



2019 National Emissions Inventory Technical Support Document: Point Data Category

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U.S. Environmental Protection Agency
Office of Air Quality Planning and Standards
Air Quality Assessment Division
Emissions Inventory and Analysis Group
Research Triangle Park, NC

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Acronyms and Chemical Notations

AERR	Air Emissions Reporting Rule
APU	Auxiliary power unit
BEIS	Biogenics Emissions Inventory System
C1	Category 1 (commercial marine vessels)
C2	Category 2 (commercial marine vessels)
C3	Category 3 (commercial marine vessels)
CAMD	Clean Air Markets Division (of EPA Office of Air and Radiation)
CAP	Criteria Air Pollutant
CBM	Coal bed methane
CDL	Cropland Data Layer
CEC	North American Commission for Environmental Cooperation
CEM	Continuous Emissions Monitoring
CENRAP	Central Regional Air Planning Association
CERR	Consolidated Emissions Reporting Rule
CFR	Code of Federal Regulations
CH4	Methane
CMU	Carnegie Mellon University
CMV	Commercial marine vessels
CNG	Compressed natural gas
CO	Carbon monoxide
CO2	Carbon dioxide
CSV	Comma Separated Variable
dNBR	Differenced normalized burned ratio
E10	10% ethanol gasoline
EDMS	Emissions and Dispersion Modeling System
EF	emission factor
EGU	Electric Generating Utility
EIS	Emission Inventory System
EAF	Electric arc furnace
EF	Emission factor
EI	Emissions Inventory
EIA	Energy Information Administration
EMFAC	Emission FACTor (model) – for California
EPA	Environmental Protection Agency
ERG	Eastern Research Group
ERTAC	Eastern Regional Technical Advisory Committee
FAA	Federal Aviation Administration
FACTS	Forest Service Activity Tracking System
FCCS	Fuel Characteristic Classification System
FETS	Fire Emissions Tracking System
FWS	United States Fish and Wildlife Service
FRS	Facility Registry System
GHG	Greenhouse gas
GIS	Geographic information systems
GPA	Geographic phase-in area

GSE	Ground support equipment
HAP	Hazardous Air Pollutant
HCl	Hydrogen chloride (hydrochloric acid)
Hg	Mercury
HMS	Hazard Mapping System
ICR	Information collection request
I/M	Inspection and maintenance
IPM	Integrated Planning Model
KMZ	Keyhole Markup Language, zipped (used for displaying data in Google Earth)
LRTAP	Long-range Transboundary Air Pollution
LTO	Landing and takeoff
LPG	Liquified Petroleum Gas
MARAMA	Mid-Atlantic Regional Air Management Association
MATS	Mercury and Air Toxics Standards
MCIP	Meteorology-Chemistry Interface Processor
MMT	Manure management train
MOBILE6	Mobile Source Emission Factor Model, version 6
MODIS	Moderate Resolution Imaging Spectroradiometer
MOVES	Motor Vehicle Emissions Simulator
MW	Megawatts
MWC	Municipal waste combustors
NAA	Nonattainment area
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NARAP	North American Regional Action Plan
NASF	National Association of State Foresters
NASS	USDA National Agriculture Statistical Service
NATA	National Air Toxics Assessment
NCD	National County Database
NEEDS	National Electric Energy Data System (database)
NEI	National Emissions Inventory
NESCAUM	Northeast States for Coordinated Air Use Management
NFEI	National Fire Emissions Inventory
NG	Natural gas
NH ₃	Ammonia
NMIM	National Mobile Inventory Model
NO	Nitrous oxide
NO ₂	Nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO _x	Nitrogen oxides
O ₃	Ozone
OAQPS	Office of Air Quality Standards and Planning (of EPA)
OEI	Office of Environmental Information (of EPA)
ORIS	Office of Regulatory Information Systems
OTAQ	Office of Transportation and Air Quality (of EPA)
PADD	Petroleum Administration for Defense Districts

PAH	Polycyclic aromatic hydrocarbons
Pb	Lead
PCB	Polychlorinated biphenyl
PM	Particulate matter
PM25-CON	Condensable PM2.5
PM25-FIL	Filterable PM2.5
PM25-PRI	Primary PM2.5 _s (condensable plus filterable)
PM2.5	Particulate matter 2.5 microns or less in diameter
PM10	Particulate matter 10 microns or less in diameter
PM10-FIL	Filterable PM10
PM10-PRI	Primary PM10
POM	Polycyclic organic matter
POTW	Publicly Owned Treatment Works
PSC	Program system code (in EIS)
RFG	Reformulated gasoline
RPD	Rate per distance
RPP	Rate per profile
RPV	Rate per vehicle
RVP	Reid Vapor Pressure
Rx	Prescribed (fire)
SCC	Source classification code
SEDS	State Energy Data System
SFv1	SMARTFIRE version 1
SFv2	SMARTFIRE version 2
S/L/T	State, local, and tribal (agencies)
SMARTFIRE	Satellite Mapping Automated Reanalysis Tool for Fire Incident Reconciliation
SMOKE	Sparse Matrix Operator Kernel Emissions
SO2	Sulfur dioxide
SO4	Sulfate
TAF	Terminal Area Forecasts
TEISS	Tribal Emissions Inventory Software Solution
TRI	Toxics Release Inventory
UNEP	United Nations Environment Programme
USDA	United States Department of Agriculture
VMT	Vehicle miles traveled
VOC	Volatile organic compounds
USFS	United States Forest Service
WebFIRE	Factor Information Retrieval System
WFU	Wildland fire use
WLF	Wildland fire
WRAP	Western Regional Air Partnership
WRF	Weather Research and Forecasting Model

1 Introduction

The Environmental Protection Agency (EPA) has released the 2019 National Emissions Inventory (NEI) for the Point data category. This is not a comprehensive public release of the triennial NEI; the most-recent being the 2017 NEI, is available on the web at the [2017 NEI Data page](#). As such, this document will discuss only the point emissions inventory for the 2019 NEI, which represents point source emissions for the year 2019. For the remainder of this document “2019 NEI” is used to represent the 2019 Point data category of the NEI. Multiple versions of the 2019 NEI point inventory were prepared. The 2019 NEI point data were first developed into an inventory during the summer of 2021. This preliminary version was used to facilitate a review of toxics emissions by state, local, and tribal (S/L/T) data submitters that occurred during August and September of 2021. In September 2021 some updates were made particularly to installed control devices and this version was used for analyses related to ozone precursors. In December 2021, updates from the S/L/T toxics review were incorporated into the inventory and the resulting version was used for air quality modeling that included both criteria and toxic emissions. This document focuses on the September 2021 and December 2021 versions. Where methodological approaches between the September and December versions differ, those are described.

1.1 What data are included in the 2019 NEI Point Data Category release?

The NEI is a national compilation of air emission estimates of criteria air pollutants (CAPs), the precursors of CAPs, and hazardous air pollutants (HAPs). The hazardous air pollutants that are included in the NEI are based on Section 112(b) of the Clean Air Act. State, local and tribal air agencies submit emission estimates to EPA and the Agency adds information from EPA emissions programs, such as the emission trading program, Toxics Release Inventory (TRI), and data collected during rule development or compliance testing.

The triennial NEI also includes estimates of emissions from stationary sources (large and small industries, commercial, institutional and consumer), mobile sources, fires and biogenic emissions. The 2019 NEI only includes the point data category emissions, primarily stationary sources (large and small industries, commercial, institutional), as well as emissions from aircraft (not including in-flight lead emissions) and many rail yards. EPA uses the NEI in rule development, non-attainment area designations, and as an input to various reports and assessments. This document discusses the Point inventory component of the NEI. The NEI program develops datasets, blends data from these multiple sources, and performs data processing steps that further enhance, quality assure, and augment the compiled data.

The emissions data in the NEI are compiled at different levels of granularity, depending on the data category. For point sources (source at a known latitude and longitude), emissions are inventoried at a process-level within a facility. The point data are collected from S/L/T air agencies and the EPA emissions programs including the TRI, the Acid Rain Program, and Maximum Achievable Control Technology (MACT) standards development.

