Tran Systems

SEMAP REGION AREA AND NONROAD PROJECTION YEAR INVENTORIES

FINAL REPORT

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Prepared for:

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ACRONYMS AND ABBREVIATIONS

AEO2010	*Annual Energy Outlook 2010*
AIM	architectural and industrial maintenance
APU	auxiliary power unit
Btu	British thermal units
CE	control efficiency
CF	control factors
CMVs	commercial marine vessels
CNG	compressed natural gas
CO	carbon monoxide
EGU	electricity generating unit
EPA	U.S. Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FIPS	Federal Information Processing Standard
g	grams
gal	gallon
GSE	ground support equipment
LPG	liquefied petroleum gas
LTO	landing and take-off operation
MACT	maximum achievable control technology
MANE-VU	Mid-Atlantic Northeast Visibility Union
MARAMA	Mid-Atlantic Regional Air Management Association
MSAT	Mobile Source Air Toxics
MSW	municipal solid waste
NAICS	North American Industrial Classification System
NCD	NMIM county-level database
NEI	National Emissions Inventory
NH_3	ammonia
NMIM	National Mobile Inventory Model
NO_x	oxides of nitrogen
NSPS	New Source Performance Standards
OTC	Ozone Transport Commission
PFCs	portable fuel containers
PM_{10}	particles with a diameter less than 10 micrometers
$PM_{2.5}$	particles with a diameter less than 2.5 micrometers
ppm	parts per million
RE	rule effectiveness
RIA	regulatory impact analyses
RP	rule penetration
RVP	Reid vapor pressure
SCC	Source Classification Code
SEMAP	Southeastern Modeling, Analysis, and Planning
SESARM	Southeastern States Air Resource Managers, Inc.
SIPs	State Implementation Plans
SO_2	sulfur dioxide
TAF	Terminal Area Forecasts
TranSystems	TranSystems|E.H. Pechan

VISTAS	Visibility Improvement – State and Tribal Association of the Southeast
VMT	vehicle miles traveled
VOCs	volatile organic compounds

SECTION I. INTRODUCTION

TranSystems|E.H. Pechan (TranSystems) is supporting the Southeastern States Air Resource Managers, Inc. (SESARM) in the Southeastern Modeling, Analysis, and Planning (SEMAP) project that is funded by the same ten states originally involved in the Visibility Improvement – State and Tribal Association of the Southeast (VISTAS) project. The SEMAP project addresses the next phase of ozone, fine particle, and regional haze assessment obligations of the SESARM member states. The SEMAP project is designed to produce technical analyses to aid the participating agencies in developing State Implementation Plans (SIPs) required by the Clean Air Act.

TranSystems contract with SESARM called for developing emission inventories for at least one future year for emissions and air quality modeling purposes. SESARM selected 2018 as the primary emissions projection year. To supplement this specific projection year analysis, TranSystems also developed growth and control factors for the 2017-2025 period. All of the projection year work included best estimates of the activity changes influencing air pollution emissions in this region, plus the effects of federal, state and local air pollution control regulations.

The scope of TranSystems contract with SESARM was to develop base year and future year emission estimates for area sources and non-road mobile sources for the participating states to support regional air quality modeling and assessment of fine particles, ozone and regional haze. In this instance, non-road mobile sources include all of the source categories included in the U.S. Environmental Protection Agency's (EPA's) NONROAD model, plus commercial marine vessels, aircraft and railroad locomotives. Emissions are reported by source category by county for each county in Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, Virginia and West Virginia.

The emission inventories consist of all primary and precursor emissions necessary to accurately model fine particles and ozone, including ammonia (NH_3), carbon monoxide (CO), oxides of nitrogen (NO_x), particles with a diameter less than 2.5 micrometers ($PM_{2.5}$), particles with a diameter less than 10 micrometers (PM_{10}), sulfur dioxide (SO_2), and volatile organic compounds (VOCs). Note that all of the fugitive dust PM emissions estimates are as estimated using AP-42 equations. No transport factors have been applied.

This report documents the inventory data sources, methods, approach, results, state revisions, and any special tasks performed to develop these projection year emission inventories (for 2018) and growth and control factors (for 2017-2025). The documentation includes tables and charts of the area and non-road mobile source category data by pollutant by state and local agency. This report also provides emission inventory totals for the entire Southeast by pollutant and source category. In addition, this report describes the growth assumptions and projection factors used to generate these inventories.

This report is organized in five main sections, including this Introduction. Section II describes the methods that were used to develop future year emission estimates for stationary area source categories. The first part of Section II describes the growth factor development, including the process for obtaining state comments and incorporating those comments in the growth factor file. The second part of section II explains how control factors were developed to account for the expected emission reductions associated with federal, state and local air pollution control regulations that affect sources in the Southeast. Section III of this report explains how the projection year emissions were estimated for the NONROAD model and marine, aircraft and rail categories. Section IV of this report provides forecast year emission summaries and compares the 2018 emission estimates by area and source sector with the corresponding 2007 emission estimates. Documentation of the growth and control factor files formats, filenames and locations is provided in Section V along with any needed explanations of how these files were developed.

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SECTION II. STATIONARY AREA SOURCE EMISSIONS

Stationary area sources (or nonpoint sources) include small fuel combustors, solvent utilization, fugitive dust source categories, and other sources too small to be included in the point source inventory. For these types of emissions, a combination of activity data and emissions factors are used to estimate emissions. This section first describes the data sources/methods for projecting post-2007 changes in stationary area source emissions activity levels. This is followed by a discussion of data sources and procedures for projecting changes in area source emission levels.

A.   STATIONARY AREA SOURCE EMISSION ACTIVITY GROWTH

There are three major types of data that TranSystems used to estimate expected changes in area source emission activity levels for the period 2017-2025:

- Energy consumption and production forecasts from *Annual Energy Outlook 2010 (AEO 2010)* (EIA, 2010);
- Socioeconomic projections from *Annual Energy Outlook 2010*; and
- Source category-specific forecasts developed for an EPA-sponsored effort to improve emission projection methodologies for non-electricity generating unit (EGU) stationary sources.

1.   Energy Consumption/Production Data

AEO energy consumption/production forecasts are generally available by Census division; however, some sector/fuel types are only forecast at the national level. The SEMAP project states are included in one of two Census divisions:

- **South Atlantic**: Florida, Georgia, North Carolina, South Carolina, Virginia, and West Virginia; and
- **East South Central**: Alabama, Kentucky, Mississippi, and Tennessee.

For the SEMAP project, TranSystems compiled projections data from *AEO 2010* to estimate energy consumption and production activity level changes. The *AEO 2010* provides annual energy forecasts from a 2007 base year through 2035. TranSystems compiled relevant *AEO 2010* data for the projection year(s) and 2007, and computed ratios representing the projection year level of energy consumption/production relative to 2007 levels of energy consumption/production.

2.   Socioeconomic Data

Among the reasons to select AEO's data over other data sources are (1) to ensure consistency with the AEO energy consumption/production projections data; (2) the AEO data and models are publicly available, while many other data and models are proprietary; and (3) the AEO provides additional forecast model transparency/documentation. The AEO socioeconomic data are available by Census division. TranSystems compiled relevant *AEO 2010* data for the projection year(s) and 2007, and computed ratios representing the projection year level of socioeconomic activity relative to 2007 levels of activity.

3.   Source Category-Specific Data

TranSystems identified a list of fifty priority non-energy-related stationary area source categories for an EPA-sponsored projection methodology improvement project (Pechan, 2010). For these categories, TranSystems evaluated alternatives to the use of socioeconomic projections as emission activity growth indicators. Priority source categories were identified based on the highest–emitting NO_x, VOC, SO_2, and $PM_{2.5}$ emission source categories in the 2002 National Emissions Inventory (NEI). TranSystems developed emission projection data/method refinements for most of these priority source categories, many of which also appear in the SEMAP base year inventory. TranSystems adjusted the projections data from this EPA project for use in the SEMAP forecasting effort. These

adjustments were limited to estimating data for the years of SEMAP interest. The EPA data reflect estimated emission activity growth from a 2005 base year, and provide projections for each fifth year over the 2010 through 2030 period.

4.   Assignment of Growth Indicators to Source Categories

Table II-1 presents TranSystems crosswalk between SEMAP stationary area source categories and growth indicators. TranSystems used the same growth indicator assignments as identified in the EPA projections improvement project (Pechan, 2010). As noted in Table II-1, there are a few SEMAP area source categories that do not appear in EPA's crosswalk. TranSystems assigned growth indicators for these source categories from one of the three data sources noted above. As with the EPA project crosswalk, the selected growth indicators reflect available projections data that was determined to most closely reflect the emissions activity for the source category. In addition, for certain categories – including Residential Wood Combustion, Stage I Gasoline, Stage II Gasoline, and Portable Fuel Containers – a hybrid growth and control factor was developed which represents the effects of growth and control in a single factor. More information on the categories using hybrid growth and control factors is provided in the next section of this report.

Table II-1. – Field Definitions

SCC_Abbr – This field is for the Source Classification Code (SCC).

SCCX_DESC – These fields are for the descriptive characteristics of the associated SCC code.

In EPA Crosswalk? – This field identifies whether or not an SCC/Source combination is present in the EPA Crosswalk. Y indicates an SCC/Source combination is present in the EPA Crosswalk, while a blank value indicates it is not.

Growth Indicator – All of the columns underneath this header pertain specifically to the growth indicators.

Description – This is a generalized description of the data used as the Source for the growth indicators.

Data Type – This field refers to the data type of the Source, possible options for this field are:

> *Category-Specific*: These growth factors are developed using a wide variety of data sources chosen for their relevance to the category in question.

> *Demographic*: These growth factors are developed using population based data sources.

> *Employment*: These growth factors are developed using employment based data sources, for example the number of individuals employed in a certain industry.

> *Energy-Consumption*: These growth factors are developed using data sources related to the consumption of a particular type of energy (e.g., Coal) in a certain sector (e.g., Commercial).

> *Energy-Production*: These growth factors are developed using data sources related to the production of energy resources, typically related to crude oil and petroleum products.

> *Output*: These growth factors are developed using data sources related to the output of an industry or crop output.

Geography – This field indicates the level of geographic specificity at which the growth indicator was developed.

Table II-1. SEMAP Stationary Area Source Growth Indicators by Category

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2102001000	Stationary Source Fuel Combustion	Industrial	Anthracite Coal	Total: All Boiler Types	Y	Industrial/Total Industrial/Other Industrial Coal	Energy Consumption	Region
2102002000	Stationary Source Fuel Combustion	Industrial	Bituminous/ Subbituminous Coal	Total: All Boiler Types	Y	Industrial/Total Industrial/Other Industrial Coal	Energy Consumption	Region
2102004000	Stationary Source Fuel Combustion	Industrial	Distillate Oil	Total: Boilers and IC Engines	Y	Industrial/Total Industrial/Distillate Fuel Oil	Energy Consumption	Region
2102005000	Stationary Source Fuel Combustion	Industrial	Residual Oil	Total: All Boiler Types	Y	Industrial/Total Industrial/Residual Fuel Oil	Energy Consumption	Region
2102006000	Stationary Source Fuel Combustion	Industrial	Natural Gas	Total: Boilers and IC Engines	Y	Industrial/Total Industrial/Natural Gas	Energy Consumption	Region
2102007000	Stationary Source Fuel Combustion	Industrial	Liquified Petroleum Gas (LPG)	Total: All Boiler Types	Y	Industrial/Total Industrial/Liquefied Petroleum Gases	Energy Consumption	Region
2102008000	Stationary Source Fuel Combustion	Industrial	Wood	Total: All Boiler Types	Y	Industrial/Total Industrial/Renewable Energy	Energy Consumption	Region
2102011000	Stationary Source Fuel Combustion	Industrial	Kerosene	Total: All Boiler Types	Y	Industrial/Total Industrial/Other Petroleum	Energy Consumption	Region
2103001000	Stationary Source Fuel Combustion	Commercial/ Institutional	Anthracite Coal	Total: All Boiler Types	Y	Commercial/Coal	Energy Consumption	Region
2103002000	Stationary Source Fuel Combustion	Commercial/ Institutional	Bituminous/ Subbituminous Coal	Total: All Boiler Types	Y	Commercial/Coal	Energy Consumption	Region
2103004000	Stationary Source Fuel Combustion	Commercial/ Institutional	Distillate Oil	Total: Boilers and IC Engines	Y	Commercial/Distillate Fuel Oil	Energy Consumption	Region
2103005000	Stationary Source Fuel Combustion	Commercial/ Institutional	Residual Oil	Total: All Boiler Types	Y	Commercial/Residual Fuel Oil	Energy Consumption	Region
2103006000	Stationary Source Fuel Combustion	Commercial/ Institutional	Natural Gas	Total: Boilers and IC Engines	Y	Commercial/Natural Gas	Energy Consumption	Region
2103007000	Stationary Source Fuel Combustion	Commercial/ Institutional	LPG	Total: All Combustor Types	Y	Commercial/Liquefied Petroleum Gases	Energy Consumption	Region
2103008000	Stationary Source Fuel Combustion	Commercial/ Institutional	Wood	Total: All Boiler Types	Y	Commercial/Renewable Energy	Energy Consumption	Region
2103011000	Stationary Source Fuel Combustion	Commercial/ Institutional	Kerosene	Total: All Combustor Types	Y	Commercial/Kerosene	Energy Consumption	Region
2104001000	Stationary Source Fuel Combustion	Residential	Anthracite Coal	Total: All Combustor Types	Y	Residential/Coal	Energy Consumption	Region
2104002000	Stationary Source Fuel Combustion	Residential	Bituminous/ Subbituminous Coal	Total: All Combustor Types	Y	Residential/Coal	Energy Consumption	Region

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2104004000	Stationary Source Fuel Combustion	Residential	Distillate Oil	Total: All Combustor Types	Y	Residential/Distillate Fuel Oil	Energy Consumption	Region
2104006000	Stationary Source Fuel Combustion	Residential	Natural Gas	Total: All Combustor Types	Y	Residential/Natural Gas	Energy Consumption	Region
2104007000	Stationary Source Fuel Combustion	Residential	Liquified Petroleum Gas (LPG)	Total: All Combustor Types	Y	Residential/Liquefied Petroleum Gases	Energy Consumption	Region
2104008100	Stationary Source Fuel Combustion	Residential	Wood	Fireplace: general		Residential Fireplaces: All	Category-specific	Nation
2104008210	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: fireplace inserts; non-EPA certified		Residential Fireplaces: Non-Certified	Category-specific	Nation
2104008220	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: fireplace inserts; EPA certified; non-catalytic		Residential Fireplaces: Certified, Non-Catalytic	Category-specific	Nation
2104008230	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: fireplace inserts; EPA certified; catalytic		Residential Fireplaces: Certified, Catalytic	Category-specific	Nation
2104008310	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: freestanding, non-EPA certified		Residential Woodstoves: All	Category-specific	Nation
2104008320	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: freestanding, EPA certified, non-catalytic		Residential Woodstoves: Certified, Non-Catalytic	Category-specific	Nation
2104008330	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: freestanding, EPA certified, catalytic		Residential Woodstoves: Certified, Catalytic	Category-specific	Nation
2104008400	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: pellet-fired, general (freestanding or FP insert)		Residential Woodstoves: All	Category-specific	Nation
2104008510	Stationary Source Fuel Combustion	Residential	Wood	Furnace: Indoor, cordwood-fired, non-EPA certified		Residential/Renewable Energy	Energy Consumption	Region
2104008610	Stationary Source Fuel Combustion	Residential	Wood	Hydronic heater: outdoor		Outdoor Wood Burning	Category-specific	Nation
2104009000	Stationary Source Fuel Combustion	Residential	Firelog	Total: All Combustor Types	Y	Residential/Renewable Energy	Energy Consumption	Region
2104011000	Stationary Source Fuel Combustion	Residential	Kerosene	Total: All Heater Types	Y	Residential/Kerosene	Energy Consumption	Region
2275085000	Mobile Sources	Aircraft	Unpaved Airstrips	Total	Y	Transportation/Air/Aviation Gasoline	Energy Consumption	Nation
2275900000	Mobile Sources	Aircraft	Refueling: All Fuels	All Processes	Y	Transportation/Air/Total	Energy Consumption	Nation

