Appendix 10-1:
2017 Periodic Emission Inventory
Point and Area Sources

1.0 Point Sources

For the purposes of this 2017 emission inventory, a point source is defined as a stationary facility that emits or has the potential to emit at or above any of the following thresholds:

- 10 tons per year of VOC
- 25 tons per year of NO_x
- 100 tons per year of carbon monoxide, $PM_{2.5}$, PM_{10}, SO_2, ammonia

The remaining stationary sources are included in the area source emission inventory.

1.1 VOC, NO_x, Carbon Monoxide, Ammonia, SO_2, PM_{10}, and $PM_{2.5}$ Emissions From Emission Statements

The 2017 point source inventories for VOC, NO_x, carbon monoxide, ammonia, SO_2, PM_{10}, and $PM_{2.5}$ were developed using data reported by facilities to the NJDEP through the Emission Statement Program. Facilities are required to prepare an annual accounting of air emissions for each pollutant source at the facility and to report those emissions by submitting an Emission Statement to the NJDEP in accordance with N.J.A.C. 7:27-21. A total of 455 facilities, including power plants with units that report to the Clean Air Markets Division (CAMD), were identified in New Jersey as meeting one of the required criteria in 2017.

Emission Statement data are submitted through NJDEP's data entry software, known as Remote Air Data Input Users System (RADIUS). Table 4 provides a brief description of the Emission Statement information collected.

Table 4: Emission Statement Information

Screen Name	Description of Emission Statement Data
Facility Profile (General)	Plant level data (Facility Information)
Facility Profile (Planning)	Estimates of plant activities for planning purposes
Non-Source Fugitive Emissions	Fugitive emissions
Insignificant Source Emissions	List of sources not requiring permits
Equipment Inventory	List of permitted sources
Control Device Inventory	List of control devices
Emission Point Inventory	List of emission points (stacks) for the permitted sources
Emission Unit/Batch Process Inventory	List of emission units and batch processes containing the permitted sources
Subject Item Group Inventory	List of sources grouped for various permitting purposes
Emission Statement	Process and emission data for all sources, including control efficiency and source details

The certified RADIUS file containing the emission statement data was imported into the New Jersey Emission Management System (NJEMS) database. After the data was quality assured (see Section VII(A)), the data was submitted to the USEPA's NEI database.

1.2. Rule Effectiveness

Per the USEPA's guidance,[1] [2] a rule effectiveness factor should be applied to applicable sources for the emission inventories. The purpose of the rule effectiveness factor is to account for noncompliance with existing rules, pollution control equipment failures and control equipment downtime. The USEPA guidance requires states to apply a default rule effectiveness factor of eighty percent unless other, state-specific data exist to justify the use of a different value. Therefore, New Jersey only applies the default rule effectiveness in cases where the actual control efficiency has not been reported to New Jersey.

1.3. Point Source Inventory Data

The point source inventory is summarized in the SIP. Attachment 1 contains the detailed point source emission inventories for VOC, NO_x, carbon monoxide, ammonia, PM_{10}, $PM_{2.5}$, and SO_2, respectively. These attachments are only available electronically.

1.4. Point Source Quality Assurance

This section outlines and discusses the quality assurance checks performed on the point source emission statement data submitted to the NJDEP.

i. Data Entry Checks

Pursuant to N.J.A.C. 7:27-21 et seq., 2017 point source emissions were reported by applicable facilities to the NJDEP through the Emission Statement Program. All applicable facilities reported their 2017 emissions in electronic format; therefore, no data entry quality assurance was necessary.

ii. Completeness Checks & Reasonableness Checks

All of the Emission Statements submitted by applicable facilities in 2017 were checked for completeness. The checklist in Attachment 2 was used for emission statement review. NJDEP staff accessed data from both the New Jersey Environmental Management System (NJEMS) and the NJDEP Emission Statement Program Confidential Cabinet and compiled data into various reports using the Web Intelligence Software and Microsoft Access software (Access) to assist in determining responses to the questions in this checklist. NJEMS is the database that the NJDEP uses to store all emission statement data. The Confidential Cabinet contains all the confidential process data, which are manually reviewed by the NJDEP staff. Web Intelligence Software is the report writer software that the NJDEP uses to access the data stored in the New Jersey Environmental Management System, while Access is the software that the NJDEP uses to configure the data from Web Intelligence Software into other useful reports for error checks. The data source used for determining the response to each specific question in the checklist is identified after each question.

