

Appendix D

2014 Annual Emissions Inventory Documentation

2014 Annual Emissions Inventory

D-1 Introduction:

The Missouri Department of Natural Resources' Air Pollution Control Program developed a comprehensive statewide emissions inventory for 2014, as required by EPA's Air Emissions Reporting Requirements (AERR) rule as revised in 2014 (80 FR 8787). The inventory includes point, nonpoint, onroad mobile, and nonroad mobile source emissions. This document describes how the 2014 inventory is created, including compilation and submission to the National Emissions Inventory (NEI) through EPA's Emissions Inventory System (EIS). This report documents the 2014 inventory in detail from its creation, quality assurance, and final summaries. It also details the qualifications and limitations of the inventory.

Various tables are included showing summarized, facility-specific, and source category-specific data. All emission amounts are given in tons per year unless otherwise noted. Blank fields and those with dashes indicate a value of zero. Fields with 0, 0.0, or 0.00 contain small values that round to zero.

The pollutants inventoried include the criteria air pollutants (CAPs) sulfur oxides (SO_x), nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), coarse particulate matter (PM₁₀ Primary), fine particulate matter (PM_{2.5} Primary), ammonia (NH₃), and lead (Pb). The air program also inventories speciated Hazardous Air Pollutant (HAP) emissions for certain data categories including point sources. HAPs are only included when they meet reporting thresholds for point sources, and only for some nonpoint categories where an EPA-provided tool includes those pollutants. For some data categories, particulate matter (PM) is further disaggregated to its component parts: PM₁₀ Primary is the sum of PM condensable (PM CON) and PM₁₀ Filterable (PM₁₀ FIL), and PM_{2.5} Primary is the sum of PM condensable (PM CON) and PM_{2.5} Filterable (PM_{2.5} FIL). The inventory does not include greenhouse gas (GHG) emissions and none of the tables in this document will summarize GHGs.

The inventory covers all 115 counties of Missouri, and there are no tribal areas in the state or local agencies that estimate emissions. Annual emissions are developed for point, nonpoint, onroad mobile and nonroad mobile sources. Point source emissions are prepared at the facility level with a geographic coordinate. Nonpoint, onroad mobile, and nonroad mobile sources are submitted at the county –total level. The emissions cover a continuous 12 month period from January 1 to December 31 of the year. Where indicated, the emission estimate may be based on information from previous years where 2014 activity or emissions are not available (several nonpoint and mobile categories), but it is determined to be the best information to represent emissions in 2014. Ozone precursor pollutants of NO_x, VOC and CO are also collected for the 5-county St. Louis area for point sources during the peak ozone season, June 1 to August 31.

Emissions on a typical summer day during this peak ozone season period are used in ozone-related SIP documents.

Staff resources used in developing the various portions of the inventory include:

Air Quality Analysis Section, Data Management Unit Staff:

- Nathan O’Neil: Data Management Unit Chief, oversight of point data, quality assurance and data submission.
- Jeanne Brown: Point source data entry, quality assurance, and data submission
- Josh Martin: Point source quality assurance; HAP quality assurance
- Kent Branson: Point source quality assurance
- Erin Henry: Point source quality assurance
- Terry Stock: Point source quality assurance and nonpoint source development
- Brenda Wansing: Point source data entry, quality assurance

Air Quality Planning Section, Planning Unit Staff:

- Stacy Allen: oversight of nonpoint, onroad and nonroad mobile data, calculation and model runs, quality assurance and data submission.
- Cliff Li: nonpoint, onroad, and nonroad mobile data, calculation and model runs.

Table D-1 Statewide 2014 Emissions (tons per year)

	Lead	NH ₃	CO	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
Point Total	6.28	1,409	95,206	104,735	5,605	2,652	166,870	14,622
Nonpoint Total	1.22	128,482	155,679	15,903	1,216,066	178,387	825	91,930
Onroad Total	-	2,885	597,565	168,584	5,675	5,177	855	66,753
Nonroad Total	3.46	20.13	31,416	40,794	1,556	1,438	572	4,975
Missouri Total*	10.9	132,796	879,866	330,016	1,228,902	187,654	169,122	178,280

*Totals may not sum due to rounding

D-2 Point Source Data Collection

Point source data is collected from permitted facilities in the form of a report called the Emissions Inventory Questionnaire (EIQ). The EIQ is a report detailing facility operational data and estimating the amount of air pollution emitted, and its collection is governed by Missouri Statute 10 CSR 10-6.110. The facility will either submit a detailed annual “full” report, with updated calendar year operations and emissions, or a “reduced” report, which represents that

their last full report emissions are a reasonable estimate for the current year, within emission change and permit tolerances. These reports are certified by the facility, but are subject to review and revision based on quality assurance performed by the state, or notification by the facility of errors in the original submission. The point data presented in this report reflects all updates made to emission reports through March 24, 2016.

The AERR requires submission of Type A and B point source facilities actual emissions for the 2014 reporting year. The AERR definition of Type A and B point source facilities depends on the pollutant-specific PTE and location within a designated nonattainment area. Since the air program does not maintain records of facility total potential to emit, the permit type is used to determine Type A and B status. Missouri has one area designated as a moderate ozone nonattainment area, so the Type B thresholds for SO_x, VOC, NO_x, CO, Pb, PM₁₀ and NH₃ are compared to permit thresholds. Per Missouri operating permit rule 10 CSR 10-6.065, Part 70 sources and Intermediate sources have uncontrolled PTE of at least one pollutant in excess of the AERR Type B thresholds. All Missouri sources with Part 70 operating permits are submitted as Type A sources. All Missouri sources with Intermediate operating permits are submitted as Type B sources. Sources with either permit type are required to complete the “full” emissions report, detailing their actual operations and emissions during the 2014 year. Two sources that had neither a Part 70 operating permit nor an Intermediate operating permit were included in the Point Sources submission as they had annual lead emissions above 0.5 Tons. These two sources were also required to complete a “full” emissions report for 2014. For all facilities submitted as Point Sources, emission units permitted at the facility via their construction or operating permit are included in the report, including both stack and fugitive emission releases.

A fully detailed emission report contains several elements, most of which originated and continue to exist on paper EIQ forms. The following list provides brief description of the forms available for use in completing an EIQ, and the forms themselves appear online at <http://www.dnr.mo.gov/env/apcp/moeis/emissionsreporting.htm>. The forms have undergone little substantial change since 2014, covering only web address updates and fee amounts. In general, forms beginning with number one (1) provide general facility information, and forms beginning with a two (2) provide detailed annual emission calculations.

Form Name	Form Description	Form Number
Form 1.0 General Plant Information	General plant information, plant-wide emissions totals, signature section certifying submitted information is accurate and complete.	780-1431

Form Name	Form Description	Form Number
Form 1.1 Process Flow Diagram	Diagram identifying and linking all emission units, processes, air pollution control devices, and emission release points for a facility.	780-1619
Form 1.2 Summary of Emission Units and Related Processes	List of all emission units, associated processes, and unit operating status.	780-1620
Form 2.0 Emission Unit Information	Main emissions reporting form; separate Form 2.0 required for each significant process for which emissions are being reported.	780-1621
Form 2.0C Control Device Information	Control device information when there is a control device operative at an emission unit; separate Form 2.0C required for each control device.	780-1434
Form 2.0K Charcoal Kiln Information	Details the operations and characteristics of charcoal kilns.	780-1530
Form 2.0L Landfill Information	Form for reporting emissions from landfills.	780-1583
Form 2.0P Portable Equipment Information	Details the locations and operations for portable equipment operations including quarries, asphalt plants, and concrete batch plants.	780-1433
Form 2.0S Stack/Vent Information	Stack information for emission units where emissions from a process enter the ambient air through one or more stacks/vents.	780-1435
Form 2.0Z Ozone Season Information Form	Calculation of ozone season day emissions of VOC, NO _x , or CO; required from facilities located in the St. Louis ozone nonattainment counties of St. Louis, St. Charles, Franklin and Jefferson Counties and St. Louis City.	780-1452
Form 2.1 Fuel Combustion Worksheet	Combustion equipment itemization including equipment design rate and fuel type.	780-1436
Form 2.2 Incinerator Worksheet	Information related to the incinerator, waste material(s) incinerated, and the annual waste material throughput.	780-1438
Form 2.3 VOC Process Mass-Balance Worksheet	Calculates a VOC mass balance emission factor from one or more VOC-containing materials.	780-1440
Form 2.4 Volatile Organic Liquid Loading Worksheet	Calculates an emission factor for petroleum liquid loading into tank trucks, rail cars, and barges based on AP-42.	780-1625
Form 2.5L General Liquid Storage Tank Information	Information about storage tanks.	780-1444

Form Name	Form Description	Form Number
Form 2.7 Haul Road Fugitive Emissions Worksheet	Calculates an emission factor for unpaved haul roads based on AP-42 formula.	780-1445
Form 2.8 Storage Pile Worksheet	Calculates emission factors for activity and wind erosion from storage piles based on AP-42 formulas.	780-1446
Form 2.9 Stack Test/Continuous Emission Monitoring Worksheet	Documentation for emission factors derived from stack tests or CEM devices.	780-1447
Form 2.T Hazardous Air Pollutant Worksheet	Speciates HAP chemicals emitted at the process level; separates individual HAPs from those included in VOC/PM emissions.	780-1448
Form 3.0 Emission Fee Calculation	Summary table showing emissions from all processes.	780-1509
Form 3.0CK Emission Fee Calculation for Charcoal Kilns	Summary table showing emissions from charcoal kiln operations.	780-1508
Dry Cleaner – Non-chlorinated and Petroleum Based Solvents	Emissions calculations for dry cleaners using non-chlorinated solvent and with combined dryer capacity of 84 pounds or more.	780-1954
Form 4.0 Financial Cost Estimate	Estimate the cost of complying with air pollution regulation.	780-1622

Though paper forms were the origination of emission reporting, the air program now has an online emission reporting system called the Missouri Emission Inventory System, or MoEIS. The data elements on the hardcopy forms have an electronic counterpart in MoEIS, though several data elements which were calculated by the user and written on the form are now automatically populated by MoEIS. For the full emission reports submitted by an AERR Type A or B facility, the report can be submitted either on paper forms or via MoEIS. Both submittals require a signature page to certify that representative emissions have been reported, to the best knowledge of the facility representative.

All data elements for full emission reports are stored in the underlying MoEIS database. For reports that are submitted on paper forms, the data is entered to the MoEIS database by the ACP staff members within a few weeks of receipt. Both the number and type of reports submitted annually are monitored to ensure proper coverage of AERR-reportable point source facilities. Paper forms were due by April 1, 2015, and MoEIS submissions were due by May 1, 2015. Late reports from AERR point source facilities were collected through reminders, enforcement actions, or site visits.

EIQ solicitations for calendar year 2014 were mailed to facilities the last week of December 2014. A total of 2,233 EIQs were mailed statewide, of which 227 were submitted as no production, 778 were full EIQs, and 1,228 were submitted as reduced reporting forms. Of those full reports, 492 facility reports are for AERR Type A or B facilities included as point sources in Missouri's submittal to the NEL.

D-3 Point Source Inventory

- *Quality Assurance Prioritization*

The Data Management Unit prioritizes review of facilities that produce the most emissions, specifically facilities with a Part 70 or Intermediate operating permit. While every data element collected helps to characterize the emission estimate, the fields most directly tied to the emissions calculation are given the highest priority. Additional priority was given to improving stack parameter data. While this data does not directly impact reported emissions, it is important to the emissions modeling process.

- *Quality Assurance Methods*

The Data Management Unit's general quality assurance (QA) procedures utilize many of the techniques outlined in the EPA's Emission Inventory Improvement Program (EIIP) Technical Report Series Volume 6: Quality Assurance Procedures. The unit groups these techniques into two basic categories: Bottom-Up QA procedures and Top-Down QA procedures. Top-Down Procedures analyze groups of emissions data that share a common trait and look for outliers, in keeping with the 'Reality Check' technique. Bottom-Up procedures evaluate individual EIQs that are believed to be erroneous due to data entry errors or inconsistencies brought up by a third party. The Air Quality Analysis unit's quality assurance efforts are driven by top-down techniques, with individual EIQ improvements due to referrals from other air program staff. This allows prioritization of potential errors found and maximizes the results achievable with the available staff resources. Correction of individual reports is done based on the results of the top-down and referral reviews.

The Data Management Unit reviewed a number of types of data elements. SCC's were reviewed for appropriateness for the type of process being reported. Changes in SCC's from previous emission year reports were also reviewed to make sure the change was accurate and that the factors were changed when needed.

Emission factors were reviewed in a number of ways. When the facility chooses AP-42 or WebFIRE as the source of emission factor, the factors were compared to the current EPA factors to ensure the correct factors are being used for the SCC. Recent stack tests were reviewed and compared to the emission factors being reported. When needed, the emission factor was updated

to match the most recent stack test. When a facility chooses engineering calculation for the source of emission factor, large changes in emission factors from previous reports were reviewed for accuracy.

Control equipment and efficiencies were reviewed. The type of control equipment was compared to the process being reported for appropriateness. Unexpected control efficiencies were compared to permit documentation to verify accuracy.

Large emission changes from previous reports were reviewed at the facility and process level. In some cases the facility was contacted to confirm the change.

Hazardous air pollutants review by comparing emissions to the emissions reported in EPA's Toxic Release Inventory (TRI). Where large differences were found, the facility was contacted to provide an explanation for the difference and/or updated HAP emissions.

All facilities that reported above 0.1 Tons of lead facility-level emissions were reviewed. Emission factors and throughputs were all verified with permit documentation and additional facility documentation.