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2294000000	Mobile Sources	Paved Roads	All Paved Roads	Total: Fugitives	Y	Total VMT	Category-specific	State
2296000000	Mobile Sources	Unpaved Roads	All Unpaved Roads	Total: Fugitives	Y	Unpaved VMT	Category-specific	Nation
2301030000	Industrial Processes	Chemical Manufacturing: SIC 28	Process Emissions from Pharmaceutical Manuf (NAPAP cat. 106)	Total	Y	Pharmaceutical Industry Employment (Pharmaceutical Manufacturing)	Employment	Nation
2301040000	Industrial Processes	Chemical Manufacturing: SIC 28	Fugitive Emissions from Synthetic Organic Chem Manuf (NAPAP cat. 102)	Total	Y	Basic Organic Chemicals - NAICS 32511, 32519	Output	Region
2302002000	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Charbroiling	Total	Y	Food Products - NAICS 311	Output	Region
2302002100	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Charbroiling	Conveyorized Charbroiling	Y	Food Products - NAICS 311	Output	Region
2302002200	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Charbroiling	Under-fired Charbroiling	Y	Food Products - NAICS 311	Output	Region
2302003000	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Deep Fat Frying	Y	Food Products - NAICS 311	Output	Region
2302003100	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Flat Griddle Frying	Y	Food Products - NAICS 311	Output	Region
2302003200	Industrial Processes	Food and Kindred Products: SIC 20	Commercial Cooking - Frying	Clamshell Griddle Frying	Y	Food Products - NAICS 311	Output	Region
2302050000	Industrial Processes	Food and Kindred Products: SIC 20	Bakery Products	Total	Y	Crop Production - NAICS 111	Output	Region
2302070005	Industrial Processes	Food and Kindred Products: SIC 20	Fermentation/ Beverages	Wineries	Y	Beverage and Tobacco Products - NAICS 312	Output	Region
2302070010	Industrial Processes	Food and Kindred Products: SIC 20	Fermentation/ Beverages	Distilleries	Y	Beverage and Tobacco Products - NAICS 312	Output	Region
2305070000	Industrial Processes	Mineral Processes: SIC 32	Concrete, Gypsum, Plaster Products	Total	Y	Other Nonmetallic Mineral Products - NAICS 327 less 3272 & 32731	Output	Region
2306000000	Industrial Processes	Petroleum Refining: SIC 29	All Processes	Total	Y	Petroleum and Coal Products Manufacturing - NAICS 324	Output	Region
2306010000	Industrial Processes	Petroleum Refining: SIC 29	Asphalt Paving/Roofing Materials	Total	Y	Other Petroleum and Coal Products - NAICS 32412, 32419	Output	Region
2307060000	Industrial Processes	Wood Products: SIC 24	Miscellaneous Wood Products	Total	Y	Wood Products - NAICS 321	Output	Region
2308000000	Industrial Processes	Rubber/Plastics: SIC 30	All Processes	Total	Y	Plastics and Rubber Products - NAICS 326	Output	Region
2309000000	Industrial Processes	Fabricated Metals: SIC 34	All Processes	Total	Y	Fabricated Metal Products - NAICS 332	Output	Region
2309100010	Industrial Processes	Fabricated Metals: SIC 34	Coating, Engraving, and Allied Services	Electroplating	Y	Fabricated Metal Products - NAICS 332	Output	Region

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2309100230	Industrial Processes	Fabricated Metals: SIC 34	Coating, Engraving, and Allied Services	Alkaline Cleaning	Y	Fabricated Metal Products - NAICS 332	Output	Region
2310000000	Industrial Processes	Oil and Gas Production: SIC 13	All Processes	Total: All Processes	Y	Oil & Gas Extraction & Support Activities - NAICS 211, 213	Output	Region
2311010000	Industrial Processes	Construction: SIC 15 - 17	General Building Construction	Total	Y	Acres disturbed - Residential and Nonresidential Construction Only	Category-specific	Nation
2311020000	Industrial Processes	Construction: SIC 15 - 17	Heavy Construction	Total	Y	Acres disturbed - Nonresidential Construction Only (IndCommInst Construction)	Category-specific	Nation
2311030000	Industrial Processes	Construction: SIC 15 - 17	Road Construction	Total	Y	Acres disturbed - Highway Construction Only (Road Construction)	Category-specific	Nation
2325000000	Industrial Processes	Mining and Quarrying: SIC 14	All Processes	Total	Y	Mining Machinery Operators (Mining and Quarrying)	Employment	Nation
2399000000	Industrial Processes	Industrial Processes: NEC	Industrial Processes: NEC	Total	Y	Total Industrial - NAICS 111-115, 21*, 23*, 31-33	Output	Region
2401001000	Solvent Utilization	Surface Coating	Architectural Coatings	Total: All Solvent Types	Y	Paints and Coatings/Architectural/ Solvents	Category-specific	Nation
2401001010	Solvent Utilization	Surface Coating	Architectural Coatings	Primers, Sealers, and Undercoaters	Y	Paints and Coatings/Architectural/ Solvents	Category-specific	Nation
2401001050	Solvent Utilization	Surface Coating	Architectural Coatings	All Other Architectural Categories	Y	Paints and Coatings/Architectural/ Solvents	Category-specific	Nation
2401005000	Solvent Utilization	Surface Coating	Auto Refinishing: SIC 7532	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401005600	Solvent Utilization	Surface Coating	Auto Refinishing: SIC 7532	Primers	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401005700	Solvent Utilization	Surface Coating	Auto Refinishing: SIC 7532	Top Coats	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401008000	Solvent Utilization	Surface Coating	Traffic Markings	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401015000	Solvent Utilization	Surface Coating	Factory Finished Wood: SIC 2426 thru 242	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401020000	Solvent Utilization	Surface Coating	Wood Furniture: SIC 25	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401025000	Solvent Utilization	Surface Coating	Metal Furniture: SIC 25	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401030000	Solvent Utilization	Surface Coating	Paper: SIC 26	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401040000	Solvent Utilization	Surface Coating	Metal Cans: SIC 341	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401045000	Solvent Utilization	Surface Coating	Metal Coils: SIC 3498	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401050000	Solvent Utilization	Surface Coating	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401055000	Solvent Utilization	Surface Coating	Machinery and Equipment: SIC 35	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2401060000	Solvent Utilization	Surface Coating	Large Appliances: SIC 363	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401065000	Solvent Utilization	Surface Coating	Electronic and Other Electrical: SIC 36 - 363	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401070000	Solvent Utilization	Surface Coating	Motor Vehicles: SIC 371	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401075000	Solvent Utilization	Surface Coating	Aircraft: SIC 372	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401080000	Solvent Utilization	Surface Coating	Marine: SIC 373	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401085000	Solvent Utilization	Surface Coating	Railroad: SIC 374	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401090000	Solvent Utilization	Surface Coating	Miscellaneous Manufacturing	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401100000	Solvent Utilization	Surface Coating	Industrial Maintenance Coatings	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2401200000	Solvent Utilization	Surface Coating	Other Special Purpose Coatings	Total: All Solvent Types	Y	Paints and Coatings/non-Architectural/Solvents	Category-specific	Nation
2415000000	Solvent Utilization	Degreasing	All Processes/All Industries	Total: All Solvent Types	Y	Cleaning Products/Industrial & Institutional Solvents	Category-specific	Nation
2415100000	Solvent Utilization	Degreasing	All Industries: Open Top Degreasing	Total: All Solvent Types	Y	Cleaning Products/Industrial & Institutional Solvents	Category-specific	Nation
2415130000	Solvent Utilization	Degreasing	Electronic and Other Elec. (SIC 36): Open Top Degreasing	Total: All Solvent Types	Y	Cleaning Products/Industrial & Institutional Solvents	Category-specific	Nation
2415145000	Solvent Utilization	Degreasing	Miscellaneous Manufacturing (SIC 39): Open Top Degreasing	Total: All Solvent Types	Y	Cleaning Products/Industrial & Institutional Solvents	Category-specific	Nation
2415345000	Solvent Utilization	Degreasing	Miscellaneous Manufacturing (SIC 39): Cold Cleaning	Total: All Solvent Types	Y	Cleaning Products/Industrial & Institutional Solvents	Category-specific	Nation
2415360000	Solvent Utilization	Degreasing	Auto Repair Services (SIC 75): Cold Cleaning	Total: All Solvent Types	Y	Cleaning Products/Industrial & Institutional Solvents	Category-specific	Nation
2420000000	Solvent Utilization	Dry Cleaning	All Processes	Total: All Solvent Types	Y	Dry Cleaning & Other/Dry Cleaning Solvents	Category-specific	Nation
2420000370	Solvent Utilization	Dry Cleaning	All Processes	Special Naphthas	Y	Dry Cleaning & Other/Dry Cleaning Solvents	Category-specific	Nation
2425000000	Solvent Utilization	Graphic Arts	All Processes	Total: All Solvent Types	Y	Printing Ink/Solvents	Category-specific	Nation
2440000000	Solvent Utilization	Miscellaneous Industrial	All Processes	Total: All Solvent Types	Y	Other Manufacturing/Solvents	Category-specific	Nation
2460000000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Processes	Total: All Solvent Types	Y	Cosmetics & Toiletries plus Dry Cleaning and Other plus Transportation plus Construction/Solvents	Category-specific	Nation
2460100000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Personal Care Products	Total: All Solvent Types	Y	Cosmetics and Toiletries/Solvents	Category-specific	Nation

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2460200000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Household Products	Total: All Solvent Types	Y	Cosmetics & Toiletries plus Dry Cleaning and Other plus Transportation plus Construction/Solvents	Category-specific	Nation
2460400000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Automotive Aftermarket Products	Total: All Solvent Types	Y	Transportation/Motor Vehicle Solvents	Category-specific	Nation
2460500000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Coatings and Related Products	Total: All Solvent Types	Y	Paints and Coatings/Solvents	Category-specific	Nation
2460600000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Adhesives and Sealants	Total: All Solvent Types	Y	Adhesives and Sealants/Solvents	Category-specific	Nation
2460800000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All FIFRA Related Products	Total: All Solvent Types	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2460900000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	Miscellaneous Products (Not Otherwise Covered)	Total: All Solvent Types	Y	Cosmetics & Toiletries plus Dry Cleaning and Other plus Transportation plus Construction/Solvents	Category-specific	Nation
2461020000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Asphalt Application: All Processes	Total: All Solvent Types	Y	Asphalt Production/Solvents	Category-specific	Nation
2461021000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Cutback Asphalt	Total: All Solvent Types	Y	Asphalt Production/Solvents	Category-specific	Nation
2461022000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Emulsified Asphalt	Total: All Solvent Types	Y	Asphalt Production/Solvents	Category-specific	Nation
2461023000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Asphalt Roofing	Total: All Solvent Types	Y	Asphalt Production/Solvents	Category-specific	Nation
2461800000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: All Processes	Total: All Solvent Types	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	All Processes	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850001	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Herbicides, Corn	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850004	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Herbicides, Potatoes	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850005	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Herbicides, Soy Beans	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850006	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Herbicides, Hay & Grains	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850009	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Herbicides, Not Elsewhere Classified	Y	Agricultural Chemical/Solvents	Category-specific	Nation

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						Description	Data Type	Geography
2461850051	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Other Pesticides, Corn	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850054	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Other Pesticides, Potatoes	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850055	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Other Pesticides, Soy Beans	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850056	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Other Pesticides, Hay & Grains	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2461850099	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	Other Pesticides, Not Elsewhere Classified	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2465000000	Solvent Utilization	Miscellaneous Non-industrial: Consumer	All Products/Processes	Total: All Solvent Types	Y	Cosmetics & Toiletries plus Dry Cleaning and Other plus Transportation plus Construction/Solvents	Category-specific	Nation
2465100000	Solvent Utilization	Miscellaneous Non-industrial: Consumer	Personal Care Products	Total: All Solvent Types	Y	Cosmetics and Toiletries/Solvents	Category-specific	Nation
2465200000	Solvent Utilization	Miscellaneous Non-industrial: Consumer	Household Products	Total: All Solvent Types	Y	Cleaning Products/Household Solvents	Category-specific	Nation
2465400000	Solvent Utilization	Miscellaneous Non-industrial: Consumer	Automotive Aftermarket Products	Total: All Solvent Types	Y	Transportation/Motor Vehicle Solvents	Category-specific	Nation
2465800000	Solvent Utilization	Miscellaneous Non-industrial: Consumer	Pesticide Application	Total: All Solvent Types	Y	Agricultural Chemical/Solvents	Category-specific	Nation
2501000090	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Breathing Loss	Distillate Oil	Y	Refined Petroleum Products Supplied/Distillate Fuel Oil	Energy Production	Nation
2501010120	Storage and Transport	Petroleum and Petroleum Product Storage	Commercial/Industrial: Breathing Loss	Gasoline		Total Energy/Motor Gasoline	Energy Consumption	Regional
2501011011	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Permeation	Y	Portable Fuel Containers/MSAT Residential Permeation VOC Emissions	Category-specific	State
2501011012	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Evaporation (includes Diurnal losses)	Y	Portable Fuel Containers/MSAT Residential Evaporation VOC Emissions	Category-specific	State
2501011013	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Spillage During Transport	Y	Portable Fuel Containers/MSAT Residential Spillage During Transport VOC Emissions	Category-specific	State
2501011014	Storage and Transport	Petroleum and Petroleum Product Storage	Residential Portable Gas Cans	Refilling at the Pump - Vapor Displacement	Y	Portable Fuel Containers/MSAT Residential Refilling at Pump Vapor Displacement VOC Emissions	Category-specific	State

