphic Arts	VOC	1.70397	1.94317	2.17123
2460100000	Non-industrial: Consumer and Commercial Personal Care Products	VOC	0.65589	0.74797	0.83575
2460200000	Non-industrial: Consumer and Commercial All Household Products	VOC	0.66790	0.76165	0.85105
2460400000	Non-industrial: Consumer and Commercial-All Automotive Aftermarket Products	VOC	0.06216	0.06216	0.06216
2460500000	Non-industrial: Consumer and Commercial- All Coatings and Related Products	VOC	0.31809	0.36274	0.40531
2460600000	Non-industrial: Consumer and Commercial- All Adhesives and Sealants	VOC	0.61073	0.69646	0.77820

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2460800000	Miscellaneous Non-industrial: Consumer and Commercial- All FIFRA related Products	VOC	0.58554	0.58554	0.58554
2460900000	Miscellaneous Non-industrial: Consumer and Commercial- Miscellaneous (NEC)	VOC	0.02344	0.02673	0.02987

M. Waste Disposal – Composting

Greenwaste composting includes the diversion of yard waste, food waste, and other biogenic waste from landfills to composting facilities. Estimates of emissions are based on the amount of food and yard waste composted.

Note that this source category does not include the composting of biosolids from wastewater treatment plants or manure management facilities. There are separate SCCs for biosolids (2680001000) and for a mixture of greenwaste and biosolids (2680002000). Note also that this source category estimates emissions from composting facilities but does not estimate emissions from backyard composting.

The calculations for estimating the emissions from greenwaste composting involve first estimating the amount of food and yard waste composted in each county. The amount of state-level food waste composted is available from the EPA report *Food Waste Management in the United States, 2014*. The amount of state-level yard waste composted is estimated by calculating the per-capita amount of yard waste composted using national data from the EPA report *Advancing Sustainable Materials Management: 2015 Fact Sheet* and multiplying that by the state population. The state-level yard and food waste are summed together and distributed to the counties based on the proportion of employment at solid waste landfills.

Table 22 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Waste Disposal – Composting

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2680003000	Composting- 100% Green Waste	VOC	0.05256	0.05256	0.05256

N. Waste Disposal – Open Burning

This source category includes several types of intentional burning for waste disposal purposes, except for agricultural purposes. This source category includes open burning of municipal solid waste, land clearing debris, and different types of yard waste. Open burning of yard waste is the purposeful burning of leaf and brush species in outdoor areas, Emission estimates for leaf and brush waste burning are a function of the amount of waste burned per year. Open burning of land clearing debris is the purposeful burning of debris, such as trees, shrubs, and brush, from the clearing of land for the construction of new buildings and highways. Emission estimates from open burning of land clearing debris are a function of the amount of material or fuel subject to burning per year. Open burning of residential household waste (RHW) is the purposeful burning of RHW in outdoor areas. Emission estimates for RHW burning are a function of the amount of waste burned per year.

1. Yard Waste

The calculations for estimating the emissions from the burning of yard waste involve first estimating the amount of leaf and brush waste generated in each county. The amount of waste generated in the U.S. is available from the EPA report *Advancing Sustainable Materials Management: 2015 Fact Sheet*. The amount of county-level yard waste burned is estimated by calculating the per capita amount of leaf and brush waste generated using the national data from the EPA report and multiplying that by the number of people likely to burn waste in each county. The number of people likely to burn waste is based on the rural population in each county from the 2010 census.

2. Land Clearing Debris

The emissions from open burning from land clearing debris are estimated based on the number of acres disturbed from non-residential, residential, and road construction. The number of acres disturbed is multiplied by a fuel loading factor to determine the amount of land clearing debris burned in each county.

3. Residential Household Waste

The calculations for estimating the emissions from the burning of RHW involve first estimating the amount of combustible waste generated in each county. The amount of waste generated in the U.S. is available from the EPA report, *Advancing Sustainable Materials Management: 2015 Fact Sheet*. The amount of county-level RHW burned is estimated by calculating the per capita amount of RHW generated using the national data from the EPA and multiplying that by the number of people likely to burn waste in each county. The number of people likely to burn waste is based on the rural population in each county from the 2010 census. To estimate emissions from RHW burning, pollutant emissions factors are multiplied by the amount of combustible waste burned.

Table 23 – Projected NO_X Emissions (tons per OSD) for the Maintenance Area – Waste Disposal – Open Burning

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2610000100	Open Burning- Yard Waste_Leaf Species	NO_X	0.00127	0.00127	0.00127
2610000400	Open Burning- Yard Waste_Brush	NO_X	0.00127	0.00127	0.00127
2610000500	Open Burning- Land Clearing Debris (excludes Logging Debris)	NO_X	0.14956	0.14956	0.14956
2610030000	Open Burning- Residential Household Waste	NO_X	0.03232	0.03232	0.03232

Table 24 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Waste Disposal – Open Burning

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2610000100	Open Burning- Yard Waste_Leaf Species	VOC	0.00673	0.00673	0.00673
2610000400	Open Burning- Yard Wast_Brush	VOC	0.00673	0.00673	0.00673
2610000500	Open Burning- Land Clearing Debris (excludes Logging Debris)	VOC	0.49463	0.49463	0.49463
2610030000	Open Burning- Residential Household Waste	VOC	0.03945	0.03945	0.03945

O. Waste Disposal – Nonpoint POTWs

This source category, Publicly Owned Treatment Works, includes treatment works owned by a state, municipality, city, town, special sewer district, or other publicly owned and financed entity as opposed to a privately (industrial) owned treatment facility. The definition includes intercepting sewers, outfall sewers, sewage collection systems, pumping, power, and other equipment. The wastewater treated by these POTWs is generated by industrial, commercial, and domestic sources.

The calculations for estimating the emissions from POTWs involve multiplying the wastewater flow rate by emissions factors.

Table 25 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Waste Disposal – Nonpoint POTWs

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2630020000	Wastewater Treatment- POTW	VOC	0	0	0

P. Highway Vehicle Refueling

Emission estimates were calculated based on the EPA's MOVES model, run with EPA-developed and Department-submitted activity data. The MOVES model estimates emissions/emission rates for multiple emissions processes, including refueling. Only vehicle refueling is reported in the nonpoint sector.

Table 26 – Projected VOC Emissions (tons per OSD) for the Maintenance Area – Highway Vehicle Refueling

SCC	SCC Description	Pollutant Code	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2201000062	Highway Vehicles – Gasoline Refueling	VOC	0.32609	0.39123	0.45376
2202000062	Highway Vehicles – Diesel Refueling	VOC	0.02596	0.03114	0.03612
2205000062	Highway Vehicles - Ethanol (E-85) Refueling	VOC	0.00128	0.00153	0.00178

Section IV. Summation of Nonpoint Source Emissions for the Maintenance Area

The total emissions of NO_X and VOC in tons per day for the Maintenance Area are presented in Tables 27 and 28. The emissions in the preceding section were summed to determine total NO_X emissions and VOC emissions for each projection year through 2036.

Table 27 – Total Nonpoint Source NO_X (tons per day) for the Maintenance Area

2018	2026	2036
1.03	1.05	1.06

Table 28 – Total Nonpoint Source VOC (tons per day) for the Maintenance Area

2018	2026	2036
9.54	10.15	10.76

Appendix C

On-road Mobile Source Inventory Documentation

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Section I. Introduction and Scope

The on-road mobile source inventory detailed in this appendix has been developed for the Maintenance Area. All emissions are calculated on a ton per summer day basis. On-road mobile sources have been identified from the latest version of MOVES3.1. On-road mobile sources consist of cars, trucks, and motorcycles that travel on the main roads and interstates.

Although the Department's emission inventories include all the criteria pollutants and many toxic pollutants, only NO_X and VOCs are reported within this maintenance plan since they are important for ozone formation. The emissions in this report represent 2018 (the base year) and are projected to the future years 2026 and 2036.