While not provided for the 2019 NEI, nonpoint sources (typically smaller, yet pervasive sources) and mobile sources (both onroad and nonroad), emissions are given as county totals. For wildfires and prescribed burning, the data are compiled as day-specific, coordinate-specific (similar to point) events in the “event” portion of the inventory, and these emission estimates are further stratified into smoldering and flaming components.

The pollutants included in the NEI are the pollutants associated with the National Ambient Air Quality Standards (NAAQS), known as CAPs, as well as HAPs associated with EPA’s Air Toxics Program. The CAPs have ambient concentration limits or are precursors for pollutants with such limits from the NAAQS program. These pollutants include lead (Pb), carbon monoxide (CO), nitrogen oxides (NOx), volatile organic compounds (VOCs), sulfur dioxide (SO₂), particulate matter 10 microns or less (PM₁₀), particulate matter 2.5 microns or less (PM_{2.5}), and

ammonia (NH₃), which is technically not a CAP, but an important PM precursor. The HAP pollutants include the 187 remaining HAP pollutants (methyl ethyl ketone was removed) from the original 188 listed in Section 112(b) of the 1990 Clean Air Act Amendments¹ as well as a newly listed HAP 1-Bromopropane. There are many different types of HAPs. For example, some are acid gases such as hydrochloric acid (HCl); others are heavy metals such as mercury (Hg), nickel and cadmium; and others are organic compounds such as benzene, formaldehyde, and acetaldehyde. Greenhouse gases (GHGs) are included in the NEI for point sources where they have been reported.

1.2 What is included in this documentation?

This technical support document (TSD) provides a reference for the 2019 NEI. The primary purpose of this document is to explain the sources of information included in the inventory. This includes showing the sources of data and types of sources that are used for each data category, and then providing more information about the EPA-created components of the data. After the introductory material included in this section, Section 2 provides an overview of the contents of the inventory. Section 3 provides an overview of how the point source inventory was developed.

Estimates of emissions in the year 2019 for sources other than point sources were developed by EPA as part of the 2019 emissions modeling platform but are not considered part of the NEI. For emissions data other than point sources, the modeling platform emissions development methodologies for 2019 do not rely on data submitted by state, local, and tribal agencies for the specific year like the NEI. Instead, estimates for some data categories are based on adjustments to the most recent triennial NEI data, while others are based on data sets with national coverage similar to those used to develop the triennial NEIs. Once completed, these data and the documentation for the development of data for the 2019 modeling platform will be available from the [2019 Emissions Modeling Platform website](#).

1.3 Where can I obtain the 2019 NEI data?

NEI data are available in several different ways listed below. Data are available to the reporting agencies and EPA staff via the Emission Inventory System (EIS).

1.3.1 Emission Inventory System Gateway

The [EIS Gateway](#) is available to all EPA staff, EIS data submitters (i.e., the S/L/T air agency staff), Regional Planning Organization staff that support state, local and tribal agencies, and contractors working for the EPA on emissions related work. The EIS reports functions can be used to obtain raw input datasets and create summary files from these datasets as well as older versions of the NEI such as 2017, 2014, 2011, and 2008. The September version of the 2019 NEI *dataset* in EIS is called “2019NEI_V1”, while the December version of 2019 NEI *dataset* in the EIS is called “2019NEI_V2”. Note that if you run facility-, unit- or process-level reports in the EIS, you will get the 2019 NEI emissions data, but the facility inventory is dynamic in the EIS and will reflect more current information. The file that EIS creates for preparation of emissions for air quality modeling is called a “flat file”, which is a comma-separated tabular file of emissions that for point sources also includes locations and stack parameters. The information in the flat file is based on the facility inventory information available at the time the flat file is generated. Thus, facility information in the flat file from September will not be the same as facility information in the flat file from December if facility inventory changes have occurred in the intervening time. See Section 1.3.3 for more information on the modeling flat files.

¹ The original of HAPs is available on the [EPA Technology Transfer Network – Air Toxics Web Site](#).

1.3.2 NEI main webpage

The 2019 NEI point inventory is not released on the [NEI main web page](#) but is released with the 2019 emissions modeling platform. The [2017 NEI Data web page](#) includes the most recent **publicly**-available version of the triennial 2017 NEI along with the 2017 NEI plan and schedules and all publicly-available supporting materials by inventory data category (e.g., point, nonpoint, nonroad mobile, onroad mobile, events) and an associated TSD.

Two types of point data summaries are available on the 2017 NEI Data page, facility summaries and process-level summaries. The source classification codes (SCC) data files section of the webpage provides the process level summaries for all data categories. These detailed CSV files (provided in zip files) contain emissions at the process level. Due to their size, they are broken out into EPA regions. Facility-level by pollutant summaries are also available. These CSV files must be “linked” (as opposed to imported) to open them with Microsoft® Access®. County and tribe-level summaries for events are also provided.

The [2017 NEI Data page](#) also includes a query tool that allows for summaries by EIS Sector (see Section 2.1) or the more traditional Tier 1 summary level (for CAPs only) used in the [EPA Trends Report](#). Summaries from the 2017 NEI Data site include national-, state-, and county-level emissions for CAPs, HAPs and GHGs. You can choose which states, EIS Sectors, Tiers, and pollutants to include in custom-generated reports to download Comma Separated Value (CSV) files to import into Microsoft® Excel®, Access®, or other spreadsheet or database tools. Biogenic emissions and tribal data (but not tribal onroad emissions) are also available from this tool. Tribal summaries are also posted under the “Additional Summary Data” section of this page.

Documentation for the 2017 NEI is available from the [2017 NEI data page](#) which includes links to the [2017 NEI TSD](#) and supporting materials. This page is a working page, meaning that content is updated as new products are developed. Emissions data used in the 2019 emissions modeling platform rely on many of the methods used to develop the 2017 NEI as described in the 2017 NEI TSD.

1.3.3 Modeling files

The modeling files, provided on the [Air Emissions Modeling website](#), are provided in formats that can be read by the [Sparse Matrix Operator Kernel Emissions](#) (SMOKE) modeling system. These files are also CSV formats that can be read by other systems, such as databases. The modeling files provide the process-level emissions apportioned to release points (with one pollutant per line), and the release parameters for the release points. Release parameters include stack height, stack exit diameter, exit temperature, exit velocity and flow rate. The EPA may make changes to the NEI modeling files prior to their use. The 2019 modeling platform is based on the 2019 NEI point inventory along with emissions that represent 2019 for many other sources and for some sources 2017 NEI data are used directly. The development of the 2019 emissions modeling platform is discussed in the TSD for the 2019 Emissions Modeling Platform, which will be posted on the [2019 Emissions Modeling Platform web page](#) once available.

The SMOKE flat files for the September and December versions of the point inventory are available on the [air emissions modeling FTP site for 2019](#).

1.4 Why is the NEI created?

The NEI is created to provide the EPA, federal, state, local and tribal decision makers, and the national and international public the best and most complete estimates of CAP and HAP emissions. While the EPA is not directly obligated to create the NEI, the Clean Air Act authorizes the EPA Administrator to implement data collection efforts needed to properly administer the NAAQS program. Therefore, the Office of Air Quality

Planning and Standards (OAQPS) maintains the NEI program in support of the NAAQS. Furthermore, the Clean Air Act requires States to submit emissions to the EPA as part of their State Implementation Plans (SIPs) that describe how they will attain the NAAQS. The NEI is used as a starting point for many SIP inventory development efforts and for states to obtain emissions from other states needed for their modeled attainment demonstrations. The NEI is the basis for many types of air quality modeling studies.

While the NAAQS program is the basis on which the EPA collects CAP emissions from the S/L/T air agencies, it does not require collection of HAP emissions. For this reason, the HAP reporting requirements are voluntary. Nevertheless, the HAP emissions are an essential part of the NEI program. These emissions estimates allow EPA to assess progress in meeting HAP reduction goals described in the Clean Air Act amendments of 1990. These reductions seek to reduce the negative impacts to people of HAP emissions in the environment, and the NEI allows the EPA to assess how much emissions have been reduced since 1990.