[1] USEPA, "Guidelines for Estimating and Applying Rule Effectiveness for Ozone/CO State Implementation Plan Base Year Inventories", November 1992. Hereafter cited as Rule Effectiveness Guidance.
[2] USEPA, "Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations", June 2003.

The 2017 point source inventories from the Emission Statement Program were compared to the 2014 inventories in order to identify any anomalies that might indicate calculation or data errors, and to verify reasons for trends towards higher or lower emissions. An overall summary of statewide emission differences is shown in Table 13 below. Annual emissions decreased between 2014 and 2017, while the summer VOC emissions between 2014 and 2017 slightly increased. The increase in summer VOC emissions is due to increased activity in the petroleum bulk stations and terminals sector. The decreases noted for the other pollutants, most notably those for NOx, can be attributed chiefly to reductions in emission from electric generation facilities.

Table 13: Statewide Point Source Emission Inventory Comparison

Summer Controlled Emissions (Tons per Day)	New Jersey 2014	New Jersey 2017
VOC	33.92	36.31
NO_x	82.33	48.66
CO	44.55	31.17

Annual Controlled Emissions (Tons per Year)	New Jersey 2014	New Jersey 2017
VOC	7,397	6,809
NOx	13,269	9,824
CO	6,509	5,733
SO_2	3,634	2,221
$PM_{2.5}$	2,492	2,085
PM_{10}	2,916	2,535
NH_3	1,128	1,120

2.0 Area Sources

The area source component of the 2017 emission inventory includes emissions from numerous facilities or activities that individually release small amounts of a given pollutant, but collectively they can release significant amounts of a pollutant. This includes small stationary sources that fall below required emission reporting thresholds by the Emission Statement Program. Area sources are small and numerous and have emissions which are not readily associated with a single point or a small set of points. Some of the stationary sources in this sector are sometimes referred to as minor point sources.

2.1. VOC, NO_x, CO, SO_2, $PM_{2.5}$, and PM_{10} Emission Calculation Procedures

The VOC, NO_x, CO, SO_2, $PM_{2.5}$, and PM_{10} emissions from area source categories were calculated, for the most part, by multiplying a USEPA published emission factor by a known indicator of activity for each source category, such as employment, population and fuel usage. The emissions were first calculated on an annual basis since most activity data was provided on an annual basis. The annual emission estimates were allocated to each season, based on seasonal adjustment factors. A calculation methodology sheet was created to document the data used to estimate the emissions from each area source category. In general, the calculation methodology sheets document the calculation methodology selected, the process used to estimate the emissions, all assumptions required to calculate the emissions, and all sources of data. A complete set of calculation methodology sheets is included in Attachment 3.

The following sections describe how the area source emission inventory was developed.

i. Annual Emissions

Most USEPA emission factors are in pounds of pollutant emitted per unit of activity. The general calculation methodology to estimate tons of pollutant emitted per year can be expressed as:

$$Emissions_{Annual} = EF \times AL/CF \quad (1)$$

where:
$Emissions_{Annual}$ = Annual pollutant emissions in tons per year
EF = Annual emission factor
AL = Annual activity level
CF = Factor to convert pounds to tons

ii. Daily Emissions

Daily emissions were estimated by incorporating annual activity day factors for a given area source category operation into the annual emission estimate calculation. The annual activity day factor is determined by the activity of a given source category during a week. For example, automobile refinishing establishments typically operate five (5) days per week while the use of consumer products occurs seven (7) days per week. The annual activity day factors are calculated by:

$$AADF = (WAF) * (52 \text{ weeks/year}) \quad (2)$$

where:
AADF = Annual activity day factor
WAF = Weekly Activity Factor (Activity Days/Week)

iii. Seasonal Adjustment Factor

Activity for several source categories fluctuates on a seasonal basis. For example, architectural surface coating and pesticide application activities occur more in the warmer months (June, July and August). Conversely, some activities do not occur very often in the warmer months such as heating activities. Some activities are considered uniform throughout the year, such as marine vessel, aircraft, railroad, and industrial surface coating operations. In order to estimate seasonal average daily emissions, the annual emissions are adjusted as follows:

$$Emissions_{Season} = Emissions_{Annual} * SAF/AADF \quad (3)$$

where:
SAF = Seasonal Adjustment Factor

New Jersey applied transport factors to all of the area source categories included in the inventory that were estimated by USEPA for the 2017 NEI in order to estimate daily emissions. The USEPA only estimated annual emissions for these area source categories for the NEI.