Section II. Emissions Estimation Approach

Mobile source emissions are estimated by the methodologies suggested in the EPA document *MOVES3 Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity* (EPA-420-B-20-052, November 2020), hereafter referred to as the Technical Guidance document.

The EPA mobile model MOVES3.1 is used to generate emissions for on-road mobile sources in this document. MOVES3, first released in November 2020 and updated in November 2022 (MOVES 3.1), replaces the previous emissions model, MOVES2014, as the emissions model that the EPA will maintain and support. MOVES3.1 is designed to estimate emission factors and inventories, representing both exhaust and evaporative emissions as well as brake and tire wear, for VOCs, NO_X, CO, PM_{10}, $PM_{2.5}$, and other pollutants and precursors from all types of on-road vehicles, including cars, trucks, buses, and motorcycles.

Section III. Quality Assurance Measures

The quality analysis (QA) for the on-road mobile source category can be broken into three components: 1) inputs, 2) MOVES3.1 run specification (runspec), and 3) MOVES3.1 output. Each of these components is detailed in the paragraphs below.

In all cases, input information being used for the MOVES3.1 runs was not received in MOVES3.1 format. When data had to be manipulated to get it into the proper format, the final data was compared back to the original data to make sure there were no errors made and the values are represented correctly in the input files.

After the speed and VMT information was acquired from the Charlotte Department of Transportation (CDOT), the data was checked for reasonableness against previous years' data for the area, where possible. Each year's estimated annual VMT was compared to each other to make sure they were all reasonable and consistent and no errors were made in generating the inputs. The speeds were all reviewed to make sure they were consistent with the road type and time of day.

Once the input files were prepared, a staff member not responsible for generating the inputs spot checked some of the files to make sure they looked reasonable and that the values added up properly. This was especially helpful in reviewing the average speed distribution inputs as the development of the files was very tedious and errors could easily occur. If any discrepancies were found, they were noted back to the person who generated the input files for correction.

Since more than one staff member was responsible for doing the MOVES3.1 runs, a template was created that outlined all selections and steps that needed to be included in the runspecs. This ensured consistency in the runspecs.

Once MOVES3.1 was run, the output results were compared to each other to make sure they looked consistent. A couple of the years were run by more than one person to make sure the same output emissions were received. The 'moveserror' output table was also checked for each MOVES3.1 run to ensure there were no errors noted during the run. In all cases, there were no errors noted for any of the runs.

A final QA step is to check the kilograms per ozone season day (kg/OSD) emissions developed using the input data and compare this to previous years to check for reasonableness.

Section IV. Discussion of Mobile Source Categories

On-road mobile sources produce VOCs and NO_X, along with a host of other pollutants. Emissions of NO_X and VOC are estimated in the mobile source inventory required for the maintenance plan. The objective of the following section is to describe the source category and the emissions estimation procedures. This section also includes tables summarizing the estimated emissions for a typical June-July-August day for the Maintenance Area.

A. Introduction

On-road mobile sources are considered to be vehicles that travel on the roadways. Emissions from motor vehicles occur throughout the day while the vehicle is in motion, at idle, parked, and during refueling. All these emissions processes need to be estimated in order to properly reflect the total emissions from this source category. It is important to note that emissions from vehicle refueling (Stage 2 refueling emissions) and spillage loss during refueling emissions are accounted for in the nonpoint source portion of the inventory (Appendix B) and are not included in the MOVES3.1 runs.

The EPA developed the MOVES3.1 model to estimate emissions based on more current information on the way vehicles are driven in a particular area. Key inputs for MOVES3.1 include information on the age of vehicles on the roads, the average speed of those vehicles, what types of roads those vehicles are traveling, and any control technologies in place in an area to reduce emissions for motor vehicles (e.g., emissions inspection programs), temperature, and humidity data.

A very important component of the on-road mobile emissions estimation process is interagency consultation. The South Carolina interagency consultation partners involved in the development

of the maintenance plan include EPA Region 4, the South Carolina Department of Transportation (SCDOT), the Federal Highway Administration, the Federal Transit Administration, the Department, and the RFATS MPO. The interagency consultation partners consult on MOVES3.1 modeling inputs as well as issues concerning the motor vehicle emission budgets through monthly conference calls and via email.

B. MOVES3.1 Runs

Runspecs and inputs were developed using the EPA's Technical Guidance document as guidance. Due to the size and the complexity of the MOVES3.1 input and output files, the files will be provided electronically. A complete listing of the files is referenced in Section V of this document.

1. Runspec Selections

In order to use MOVES3.1 to develop emissions for SIP purposes, certain criteria had to be met in selections made in the runspec. The following are selections made for each tab of the runspec:

Model Version:

MOVES3.1

Scale:

Domain/Scale = County

Calculation Type = Inventory

Time Spans:

Time Aggregation Level = Hour

Years = 2018 (Base Year), 2026 (Interim Year), and 2036 (Final Year)

Months = June, July, and August
Selected to represent worst case ozone season months.

Days = Weekdays
Recommended for SIPs in the Technical Guidance document.

Hours = Start Hour = 00:00-00:59 & End Hour = 23:00-23:59
Represents all 24 hours in a day.

Geographic Bounds:

York County, South Carolina

Vehicles/Equipment- On-road Vehicle Equipment:

The Technical Guidance document indicates users must select the appropriate fuel and vehicle type combinations in the On-road Vehicle Equipment panel to reflect the full range of vehicles that will operate in the county. All fuel/type combinations were selected.

Road Type:

All 5 road types were selected.

The Technical Guidance document indicates that all SIP and regional conformity analyses must include the Off-Network Road type in order to account for emissions from vehicle starts, extended idle activity, and evaporative emissions (for hydrocarbons).

Pollutants/Processes:

All processes for total gaseous hydrocarbons, non-methane hydrocarbons, VOC and NO_X have been selected, except refueling and spillage emissions, since these are already captured in our nonpoint source inventory.

Output- General Output:

Units:

Mass Units = Kilograms

During the preparation of the York nonattainment area attainment demonstration in 2007, it was determined through interagency consultation that kg per day would be the most appropriate unit to use for MVEBs and transportation conformity.

Energy Units = Million BTU

Distance Units = Miles

Activity:

'Population' and 'Distance Traveled' were selected.

Recommended by the Technical Guidance document.

Output- Output Emission Detail:

Always: 24-Hour Day and County were selected.

For all vehicle equipment categories: No selections were made.

On Road: No selections were made.

Advanced Performance Features:

No selections were made.

2. Input Assumptions for MOVES3.1

a. Source Type Population

To develop source type population data, the Department obtained a July 31, 2018, snapshot of vehicle population for the entire county of York from the South Carolina Department of Motor Vehicles (SCDMV). This population data was not broken out by the MOVES3.1 source type categories. Passenger vehicles and motorcycles were the only MOVES3.1 source types that could be distinguished from all other vehicles. As the Technical Guidance document indicates, the 2018 default York County source type population data was exported from MOVES3.1 and used to help apportion the actual vehicle type population. Using the ratio of MOVES3.1 passenger cars and passenger trucks to each other, the actual York County passenger vehicle population was separated into passenger cars and passenger trucks. Vehicles designated as "trailers" were removed. For the remaining non-passenger and non-motorcycle/moped sources, the MOVES3.1 ratio of each was calculated against all non-passenger and non-motorcycle/moped population. This ratio was then multiplied by the remaining actual York population (after the passenger cars, passenger trucks, trailers, mopeds, and motorcycle populations had been subtracted). This methodology created MOVES3.1-ready source type population values for all of York County.