Stack parameters were reviewed. When the stack height was reported as 10 feet or less, the facility was contacted to confirm the stack height. Reported flow rate and stack diameter were used to calculate a velocity, and the calculated velocity was compared to the reported velocity. When the difference between calculated velocity and reported velocity was greater than 5%, the facility was contacted to verify the correct stack parameters.

Throughout the year, inspectors and permit writers contact the Data Management Unit with potential issues with individual facilities emissions data. These issues are reviewed and when appropriate, staff will work with the facility to make needed updates to the emissions report.

- *Ozone Season Day Emissions*

Ozone season day emissions are submitted only for Missouri sources in the 5-county St. Louis Ozone Nonattainment area (Franklin, Jefferson, St. Charles, and St. Louis Counties and the City of St. Louis). These emission estimates detail the amount of emissions on a typical summer day during the peak ozone season from June 1 through August 31. Only the ozone precursor pollutants of NO_x, VOC and CO are reported at this temporal scale. Ozone season day emissions are calculated using the Form 2.0Z Ozone Season Information Form or the Ozone Season Worksheet in MoEIS. The Ozone Season Worksheet calculates these emissions automatically for each emission process, using summer activity percentage, already provided by the facility, to convert the annual throughput into a summer throughput. The calculated emissions for June 1 to

August 31 are converted from pounds to tons and then divided by 92 to get the average ozone season day emissions.

- *EPA Augmentation and Quality Assurance*

After the point source data had been submitted to the EIS, EPA began their data augmentation and quality assurance process. The PM data augmentation involved adding PM₁₀-PRI and PM_{2.5}-PRI when just PM₁₀-FIL, PM_{2.5}-FIL, and PM-CON were reported. The PM data augmentation also involved adding PM₁₀-FIL, PM_{2.5}-FIL, and when appropriate PM-CON when just PM₁₀-PRI and PM_{2.5}-PRI were reported. These changes were reviewed and while the additional pollutants were added to Missouri's emissions in the NEI, the data submitted by Missouri was not altered. State submitted HAP data was compared to the 2011 and 2014 TRI and compared to the 2011 NEI. The sites with large differences were identified by EPA and the comparisons provided to the State for review. Missouri contacted a number of sites as a result of this comparison, and three facilities provided updated data that Missouri submitted to the EIS. EPA also preformed HAP data augmentation using SCC based HAP emission factors, and when specific HAPs were not reported by the State, these emissions were added to the NEI. Missouri will review the HAP factors used in this process and when appropriate will apply this information to future emission reports.

D-4 Nonpoint Source Inventory

Nonpoint emissions estimates were developed for several categories by EPA for the 2014 inventory. Where appropriate, the air program accepted these estimates with no modifications as generated by EPA.

When it was determined that emissions from the air program may be substantially different than EPA estimates, state specific information was used to produce more accurate data. For some source categories, this was done by modifying the numbers produced by EPA. In other instances, estimates were developed by air program staff.

This 2014 inventory does not include biogenic or geogenic emissions. The inventory does not include the nonpoint categories for wildfire which are in the event inventory. The specifics for the various nonpoint categories are includes in the following subsections.

D-4-1 Ag Burning

EPA provided draft agricultural burning estimates on May 2015 for state review. These estimates are based on satellite detected fires and burn scars, combined with land cover information. Comments were submitted by the air program asking for revisions that would lower the acreage burned on days with heavy rain and snow cover. EPA has not posted revised

emission estimates for this category as of February 2016, and the draft estimates are accepted until revisions are completed. The SCCs covered in this category are:

SCC	SCC Description
2801500000	Agric - Crops /Field Burning - whole field set on fire /Unspecified
2801500141	Agric - Crops /Field Burning - whole field set on fire /Crop is Bean (red): Headfire Burning
2801500150	Agric - Crops /Field Burning - whole field set on fire /Crop is Corn: Burning Techniques Not Important
2801500151	Agric - Crops /Field Burning - whole field set on fire /Crop is Double Crop Winter Wheat and Corn: Burning Techniques Not Important
2801500160	Agric - Crops /Field Burning - whole field set on fire /Crop is Cotton: Burning Techniques Not Important
2801500171	Agric - Crops /Field Burning - whole field set on fire /Crop is Fallow : Burning Techniques Not Important
2801500220	Agric - Crops /Field Burning - whole field set on fire /Crop is Rice: Burning Techniques Not Significant
2801500262	Agric - Crops /Field Burning - whole field set on fire /Crop is Wheat: Backfire Burning
2801500264	Agric - Crops /Field Burning - whole field set on fire /Crop is Double Crop Winter Wheat and Soybeans

Total statewide emissions (tons per year)

STATE	CO	NH ₃	NO _x	PM ₁₀ -PRI	PM ₂₅ -PRI	SO ₂	VOC
MISSOURI	14,737	3,763	651	2,434	1,432	307	1,129

D-4-2 Cremation- Human and Animal

EPA provided estimates for 2014 that are exactly the same as the estimates included in 2011 NEIV2. The air program does not accept these estimates and used 2014 facility-reported data to create a bottom-up inventory. The air program inventory includes only criteria pollutants, and does not include mercury.

The SCCs included in this category are:

SCC	SCC Description Level One	SCC Description Level Two	SCC Description Level Three	SCC Description Level Four
2810060100	Miscellaneous Area Sources	Other Combustion	Cremation	Humans
2810060200	Miscellaneous Area Sources	Other Combustion	Cremation	Animals

Human and animal crematories in Missouri are subject to air permitting and emission reporting requirements. From their most recent reported information, these crematories are summed to the county-level and reported as a nonpoint category as none are large enough to be point sources under the AERR based on their potential to emit.

Total statewide emissions (tons per year)

SCC	Lead	CO	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
2810060100	0.0148	2.553	2.8581	2.7707	2.5599	1.5894	2.071
2810060200	0.0133	6.6382	5.9925	5.4232	5.0782	5.2491	7.3652

D-4-3 Oil and Gas

EPA provided estimates in two tools – Oil and Gas Exploration v1.0 and Oil and Gas Production v1.1. The air program accepted estimates from both tools as there are few locations in the state with oil and gas activity, and they are all not included in point sources and should be reported exclusively in nonpoint. The tools create emissions for criteria and HAP pollutants for the following SCCs in Missouri:

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2310000220	Industrial Processes	Oil and Gas Exploration and Production	All Processes	Drill Rigs
2310000660	Industrial Processes	Oil and Gas Exploration and Production	All Processes	Hydraulic Fracturing Engines
2310023600	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	CBM Well Completion: All Processes

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2310023606	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Mud Degassing
2310111700	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Oil Exploration	Oil Well Completion: All Processes
2310121100	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Exploration	Mud Degassing
2310121700	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Exploration	Gas Well Completion: All Processes
2310000330	Industrial Processes	Oil and Gas Exploration and Production	All Processes	Artificial Lift
2310000550	Industrial Processes	Oil and Gas Exploration and Production	All Processes	Produced Water
2310010100	Industrial Processes	Oil and Gas Exploration and Production	Crude Petroleum	Oil Well Heaters
2310010200	Industrial Processes	Oil and Gas Exploration and Production	Crude Petroleum	Oil Well Tanks - Flashing & Standing/Working/Breathing
2310010300	Industrial Processes	Oil and Gas Exploration and Production	Crude Petroleum	Oil Well Pneumatic Devices
2310011000	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Oil Production	Total: All Processes
2310011201	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Oil Production	Tank Truck/Railcar Loading: Crude Oil

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2310011501	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Oil Production	Fugitives: Connectors
2310011502	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Oil Production	Fugitives: Flanges
2310011503	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Oil Production	Fugitives: Open Ended Lines
2310011505	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Oil Production	Fugitives: Valves
2310021010	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Storage Tanks: Condensate
2310021030	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Tank Truck/Railcar Loading: Condensate
2310021100	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Gas Well Heaters
2310021102	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Natural Gas Fired 2Cycle Lean Burn Compressor Engines 50 To 499 HP
2310021202	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Natural Gas Fired 4Cycle Lean Burn Compressor Engines 50 To 499 HP
2310021251	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Lateral Compressors 4 Cycle Lean Burn
2310021300	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Gas Well Pneumatic Devices

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2310021302	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Natural Gas Fired 4Cycle Rich Burn Compressor Engines 50 To 499 HP
2310021351	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Lateral Compressors 4 Cycle Rich Burn
2310021400	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Gas Well Dehydrators
2310021501	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Fugitives: Connectors
2310021502	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Fugitives: Flanges
2310021503	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Fugitives: Open Ended Lines
2310021505	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Fugitives: Valves
2310021506	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Fugitives: Other
2310021603	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Production	Gas Well Venting - Blowdowns
2310023010	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Storage Tanks: Condensate
2310023030	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Tank Truck/Railcar Loading: Condensate

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2310023100	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	CBM Well Heaters
2310023102	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	CBM Fired 2Cycle Lean Burn Compressor Engines 50 To 499 HP
2310023202	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	CBM Fired 4Cycle Lean Burn Compressor Engines 50 To 499 HP
2310023251	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Lateral Compressors 4 Cycle Lean Burn
2310023300	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Pneumatic Devices
2310023302	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	CBM Fired 4Cycle Rich Burn Compressor Engines 50 To 499 HP
2310023310	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Pneumatic Pumps
2310023351	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Lateral Compressors 4 Cycle Rich Burn
2310023400	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Dehydrators
2310023511	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Fugitives: Connectors
2310023512	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Fugitives: Flanges

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2310023513	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Fugitives: Open Ended Lines
2310023515	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Fugitives: Valves
2310023516	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	Fugitives: Other
2310023603	Industrial Processes	Oil and Gas Exploration and Production	Coal Bed Methane Natural Gas	CBM Well Venting - Blowdowns
2310111401	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Oil Exploration	Oil Well Pneumatic Pumps
2310121401	Industrial Processes	Oil and Gas Exploration and Production	On-Shore Gas Exploration	Gas Well Pneumatic Pumps

Total Emissions by county (tons per year):

SCC	State and County FIPS code	CO	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
2310000220	29037	0.0866	0.3222	0.0133	0.0129	0.0008	0.0176
2310000220	29095	0.0172	0.0639	0.0026	0.0026	0.0002	0.0035
2310000220	29205	0.0914	0.3401	0.0141	0.0137	0.0008	0.0185
2310111100	29037	-	-	-	-	-	7.64
2310111100	29095	-	-	-	-	-	0.69
2310111100	29205	-	-	-	-	-	3.37

D-4-4 Asphalt Paving

EPA provided asphalt paving emission estimates, and the air program accepted these estimates as these emissions are exclusively in the nonpoint category. The methodology EPA uses is updated from previous NEIs to remove dependencies on older data sources that are no longer updated and minimize the number of assumptions in the calculation. The SCCs estimated in this category are:

SCC	SCC Description	
2461021000	Solvent Utilization	Misc Non-industrial: Commercial, Cutback Asphalt
2461022000	Solvent Utilization	Misc Non-industrial: Commercial, Emulsified Asphalt

Total statewide asphalt paving emissions (tons per year)

SCC	Paving Type	Pollutant	Emissions (tons)
2461021000	Cutback	VOC	3,005.54
2461022000	Emulsified	VOC	3,610.38

Cutback emissions are almost double the 2011 NEI estimate of 1,855 tons, and emulsified are more than 3 times the 2011 NEI estimate of 970 tons. The new methodology increases the emission estimate for all counties in Missouri.

D-4-5 Backyard BBQ

EPA provided estimates for this category, and the air program accepted these as the default.

SCC	SCC Description
2810025000	Miscellaneous Area Sources - Other Combustion - Charcoal Grilling - Residential

Total annual emissions (tons per year)

SCC	CO	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	VOC
2810025000	5,165.54	110.83	361.35	289.08	96.78

D-4-6 Commercial Cooking

EPA provided estimates for this category, and the air program accepted these as defaults in version 1.1 of the tool released Dec 2015. An updated version 1.2 released in March 2016 was

not reviewed and is not included in this inventory. No point source subtraction is needed for this category. SCCs included in this category are listed below.

SCC	SCC Description Level 3	SCC Description Level 4
2302002100	Commercial Cooking – Charbroiling	Conveyorized Charbroiling
2302002200	Commercial Cooking – Charbroiling	Under-fired Charbroiling
2302003000	Commercial Cooking – Frying	Deep Fat Frying
2302003100	Commercial Cooking – Frying	Flat Griddle Frying
2302003200	Commercial Cooking – Frying	Clamshell Griddle Frying

There are no emission factors for either NO_x or SO_x in the methodology. Total statewide emissions by SCC (tons per year):

SCC	CO	PM ₁₀ -PRI	PM _{2.5} -PRI	VOC
2302002100	165.57	198.23	192.15	49.13
2302002200	521.91	1331.11	1286.81	159.10
2302003000	0	0	0	25.89
2302003100	42.18	345.18	262.25	20.23
2302003200	0	23.17	19.512	0.81

D-4-7 ICI Combustion

EPA provides a tool to assist states in creating the nonpoint Industrial and Commercial/Institutional (ICI) fuel combustion emission estimates. The Microsoft Access tool is called the ICI Combustion Tool, and the latest release is version 1.4 on 12-14-2015. The tool is documented in the ICI Tool Documentation v1_4.pdf, and a user guide is named ICI Tool Users Guide v1_4.pdf. This tool was used by Missouri to create nonpoint ICI Combustion emission estimates as described below.

ICI nonpoint estimates are required for states where not all fuel consumed in the area are included in the point source inventory. EPA sets the minimum point source threshold to capture only the largest emitters with detailed point source information. The remaining smaller, yet numerous, nonpoint sources must be inventoried without facility-specific information. With that in mind, total statewide fuel usage from the 2013 Energy Information Administration’s State Energy Data System (SEDS) is the primary data source for the nonpoint estimate. The tool adjusts the fuel usage to account for fuel consumed by nonroad mobile sources and product feedstocks, and allows states to adjust underlying assumptions. The tool also provides the point to nonpoint source crosswalk used for point source activity subtraction to eliminate double-counting of fuel used at point sources that should be removed from the statewide total fuel usage.