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator Description	Data Type	Geography
2501060051	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Submerged Filling	Y	Transportation/Motor Gasoline Adjusted by State VMT	Category-specific	State
2501060052	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Splash Filling	Y	Transportation/Motor Gasoline Adjusted by State VMT	Category-specific	State
2501060053	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Balanced Submerged Filling	Y	Transportation/Motor Gasoline Adjusted by State VMT	Category-specific	State
2501060100	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 2: Total	Y	Transportation/Motor Gasoline Adjusted by State VMT	Category-specific	State
2501060102	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 2: Displacement Loss/Controlled		Transportation/Motor Gasoline Adjusted by State VMT	Category-specific	State
2501060103	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 2: Spillage		Transportation/Motor Gasoline Adjusted by State VMT	Category-specific	State
2501060201	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Underground Tank: Breathing and Emptying	Y	Transportation/Motor Gasoline Adjusted by State VMT	Category-specific	State
2501070000	Storage and Transport	Petroleum and Petroleum Product Storage	Diesel Service Stations	Total: All Products/All Processes		Transportation/Distillate Fuel Oil	Energy Consumption	Region
2501070051	Storage and Transport	Petroleum and Petroleum Product Storage	Diesel Service Stations	Stage 1: Submerged Filling	Y	Transportation/Distillate Fuel Oil	Energy Consumption	Region
2501070052	Storage and Transport	Petroleum and Petroleum Product Storage	Diesel Service Stations	Stage 1: Splash Filling	Y	Transportation/Distillate Fuel Oil	Energy Consumption	Region
2501070101	Storage and Transport	Petroleum and Petroleum Product Storage	Diesel Service Stations	Stage 2: Displacement Loss/ Uncontrolled	Y	Transportation/Distillate Fuel Oil	Energy Consumption	Region
2501070103	Storage and Transport	Petroleum and Petroleum Product Storage	Diesel Service Stations	Stage 2: Spillage	Y	Transportation/Distillate Fuel Oil	Energy Consumption	Region
2501070201	Storage and Transport	Petroleum and Petroleum Product Storage	Diesel Service Stations	Underground Tank: Breathing and Emptying	Y	Transportation/Distillate Fuel Oil	Energy Consumption	Region
2501080050	Storage and Transport	Petroleum and Petroleum Product Storage	Airports: Aviation Gasoline	Stage 1: Total	Y	Transportation/Air/ Aviation Gasoline	Energy Consumption	Nation
2501080100	Storage and Transport	Petroleum and Petroleum Product Storage	Airports: Aviation Gasoline	Stage 2: Total	Y	Transportation/Air/ Aviation Gasoline	Energy Consumption	Nation
2501995030	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Working Loss	Crude Oil	Y	Crude Oil Production	Energy Production	Region
2501995060	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Working Loss	Residual Oil	Y	Refined Petroleum Products Supplied/Residual Fuel Oil	Energy Production	Nation
2501995090	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Working Loss	Distillate Oil	Y	Refined Petroleum Products Supplied/Distillate Fuel Oil	Energy Production	Nation

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2501995120	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Working Loss	Gasoline	Y	Refined Petroleum Products Supplied/Motor Gasoline	Energy Production	Nation
2501995150	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Working Loss	Jet Naphtha	Y	Refined Petroleum Products Supplied/Other	Energy Production	Nation
2501995180	Storage and Transport	Petroleum and Petroleum Product Storage	All Storage Types: Working Loss	Kerosene	Y	Refined Petroleum Products Supplied/Distillate Fuel Oil	Energy Production	Nation
2505020030	Storage and Transport	Petroleum and Petroleum Product Transport	Marine Vessel	Crude Oil	Y	Crude Oil Production	Energy Production	Region
2505020060	Storage and Transport	Petroleum and Petroleum Product Transport	Marine Vessel	Residual Oil	Y	Refined Petroleum Products Supplied/Residual Fuel Oil	Energy Production	Nation
2505020090	Storage and Transport	Petroleum and Petroleum Product Transport	Marine Vessel	Distillate Oil	Y	Refined Petroleum Products Supplied/Distillate Fuel Oil	Energy Production	Nation
2505020120	Storage and Transport	Petroleum and Petroleum Product Transport	Marine Vessel	Gasoline	Y	Refined Petroleum Products Supplied/Motor Gasoline	Energy Production	Nation
2505020150	Storage and Transport	Petroleum and Petroleum Product Transport	Marine Vessel	Jet Naphtha	Y	Refined Petroleum Products Supplied/Other	Energy Production	Nation
2505020180	Storage and Transport	Petroleum and Petroleum Product Transport	Marine Vessel	Kerosene	Y	Refined Petroleum Products Supplied/Distillate Fuel Oil	Energy Production	Nation
2505030000	Storage and Transport	Petroleum and Petroleum Product Transport	Truck	Total: All Products	Y	Refined Petroleum Products Supplied/Total	Energy Production	Nation
2505030120	Storage and Transport	Petroleum and Petroleum Product Transport	Truck	Gasoline	Y	Transportation/Motor Gasoline Adjusted by State VMT	Category-specific	State
2505040120	Storage and Transport	Petroleum and Petroleum Product Transport	Pipeline	Gasoline	Y	Refined Petroleum Products Supplied/Motor Gasoline	Energy Production	Nation
2510000000	Storage and Transport	Organic Chemical Storage	All Storage Types: Breathing Loss	Total: All Products	Y	Basic Organic Chemicals - NAICS 32511, 32519	Output	Region
2515000900	Storage and Transport	Organic Chemical Transport	All Transport Types	Tank Cleaning		Basic Organic Chemicals - NAICS 32511, 32519	Output	Region
2530000020	Storage and Transport	Bulk Materials Storage	All Storage Types	Cement	Y	Cement Manufacturing - NAICS 32731	Output	Region
2530000100	Storage and Transport	Bulk Materials Storage	All Storage Types	Limestone	Y	Other Mining & Quarrying - NAICS 2122, 2123	Output	Region
2530000120	Storage and Transport	Bulk Materials Storage	All Storage Types	Sand	Y	Other Mining & Quarrying - NAICS 2122, 2123	Output	Region
2530050000	Storage and Transport	Bulk Materials Storage	Bulk Stations/ Terminals	Total: All Products	Y	Population (Thous)	Demographic	Region

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2601000000	Waste Disposal, Treatment, and Recovery	On-site Incineration	All Categories	Total	Y	Population (Thous)	Demographic	Region
2601010000	Waste Disposal, Treatment, and Recovery	On-site Incineration	Industrial	Total	Y	Total Industrial - NAICS 111-115, 21*, 23*, 31-33	Output	Region
2601020000	Waste Disposal, Treatment, and Recovery	On-site Incineration	Commercial/ Institutional	Total	Y	Population (Thous)	Demographic	Region
2601030000	Waste Disposal, Treatment, and Recovery	On-site Incineration	Residential	Total	Y	Rural Population (Household Waste)	Demographic	State
2610000100	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Yard Waste - Leaf Species Unspecified	Y	Rural Population (Household Waste)	Demographic	State
2610000400	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Yard Waste - Brush Species Unspecified	Y	Rural Population (Household Waste)	Demographic	State
2610030000	Waste Disposal, Treatment, and Recovery	Open Burning	Residential	Household Waste (use 26-10-000-xxx for Yard Wastes)	Y	Rural Population (Household Waste)	Demographic	State
2620000000	Waste Disposal, Treatment, and Recovery	Landfills	All Categories	Total	Y	Population (Thous)	Demographic	Region
2620030000	Waste Disposal, Treatment, and Recovery	Landfills	Municipal	Total	Y	Population (Thous)	Demographic	Region
2630020000	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	Public Owned	Total Processed	Y	Municipal Flow Design (Municipal Wastewater)	Category-specific	State
2630020001	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	Public Owned	Flaring of Gases	Y	Municipal Flow Design (Municipal Wastewater)	Category-specific	State
2640000000	Waste Disposal, Treatment, and Recovery	TSDFs	All TSDF Types	Total: All Processes	Y	Population (Thous)	Demographic	Region
2660000000	Waste Disposal, Treatment, and Recovery	Leaking Underground Storage Tanks	Leaking Underground Storage Tanks	Total: All Storage Types	Y	Manufacturing and Service & Other (Total)/Solvents	Category-specific	Nation
2801000000	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture - Crops	Total	Y	Major Crop Acres Harvested (Agricultural Burning)	Category-specific	Nation
2801000003	Miscellaneous Area Sources	Agriculture Production - Crops	Agriculture - Crops	Tilling	Y	Major Crop Acres Tilled (Agricultural Tilling)	Category-specific	Nation
2801700001	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Anhydrous Ammonia	Y	Crop Production - NAICS 111	Output	Region
2801700002	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Aqua Ammonia	Y	Crop Production - NAICS 111	Output	Region
2801700003	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Nitrogen Solutions	Y	Crop Production - NAICS 111	Output	Region
2801700004	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Urea	Y	Crop Production - NAICS 111	Output	Region

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2801700005	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Nitrate	Y	Crop Production - NAICS 111	Output	Region
2801700006	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Sulfate	Y	Crop Production - NAICS 111	Output	Region
2801700007	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Thiosulfate	Y	Crop Production - NAICS 111	Output	Region
2801700010	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	N-P-K	Y	Crop Production - NAICS 111	Output	Region
2801700011	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Calcium Ammonium Nitrate	Y	Crop Production - NAICS 111	Output	Region
2801700012	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Potassium Nitrate	Y	Crop Production - NAICS 111	Output	Region
2801700013	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Diammonium Phosphate	Y	Crop Production - NAICS 111	Output	Region
2801700014	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Monoammonium Phosphate	Y	Crop Production - NAICS 111	Output	Region
2801700015	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Liquid Ammonium Polyphosphate	Y	Crop Production - NAICS 111	Output	Region
2801700099	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Miscellaneous Fertilizers	Y	Crop Production - NAICS 111	Output	Region
2805001000	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef Cattle Feedlots	Total (also see 2805020000)	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805001100	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef Cattle - finishing operations on feedlots (drylots)	Dust kicked-up by Hooves	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805001200	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef Cattle - finishing operations on feedlots (drylots)	Feed preparation	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805001300	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef Cattle - finishing operations on feedlots (drylots)	Land Application of Manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805002000	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle production composite	Note Elsewhere Classified	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805003100	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on paste/range	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805007100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with dry manure management systems	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2805007300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with dry manure management systems	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805008100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805008200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Manure handling and storage	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805008300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805009100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805009200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Manure handling and storage	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805009300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805010100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805010200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Manure handling and storage	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805010300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805018000	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle composite	Not Elsewhere Classified	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805019100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805019200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Manure handling and storage	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator		
						Description	Data Type	Geography
2805019300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805021100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805021200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Manure handling and storage	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805021300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805022100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805022200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Manure handling and storage	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805022300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805023100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805023200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Manure handling and storage	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805023300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805025000	Miscellaneous Area Sources	Agriculture Production - Livestock	Hogs and Pigs Composite	Total	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805030000	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry and Chickens Composite	Total	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805030007	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry Waste Emissions	Ducks	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805030008	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry Waste Emissions	Geese	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region

SCC	SCC1_DESC	SCC3_DESC	SCC6_DESC	SCC8_DESC	In EPA Crosswalk?	Growth Indicator Description	Data Type	Geography
2805035000	Miscellaneous Area Sources	Agriculture Production - Livestock	Horses and Ponies Composite	Total	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805039100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805039200	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Manure handling and storage	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805039300	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805040000	Miscellaneous Area Sources	Agriculture Production - Livestock	Sheep and Lambs Composite	Total	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805045000	Miscellaneous Area Sources	Agriculture Production - Livestock	Goats Waste Emissions	Not Elsewhere Classified	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805047100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal age)	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805047300	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal age)	Land application of manure	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2805053100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - outdoor operations (unspecified animal age)	Confinement	Y	Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2806010000	Miscellaneous Area Sources	Domestic Animals Waste Emissions	Cats	Total		Population (Thous)	Demographic	Region
2806015000	Miscellaneous Area Sources	Domestic Animals Waste Emissions	Dogs	Total		Population (Thous)	Demographic	Region
2807030000	Miscellaneous Area Sources	Wild Animals Waste Emissions	Deer	Total		Other Agriculture, Forestry, Fishing & Hunting - NAICS 112 - 115	Output	Region
2810025000	Miscellaneous Area Sources	Other Combustion	Charcoal Grilling	Total	Y	Population (Thous)	Demographic	Region
2810030000	Miscellaneous Area Sources	Other Combustion	Structure Fires	Total	Y	No Growth	Category-specific	N/A
2810050000	Miscellaneous Area Sources	Other Combustion	Motor Vehicle Fires	Total	Y	Population (Thous)	Demographic	Region
2810060200	Miscellaneous Area Sources	Other Combustion	Cremation	Animals	Y	Population (Thous)	Demographic	Region

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						Description	Data Type	Geography
2830000000	Miscellaneous Area Sources	Catastrophic/ Accidental Releases	All Catastrophic/ Accidental Releases	Total	Y	No Growth	Category-specific	N/A
2830001000	Miscellaneous Area Sources	Catastrophic/ Accidental Releases	Industrial Accidents	Total	Y	No Growth	Category-specific	N/A
2841000040	Miscellaneous Area Sources	Miscellaneous Repair Shops	Miscellaneous Repair Shops	Soldering Operations	Y	Population (Thous)	Demographic	Region

B.   STATIONARY AREA SOURCE EMISSION CONTROLS

This section describes the control factor development part of the projections analysis.

1.   VOC Solvent Categories

EPA estimated that the aerosol coatings rule will achieve the equivalent of a 19 percent reduction in mass VOC emissions from the 1990 baseline (FR, 2008). The year 1990 represents the baseline, since there has been no previous Federal rulemaking for aerosol coatings. The creditable reduction that may be claimed is 0.114 pounds per capita. This VOC emission reduction is applied to SCC 2460500000, which are coatings and related products. A 12 percent VOC emission reduction is applied to SCC 2460500000 in the forecast year to estimate the benefit of the federal aerosol coatings rule. This percentage is lower than the equivalent value estimated by EPA because the aerosol coatings rule is a subset of the Coatings and related products category represented by SCC 2460500000.

EPA is still evaluating federal rules for other solvent categories, including architectural and industrial maintenance (AIM) coatings and consumer solvents. All of these may potentially see federal action in the future, but at the moment there are no additional regulations of solvent categories on the books. However, based on information from the Ozone Transport Commission (OTC), there have been additional solvent regulations put into place in certain Virginia counties for both AIM coatings and consumer solvents. These are shown in Table II-2.

For AIM coatings, the 2001 OTC model rule was estimated to provide a 31 percent reduction in VOC emissions from the Federal Part 59 rule that was adopted in the 1990s (OTC, 2001). For modeling purposes, a 31 percent reduction in VOC emissions was estimated for the AIM rule in the Fredericksburg and Richmond areas as shown in Table II-2. The reductions apply to the following SCCs:

- 24-01-001-000 All AIM Coatings;
- 24-01-002-000 AIM Coatings Solvent Based;
- 24-01-003-000 AIM Coatings Water Based;
- 24-01-008-000 Traffic Markings;
- 24-01-100-000 Industrial Maintenance Coatings; and
- 24-01-200-000 Other Special Purpose Coatings.

Each Mid-Atlantic Northeast Visibility Union (MANE-VU) state was polled by the Mid-Atlantic Regional Air Management Association (MARAMA) to determine whether the state has adopted a rule that would achieve reductions equivalent to the 2001 OTC recommendations and whether the estimated reduction in VOC emissions should be applied in 2013, 2017, and 2020. Many states adopted the rule prior to 2007 and have already accounted for the reductions attributable to the rule in their 2007 inventories. Other states had compliance dates after 2007 and the effect of the rule was not accounted for in their 2007 inventory.

Table II-2. Virginia AIM Rule

State	VOC Percent Reduction to use for 2017-2025:
VA-NVA	0
VA-FRD	31.0
VA-RCH	31.0
VA-Other	0

NOTES: VA-NVA includes the cities/counties in the Northern Virginia emission control area.
VA-FRD includes the cities/counties in the Fredericksburg emission control area.
VA-RCH includes the city/counties in the Richmond emission control area.
VA-Other includes cities/counties in Virginia not listed above.