The ratio of the Maintenance Area population to the county population was used to estimate emissions for the Maintenance Area. Table 1 contains the 2020 population for York County, taken from the US Census, and population projections as determined by the RFATS MPO. The population of the Maintenance Area is provided, as well as the percentage of the Maintenance Area to the entire county. This percentage was used to allocate the county-level emissions to the Maintenance Area for the base year and all future years.

Table 1 – Population Data

	Maintenance Area Population	Entire York County Population	% Population in Maintenance Area
Year 2020	222,667	282,090	78.9%

Once the base year source type population was generated, the future year files for 2026 and 2036 needed to be estimated. The SCDMV has not been able to provide future year vehicle population data, nor have they had any suggestions on expected annual growth in vehicle population values. In order to get an estimate of average annual vehicle population growth, the Department obtained two years of historical York County vehicle population data from the SCDMV, 2005 and 2022. Using these two years, the average annual increase percentage was calculated, as seen in Table 2 below. This data was used to estimate the population for future years through 2036.

Table 2 – Vehicle Average Annual Increase Percentage

2005	2022	# of Vehicles Increased Over 17 Years	% Increase from 2005	Average Annual Increase Over 17 Years
176,830	257,023	80,193	45.35%	2.668%

The most recent year, 2022, source type population increased by 10.671 percent to generate a 2026 estimate. The 2022 source type population increased by 37.347 percent to generate a 2036 estimate. The years used for the maintenance plan are shown in Table 3 below.

Table 3 – Source Type Population (Base and Future Years)

Source Type ID	Source Type Name	2018 Source Type Population	2026 Source Type Population	2036 Source Type Population
11	Motorcycle	5803.884	7095.555	8805.906
21	Passenger Car	65611.19	78754.27	97737.63
31	Passenger Truck	71987.25	85439.8	106034.7
32	Light Commercial Truck	22584.11	28144.37	34928.44
41	Other Buses	505.7744	645.5416	801.1465
42	Transit Bus	164.0225	209.3508	259.8139
43	School Bus	710.0635	906.2856	1124.742
51	Refuse Truck	86.28442	113.3161	140.6304
52	Single Unit Short-haul Truck	12158.81	15968.08	19817.12
53	Single Unit Long-haul Truck	540.9603	710.4388	881.6869
54	Motorhome	1205.441	1583.099	1964.698
61	Combination Short-haul Truck	1541.511	1892.988	2349.285
62	Combination Long-haul Truck	2416.286	2967.222	3682.458

b. Vehicle Type VMT

The input file for this data is called 'HPMSVTypeDay', since daily VMT is being provided. Daily weekday VMT and speed data was obtained from CDOT (see Tables 4, 5, and 6). The CDOT data was used to compile the average daily VMT by MOVES3.1 road type. VMT was distributed to the MOVES3.1 source types according to the distribution in SCDOT's 2018, 2019, and 2021 Functional Class Annual Reports. SCDOT collects limited functional class data. The data varies considerably from year to year. Data from the three most recent years was averaged to inform the development of VMT fractions to be applied to each MOVES3.1 source type. Due to the response to the COVID-19 pandemic, data from the year 2020 was excluded from the three-year average since it is not representative of a normal travel year. Since this input format includes a 'month' field, the calculated VMT values were used for all months.

Table 4 – 2018 Base Year Maintenance Area VMT and Speed Data Provided by CDOT

Road Type	AM Peak VMT	AM Peak Speed	Midday VMT	Midday Speed	PM Peak VMT	PM Peak Speed	Night VMT	Night Speed	Daily VMT	Daily Speed
Rural Interstate	285,084	59.5	341,872	63.7	281,044	58.6	197,417	63.8	1,105,417	61.2
Rural Principal Arterial	32,874	32.8	42,311	51.5	33,295	29.9	18,263	57.4	126,743	38.9
Rural Minor Arterial	80,043	28.7	116,200	30.2	85,124	25.6	70,637	41.1	352,004	30.1
Rural Major Collector	84,267	36.0	114,153	39.7	86,516	32.5	62,139	46.8	347,074	37.7
Rural Minor Collector	10,223	13.0	14,892	15.8	10,742	11.6	8,397	26.7	44,254	14.9
Rural Local	117,863	27.0	199,596	26.7	130,749	26.4	100,920	27.7	549,129	26.8
Urban Interstate	243,680	57.6	292,661	60.5	244,357	57.0	179,348	60.6	960,046	58.9
Urban Freeway/ Expressway	19,442	45.4	29,912	45.7	21,716	45.0	13,516	45.3	84,586	45.4
Urban Principal Arterial	227,346	27.9	354,075	31.2	244,196	25.3	206,868	38.8	1,032,485	29.9
Urban Minor Arterial	173,793	26.9	272,913	27.7	191,623	24.8	151,653	36.1	789,982	28.0
Urban Collector	81,712	21.6	131,776	22.4	90,865	19.6	63,583	33.9	367,937	22.8
Urban Local	157,069	24.1	297,609	24.1	180,080	23.8	144,951	24.9	779,709	24.2
Rural	610,354	38.0	829,024	38.8	627,470	35.3	457,775	43.9	2,524,622	38.5
Urban	903,042	30.5	1,378,947	30.7	972,838	28.3	759,919	37.1	4,014,745	31.0
County	1,513,396	33.2	2,207,970	33.3	1,600,308	30.7	1,217,693	39.4	6,539,367	33.5

Table 5 – 2026 Future Year Maintenance Area VMT and Speed Data Provided by CDOT

Road Type	AM Peak VMT	AM Peak Speed	Midday VMT	Midday Speed	PM Peak VMT	PM Peak Speed	Night VMT	Night Speed	Daily VMT	Daily Speed
Rural Interstate	303,367	56.4	383,513	63.3	301,644	54.8	220,926	63.8	1,209,450	59.3
Rural Principal Arterial	34,777	25.3	50,029	42.1	34,788	22.5	23,638	57.5	143,232	31.7
Rural Minor Arterial	97,812	26.0	145,181	27.3	105,026	22.5	86,378	40.1	434,397	27.3
Rural Major Collector	101,400	36.3	141,832	39.3	106,067	32.3	76,387	46.1	425,686	37.5

Road Type	AM Peak VMT	AM Peak Speed	Midday VMT	Midday Speed	PM Peak VMT	PM Peak Speed	Night VMT	Night Speed	Daily VMT	Daily Speed
Rural Minor Collector	12,476	13.8	18,962	16.1	13,325	12.4	10,363	28.0	55,126	15.6
Rural Local	154,306	25.9	261,139	25.1	173,825	24.9	131,938	27.3	721,208	25.6
Urban Interstate	269,002	54.4	341,102	60.0	275,214	52.5	210,413	60.4	1,095,732	56.6
Urban Freeway/ Expressway	24,215	43.6	36,401	44.8	27,104	41.8	17,204	45.1	104,924	43.8
Urban Principal Arterial	257,959	25.7	408,864	28.5	276,792	22.8	248,549	37.8	1,192,164	27.7
Urban Minor Arterial	212,233	25.3	341,789	25.8	234,638	22.5	181,964	35.4	970,625	26.1
Urban Collector	107,075	21.6	171,342	22.5	118,900	19.5	81,065	33.8	478,382	22.7
Urban Local	204,444	23.8	385,325	23.7	234,471	23.3	184,034	25.0	1,008,273	23.9
Rural	704,139	34.9	1,000,656	36.1	734,675	31.9	549,63	42.7	2,989,10	35.6
Urban	1,074,93	28.7	1,684,82	29.1	1,167,12	26.2	923,23	36.4	4,850,100	29.3
County	1,779,07	30.9	2,685,48	31.4	1,901,79	28.1	1,472,9	38.5	7,839,20	31.5