The remaining fuel usage is assumed to be all nonpoint, and is distributed within a state to the county-level using Bureau of the Census employment by county. The tool calculates criteria pollutant emissions and outputs those estimates in EPA-ready EIS format.

Details of Tool Use:

The air program chose only its state when first opening and using the tool, though multiple state areas can be estimated with the tool. Next, the tool requires the state to choose to perform point source subtraction using either activity or emission data. For Missouri, 2014 activity data is chosen because fuel usage at point sources is almost universally reported. Likewise, emission data is more difficult to subtract because uncontrolled point emissions must be calculated for all criteria pollutants, with more potential for error. The discrepancy between using 2014 point source data and 2013 SEDS (latest available, released July 2015) data is discussed later in the documentation.

The tool outputs a spreadsheet template where the air program is to input the county total fuel usage by point source SCC in a specified unit of measure. With this template, the program was able to pull from the point inventory all activity data for the specified SCCs, including the reported fuel usage quantity in its reported unit of measure and heat content of that fuel. Based on the first pull of point source data, several facilities emission reports were amended where they were using an incorrect point source SCC for their industry type. Specifically, many electric generating units (EGUs) were using SCCs for the industrial and commercial/institutional sectors, and their codes were updated to EGU-specific SCCs. Similarly, many industrial facilities were using electric generating unit SCCs and were changed back to industrial codes. After these corrections to point source SCCs were completed, the data was pulled a second time to reflect the changes. Because several EGUs also combust natural gas for space heating but there is no point SCC for that activity, these facilities will be included with the industrial space heating point SCCs they use for reporting. A few remaining EGUs (with NAICS 221112 Fossil Fuel Electric Power Generation) where a best fit EGU point SCC could not be determined are eliminated from the point source data. Additionally, eight point source SCC records at three different facilities report a non-zero activity as either hours of operation or brake horsepower-hours because of stack tested emission factors. Because there is no reported amount of fuel used for these processes, they are not included in the point source subtraction data.

The tool documentation, section 4.3, states “natural gas consumed as pipeline fuel is not included by the SEDS within the Industrial sector. Therefore, it is necessary to exclude pipeline natural gas consumption in performing natural gas combustion subtraction.” The tool references the SEDS documentation stating that all pipeline natural gas is included in the transportation sector, not fuel consumption total (http://www.eia.gov/state/seds/sep_use/notes/use_natgas.pdf). The ICI tool documentation suggests removing all point source consumption in point SCCs 202002** to eliminate natural gas consumption at pipeline facilities from the point source natural gas

combustion total. A review of Missouri point source records shows that a mix of facility types use the industrial natural gas combustion point SCCs 202002** and the SCC is not exclusively within the pipeline natural gas industrial sector. Instead of following the suggested point source removal method by SCC, all natural gas consumption at facilities with NAICS 486210 for “Pipeline Transportation of Natural Gas” is removed, regardless of SCC. Eleven facilities were removed based on the exclusion by NAICS 486210.

The remaining fuel usage data needs to be converted from the point source reported unit of measure to the template required unit of measure. The reported heat content of fuel is used to convert from the reported unit of measure to BTU, and standard conversions for diesel and natural gas were used to convert from BTU to the required unit of measure (137,000,000 btu/ thousand gallons of diesel, 1,050,000,000 btu/million cubic feet of natural gas).

The final converted throughput table in excel is then imported to Access for ease of use. The raw, process-by-process point data is summed for each county and SCC using Access. Then the totals are matched up to the required point source template format and put into the ICI Template for importing to the ICI Tool. Once the ICI template for point source fuel usage is loaded into the tool, the template is imported back to the ICI tool. The tool also allows states to edit several assumptions in the tool, including coal type distribution, boiler/engine split, sulfur content of fuels. Most of these default assumptions are built on available national or regional information from publicly available datasets. Because the nonpoint fuel usage by definition is at smaller sources where facility-level data is not available, the default information in the tool is relied upon for these emission estimates.

Total statewide emissions, in tons per year, are listed below.

SCC	SCC Description	CO	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
2102001000	Stationary Fuel Comb /Industrial /Anthracite Coal /Total: All Boiler Types	0	0	0	0	0	0
2102002000	Stationary Fuel Comb /Industrial /Bituminous/Subbituminous Coal /Total: All Boiler Types	0	0	0	0	0	0
2102004001	Stationary Fuel Comb /Industrial /Distillate Oil /Boilers	6	25	3	2	12	0
2102004002	Stationary Fuel Comb /Industrial /Distillate Oil /IC Engines	167	776	56	52	12	54
2102005000	Stationary Fuel Comb /Industrial /Residual Oil /Total: All Boiler Types	0	0	0	0	0	0
2102006000	Stationary Fuel Comb /Industrial /Natural Gas /Total: Boilers and IC Engines	1255	1495	8	6	9	82
2102007000	Stationary Fuel Comb /Industrial /Liquified Petroleum Gas /Total: All Boiler Types	34	61	0	0	0	2

SCC	SCC Description	CO	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
2102008000	Stationary Fuel Comb /Industrial /Wood /Total: All Boiler Types	0	0	0	0	0	0
2102011000	Stationary Fuel Comb /Industrial /Kerosene /Total: All Boiler Types	0	0	0	0	0	0
2103001000	Stationary Fuel Comb /Commercial/Institutional /Anthracite Coal /Total: All Boiler Types	0	0	0	0	0	0
2103002000	Stationary Fuel Comb /Commercial/Institutional /Bituminous/Subbituminous Coal /Total: All Boiler Types	0	0	0	0	0	0
2103004001	Stationary Fuel Comb /Commercial/Institutional /Distillate Oil /Boilers	1	4	0	0	0	0
2103004002	Stationary Fuel Comb /Commercial/Institutional /Distillate Oil /IC Engines	42	197	14	14	1	14
2103005000	Stationary Fuel Comb /Commercial/Institutional /Residual Oil /Total: All Boiler Types	0	0	0	0	0	0
2103006000	Stationary Fuel Comb /Commercial/Institutional /Natural Gas /Total: Boilers and IC Engines	2470	2941	15	13	18	162
2103007000	Stationary Fuel Comb /Commercial/Institutional /Liquified Petroleum Gas /Total: All Combustor Types	160	285	1	1	1	10
2103008000	Stationary Fuel Comb /Commercial/Institutional /Wood /Total: All Boiler Types	1058	388	911	788	44	30
2103011000	Stationary Fuel Comb /Commercial/Institutional /Kerosene /Total: All Combustor Types	0	1	0	0	2	0
Total		5,194	6,172	1,009	877	99	355

Though the tool was released in Dec 2015 and the air program completed estimates in Jan 2016, EPA's contractor provided an updated tool assumption on the boiler/engine split based on the EIA Manufacturing Energy Consumption Survey (MECS) in February 2016. Because the updated assumption was released 2 days before the nonpoint data due date and a reference to the supporting data was not released until after the nonpoint due date, the air program chose to leave the original boiler/engine splits unchanged in this inventory.

D-4-8 Solvents

EPA provided a tool called the Solvent Tool, v1.5, in December 2015 for use by states in estimating nonpoint solvent emission categories. The tool comes in two versions depending on the state choice to estimate graphic arts as either per employee or population calculation. The air program chose to use the per employee calculation method.

The air program accepts the Solvent Tool v1.5 output for SCCs with calculations based on population and lane miles as these have no point source subtraction. These SCCs are listed below.

SCC	Category Description	Activity Unit of Measure
2401001000	SC: Architectural Coatings - total	person
2401008000	SC: Traffic Paint	lane mile
2401100000	SC: Industrial Maintenance Coatings	person
2401200000	SC: Other Special Purpose Coatings	person
2460100000	C&C: Cosmetics and Toiletries	person
2460200000	C&C: Cleaning Products; Household	person
2460400000	C&C: Auto Aftermarket	person
2460500000	C&C: Coatings and Related Products	person
2460600000	C&C: adhesives and sealants	person
2460800000	C&C: FIFRA Regulated Products	person
2460900000	C&C: Misc. Products (not otherwise covered)	person

Point source subtraction is a key element of many other categories covered by the solvent tool. Though the tool was designed to accept point source subtraction by either subtracting the number of point source employees or uncontrolled point source VOC emissions, the subtraction of employees method does not allow for a full accounting of large point sources. For example, the tool creates an estimated number of employees, by North American Industrial Classification System (NAICS) and county, where the Census report withholds a specific employment value to avoid disclosing confidential information where only a single or few employers exist. The tool does not reveal exactly how many facilities are included in that total. With an estimated number of employees and no facility count, the tool makes it impossible to completely remove any remaining nonpoint employees where the program could ensure that all the emissions for that NAICS and county are covered by the point source data. Many of the solvent categories have one or two single, large employers in particular industries in a county, and it is preferable to zero out any remaining nonpoint employees to avoid overestimating emissions. For this reason, the program chooses to calculate emissions using some information from the tool, like emission factors, and state-specific information like point source employment by facility, NAICS and county and the US Census County Business Patterns (CBP). The latest CBP available is for the 2013 year, and is the same dataset used within the Solvent Tool v1.5.

The air program downloaded the 2013 CBP county-level data for the entire country, then parsed out only records for Missouri. The state-total CBP data for Missouri was also downloaded. CBP contains NAICS for all types of employment in the US, though only certain industries are related to emissions from solvent use. The Solvent Tool v1.5 table *NAICS to SCC x-walk* is used to limit

the number of CBP NAICS codes where solvent emissions are estimated. From this set of NAICS, each nonpoint solvent SCC is examined for point source subtraction as described below.

- **2401005000 Automobile Refinishing**

For this nonpoint SCC, there are several possible NAICS to look for within the list of point sources: 81112*, 4411* and 4412*. There are no point sources with those NAICS from Missouri, so no subtraction needs to be completed. The estimate from the Solvent Tool v1.5 is accepted.

- **2401015000 Wood and Composition Flat Stock, Factory Finished Wood**

For this nonpoint SCC, there are several possible NAICS to look for within the list of point sources: 321*. There are 7 point facilities to subtract from the CBP totals from 6 counties. The method of the Solvent Tool v1.5 is followed to recalculate the number of nonpoint employees by county after subtracting the point source employees. The method is outlined in the Solvent Tool Documentation v1.5.pdf.

The NAICS associated with this nonpoint SCC are:

NAICS	NAICS Description
321///	Wood Product Manufacturing

For counties with point source employees, either the total county reported CBP employment is reduced directly by the number of point source employees or the estimated number of employees for withheld counties is adjusted downward to remove point source employees. As an example of direct subtraction of the number of employees, county 091 has a CBP reported number of employees in NAICS 321/// of 830 at 20 different facilities. The two Missouri point sources in the county have reported 420 and 62 employees which are removed from the CBP number of 830 to leave 348 nonpoint employees for the emission estimation calculation in the county. As an example of estimated employment reduction, county 105 has a withheld employment number flagged as letter E. The range of employees for letter E is 250-499 at four facilities, two of which have 1 to 4 employees, one has 10 to 19 employees, and the last has 250 to 499 employees. The largest employer is a point source that should be removed from the number of nonpoint employees before creating an emission estimate. The estimated number of nonpoint employees is reduced to the sum of the midpoints of the remaining facilities, two facilities at 2.5 employees and one facility at 14.5 employees, leaving a total of 19.5 nonpoint employees.

After the point source employees are subtracted, then the Solvent Tool v1.5 methodology is followed to create an adjustment factor that ensures the estimated county numbers sum to the state total NAICS employment. Where the state total NAICS employment is a withheld number, the midpoint of the range is used as the state total NAICS employment

figure. A similar method is used for all following nonpoint SCCs to arrive at a nonpoint number of employees in each county.

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of CBP reported facilities	Number of Point Facilities
29091	20	2
29105	4	1
29107	1	1
29201	3	1
29203	19	1
29225	5	1

- **2401020000 Wood Furniture and Fixtures**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
337110	Wood Kitchen Cabinet and Countertop Manufacturing
337121	Upholstered Household Furniture Manufacturing
337122	Nonupholstered Wood Household Furniture Manufacturing
337127	Institutional Furniture Manufacturing
337211	Wood Office Furniture Manufacturing
337212	Custom Architectural Woodwork and Millwork Manufacturing
337215	Showcase, Partition, Shelving, and Locker Manufacturing

The Solvent Tool also matches NAICS 337129 to this nonpoint category, but that NAICS was retired in 2012 NAICS and no Missouri point sources use that retired code.

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29071	1
29145	1
29183	1
29207	1
29215	1

- **2401025000 Metal Furniture**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
337124	Metal Household Furniture Manufacturing
337127	Institutional Furniture Manufacturing
337214	Office Furniture (except wood) Manufacturing
337215	Showcase, Partition, Shelving, and Locker Manufacturing

There is only one point source that corresponds to these NAICS – it’s located in county 29071 Franklin, and has 105 employees. The CBP estimates do not place any employees in these NAICS in this county (as this facility is also estimated as part of nonpoint SCC 2401020000 Wood Furniture and Fixtures) and so no point source subtraction is completed for this nonpoint category. The default emissions are accepted for this nonpoint SCC.