The OTC 2001 model rule for consumer products uses more stringent VOC content limits than the Federal rule that became effective in 1998. The OTC 2006 model rule modified the OTC 2001 model rule based on amendments adopted by CARB in July 2005 to include additional products and more stringent VOC limits for certain products.

The reductions apply to the following SCCs:

- 24-60-000-000 Consumer Products, All Products;
- 24-60-100-000 Consumer Products, Personal Care Products;
- 24-60-200-000 Consumer Products, Household Products;
- 24-60-400-000 Consumer Products, Auto Aftermarket Products;
- 24-60-500-000 Consumer Products, Coatings;
- 24-60-600-000 Consumer Products, Adhesives and Sealants;
- 24-60-800-000 Consumer Products, Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) Products;
- 24-60-900-000 Consumer Products, Misc. Products; and
- 24-65-000-000 Consumer Products, All Products.

For Virginia, a set of control factors were developed to reflect the reductions to the SCCs proposed above, as shown in Table II-3.

Table II-3. Virginia Consumer Products Rules

State	VOC Percent Reduction to use for 2017-2025:
VA-NVA	2.0
VA-FRD	15.9
VA-RCH	15.9
VA-Other	0

2.   Portable Fuel Containers

EPA adopted emission standards for portable fuel containers (PFCs) under the consumer products authority of the Clean Air Act. Starting with containers manufactured in 2009, the standard limits evaporation and permeation emissions from these containers to 0.3 grams of hydrocarbons per gallon per day. EPA also adopted test procedures and a certification and compliance program in order to ensure that containers meet the emission standard over a range of in-use conditions.

Because the growth rates reflected in SESARM's growth factor file incorporate the combined effect of projected activity level and emission rate changes, it was not necessary to develop separate control factors for PFCs. The PFC growth factors were developed by interpolating from EPA emission estimates developed for 2002, 2010, 2015, 2020, and 2030 in support of the MSAT rule (EPA, 2007). The EPA estimates, which reflect state-level residential and commercial sector permeation, evaporation, spillage, and refilling VOC emissions, incorporate both emission activity changes, as well as the emission reduction effects of state programs to reduce PFC emissions, standards EPA promulgated in the MSAT rule, and the Renewable Fuel Standard's effects on gasoline volatility.

3.   Residential Wood Heating (Woodstoves and Fireplace Inserts)

Similar to PFCs, it was not necessary to develop residential wood combustion source category control factors because EPA has developed growth estimates that reflect the combined effects of activity growth and Federal New Source Performance Standards (NSPS) for wood heaters (EPA, 2008a). Table II-4 summarizes the growth rate assumptions applied for each residential wood combustion SCC in the SESARM base year inventory. 2018 growth factors were then calculated relative to a 2008 base year, since that is the year that the NSPS went into effect.

It is important to note that EPA is planning to propose revisions to the residential wood combustion NSPS. The new standards are expected to affect more types of residential wood heating devices (e.g., pellet stoves and hydronic heaters), as well as tighten standards for at least some of the devices subject to the current NSPS.

Table II-4. Residential Wood Combustion Category Growth Assumptions

SCC	Description	Growth Rate Assumption*
2104008100	Fireplace: General	+1%/year
2104008210	Woodstove: Fireplace Inserts; Non-EPA Certified	-2%/year
2104008220	Woodstove: Fireplace Inserts; EPA Certified; Non-catalytic	+2%/year
2104008230	Woodstove: Fireplace Inserts; EPA Certified; Catalytic	+2%/year
2104008310	Woodstove: Freestanding, Non-EPA Certified	-2%/year
2104008320	Woodstove: Freestanding, EPA Certified, Non-Catalytic	+2%/year
2104008330	Woodstove: Freestanding, EPA Certified, Catalytic	+2%/year
2104008400	Woodstove: Pellet-fired, General (freestanding or fireplace insert)	+2%/year
2104008610	Hydronic Heater: Outdoor	+1%/year
2104008700	Outdoor Wood Burning Device, NEC (fire-pits, chimeas, etc.)	+1%/year

*Represents estimated combined effect of activity growth and emissions control (where applicable).

4.   Municipal Solid Waste (MSW) Open Burning

For the State of North Carolina, 2007 emissions reported for MSW Open Burning (SCC 2610030000) are uncontrolled. However, the base year emissions should have reflected a 50 percent overall control factor, with a corresponding 100 percent control efficiency (CE), 100 percent rule penetration (RP) and 50 percent rule effectiveness (RE) (Jones, 2012). North Carolina provided projected RE values showing an increasingly higher level of compliance with their MSW open burning regulations (see Table II-5).

Tran Systems

Table II-5. Forecast Year Rule Effectiveness (RE) Value for MSW Open Burning

Year	RE value
2017	0.67
2018	0.68
2019	0.70
2020	0.72
2021	0.73
2022	0.75
2023	0.75
2024	0.75
2025	0.75

When the 2018 RE value is combined with values of 100 percent for both CE and RP, an overall control factor of 0.32 is estimated for 2018, which was applied to the 2007 base year emissions for this SCC. Note that the forecast methods used are designed to provide the best possible estimate of 2018 emissions. With the 2007 base year value being fixed, application of these control factors will make it look like there are more emission reductions in North Carolina for MSW open burning than are expected.

5.   Service Stations Stage I Refueling

Table II-6 lists the SCCs used to represent Stage I service station refueling emissions. Activity data for this category are the monthly gasoline throughput values by county at service stations. Monthly gasoline throughput values used in the base year 2007 Stage I emission calculations were grown to 2018 by applying regional gasoline growth factors from *AEO 2010* to each state in the corresponding region. Gasoline throughput values for 2007 from states in the East South Central Region (Alabama, Kentucky, Mississippi, and Tennessee) were multiplied by a growth factor of 0.77 while the data from states in the South Atlantic Region (Florida, Georgia, North Carolina, South Carolina, Virginia, and West Virginia) were multiplied by a factor of 0.95. As these factors are both less than 1, they represent decreases in gasoline throughput relative to 2007.

Table II-6. Stage I Gasoline Refueling SCCs

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2501060051	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Submerged Filling
2501060052	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Splash Filling
2501060053	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 1: Balanced Submerged Filling

The 2018 monthly gasoline throughput for each county was then allocated to one of three fill methods. Based on the NESHAP for Gasoline Dispensing Facilities, fill method requirements will vary primarily based on the monthly gasoline throughput of a service station (40 CRF Part 63, 2008). In general, stations with greater than 100,000 gallons of gasoline throughput on a monthly basis are required to use a vapor balance system and stations with greater than 10,000 gallons of gasoline throughput on a monthly basis are required to use submerged fill pipes. Based on an analysis of national gasoline consumption by service station monthly throughput, the percentage of gasoline subject to each of these Stage I control methods was estimated as shown in Table II-7 (MACTEC, 2006). Thus, the 2018 monthly gasoline throughput by county was reallocated to ensure that the percentage of gasoline throughput was at least at these levels. The general process was first to increase the share subject to vapor balance so that it was 68 percent or greater, then to reduce the splash loading share so it was 12.5 percent or less and then any remainder was allocated to submerged fill. In some counties, no reallocations of the gasoline throughput were required as all of the activity was already in balanced submerged filling, some only required adjustment to balanced and splash, and then others required all of their activity to be re-allocated.

Table II-7. Allocation of Stage I Gasoline Volumes and Model Parameters by Fill Method

Fill Method	Throughput Percentage*	S Factor	Control Efficiency
Submerged fill with vapor balance	68%	1.0	90%
Submerged fill, no vapor balance	19.5%	0.6	0%
Splash loading	12.5%	1.45	0%
*SOURCE: MACTEC, 2006.			

The Stage I emission factor calculations are dependent on an S Factor value, temperature, control efficiency, and Reid vapor pressure (RVP). The control efficiency and S Factor are shown by fill method in Table II-7. These same values were also used in the base year Stage I emission calculations. The county-level monthly RVP values to be used in the 2018 Stage I emission calculations were reviewed by the SESARM agencies, and updated as requested by these agencies. The monthly temperature values used in the base year Stage I calculations were also used in the 2018 emission calculations.

Stage I emissions for 2018 were then calculated by multiplying the monthly, county-level gasoline throughput by fill method by the corresponding emission factor.

6.   Service Stations Stage II Vehicle Refueling

For vehicle refueling at gasoline service stations, emissions were calculated at a monthly level for each county using MOBILE6-based gram per gallon refueling emission factors and monthly gasoline volumes by county.

Emission Factors
The monthly fuel properties modeled in MOBILE6, including RVP, ethanol volume, and ethanol market share were reviewed by the SESARM state and local agencies, and updated where indicated by agency staff. These updated fuel properties are the same values that were also used in the National Mobile Inventory Model (NMIM) runs to estimate the nonroad emissions and in the Stage I emission calculations. In addition, these agencies also reviewed Stage II control information. Table II-8 lists the counties that were modeled with Stage II refueling controls in the 2018 MOBILE6 runs and the associated control efficiency.

Table II-8. Stage II Refueling Controls in Projection Years

State	County	Federal Information Processing Standard (FIPS) State Code	FIPS County Code	Projection Year Refueling Control Efficiency (%)
GA	Cherokee County	13	57	81
GA	Clayton County	13	63	81
GA	Cobb County	13	67	81
GA	Coweta County	13	77	81
GA	DeKalb County	13	89	81
GA	Douglas County	13	97	81
GA	Fayette County	13	113	81
GA	Forsyth County	13	117	81
GA	Fulton County	13	121	81
GA	Gwinnett County	13	135	81
GA	Henry County	13	151	81
GA	Paulding County	13	223	81
GA	Rockdale County	13	247	81
KY	Boone County	21	15	95
KY	Campbell County	21	37	95

State	County	Federal Information Processing Standard (FIPS) State Code	FIPS County Code	Projection Year Refueling Control Efficiency (%)
KY	Jefferson County	21	111	95
KY	Kenton County	21	117	95
TN	Davidson County	47	37	95
TN	Rutherford County	47	149	86
TN	Sumner County	47	165	86
TN	Williamson County	47	187	86
TN	Wilson County	47	189	86

MOBILE6 runs were generated by county and month using these fuel properties, Stage II control efficiencies as indicated in Table II-8, and hourly temperature data, as used in the base year NMIM runs. Output from these runs included 2018 VOC refueling grams per mile emission factors by vehicle type and 2018 vehicle fuel economy (miles per gallon) by vehicle type for each month and county. The vehicle fuel economy data were needed to convert the refueling emission factors to grams per gallon. A weighted all-gasoline-vehicle emission factor was estimated in grams per gallon by month and county using the MOBILE6 gram per mile emission rate, the MOBILE6 fuel economy, and the VMT mix fraction from the base year calculations. This calculation was performed for each month and county.

Activity
The monthly gasoline volumes by county used in the Stage I calculations, representing the 2007 volumes grown to 2018 using regional gasoline growth factors, were also used in estimating the Stage II emissions.

Emissions
Stage II refueling emissions were calculated for 2018 by multiplying the weighted county/monthly grams per gallon emission rates for each month and county by the corresponding gasoline volume in gallons. The monthly emissions summed and converted from grams to tons to obtain annual 2018 county-level Stage II refueling emissions. All emissions from Stage II service station refueling were assigned to SCC 2501060100.

7. Area Source Maximum Achievable Control Technology (MACT)

During the spring of 2011, TranSystems developed summaries of MACT standards that EPA has been in the process of developing for about 70 area source categories. While EPA expects there to be criteria pollutant emission reductions associated with these area source standards, for the emissions projections analysis that was performed for the Mid-Atlantic and Northeast states, it was assumed that states already have emission standards that are as strict as the area source MACT standards. We went through a process of having each of the SESARM states and local agency review the area source MACTs and the likely effects in their areas. This review focused on Group One and Group Two rules. After this review and consultation period ended, it was agreed to only include the MACT effects of Stage I (service station) controls.

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SECTION III. NONROAD MOBILE SOURCE EMISSIONS

The nonroad sector is comprised of nonroad engines included in EPA's NONROAD model, as well as other engines not modeled in NONROAD, including aircraft, commercial marine vessels and locomotives. A 2018 nonroad sector inventory was developed using the following general procedures:

- NONROAD model categories were based on NMIM2008. SESARM agencies were asked to review and provide revisions as needed to select fuel inputs in the latest 2018 NMIM County Database.
- Aircraft category emissions were forecast using landing and take-off operation (LTO) projections available from the Federal Aviation Administration. No controls were assumed for the aircraft sector.
- For the commercial marine vessel and locomotive categories, emissions were projected using growth factors developed from available fuel or emission forecasts, coupled with emission reductions available from EPA regulatory support documents for these categories.

A more detailed description of how 2018 emissions estimates for all nonroad categories were prepared is provided below.

A.   NONROAD MODEL SOURCES

NONROAD model categories include equipment such as recreational marine and land-based vehicles, farm, construction and industrial machinery, and lawn and garden equipment. These equipment are powered by compression-ignition engines, which are typically diesel-fueled, as well as spark-ignition or gasoline-fueled engines. Compressed natural gas (CNG) and liquefied petroleum gas (LPG) engines are also included in the NONROAD model.

For the NONROAD model categories, only a future year 2018 emissions inventory was prepared. Growth and control factors representing these categories for 2017, as well as 2019 through 2025 were not required for this effort, in part because growth and emission reduction data are embedded in the detailed NONROAD model algorithms, and cannot easily be resolved at the SCC level.

NMIM2008 incorporates EPA's latest NONROAD model (NONROAD2008a) released in July 2009, and reflects all of EPA's final nonroad standards to date. TranSystems distributed 2018 fuel input data from the NMIM county-level database (NCD) to SESARM agencies for review and comment. This included monthly RVP, ethanol volume percent, ethanol market shares, and corresponding oxygen weight percent. Updates provided by the SESARM agencies were incorporated in the NMIM county database to be used for the 2018 NMIM nonroad runs.

Fuel sulfur levels relied on the NMIM model defaults. For 2018, the land-based nonroad diesel sulfur concentration is 11 parts per million (ppm), while the recreational marine nonroad diesel sulfur concentrations is 49 ppm. For gasoline sulfur, average county, monthly values are approximately 24 ppm, with little deviation (standard deviation of 1.16 ppm). Temperature data as modeled in the base year 2007 NMIM runs were used for all subsequent forecast years.

Once the inputs to NMIM/NONROAD were quality assured, TranSystems ran NMIM to generate 2018 annual emission estimates for all SESARM states for all NONROAD model SCCs. Emissions from aircraft ground support equipment are now entirely addressed by the aircraft sector inventory. As with the base year, TranSystems removed emission estimates from the NMIM output for the airport ground support equipment (GSE) SCCs (i.e., SCCs 2265008005, 2267008005, and 2270008005).

B.   AIRCRAFT, COMMERCIAL MARINE VESSELS, AND LOCOMOTIVES

This section describes how TranSystems estimated growth factors for aircraft, as well as growth and control factors for commercial marine vessels and locomotives. The growth and control factors can be used by SEMAP state and local agencies to prepare future year inventories for 2017-2025 from a 2007 base year. A 2018 forecast year emissions inventory was prepared for SEMAP using growth and control factors representative of 2018.

1.   Aircraft

Aircraft emission estimates were developed for the SCCs shown in Table III-1for the 2007 SEMAP base year inventory.