Table 6 – 2036 Future Year Maintenance Area VMT and Speed Data Provided by CDOT

Road Type	AM Peak VMT	AM Peak Speed	Mid-day VMT	Mid-day Speed	PM Peak VMT	PM Peak Speed	Night VMT	Night Speed	Daily VMT	Daily Speed
Rural Interstate	326,129	50.3	433,142	62.2	325,680	49.1	249,451	63.9	1,334,402	55.6
Rural Principal Arterial	35,594	19.6	54,956	31.4	36,232	16.2	27,082	57.2	153,864	24.5
Rural Minor Arterial	109,799	23.7	168,471	25.2	117,500	19.8	102,452	39.2	498,222	25.1
Rural Major Collector	114,682	31.1	168,006	33.9	121,313	27.5	90,900	45.0	494,902	32.8
Rural Minor Collector	16,199	14.8	26,138	16.3	17,577	13.5	13,464	28.4	73,377	16.4
Rural Local	196,581	24.9	333,058	23.8	219,049	23.1	163,090	27.0	911,779	24.4
Urban Interstate	291,276	51.1	388,065	59.1	298,863	47.9	234,995	60.3	1,213,199	54.2
Urban Freeway/ Expressway	28,216	39.6	43,178	43.0	30,952	36.9	21,532	45.1	123,877	40.8
Urban	289,325	21.9	467,638	23.9	311,550	19.1	291,721	36.1	1,360,234	23.8

Road Type	AM Peak VMT	AM Peak Speed	Mid-day VMT	Mid-day Speed	PM Peak VMT	PM Peak Speed	Night VMT	Night Speed	Daily VMT	Daily Speed
Principal Arterial										
Urban Minor Arterial	249,715	22.7	409,701	22.8	277,691	19.7	217,363	32.7	1,154,470	23.2
Urban Collector	132,334	22.1	218,500	22.7	151,186	20.1	98,028	33.1	600,048	23.0
Urban Local	247,671	23.2	465,417	22.8	285,163	22.5	219,611	24.8	1,217,862	23.2
Rural	798,985	31.2	1,183,77	32.9	837,351	27.9	646,439	41.7	3,466,545	32.4
Urban	1,238,54	26.2	1,992,5	26.5	1,355,4	23.5	1,083,3	35.1	5,669,690	26.9
County	2,037,52	28.0	3,176,27	28.6	2,192,8	25.0	1,729,7	37.3	9,136,236	28.7

c. Fuel Formulation and Supply

The Technical Guidance document states that changes should be made only where local volumetric fuel property information is available, except in the case of RVP where a user should change the value to reflect the regulatory requirements and differences between ethanol and non-ethanol blended gasolines. South Carolina does not have local fuel parameter data so the MOVES3.1 default data was used for the required fuel inputs. Through the fuel wizard, RVP for gasoline vehicles (fuelTypeID 1) were changed to reflect the summer RVP regulatory requirement of 9.0.

d. Meteorology

For average summer day ozone for SIP or conformity purposes, the Technical Guidance recommends using average daily temperature profiles for July, or for the three-month period that best represents the area's ozone season. For this effort, the surface hourly data for the Charlotte International Airport was acquired from the Cornell University Climod Archive (hppt://climod.nrcc.cornell.edu/climod/hourly/). Hourly temperature and dew point data for the months of June, July, and August for the years 2018-2022 was extracted from the database. Average hourly temperatures and relative humidity for each hour of the dataset were calculated.

e. Road Type Distribution

Data from the SCDOT Federal Highway Annual Travel Activity Reports for the years 2018, 2019, and 2021 was averaged to allocate an appropriate fraction of each source type's VMT to each road type. Due to the response to the COVID-19 pandemic, data from the year 2020 was excluded from the three-year average since it is not representative of a normal travel year. For consistency, the same road type distribution file was used for all years.

f. Age Distribution

Age distribution inputs were created using York County age data, by vehicle type, that was provided by SCDMV. Only current (March 2023) data could be obtained. This local data was used for all vehicle types, except MOVES3.1 Source type '53' (Single Unit Long-haul Truck) and '62'

(Combination Long-haul Truck). The Technical Guidance recommends using default age distribution for these source types. This local/default combination input was used for all years.

g. Average Speed Distribution

Speed data for A.M. peak hours (6:00 a.m. to 8:00 a.m.), Midday (9:00 a.m. to 2:00 p.m.), P.M. peak hours (3:00 p.m. to 5:00 p.m.) and Night hours (6:00 p.m. to 5:00 a.m.) was obtained for all modeled years from the CDOT. Vehicle hours traveled (VHT) was calculated for each urban and rural road type by dividing VMT by speed. VHT for each road type was then assigned to a MOVES3.1 speed bin. There are 16 speed bins, whose speed ranges are detailed in the Technical Guidance document. VHT for each of the four MOVES3.1 on-road road types was totaled for each time period of the day and a fraction developed for each speed bin. Each road type (4 road types), source type (13 source types), and hour (24 hourdayIDs for weekdays) combination has a fraction totaling 1.0. These fractions were calculated and saved in the proper MOVES3.1 format, using the default average speed file as a template, and used in the modeling.

C. Estimated Emissions from On-Road Mobile Sources

Using the outlined inventory approach, the MOVES3.1 model gave a summary of emissions in kilograms per average ozone season day. To represent these emissions in tons per average ozone season day, a conversion factor of 1 kg = 0.00110231 tons was used. Table 7 summarizes the NO_X and VOC emissions.

Table 7 – On-Road Mobile Source NO_X and VOC Emissions in the Maintenance Area per Ozone Season Day

	2018		2026		2036	
	kg/OSD	**tons/OSD**	**kg/OSD**	**tons/OSD**	**kg/day**	**tons/OSD**
NO_X	6224.03	6.86	3148.13	3.47	2273.63	2.51
VOC	2555.02	2.82	1563.6	1.72	1256.15	1.38

D. Motor Vehicle Emissions Budget for Conformity

The purpose of transportation conformity is to ensure that federal transportation actions occurring in a maintenance area do not hinder the area from maintaining the 8-hour ozone standard. This means that the level of emissions estimated for the MPO's Transportation Implementation Plan and Long-Range Transportation Plan must not exceed the Motor Vehicle Emissions Budget as defined in this maintenance plan.

According to Section 93.118 of the transportation conformity rule, a maintenance plan must establish MVEBs for the last year of the maintenance plan, in this case, 2036.

The MVEBs will be set in terms of kilograms per ozone season day. During the preparation of the York nonattainment area attainment demonstration in 2007 it was determined through interagency consultation that kg per day would be the most appropriate unit to use for MVEBs and transportation conformity.

Table 8 shows the Maintenance Area on-road mobile NO_X and VOC emissions expressed in kilograms per day with the corresponding tons per day values for base year 2018 and the last year of the maintenance plan, 2036. These emissions were calculated using MOVES3.1, which outputs values in terms of kilograms per day. A conversion factor of 1 kg = 0.00110231 tons was then used to convert the values to tons per day.

Table 8 – On-Road Mobile Source NO_X and VOC Emissions in the Maintenance Area per Ozone Season Day

	2018		2036	
Pollutant	**tons**	**kg**	**tons**	**kg**
NO_X	6.86	6224.03	2.51	2273.63
VOC	2.82	2555.02	1.38	1256.15

The Department has decided to allocate the safety margin to the MVEBs to allow for unanticipated growth in VMT, changes to vehicle mix assumptions, etc., that will influence the emission estimates. Upon the EPA's affirmative adequacy finding for the partial county MVEBs, as shown in Table 9, they will become the applicable MVEBs for the Maintenance Area.