- **2401030000 Paper, Foil and Film**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
322220	Paper Bag and Coated and Treated Paper Manufacturing

Only a single point source appears in Missouri’s data with the NAICS 322220 that matches to a county with CBP employment in NAICS 322220. There are two Missouri point sources in county 29031 Cape Girardeau listed with NAICS 322220, but there are no corresponding employment records for that county in CBP, so these point sources cannot be subtracted. The following list shows the only county a point source facility that is removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29510	1

- **2401040000 Metal Cans**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
33243/	Metal Can, Box, and other Metal Container (light gauge) Manufacturing

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29021	1
29077	1
29099	1
29189	1

- **2401055000 Machinery and Equipment**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
3331//	Agriculture, Construction, and Mining Machinery Manufacturing
3332//	Industrial Machinery Manufacturing
3333//	Commercial and Service Industry Machinery Manufacturing
33341/	Ventilation, Heating, Air-Conditioning, and Commercial Refrigeration Equipment Manufacturing

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29099	1
29183	1

- **2401060000 Appliances**

For this nonpoint SCC, there are several possible NAICS to look for within the list of point sources: 3352//. There are no point sources with those NAICS from Missouri, so no subtraction needs to be completed. The estimate from the Solvent Tool v1.5 is accepted.

- **2401065000 Electronic and Other Electrical Coatings**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
331491	Nonferrous Metal (except Copper and Aluminum) Rolling, Drawing, and Extruding
335921	Fiber Optic Cable Manufacturing
335929	Other Communication and Energy Wire Manufacturing
335311	Power, Distribution, and Specialty Transformer Manufacturing

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29027	1

- **2401070000 Motor Vehicles**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
3361//	Motor Vehicle Manufacturing
3362//	Motor Vehicle Body and Trailer Manufacturing
3363//	Motor Vehicle Parts Manufacturing

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29047	1
29051	1
29061	1
29071	1
29079	1
29091	1
29095	1
29097	1
29117	1
29147	1
29157	1
29159	1
29175	1
29183	1
29201	3
29229	1

- **2401075000 Aircraft**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
3364//	Aerospace Product and Parts Manufacturing

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29071	1
29183	1
29189	2

- **2401080000 Marine Coatings**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
3366//	Ship and Boat Building
488390	Other Support Activities for Water Transportation

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29083	1
29105	3
29155	1

- **2401085000 Railroads**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
3365//	Railroad Rolling Stock Manufacturing

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29095	1
29099	1

- **2401090000 Miscellaneous Manufacturing**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
339///	Miscellaneous Manufacturing
3369//	Other Transportation Equipment Manufacturing

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29165	1

- **2415000000 Cleaning Products: Industrial and Institutional (Degreasing)**

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
331///	Primary Metal Manufacturing
332///	Fabricated Metal Product Manufacturing
333///	Machinery Manufacturing
334///	Computer and Electronic Product Manufacturing
335///	Electrical Equipment, Appliance, and Component Manufacturing
336///	Transportation Equipment Manufacturing
337///	Furniture and Related Product Manufacturing
339///	Miscellaneous Manufacturing
441///	Motor Vehicle and Parts Dealers
483///	Water Transportation
484///	Truck Transportation
485///	Transit and Ground Passenger Transportation
488///	Support Activities for Transportation
8111//	Automotive Repair and Maintenance
8112//	Electronic and Precision Equipment Repair and Maintenance

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29007	1
29009	2
29019	3
29021	3
29023	2
29027	1
29031	1
29045	1
29047	2
29051	1
29061	1
29071	7
29077	2
29079	1
29083	1
29087	1
29091	1
29095	3
29097	3
29099	5
29101	1
29105	5

FIPS County Number	Number of Point Facilities
29113	2
29117	1
29143	1
29145	3
29147	1
29151	1
29155	1
29157	1
29159	3
29165	2
29175	1
29183	5
29187	1
29189	5
29201	3
29205	1
29207	1
29215	1
29219	1
29229	1
29510	5

- **2420000000 Dry Cleaning**

For this nonpoint SCC, there is only one NAICS to look for within the list of point sources: 812320. There are no point sources with those NAICS from Missouri, so no subtraction needs to be completed. The estimate from the Solvent Tool v1.5 is accepted.

- **2425000000 Graphic Arts**

EPA's tool provides a choice for states to use either a population-based emission factor (lbs/person) or an employment-based emission factor (lbs/employee). These emission factors are updated from the last NEI in 2011 based on new solvent sales data and new population and employment numbers.

Similar to the wood composition and flat stock method above, the point source employees are subtracted directly for CBP reported county total employment numbers, or

the number of facilities and range midpoints are used when adjusting the estimated range of employees. The following NAICS are mapped to this nonpoint category:

NAICS	NAICS Description
322211	Corrugated and Solid Fiber Box Manufacturing
322212	Folding Paperboard Box Manufacturing
322219	Other Paperboard Container Manufacturing
322220	Paper Bag and Coated and Treated Paper Manufacturing
322230	Stationery Product Manufacturing
322291	Sanitary Paper Product Manufacturing
322299	All Other Converted Paper Product Manufacturing

The following list shows only counties with point source facilities that are removed from the nonpoint estimates. Counties with NAICS employees but no point sources are not listed.

FIPS County Number	Number of Point Facilities
29021	1
29027	1
29047	2
29051	1
29071	1
29073	1
29083	2
29095	2
29115	1
29189	2
29219	1
29510	3

Solvent emissions for nonpoint SCCs are as follows:

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	VOC (tons per year)
2401001000	Solvent Utilization	Surface Coating	Architectural Coatings	Total: All Solvent Types	7,072.55

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	VOC (tons per year)
2401005000	Solvent Utilization	Surface Coating	Auto Refinishing: SIC 7532	Total: All Solvent Types	1,427.02
2401008000	Solvent Utilization	Surface Coating	Traffic Markings	Total: All Solvent Types	1,381.62
2401015000	Solvent Utilization	Surface Coating	Factory Finished Wood: SIC 2426 thru 242	Total: All Solvent Types	130.87
2401020000	Solvent Utilization	Surface Coating	Wood Furniture: SIC 25	Total: All Solvent Types	746.40
2401025000	Solvent Utilization	Surface Coating	Metal Furniture: SIC 25	Total: All Solvent Types	185.07
2401030000	Solvent Utilization	Surface Coating	Paper: SIC 26	Total: All Solvent Types	124.50
2401040000	Solvent Utilization	Surface Coating	Metal Cans: SIC 341	Total: All Solvent Types	127.14
2401055000	Solvent Utilization	Surface Coating	Machinery and Equipment: SIC 35	Total: All Solvent Types	292.12
2401060000	Solvent Utilization	Surface Coating	Large Appliances: SIC 363	Total: All Solvent Types	4.05
2401065000	Solvent Utilization	Surface Coating	Electronic and Other Electrical: SIC 36 - 363	Total: All Solvent Types	25.80
2401070000	Solvent Utilization	Surface Coating	Motor Vehicles: SIC 371	Total: All Solvent Types	563.14
2401075000	Solvent Utilization	Surface Coating	Aircraft: SIC 372	Total: All Solvent Types	4.80

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	VOC (tons per year)
2401080000	Solvent Utilization	Surface Coating	Marine: SIC 373	Total: All Solvent Types	114.80
2401085000	Solvent Utilization	Surface Coating	Railroad: SIC 374	Total: All Solvent Types	46.26
2401090000	Solvent Utilization	Surface Coating	Miscellaneous Manufacturing	Total: All Solvent Types	416.75
2401100000	Solvent Utilization	Surface Coating	Industrial Maintenance Coatings	Total: All Solvent Types	1,822.91
2401200000	Solvent Utilization	Surface Coating	Other Special Purpose Coatings	Total: All Solvent Types	18.14
2415000000	Solvent Utilization	Degreasing	All Processes/All Industries	Total: All Solvent Types	3,514.08
2420000000	Solvent Utilization	Dry Cleaning	All Processes	Total: All Solvent Types	10.65
2425000000	Solvent Utilization	Graphic Arts	All Processes	Total: All Solvent Types	14,126.24
2460100000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Personal Care Products	Total: All Solvent Types	6,044.92
2460200000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Household Products	Total: All Solvent Types	6,649.41
2460400000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Automotive Aftermarket Products	Total: All Solvent Types	4,110.54

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four	VOC (tons per year)
2460500000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Coatings and Related Products	Total: All Solvent Types	2,871.34
2460600000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All Adhesives and Sealants	Total: All Solvent Types	1,722.80
2460800000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	All FIFRA Related Products	Total: All Solvent Types	5,379.97
2460900000	Solvent Utilization	Miscellaneous Non-industrial: Consumer and Commercial	Miscellaneous Products (Not Otherwise Covered)	Total: All Solvent Types	211.57

D-4-9 Agricultural Pesticides

EPA provided estimates for the agricultural pesticide sector in a spreadsheet tool in February 2016 called the Agricultural Pesticide Application Emissions tool v2.0.

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2461850000	Solvent Utilization	Miscellaneous Non-industrial: Commercial	Pesticide Application: Agricultural	All Processes

The current tool estimates emissions for the various crop types and pesticides in use and then totals them to a combined nonpoint SCC. The 2011 NEI estimates did not use the combined nonpoint SCC, instead using the crop-specific SCCs for each county.

Total statewide emissions are:

SCC	Pollutant	Emissions (tons per year)
2461850000	VOC	4,093

D-4-10 Residential Heating, non-wood

Residential heating with fuels other than wood is contained in this category. As with all residential emission sources, there is no point source subtraction needed. The air program accepts the emission estimates provided by EPA in five excel and access tools, each named version 1.1 and released in Dec 2015. EPA released an updated version 1.2 on March 9, 2016, but Missouri’s emissions remained the same in the updated version.

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2104001000	Stationary Source Fuel Combustion	Residential	Anthracite Coal	All Boiler Types
2104002000	Stationary Source Fuel Combustion	Residential	Bituminous/ Subbituminous Coal	All Boiler Types
2104004000	Stationary Source Fuel Combustion	Residential	Distillate Oil	Total Boilers and IC Engines
2104006000	Stationary Source Fuel Combustion	Residential	Natural Gas	Total: Boilers and IC Engines
2104007000	Stationary Source Fuel Combustion	Residential	Liquefied Petroleum Gas (LPG)	Total: All Combustion Types
2104011000	Stationary Source Fuel Combustion	Residential	Kerosene	Total: All Combustor Types

Total statewide emissions in tons per year:

SCC	Residential Fuel Type	CO	NH ₃	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
2104001000	Coal – anthracite	0	0	0	0	0	0	0
2104002000	Coal – Bituminous or Subbituminous	0	0	0	0	0	0	0
2104004000	Distillate	4.62	0.92	16.63	2.20	1.97	39.36	0.65

SCC	Residential Fuel Type	CO	NH ₃	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
2104006000	Natural Gas	2,128.92	1,064.46	5,002.96	27.68	22.89	31.93	292.73
2104007000	LPG	318.80	3.90	1,124.19	4.14	3.42	4.77	43.77
2104011000	Kerosene	0.51	0.10	1.82	0.24	0.22	4.31	0.07

D-4-11 Agricultural Tilling

Agricultural tilling emissions are created by the mechanical overturning of soil. There is no point source subtraction needed for these emissions, and the air program accepts the emission estimates provided by EPA in the excel spreadsheet version 3.1 released in March 2016. The only pollutant estimated for this category is particulate matter, specifically the pollutants PM₁₀-PRI and PM_{2.5}-PRI which are equal to their filterable components.

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2801000003	Miscellaneous Area Sources	Agriculture Production – Crops	Agriculture-Crops	Tilling

Total statewide emissions in tons per year:

SCC	PM ₁₀ -PRI	PM _{2.5} -PRI
2801000003	299,883	59,976

D-4-12 Construction Dust

Emissions in this category originate from three types of construction activities: nonresidential, residential, and road construction. Each is calculated by an EPA provided excel spreadsheets for the following SCCs:

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2311010000	Industrial Processes	Construction: SIC 15-17	Residential	Total

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2311020000	Industrial Processes	Construction: SIC 15-17	Industrial/Commercial/Institutional	Total
2311030000	Industrial Processes	Construction: SIC 15-17	Road Construction	Total

EPA released spreadsheets named version 2.0 for residential and nonresidential construction in Dec 2015 and version 3.0 for road construction in Feb 2016. The only pollutant estimated for this category is particulate matter, specifically the pollutants PM₁₀-PRI and PM_{2.5}-PRI which are equal to their filterable components. The air program accepts the EPA estimates for these SCCs as there is no point source subtraction for this category. The program corrected the EPA spreadsheet "Emissions" worksheet where the SCCs for Hickory and Wayne counties were listed with an incorrect SCC, though emissions remain zero. Total statewide annual emissions in tons per year are listed below.

SCC	PM ₁₀ -PRI	PM _{2.5} -PRI
2311010000	1,285.31	128.53
2311020000	38,517.91	3,851.79
2311030000	7,692.63	769.26

D-4-13 Mining and Quarrying

Missouri created its own estimates for the mining and quarrying sector as opposed to the EPA version 2.3 estimates provided in March 2016. Mining and quarrying activities produce particulate emissions due to the variety of processes used to extract the ore and associated overburden, including drilling and blasting, loading and unloading, and overburden replacement. Nonmetallic, metallic, coal mining operations are covered in the general mining SCC, and only lead ore mining is included in its specific SCC.

For this source category the following SCCs are assigned:

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2325000000	Industrial Processes	Mining and Quarrying: SIC 14	All Processes	Total
2325060000	Industrial Processes	Mining and Quarrying: SIC 14	Lead Ore Mining and Milling	Total

Nonmetallic, metallic, coal mining operations are covered in the general mining SCC, and only lead ore mining is included in its specific SCC.

The program chose to create state-specific estimates for these categories due to the accurate placement and magnitude of emissions of mining operations within counties of the state, as opposed to EPA’s methodology that allocates emissions based on employment within certain NAICS codes, regardless of the particular emission generating sources at individual quarries. EPA does not provide estimates for the lead ore mining SCC as Missouri is the only state with lead ore mining operations, and the program has typically provided these estimates.