1.5 How is the NEI created?

The [Air Emissions Reporting Rule](#) (AERR) is the regulation that requires state and local agencies to submit CAP emissions, and the Emissions Inventory System is the data system used to collect, QA, and compile those submittals as well as EPA augmentation data. Most S/L/T air agencies also provide voluntary submissions of HAP emissions. The 2008 NEI was the first inventory compiled using the AERR, rather than its predecessor, the Consolidated Emissions Reporting Rule (CERR). The 2017 NEI was the fourth AERR-based inventory, and improvements in the 2017 NEI process reflect lessons learned by the S/L/T air agencies and EPA from the prior NEI efforts. The AERR requires agencies to report all sources of emissions, except fires and biogenic sources. Reporting of open fire sources, such as wildfires, is encouraged, but not required. Sources are divided into large groups called “data categories”: stationary sources are “point” or “nonpoint” (county totals) and mobile sources are either onroad (cars and trucks driven on roads) or nonroad (locomotives, aircraft, marine, off-road vehicles and nonroad equipment such as lawn and garden equipment).

The AERR has emissions thresholds above which States must report stationary emissions as “point” sources, with the remainder of the stationary emissions reported as “nonpoint” sources.

The AERR changed the way these reporting thresholds work, as compared to the CERR, by changing these thresholds to “potential to emit” thresholds rather than actual emissions thresholds. In both the CERR and the AERR, the emissions that are reported are actual emissions, despite that the criteria for which sources to report is now based on potential emissions. The AERR requires emissions reporting for “Type A” point sources every year, with additional requirements every third year in the form of lower point source emissions thresholds. 2017 is one of these third-year (aka “triennial”) inventories, while the reporting thresholds for 2019 are higher in this interim year.

Table 1-1 provides the potential-to-emit reporting thresholds that applied for the 2017 and 2019 NEI cycles. “Type B” is the terminology in the rule that represents the lower emissions thresholds required for point sources in the triennial years. The reporting thresholds are sources with potential to emit of 100 tons/year or more for most criteria pollutants, with the exceptions of CO (1000 tons/year), and, updated starting with the 2014 inventory, Pb (0.5 tons/year, actual). As shown in the table, special requirements apply to nonattainment area (NAA) sources, where even lower thresholds apply. The relevant ozone (O₃), CO, and PM₁₀ nonattainment areas that applied during the year that the S/L/T agencies submitted their data for the 2017 NEI are available on the [Nonattainment Areas for Criteria Pollutants \(Green Book\) web site](#).

Table 1-1: Point source reporting thresholds (potential to emit) for CAPs in the AERR

Pollutant	Type A sources (every year)	Type B Sources (triennial)	Triennial Thresholds¹ within Nonattainment Areas
(1) SO ₂	≥2500	≥100	≥100
(2) VOC	≥250	≥100	O ₃ (moderate) ≥ 100
			O ₃ (serious) ≥ 50
			O ₃ (severe) ≥ 25
			O ₃ (extreme) ≥ 10
(3) NO _x	≥2500	≥100	≥100
(4) CO	≥2500	≥1000	O ₃ (all areas) ≥ 100
			CO (all areas) ≥ 100
(5) Lead		≥0.5 (actual)	≥0.5 (actual)
(6) Primary PM ₁₀	≥250	≥100	PM ₁₀ (moderate) ≥100
			PM ₁₀ (serious) ≥70
(7) Primary PM _{2.5}	≥250	≥100	≥100
(8) NH ₃	≥250	≥100	≥100

¹Thresholds for point source determination shown in tons per year of potential to emit as defined in 40 CFR part 70, with the exception of lead.

Based on the AERR requirements, S/L/T air agencies submit emissions or model inputs of point, nonpoint, onroad mobile, nonroad mobile, and fire emissions sources. With the exception of California, reporting agencies were required to submit model inputs for onroad and nonroad mobile sources instead of emissions. For the 2017 NEI, all these emissions and inputs were required to be submitted to the EPA per the AERR by December 31, 2018 (with an extension given through January 15, 2019). For the 2019 NEI submissions for point sources were required by December 31, 2020 (with an extension given through January 15, 2021). Once the initial reporting NEI period closed, the EPA provided feedback on data quality such as suspected outliers and missing data by comparing to previously established emissions ranges and past inventories. In addition, the EPA augmented the S/L/T data using various sources of data and augmentation procedures. This documentation provides a detailed account of EPA’s quality assurance and augmentation methods.

1.6 Who are the target audiences for the NEI?

The comprehensive nature of the NEI allows for many uses and, therefore, its target audiences include EPA staff and policy makers, the U.S. public, other federal and S/L/T decision makers, and other countries. Table 1-2 below lists the major current and planned uses of the NEI. These uses include those by the EPA in support of the NAAQS, Air Toxics, and other programs as well as uses by other federal and regional agencies and for international needs. In addition to this list, the NEI is used to respond to Congressional inquiries, provide data that supports university research, and helps environmental groups and other interested parties to understand sources of air pollution.

Table 1-2: Examples of major current uses of the NEI

Audience	Purposes
U.S. Public	Learn about sources of air emissions
EPA – NAAQS	Regulatory Impact Analyses – benefits estimates using air quality modeling
	NAAQS Implementations, including State Implementation Plans (SIPs)
	Monitoring Rules
	Final NAAQS designations
	NAAQS Policy Assessments
	Integrated Science Assessments
	Transport Rule air quality modeling (e.g., Cross-State Air Pollution Rule)
EPA – Air toxics	Air toxics analyses
	Mercury and Air Toxics Standard – mercury risk assessment and Regulatory Impact Assessment
	National Monitoring Programs Annual Report
	Toxicity Weighted emission trends for the Government Performance and Reporting Act (GPRA)
	Residual Risk and Technology Review – starting point for inventory development
EPA – other	NEI Reports – analysis of emissions inventory data
	Report on the Environment
	Air Emissions website for providing graphical access to CAP emissions for state maps and Google Earth views of facility total emissions
	Support of regulatory development for mobile sources
	Long term time series modeling analyses for deposition and other purposes (e.g., EQUATES)
	Department of Transportation, national transportation sector summaries of CAPs
	Black Carbon Report to Congress
Other federal or regional agencies	Modeling in support of Regional Haze SIPs, the Centers for Disease Control and Prevention (CDC) national environment public health tracking indicators, and other air quality issues
International	United Nations Environment Programme (UNEP) – global and North American Assessments
	The Organization for Economic Co-operation and Development (OECD) - environmental data and indicators report
	UNECE Convention on Long-Range Transboundary Air Pollution (CLRTAP) - emission reporting requirements, air quality modeling, and science assessments
	Community Emissions Data System (CEDS) - science network for earth system, climate, and atmospheric modeling
	Commission for Environmental Cooperation (CEC) - North American emissions inventory improvement and reduction policies
	U.S. and Canada Air Quality Reports
	Arctic Contaminants Action Program (ACAP) - national environmental and emission reduction strategy for the Arctic Region
Other outside parties	Researchers and graduate students

1.7 What are appropriate uses of the NEI and what are the caveats about the data?

As shown in the preceding section, the NEI provides a readily-available comprehensive inventory of both CAP and HAP emissions to meet a variety of user needs. Although the accuracy of individual emissions estimates will vary from facility-to-facility or county-to-county, the NEI largely meets the needs of these users in the aggregate. Some NEI users may wish to evaluate and revise the emission estimates for specific pollutants from specific source types for either the entire U.S. or for smaller geographical areas to meet their needs. Regulatory uses of the NEI by the EPA, such as for interstate transport, always include a public review and comment period.

One of the primary goals of the NEI is to provide the best assessment of current emissions levels using the data, tools and methods currently available. For significant emissions sectors of key pollutants, the available data, tools and methods typically evolve over time in response to identified deficiencies and the need to understand

the costs and benefits of proposed emissions reductions. As these method improvements have been made, there have not been consistent efforts to revise previous NEI year estimates to use the same methods as the current year. Therefore, care must be taken when reviewing different NEI year publications as a time series with the goal of determining the trend or difference in emissions from year to year. An example of such a method change in the 2008 NEI v3 and 2011 NEI is the use of the [Motor Vehicle Emissions Simulator \(MOVES\) model](#) for the onroad data category. Previous NEI years had used the Mobile Source Emission Factor Model, version 6 (MOBILE6) and earlier versions of the MOBILE model for this data category. The 2011 NEI (2011v2) also used an older version of MOVES (2014) than the 2017 NEI (MOVES2014b). MOVES also calculates nonroad equipment emissions, including VOCs and toxics. Emissions based on the latest version of MOVES lead to slightly more nonroad NO_x emissions in some locations as compared to previous inventories.