Table 9 – Maintenance Area NO_X and VOC MVEBs for 2018 and 2036 per Ozone Season Day (Including Safety Margin)

VOC Emissions (kg/OSD)		
	2018	**2036**
Base Emissions	2555.02	1256.15
Safety Margin Allocated to MVEB	N/A	272.16
VOC Conformity MVEB	2555.02	1528.31
NO_X Emissions (kg/OSD)		
	2018	**2036**
Base Emissions	6224.03	2273.63
Safety Margin Allocated to MVEB	N/A	4281.96
NO_X Conformity MVEB	6224.03	6555.59

The MOVES Technical Guidance document directs that all processes, including refueling emissions, be included in MOVES work for SIPs or regional conformity analysis. In South Carolina, however, these processes are accounted for in the nonpoint source inventory (Appendix B) and have not been included in previous budgets or conformity analysis. For this reason, these processes have not been included in the inventories or the MVEB for this maintenance plan. Refueling emissions are included separately in Table 10 for the budget years of 2018 and 2036 for informational purposes only.

Table 10 – Maintenance Area NO_X and VOC Refueling Emissions for 2018 and 2036.

	kg/OSD Refueling Emissions	
	2018	**2036**
NO_X	0.00	0.00

VOC	286.99	399.35

Section V. Data Files Provided

This section contains a list of all data files which were used in the MOVES3.1 runs. All these files are in a format that is readable by MOVES3.1.

2018 Data

1_York_2018_OSD_wAct_runspec
1_york_2018_2ndmaintplan_osd_wact_input
1_york_2018_2ndmaintplan_osd_wact_output

2026 Data

1_York_2026_OSD_wAct_runspec
1_york_2026_2ndmaintplan_osd_wact_input
1_york_2026_2ndmaintplan_osd_wact_output

2036 Data

1_York_2036_OSD_wAct_runspec
1_york_2036_2ndmaintplan_osd_wact_input
1_york_2036_2ndmaintplan_osd_wact_output

Appendix D

Nonroad Mobile Source Inventory Documentation

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List of Tables

Section I. Introduction and Scope

This inventory includes nonroad mobile sources found in the Maintenance Area. The nonroad mobile source category includes a diverse collection of equipment such as lawnmowers, chain saws, tractors, all-terrain vehicles, forklifts, and construction equipment. The nonroad portion of the MOVES3.1 model was used to estimate emissions for the entire County of York for most of the nonroad sources. Some nonroad sources are not calculated by the nonroad portion of the MOVES3.1 model, such as Line-haul Rail, Airplanes, and Commercial Marine emissions. Airplane emissions are accounted for within the airport emissions section in the point source inventory (Appendix A) and are not included in this nonroad inventory. There are no commercial marine emissions associated with York County. Line haul rail emissions are present in the Maintenance Area and are included in this document.

Section II. MOVES3.1 Nonroad Runs

A. Input Assumptions for MOVES3.1

The options files used to provide necessary inputs to the MOVES3.1 model were tailored to reflect York County specific data. The Department used default data built into the MOVES3.1 model for nonroad mobile sources since the Department does not have York County specific nonroad vehicle information. The specific selections made during the running of the nonroad portion of the MOVES3.1 model are outlined in the following section.

The model was set up to estimate the nonroad emissions from all types of equipment for York County for a typical ozone season weekday for the years 2018, 2026, and 2036. The model results provided the daily NO_X and VOC estimates for the entire county for each of the requested years.

The ratio of the Maintenance Area population to the county population was used to estimate emissions for the Maintenance Area. Table 1 contains the 2020 population for York County, taken from the US Census, and population projections as determined by the RFATS MPO. The population of the Maintenance Area is also provided, as well as the percentage of the Maintenance Area to the entire county. This percentage was used to allocate the county-level emissions to the Maintenance Area, for the base year and all future years.

Table 1 – Population Data

	Maintenance Area Population	Entire York County Population	% Population in Maintenance Area
Year 2020	222,667	282,090	78.9%

B. MOVES3.1 Run Options

The following information outlines the run options selected to generate the entire county nonroad mobile source emissions using MOVES3.1.

Scale

Model = Nonroad

Domain/Scale = National

Calculation Type = Inventory

Time Spans

Years = 2018 (Base Year), 2026 (Interim Year), and 2036 (Final Year)

Months = June, July, and August
Selected to represent worst case ozone season months.

Days = Weekdays
Recommended for SIPs in the Technical Guidance document.

Geographic Bounds

Region = County

State = South Carolina

Selections = York County

Vehicle/Equipment

All available fuel/sector combinations were selected.

Road Type

Road Type = Nonroad

Pollutant/Processes

Total Gaseous Hydrocarbons (All Processes)

Non-Methane Hydrocarbons (All Processes)

Volatile Organic Compounds (All Processes)

Oxides of Nitrogen (NO_X) (All Processes)

Strategies

Did not compute Rate of Progress.

Output

General Output:

Mass Units = U.S. Tons

Energy Units = Million BTU

Distance Units = Miles

Output Emissions:

24-Hour Day and County were selected.

SCC selected.

C. MOVES3.1 Emissions from Nonroad Mobile Sources

For reporting purposes, the Maintenance Area NO_X and VOC emissions are summarized by equipment type in Table 2 and Table 3 below.

Table 2 – MOVES3.1 Nonroad Mobile NO_X Emissions by Equipment Type in the Maintenance Area

NO_X Emissions (Tons per Ozone Season Day)			
Classification	**2018**	**2026**	**2036**
Agricultural Equipment	0.0556	0.0256	0.0098
Commercial Equipment	0.0944	0.0775	0.0765
Construction & Mining Equipment	0.7631	0.3147	0.1983
Industrial Equipment	0.1469	0.1478	0.2099
Lawn and Garden Equipment	0.1399	0.1301	0.1316
Logging Equipment	0.0061	0.0012	0.0010
Railroad Equipment	0.0012	0.0008	0.0003
Pleasure Craft Equipment	0.0746	0.0693	0.0678
Recreational Vehicles	0.0062	0.0063	0.0067
NO_X Totals	**1.2879**	**0.7734**	**0.7020**

Table 3 – MOVES3.1 Nonroad Mobile VOC Emissions by Equipment Type in the Maintenance Area

VOC Emissions (Tons per Ozone Season Day)			
Classification	**2018**	**2026**	**2036**
Agricultural Equipment	0.0060	0.0027	0.0011
Commercial Equipment	0.1159	0.1281	0.1556
Construction & Mining Equipment	0.1332	0.0769	0.0566
Industrial Equipment	0.0261	0.0269	0.0382
Lawn and Garden Equipment	0.6721	0.7165	0.7860
Logging Equipment	0.0071	0.0065	0.0061
Railroad Equipment	0.0003	0.0002	0.0001
Pleasure Craft Equipment	0.3061	0.1755	0.1363
Recreational Vehicles	0.0736	0.0681	0.0733
VOC Totals	**1.3404**	**1.2014**	**1.2533**

Section III. Line-Haul Railroad

Railroads are categorized by size (Class I, Class II, Class III) and passenger service. Class I railroads are long haul operations, while Class II and Class III railroads are short lines, serving localized markets. There does not appear to be any significant amount of passenger rail activity in York County, and the EPA's 2017 NEI shows no emissions for passenger rail activity for York County. As such, only Class I and Class II/III line-haul emissions are present in these emissions calculations. Railroad locomotive emissions are not included in the nonroad portion of the MOVES3.1 model, so the emissions must be calculated differently. The Department does not have ozone season emissions data for the Maintenance Area, so the entire York County annual emissions from the EPA's 2017 NEIv1 were used as the starting point. The next step was to allocate the annual emissions down to an average ozone season day. No known allocation factors were available to do this, so the annual emissions were allocated down to an average daily value by dividing by 365 (the number of days in the year 2017). The resulting average daily value was assumed to be an average ozone season daily value.

Now that the 2017 average ozone season daily emissions for the entire County of York are determined, the emissions need to be allocated to the Maintenance Area portion of the county. The Department decided that using the length of rail lines was the best indicator of where these emissions may be occurring in the county. Based on data from the SCDOT and GIS mapping, it appears that all rail lines in York County fall within the Maintenance area. As a result, all York County emissions from line haul rail were assumed to take place within the Maintenance Area, and no apportioning was necessary.