iv. County Level Emissions

Depending on the activity data obtained for a particular category, emissions are either calculated on a statewide basis and allocated to the county level based on a secondary activity

indicator, or are calculated on a county basis and totaled for statewide emissions. For example, architectural coatings emissions are calculated at the county level using county population and dry cleaning emissions are calculated at the county level using county employment. Residential natural gas combustion is calculated at the state level using statewide fuel use estimates published by the United States Department of Energy and is allocated to the county level based on census data regarding the number of houses using natural gas as a primary heat source.

v. Strategies to Eliminate Double Counting

Emissions for some source categories are estimated in both the area source portion of the inventory and in the point source inventory. Reporting the emissions in each category results in double counting of the emissions. Therefore, the area source portion of the inventory must be adjusted for the emissions already accounted for in the point source inventory. There are three ways to eliminate this double counting. One approach is to delete a known point source from the database used to calculate the area source inventory. For example, if a particular industrial incinerator submits an emission statement then it is included in the point source inventory and is not included in the area source inventory. A second approach involves adjusting the source category activity level by subtracting the activity reported in the point source inventory. For example, industrial fuel combustion emissions are estimated in both the point source and the area source inventories. Since the industrial fuel use activity level reported by facilities is accounted for in the point source inventory, this fuel can be subtracted from the area source statewide industrial fuel use activity level in the area source inventory. The resulting area source activity level is then utilized in the calculation to estimate the emissions for this category for area sources. A third approach involves adjusting the source category emission estimate by subtracting the point source emission estimate from the area source emission estimate. For example, emissions from graphic arts operations are estimated in both the point and area source inventories. The point source emissions are based on emission statements submitted by the graphic arts facility. The area source emissions are based on population activity at the county level. The reported point source emissions are subtracted from calculated area source emissions for that county. The USEPA estimated emissions for publicly owned treatment works and gasoline pipelines for New Jersey. New Jersey submitted point source data for subtraction from these categories to EPA.

vi. Emission Controls

New Jersey has developed a number of air pollution control measures to reduce area source emissions by either requiring VOC content limitations on specific products or requiring installation of a control apparatus to capture a specified percentage of pollutant emissions. For example, the New Jersey Architectural Coatings Rule (N.J.A.C. 7:27-23) limits the VOC content in paints, while the Marine Tank Vessel Loading and Ballasting Operations rule (N.J.A.C. 7:27-16.5) requires that most marine vessel terminals that load or ballast gasoline install and operate a control apparatus that reduces total VOC emissions to the outdoor atmosphere by no less than 95%. Another example is New Jersey's ICI Boiler Rule. While not an area source rule, it requires certain area source boilers to do annual "tune-ups" or adjust the combustion process annually in boilers as small as 5 MMBtu/hr. New Jersey's Sulfur in Fuels Rule (N.J.A.C. 7:27-9) reduced the sulfur content in #2 fuel oil to 15 ppm, #4 fuel oil to 2,500 ppm, and #6 fuel oil to 5,000 ppm. Reductions in SO_2 were calculated based as a ratio of sulfur content before and after the rule and varied by county based on existing New Jersey rules. Reductions in NO_x were calculated through a regional process with MARAMA and were estimated to be 22% in boilers and 1% in engines burning distillate oil. All of New Jersey's area source control measures are discussed in detail in the calculation methodology sheets in Attachment 3.

Control efficiency factors have been developed to adjust the emission inventory in response to New Jersey APC measures. For example, the control efficiency for any marine vessel gasoline loading/ballasting operations must be 95% in accordance with the aforementioned New Jersey Marine Vessel rule. The USEPA has also developed air pollution control measures, which are reflected in the calculations, if applicable, such as the National Consumer Products rule which sets standards for consumer products, automobile refinish coatings, and architectural coatings.

The USEPA requires that rule effectiveness and rule penetration factors be applied to adjust the emission inventory whenever control measures have been applied to an inventory.[3] The purpose of the rule effectiveness factor is to account for the underestimation of emissions due to noncompliance with the existing control measures, control device equipment downtime or operating problems, process upsets, and the inability of most emission estimate calculation procedures to incorporate these problems.[4] Rule penetration is a measure of the extent to which a rule applies to a given source category.