Other significant emissions sectors were improved in the 2017 NEI and therefore trends are also impacted by inconsistent methods. Examples include paved and unpaved road PM emissions, ammonia fertilizer and animal waste emissions, oil and gas production, residential wood combustion, solvents, industrial and commercial/institutional fuel combustion and commercial marine vessel emissions.

Users should take caution in using the emissions data for filterable and condensable components of particulate matter (PM10-FIL, PM2.5-FIL and PM-CON), which is not complete and should not be used at any aggregated level. These data are provided for users who wish to better understand the components of the primary PM species, where they are available, in the disaggregated, process-specific emissions reports. Where not reported by S/L/T agencies, the EPA augments these components (see Section 2.2.4). However, not all sources are covered by this routine, and in mobile source and fire models, only the primary particulate species are estimated. Thus, users interested in PM emissions should use the primary species of particulate matter (PM10-PRI and PM25-PRI), described in this document simply as PM10 and PM2.5.

2 2019 NEI contents overview

2.1 What are EIS sectors?

First used for the 2008 NEI, EIS Sectors continue to be used for the 2019 NEI data. The sectors were developed to better group emissions for both CAP and HAP summary purposes. The sectors are based simply on grouping the emissions by the emissions process as indicated by the SCC to an EIS sector. In building this list, we gave consideration not only to the types of emissions sources our data users most frequently ask for, but also to the need to have a relatively concise list in which all sectors have a significant amount of emissions of at least one pollutant. The SCC-EIS Sector cross-walk used for the summaries provided in this document is available for download from the [Source Classification Codes \(SCCs\) website](#). No changes were made to the SCC-mapping or sectors used for the 2019 NEI except where SCCs were retired, or new SCCs were added.

Some of the sectors include the nomenclature “NEC,” which stands for “not elsewhere classified.” This simply means that those emissions processes were not appropriate to include in another EIS sector and their emissions were too small individually to include as its own EIS sector.

Since the 2008 NEI, the inventory has been reported and compiled in EIS using five major data categories: point, nonpoint, onroad, nonroad and events. The event category is used to compile day-specific data from prescribed burning and wildfires. While events could be other intermittent releases such as chemical spills and structure fires, prescribed burning and wildfires have been a focus of the NEI creation effort and are the only emission sources contained in the event data category.

Table 2-1 shows the EIS sectors or source category component of the EIS sector in the left most column. EIS data categories -Point, Nonpoint, Onroad, Nonroad, and Events- that have emissions in these sectors/source categories are also reflected. While this document only discusses the 2019 Point NEI, the other data categories are provided as a reference.

As Table 2-1 illustrates, many EIS sectors include emissions from more than one EIS data category because the EIS sectors are compiled based on the type of emissions sources rather than the data category. Note that the emissions summary sector “Mobile – Aircraft” is reported partly to the point and partly to the nonpoint data categories and “Mobile – Commercial Marine Vessels” and “Mobile – Locomotives” are reported to the nonpoint data category. We include biogenics emissions, “Biogenics - Vegetation and Soil,” in the nonpoint data category in the EIS; however, we document biogenics in its own Section (8). NEI users who aggregate emissions by EIS data category rather than EIS sector should be aware that these changes will give differences from historical summaries of “nonpoint” and “nonroad” data unless care is taken to assign those emissions to the historical grouping.

Table 2-1: EIS sectors/source categories with EIS data category emissions reflected

Component EIS Sector or EIS Sector: Source Category Name	Point	Nonpoint	Onroad	Nonroad	Event
Agriculture - Crops & Livestock Dust		<input checked="" type="checkbox"/>			
Agriculture - Fertilizer Application		<input checked="" type="checkbox"/>			
Agriculture - Livestock Waste	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

Component EIS Sector or EIS Sector: Source Category Name	Point	Nonpoint	Onroad	Nonroad	Event
Biogenics - Vegetation and Soil		<input checked="" type="checkbox"/>			
Bulk Gasoline Terminals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Commercial Cooking		<input checked="" type="checkbox"/>			
Dust - Construction Dust	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Dust - Paved Road Dust		<input checked="" type="checkbox"/>			
Dust - Unpaved Road Dust		<input checked="" type="checkbox"/>			
Fires - Agricultural Field Burning		<input checked="" type="checkbox"/>			
Fires - Prescribed Burning					<input checked="" type="checkbox"/>
Fires – Wildfires					<input checked="" type="checkbox"/>
Fuel Comb - Comm/Institutional - Biomass	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Comm/Institutional – Coal	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Comm/Institutional - Natural Gas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Comm/Institutional – Oil	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Comm/Institutional – Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Electric Generation – Biomass	<input checked="" type="checkbox"/>				
Fuel Comb - Electric Generation – Coal	<input checked="" type="checkbox"/>				
Fuel Comb - Electric Generation - Natural Gas	<input checked="" type="checkbox"/>				
Fuel Comb - Electric Generation – Oil	<input checked="" type="checkbox"/>				
Fuel Comb - Electric Generation – Other	<input checked="" type="checkbox"/>				
Fuel Comb - Industrial Boilers, ICEs - Biomass	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Industrial Boilers, ICEs – Coal	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Industrial Boilers, ICEs – Oil	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Industrial Boilers, ICEs - Other	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Fuel Comb - Residential - Natural Gas		<input checked="" type="checkbox"/>			
Fuel Comb - Residential – Oil		<input checked="" type="checkbox"/>			
Fuel Comb - Residential – Other		<input checked="" type="checkbox"/>			
Fuel Comb - Residential – Wood		<input checked="" type="checkbox"/>			
Gas Stations	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Industrial Processes - Cement Manufacturing	<input checked="" type="checkbox"/>				
Industrial Processes - Chemical Manufacturing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Industrial Processes - Ferrous Metals	<input checked="" type="checkbox"/>				
Industrial Processes – Mining	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Industrial Processes – NEC	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Industrial Processes - Non-ferrous Metals	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Industrial Processes - Oil & Gas Production	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Industrial Processes - Petroleum Refineries	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Industrial Processes - Pulp & Paper	<input checked="" type="checkbox"/>				
Industrial Processes - Storage and Transfer	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

Component EIS Sector or EIS Sector: Source Category Name	Point	Nonpoint	Onroad	Nonroad	Event
Miscellaneous Non-Industrial NEC: Residential Charcoal Grilling		<input checked="" type="checkbox"/>			
Miscellaneous Non-Industrial NEC: Portable Gas Cans		<input checked="" type="checkbox"/>			
Miscellaneous Non-Industrial NEC: Nonpoint Hg		<input checked="" type="checkbox"/>			
Miscellaneous Non-Industrial NEC (All other)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Mobile – Aircraft	<input checked="" type="checkbox"/>				
Mobile - Commercial Marine Vessels		<input checked="" type="checkbox"/>			
Mobile – Locomotives	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Mobile - NonRoad Equipment – Diesel	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
Mobile - NonRoad Equipment – Gasoline	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
Mobile - NonRoad Equipment – Other	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	
Mobile - Onroad – Diesel Heavy Duty Vehicles			<input checked="" type="checkbox"/>		
Mobile - Onroad – Diesel Light Duty Vehicles			<input checked="" type="checkbox"/>		
Mobile - Onroad – Gasoline Heavy Duty Vehicles			<input checked="" type="checkbox"/>		
Mobile - Onroad – Gasoline Light Duty Vehicles			<input checked="" type="checkbox"/>		
Solvent - Consumer & Commercial Solvent Use: Agricultural Pesticides		<input checked="" type="checkbox"/>			
Solvent - Consumer & Commercial Solvent Use: Asphalt Paving		<input checked="" type="checkbox"/>			
Solvent - Consumer & Commercial Solvent Use: All Other Solvents		<input checked="" type="checkbox"/>			
Solvent – Degreasing	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Solvent - Dry Cleaning	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Solvent - Graphic Arts	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Solvent - Industrial Surface Coating & Solvent Use	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
Solvent - Non-Industrial Surface Coating		<input checked="" type="checkbox"/>			
Waste Disposal: Open Burning		<input checked="" type="checkbox"/>			
Waste Disposal: Nonpoint POTWs		<input checked="" type="checkbox"/>			
Waste Disposal: Human Cremation		<input checked="" type="checkbox"/>			
Waste Disposal: Nonpoint Hg		<input checked="" type="checkbox"/>			
Waste Disposal (all remaining sources)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			

2.2 How is the NEI constructed?

Data in the NEI come from a variety of sources. The emissions are predominantly from S/L/T agencies for both CAP and HAP emissions. In addition, the EPA quality assures and augments the data provided by states to assist with data completeness, particularly with the HAP emissions since the S/L/T HAP reporting is voluntary.