Mining and quarrying operations are required to report emissions directly to the state if they are subject to 10 CSR 10-6.110, generally meaning they have a construction or operating permit. Facilities that are large enough to meet EPA’s requirements to be reported as a point source under the AERR are not included in the nonpoint emission estimate. Portable mining and quarrying emissions are proportioned to specific counties based on each county’s percent of stationary mining and quarrying emissions. The Missouri emission inventory database is queried to identify sources with industry NAICS and emission process SCCs representative of mining and quarrying operations. Seventy five of Missouri’s 115 counties have at least one mine or quarry, and the majority of operations are non-metallic limestone facilities. Lead ore mining facilities are a short list of only a single NAICS 212231 with a description of their final product containing the words “lead ore”. A total of 8 individual facilities in four counties are included in the lead ore mining emission estimates. Some controls may be included in a county emission estimate if a facility is required to control certain emission processes in their permit, but no attempt is made to itemize these controls at the county level in the NEI submission.

Total statewide emissions in tons per year are listed below.

SCC	Lead	PM ₁₀ -PRI	PM _{2.5} -PRI
2325000000	-	886.44	233.21
2325060000	1.18	122.88	19.74

D-4-14 Paved and Unpaved Roads

Paved and unpaved roadway emissions are created by the mechanical action of tires on the road surface, not the combustion emissions of vehicle engines or break wear. There is no point source subtraction needed for these emissions, and the air program accepts the emission estimates provided by EPA in the version 2.0 unpaved spreadsheet released in Dec 2015, and the version 2.1 paved road spreadsheet released in March 2016. The only pollutant estimated for this category is particulate matter, specifically the pollutants PM₁₀-PRI and PM_{2.5}-PRI which are equal to their filterable components. The 2014 road dust methodology differs from 2011 in that previous inventories accounted for the emission controls due to precipitation, and the 2014

inventory eliminates that control. The non-precipitation adjusted emission estimates are more useful for emissions modelers, the primary end user of the emissions inventory.

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2294000000	Mobile Sources	Paved Roads	All Paved Roads	Total: fugitives
2296000000	Mobile Sources	Unpaved Roads	All Unpaved Roads	Total: fugitives

Statewide total emissions (tons per year):

SCC	PM ₁₀ -PRI	PM _{2.5} -PRI
2294000000	45,435.51	11,221.74
2296000000	797,067.83	79,450.69

D-4-15 Aviation Gasoline Distribution

The distribution of aviation gasoline generates emissions during shipment via bulk tanker trucks and the filling of onsite storage tanks, called Stage 1 emissions. Emissions are also generated as individual aircraft are fueled from smaller airport service tanker trucks, called Stage 2 emissions. The air program accepts EPA estimates from this category as there is no point source subtraction. The version 3.0 spreadsheets and documentation released in Nov 2015 are accepted. EPA released version 4.0 for this category in Dec 2015, but Missouri emissions remained unchanged (the tool added Puerto Rico and US Virgin Island estimates).

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2501080050	Storage and Transport	Petroleum and Petroleum Product Storage	Airports: Aviation Gasoline	Stage 1: Total
2501080100	Storage and Transport	Petroleum and Petroleum Product Storage	Airports: Aviation Gasoline	Stage 2: Total

Statewide total emissions are listed below in tons per year.

SCC	Lead	VOC
2501080050	0.0025	400.11
2501080100	0.00014	22.56

D-4-16 *Portable Fuel Containers*

Emissions from portable fuel containers come from a variety of processes, including vapor displacement, spillage, and permeation/evaporation. Emissions are estimated for both residential and commercial operations. Portable fuel containers used to refill nonroad equipment, like lawn mowers, are not included in this category as they are included in the nonroad category. The following SCCs are included in the estimates:

SCC	Description
2501011011	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Permeation
2501011012	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Evaporation
2501011013	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Spillage During Transport
2501011014	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Refilling at the Pump - Vapor Displacement
2501011015	Storage and Transport; Petroleum and Petroleum Product Storage; Residential Portable Gas Cans; Refilling at the Pump - Spillage
2501012011	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Permeation
2501012012	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Evaporation
2501012013	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Spillage During Transport
2501012014	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Refilling at the Pump - Vapor Displacement
2501012015	Storage and Transport; Petroleum and Petroleum Product Storage; Commercial Portable Gas Cans; Refilling at the Pump - Spillage

EPA provided estimates for both VOC and HAPs as calculated from the regulatory impact report future years for the mobile source emission controls of MSAT2 and EPA's Tier 3 vehicle rule. No point source subtraction is necessary from this sector, and EPA's estimates from Nov 2015 are accepted.

Statewide emissions in tons per year are listed below.

SCC	Description	VOC
2501011011	Residential permeation	186.63
2501011012	Residential evaporation	209.41
2501011013	Residential Spillage	287.00
2501011014	Residential Refilling at Pump, vapor displacement	47.97
2501011015	Residential Refilling at Pump, spillage	8.02
2501012011	Commercial permeation	8.15
2501012012	Commercial evaporation	6.68
2501012013	Commercial spillage	391.51
2501012014	Commercial Refilling at Pump, vapor displacement	138.20
2501012015	Commercial Refilling at Pump, spillage	15.44

D-4-17 Open Burning

Open burning emissions cover the combustion of residential municipal solid waste, yard debris such as leaves and brush, and land clearing debris. Some controls are included for urban areas assumed to have no burning, or areas with burn bans. There is no point source subtraction for this category, so the air program accepts EPA's March 2016 version 1.1 estimates for this category.

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2610030000	Waste Disposal, Treatment, and Recovery	Open Burning	Residential	Household Waste (use 26-10-000-xxx for Yard Wastes)
2610000100	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Yard Waste – Leaf Species Unspecified
2610000400	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Yard Waste – Brush Species Unspecified
2610000500	Waste Disposal, Treatment, and Recovery	Open Burning	All Categories	Land Clearing Debris

Statewide Emissions in tons per year:

SCC	CO	NO_x	PM₁₀- PRI	PM_{2.5}- PRI	SO_x	VOC
2610030000	7,365.77	519.93	3,929.93	3,015.63	86.65	741.77
2610000100	354.12	19.60	69.56	53.62	2.4	88.53
2610000400	442.66	15.80	62.38	48.09	5.24	60.07
2610000500	33,715.96	997.51	3,391.54	2,614.54	-	2,314.23

EPA provided versions of the Residential Wood Combustion tool, 1.0 through 2.7, released before Aug 2015. Several states, including Missouri, commented on deficiencies in the tool as compared to the tool used for the 2011 NEI. EPA and its contractor are revising version 2.7 of the tool as of March 2016, and released a new version on April 28, 2016. The air program has not reviewed the newest version 3.0 release and chooses to use the 2011 NEI estimates, unchanged, for 2014.

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2104008100	Stationary Source Fuel Combustion	Residential	Wood	Fireplace: general
2104008210	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: fireplace inserts; non-EPA certified
2104008220	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: fireplace inserts; EPA certified; non-catalytic
2104008230	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: fireplace inserts; EPA certified; catalytic
2104008310	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: freestanding, non-EPA certified
2104008320	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: freestanding, EPA certified, non-catalytic
2104008330	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: freestanding, EPA certified, catalytic
2104008400	Stationary Source Fuel Combustion	Residential	Wood	Woodstove: pellet-fired, general
2104008510	Stationary Source Fuel Combustion	Residential	Wood	Furnace: Indoor, cordwood-fired, non-EPA certified
2104008610	Stationary Source Fuel Combustion	Residential	Wood	Hydronic heater: outdoor
2104008700	Stationary Source Fuel Combustion	Residential	Wood	Outdoor wood burning device, NEC
2104009000	Stationary Source Fuel Combustion	Residential	Firelog	Total: All Combustor Types

Statewide Emissions in tons per year:

SCC	SCC Description	CO	NH ₃	NO _x	PM ₁₀ -PRI	PM _{2.5} -PRI	SO ₂	VOC
2104008100	Fireplace: general	27,656.78	334.11	482.60	4,380.54	4,380.54	74.25	3,508.14
2104008210	Woodstove: fireplace inserts; non-EPA certified	20,347.31	149.87	246.85	2,697.69	2,697.69	35.26	4,672.48
2104008220	Woodstove: fireplace inserts; EPA certified; non-catalytic	3,958.89	25.31	64.11	551.10	551.10	11.25	337.41
2104008230	Woodstove: fireplace inserts; EPA certified; catalytic	978.55	8.44	18.75	191.21	191.21	3.75	140.60
2104008310	Woodstove: freestanding, non-EPA certified	18,632.92	137.24	226.05	2,470.40	2,470.40	32.29	4,278.79
2104008320	Woodstove: freestanding, EPA certified, non-catalytic	3,627.03	23.18	58.73	504.90	504.90	10.30	309.12
2104008330	Woodstove: freestanding, EPA certified, catalytic	896.23	7.73	17.17	175.13	175.13	3.43	128.77
2104008400	Woodstove: pellet-fired, general	222.16	4.19	53.10	42.76	42.76	4.47	0.57
2104008510	Furnace: Indoor, cordwood-fired, non-EPA certified	2,445.49	23.98	24.53	367.62	367.62	27.04	157.17
2104008610	Hydronic heater: outdoor	6,061.87	30.31	31.01	1,077.67	1,077.67	34.18	1,134.92
2104008700	Outdoor wood burning device, NEC	88.31	1.07	1.54	13.99	13.99	0.24	11.20
2104009000	Total: All Combustor Types	595.64		36.59	139.62	135.24		188.39
Residential Wood Statewide Total		85,511.19	745.42	1,261.01	12,612.61	12,608.23	236.47	14,867.55

D-4-19 *Agricultural Livestock*

EPA uses the Carnegie Mellon University (CMU) ammonia model to estimate emissions from the handling of livestock waste. The air program chooses to use the 2011 inventory, unchanged, to represent emissions in the 2014 inventory as the updated CMU model and emission estimates were released in May 2016 and have not been reviewed.

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2805001100	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Confinement
2805001200	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Manure handling and storage
2805001300	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on feedlots (drylots)	Land application of manure
2805002000	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle production composite	Not Elsewhere Classified
2805003100	Miscellaneous Area Sources	Agriculture Production - Livestock	Beef cattle - finishing operations on pasture/range	Confinement
2805007100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with dry manure management systems	Confinement
2805007300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with dry manure management systems	Land application of manure
2805008100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Confinement
2805008200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Manure handling and storage
2805008300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - layers with wet manure management systems	Land application of manure

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2805009100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Confinement
2805009200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Manure handling and storage
2805009300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - broilers	Land application of manure
2805010100	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Confinement
2805010200	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Manure handling and storage
2805010300	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry production - turkeys	Land application of manure
2805018000	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle composite	Not Elsewhere Classified
2805019100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Confinement
2805019200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Manure handling and storage
2805019300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - flush dairy	Land application of manure
2805021100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Confinement
2805021200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Manure handling and storage
2805021300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - scrape dairy	Land application of manure
2805022100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Confinement
2805022200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Manure handling and storage
2805022300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - deep pit dairy	Land application of manure
2805023100	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Confinement
2805023200	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Manure handling and storage

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2805023300	Miscellaneous Area Sources	Agriculture Production - Livestock	Dairy cattle - drylot/pasture dairy	Land application of manure
2805025000	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production composite	Not Elsewhere Classified (see also 28-05-039, -047, -053)
2805030000	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry Waste Emissions	Not Elsewhere Classified (see also 28-05-007, -008, -009)
2805030007	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry Waste Emissions	Ducks
2805030008	Miscellaneous Area Sources	Agriculture Production - Livestock	Poultry Waste Emissions	Geese
2805035000	Miscellaneous Area Sources	Agriculture Production - Livestock	Horses and Ponies Waste Emissions	Not Elsewhere Classified
2805039100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Confinement
2805039200	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Manure handling and storage
2805039300	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - operations with lagoons (unspecified animal age)	Land application of manure
2805040000	Miscellaneous Area Sources	Agriculture Production - Livestock	Sheep and Lambs Waste Emissions	Total
2805045000	Miscellaneous Area Sources	Agriculture Production - Livestock	Goats Waste Emissions	Not Elsewhere Classified
2805047100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal age)	Confinement
2805047300	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - deep-pit house operations (unspecified animal age)	Land application of manure
2805053100	Miscellaneous Area Sources	Agriculture Production - Livestock	Swine production - outdoor operations (unspecified animal age)	Confinement

Emissions in tons per year:

SCC	NH ₃
2805001100	1,010.8932
2805001200	0.404
2805001300	768.2771
2805002000	10,961.5927
2805003100	9,684.8634
2805007100	3,212.4619
2805007300	74.5474
2805008100	0
2805008200	0
2805008300	0
2805009100	5,121.1742
2805009200	930.4866
2805009300	4,189.3855
2805010100	4,294.5337
2805010200	772.6706
2805010300	3862.2851
2805018000	1,261.5641
2805019100	26.3505
2805019200	74.1902
2805019300	7.4698
2805021100	687.4305

SCC	NH ₃
2805021200	931.5414
2805021300	1,156.7033
2805022100	100.4349
2805022200	4.6933
2805022300	58.1121
2805023100	459.2368
2805023200	8.4446
2805023300	612.5422
2805025000	0
2805030000	711.5922
2805030007	20.3368
2805030008	5.9475
2805035000	2,008.881
2805039100	7,755.4032
2805039200	14,218.2215
2805039300	1,212.3308
2805040000	269.8471
2805045000	673.689
2805047100	1,738.2422
2805047300	727.239
2805053100	35.0922

D-4-20 Agricultural Fertilizer

EPA uses the Carnegie Mellon University (CMU) ammonia model to estimate emissions from the application of agricultural fertilizer. The air program is using the 2011 inventory pulled forward unchanged for the 2014 inventory as the updated 2014 inventory was not released until April 2016 and the program has not reviewed it.