Now that the 2017 average ozone season daily emissions for the Maintenance Area are determined, the values then needed to be grown to years 2018, 2026, and 2036. Growth rate projections, from the EPA's 2016v2 modeling platform, were calculated and were the basis for the growth used in this effort. These rates were based on a 2016 base year with future years 2026 (10-year growth) and 2032 (16-year growth). These growth rates needed to be adjusted, as the Department needed

to grow 2017 NEI data to the base year of 2018 (1-year growth) and to the future years of 2026 (9-year growth) and 2036 (19-year growth).

Underlying assumptions:

1) Growth rate is a linear measure and can be arithmetically scaled.

2) Growth rate for 2016-2032 (2016v2 modeling data) can be scaled for the period 2018-2036, that is, the growth rate line will have the same slope when extrapolated beyond 2032.

For a 10-year growth rate, the first step is to calculate the change:

$R_{10} - 1.0 = \Delta R_{10}$

To adjust to an 8-year period, for example, multiply by 8/10:

$8/10 * \Delta R_{10} = \Delta R_8$

The resulting value is added to unity to produce the estimated 8-year growth rate:

$\Delta R_8 + 1.0 = R_8$

The principle remains the same for other time periods, for example 19 years, but in these cases the assumption is made that the growth rate can be extrapolated beyond the 10-year period for which it was calculated.

Example 1:

The 2016-2026 growth rate for SCC 2285002006 (Railroad Line Haul_Class I_Diesel) for NO_X is 0.9773917. We want to calculate the growth rate for the 1-year period from 2017-2018. Because the growth rate is negative, begin by subtracting 1.0:

0.9773917 – 1.0 = -0.0226083

Now that we have the negative growth rate over a 10-year period, we need to scale this down to a 1-year period. To accomplish this, we will multiple the negative growth rate by 0.1, or one tenth of the time frame:

0.1 * -0.0226083= -0.00226083

By adding 1.0 to our negative growth rate, we can calculate the growth rate.

1.0 + (-0.00226083) = 0.99773917

The estimated 1-year growth rate for the period from 2017-2018 is 0.99773917.

The above approach is the same if the 10-year growth rate is positive. The difference is the adjusted growth rate will also be positive, only lesser.

The growth rates from the EPA's 2016v2 modeling platform cover a 16-year period from 2016 to 2032. The time period selected by the Department for this demonstration covers a 19-year period from 2017 to 2036. As such, growth rates need to be adjusted by a different factor:

19/16 = 1.1875

Example 2:

For the SCC and pollutant in Example 1, the 2016-2032 growth rate is 0.727482. Following the same steps previously provided, the estimated 19-year growth rate is calculated as follows:

0.727482 – 1.0 = -0.272518

1.1875 * -0.272518 = -0.32361512

1.0 + (-0.32361512) = 0.67638488

The estimated 19-year growth rate for the period from 2017 to 2036 is 0.67638488.

Table 4 below contains the growth factors for each of the categories and pollutants. Most of the growth rates were calculated based on emissions data from the EPA's 2016v2 modeling platform.

Table 4 – Calculated Growth Factors for the Maintenance Area

Year Interval	2017-2018		2017-2026		2017-2036	
Pollutant	**NO_X**	**VOC**	**NO_X**	**VOC**	**NO_X**	**VOC**
Class I	0.9774	0.9687	0.7965	0.7184	0.6764	0.4701
Class II/III	1.0009	1.0063	1.0085	1.0566	1.0004	1.0633

The 2017 average ozone season daily emissions for the Maintenance Area were multiplied by the calculated growth rates to generate projected average ozone season daily emissions for the Maintenance Area for years 2018, 2026, and 2036. Tables 5 and 6 show the calculated railroad emissions for the Maintenance Area.

Table 5 – Line-Haul Rail NO_X Emissions by Locomotive Type in the Maintenance Area

SCC	SCC Description	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2285002006	Railroad_diesel_linehaul locomotives Class I	0.2020	0.1646	0.1398
2285002007	Railroad_diesel_linehaul locomotives Class II/III	0.0035	0.0035	0.0035

Railroad Total NO_X	0.2055	0.1681	0.1433

Table 6 – Line-Haul Rail VOC Emissions by Locomotive Type in the Maintenance Area

SCC	SCC Description	2018 Grown (tons / OSD)	2026 Grown (tons / OSD)	2036 Grown (tons / OSD)
2285002006	Railroad_diesel_linehaul locomotives Class I	0.0092	0.0068	0.0045
2285002007	Railroad_diesel_linehaul locomotives Class II/III	0.0002	0.0002	0.0002
Railroad Total VOC		0.0094	0.0070	0.0047

Section IV. Summation of Nonroad Source Emissions for the Maintenance Area

The emissions of NO_X and VOC in tons per ozone season day are presented in Table 7. Emissions in the preceding sections were summed to determine total NO_X and VOC emissions for each projected year through 2036.

Table 7 – Total Nonroad Mobile Source Emissions in the Maintenance Area (Tons per Ozone Season Day)

	2018	2026	2036
Total NO_X	1.49	0.94	0.85
Total VOC	1.35	1.21	1.26

Appendix E

Event Source Inventory Documentation

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Section I. Introduction and Scope

Event sources include wild land fires (WLFs) and are generally defined as any non-structural fire that occurs in wild lands. Previously these fires were included within the nonpoint sector but are now calculated and tracked by individual fire. Included in WLFs are the following types of fires:

A. Prescribed (Rx) Fires

Any fire intentionally ignited by management actions in accordance with applicable laws and regulations to meet specific land or resource management objectives are considered to be prescribed fires. Prescribed fire is one type of fuels treatment. Fuels treatments are vegetation management activities intended to modify or reduce hazardous fuels. Fuels treatments include prescribed fires, wildland fire use, and mechanical treatment. Pile burning is a type of prescribed fire in which fuels are gathered into piles before burning. Pile burn emissions are not currently included in the NEI due to lack of usable data and default methods. Agricultural burning is a type of prescribed fire specifically used on land used or intended to be used for raising crops or grazing. Agricultural burning is not included in events emissions but is included in the nonpoint sector emissions.

B. Wildfire (WF)

Wildfires are fires started by an unplanned ignition caused by lightning, volcanoes, other acts of nature, unauthorized activity, accidental, human-caused actions, or a prescribed fire that has developed into an unintentional wildfire.