The NEI is built by data category for point, nonpoint, nonroad mobile, onroad mobile and events. Each data category contains emissions from various reporters in multiple datasets which are blended to create the final NEI “selection” for that data category. Each data category selection includes S/L/T data and numerous other datasets that are discussed in more detail in each of the following sections in this document. In general, S/L/T data take precedence in the selection hierarchy, which means that it supersedes any other data that may exist for a specific county/tribe/facility/process/pollutant. In other words, the selection hierarchy is built such that the preferred source of data, usually S/L/T, is chosen when multiple sources of data are available. There are

exceptions, to this general rule, which arise based on quality assurance checks and feedback from S/L/Ts that we will discuss in later sections.

The EPA uses augmentation and additional EPA datasets to create the most complete inventory for stakeholders, for use in such applications as NATA, air quality modeling, national rule assessments, international reporting, and other reports and public inquiries. Augmentation to S/L/T data, in addition to EPA datasets, fill in gaps for sources and/or pollutants often not reported by S/L/T agencies. The basic types of augmentation are discussed in the following sections.

2.2.1 Toxics Release Inventory data

The EPA used air emissions data from the 2019 [Toxics Release Inventory](#) (TRI) to supplement point source HAP and NH3 emissions provided to EPA by S/L/T agencies. All TRI emissions values that could reasonably be matched to an EIS facility with some certainty and with limited risk of double-counting nonpoint emissions were loaded into the EIS for viewing and comparison if desired, but only those pollutants that were not reported anywhere at the EIS facility by the S/L/T agency were included in the 2019 NEI.

The TRI is an EPA database containing data on disposal or other releases including air emissions of over 650 toxic chemicals from approximately 21,000 facilities. One of TRI’s primary purposes is to inform communities about toxic chemical releases to the environment. Data are submitted annually by U.S. facilities that meet TRI reporting criteria. Section 3 provides more information on how TRI data was used to supplement the point inventory.

2.2.2 Chromium speciation

The reporting cycle included 5 valid pollutant codes for chromium, as shown in Table 2-2.

Table 2-2: Valid chromium pollutant codes

Pollutant Code	Description	Pollutant Category Name	Speciated?
1333820	Chromium Trioxide	Chromium Compounds	yes
16065831	Chromium III	Chromium Compounds	yes
18540299	Chromium (VI)	Chromium Compounds	yes
7440473	Chromium	Chromium Compounds	no
7738945	Chromic Acid (VI)	Chromium Compounds	yes

In the above table, all pollutants but “chromium” are considered speciated, and so for clarity, chromium (pollutant 7440473) is referred to as “total chromium” in the remainder of this section. Total chromium could contain a mixture of chromium with different valence states. Since one key inventory use is for risk assessment, and since the valence states of chromium have very different risks, speciated chromium pollutants are the most useful pollutants for the NEI. Therefore, the EPA speciates S/L/T-reported and TRI-based total chromium into hexavalent chromium and non-hexavalent chromium. Hexavalent chromium, or Chromium (VI), is considered high risk and other valence states are not. Most of the non-hexavalent chromium is trivalent chromium (Chromium III); therefore, the EPA characterized all non-hexavalent chromium as trivalent chromium. The 2019 NEI does not contain any total chromium, only the speciated pollutants shown in Table 2-2.

This section describes the procedure we used for speciating chromium emissions from total chromium that was reported by S/L/T agencies.

We used the EIS augmentation feature to speciate S/L/T agency reported total chromium. For point sources, the EIS uses the following priority order for applying the factors:

- 1) By Process ID
- 2) By Facility ID
- 3) By County
- 4) By State
- 5) By Emissions Type (for NP only)
- 6) By SCC
- 7) By Regulatory Code
- 8) By NAICS
- 9) A Default value if none of the others apply

If a particular emissions source of total chromium is not covered by the speciation factors specified by any of the first 8 attributes, a default value of 34 percent hexavalent chromium, 66 percent trivalent chromium is applied.

For the chromium augmentation, only the “By Facility ID” (2), “By SCC” (6), and “By Default” (9) were used on S/L/T-reported total chromium values. For TRI dataset chromium, the “By NAICS” (8) option was primarily used, although a small number of “By Facility” (2) occurrences were used rather than NAICS. The EIS generates and stores an EPA dataset containing the resultant hexavalent and trivalent chromium species. For all other data categories (e.g., nonpoint, onroad and nonroad), chromium speciation is performed at the SCC level.

This procedure generated hexavalent chromium (Chromium (VI)) and trivalent chromium (Chromium III), and it had no impact on S/L/T agency data that were provided as one of the speciated forms of chromium. The sum of the EPA-computed species (hexavalent and trivalent chromium) equals the mass of the total chromium (i.e., pollutant 7440473) submitted by the S/L/T agencies.

The EPA then used this dataset in the 2019 NEI selection by adding it to the data category-specific selection hierarchy and by excluding the S/L/T agency unspicated chromium from the selection through a pollutant exception to the hierarchy.

Most of the speciation factors used in the 2019 NEI are SCC-based and are based on data that have been used by the EPA for projects that estimate risks. Some factors are updated with every inventory cycle. New data may be developed by OAQPS during rule development or toxics review. The speciation factors can be accessed in the EIS through the reference data link “Augmentation Profile Information.” A chromium speciation “profile” is a set of output multiplication factors for a type of emissions source. The profile data for chromium are stored in the same tables as the HAP augmentation factors described in Section 2.2.3. The speciation factors are a specific case of HAP augmentation whereby the “output pollutants” are always hexavalent chromium and trivalent chromium, and the “input pollutant” is always chromium. There are 3 main tables and a summary table. The summary table excludes the metadata and comments regarding the derivation of the factors and assignment to SCCs; to learn more of the derivation of the factor or assignment of “profile” to a source, the main tables (not summary table) should be consulted.

The three main tables are:

- Augmentation Profile Names and Input Pollutants – general information about the profile and source of the profile names and factors.
- Augmentation Multiplication Factors – provides the output pollutants and multiplication factors associated with a given Augmentation Profile and input pollutant.
- Augmentation Assignments – provides the assignment of the profile to the data source (the list of 9 items above).

The summary table is the Augmentation Multiplication Factors and Assignments, a composite table that provides a view of all the combinations of output pollutants and assignment information associated with a given profile.

For non-EIS users, the data from the main tables were downloaded and provided as described in Section 3 (3.1.4-S/L/T chromium speciation, 3.1.6 – TRI chromium speciation and 3.1.6, HAP augmentation).

2.2.3 HAP augmentation

The EPA supplements missing HAPs in S/L/T agency-reported data. HAP emissions are calculated by multiplying appropriate surrogate CAP emissions by a ratio of HAP to CAP emission factors. For the 2019 NEI, we augmented HAPs for the point and nonpoint data categories. Generally, for point sources, the CAP-to-HAP ratios were computed using uncontrolled emission factors from the [WebFIRE database](#) (which contains primarily [AP-42](#) emissions factors). For nonpoint sources, the ratios were computed from the EPA-generated nonpoint data, which contain both CAPs and HAPs where applicable.

HAP augmentation is performed on each emissions source (i.e., specific facility and process for point sources, county and process level for nonpoint sources) using the same EIS augmentation feature as described in chromium speciation. However, unlike chromium speciation, there is no default augmentation factor so that not every process that has S/L/T CAP data will end up with augmented HAP data.