Whenever a control measure is applied to a specific area source category, the three factors of control efficiency (CE), rule effectiveness (RE), and rule penetration (RP) are incorporated into the two emission estimation equations (1) and (3) as follows:

$$Emissions_{Annual} = \{EF \times AL \times [1 - (CE \times RE \times RP)]\}/CF \quad (5)$$

$$Emissions_{Daily} = \{EF \times AL \times SAF \times [1- (CE \times RE \times RP)]\}/ (AADF \times CF) \quad (6)$$

Control efficiency, rule effectiveness, and rule penetration are normally expressed as percentages but used as fractions in the above equations. For the area emission inventory, the USEPA default rule effectiveness value of eighty percent and rule penetration value of 100 percent was used the majority of the time.

vii. Fugitive Dust

Fugitive dust-related $PM_{2.5}$ and PM_{10} emissions calculated using USEPA emission inventory guidance is not representative of ambient air quality, as demonstrated by monitoring data and USEPA guidance on fugitive dust transport fractions. The USEPA has developed a methodology to reduce the fugitive dust emissions in the ambient air by applying transport factors.[5] New Jersey applied USEPA transport factors when developing the 2017 area source emission inventory. The area source categories affected by the PM transport fractions include paved roads, unpaved roads, construction, mining and quarrying, agricultural tilling, and agricultural dust kicked up by animals. The uncontrolled emissions for paved roads, unpaved roads, agricultural tilling, and agricultural dust kicked up by animals were estimated by the USEPA for the 2017 NEI and New Jersey applied the transport fraction to these categories for the adjusted PM_{10} and $PM_{2.5}$ inventories. The USEPA transport factors that were applied to New Jersey's 2017 $PM_{2.5}$ and PM_{10} area source inventory are listed in Table 3, below:

Table 3: PM Transport Fractions for New Jersey Counties

[3] Guidelines for Estimating and Applying Rule Effectiveness for Ozone/CO State Implementation Plan Base Year Inventories, Office of Air Quality Planning and Standards, USEPA, November 1992, page 21.
[4] Ibid. page 3.
[5] U.S. Environmental Protections Agency. *Emissions Modeling Clearinghouse - Fugitive Dust Fractions*. February 2007. (http://www.epa.gov/ttn/chief/emch/dustfractions).

County FIPS	County	PM Transport Fraction
34001	ATLANTIC	0.3377
34003	BERGEN	0.2657
34005	BURLINGTON	0.3008
34007	CAMDEN	0.1375
34009	CAPE MAY	0.8146
34011	CUMBERLAND	0.5151
34013	ESSEX	0.3461
34015	GLOUCESTER	0.4361
34017	HUDSON	0.5286
34019	HUNTERDON	0.4911
34021	MERCER	0.3472
34023	MIDDLESEX	0.3273
34025	MONMOUTH	0.5468
34027	MORRIS	0.2297
34029	OCEAN	0.5196
34031	PASSAIC	0.1971
34033	SALEM	0.5905
34035	SOMERSET	0.3635
34037	SUSSEX	0.3404
34039	UNION	0.3117
34041	WARREN	0.4055

2.2. Area Source Categories Estimated by the USEPA for the 2017 National Emission Inventory (NEI)

New Jersey added several categories to the 2017 area source inventory that were calculated by the USEPA for the 2017 National Emission Inventory (NEI). These categories are included in Table 4 Below:

Table 4: Area Source Categories Estimated by the USEPA for the 2017 NEI

SCC	Description	Pollutants
2102008000	Industrial Wood Combustion	All
2103008000	Commercial/Institutional Wood Combustion	All
2104008100	Residential Fireplace Wood	All
2104008210	Residential Woodstove Insert Non EPA	All
2104008220	Residential Woodstove Insert EPA Certified Non Catalytic	All
2104008230	Residential Woodstove Insert EPA Certified Catalytic	All
2104008310	Residential Woodstove Free Non EPA	All
2104008320	Residential Woodstove Free EPA Certified Non Catalytic	All