Table III-I. Aircraft SCCs

Description	SCC
Military Aircraft	2275001000
Commercial Aircraft	2275020000
General Aviation - Piston	2275050011
General Aviation - Turbine	2275050012
Air Taxi - Piston	2275060011
Air Taxi - Turbine	2275060012
Auxiliary Power Unit (APU)	2275070000
4-Stroke Gasoline GSE	2265008005
LPG GSE	2267008005
CNG GSE	2268008005
Diesel GSE	2270008005

Growth factors for all aircraft engine and airport-related SCCs were based on state-level LTO projections available from the Federal Aviation Administration's Terminal Area Forecasts (TAF) (FAA, 2010). Forecasts of LTOs are available for commercial, military, general aviation and air taxi operations (both itinerant and local). Commercial aircraft LTO data were used to develop growth factors for the APU and GSE categories. All growth factors were calculated relative to 2007 LTO data. Growth rates for military aircraft were held constant at 2007 levels. Forecasts of LTOs for individual airports/facilities in the TAF assigned to counties were compiled by aircraft type for the select forecast year, and summed to the county level. Since all airports and their associated LTOs in the TAF could not be readily assigned to counties, state average growth factors were also calculated.

Traditionally, control factors have not been applied to aircraft for criteria pollutant forecasts. Quantitative information on reductions has not been available, and the reductions from these standards are believed to be minimal. EPA's Office of Transportation and Air Quality has an active project that is designed to help them better understand the impact of International Civil Aviation Organization standards on commercial aircraft NO_x emission inventories. Based on communications with EPA, it was determined that year-specific NO_x control factors accounting for rule penetration into the domestic aircraft fleet will be forthcoming, but are not yet available (Manning, 2011). As such, no controls were developed and applied to the aircraft engine category forecasts.

2.   Commercial Marine Vessels

For the purpose of applying growth and controls for commercial marine vessels (CMVs), it was assumed that Category 1 and 2 engines typically use distillate fuels, while Category 3 engines primarily use residual blends. As such, Category 1 & 2 growth and control factors were applied to diesel in-port and underway SCCs (2280002100 and 2280002200), and Category 3 growth factors and reductions were applied to residual in-port and underway SCCs (2280003100 and 2280003200).

TranSystems developed growth factors for residual CMVs using average annual growth rates by region developed by EPA in support of their Category 3 engine rulemaking (EPA, 2009a). Regional growth rates are available for designated states in the East Coast region, as well as the Gulf Coast Region.

For diesel engine CMV emissions, TranSystems calculated growth factors based on fuel consumption forecasts published by the EIA. Table 67 of EIA's *AEO 2010* provides national-level forecasts of distillate oil (diesel) energy consumption (in trillion British thermal units [Btu]) by domestic and international shipping sectors for years out to 2035 (EIA, 2010).

In 2009, EPA promulgated new emission standards for certain categories of diesel engines used in CMVs. TranSystems developed CMV control factors using information from EPA's regulatory impact analyses (RIA) for these emission standards (EPA, 2008b; EPA, 2009a).

Control factors for Category 1 and 2 engines were developed based on emission reductions calculated from national base case and control case inventories developed for the years 2002 through 2040 (EPA, 2008b). These control factors account for both the level of control required by the standard (i.e., control efficiency) as well as the measure of rule penetration (i.e., what fraction of the fleet is meeting the specific level of control). TranSystems estimated emission reductions and control factors for the chosen forecast year relative to any reductions expected to occur in the 2007 base year. Emission reductions were modeled for NO_x, SO_2, PM_{10}, $PM_{2.5}$, and VOC for Category 1 and 2 engines.

Control factors for Category 3 engines were developed from EPA regional base case and control case inventories. EPA's RIA for Category 3 engines includes base and control case inventories for select years out to 2030 (EPA, 2009a). Region-specific control factors were developed for the selected forecast year based on EPA's inventories for the East Coast and Gulf Coast regions of the U.S. Using EPA designations, SESARM states/counties were assigned to the East Coast or Gulf Coast region. Emission reductions were modeled for NO_x, SO_2, PM_{10}, and $PM_{2.5}$ for Category 3 engines.

3. Locomotives

Base year emissions for locomotives are reported for the following SCCs:

- 2285002006 – Diesel Class I Line Haul;
- 2285002007 – Diesel Class II/III Line Haul;
- 2285002008 – Diesel Passenger (Amtrak);
- 2285002009 – Diesel Commuter; and
- 2285002010 – Diesel Switchyard Locomotives.

For Class I and Class II/III line haul and diesel switchyard operations, TranSystems calculated growth factors based on freight rail sector fuel consumption forecasts, as published by the EIA. Table 67 of EIA's *AEO 2010* provides national-level forecasts of freight rail distillate oil (diesel) consumption (in trillion Btu) out to 2035 (EIA, 2010). For passenger and commuter rail, growth factors were developed from national forecasts of intercity rail diesel consumption, and commuter rail diesel consumption, available from Table 46 of *AEO 2010* (EIA, 2010). The growth factors represent national-level forecasts; the same values were used for all states.

Similar to CMVs, diesel locomotive engines are subject to revised Federal Tier 0, Tier 1, and Tier 2 standards, as well as new Tier 3 and 4 standards. TranSystems developed control factors for diesel-powered locomotive engine emissions based on EPA's locomotive engine RIA and associated emission factor guidance (EPA, 2008b; EPA, 2009b). TranSystems compiled fleet-average emission factors published by EPA for 2007 and the chosen forecast

year, and calculated the incremental reductions expected over this time period. Future year emission factors are available for Large Class I Line Haul, Small Class II/III Line Haul, Switchyard, and Passenger/Commuter operations. Reductions were modeled for NO_x, PM_{10}, $PM_{2.5}$, VOC, as well as SO_2.

SO_2 reductions were estimated using EPA's suggested future average fuel sulfur values (EPA, 2009c). However, since ERTAC assumed a 2007 SO_2 emission factor of 1.88 grams (g)/gallon (gal), this value replaced EPA's average 2007 value (equivalent to 8.34 g/gal) in calculating future year reductions for line haul and switchyard locomotive SCCs. By 2018, EPA estimated an average emission factor of 0.35 g/gal, resulting in an emission reduction approximating 82 percent. The following calculation shows how SO_2 emission factors were derived based on the assumed sulfur content (in ppm) of the fuel for both 2007 and 2018.

$$SO_2 (g/gal) = (FD) \times (CF) \times (64\ g\ SO_2/32\ g\ S) \times (S\ content)$$

where: FD = fuel density (g/gallon)
CF = conversion factor, or fraction of fuel sulfur converted to SO_2
S = sulfur content of fuel, ppm

In 2007, the sulfur content of the fuel is 300 ppm:

$$SO_2 (g/gal) = (3200) \times (0.978) \times (2.00) \times (300\ x\ 10^6) = 1.88\ g/gal$$

For 2018, the sulfur content of the fuel is 55 ppm:

$$SO_2 (g/gal) = (3200) \times (0.978) \times (2.00) \times (55\ x\ 10^6) = 0.34\ g/gal$$

SECTION IV. FORECAST YEAR (2018) EMISSION SUMMARIES

This section presents the emission summaries for the 2018 stationary area and nonroad mobile emissions inventory for the SEMAP region. The 2018 emission summaries are presented first, followed by comparisons with 2007 base year emissions.

A.   NONROAD MOBILE SOURCES

1.   2018 Emission Estimates

Table IV-1 provides a summary of 2018 nonroad mobile annual emissions by the four major nonroad subsectors for the SESARM region. PM_{10} and $PM_{2.5}$ emissions represent primary PM, and are reported as PM10-PRI, and PM25-PRI. The commercial marine category is the most significant contributor regionally to SO_2 emissions. NONROAD model (i.e., NMIM) categories account for the large majority of emissions for NO_x, VOC, PM10-PRI, PM25-PRI, and CO.

Table IV-1. 2018 SESARM Nonroad Source Emissions by Major Sector

Category	Pollutant Emissions, tons per year						
	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH_3
NONROAD Model	562	225,759	347,820	24,343	23,029	3,320,300	534
Aircraft	3,516	36,409	18,287	3,981	3,005	195,770	NA
Commercial Marine	10,049	142,298	4,407	4,536	4,346	30,513	99
Locomotive	328	104,552	4,409	2,468	2,281	22,403	70
All Nonroad	14,455	509,018	374,922	35,328	32,662	3,568,986	703

Table IV-2 presents a summary of the annual NONROAD model emission estimates by state, as well as the percentage contribution of each state to total regional emissions. Similar summaries providing 2018 annual state-level emission estimates for aircraft, commercial marine, and locomotives, as well as the percent contributions, are shown in Tables IV-3, IV-4, and IV-5, respectively.

Table IV-2. 2018 NONROAD Model Emission Estimates by State

State	Pollutant Emissions, tons per year						
	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH_3
Alabama	40	14,937	27,602	1,617	1,526	221,071	35
Florida	158	66,403	107,377	6,864	6,490	987,937	159
Georgia	70	27,977	39,745	3,207	3,033	413,064	68
Kentucky	36	15,915	19,839	1,564	1,487	170,049	33
Mississippi	27	11,413	18,724	1,126	1,067	128,957	25
North Carolina	77	29,663	40,594	3,207	3,036	418,789	70
South Carolina	39	13,664	22,564	1,557	1,472	263,422	35
Tennessee	50	20,016	29,659	2,077	1,967	261,930	45
Virginia	55	21,415	31,207	2,550	2,409	376,528	54
West Virginia	12	4,357	10,509	574	540	78,553	11
Total SESARM	562	225,759	347,820	24,343	23,029	3,320,300	534

	Percentage of Regional Total						
State	SO$_2$	NO$_x$	VOC	PM10-PRI	PM25-PRI	CO	NH$_3$
Alabama	7.0	6.6	7.9	6.6	6.6	6.7	6.6
Florida	28.1	29.4	30.9	28.2	28.2	29.8	29.7
Georgia	12.5	12.4	11.4	13.2	13.2	12.4	12.8
Kentucky	6.3	7.0	5.7	6.4	6.5	5.1	6.3
Mississippi	4.8	5.1	5.4	4.6	4.6	3.9	4.6
North Carolina	13.6	13.1	11.7	13.2	13.2	12.6	13.0
South Carolina	6.9	6.1	6.5	6.4	6.4	7.9	6.5
Tennessee	8.9	8.9	8.5	8.5	8.5	7.9	8.5
Virginia	9.7	9.5	9.0	10.5	10.5	11.3	10.0
West Virginia	2.1	1.9	3.0	2.4	2.3	2.4	2.0
Total SESARM	100	100	100	100	100	100	100

Table IV-3. 2018 Aircraft Emission Estimates by State

	Pollutant Emissions, tons per year					
State	SO$_2$	NO$_x$	VOC	PM10-PRI	PM25-PRI	CO
Alabama	55	474	915	299	209	15,032
Florida	1,165	12,755	5,019	1,009	770	56,982
Georgia	750	6,124	2,849	426	349	29,653
Kentucky	191	1,963	820	181	136	10,228
Mississippi	23	190	671	171	119	8,631
North Carolina	455	4,355	2,567	527	433	23,501
South Carolina	64	554	825	194	138	10,235
Tennessee	349	4,035	1,542	276	215	15,390
Virginia	455	5,882	2,843	832	589	22,736
West Virginia	9	77	237	67	46	3,382
Total SESARM	3,516	36,409	18,287	3,981	3,005	195,770
	Percentage of Regional Total					
State	SO$_2$	NO$_x$	VOC	PM10-PRI	PM25-PRI	CO
Alabama	1.6	1.3	5.0	7.5	7.0	7.7
Florida	33.1	35.0	27.4	25.3	25.6	29.1
Georgia	21.3	16.8	15.6	10.7	11.6	15.1
Kentucky	5.4	5.4	4.5	4.5	4.5	5.2
Mississippi	0.7	0.5	3.7	4.3	4.0	4.4
North Carolina	12.9	12.0	14.0	13.2	14.4	12.0
South Carolina	1.8	1.5	4.5	4.9	4.6	5.2
Tennessee	9.9	11.1	8.4	6.9	7.2	7.9
Virginia	12.9	16.2	15.5	20.9	19.6	11.6
West Virginia	0.3	0.2	1.3	1.7	1.5	1.7
Total SESARM	100	100	100	100	100	100

Table IV-4. 2018 Commercial Marine Vessel Emission Estimates by State

State	Pollutant Emissions, tons per year						
	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH_3
Alabama	1,103	15,269	349	519	502	3,890	8
Florida	2,565	45,268	1,467	1,190	1,131	7,906	38
Georgia	623	9,321	262	286	276	1,963	5
Kentucky	956	12,798	272	449	435	3,045	11
Mississippi	1,078	14,925	340	506	489	3,437	10
North Carolina	274	3,980	126	109	104	747	3
South Carolina	561	2,018	158	61	54	292	1
Tennessee	688	6,156	615	392	366	2,107	4
Virginia	1,236	19,632	544	571	550	4,050	11
West Virginia	965	12,930	275	453	440	3,077	8
Total SESARM	10,049	142,298	4,407	4,536	4,346	30,513	99
	Percentage of Regional Total						
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH_3
Alabama	11.0	10.7	7.9	11.4	11.6	12.7	8.5
Florida	25.5	31.8	33.3	26.2	26.0	25.9	38.0
Georgia	6.2	6.6	5.9	6.3	6.3	6.4	5.4
Kentucky	9.5	9.0	6.2	9.9	10.0	10.0	11.1
Mississippi	10.7	10.5	7.7	11.1	11.3	11.3	10.3
North Carolina	2.7	2.8	2.9	2.4	2.4	2.4	2.6
South Carolina	5.6	1.4	3.6	1.3	1.2	1.0	1.1
Tennessee	6.8	4.3	14.0	8.6	8.4	6.9	4.0
Virginia	12.3	13.8	12.3	12.6	12.7	13.3	11.3
West Virginia	9.6	9.1	6.2	10.0	10.1	10.1	7.7
Total SESARM	100	100	100	100	100	100	100

Table IV-5. 2018 Locomotive Emission Estimates by State

State	Pollutant Emissions, tons per year						
	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH_3
Alabama	34	12,266	522	292	270	2,623	8
Florida	22	8,214	347	187	174	1,565	5
Georgia	46	16,599	706	394	364	3,509	11
Kentucky	32	11,235	457	261	241	2,430	8
Mississippi	18	6,849	271	153	141	1,340	4
North Carolina	22	7,881	337	185	172	1,665	5
South Carolina	17	5,957	245	139	129	1,304	4
Tennessee	64	13,253	584	318	290	2,886	9
Virginia	47	13,808	595	340	317	3,212	10
West Virginia	26	8,488	345	199	184	1,869	6
Total SESARM	328	104,552	4,409	2,468	2,281	22,403	70

State	Percentage of Regional Total						
	SO₂	NOₓ	VOC	PM10-PRI	PM25-PRI	CO	NH₃
Alabama	10.5	11.7	11.8	11.8	11.8	11.7	11.8
Florida	6.7	7.9	7.9	7.6	7.6	7.0	6.9
Georgia	13.9	15.9	16.0	16.0	16.0	15.7	15.7
Kentucky	9.6	10.7	10.4	10.6	10.6	10.8	10.9
Mississippi	5.6	6.6	6.1	6.2	6.2	6.0	6.0
North Carolina	6.6	7.5	7.6	7.5	7.5	7.4	7.5
South Carolina	5.2	5.7	5.6	5.6	5.7	5.8	5.8
Tennessee	19.6	12.7	13.2	12.9	12.7	12.9	12.4
Virginia	14.4	13.2	13.5	13.8	13.9	14.3	14.2
West Virginia	8.1	8.1	7.8	8.1	8.0	8.3	8.7
Total SESARM	100	100	100	100	100	100	100

2.   Comparison with 2007 Emissions

Table IV-6 shows how 2018 emissions compare with 2007 emissions for the entire SESARM region, for the four major nonroad subsectors. The various subsectors are also compared at a state-level between the base and forecast year (see Tables IV-7 through IV-10).