HAP augmentation input pollutants are S/L/T-submitted VOC, PM10-PRI, PM25-PRI, SO2, and PM10-FIL. The resulting output can be a single output pollutant or a full suite of output pollutants. Not every source that has a CAP undergoes HAP augmentation (i.e., livestock NH3 and fugitive dust PM25-PRI). The sum of the HAP augmentation factors does not need to equal 1 (100%); however, we try to ensure, for example, that the sum of HAP-VOC factors is less than 1 for mass balance. HAP augmentation factors are grouped into profiles that contain unique output pollutant factors related to a type of source. Assigning these profiles to the individual sources depends on the source attributes, commonly the SCC.

There are business rules specific to each data category discussed in the point section (3.1.6) of this TSD and nonpoint (Section 4.1.6) in the [2017 NEI TSD](#). The ultimate goal is to prevent double-counting of HAP emissions between S/L/T data and the EPA HAP augmentation output, and to prevent, where possible, adding HAP emissions to S/L/T-submitted processes that are not desired. NEI developers use their judgment on how to apply HAP augmentation to the resulting NEI selection.

Caveats

HAP augmentation does have limitations; HAP and CAP emission factors from WebFIRE do not necessarily use the same test methods. In some situations, the VOC emission factor is less than the sum of the VOC HAP emission factors. In those situations, we normalize the HAP ratios so as not to create more VOC HAPs than VOC. We are also aware that there are many similar SCCs that do not always share the same set of emission factors/output pollutants. We do not apply ratios based on emission factors from similar SCCs other than for mercury from combustion SCCs. We would prefer to get HAPs reported from reporting agencies or get the data from other sources (compliance data from rule), but such data are not always available.

Because many of the AP-42 factors are 20+ years old, many incremental edits to these factors have been made over time. We have removed some factors based on results of NATA reviews. For example, we discovered ethylene dichloride was being augmented for SCCs related to gasoline distribution. This pollutant was associated with leaded gasoline which is no longer used. Therefore, we removed it from our HAP augmentation between

2011 NEI v2 and 2014. We also received specific facility and process augmentation factors resulting from the NATA reviews. More discussion of the underlying data used is discussed in Section 3.1.6.

For point sources, HAPs augmentation data are not used when S/L/T air agency data exists at any process at the facility for the same pollutant. That means that if a S/L/T reports a particular HAP at some processes but misses others, then those other processes will not be augmented with that HAP.

2.2.4 PM augmentation

Particulate matter (PM) emissions species in the NEI are primary PM10 (called PM10-PRI in the EIS and NEI) and primary PM2.5 (PM25-PRI), filterable PM10 and filterable PM2.5 (PM10-FIL and PM25-FIL) and condensable PM (PM-CON). The EPA needed to augment the S/L/T agency PM components for the point and nonpoint inventories to ensure completeness of the PM components in the final NEI and to ensure that S/L/T agency data did not contain inconsistencies. An example of an inconsistency is if the S/L/T agency submitted a primary PM2.5 value that was greater than a primary PM10 value for the same process. Commonly, the augmentation added condensable PM or PM filterable (PM10-FIL and/or PM25-FIL) where none was provided, or primary PM2.5 where only primary PM2.5 was provided.

In general, emissions for PM species missing from S/L/T agency inventories were calculated by applying factors to the PM emissions data supplied by the S/L/T agencies. These conversion factors were first used in the 1999 NEI's "PM Calculator" as described in an NEI conference paper [ref 1]. The resulting methodology allows the EPA to derive missing PM10-FIL or PM25-FIL emissions from incomplete S/L/T agency submissions based on the SCC and PM controls that describe the emissions process. In cases where condensable emissions are not reported, conversion factors are applied to S/L/T agency reported PM species or species derived from the PM Calculator databases. The PM Calculator has undergone several edits since 1999; now called the "PM Augmentation Tool," this Microsoft® Access® database is no longer made available because it should not be run for any purpose other than gap-filling the final NEI selection.

The PM Augmentation Tool is used only for point and nonpoint sources, and the output from the tool is heavily-screened prior to use in the NEI. This screening is done to prevent trivial overwriting of S/L/T data from PM Augmentation Tool calculations, particularly for primary PM submittals by S/L/Ts. More details on the caveats to using the PM Augmentation Tool are discussed in Section 3.1.3 of this TSD for point sources and Section 4.1.5 in the [2017 NEI TSD](#) for nonpoint sources.

2.2.5 Other EPA datasets

In addition to TRI, chromium speciation, HAP and PM augmentation, the EPA generates other data to produce a complete inventory. As discussed in Section 3.6, EIS generates the following speciated PM2.5 emissions for sources with primary PM2.5 emissions: elemental (also referred to as "black") carbon (EC), organic carbon (OC), nitrate (NO3), sulfate (SO4), and the remainder of PM25-PRI (PMFINE). In addition, a copy of PM25-PRI and PM10-PRI from mobile source diesel engines, relabeled as DIESEL-PM25 and DIESEL-PM10, respectively, are also generated. Examples of other EPA data for point sources, discussed in Section 3, include EPA landfills, electric generating units (EGUs), and aircraft.

2.2.6 Data Tagging

S/L/T agency data generally are used first when creating the NEI selection. When S/L/T data are used, then the NEI would not use other data (primarily EPA data from stand-alone datasets or HAP, PM or TRI augmentation) that also may exist for the same process/pollutant. Thus, in most cases the S/L/T agency data are used;

however, for several reasons, sometimes we need to exclude, or “tag out” S/L/T agency data. Examples of these “S/L/T tags” are when S/L/T agency staff alert the EPA to exclude their data (because of a mistake or outdated value), or when EPA staff find problems with submitted data. Another example is when S/L/T emissions data are significantly less than TRI and are presumed to be incomplete, which can happen for S/L/T that use automated gap-filling procedures for facilities that do not voluntarily provide HAP emissions. These automated procedures gap-fill only for processes that have emission factors and miss processes/pollutants that may have been reported to TRI using other means besides published emission factors.

In previous NEI years data tagging had also been used to avoid double-counting emissions by using emissions from more than one dataset because the two datasets were at different levels of granularity and thus not able to be integrated to the full process level of detail required by the standard selection hierarchy software. The primary example of this is the TRI dataset, which provides facility-total emissions rather than individual process-level emissions. Because the TRI emissions must be stored to a single emission process that is not the same as that used by the S/L/T agency, the standard hierarchy selection software would use both. Thus, tagging was used to “block” any TRI values where the S/L/T had reported the same pollutant at any process(es) within the same facility. Starting with the 2017 NEI, a series of additional rules were added to the selection hierarchy to avoid such tagging. Point source datasets are now identified as being either Process-level, Unit-level, or Facility-level granularity, and the selection software now uses those identifications to avoid double-counting, avoiding the need for those types of tags.

2.2.7 Inventory Selection

Once all S/L/T and EPA data are quality assured in the EIS, and all augmentation and data tagging are complete, then we use the EIS to create a data category-specific inventory selection. To do this, each EIS dataset is assigned a priority ranking prior to running the selection with EIS. The EIS then performs the selection at the most detailed inventory resolution level for each data category. For point sources, this is the process and pollutant level. For nonpoint sources, it is the process (SCC)/shape ID (i.e., ports) and pollutant level. For onroad and nonroad sources, it is process/pollutant, and for events it is day/location/process and pollutant. At these resolutions, the inventory selection process uses data based on highest priority and excludes data where it has been tagged. The EPA then quality assures this final blended inventory to ensure expected processes/pollutants are included or excluded. The EIS uses the inventory selection to also create the SMOKE Flat Files, EIS reports and data that appear on the NEI website.

2.3 How did the 2017 NEI compare to past inventories?

Many similarities exist between the 2017 NEI approaches and past NEI approaches, notably that the data are largely compiled from data submitted by S/L/T agencies for CAPs, and that the HAP emissions are augmented by the EPA to differing degrees depending on geographical jurisdiction because they are a voluntary contribution from the partner agencies. In 2017, S/L/T participation was somewhat more comprehensive than in 2014, though both were good. The NEI program continues with the 2017 NEI to work towards a complete compilation of the nation’s CAPs and HAPs. The EPA provided feedback to S/L/T agencies during the compilation of the data on critical issues (such as potential outliers, missing SCCs, missing Hg data and coke oven data) as has been done in the past, collected responses from S/L/T agencies to these issues, and improved the inventory for the release based on S/L/T agency feedback. In addition to these similarities, there are some important differences in how the 2017 NEI has been created and the resulting emissions, which are described in the following two subsections.