SCC	Description	Pollutants
2104008330	Residential Woodstove Free EPA Certified Catalytic	All
2104008400	Residential Woodstove Pellet-Fired	All
2104008510	Residential Furnace Indoor Cordwood-Fired	All
2104008530	Residential Furnace Indoor Pellet General	All
2104008610	Residential Wood Hydronic Heater Outdoor	All
2104008620	Residential Wood Hydronic Heater Indoor	All
2104008630	Residential Wood Hydronic Heater Pellet Fired	All
2104008700	Residential Wood Outdoor Burning Device NEC	All
2104009000	Residential Wood Firelog-Total: All Combustor Types	All, except Ammonia
2294000000	Paved Roads	$PM_{2.5}$, PM_{10}
2296000000	Unpaved Roads	PM_{10}, $PM_{2.5}$
2302002100	Commercial Cooking: Conveyorized Charbroiling	VOC, CO, $PM_{2.5}$, PM_{10}
2302002200	Commercial Cooking: Underfired Charbroiling	VOC, CO, $PM_{2.5}$, PM_{10}
2302003000	Commercial Cooking: Deep Fat Frying	VOC
2302003100	Commercial Cooking: Flat Griddle Frying	VOC, CO, $PM_{2.5}$, PM_{10}
2302003200	Commercial Cooking: Clamshell Griddle Frying	VOC, CO, $PM_{2.5}$, PM_{10}
2505040120	Pipeline Gasoline	VOC
2630020000	Public Owned Treatment Works	VOC, Ammonia
2680003000	Composting	VOC, Ammonia
2801000003	Agricultural Tilling	$PM_{2.5}$, PM_{10}
2801700099	Fertilizer Application - Miscellaneous Fertilizers	Ammonia
2805001000	Beef cattle - finishing operations on feedlots (drylots) - Dust kicked up by hooves	$PM_{2.5}$, PM_{10}
2805001010	Dairy Cattle - Dust kicked up by hooves	$PM_{2.5}$, PM_{10}
2805001020	Broilers - Dust kicked up by feet	$PM_{2.5}$, PM_{10}
2805001030	Layers - Dust kicked up by feet	$PM_{2.5}$, PM_{10}
2805001040	Swine - Dust kicked up by hooves	$PM_{2.5}$, PM_{10}
2805001050	Turkeys - Dust kicked up by feet	$PM_{2.5}$, PM_{10}
2805002000	Beef cattle production composite - Not Elsewhere Classified	VOC, Ammonia
2805007100	Poultry production - layers with dry manure management systems - Confinement	VOC, Ammonia
2805009100	Poultry production - broilers - Confinement	VOC, Ammonia
2805010100	Poultry production - turkeys - Confinement	VOC, Ammonia

SCC	Description	Pollutants
2805018000	Dairy cattle composite - Not Elsewhere Classified	VOC, Ammonia
2805025000	Swine production composite - Not Elsewhere Classified	VOC, Ammonia
2805035000	Horses and Ponies Waste Emissions - Not Elsewhere Classified	VOC, Ammonia
2805040000	Sheep and Lambs Waste Emissions - Total	VOC, Ammonia
2805045000	Goats Waste Emissions - Not Elsewhere Classified	VOC, Ammonia
2810025000	Residential Grilling	VOC, CO, NOx, $PM_{2.5}$, PM_{10}
2810060100	Human Cremation	All, except Ammonia
2810060200	Animal Cremation	All, except Ammonia

New Jersey submitted state specific VMT inputs for USEPA to use to estimate emissions for paved and unpaved roads.

Refueling
VOC emissions from refueling from gasoline (SCC 2201000062), diesel (SCC 2202000062) and ethanol (E85) (SCC 2205000062) were estimated by USEPA for the 2017 NEI onroad inventory. These SCCs were removed from New Jersey's 2017 onroad inventory and added to the 2017 area source inventory.

2.3. Ammonia Emissions

Ammonia emissions in New Jersey's 2017 inventory from livestock waste and fertilizer were prepared by the USEPA for the 2017 NEI using the Carnegie Mellon University (CMU) Ammonia Model.[6] The USEPA also estimated ammonia emissions for industrial wood combustion, commercial wood combustion, residential wood combustion, publicly owned treatment works, and composting. The SCCs for these area source categories are included in Table 4.

Ammonia emissions for industrial and commercial combustion sources were estimated by New Jersey in the same manner as the other pollutants in New Jersey's inventory, as discussed above and in the calculation methodology sheets.

2.4. Agricultural VOC Emissions

VOC emissions in New Jersey's inventory from fertilizer and livestock waste were prepared by the USEPA for the 2017 NEI. VOC emissions from these area source categories were estimated by EPA by multiplying a national VOC/NH_3 emissions ratio (VOC = 8% of NH_3 emissions) by the county NH_3 emissions for those categories.[7] The SCCs for these area source categories are included in Table 4.

[6] United States Environmental Protection Agency (USEPA), "2017 National Emissions Inventory Complete Release, Technical Support Document", April 2020.