Table IV-6. Comparison of 2007 and 2018 Nonroad Mobile Sector Inventory for the SESARM Region

2007 Nonroad Mobile Inventory							
	Pollutant Emissions, tons per year						
Category	SO₂	NOₓ	VOC	PM10-PRI	PM25-PRI	CO	NH₃
NONROAD Model	23,308	404,580	629,693	41,489	39,517	4,642,050	447
Aircraft	3,105	32,153	18,444	4,066	3,037	196,823	N/A
Commercial Marine	33,715	162,801	4,516	7,869	7,462	28,726	86
Locomotive	2,178	155,025	8,285	5,085	4,693	21,633	67
All Nonroad	62,307	754,560	660,938	58,508	54,709	4,889,229	601
2018 Nonroad Mobile Inventory							
	Pollutant Emissions, tons per year						
Category	SO₂	NOₓ	VOC	PM10-PRI	PM25-PRI	CO	NH₃
NONROAD Model	562	225,759	347,820	24,343	23,029	3,320,300	534
Aircraft	3,516	36,409	18,287	3,981	3,005	195,770	NA
Commercial Marine	10,049	142,298	4,407	4,536	4,346	30,513	99
Locomotive	328	104,552	4,409	2,468	2,281	22,403	70
All Nonroad	14,455	509,018	374,922	35,328	32,662	3,568,986	703
Percentage Difference [(2018-2007)/2007]							
	Percentage Difference						
State	SO₂	NOₓ	VOC	PM10-PRI	PM25-PRI	CO	NH₃
NONROAD Model	-98	-44	-45	-41	-42	-28	20
Aircraft	13	13	-1	-2	-1	-1	NA
Commercial Marine	-70	-13	-2	-42	-42	6	15
Locomotive	-85	-33	-47	-51	-51	4	4
All Nonroad	-77	-33	-43	-40	-40	-27	17

For the NONROAD model category, Table IV-7 shows how emissions are expected to change by state and pollutant from 2007 to 2018. With Federal nonroad engine/vehicle emission standards continuing to phase-in over this forecasting horizon, emissions of all of the pollutants shown, except NH₃, are expected to decline significantly in the Southeast over this period. Expected emission reductions of VOC, NOₓ, and PM are all expected to decline in the range of 40 to 49 percent. SO₂ emissions have the most dramatic drop of any pollutants between 2007 and 2018 as lower sulfur fuel regulations for off-road engines combine with tighter emission standards to achieve these large

reductions. NONROAD model NH_3 emissions increase by an average of 20 percent across the SEMAP region as nonroad equipment populations and activity increase.

Table IV-7. Comparison of 2007 and 2018 NONROAD Model Inventory for the SESARM Region

2007 NONROAD Model Emission Estimates by State						
	Pollutant Emissions, tons per year					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH_3
Alabama	1,483	26,695	49,955	2,806	2,665	316,138	30
Florida	6,714	109,218	193,974	11,543	10,986	1,431,462	134
Georgia	3,079	51,524	69,915	5,315	5,067	629,419	56
Kentucky	1,630	28,665	36,641	2,877	2,749	240,397	28
Mississippi	1,147	20,050	33,760	2,126	2,025	187,258	21
North Carolina	3,111	55,743	76,568	5,434	5,181	597,359	58
South Carolina	1,522	26,742	42,293	2,661	2,534	328,606	29
Tennessee	1,884	36,756	54,089	3,637	3,467	388,497	38
Virginia	2,329	41,658	55,164	4,132	3,937	416,303	45
West Virginia	410	7,529	17,333	957	905	106,609	9
Total SESARM	23,308	404,580	629,693	41,489	39,517	4,642,047	447
2018 NONROAD Model Emission Estimates by State						
	Pollutant Emissions, tons per year					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH_3
Alabama	40	14,937	27,602	1,617	1,526	221,071	35
Florida	158	66,403	107,377	6,864	6,490	987,937	159
Georgia	70	27,977	39,745	3,207	3,033	413,064	68
Kentucky	36	15,915	19,839	1,564	1,487	170,049	33
Mississippi	27	11,413	18,724	1,126	1,067	128,957	25
North Carolina	77	29,663	40,594	3,207	3,036	418,789	70
South Carolina	39	13,664	22,564	1,557	1,472	263,422	35
Tennessee	50	20,016	29,659	2,077	1,967	261,930	45
Virginia	55	21,415	31,207	2,550	2,409	376,528	54
West Virginia	12	4,357	10,509	574	540	78,553	11
Total SESARM	562	225,759	347,820	24,343	23,029	3,320,300	534
Percentage Difference [((2018-2007)/2007)*100]						
	Percentage Difference (%)					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH_3
Alabama	-97	-44	-45	-42	-43	-30	18
Florida	-98	-39	-45	-41	-41	-31	19
Georgia	-98	-46	-43	-40	-40	-34	21
Kentucky	-98	-44	-46	-46	-46	-29	20
Mississippi	-98	-43	-45	-47	-47	-31	18
North Carolina	-98	-47	-47	-41	-41	-30	20
South Carolina	-97	-49	-47	-42	-42	-20	19
Tennessee	-97	-46	-45	-43	-43	-33	20
Virginia	-98	-49	-43	-38	-39	-10	20
West Virginia	-97	-42	-39	-40	-40	-26	20
Total SESARM	-98	-44	-45	-41	-42	-28	20

For the aircraft category, modest increases (~2 to 7 percent), are seen region wide for VOC, CO, PM10-PRI, and PM25-PRI, with relatively higher increases approaching 14 percent for NO_x and SO_2. Since no controls were applied for the aircraft category, all differences are attributable to variations in growth rates. At a state level (see Table IV-8), Kentucky and South Carolina show consistent decreases for all pollutants. For all states, decreases or small increases are seen for CO, PM10-PRI, PM25-PRI, and VOC. States such as Florida, Georgia, and North Carolina show relatively high increases for NO_x and SO_2. Commercial aircraft at larger airports in these states contributes to

the majority (~80 percent) of NO_x and SO_2 emissions relative to other aircraft types, and the growth predicted at airports in these states was significant.

Table IV-8. Comparison of 2007 and 2018 Aircraft Inventory for the SESARM Region

2007 Aircraft Emission Estimates by State						
	Pollutant Emissions, tons per year					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO
Alabama	51	440	891	294	205	14,778
Florida	992	10,746	5,060	1,028	772	57,332
Georgia	608	4,909	2,771	433	346	28,082
Kentucky	219	2,257	918	204	154	11,555
Mississippi	26	219	665	168	117	8,520
North Carolina	370	3,499	2,487	521	423	22,482
South Carolina	68	586	930	210	149	11,117
Tennessee	354	4,054	1,623	292	227	16,318
Virginia	410	5,385	2,842	844	594	23,032
West Virginia	7	59	257	72	50	3,607
Total SESARM	**3,105**	**32,153**	**18,444**	**4,066**	**3,037**	**196,823**
2018 Aircraft Emission Estimates by State						
	Pollutant Emissions, tons per year					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO
Alabama	55	474	915	299	209	15,032
Florida	1,165	12,755	5,019	1,009	770	56,982
Georgia	750	6,124	2,849	426	349	29,653
Kentucky	191	1,963	820	181	136	10,228
Mississippi	23	190	671	171	119	8,631
North Carolina	455	4,355	2,567	527	433	23,501
South Carolina	64	554	825	194	138	10,235
Tennessee	349	4,035	1,542	276	215	15,390
Virginia	455	5,882	2,843	832	589	22,736
West Virginia	9	77	237	67	46	3,382
Total SESARM	**3,516**	**36,409**	**18,287**	**3,981**	**3,005**	**195,770**
Percentage Difference [((2018-2007)/2007)*100]						
	Percentage Difference (%)					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO
Alabama	8	8	3	2	2	2
Florida	17	19	-1	-2	0	-1
Georgia	23	25	3	-2	1	6
Kentucky	-13	-13	-11	-11	-12	-11
Mississippi	-12	-13	1	2	1	1
North Carolina	23	24	3	1	2	5
South Carolina	-6	-6	-11	-8	-8	-8
Tennessee	-1	0	-5	-6	-5	-6
Virginia	11	9	0	-1	-1	-1
West Virginia	26	31	-8	-7	-7	-6
Total SESARM	**13**	**13**	**-1**	**-2**	**-1**	**-1**

For the commercial marine category (Table IV-9), substantial decreases are seen for most states for SO_2, PM10-PRI, and PM25-PRI. This is due to exceedingly stringent fuel sulfur levels required for commercial ships. The incremental reductions are not expected to be as high for Category 1 and 2 engine equipped ships assumed to be using marine diesel oil (e.g., those operating primarily in the inland waterways). This is apparent in the relatively lower SO_2 reductions in the inland SESARM states (Kentucky, Tennessee, and West Virginia). NO_x reductions are expected for all vessel types (Category 1 and 2, and Category 3), and VOC engine standards apply to Category 1 and 2 engines.

Table IV-9. Comparison of 2007 and 2018 CMV Inventory for the SESARM Region

2007 Commercial Marine Vessel Emission Estimates by State						
	Pollutant Emissions, tons per year					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH3
Alabama	1,739	18,554	411	726	699	3,723	8
Florida	18,146	48,271	1,261	2,971	2,778	7,014	29
Georgia	2,044	10,582	257	476	456	1,845	5
Kentucky	1,015	15,726	338	576	558	3,009	11
Mississippi	1,784	18,119	401	710	683	3,368	10
North Carolina	1,846	4,233	109	222	209	670	2
South Carolina	1,289	1,946	109	138	123	220	1
Tennessee	731	7,565	765	502	469	2,082	4
Virginia	4,094	21,918	524	966	922	3,755	10
West Virginia	1,026	15,888	341	582	564	3,040	8
Total SESARM	33,715	162,801	4,516	7,869	7,462	28,726	86

2018 Commercial Marine Vessel Emission Estimates by State						
	Pollutant Emissions, tons per year					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH3
Alabama	1,103	15,269	349	519	502	3,890	8
Florida	2,565	45,268	1,467	1,190	1,131	7,906	38
Georgia	623	9,321	262	286	276	1,963	5
Kentucky	956	12,798	272	449	435	3,045	11
Mississippi	1,078	14,925	340	506	489	3,437	10
North Carolina	274	3,980	126	109	104	747	3
South Carolina	561	2,018	158	61	54	292	1
Tennessee	688	6,156	615	392	366	2,107	4
Virginia	1,236	19,632	544	571	550	4,050	11
West Virginia	965	12,930	275	453	440	3,077	8
Total SESARM	10,049	142,298	4,407	4,536	4,346	30,513	99

Percentage Difference [((2018-2007)/2007)*100]						
	Percentage Difference (%)					
State	SO_2	NO_x	VOC	PM10-PRI	PM25-PRI	CO	NH3
Alabama	-37	-18	-15	-28	-28	4	4
Florida	-86	-6	16	-60	-59	13	31
Georgia	-70	-12	2	-40	-40	6	18
Kentucky	-6	-19	-20	-22	-22	1	1
Mississippi	-40	-18	-15	-29	-28	2	4
North Carolina	-85	-6	15	-51	-50	11	25
South Carolina	-56	4	45	-56	-56	33	33
Tennessee	-6	-19	-20	-22	-22	1	1
Virginia	-70	-10	4	-41	-40	8	12
West Virginia	-6	-19	-20	-22	-22	1	1
Total SESARM	-70	-13	-2	-42	-42	6	15

For the locomotive category (Table IV-10), decreases for SO_2, NO_x, VOC, PM10-PRI, and PM25-PRI show little variation among states, since Federal standards apply consistently to the SESARM region line haul freight fleet for these pollutants. Controls do not impact CO and NH3 emissions, so emissions for these pollutants show modest increases in line with the surrogate growth factor. Differences among some states are likely due to the contribution of passenger/commuter rail traffic relative to all freight and passenger traffic for a given state.

Table IV-10. Comparison of 2007 and 2018 Locomotive Inventory for the SESARM Region

2007 Locomotive Emission Estimates by State							
	Pollutant Emissions, tons per year						
State	SO₂	NOₓ	VOC	PM10-PRI	PM25-PRI	CO	NH₃
Alabama	196	17,899	972	598	552	2,542	8
Florida	175	11,625	592	356	332	1,505	5
Georgia	252	24,066	1,303	801	739	3,402	11
Kentucky	173	16,806	888	550	508	2,355	7
Mississippi	131	9,933	489	304	280	1,295	4
North Carolina	130	11,592	622	378	350	1,610	5
South Carolina	99	8,968	479	296	273	1,264	4
Tennessee	367	19,461	1,083	650	591	2,799	8
Virginia	444	21,639	1,180	728	678	3,066	9
West Virginia	212	13,037	677	423	389	1,796	6
Total SESARM	2,178	155,025	8,285	5,085	4,693	21,633	67
2018 Locomotive Emission Estimates by State							
	Pollutant Emissions, tons per year						
State	SO₂	NOₓ	VOC	PM10-PRI	PM25-PRI	CO	NH₃
Alabama	34	12,266	522	292	270	2,623	8
Florida	22	8,214	347	187	174	1,565	5
Georgia	46	16,599	706	394	364	3,509	11
Kentucky	32	11,235	457	261	241	2,430	8
Mississippi	18	6,849	271	153	141	1,340	4
North Carolina	22	7,881	337	185	172	1,665	5
South Carolina	17	5,957	245	139	129	1,304	4
Tennessee	64	13,253	584	318	290	2,886	9
Virginia	47	13,808	595	340	317	3,212	10
West Virginia	26	8,488	345	199	184	1,869	6
Total SESARM	328	104,552	4,409	2,468	2,281	22,403	70
Percentage Difference [((2018-2007)/2007)*100]							
	Percentage Difference (%)						
State	SO₂	NOₓ	VOC	PM10-PRI	PM25-PRI	CO	NH₃
Alabama	-82	-31	-46	-51	-51	3	3
Florida	-87	-29	-41	-48	-48	4	4
Georgia	-82	-31	-46	-51	-51	3	3
Kentucky	-82	-33	-49	-53	-53	3	3
Mississippi	-86	-31	-45	-50	-50	3	4
North Carolina	-83	-32	-46	-51	-51	3	3
South Carolina	-83	-34	-49	-53	-53	3	3
Tennessee	-83	-32	-46	-51	-51	3	3
Virginia	-89	-36	-50	-53	-53	5	5
West Virginia	-88	-35	-49	-53	-53	4	5
Total SESARM	-85	-33	-47	-51	-51	4	4

B.   NONPOINT/AREA SOURCES

This section provides estimates of 2018 area source emissions with comparisons to 2007 base year values. As with the base year report, the emission summaries here provide information for stationary area source combustion, solvent utilization, fugitive dust sources, and all other area sources. Note that all of the fugitive dust PM emission estimates are as estimated using AP-42 equations. No transport factors have been applied.