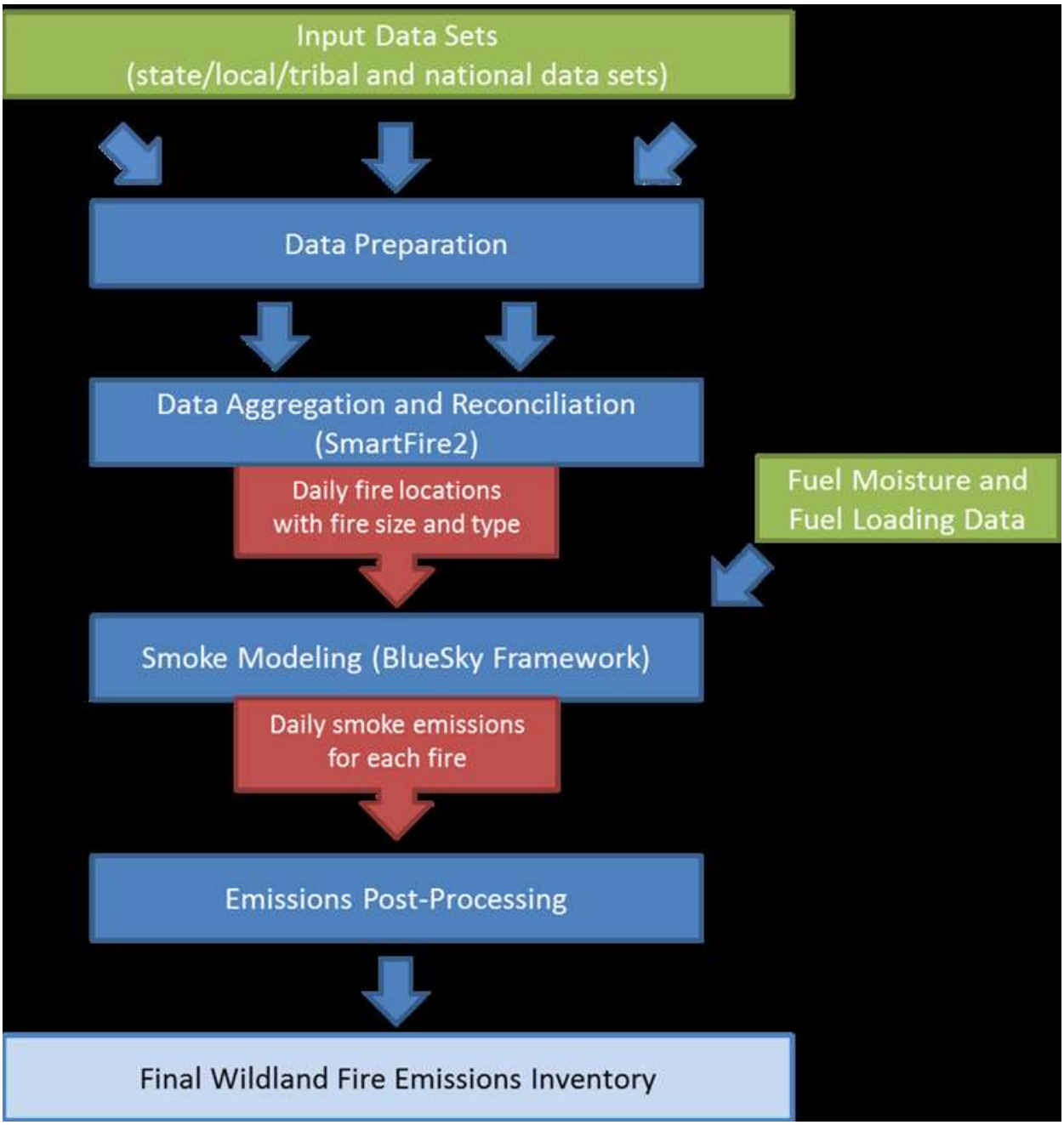
Section II. Overall Methodology

The EPA's 2017 NEI was the basis for the Department's event inventory for the Maintenance Area. For the 2017 NEI, the EPA continues to use the SMARTFIRE2 (SF2/B2) system, along with state inputs, to estimate wild land fire emission estimates. The Department provided the EPA with a list of all York County wild land and prescribed fires in 2017 to improve the quality of the estimates.

A. Base Emissions Inventory

The EPA's WLF emissions begin with raw input data and end with daily estimates of emissions from flaming combustion and smoldering combustion phases. Flaming combustion is combustion that occurs with a flame. Flaming combustion is more complete combustion and is more prevalent with fuels that have a high surface-to-volume ratio, a low bulk density, and low moisture content. Smoldering combustion is combustion that occurs without a flame. Smoldering combustion is less complete and produces some pollutant emissions, such as VOCs, at higher rates than flaming combustion. Smoldering combustion is more prevalent with fuels that have low surface-to-volume ratios, high bulk density, and high moisture content.

Figure 1 – Processing Flow for Fire Emissions Estimates in the 2017 NEI



York County actual 2017 prescribed fires and wildfires were obtained from the SC Forestry Commission and were provided to the EPA for use in the 2017 NEI calculations. The Department does not have ozone season emissions data for the Maintenance Area, so the entire York County annual emissions from the EPA's 2017 NEIv1 were used as the starting point. The next step was to allocate the annual emissions down to an average ozone season day. No known allocation factors were available to do this, so the annual emissions were allocated down to an average daily value by dividing by 365 (the number of days in the year 2017). The resulting average daily value was assumed to be an average ozone season daily value.

B. Allocation of Emissions to the Maintenance Area

Once the average ozone season daily emissions for the entire County of York were determined, the emissions were allocated to the Maintenance Area portion of the county. For event sources, the Department decided that using land area was the best indicator of where these emissions may be occurring in the county. The land area for the entire County of York is 680.8 square miles. The land area for the Maintenance Area is 275 square miles. The ratio of the Maintenance Area land to the whole county is 0.40 or 40 percent (275 / 680.8).

C. Emissions Projections

Since 2017 data is being used as the basis for the Maintenance Area inventory estimates, the data then needed to be grown to a 2018 base year and then grown to 2026 and 2036 future years. The Department decided that there is no current recommended way to appropriately grow or adjust the wildland fire emissions to future years, therefore we maintained the 2017 emissions and used that data for our 2018 base year, as well as all future years. This methodology concurs with the methodology used in the first maintenance plan.

Table 1 summarizes the average ozone season day emissions for event sources in the Maintenance Area.

Table 1 – 2017 Actual Event Source Emissions for the Maintenance Area

SCC	SCC Description	NOx (Tons per Ozone Season Day)	VOC (Tons per Ozone Season Day)
2810001001	Wildfires- Smoldering	0.000018693	0.001009719
2810001002	Wildfires- Flaming	0.000689258	0.007004387
2811015001	Prescribed Fires- Smoldering	0.000543902	0.029369436
2811015002	Prescribed Fires- Flaming	0.013839633	0.144864108
Total Emissions		**0.02**	**0.18**

The data in Table 1 above represents the emissions for 2017 as well as the base year, 2018, interim year, 2026, and final year, 2036.

Appendix F

Copy of Legal Authority

LEGAL AUTHORITY[1]

No plan for attaining a goal, the attainment of which is dependent upon regulatory action, can be used with any degree of effectiveness unless the legal framework is strong. Consequently, the Requirements for Preparation, Adoption, and Submittal of Implementation Plans, 40 CFR 51, as amended, define the necessary statutory powers which must be immediately available to states to carry out the responsibility to the Clean Air Act.

40 CFR 51.230 sets forth six specific requirements for State authority. The South Carolina Pollution Control Act, Act 1157 of 1970, as amended, S. C. Code Sections 48-1-10 thru - 350 (1976), provides the State's authority to respond to these requirements. The Attorney General of the State of South Carolina has given an opinion as to the adequacy of South Carolina laws, as follows:

Legal Authority Required 40 CFR 51	**Adequacy of S. C. Law**	**S. C. Statutes Involved**
(a) "Adopt emission standards and limitations and any other measures necessary for attainment and maintenance of national standards."	Adequate	S. C. Code Secs. 48-1-20, 48-1-50(23)
(b) "Enforce applicable laws, regulations, & standards, and seek injunctive relief."	Adequate	S. C. Code Sec. 48-1-50(1), (3), (4), (5), (11); Secs. 48-1-120, 48-1-130, 48-1-210, 48-1-320, 48-1-330.
(c) "Abate pollutant emissions on an emergency basis to prevent substantial endangerment to the health of persons, i.e., authority comparable to that available to the Administrator under section 305 of the Act."	Adequate	S. C. Code Sec. 48-1-290.
(d) "Prevent construction, modification, or operation of a facility, building, structure, or installation, or combination thereof, which directly or indirectly results or may result in emissions of any air pollutant at any location which will prevent the attainment or maintenance of a national standard."	Adequate	S. C. Code Sec. 48-1-50(5), (10); Secs. 48-1-100, 48-1-110.
(e) "Obtain Information necessary to determine whether air pollution sources are in compliance with applicable laws, regulations, and standards, Including authority to require recordkeeping and to make inspections and conduct tests of air pollution sources."	Adequate	S. C. Code Sec. 48-1-50(10), (20), (22), (24).
(f) "Require owners or operators of stationary sources to install, maintain, and use emission monitoring devices and to make periodic reports to the State on the nature and amounts of emissions from such stationary sources; also authority for the State to make such data available to the public as reported and as correlated with any applicable emission standards or limitations."	Adequate	S. C. Code Secs. 48-1-50(22), 48-1-270.