2.3.1 Differences in approaches

With any new inventory cycle, changes to approaches are made to improve the process of creating the inventory and the methods for estimating emissions. The key changes for the 2017 cycle are highlighted here.

To improve the process, we learned from the prior three triennial inventories (for 2008, 2011, and 2014) compiled with the EIS. We made changes to pollutant, SCC, and NAICS codes, refined quality assurance checks and features that were used to assist in quality assurance and streamlined the Nonpoint Survey (introduced for the 2014 NEI) to assist with S/L/T and EPA data reconciliation for the nonpoint data. The update to the nonpoint survey helped S/L/Ts and EPA avoid double counting and ensure a complete inventory between the different sources of data.

In addition to process changes, we improved emissions estimation methods for all data categories. We summarize the differences in approaches in the following sections.

2.3.1.1 Point data category

For point sources, the only change was our use of EPA-developed HAP emission estimates for the EGUs covered by the Mercury and Air Toxics Standards (MATS) review, rather than the S/L/T reported values. HAP augmentation improvements are described in Section 3.1.6. More information on point source improvements is available in Section 3.

2.4 How well are tribal data and regions represented in the 2019 NEI?

Two tribes submitted data to the EIS for 2019 NEI, Southern Ute Indian Tribe and Ute Mountain Tribe of the Ute Mountain Reservation. In addition, as shown in Table 2-3, data for an additional 6 tribes were carried forward from the 2017 NEI. In this table, a “CAP, HAP” designation indicates that both criteria and hazardous air pollutants were submitted by the tribe; “GHG” indicates greenhouse gases were submitted. CAP indicates that only criteria pollutants were submitted. Facilities on tribal land were augmented using TRI, HAPs, PM, and the 2017 NEI in the same manner as facilities under the state and local jurisdictions, as explained in Section 3.1, therefore, Tribal Nations in Table 2-3 with just a CAP flag will also have some HAP emissions in most cases. Eight additional tribal agencies, shown in Table 2-4, which did not submit any data, are represented in the point data category of the 2019 NEI due to the emissions added by the EPA. The emissions for these facilities are from the EPA gap fill datasets for airports, EGUs, and TRI data.

Table 2-3: Tribal participation in the 2019 NEI

Tribal Agency	Pollutants
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation	CAP, HAP
Coeur d’Alene Tribe	CAP, HAP
Fort Mojave Indian Tribe of Arizona, California & Nevada	CAP, GHG
Nez Perce Tribe	CAP, HAP
Northern Cheyenne Tribe	CAP
Salt River Pima Maricopa Indian Community (SRPMIC) EPNR	CAP, HAP, GHG
Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho	CAP, HAP
Southern Ute Indian Tribe	CAP, HAP, GHG
Ute Mountain Tribe of the Ute Mountain Reservation	CAP, HAP

Tribal Agency	Pollutants
Yakama Nation Reservation	CAP, HAP, GHG

Table 2-4: Facilities on Tribal lands with 2017 NEI emissions from EPA only

Tribal Agency	EPA data used
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana	Airports
Fond du Lac Band of Lake Superior Chippewa	Airports
Gila River Indian Community	TRI
Navajo Nation	EGUs
Omaha Tribe of Nebraska	Airports
Southern Ute Indian Tribe	Airports
Tohono O-Odham Nation Reservation	TRI
Ute Indian Tribe of the Uintah & Ouray Reservation, Utah	EGUs

2.5 References for 2017 inventory contents overview

1. Strait, R.; MacKenzie, D.; and Huntley, R., 2003. [PM Augmentation Procedures for the 1999 Point and Area Source NEI](#), 12th International Emission Inventory Conference – “Emission Inventories – Applying New Technologies”, San Diego, April 29 – May 1, 2003.

3 Point sources

This section provides a description of sources that are in the point data category. Point sources are included in the inventory as individual facilities, usually at specific latitude/longitude coordinates, rather than as county or tribal aggregates. These facilities include large energy and industrial sites, such as electric generating utilities (EGUs), mines and quarries, cement plants, refineries, large gas compressor stations, and facilities that manufacture pulp and paper, automobiles, machinery, chemicals, fertilizers, pharmaceuticals, glass, food products, and other products. Additionally, smaller point sources are included voluntarily by S/L/T agencies, and can include small facilities such as crematoria, dry cleaners, and even gas stations. These smaller sources may appear in one state but not another due to the voluntary nature of providing smaller sources. There are also some portable sources in the point source data category, such as hot mix asphalt facilities, which relocate frequently as a road construction project progresses. The point source data category also includes emissions from the landing and take-off portions of aircraft operations, the ground support equipment at airports, and locomotive emissions within railyards. Within a point source facility, emissions are estimated and reported for individual emission units and processes. Those emissions are associated with any number of stack and fugitive release points that each have parameters needed for atmospheric modeling exercises.

The approach used to build the 2019 National Emissions Inventory (NEI) for all point sources is discussed in Section 3.1 through Section 3.6.

3.1 Point source approach: 2019

The general approach to building the NEI point source inventory is to use state/local/tribal (S/L/T)-submitted emissions, locations, and release point parameters wherever possible. Missing emissions values are gap-filled with EPA data reflecting 2019 activities where available. Because S/L/Ts are not required to submit all point sources for 2019, the 2017 NEI is used to gap fill as a last resort where it appears that a facility is still operating but was just not reported by the S/L/T for 2019 because it is below the reporting thresholds for the non-triennial NEI years. Quality assurance reviews of the emission values, locations, and release point modeling parameters are done by the EPA on the most significant emission sources and where data does not pass quality assurance checks.

3.1.1 QA review of S/L/T data

State/local/tribal agency submittals for the 2019 NEI point sources were accepted through January 15, 2021. We then compared facility-level pollutant sums as reported by S/L/Ts for 2016 thru 2019 to flag cases where the 2019 values had changed significantly from the earlier years or were missing or were new for 2019 and had significant and unexpected emissions. The comparison table also showed the 2019 emission values from the 2019 Toxics Release Inventory (TRI), the 2019 SO₂ and NO_x and mercury values as reported to EPA's Clean Air Markets Division, and the 2019 Greenhouse Gas Reporting Program values. The set of facilities and pollutants with significant (plus or minus 50 percent from an earlier year) changes was then filtered to only include those where the absolute mass value of the difference was greater than a pollutant-specific threshold amount. When a facility-pollutant combination was new in 2019 or didn't appear in the 2019 S/L/T reports, we included those facilities and pollutants only when some reported year's emissions exceeded the pollutant-specific thresholds because the percent differences were undefined. The resulting set of 826 facility-pollutant sums were reviewed to see where we could explain the changes or had some corroborating evidence such as similar changes in TRI, GHG, or CAMD CEM reports. We removed over half of the flags via this review and provided the final set of 403 facility-pollutant to S/L/T agencies for their review on March 12, 2021.

State/local/tribal edits to address any emissions values were accepted in the Emissions Inventory System (EIS) until June 30, 2021. The S/L/T agencies did not change all of the highlighted values. Where the comparisons were exceptionally suspect, the EPA contacted the agencies by phone or by email if no edits had been made to obtain confirmation of the reported values. For a small number of cases, neither confirmation nor edits were obtained, and the value was tagged to be excluded from selection for the NEI. In some but not all of these instances, a value from TRI or the CAMD data sets was available as a replacement.

Similar to previous NEI years, we quality assured the latitude-longitude coordinates at both the site level and the release point level. In previous NEI cycles, we had reviewed, verified, and locked (in EIS) approximately 10,000 site-level coordinates of the most significant emitting facilities. For the 2019 NEI coordinate review, we compared all site coordinate pairs to the county boundaries for the FIPS county codes reported for those facilities. We then identified all facilities that met both of the following criteria: (1) more than 20 tons total criteria pollutant emissions or more than 10 pounds total hazardous air pollutants (HAPs) for 2019, (2) the coordinates caused the location of the facility to be more than a half mile outside of its indicated county. For these facilities, we reviewed the location using Google Earth, edited the location as needed in EIS, and locked the location in EIS.