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2801700001	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Anhydrous Ammonia
2801700002	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Aqueous Ammonia
2801700003	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Nitrogen Solutions
2801700004	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Urea

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2801700005	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Nitrate
2801700006	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Sulfate
2801700007	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Ammonium Thiosulfate
2801700010	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	N-P-K (multi-grade nutrient fertilizers)
2801700011	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Calcium Ammonium Nitrate
2801700012	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Potassium Nitrate
2801700013	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Diammonium Phosphate
2801700014	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Monoammonium Phosphate
2801700015	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Liquid Ammonium Polyphosphate
2801700099	Miscellaneous Area Sources	Agriculture Production - Crops	Fertilizer Application	Miscellaneous Fertilizers

Statewide Emissions in tons per year:

SCC	SCC Level Four	NH ₃
2801700001	Anhydrous Ammonia	7,349.989
2801700003	Nitrogen Solutions	5,986.774
2801700004	Urea	20,818.68
2801700005	Ammonium Nitrate	1,210.507
2801700006	Ammonium Sulfate	980.5858
2801700007	Ammonium Thiosulfate	38.40743
2801700010	N-P-K (multi-grade nutrient fertilizers)	310.0113
2801700011	Calcium Ammonium Nitrate	0.392294
2801700013	Diammonium Phosphate	2,366.52
2801700014	Monoammonium Phosphate	659.3075
2801700015	Liquid Ammonium Polyphosphate	80.17308
2801700099	Miscellaneous Fertilizers	3,360.227

D-4-21 Publicly Owned Treatment Works (POTW)

EPA provides emission estimates for wastewater treatment systems, including the pollutants VOC and ammonia. The air program chooses to use the 2011 NEI v2 estimates, unchanged, for 2014.

EPA released an updated 2014 inventory in late March 2016, but Missouri has not reviewed it.

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2630020000	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	Public Owned	Total Processed

Statewide emissions in tons per year:

SCC	NH ₃	VOC
2630020000	17.22	86.6109

D-4-22 Gasoline Distribution Stage I

Stage I gasoline distribution emissions cover the distribution of gasoline from bulk terminals and plants, through transportation via tank trucks and pipeline facilities, and filling of above and below ground storage tanks at service stations. Emissions come from venting of vapor spaces in tanks, evaporation and permeation through storage vessels, and leaks. Several SCCs are estimated in this category:

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4
2501050120	Storage and Transport	Petroleum and Petroleum Product Storage	Bulk Terminals: All Evaporative Losses	Gasoline
2501055120	Storage and Transport	Petroleum and Petroleum Product Storage	Bulk Plants: All Evaporative Losses	Gasoline
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
2501060201	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Underground Tank: Breathing and Emptying
2505030120	Storage and Transport	Petroleum and Petroleum Product Transport	Truck	Gasoline
2505040120	Storage and Transport	Petroleum and Petroleum Product Transport	Pipeline	Gasoline

EPA has generally provided emission estimates for this category as it has little overlap with point inventories and emission factors are best used consistently across the nation as these operations are subject to MACT and GACT standards. Version 1.0 estimates for 2014 were released for some SCCs on March 18th, and version 1.1 estimates were released for service station stage

emissions on March 28, 2016. The revised version 1.1 estimates reflect the controls of GACT standards for gas stations with large monthly gasoline throughput where submerged or balanced submerged filling of tanks is required. The version 1.1 estimates are included here with no point source subtraction completed. EPA released version 1.0 allowing for point source subtraction in April 2016, but the air program has not reviewed that version of the tool.

Statewide total emissions by SCC in tons per year:

SCC	Description	VOC Emissions
2501050120	Gasoline Distribution Stage 1, Bulk Terminal	1,741.28
2501055120	Gasoline Distribution Stage 1, Bulk Plant	865.12
2501060051	Service Station Stage 1, Submerged Fill	2,472.04
2501060052	Service Station Stage 1, Splash Fill	718.48
2501060053	Service Station Stage 1, Balanced Submerged Fill	1,425.99
2501060201	Service Station, Tank Breathing and Emptying	1,379.80
2505030120	Gasoline Distribution Stage 1, Tank Trucks	90.23
2505040120	Gasoline Distribution Stage 1, Pipelines	480.35

D-4-23 Gasoline Distribution Stage II

EPA has typically provided estimates for this category which includes emissions as individual vehicles are fueled at service stations. Emissions come from vehicle tank vapor venting and spillage during refueling. EPA has retired the previously used SCC codes that separated out controlled and uncontrolled Stage II emissions, and replaced it with a total emission SCC.

SCC	SCC Level One	SCC Level Two	SCC Level Three	SCC Level Four
2501060100	Storage and Transport	Petroleum and Petroleum Product Storage	Gasoline Service Stations	Stage 2: Total

Emissions from this category are estimated within the MOVES mobile source emissions model, and are included in that category.

D-5 *Onroad Mobile Source Inventory*

Emission estimates are required for all onroad vehicles on a three-year cycle based on requirements in the EPA's Air Emissions Reporting Rule (AERR). EPA requires the use of an approved mobile source emissions model, and the version used for this inventory is MOVES2014.

Inputs for the model should reflect state-specific data where possible, especially vehicle population, age, and travel information. The recommended source of data for passenger vehicle population and age are registration or inspection information at the state or county level. The Missouri Department of Revenue (MoDOR) collects vehicle registration information, and the data was requested in late 2014 for registered vehicles as of September 1, 2014. Registered vehicle information includes the VIN, county of registration, and model year. The request specifically asked that all-terrain vehicles (those not approved for on-road use) not be included in the registration list. The list includes both passenger vehicles (cars, trucks, SUVs, motorcycles) and other commercial and recreational vehicles (heavy trucks, buses, motorhomes). A total of 5,227,713 registered vehicles were included in the list from the MoDOR. To create a population of passenger vehicles, the MoDOR VINs needed to be decoded with enough information to place them into MOVES vehicle types.

VIN decoding is done using proprietary software owned by private contracting companies. The Missouri DNR contracts with Opus Inspection for software and database management of the Gateway Vehicle Inspection and Maintenance (IM) program in the St. Louis area. Their contracting services extend to decoding VINs as needed for mobile emission estimates. Since their main mission is to maintain records for vehicles subject to IM, their VIN decoding only works for the types of vehicles typically subject to IM. These are usually light duty passenger cars and trucks, either gasoline or diesel, and with model years from 1996 and newer. The remaining registered DOR VINs, typically motorcycles, heavy duty trucks, buses, and motorhomes, plus older vehicles of all types, are not decoded. Likewise, any VINs that are incorrect or incomplete due to missing or extraneous characters are not decoded by the software. The sections below document how the raw VINs are processed, assumptions made, and how the Missouri 2014 MOVES vehicle population and age distribution input tables are developed.

1. Decoding the 2014 VINs

The initial processing step by Opus Inspection returned a list of invalid VINs.

Spreadsheet 1: Invalid VINs

- Invalid VINs: 161,652 records
- Duplicate VINs: 7,079 records
- Most common invalid VIN character length: 52,204 with 13 characters

Invalid VINs cannot be decoded because they are missing characters, the characters are placed incorrectly, or the decoder wasn't able to recognize it as a legitimate string. There is not enough information in these records to place them properly within a vehicle category. Since these represent (161,652/5,227,713) 3.09% of the total statewide population, it is assumed this is an insignificant number and no attempt will be given to placing these within either the vehicle population or age distribution tables. Duplicate VINs were duplicates within the Invalid VIN list. Since the most common invalid VIN are 13 character VINs, it's assumed many of these are VINs 1980 and older non-standardized VINs.

The second processing step returned VINs that are valid, but are not found within the Opus Inspection vehicle list, mainly because they are not subject to IM testing.

Spreadsheet 2: Not Found VINs

- Not Found VINs: 281,449 records
- Most Common Makes Not Found: HD (Harley Davidson), HOND (Honda), FORD (Ford), FRHT (Freightliner), YAMA (Yamaha), CHEV (Chevrolet), KAWK (Kawasaki), INTL (International), GMC (General Motors).

The VIN decoding software does not process most motorcycles and heavy duty vehicles, plus non-gasoline or diesel fueled automobiles. These vehicles represent 5.3% of the total statewide registered VINs, and attempts are made to include these VINs in the vehicle population table (see MOVES input table development, section on population table). The age distribution table requires both model year and vehicle type, and these undecoded VINs have neither. Without both pieces of information, no attempt is made to include these VINs in the age distribution tables.

The final process decodes all the VINs possible.

Spreadsheet 3: Decoded_all.csv

- 48 separate .csv files of 100,000 records or less were retrieved from the FTP site
- The 48 .csv files were combined into one file called *Decoded_all.csv*
- 4,784,612 records (12 VINs had import errors for GVWR values, but those values are not critical to further data processing and so are left blank)

The summation of these three files totals the original number of VINs to be decoded, 5,227,713 records.

Preparation of Inputs for MOVES2014 runs:

For decoded VINs, two types of records first need to be removed:

Invalid County Codes:

Four county names from the original DOR records request were found in the list of decoded VINs. The county names are “Kansas City”, “Out of State”, “T”, and “US S”. A total of 1,163 records for these counties are removed from the *Decoded_all* table to create a new table called *Decoded_all_only valid counties*. A total of 4,783,449 records are in this table.

Duplicate VINs in a single county:

Within each county, duplicate VINs are identified to eliminate a single car from appearing twice in the counties registrations when it should only appear once. Table **Decoded_all valid cos no dups** contains the final 4,620,862 records that will be decoded to MOVES vehicle types.

With invalid records removed, the decoded VIN information can be used to place each VIN into a MOVES vehicle type. Three key pieces of information are used to make the decision. Body type code and vehicle type codes are first used to classify each vehicle, and Gross Vehicle Weight (GVW) range is used to choose final vehicle types for larger automobiles. A series of Microsoft Access queries step through the process of assigning MOVES and HPMS vehicle type codes based on decoded VIN information, and also adds in vehicle age information.

Decoded VIN Body Types	
BodyTypeCode	BodyTypeText
1	Sedan
2	Station Wagon
3	Pickup
4	Sport Utility
5	Van
6	Heavy Truck
7	Motorcycle
8	Bus
9	Coupe

Decoded VIN Vehicle Types	
VehicleTypeCode	VehicleTypeText
1	Passenger Vehicle
2	Truck/Bus
3	Motorcycle
4	School Bus
7	Special Ed Bus

MOVES and HPMS Vehicle Type List			
MOVES Source Type ID	MOVES Source Type Name	HPMS Vehicle Type ID	HPMS Vehicle Type Name
11	Motorcycle	10	Motorcycle
21	Passenger Car	25	Light Duty Vehicles
31	Passenger Truck	25	Light Duty Vehicles
32	Light Commercial Truck	25	Light Duty Vehicles
41	Intercity Bus	40	Buses
42	Transit Bus	40	Buses
43	School Bus	40	Buses
51	Refuse Truck	50	Single Unit Truck
52	Single Unit Short-Haul Truck	50	Single Unit Truck
53	Single Unit Long-Haul Truck	50	Single Unit Truck
54	Motor Home	50	Single Unit Truck
61	Combination Short-Haul Truck	60	Combination Truck
62	Combination Long-Haul Truck	60	Combination Truck

Step 1: Passenger Cars

Query 1-0: Body Type Sedan (1) and Vehicle Type Passenger Vehicle (1) updated in VIN table with MOVES Type 21 Passenger Car and HPMS Type Passenger Car 20. 1,766,157 records updated.

Query 1-1: Body Type Coupe (9) and Vehicle Type Passenger Vehicle (1) updated in VIN table with MOVES Type 21 Passenger Car and HPMS Type Passenger Car 20. 287,220 records updated.

Query 1-2: Body Type Station Wagon (2) and Vehicle Type Passenger Vehicle (1) updated in VIN table with MOVES Type 21 Passenger Car and HPMS Type Passenger Car 20. 175,609 records updated.

Step 2: Trucks

Query 1-3: Body Type Van (5) and Vehicle Type Passenger Vehicle (1) updated in VIN table with MOVES Type 31 Passenger Truck and HPMS Type 30 Other 2-axle 4-tire vehicles. 266,013 records updated.

Query 1-4: Body Type SUV (4) and Vehicle Type Passenger Vehicle (1) updated in VIN table with MOVES Type 31 Passenger Truck and HPMS Type 30 Other 2-axle 4-tire vehicles. 1,054,168 records updated.

The choice to place body types of SUV and Van in the passenger truck category comes from review of page 32 of EPA Draft Technical Document “Population and Activity of On-road Vehicles in MOVES2014”, EPA 420-D-15-001, July 2015 (<https://www3.epa.gov/otaq/models/moves/documents/420r16003a.pdf>) and US FHWA “Vehicle Type Codes and Descriptions” from the Highway Performance Monitoring System Field Manual, Apr 2011, Chapter 3 (<http://www.fhwa.dot.gov/ohim/hpmsmanl/chapt3.cfm>). This choice creates a drop in passenger car numbers compared to the default 2011 totals, and increases the light passenger truck numbers.

Query 2-0: Body Type Pickup (3) and Vehicle Type Passenger (1) and GVWR Range is blank updated in VIN table with MOVES Type 31 Passenger Truck and HPMS 30 Type Other 2-axle 4-tire vehicles. 898 records updated.

Query 2-1: Body Type Pickup (3) and Vehicle Type Passenger (1) and GVWR Range under 10,000 lbs updated in VIN table with MOVES Type 31 Passenger Truck and HPMS 30 Type Other 2-axle 4-tire vehicles. 54,120 records updated.

Query 2-2: Body Type Pickup (3) and Vehicle Type Truck/Bus (2) and GVWR Range is blank updated in VIN table with MOVES Type 31 Passenger Truck and HPMS 30 Type Other 2-axle 4-tire vehicles. 535 records updated.