[1] Section 2 of the EPA-approved South Carolina Air Quality Implementation Plan (SIP), which defines the State's statutory powers as required in 40 CFR 51.230.

Public Hearings

The South Carolina Pollution Control Act provides for notice and public hearings prior to action by the Board of Health and Environmental Control concerning adoption of regulations and standards, adoption or modification of final compliance dates, and other specified legal actions.

Additionally, Act 176 of 1977 enacted by the South Carolina General Assembly requires, among other things, that at least thirty days public notice be given before adoption, amendment or repeal of any rule. It also requires that the substance of the intended action or a description of the subjects and issues involved be made known. While this act escapes the actual requirement for a public hearing in each case, the two Acts taken together do impose the requirement of a thirty days notice of public hearing, assuring compliance with the requirements of 40 CFR 51.102, as amended.

Appendix G

Notice of General Public Interest

Published in the
South Carolina State Register
August 25, 2023

DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

NOTICE OF GENERAL PUBLIC INTEREST

NOTICE OF AMENDMENT TO AIR QUALITY STATE IMPLEMENTATION PLAN

Statutory Authority: S.C. Code Section 48-1-10 et seq.

The South Carolina (SC) Department of Health and Environmental Control (Department) is publishing this Notice of General Public Interest to provide opportunity to comment on the Department's proposal to address required State Implementation Plan (SIP) elements under Section 175A of the Clean Air Act (CAA) pertaining to maintenance plans for the control of criteria pollutants. Specifically, eight years after the redesignation of any area as attainment, the state is required to submit a revised maintenance plan for maintaining the National Ambient Air Quality Standard (NAAQS) for an additional 10 years after the expiration of the original maintenance plan. As required under Section 175A of the CAA, the Department is preparing a second 10-year maintenance plan for the continued attainment of the 2008 8-hour ozone NAAQS through 2036 and is seeking public comment. To be considered, the Department must receive comments by 5:00 p.m. on September 25, 2023, the close of the comment period.

The Department is also providing the interested public with the opportunity to request a public hearing on the SIP amendment. If requested, the Department will hold a public hearing on October 2, 2023, at 10:00 a.m., in Room 2151 of the Sims Building, 2600 Bull Street, Columbia, SC 29201. However, pursuant to 40 CFR 51.102, if the Department does not receive a request for a public hearing by the close of the comment period, 5:00 p.m. on September 25, 2023, the Department will cancel the public hearing. If the Department cancels the public hearing, then the Department will notify the public at least one week prior to the scheduled hearing via the Department's Public Notices webpage: http://www.scdhec.gov/PublicNotices/. Interested persons may also contact Holly Randolph, Air Regulation and SIP Management Section, Bureau of Air Quality, 2600 Bull Street, Columbia, SC 29201, or email at randolhk@dhec.sc.gov for more information, or to find out if the Department will hold a public hearing.

Synopsis:

The 2008 8-hour ozone NAAQS is 0.075 parts per million (ppm). A violation of this NAAQS occurs when the three-year average of the annual fourth-highest daily maximum 8-hour average ozone concentration is greater than 0.075 ppm. This three-year average is termed the "design value" for the ambient air quality monitoring site. The design value for a nonattainment area is the highest monitoring site design value in the area. On May 21, 2012, based on 2008-2010 ambient air monitoring data from several monitoring sites in the North Carolina (NC) portion of the Charlotte-Gastonia-Rock Hill, NC-SC area (Charlotte Area), the U.S. Environmental Protection Agency (EPA) designated and classified a portion of York County, SC within the Rock Hill-Fort Mill Area Transportation Study (RFATS) Metropolitan Planning Organization (MPO) area as a marginal nonattainment area for the 2008 8-hour ozone NAAQS. Effective January 11, 2016 (80 FR 76865), the EPA redesignated the York County, SC portion within the RFATS MPO area (Maintenance Area) to attainment for the 2008 8-hour ozone NAAQS. As part of the redesignation action, the Department adopted, and the EPA approved, a maintenance plan for the Maintenance Area which demonstrated continued attainment of the 2008 8-hour ozone NAAQS through 2026.

As required under Section 175A of the CAA, the Department is preparing a second 10-year maintenance plan for the continued attainment of the 2008 8-hour ozone NAAQS through 2036. The certified ambient air monitoring data demonstrates that the Charlotte Area has attained the 2008 8-hour ozone NAAQS and maintained the NAAQS every year after redesignation. The Department believes that this attainment will continue for the duration of the second 10-year maintenance plan which, as required by Clean Air Act Section 175A(d), includes contingency plans to correct any violation of the 2008 8-hour ozone NAAQS.

Appendix H

EPA Comments on the Pre-Hearing Draft Submittal and Department Responses

Received September 25, 2023

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW
ATLANTA, GEORGIA 30303-8960

September 25, 2023

Mr. Heinz Kaiser
Director
Bureau of Air Quality
Division of Emission Evaluation and Support
South Carolina Department of
Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Dear Mr. Kaiser,

Thank you for your letter dated August 25, 2023, transmitting a prehearing package regarding South Carolina's Second Maintenance Plan for the York County Portion of the Charlotte-Gastonia-Rock Hil, NC-SC 8-hour 2008 Ozone Maintenance Area. This submission is subject to public review and comment, with written comments due by close of business on September 25, 2023. The U.S. Environmental Protection Agency completed its review of the prehearing submittal and offers the following enclosed comments.

We look forward to continuing to work with you and your staff. If you have any questions please contact Ms. Jane Spann in the Air Regulatory Management Section at (404) 562-9029 or Spann.Jane@epa.gov, or have your staff contact Mr. Weston Freund at (404) 562-8773 or Freund.Weston@epa.gov.

Sincerely,

LYNORAE BENJAMIN Digitally signed by LYNORAE BENJAMIN
Date: 2023.09.25 15:42:21 -04'00'

Lynorae Benjamin
Manager
Air Planning and Implementation Branch

Enclosure

cc: Wall, Mary Peyton, SCDHEC

The U.S. Environmental Protection Agency Preliminary Comments on South Carolina's 2008 8-Hour Ozone Second 10-Year Maintenance Plan

General Comments

- When the SIP is submitted for the EPA's approval, SCDHEC will need to request that the 2014 and 2026 motor vehicle emissions budgets (MVEBs) in the first 10-year maintenance plan no longer apply for transportation conformity purposes because new 2018 and 2036 MVEBs will replace the MVEBs in the first 10-year plan. Please add a statement to either the transportation conformity section, final transmission letter or both.

Other Comments

- Table 9 could read "Total Emissions" rather than, "Total Man-Made Emissions" since in Table 8 "Wildfires and Prescribed Fires" since wildfires are not always man-made.

Department Responses to the EPA's Pre-Hearing Draft Submittal Comments

The Department received two comments from the EPA on September 25, 2023, regarding the pre-hearing draft submittal. The Department received no other comments by September 25, 2023, the close of the public comment period.

Department Response to the EPA's General Comment:

The Department has updated the language within Section IV. Motor Vehicle Emissions Budget of the Narrative to explicitly request that the 2014 and 2026 MVEBs from the first 10-year maintenance plan no longer apply for transportation conformity purposes as the MVEBs within the second 10-year maintenance plan are intended to replace the previous budgets.

Department Response to the EPA's Other Comment:

The Department agrees and has removed the language "Man-Made" from the title of Table 9 within the Narrative.