2.5. Agricultural PM Emissions

$PM_{2.5}$ and PM_{10} emissions in New Jersey's 2017 inventory from dust kicked up from animal hooves and feet were prepared by the USEPA for the 2017 NEI.[8] The SCCs for these area source categories are included in Table 4.

2.6. Area Source Inventory Data

The area source inventory is summarized in the SIP. Attachment 4 contains the detailed area source emission inventory for VOC, NO_x, CO, SO_2, $PM_{2.5}$, PM_{10}, and NH_3, respectively. These attachments are only available electronically.

2.7. Area Source Quality Assurance

The 2017 VOC, NO_x, CO, SO_2, PM_{10}, $PM_{2.5}$, and NH_3 emissions from area source categories were calculated, for the most part, by multiplying a USEPA published emission factor by a known indicator of activity for each source category such as employment, population and fuel usage. There are several area source categories and methodologies, resulting in numerous calculations. The area source emissions calculations were checked for accuracy by adding county emission totals and comparing them with the statewide emission totals. The calculations were randomly reviewed by NJDEP Bureau of Air Quality Planning staff to check for accuracy.

The 2017 VOC, NO_x, CO, SO_2, PM_{10}, $PM_{2.5}$, and NH_3 area source inventories were compared to the 2014 inventories in order to identify any anomalies that might indicate calculation or data errors, and to verify reasons for trends towards higher or lower emissions. An overall summary of statewide emission differences is shown in Table 5 below.

In order to have a fair comparison of 2014 to 2017 emissions, agricultural VOC and PM emissions, residential grilling NO_x, and animal cremation emissions (for all pollutants, except ammonia) were removed from the 2017 totals, as these emissions were not included in the 2014 inventory but are included in the 2017 inventory and cause an increase in emissions. The full 2017 area source inventory without these SCCs removed is also shown in Table 5.

A comparison of 2014 to 2017 emissions shows a decrease in daily emissions for VOC, NOx and CO. This decrease occurs with both the full and modified 2017 datasets. These emission reductions can be attributed to both New Jersey's control measures and emissions calculation methodology changes.

Annual emissions of VOC, NOx and SO_2 all show decreases (both full and modified 2017 datasets). One reason for the decreases in emissions is methodology changes in point source subtraction and fuel allocation in the ICI fuel categories. New Jersey updated the fuel allocation methodology to align with the USEPA methods used for the 2017 NEI.[9] Industrial fuel combustion emissions decreased for all pollutants because of these methodology changes. Emissions from industrial distillate oil (boilers and engines), industrial residual oil, and industrial

[5],[8] United States Environmental Protection Agency (USEPA), "2017 National Emissions Inventory Complete Release, Technical Support Document", April 2020.
[9] United States Environmental Protection Agency (USEPA), "2017 National Emissions Inventory Complete Release, Technical Support Document", April 2020.

natural gas were zeroed out in 2017 because of the methodology change. The methodology changes are discussed in detail in the calculation methodology sheets in Attachment 3.

Annual SO_2 emissions decreased by 2,846 tons per year from 2014 to 2017. The most significant decreases in SO_2 emissions include residential combustion: distillate oil and commercial/institutional combustion: distillate Oil. The decreases in emissions from these area source categories are due to due to New Jersey's low sulfur fuel rule and a decrease in the use of distillate oil for heating.

Annual VOC emissions decreased by 2,967 tpy from 2014 to 2017. The largest VOC emissions decrease is from surface coating miscellaneous manufacturing (a 2,067 tpy decrease). This is due to a change in calculation methodology. Pipeline gasoline and portable fuel containers also had large emissions decreases. VOC emissions from portable fuel containers decreased due to reductions from New Jersey's rule.

Annual NOx emissions decreased by 2,336 tpy from 2014 to 2017. The largest NO_x emissions decrease is from the residential natural gas and residential distillate oil categories.

Annual emissions of CO, $PM_{2.5}$ and PM_{10} all show emissions increases from 2014-2017. Annual CO increased by 2,332 tpy, adjusted $PM_{2.5}$ increased by 1,783 tpy, unadjusted $PM_{2.5}$ emissions increased by 886 tpy, adjusted PM_{10} emissions increased by 2,129 tpy, and unadjusted PM_{10} emissions increased by 169 tpy.

The most significant annual CO emissions differences are in the residential wood combustion category with some categories increasing and some decreasing due to methodology changes.