Query 2-3: Body Type Pickup (3) and Vehicle Type Truck/Bus (2) and GVWR Range less than 10,000 lbs updated in VIN table with MOVES Type 31 Passenger Truck and HPMS 30 Type Other 2-axle 4-tire vehicles. 996,505 records updated.

Query 2-4: Body Type Heavy Truck (6) and Vehicle Type Truck/Bus (2) and GVWR Range less than 10,000 lbs (but not zero) updated in VIN table with MOVES Type 31 Passenger Truck and HPMS Type 30 Other 2-axle 4-tire vehicles. 59 records updated.

Query 2-5: Body Type Heavy Truck (6) and Vehicle Type Truck/Bus (2) and GVWR Range is blank are updated in VIN table with MOVES Type 32 Light Commercial and HPMS Type 30 Other 2-axle 4-tire vehicles. These 7 records are all Freightliner MT-45 which are like Fed-Ex trucks. 7 records updated.

Query 2-6: Body Type Pickup (3) and Vehicle Type Passenger (1) and GVWR Range greater than 10,000 lbs are updated in VIN table with MOVES Type 32 Light Commercial and HPMS Type 30 Other 2-axle 4-tire vehicles. 2,512 records updated.

Query 2-7: Body Type Pickup (3) and Vehicle Type Truck/Bus (2) and GVWR Range over 10,000 lbs are updated in VIN table with MOVES Type 32 Light Commercial and HPMS Type 30 Other 2-axle 4-tire vehicles. 14,519 records updated.

Query 2-8: Body Type Heavy Truck (6) and Vehicle Type Truck/Bus (2) and GVWR Range over 10,000 lbs are updated in VIN table with MOVES Type 32 Light Commercial and HPMS Type 30 Other 2-axle 4-tire vehicles. 2,304 records updated.

Step 3: Non-car or truck types

Query 3-0: Body Type Sedan (1) Vehicle Type Truck/Bus (2) are reviewed due to the unusual combination of car and bus properties. The makes are International, Freightliner, and GMC and models are buses or heavy duty trucks. These are all given a MOVES and HPMS type of N/A. 6 records updated.

Query 3-1: Body Type Heavy Truck (6) and Vehicle Type Passenger (1) are reviewed due to the unusual combination of heavy truck and passenger codes. The makes are Bluebird, International, Motor Coach, and Thomas Built Buses. The makes show these to be buses or motor homes (RVs), so they are given a MOVES and HPMS type of N/A. 130 records updated.

The total number of decoded VINS and their MOVES vehicle types are listed below.

Body Code	Body Type	Vehicle Code	Vehicle Type	MOVES Type	Number of Vehicles	Total
1	Sedan	1	Passenger Vehicle	21	1,766,157	2,228,986
2	Station Wagon	1	Passenger Vehicle		175,609	
4	Sport Utility	1	Passenger Vehicle	31	1,054,168	2,372,388
5	Van	1	Passenger Vehicle		266,013	
9	Coupe	1	Passenger Vehicle		287,220	
3	Pickup	1	Passenger Vehicle		55,108	
3	Pickup	2	Truck/Bus		997,040	
6	Heavy Truck	2	Truck/Bus		59	
3	Pickup	1	Passenger Vehicle	32	2,512	19,342
3	Pickup	2	Truck/Bus		14,519	
6	Heavy Truck	2	Truck/Bus		2,311	
1	Sedan	2	Truck/Bus	N/A	6	136
6	Heavy Truck	1	Passenger Vehicle		130	
Total						4,620,852

Step 4: Add in Vehicle Age

Query 4-1: Add a column to VIN table with vehicle age based on model year field. This first step appends records for model year 2014. The formula is “2014 – (model year)”.

Model year 2014 has an age of 0. 215,970 records updated

Query 4-2: Adds the vehicle age based on model year for model year 2015. All model year 2015 vehicles are assumed with an age of 0, the same as a 2014 model year vehicle. 30,563 records updated.

Query 4-3: Adds the vehicle age for all remaining model years 2013 back to 1981 (the oldest model year in decoded VINS). 4,374,319 records updated.

The final table of decoded VINS, MOVES vehicle types and HPMS vehicle types is saved in the database:

MOVES and HPMS Vehicle Types 2014.accdb, and the table MOVES HPMS Vehicle type by VIN contains the VIN records.

2. Creating MOVES input tables

- a. *sourcetypepopulation* table: The population table for each Missouri county is updated based on decoded VINs and redistributed undecoded VINs. Since the decoded VIN list only includes passenger cars and trucks that are subject to the inspection and maintenance program, other methods were needed to update the remaining vehicle types.
 - i. Motorcycles, MOVES type 11, were addressed by obtaining a list of motorcycle maker abbreviations and comparing it to the Not Found table of VINs that were not decoded. There are 132,400 motorcycles that match the maker code and are summed to the county level to update motorcycle population.
 - ii. Light commercial trucks, MOVES type 32, were addressed by pulling forward the 2011 default population unchanged. The decoded VIN table identified only a small portion of the light commercial population, and those totaled less than 10% of the total light commercial population 2011 default.
 - iii. All other vehicle types, MOVES types 40's for buses, 50's for single unit trucks, and 60's for combination trucks, were grown from the 2011 default by redistributing the remaining 149,049 Not Found VINs. Within each county, the percent of vehicle population in 2011 by vehicle type is calculated. Each county is apportioned a number of not found VINs to redistribute by vehicle type based on the fraction of its statewide vehicle population. The county VINs are distributed to all vehicle types, including cars, trucks, buses, and

single/combo trucks, but not motorcycles, as fraction of their population in 2011.

- b. *avft* table: The *avft* table for Missouri counties is updated to account for the fraction of vehicles able to use conventional and alternative fuels. The decoded VIN table is used to update the *avft* records for passenger car and trucks, MOVES types 21 and 31, only. The state is divided into regions to estimate values for this table. The St. Louis area, Kansas City area, and outstate counties are divided up to create three different *avft* estimates.

St. Louis Counties	Kansas City Counties	Outstate Counties
29071 Franklin County	29047 Clay County	Remaining 107 Missouri counties
29099 Jefferson County	29095 Jackson County	
29183 St. Charles County	29165 Platte County	
29189 St. Louis County		
29510 St. Louis City		

The decoded VIN file includes a Fuel Code for all vehicles. The Fuel Codes are mapped to MOVES fuel types as below:

Fuel Codes	Description	MOVES Fuel Code	MOVES Fuel Type Description
D	Diesel	2	Diesel
E	Electric	9	Electricity
F	Gasoline/Flex Fuel Vehicle	5	E-85
G	Gasoline	1	Gas
I	Plug-in Hybrid	1	Gas
N	CNG	1	Gas
P	Propane	1	Gas

Plug-in hybrid cars are identified in the decoded VIN table, but are mapped to gasoline cars as their hybrid technology is based on gasoline and plug-in electric fuel types. A search of plug-in hybrid cars on fueleconomy.gov shows no plug-in electric cars with secondary fuels of diesel, E-85, CNG or LPG.

CNG and propane vehicles are mapped to gasoline fuel type in MOVES because the model cannot currently estimate emissions for those fuel types in passenger cars and trucks. Only larger vehicles are in the model with possible alternative fuels of CNG and propane.

St. Louis Area AVFT Table

MOVES Vehicle Type	MOVES Fuel Type	AVFT Fraction
21	1	0.952189
	2	0.004817
	5	0.042403
	9	0.000591
31	1	0.846888
	2	0.020689
	5	0.132423

Kansas City Area AVFT Table

MOVES Vehicle Type	MOVES Fuel Type	AVFT Fraction
21	1	0.947821
	2	0.003705
	5	0.048243
	9	0.000231
31	1	0.841827
	2	0.016855
	5	0.141318

Outstate Missouri AVFT Table

MOVES Vehicle Type	MOVES Fuel Type	AVFT Fraction
21	1	0.939274
	2	0.005545
	5	0.055098
	9	0.000083
31	1	0.835499
	2	0.029801
	5	0.1347

- c. *sourcetypeagedistribution* table: The age distribution table is populated again for only passenger cars and trucks because they are the only vehicles from the decoded VIN table with MOVES source type and model years. The decoded VINs are summarized by the same three regions used to create the avft table: St. Louis, Kansas City, and Outstate. The total number of passenger cars (MOVES vehicle type 21) and passenger trucks (type 31) are added up for each region, and the fraction of the area population due to each model year is calculated. The fractions are saved to four decimal places. The truncation of the values to four decimal places causes the total of the age distribution to not sum to one in some cases. Where the total is a few

thousandths away from one, the few thousandths are divided evenly into single thousandths (0.0001) and added to or taken away from the largest and smallest age distribution fractions so that the total age distribution fraction is one.

St. Louis Area Age Distribution Table

MOVES Vehicle Type	Vehicle Age	Age Fraction	MOVES Vehicle Type	Vehicle Age	Age Fraction
21	0	0.0653	31	0	0.0709
21	1	0.0727	31	1	0.0634
21	2	0.0659	31	2	0.0572
21	3	0.0531	31	3	0.0576
21	4	0.0552	31	4	0.0468
21	5	0.0543	31	5	0.038
21	6	0.0626	31	6	0.0611
21	7	0.0665	31	7	0.0638
21	8	0.0596	31	8	0.0605
21	9	0.0589	31	9	0.0668
21	10	0.0518	31	10	0.0637
21	11	0.0499	31	11	0.059
21	12	0.0481	31	12	0.0532
21	13	0.0446	31	13	0.0447
21	14	0.0387	31	14	0.0386
21	15	0.0332	31	15	0.0346
21	16	0.0243	31	16	0.0241
21	17	0.021	31	17	0.0209
21	18	0.0141	31	18	0.0136

MOVES Vehicle Type	Vehicle Age	Age Fraction	MOVES Vehicle Type	Vehicle Age	Age Fraction
21	19	0.0149	31	19	0.0145
21	20	0.0098	31	20	0.0118
21	21	0.008	31	21	0.0081
21	22	0.006	31	22	0.0056
21	23	0.005	31	23	0.0044
21	24	0.0038	31	24	0.0035
21	25	0.0032	31	25	0.0035
21	26	0.0022	31	26	0.0027
21	27	0.002	31	27	0.002
21	28	0.0014	31	28	0.0017
21	29	0.0014	31	29	0.0014
21	30	0.0025	31	30	0.0023

Kansas City Area Age Distribution Table

MOVES Vehicle Type	Vehicle Age	Age Fraction	MOVES Vehicle Type	Vehicle Age	Age Fraction
21	0	0.0644	31	0	0.0648
21	1	0.0639	31	1	0.0565
21	2	0.0571	31	2	0.0518
21	3	0.0473	31	3	0.0514
21	4	0.0501	31	4	0.0418
21	5	0.0463	31	5	0.0302
21	6	0.0578	31	6	0.0546

MOVES Vehicle Type	Vehicle Age	Age Fraction	MOVES Vehicle Type	Vehicle Age	Age Fraction
21	7	0.0645	31	7	0.0588
21	8	0.0615	31	8	0.0578
21	9	0.0602	31	9	0.0658
21	10	0.052	31	10	0.0655
21	11	0.0521	31	11	0.0603
21	12	0.0517	31	12	0.0572
21	13	0.0487	31	13	0.0489
21	14	0.0436	31	14	0.0438
21	15	0.0373	31	15	0.0405
21	16	0.0286	31	16	0.0307
21	17	0.0265	31	17	0.0282
21	18	0.0175	31	18	0.0173
21	19	0.0169	31	19	0.0171
21	20	0.0112	31	20	0.0136
21	21	0.0089	31	21	0.0093
21	22	0.0071	31	22	0.0072
21	23	0.0061	31	23	0.0055
21	24	0.0042	31	24	0.004
21	25	0.0036	31	25	0.0042
21	26	0.0026	31	26	0.0035
21	27	0.0023	31	27	0.0024
21	28	0.0016	31	28	0.0023

MOVES Vehicle Type	Vehicle Age	Age Fraction	MOVES Vehicle Type	Vehicle Age	Age Fraction
21	29	0.0015	31	29	0.0017
21	30	0.0029	31	30	0.0033

Outstate Missouri Age Distribution Table

MOVES Vehicle Type	Vehicle Age	Age Fraction	MOVES Vehicle Type	Vehicle Age	Age Fraction
21	0	0.0391	31	0	0.0409
21	1	0.0516	31	1	0.0436
21	2	0.0523	31	2	0.0417
21	3	0.0438	31	3	0.0425
21	4	0.0454	31	4	0.0353
21	5	0.0426	31	5	0.026
21	6	0.0563	31	6	0.046
21	7	0.061	31	7	0.0512
21	8	0.0586	31	8	0.0515
21	9	0.0613	31	9	0.0616
21	10	0.0544	31	10	0.0626
21	11	0.0542	31	11	0.0588
21	12	0.0547	31	12	0.0568
21	13	0.054	31	13	0.0537
21	14	0.0501	31	14	0.0509
21	15	0.0437	31	15	0.0479
21	16	0.0335	31	16	0.0376

MOVES Vehicle Type	Vehicle Age	Age Fraction	MOVES Vehicle Type	Vehicle Age	Age Fraction
21	17	0.0306	31	17	0.0356
21	18	0.022	31	18	0.0245
21	19	0.0207	31	19	0.0257
21	20	0.0147	31	20	0.0224
21	21	0.0122	31	21	0.0159
21	22	0.0096	31	22	0.0119
21	23	0.0079	31	23	0.0101
21	24	0.0056	31	24	0.0084
21	25	0.0052	31	25	0.0088
21	26	0.0037	31	26	0.0069
21	27	0.0029	31	27	0.0051
21	28	0.0024	31	28	0.0049
21	29	0.002	31	29	0.0039
21	30	0.0039	31	30	0.0073

- d. *hpmsvtypeyear* table: This table contains the estimate of vehicle miles traveled during the modeling period, and this information does not come from the decoded VIN table. The Missouri Department of Transportation (MoDOT) provides an estimate of annual average daily vehicle miles travelled (AADVMT) across each county of Missouri, estimated for all onroad vehicle types and road types. The estimate of counties 2014 AADVMT is based on total gallons of fuel sold in Missouri from the Missouri Department of Revenue. That sales number includes gasoline and diesel sales, though not dyed diesel sold for off-road use. The total gallons sold is multiplied by a national fuel economy number for each fuel type, estimated from the Federal Highway Administration (FHWA). The estimated total miles traveled by vehicles across the state is then distributed to counties and road types. MoDOT provides the

AADVMT as travelled on all roads, both those operated and maintained by MoDOT and other local county or municipal agencies.