1. 2018 Emission Estimates

Table IV-11 provides a summary of 2018 area source emissions for the four major source categories for the SESARM region. Area source SO_2 and NO_x emissions are dominated by fuel combustion sources. The majority of 2018 VOC emissions are expected to be from solvent evaporation. Fugitive dust from paved and unpaved road travel is the most important source of PM_{10} and $PM_{2.5}$ emissions. More than one half of the 2018 CO emissions in the region are expected to be from stationary area source fuel combustion. The 2018 NH_3 emissions are estimated to be dominated by agricultural operations.

Table IV-11. 2018 SESARM Area/Nonpoint Source Emissions by Major Source Category

Category	Pollutant Emissions, TPY						
	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3
Combustion	74,688	84,752	25,749	63,014	39,367	216,640	7,127
Solvents	0	0	743,921	25	4	0.2	0
Fugitive Dust	0	0	0	2,310,789	238,005	0	0
All Other	2,980	11,910	232,137	303,565	113,492	159,630	593,003
All Nonpoint	**77,668**	**96,662**	**1,001,806**	**2,677,393**	**390,868**	**376,270**	**600,129**

Table IV-12 presents a summary of the annual 2018 emission estimates by state, as well as the percentage contribution of each state to total regional emissions.

Table IV-12. 2018 Area/Nonpoint Source Emissions by State

2018							
	Pollutant Emissions, tons per year						
State	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3
Alabama	358	3,834	73,191	343,164	40,648	14,955	66,367
Florida	10,294	6,214	234,576	337,281	39,556	30,043	34,284
Georgia	3,961	12,875	119,637	634,603	82,644	47,133	86,612
Kentucky	15,269	12,515	66,525	227,430	40,371	55,709	55,581
Mississippi	336	6,173	60,651	321,333	41,999	22,695	62,482
North Carolina	7,067	12,064	144,031	45,154	13,252	38,072	169,750
South Carolina	6,017	9,568	59,883	262,840	39,496	33,689	30,654
Tennessee	14,144	12,455	91,366	228,155	35,368	45,467	37,428
Virginia	14,766	17,499	125,069	177,717	40,716	65,088	43,749
West Virginia	5,455	3,466	26,877	99,717	16,819	23,418	13,223
Total SESARM	**77,668**	**96,662**	**1,001,806**	**2,677,393**	**390,868**	**376,270**	**600,129**
2018							
	Percentage of Regional Total						
State	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3
Alabama	0.46	3.97	7.31	12.82	10.40	3.97	11.06
Florida	13.25	6.43	23.42	12.60	10.12	7.98	5.71
Georgia	5.10	13.32	11.94	23.70	21.14	12.53	14.43
Kentucky	19.66	12.95	6.64	8.49	10.33	14.81	9.26
Mississippi	0.43	6.39	6.05	12.00	10.75	6.03	10.41
North Carolina	9.10	12.48	14.38	1.69	3.39	10.12	28.29
South Carolina	7.75	9.90	5.98	9.82	10.10	8.95	5.11
Tennessee	18.21	12.89	9.12	8.52	9.05	12.08	6.24
Virginia	19.01	18.10	12.48	6.64	10.42	17.30	7.29
West Virginia	7.02	3.59	2.68	3.72	4.30	6.22	2.20

2. Comparison with 2007 Emissions

Table IV-13 summarizes 2007 and 2018 area source emissions for the SEMAP region for the four major area source source types. Area source SO_2 emissions are dominated by fuel combustion. Regional area source SO_2 emissions are estimated to decline by 7 percent from 2007 to 2018. This anticipates a shift away from distillate oil combustion to less polluting fuels like natural gas. Residential and commercial coal combustion remains constant for the South Atlantic states during the forecast period. Regional area NO_x emissions stay relatively stable as the shift from one fuel to another has less of an effect on NO_x. Like SO_2, NO_x emissions are dominated by fuel combustion.

Table IV-13. Regional Nonpoint – 2007 versus 2018 Emission Summaries

2007							
	Pollutant Emissions, TPY						
Category	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3
Combustion	81,007	85,050	27,943	63,826	39,879	220,715	7,048
Solvents	0	0	712,961	24	4	0.1	0
Fugitive Dust	0	0	0	2,311,660	242,976	0	0
All Other	2,905	11,807	433,868	299,768	109,871	157,631	576,975
All Nonpoint	**83,913**	**96,857**	**1,174,772**	**2,675,277**	**392,730**	**378,346**	**584,023**
2018							
	Pollutant Emissions, TPY						
Category	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3
Combustion	74,688	84,752	25,749	63,014	39,367	216,640	7,127
Solvents	0	0	743,921	25	4	0.2	0
Fugitive Dust	0	0	0	2,310,789	238,005	0	0
All Other	2,980	11,910	232,137	303,565	113,492	159,630	593,003
All Nonpoint	**77,668**	**96,662**	**1,001,806**	**2,677,393**	**390,868**	**376,270**	**600,129**
Percentage Difference [(2018-2007)/2007]							
	Percentage Difference [(2018-2007)/2007]						
Category	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3
Combustion	-8	-0.4	-8	-1	-1	-2	1
Solvents	0	0	4	4	9	71	0
Fugitive Dust	0	0	0	0	-2	0	0
All Other	3	1	-46.5	1	3	1	3
All Nonpoint	**-7**	**-0.2**	**-15**	**0.1**	**-0.5**	**-1**	**3**

NOTE: There were 2007 PM and CO emissions reported for certain solvent source categories. Solvents are typically just a VOC emissions source. Therefore, any 2018 PM and CO emission projections for solvent categories are highly uncertain.

Area source VOC emissions see some expected decline in the region (15 percent in total) as service station VOC emissions drop by 46.5 percent via Stage 1 and Stage 2 controls, and VOC emissions from solvents trend upward (a 4 percent expected increase) in the absence of further emission regulations for these categories (the upward trend is moderated somewhat by some Federal and state/local regulation of certain solvent categories).

Regional area source PM emissions – both PM_{10} and $PM_{2.5}$ – are expected to stay relatively constant from 2007 to 2018, as shown in Table IV-13. Area source PM_{10} emissions are dominated by fugitive dust emitters (86 percent of the 2018 total). Most of the regional fugitive dust emissions are from unpaved roads, and there is very little incentive to reduce unpaved road dust, because there is no evidence that it contributes significantly to any PM_{10} or $PM_{2.5}$ nonattainment problems in the Southeast.

Regional area source CO emissions are expected to stay relatively constant from 2007 to 2018. Area sources are not a target for achieving CO emission reductions. Regional NH_3 emissions are estimated to increase slightly (by 3 percent) from 2007 to 2018.

Table IV-14 provides area source emission estimates for 2007 and 2018 for each SEMAP state. The pollutant with the most state-by-state differences in 2007 versus 2018 emissions is SO_2. Five states (Alabama, Georgia, North Carolina, Virginia, and West Virginia) have double digit percentage differences between 2007 and 2018 emissions. The remaining states have differences of 2 percent or less. These differences are probably attributable to fuel mix. States in this region that have the highest distillate oil shares in 2007 have the biggest changes in 2018 SO_2 emissions, as distillate oil use is projected to decline.

Tables IV-15, IV-16, and IV-17 provide estimates of state-level emissions for area source fuel combustors, area source solvent utilization, and area source fugitive dust sources, respectively. When reviewing Table IV-16, it is suggested that the reader ignore the non-VOC emission estimates (and differences) because there should only be VOC emissions in the base year emission inventories for solvent evaporation. No significant trends are seen in the Table IV-17 fugitive dust emission forecasts.

Table IV-14. Area Source Emissions by SEMAP State

2018								2007							
	Pollutant Emissions, TPY								Pollutant Emissions, TPY						
State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃	State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃
Alabama	358	3,834	73,191	343,164	40,648	14,955	66,367	Alabama	431	3,940	79,030	349,981	41,587	15,152	62,426
Florida	10,294	6,214	234,576	337,281	39,556	30,043	34,284	Florida	10,334	5,982	295,630	320,780	38,238	28,548	33,666
Georgia	3,961	12,875	119,637	634,603	82,644	47,133	86,612	Georgia	4,858	12,351	143,469	640,550	83,594	45,237	85,966
Kentucky	15,269	12,515	66,525	227,430	40,371	55,709	55,581	Kentucky	15,590	12,693	75,100	226,829	40,341	55,450	52,332
Mississippi	336	6,173	60,651	321,333	41,999	22,695	62,482	Mississippi	344	6,091	74,755	326,350	42,758	22,377	58,774
North Carolina	7,067	12,064	144,031	45,154	13,252	38,072	169,750	North Carolina	8,365	12,715	152,825	51,678	16,829	47,379	169,440
South Carolina	6,017	9,568	59,883	262,840	39,496	33,689	30,654	South Carolina	6,048	9,353	76,838	266,749	39,538	32,208	30,248
Tennessee	14,144	12,455	91,366	228,155	35,368	45,467	37,428	Tennessee	14,415	12,418	111,100	215,667	33,948	44,668	35,277
Virginia	14,766	17,499	125,069	177,717	40,716	65,088	43,749	Virginia	17,022	17,740	133,935	176,265	39,034	63,838	43,038
West Virginia	5,455	3,466	26,877	99,717	16,819	23,418	13,223	West Virginia	6,504	3,574	32,089	100,429	16,862	23,490	12,858
Total SESARM	77,668	96,662	1,001,806	2,677,393	390,868	376,270	600,129	Total SESARM	83,913	96,857	1,174,772	2,675,277	392,730	378,346	584,023
2018															
	Percentage of Regional Total								Percentage Difference [(2018-2007)/2007]						
State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃	State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃
Alabama	0.46	3.97	7.31	12.82	10.40	3.97	11.06	Alabama	-17	-3	-7	-2	-2	-1	6
Florida	13.25	6.43	23.42	12.60	10.12	7.98	5.71	Florida	-0.4	4	-21	5	3	5	2
Georgia	5.10	13.32	11.94	23.70	21.14	12.53	14.43	Georgia	-18	4	-17	-1	-1	4	1
Kentucky	19.66	12.95	6.64	8.49	10.33	14.81	9.26	Kentucky	-2	-1	-11.4	0.3	0.1	0.5	6
Mississippi	0.43	6.39	6.05	12.00	10.75	6.03	10.41	Mississippi	-2	1	-19	-2	-2	1	6
North Carolina	9.10	12.48	14.38	1.69	3.39	10.12	28.29	North Carolina	-16	-5	-6	-13	-21	-20	0.2
South Carolina	7.75	9.90	5.98	9.82	10.10	8.95	5.11	South Carolina	-1	2	-22	-1	-0.1	5	1
Tennessee	18.21	12.89	9.12	8.52	9.05	12.08	6.24	Tennessee	-2	0.3	-18	6	4	2	6
Virginia	19.01	18.10	12.48	6.64	10.42	17.30	7.29	Virginia	-13	-1	-7	1	4	2	2
West Virginia	7.02	3.59	2.68	3.72	4.30	6.22	2.20	West Virginia	-16	-3	-16.2	-1	-0.3	-0.3	3
Total SESARM	100	100	100	100	100	100	100	Total SESARM	-7	-0.2	-15	0.1	-0.5	-1	3

TranSystems

Table IV-15. Area Source Combustion Emissions by SEMAP State

2018								2007							
	Pollutant Emissions, TPY								Pollutant Emissions, TPY						
State	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3	State	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3
Alabama	299	3,352	1,720	1,337	1,328	10,768	437	Alabama	376	3,490	1,903	1,400	1,391	11,257	449
Florida	10,106	5,278	1,814	7,438	2,415	14,185	315	Florida	10,163	5,131	1,921	7,506	2,436	14,263	310
Georgia	3,604	10,814	2,578	1,863	1,837	21,238	1,340	Georgia	4,528	10,447	2,751	1,910	1,884	21,466	1,274
Kentucky	14,909	11,035	3,510	12,796	8,429	29,937	655	Kentucky	15,250	11,287	3,892	13,006	8,573	31,102	670
Mississippi	193	5,328	1,122	1,035	1,004	9,751	301	Mississippi	206	5,274	1,238	1,074	1,043	9,933	307
North Carolina	6,893	11,511	3,977	4,716	4,320	29,378	929	North Carolina	8,090	11,534	4,313	4,795	4,394	29,963	910
South Carolina	5,852	8,592	1,627	10,574	7,988	18,567	441	South Carolina	5,900	8,480	1,743	10,510	7,926	18,699	427
Tennessee	13,761	10,769	2,668	12,507	2,441	24,996	814	Tennessee	14,058	10,853	2,929	12,756	2,521	25,816	833
Virginia	13,746	15,194	4,887	8,013	7,246	42,860	1,457	Virginia	16,061	15,569	5,270	8,142	7,358	43,205	1,443
West Virginia	5,324	2,878	1,847	2,736	2,360	14,960	438	West Virginia	6,376	2,985	1,984	2,728	2,354	15,012	424
Total SESARM	74,688	84,752	25,749	63,014	39,367	216,640	7,127	Total SESARM	81,007	85,050	27,943	63,826	39,879	220,715	7,048
2018															
	Percentage of Regional Total								Percentage Difference [(2018-2007)/2007]						
State	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3	State	SO_2	NO_x	VOC	PM10-PRI	PM2.5-PRI	CO	NH_3
Alabama	0.40	3.96	6.68	2.12	3.37	4.97	6.13	Alabama	-20	-4	-10	-5	-5	-4	-3
Florida	13.53	6.23	7.04	11.80	6.13	6.55	4.43	Florida	-1	3	-6	-1	-1	-1	2
Georgia	4.83	12.76	10.01	2.96	4.67	9.80	18.80	Georgia	-20	4	-6	-2	-3	-1	5
Kentucky	19.96	13.02	13.63	20.31	21.41	13.82	9.19	Kentucky	-2	-2	-10	-2	-2	-4	-2
Mississippi	0.26	6.29	4.36	1.64	2.55	4.50	4.22	Mississippi	-6	1	-9	-4	-4	-2	-2
North Carolina	9.23	13.58	15.45	7.48	10.97	13.56	13.03	North Carolina	-15	-0.2	-8	-2	-2	-2	2
South Carolina	7.84	10.14	6.32	16.78	20.29	8.57	6.19	South Carolina	-1	1	-7	1	1	-1	3
Tennessee	18.42	12.71	10.36	19.85	6.20	11.54	11.42	Tennessee	-2	-1	-9	-2	-3	-3	-2
Virginia	18.40	17.93	18.98	12.72	18.41	19.78	20.44	Virginia	-14	-2	-7	-2	-2	-1	1
West Virginia	7.13	3.40	7.17	4.34	5.99	6.91	6.14	West Virginia	-16	-4	-7	0.3	0.2	-0.3	3
Total SESARM	100	100	100	100	100	100	100	Total SESARM	-8	-0.4	-8	-1	-1	-2	1

Table IV-16. Area Source Solvent Emissions by SEMAP State

2018 — Pollutant Emissions, TPY

State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃
Alabama			56,760				
Florida			173,010				
Georgia			90,744				
Kentucky			48,856	1	0.7		
Mississippi			43,555				
North Carolina			118,189			0.2	
South Carolina			41,418				
Tennessee			67,003	24	4		
Virginia			89,992				
West Virginia			14,392				
Total SESARM			743,921	25	4.3	0.2	