The most significant annual $PM_{2.5}$ emissions increases from 2014-2017 are in the commercial cooking underfired charbroiling and residential wood combustion wood fireplace categories. There were also increases in agricultural field burning, structural fires and mining,

The most significant annual PM10 emissions increases from 2014-2017 are in the commercial cooking: underfired charbroiling and agricultural tilling categories. These emissions increases are also due to calculation methodology changes.

Annual ammonia emissions show an increase of 965 tpy from 2014 to 2017. The most significant increase is from the fertilizer application category.

Table 5: Statewide Area Source Emission Inventory Comparison

Summer Controlled Emissions (Tons per Day)	New Jersey 2014	New Jersey 2017 (SCCs Removed to Match 2014)	Full New Jersey 2017
VOC	254.66	240.99	241.31
NO_x	31.19	26.02	26.16
CO	58.13	42.20	42.20

Annual Controlled Emissions (Tons per Year)	New Jersey 2014	New Jersey 2017 (SCCs Removed to Match 2014)	Full New Jersey 2017
VOC	84,407	81,440	81,554
NO_x	25,495	23,159	23,207
CO	59,616	61,948	61,948
SO_2	3,401	555	555
$PM_{2.5}$ unadjusted fugitive dust	14,677	15,563	15,619
$PM_{2.5}$ adjusted fugitive dust	11,327	13,110	13,136
PM_{10} unadjusted fugitive dust	33,597	33,766	34,250
PM_{10} adjusted fugitive dust	18,774	20,903	21,045
NH_3	2,284	3,249	3,249

2.8. Biogenic Sources

Biogenic emissions are produced by living organisms or biological processes such as trees, plants, humans, domestic animals, and wild animals.

The 2017 biogenic emissions for VOC, NO_x, and CO were calculated by the USEPA based on 2017 meteorology data from the Weather Research and Forecasting (WRF) model version 3.8 (WRFv3.8) and using the Biogenic Emission Inventory System, version 3.61 (BEIS3.61) model within the Sparse Matrix Operator Kernel Emissions (SMOKE) modeling system version 4.7. The BEIS3.61 model creates gridded, hourly, model-species emissions from vegetation and soils at 12-kilometer horizontal resolution. The 12-kilometer gridded hourly data are summed to monthly and annual level and are mapped from 12-kilometer grid cells to counties using a standard mapping file.[10] The USEPA inventory currently does not include ammonia emission estimates for humans, domestic animals, and wild animals. New Jersey has submitted estimates for these categories in past inventories, but USEPA removes them for modeling to be consistent with other states. Therefore, New Jersey no longer submits emission estimates for those categories.

The USEPA 2017 biogenic source emission inventory is included as Attachment 5.

[10,8] United States Environmental Protection Agency (USEPA), "2017 National Emissions Inventory Complete Release, Technical Support Document", April 2020.

2.9. Events

Wildfires and prescribed burns (Wildland Fires in sum, WLFs) that occur during the inventory year are included in the USEPA NEI as “event” sources. Emissions from these fires, as well as agricultural fires, make up the National Fire Emissions Inventory (NFEI).

New Jersey submitted fire activity data inputs obtained from the NJDEP Division of Forestry to the USEPA to be used in their emission calculations for events. This data included day-specific, latitude-longitude, and acres burned for wildfire and prescribed burns. The data provided by the Division of Forestry did not contain end dates, so New Jersey opted for the USEPA to use national default datasets. New Jersey also answered the USEPA 2017 NEI Wildland Fire Inventory Database Questionnaire to help with the development of the events inventory.

The USEPA’s 2017 NEI wildland fire emissions estimates were estimated using Satellite Mapping Automated Reanalysis Tool for Fire Incident Reconciliation version 2 (SMARTFIRE2) and BlueSky Modeling Framework. SMARTFIRE2 is an algorithm and database system that operate within a geographic information system (GIS).[11]

The USEPA 2017 wildfire and prescribed burning events emission inventory is included as Attachment 6. A summary of the data is included below in Table 6.