The AADVMT by county then is broken down to HPMS vehicle types from another 2014 MoDOT estimate of total statewide VMT by vehicle type. A single distribution of VMT by vehicle type is applied to the AADVMT of each county in Missouri. The AADVMT number for each county is converted to annual VMT using EPA’s “advmt-converter-tool-moves2014” excel tool. The tool creates three associated tables, dayvmfraction, hourvmfraction, and monthvmfraction based on the choices on the data input worksheet. With uniform default choices, many of these tables are unchanged from county to county and so do not vary across the state CDBs.

e. *imcoverage* table: This table is updated for the five St. Louis counties that are part of the 2008 ozone nonattainment area. These counties are Franklin (29071), Jefferson (29099), St. Charles (29183), St. Louis (29189), and the independent city of St. Louis (29510). These counties participate in a vehicle inspection and maintenance program to ensure cars and trucks on the road meet emission standards. The Inspection and Maintenance (IM) program provided the data on testing and results that are used here to calculate MOVES model input values. The calculated values and other table values selected follow EPA’s *MOVES2014 and MOVES2014a Technical Guidance: Using MOVES to Prepare Emission Inventories for State Implementation Plans and Transportation Conformity* found at <http://www3.epa.gov/otaq/models/moves/documents/420b15093.pdf>, last updated Nov 2015. According to the guidance, the IM table addresses fuel types of gasoline and ethanol, with rows in the table for both types. The following describes the approach to develop each parameter of the IM coverage table.

i. *Pollutant Process ID*: The default data for the IM input table for St. Louis County was exported from the MOVES county database manager. The default data included four different IM test types, though the column “useIMyn” only has two tests turned on. Since the St. Louis area has two different test types (On-board diagnostics) OBD tests for the exhaust and evaporative systems, these were the only two types of tests that were “turned on”. The associated pollutant process IDs affected by those test types are listed in the Pollutant Process ID column.

Test Standard	Pollutant Process IDs	Process Name
43 – Evaporative OBD Test	112 - total hydrocarbon	Evaporative Fuel Vapor Venting
	113 – total hydrocarbon	Evaporative Fuel Leaks
51 – Exhaust OBD Test	101 – total hydrocarbon	Running Exhaust
	102 – total hydrocarbon	Start exhaust

Test Standard	Pollutant Process IDs	Process Name
	201 – Carbon Monoxide	Running Exhaust
	202- Carbon Monoxide	Start exhaust
	301 – Nitrogen Oxides	Running Exhaust
	302 – Nitrogen Oxides	Start exhaust

- ii. *Source Type ID:* The St. Louis IM program includes passenger cars and also trucks with a gross vehicle weight rating of 8,500 lbs. or less. Therefore, the three source type IDs included in the IM input table for the St. Louis nonattainment area are passenger cars, passenger trucks, and light commercial trucks (IDs = 21, 31, and 32).
- iii. *Inspection Frequency:* The St. Louis IM program requires that emission be tested every two years, so the inspection frequency ID that represents biennial tests (ID = 2) was used in the IM input table for the OBD tests applicable to the St. Louis nonattainment area.
- iv. *Test Standards:* The St. Louis IM program is a centralized program with OBD tests for exhaust and evaporative systems on the vehicles. Therefore, the test standard IDs for exhaust OBD check and the evaporative system OBD check (IDs = 43 and 51) were used for the St. Louis nonattainment area. The corresponding column, UseIMyn, is marked Y for only these two test standards.
- v. *IM Program ID:* This is an arbitrary number developed by the MOVES user to define a unique test given for vehicles within a range of model years. Therefore, IM program IDs were arbitrarily assigned to the various unique tests within the St. Louis IM program.
- vi. *Beginning and Ending Model Years:* The St. Louis IM program applies to gasoline vehicles with a model year of 1996 or later and diesel vehicles with a model year of 1997 or later. Since the emissions inspection is required biennially, the ending model year would always be two years less than the emissions inventory year that is being developed. Therefore, for the tests for gasoline vehicles, the beginning model year is 1996 and the ending model year is two years earlier than the year for which MOVES is being run, and the for diesel vehicles the beginning model year is 1997 and the ending model year is two years earlier than the year for which MOVES is being run.
- vii. *Compliance Factor:* According to page 53 of the MOVES guidance document the compliance factor is calculated with the following equation:

$$\text{Compliance Factor} = \text{percent compliance rate} \times (100 - \text{percent waiver rate}) \times \text{regulatory class coverage adjustment.}$$

Therefore, in order to calculate the compliance factor for each source type included in the IM program, the compliance rate, waiver rate, and regulatory class coverage adjustment needed to be determined. These three values were determined by the processes described below and then the compliance factors for each source type were calculated with the equation written above.

1. Compliance Rate

The compliance rate was calculated with the following equation:

Compliance Rate = Number of vehicles that were tested over a two year period (2013 – 2014) / Population of vehicles that is theoretically subject to IM during the same period.

To determine the compliance rate as it compares to the source type population by model year, the population of vehicles that is theoretically subject to IM first needs to be estimated.

The number of vehicles theoretically subject to the IM program are identified from all decoded VINs. Since the VIN decoding is done by the company who oversees the IM program, it is assumed that their VIN decoder will have decoded all subject vehicles within the Department of Revenue registration list. The VINs that were not found by their decoder (motorcycles, heavy trucks) and invalid VINs (missing characters, typographical errors) are not included in this subject vehicle total. From the decoded VIN list, subject diesel vehicles are identified as those with fuel type “D” for diesel and model year 1997 and newer within the St. Louis five county area. The Missouri IM rule (10 CSR 10-5.381) identifies exempted heavy duty gas and diesel vehicles as those with GVWR over 8,500 lbs. Since heavy trucks are coded to MOVES vehicle type 32 according to GVWR >10,000 lbs, only MOVES type of 31 (passenger truck) are included as potentially subject to the rule. In the decoded VIN table, there are columns for both GVWR range and a specific GVWR, though not both columns are decoded for all VINs. The choice of VINs to include as subject vehicles was decided by:

- Where GVWR numeric value or GVWR range doesn't exist, include these vehicles.
- Where either GVWR or range doesn't exist, include GVWR values under 8,500 lb or ranges completely under 8,500 lb. For ranges that span 8,500 lb where a specific GVWR doesn't exist, only include the range 8,001-9,000 lb.

From the decoded VIN list, subject gasoline vehicles are identified as those with fuel types “G” for gasoline or “F” for flex fuels. State rule 10 CSR 10-5.381 exempts vehicles that are plug-in hybrid, meaning that they recharge a battery by plug in and they can run exclusively on electric power for any portion of their trip. Specifically, the Chevy Volt qualifies for an exemption from IM because of its battery recharge, even though a portion of its trip can be powered by the backup gasoline engine. These vehicles are not included in the total gasoline vehicles subject to IM as their VIN-decoded fuel type is “I” for plug in hybrid. The choice of gasoline vehicles subject was decided by:

Fuel type “G” or “F”, MOVES vehicle type 21 or 31 (passenger car or truck), model year 1996 and newer per 10 CSR 10-5.381, and in the five St. Louis area counties.

The total count of vehicles from the decoded VIN table is less than the number of tested vehicles as reported by the inspection and maintenance program. After reviewing the invalid VIN table received from the IM contractor, it was determined that all invalid VINs in the 5 county area should be included in the number of vehicles potentially subject to IM. These VINs were invalid as they were entered into the Department of Revenue database, and at IM test time would have their VIN entered correctly to the contractor software. The total of decoded VIN subject vehicles and invalid VIN for the five county area determine the number of vehicles theoretically subject to IM in St. Louis.

Vehicles Theoretically Subject to the IM Program in St. Louis

County	Vehicle Count
Franklin	83,610
Jefferson	174,422
St Charles	299,391
St Louis City	161,285
St Louis County	788,795
Total	1,507,503
Invalid VIN 5-county total	39,987
Total Theoretically Subject Vehicles	1,547,490

The Air Program also reviewed the IM report to determine the total number of vehicles which had their emissions tested at least once from

January 1, 203 through December 31, 2014. The report also includes the total number of vehicles that received waivers during the same time period. The table below shows the number of tests and waivers.

Initially Tested Vehicles that Received a Waiver in the St. Louis IM Program from January 1, 2010 through December 31, 2011.

Model Year	Passenger Car			Truck			Total Initially Tested		
	Test Count	Waivers	% Waivers	Test Count	Waivers	% Waivers	Test Count	Waivers	% Waivers
1996	19007	45	0.24%	5266	6	0.11%	18500	43	0.23 %
1997	30309	58	0.19%	7703	18	0.23%	6985	20	0.29 %
1998	35585	66	0.19%	8147	14	0.17%	33579	70	0.21 %
1999	52593	73	0.14%	9528	8	0.08%	11223	14	0.12 %
2000	58569	87	0.15%	10544	13	0.12%	53617	77	0.14 %
2001	68661	129	0.19%	11809	10	0.08%	14348	26	0.18 %
2002	77742	127	0.16%	11977	6	0.05%	71382	111	0.16 %
2003	84858	99	0.12%	12317	8	0.06%	16723	24	0.14 %
2004	88243	76	0.09%	12929	8	0.06%	81974	75	0.09%
2005	101147	69	0.07%	12111	5	0.04%	19278	11	0.06 %
2006	96625	65	0.07%	10805	9	0.08%	88038	68	0.08 %
2007	108322	36	0.03%	11423	2	0.02%	20750	5	0.02 %
2008	103431	23	0.02%	9810	3	0.03%	93547	25	0.03 %
2009	78020	8	0.01%	6431	0	0.00%	13893	0	0.00 %
2010	92146	5	0.01%	7793	1	0.01%	77926	6	0.01 %
2011	98739	1	0.00%	9438	0	0.00%	26983	0	0.00 %
2012	112681	1	0.00%	7881	0	0.00%	96053	0	0.00 %
2013	34281	0	0.00%	2058	0	0.00%	26649	0	0.00%
2014	8749	0	0.00%	506	0	0.00%	9255	0	0.00%
Total	1349708	968	0.07 %	167970	111	0.07 %	1518184	1079	0.07%

The compliance rate is calculated from the tables above for the St. Louis IM Program as:

$$\text{Compliance Rate: } (1,518,184/1,547,490) \times 100\% = 98.11\%$$

Waiver Rate: The waiver rate is the percentage of vehicles that fail an initial IM test and do not pass a retest, but do receive a certificate of compliance. The waiver rate was determined by dividing the number of vehicles that received waivers from January 1, 2013 through December 31, 2014 by the total number of vehicles that were tested at least once during the same time period. Therefore, the

waiver rate was calculated for the St. Louis IM Program with the following equation:

$$\text{Waiver Rate: } (1,079 / 1,518,184) \times 100\% = 0.07\%$$

Regulatory Class Coverage Adjustment: The regulatory class coverage adjustment is an adjustment that accounts for the fraction of vehicles within a source type that are covered by the IM program. Since the IM program in St. Louis exempts vehicles with a gross vehicle weight rating above 8,500 lbs., the compliance factor needs to reflect the percentage of vehicles in the source types subject to IM that are exempt because of their GVWR. Table A.3 in the Appendix of the MOVES Technical Guidance Document was used to develop adjustments to the compliance factor to account for this discrepancy. The adjustments are percentages of vehicle miles traveled by the various regulatory weight classes within a source type. The corresponding adjustment factors used for the three source categories are as follow:

- Passenger cars: 100%
- Passenger Trucks: 98%
- Light Commercial Trucks: 92%

Calculating the Compliance Factor: Based on the calculations listed above the compliance factor for each source category impacted by the IM program in St. Louis is listed below.

- Passenger cars: $98.11\% \times (100\% - 0.07\%) \times 100\% = \mathbf{98.04\%}$
- Passenger Trucks: $98.11\% \times (100\% - 0.07\%) \times 98\% = \mathbf{96.08\%}$
- Light Commercial Trucks: $98.11\% \times (100\% - 0.07\%) \times 92\% = \mathbf{90.20\%}$

D-6 Nonroad Mobile Source Inventory

Nonroad emissions, as produced by the MOVES2014 model, are a required portion of the 2014 NEI submittal.

Missouri ran the Nonroad model within MOVES on Jan 13, 2016, using all default information from EPA, for the 2014 emission year. There are no Missouri-specific input tables to replace the defaults. Results are examined and compared to 2011 nonroad emissions.

Missouri sent a support request message on Wed Jan 13th, 2016 through EPA's Emission Inventory System (EIS) indicating that the default information for nonroad are accepted for this category. Missouri also accepts the defaults for aircraft, railroad, and commercial marine portions of the nonroad inventory that are not estimated by the nonroad model. A LADCO

project to create a commercial marine inventory for 2014 is being revised, and should be available in time for the NEIv2 data submittal due date. A LADCO project to create a 2014 rail inventory is due for completion in the fall of 2016. Until then, 2011 emissions are used for 2014 for the rail portion of the nonroad inventory.