2007 — Pollutant Emissions, TPY

State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃
Alabama			54,760				
Florida			164,244				
Georgia			86,349				
Kentucky			45,697	1	1		
Mississippi			42,797				
North Carolina			113,623			0.1	
South Carolina			38,952				
Tennessee			63,279	22	4		
Virginia			89,798				
West Virginia			13,463				
Total SESARM			712,961	24	4	0.1	

2018 — Percentage of Regional Total

State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃
Alabama			7.63	0.00	0.00	0.00	
Florida			23.26	0.00	0.00	0.00	
Georgia			12.20	0.00	0.00	0.00	
Kentucky			6.57	4.67	16.47	0.00	
Mississippi			5.85	0.00	0.00	0.00	
North Carolina			15.89	0.00	0.00	100.00	
South Carolina			5.57	0.00	0.00	0.00	
Tennessee			9.01	95.33	83.53	0.00	
Virginia			12.10	0.00	0.00	0.00	
West Virginia			1.93	0.00	0.00	0.00	
Total SESARM			100	100	100	100	

Percentage Difference [(2018-2007)/2007]

State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃
Alabama			4				
Florida			5				
Georgia			5				
Kentucky			7	17	-28		
Mississippi			2				
North Carolina			4			71	
South Carolina			6				
Tennessee			6	8	-9		
Virginia			0.2				
West Virginia			7				
Total SESARM			4	4	9	71	

Table IV-17. Area Source Fugitive Dust Emissions by SEMAP State

2018								2007							
	Pollutant Emissions, TPY								Pollutant Emissions, TPY						
State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃	State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃
Alabama				310,914	32,348			Alabama				318,858	33,717		
Florida				285,547	22,289			Florida				270,262	22,325		
Georgia				573,441	59,974			Georgia				580,492	62,104		
Kentucky				184,724	19,530			Kentucky				184,551	19,979		
Mississippi				296,341	31,812			Mississippi				301,642	32,897		
North Carolina				34,534	3,428			North Carolina				37,467	3,722		
South Carolina				230,743	22,408			South Carolina				235,508	23,304		
Tennessee				188,503	19,985			Tennessee				176,850	19,521		
Virginia				134,777	19,698			Virginia				134,014	18,730		
West Virginia				71,266	6,533			West Virginia				72,018	6,676		
Total SESARM				2,310,789	238,005			Total SESARM				2,311,660	242,976		

2018															
	Percentage of Regional Total								Percentage Difference [(2018-2007)/2007]						
State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃	State	SO₂	NOₓ	VOC	PM10-PRI	PM2.5-PRI	CO	NH₃
Alabama				13.45	13.59			Alabama				-2	-4		
Florida				12.36	9.36			Florida				6	-0.2		
Georgia				24.82	25.20			Georgia				-1	-3		
Kentucky				7.99	8.21			Kentucky				0.1	-2		
Mississippi				12.82	13.37			Mississippi				-2	-3		
North Carolina				1.49	1.44			North Carolina				-8	-8		
South Carolina				9.99	9.42			South Carolina				-2	-4		
Tennessee				8.16	8.40			Tennessee				7	2		
Virginia				5.83	8.28			Virginia				0.6	5		
West Virginia				3.08	2.74			West Virginia				-1	-2		
Total SESARM				100	100			Total SESARM				0.0	-2		

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SECTION V. PREPARATION OF DATA FILES

This section provides the filenames and formatting information for the 2017-2025 projection year growth and control factor files for area and nonroad mobile sources for the SEMAP region. It also provides the file names for the 2018 emission summary files.

A.   AREA

SESARM_States_SCC_and_GF_Summary_v3.xlsx – This file contains a list of all the Growth Factors used for Area sources for the projection year of 2018 as well as other selected years. Below is a description of the elements in this spreadsheet and what they mean:

State FIPS – The State FIPS code for the state referenced in the "State" column.

strSCC – This column is for the SCC code.

SCC1_DESC – This column is for the Level 1 SCC Description.

SCC3_DESC – This column is for the Level 2 SCC Description.

SCC5_DESC – This column is for the Level 3 SCC Description.

SCC8_DESC – This column is for the Level 4 SCC Description.

Code – This column is for the TranSystems internal code used by TranSystems to designate which Growth Factor will be used for the particular State / SCC combination.

Description – This column is for a brief description of the Growth Factor.

Data Type – This column is for a general descriptor related to the basis of the Growth Factor. Each Growth Factor will fall under one of 6 different types:

1. *Category-Specific* – This is a growth factor developed for a specific category; like Residential Wood Combustion, it may incorporate data from multiple other sources so does not fit neatly into other types.

2. *Demographic* – This is a population based Growth Factor and it typically uses population from *AEO 2010*. An example of a demographic based Growth Factor would be using the regional population as a surrogate for emissions associated with landfills for states within that region.

3. *Employment* – This is an employment based Growth Factor and it typically uses category specific employment information like for the Mining Machinery Operators category employment information specific to Mining and Quarrying is used.

4. *Energy Consumption* – This is a consumption based Growth Factor and it typically uses category specific and may use region specific data from *AEO 2010* "Regional Energy Consumption and Prices by Sector" and "Transportation Demand Sector Data Tables" supplemental tables. An example of a consumption based Growth Factor would be using the regional consumption of commercial coal as a surrogate for commercial and institutional coal combustion for states within that region.

5. *Energy Production* – This is a production based Growth Factor and it typically uses category specific and may use region specific data from *AEO 2010* "Petroleum, Natural Gas, Coal, Macroeconomic, International Data" supplemental tables and main reference case "Liquid Fuels Supply and Disposition Balance" table. An example of a production based Growth Factor would be using the regional production of oil as a surrogate for the emissions associated with the storage and transport of petroleum products for states within that region.

6. *Output* – This is an output based Growth Factor and it typically uses category and region specific data from AEO Regional Output tables. An example of an output based Growth Factor would be using the regional output of crops as a surrogate for the emissions associated with the application of fertilizer for states within that region.

Geography – This column is used to define the level of geographic specificity used for the Growth Factor, there are 4 different types:

1. *Nation* – For these categories the best data available was at the national level, an example of this is for some of the "Energy Production" categories (like Distillate Fuel Oil supplied) are only available at the national level.

2. *Region* – This indicates where there was regional level data available was used to develop the growth factor for a state/county. This can be either a production or a consumption region; however, note that these regional classifications may not be the same across different data sources. In addition, several "Output" data types have regional based data.

3. *State* – For these categories state level data was available or methods were developed to allocate data down to a state level. These are typically "Category-Specific" data types.

4. *N/A* – "Not Applicable", this designation is reserved for those categories which had a "No Growth" designation, so the data did not have a geographic distinction.

<u>Sample Calculation</u>

For example, the growth factor for the state of North Carolina and the SCC 2103002000 (Commercial / Institutional Coal Combustion) is based on Commercial Coal consumption. This data is summarized by region in the *AEO 2010* "Regional Energy Consumption and Prices by Sector" supplemental tables. Since North Carolina is in the South Atlantic region under this table's classification here is how the growth factor was calculated:

2007 South Atlantic Commercial Coal Consumption: 0.00519 (Quadrillion BTU)

2017 South Atlantic Commercial Coal Consumption: 0.005219 (Quadrillion BTU)

Growth Factor Calculation: 0.005219 / 0.00519 = 1.005588

Growth Factor: 1.00558

SESARM_Area_CF_Projection_Years.xlsx – This file contains information on those area source categories which had a control factor applied to them. These control factors are applied to open burning categories in North Carolina and certain solvent categories in Virginia. The file contains the State/County FIPS, the SCC, the Pollutant Code and the Control Factor (CF) for all of the projection years. All other area source control effects are incorporated in the growth factor file.

SESARM_Stage1_Combined_Growth_and_Control_Factors.xls – This file contains state level combined growth and control factors for each year from 2017 through 2025 applicable to Stage 1 service station gasoline filling of the underground tanks. These factors should be multiplied by 2007 Stage 1 VOC emissions to estimate projection year Stage 1 VOC emissions. These factors account for both the regional change in fuel consumption as well as the Stage 1 filling controls. Note that the same factors apply to all three Stage 1 SCCs (submerged filling, splash filling, and balanced submerged filling) in a given state. Overall growth and controls from all three of these SCCs combined were considered in determining the Stage 1 controls, and due to the shift in fill methods and volumes from the base year to the projection years, the total from these three SCCs should be looked at as a whole as the growth and control factors applied to any one of the SCCs from the base year may be misleading.

SESARM_Stage2_Combined_Growth_and_Control_Factors.xls – This file contains county-specific combined growth and control factors for each year from 2017 through 2025 applicable to Stage 2 service station gasoline refueling. These factors should be multiplied by 2007 Stage 2 VOC emissions at the county level to estimate projection year Stage 2 VOC emissions for the same county. These factors account for both the regional change in fuel consumption as well as the Stage 2 at-the-pump controls, in counties where this is applicable, and onboard vehicle refueling controls. These were estimated based using MOBILE6 emission factors for 2017, 2018, 2020, and 2025, and interpolating for in-between years. These combined growth and control factors vary by county due to differences in the RVP values and temperatures by county.

B.   NONROAD

Relevant nonroad growth and control information was transmitted in the following files:

Nonroad Growth Factor Summary.xlsx – This file contains growth factors by state and SCC for each forecast year relative to 2007 (Columns K through S – highlighted in green). A growth factor code and growth factor code description are also provided to indicate which set of data were used to develop each growth factor. County-level growth factors were developed for some counties for residual CMV (to reflect available regional growth rates), and for aircraft where airports and their associated LTOs from the TAF could be matched to counties. The geographic resolution of the growth factors is indicated in Column J, "Geography." The state or county to which the growth factor applies is listed under Column A, "FIPS." State or local agencies should first match nonroad category growth factors by SCC and FIPS county, and where there is no match at the county level, the state-level growth factor should be used.

SEMAP Rail and CMV Control Factors.xlsx – This file contains two sheets - "Locomotive Controls," and "CMV Controls." In both sheets, control factors (CF) by state or county and SCC are provided for each forecast year relative to 2007 (highlighted in yellow and labeled as 2017 CF, 2018 CF, etc.) Values for CE, RP, and RE, that comprise the overall control factor, are also included. Control efficiency for each SCC was determined by compiling the control efficiency of the most stringent Tier associated with a standard, relative to the baseline control. RE was always assumed to be 100 percent. RP was then estimated based on the CE, RE, and final CF value. All values are expressed as a percent. In a few cases, county-level control factors were developed (e.g., for residual CMV to reflect regional growth rates in Florida). The state or county to which the control factor applies is listed under Column A, "FIPS." Similar to the growth factors, state or local agencies should first match nonroad control factors by SCC and county, and where there is no match at the county level, the state-level GF should be applied.

C.   2018 NONPOINT/AREA EMISSION SUMMARY FILES

Nonpoint/area emission summaries for 2018 at the county/SCC level of detail were generated for each state. These summaries are available in the following Microsoft Excel spreadsheet files:

2018_FINAL_AL_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_FL_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_GA_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_KY_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_MS_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_NC_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_SC_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_TN_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_VA_County SCC Area Emission Summaries_Oct16_2012.xlsx; and
2018_FINAL_WV_County SCC Area Emission Summaries_Oct16_2012.xlsx.

In addition, the following separate summary files containing only one county were also prepared for the use of their respective air agencies:

2018_FINAL_DavidsonCnty_TN_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_JeffersonCnty_KY_County SCC Area Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_KnoxCnty_TN_County SCC Area Emission Summaries_Oct16_2012.xlsx; and
2018_FINAL_ShelbyCnty_TN_County SCC Area Emission Summaries_Oct16_2012.xlsx.

D.   NONROAD COUNTY EMISSION SUMMARIES

Nonroad emission summaries for 2018 at the county/SCC level of detail were generated for each state. These summaries include emissions from the NONROAD Model emission sources as well as emissions from aircraft, commercial marine vessels, and locomotives. These summaries are available in the following Microsoft Excel spreadsheet files:

2018_FINAL_AL_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_FL_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_GA_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_KY_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_MS_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_NC_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_SC_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_TN_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_VA_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx; and
2018_FINAL_WV_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx.

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2018_FINAL_DavidsonCnty_TN_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx;
2018_FINAL_JeffersonCnty_KY_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx; and
2018_FINAL_ShelbyCnty_TN_County SCC Nonroad Emission Summaries_Oct16_2012.xlsx.

SECTION VI. REFERENCES

40 CFR Part 63, 2008. *Federal Register*, "National Emission Standards for Hazardous Air Pollutants for Source Categories: Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities; and Gasoline Dispensing Facilities," Volume 73, No. 7, January 10, 2008.

EIA, 2010. Energy Information Administration, Department of Energy, "Annual Energy Outlook, 2010, with Projections through 2035," DOE/EIA-0383(2010), Energy Information Administration, Office of Integrated Analysis and Forecasting, Washington, DC, May 11, 2010.

EPA, 2007: U.S. Environmental Protection Agency, "National Scale Modeling for the Final Mobile Source Air Toxics Rule," Office of Air Quality Planning and Standards, Emissions Analysis and Monitoring Division, Research Triangle Park, NC, EPA 454/R-07-002, February 2007.

EPA, 2008a: U.S. Environmental Protection Agency, "Technical Support Document: Preparation of Emissions Inventories for the 2002-based Platform, Version 3, Criteria Air Pollutants," http://www.epa.gov/scram001/reports/Emissions%20TSD%20Vol1_02-28-08.pdf, January 2008.

EPA, 2008b. U.S. Environmental Protection Agency, "Regulatory Impact Analysis: Control of Emissions of Air Pollution from Locomotive Engines and Marine Compression Ignition Engines Less than 30 Liters Per Cylinder," Office of Transportation and Air Quality, EPA-420-R-08-001. March 2008.

EPA, 2009a. U.S. Environmental Protection Agency, "Regulatory Impact Analysis: Control of Emissions of Air Pollution from Category 3 Marine Diesel Engines," Office of Transportation and Air Quality, EPA 420-R-09-019. December 2009.

EPA, 2009b. U.S. Environmental Protection Agency, "Emission Factors for Locomotives," Office of Transportation and Air Quality, EPA-420-F09-025, April 2009.

EPA, 2009c: U.S. Environmental Protection Agency, "Suggested Nationwide Average Fuel Properties," Office of Transportation and Air Quality, EPA-420-B-09-018, April 2009.

FAA, 2010. Federal Aviation Administration, "Terminal Area Forecasts, 2009-2030," available from http://aspm.faa.gov/main/taf.asp, 2010.

FR, 2008: *Federal Register*, "National Volatile Organic Compound Emission Standards for Aerosol Coatings," http://federalregister.gov/a/e8-5589, rule promulgated on 3/24/2008.

Jones, 2012. Telecommunication, Phyliss Jones, North Carolina Department of the Environment and Natural Resources, with K. Thesing, TranSystems, May 2012.

MACTEC, 2006. MACTEC Federal Programs, Inc., "Gasoline Distribution Area Source Control Cost Estimates," prepared for the U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, October 3, 2006.

Manning, 2011. Personal Communication, Bryan Manning, EPA, with K. Thesing, TranSystems, March 24, 2011.

OTC, 2001: Ozone Transport Commission, "Model Rule Preamble: Architectural and Industrial Maintenance Coatings," http://www.ct.gov/dep/lib/dep/air/ozone/ozone_sip_revision/aim.pdf, accessed July 2012.

Pechan, 2010. E.H. Pechan & Associates, Inc., "Development of New Emissions Projections Estimation Methods and Models for Stationary Non-EGU Sources," prepared for U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, August 2010.