Table 6: Wildfire and Prescribed Burning Emissions

County	Wildfires						
	Tons Per Summer Day						
	VOC	NOx	CO	PM2.5	PM10	SO2	Ammonia
Atlantic	0.92	0.07	7.73	0.35	0.41	0.03	0.06
Bergen	0.08	0.01	0.71	0.03	0.04	0.00	0.01
Burlington	0.14	0.01	1.17	0.05	0.06	0.00	0.01
Camden	0.10	0.00	0.89	0.04	0.04	0.00	0.01
Cape May	0.06	0.00	0.55	0.02	0.03	0.00	0.00
Cumberland	0.63	0.03	5.38	0.23	0.27	0.02	0.04
Essex							
Gloucester	0.56	0.04	4.72	0.21	0.25	0.02	0.04
Hudson							
Hunterdon	0.04	0.00	0.36	0.02	0.02	0.00	0.00
Mercer	0.01	0.00	0.12	0.01	0.01	0.00	0.00
Middlesex	0.03	0.00	0.25	0.01	0.01	0.00	0.00
Monmouth	0.20	0.01	1.66	0.07	0.09	0.01	0.01
Morris	0.07	0.00	0.61	0.03	0.03	0.00	0.00
Ocean	10.97	0.46	93.40	3.89	4.59	0.30	0.76
Passaic	0.14	0.01	1.19	0.05	0.06	0.01	0.01
Salem	0.03	0.00	0.29	0.01	0.02	0.00	0.00
Somerset	0.02	0.00	0.18	0.01	0.01	0.00	0.00
Sussex	0.15	0.01	1.26	0.06	0.07	0.01	0.01
Union	0.00	0.00	0.04	0.00	0.00	0.00	0.00
Warren	0.08	0.01	0.69	0.03	0.04	0.00	0.01
Total in State	**14.26**	**0.68**	**121.20**	**5.12**	**6.04**	**0.41**	**0.99**

Table 6 (continued): Wildfire and Prescribed Burning Emissions

County	Wildfires						
	Tons Per Year						
	VOC	NOx	CO	PM2.5	PM10	SO2	Ammonia
Atlantic	108	8	910	41	48	4	8
Bergen	10	1	83	4	4	0	1
Burlington	16	1	138	6	7	1	1
Camden	12	1	105	4	5	0	1
Cape May	8	0	64	3	3	0	1
Cumberland	75	3	634	27	31	2	5
Essex							
Gloucester	66	5	556	25	30	3	5
Hudson							
Hunterdon	5	0	42	2	2	0	0
Mercer	2	0	14	1	1	0	0
Middlesex	4	0	30	1	2	0	0
Monmouth	23	2	195	9	10	1	2
Morris	8	1	72	3	4	0	1
Ocean	1,292	54	11,003	458	541	35	90
Passaic	17	1	140	6	7	1	1
Salem	4	0	35	2	2	0	0
Somerset	3	0	21	1	1	0	0
Sussex	17	1	148	7	8	1	1
Union	1	0	5	0	0	0	0
Warren	10	1	81	4	4	0	1
Total in State	**1,679**	**80**	**14,277**	**603**	**711**	**48**	**117**

Table 6 (continued): Wildfire and Prescribed Burning Emissions

County	Prescribed Burning						
	Tons Per Summer Day						
	VOC	NOx	CO	PM2.5	PM10	SO2	Ammonia
Atlantic	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Bergen							
Burlington	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Camden	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cape May	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cumberland	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Essex	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Gloucester	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Hudson							
Hunterdon	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Mercer	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Middlesex							
Monmouth	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Morris	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ocean	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passaic							
Salem							
Somerset	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sussex	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Union							
Warren							
Total in State	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Table 6 (continued): Wildfire and Prescribed Burning Emissions

County	Prescribed Burning						
	Tons Per Year						
	VOC	NOx	CO	PM2.5	PM10	SO2	Ammonia
Atlantic	80	5	675	30	35	3	6
Bergen							
Burlington	1,542	102	13,045	572	675	53	107
Camden	88	7	741	33	39	3	6
Cape May	167	13	1,406	63	74	6	12
Cumberland	663	38	5,618	242	286	21	46
Essex	331	15	2,816	119	140	9	23
Gloucester	130	11	1,091	49	58	5	9
Hudson							
Hunterdon	86	8	724	33	39	4	6
Mercer	33	3	273	13	15	1	2
Middlesex							
Monmouth	171	12	1,445	64	75	6	12
Morris	172	10	1,459	63	74	6	12
Ocean	468	34	3,949	175	207	17	33
Passaic							
Salem							
Somerset	41	4	342	16	19	2	3
Sussex	39	3	330	15	18	2	3
Union							
Warren							
Total in State	**4,010**	**265**	**33,914**	**1,487**	**1,755**	**138**	**279**