In addition, we compared the release point coordinates of all release points with any 2019 emissions to their site level coordinates, whether protected or not. In cases where we found a difference of more than 0.003 degrees in either latitude plus longitude, we reviewed the release point coordinates in Google Earth and either confirmed that the release point appeared to be on the facility's footprint or we removed the release point's coordinates, which will allow the modeling files to inherit the site coordinates. Site coordinates were edited and locked as needed as part of this release point coordinate review. A new critical QA check was also implemented in EIS, beginning with the 2018 NEI point source submittals, to disallow the reporting of facility and release point coordinates that differ by more than a facility-specific amount for either latitude or longitude. The tolerance amount was set at 0.003 for most facilities, but that tolerance was increased for facilities where the above review had confirmed that the individual release point coordinates were valid. Some smaller footprint facilities that had to be reviewed due to apparent violations also had the tolerance set lower as part of the above review.

Site coordinates as seen in the TRI and GHG Reporting programs were compared to the coordinates in EIS for matched facilities. Because of similar reviews and the release point comparison work described above, almost all discrepancies for facilities with any significant emissions had already been reviewed and locked in previous NEI cycles. A handful of additional facilities were edited and locked in EIS from this review for the 2019 NEI.

An additional round of S/L/T agency review of 2019 HAP emissions from point sources was conducted beginning July 31, 2021 and ending September 30, 2021. After reviewing all emissions changes, release point location changes, and release point parameter changes submitted by S/L/T agencies, we created in EIS a facility dataset containing release point location and release point location changes and a 2019 point dataset consisting of all accepted HAP emissions changes (EIS dataset 2019EPA_AD TU_SLT). These datasets were applied to the first version of the 2019 NEI to create a second version of the 2019 NEI in December 2021.

3.1.2 Sources of EPA data and selection hierarchy

Table 3-1 lists the datasets that we used to compile the 2019 NEI point inventory and the hierarchy used to choose which data value to use for the NEI when multiple data sets are available for the same emissions source.

The EPA developed all datasets other than those containing S/L/T agency data. The primary purpose of the EPA datasets is to add or "gap fill" pollutants or sources not provided by S/L/T agencies, to resolve inconsistencies in S/L/T agency-reported pollutant submissions for particulate matter (PM) and to speciate S/L/T agency reported total chromium into hexavalent and trivalent forms.

The hierarchy or “order” provided in the tables below defines which data are to be used for situations where multiple datasets provide emissions for the same pollutant and emissions process. The dataset with the lowest order number on the list is preferentially used over other datasets. The table includes the rationale for why each dataset was assigned its position in the hierarchy. In addition to the order of the datasets, the selection also considers whether individual data values have been tagged. Any data that were tagged by the EPA in any of the datasets were not used. State/local/tribal agency data were tagged only if they were deemed to be likely outliers and were not addressed during the S/L/T agency data reviews. As in earlier NEI years, the 2019 point source selection also excludes dioxins, furans and radionuclides. The EPA has not evaluated the completeness or accuracy of the S/L/T agency dioxin and furan values nor radionuclides and does not have plans to supplement these reported emissions with other data sources to compile a complete and accurate estimate for these pollutants as part of the NEI. The 2019 NEI point source inventory does include greenhouse gas emissions. Facility total values for four GHGs (CO₂, CH₄, N₂O, and SF₆) were copied from the [U.S. Greenhouse Gas Inventory Report website](#) and matched to EIS facilities.

The 2019 NEI December 2021 version (EIS dataset 2019NEI_V2) is similar to the September 2021 selection (EIS dataset 2019NEI_V1) shown in Table 3-1 except for the introduction of S/L/T edits resulting from an S/L/T air toxics review effort; these S/L/T air toxics edits (EIS dataset 2019EPA_ATDU_SLT) supersede HAP emission estimates and release point characteristics from the September 2021 selection shown here. Note that we recommend the December 2021 version be used for analyses that require accurate estimates of air toxics.

Table 3-1: Data sets and selection hierarchy used for 2019 NEI September 2021 release point source data category

Dataset name	Description and Rationale for the Order of the Selected Datasets	Order
2019EPA_GHG	Facility-level emissions for four specific GHGs from the USEPA’s Greenhouse Gas Reporting Program	1
2019EPA_PM-Aug	PM components added to gap fill missing S/L/T agency data or make corrections where S/L/T agency have inconsistent emissions across PM components. Uses ratios of emission factors from the PM Augmentation Tool for covered source classification codes (SCCs). For SCCs without emission factors in the tool, checks/corrects discrepancies or missing PM species using basic relationships such as ensuring that primary PM is greater than or equal to filterable PM (see Section 3.1.3).	2
Responsible Agency Data Set	S/L/T agency submitted data through June 2021. These data are selected ahead of lower hierarchy datasets except where individual values in the S/L/T agency emissions were suspected outliers that were not addressed during the draft review and therefore tagged by the EPA.	3
2019EPA_CrAug	Hexavalent and trivalent chromium speciated from S/L/T agency reported chromium. EIS augmentation function creates the dataset by applying multiplication factors by SCC, facility, process or North American Industry Classification System (NAICS) code to S/L/T agency total chromium. See Section 3.1.4.	4
2019EPA_TRI	TRI data for the year 2019 (see Section 3.1.5). These data are selected for a facility only when the S/L/T agency data do not include emissions for a given pollutant at any process for that facility.	5

Dataset name	Description and Rationale for the Order of the Selected Datasets	Order
2019EPA_TRICr	TRI data reported as total chromium for the year 2019 speciated into the chromium III and chromium VI valence amounts, usually by use of a NAICs-based speciation profile, but possibly by use of a facility-specific profile.	6
2019EPA_HAPAug	HAP data computed from S/L/T agency criteria pollutant data using HAP/CAP EF ratios based on the EPA Factor Information Retrieval System (WebFIRE) database as described in Section 3.1.6. These data are selected below the TRI data because the TRI data are expected to be better.	7
2019EPA_HAPAug-PMAug	This dataset was created in the same fashion as the 2019EPA_HAPAug dataset above and is a supplement to it. This dataset contains HAPs calculated by applying a ratio to PM10-FIL emissions, for those instances where the S/L/T dataset did not contain any PM10-FIL emissions, but the PM augmentation routine was able to calculate a PM10-FIL value from some PM species that was reported by the S/L/T. Note that older draft versions of the EIS dataset 2019NEI_draft did not include this step.	8
2019EPA_EGU	CAP and HAP emission unit level emissions from either the annual sum of CAMD hourly CEM data for SO ₂ , NO _x or Hg or from emission factors used in previous NEI year inventories from AP-42 and other sources multiplied by 2019 CAMD heat input data.	9
2017NEI_NOV2020_PT	The 2017 NEI selection, used here to gapfill any non-reported facilities and pollutants that are still marked as “Operating” and for which no 2019 emission estimates are available from any of the higher-ranked datasets.	10

3.1.3 Particulate matter augmentation

Particulate matter emissions components² in the NEI are primary PM₁₀ (called PM₁₀-PRI in the EIS and NEI) and primary PM_{2.5} (PM₂₅-PRI), filterable PM₁₀ (PM₁₀-FIL) and filterable PM_{2.5} (PM₂₅-FIL) and condensable PM (PM-CON, which is all within the PM_{2.5} portion on PM, i.e., PM₂₅-PRI = PM₂₅-FIL + PM-CON). The EPA needed to augment the S/L/T agency PM components to ensure completeness of the PM components in the final NEI and to ensure that S/L/T agency data did not contain inconsistencies. An example of an inconsistency is if the S/L/T agency submitted a primary PM_{2.5} value that was greater than a primary PM₁₀ value for the same process. Commonly, the augmentation added condensable PM or PM filterable (PM₁₀-FIL and/or PM₂₅-FIL) where no value was provided, or primary PM_{2.5} where only primary PM₁₀ was provided. Additional information on the procedure is provided in the 2008 NEI PM augmentation documentation [ref 1].

In general, emissions for PM species missing from S/L/T agency inventories were calculated by applying factors to the PM emissions data supplied by the S/L/T agencies. These conversion factors were first used in the 1999 NEI’s “PM Calculator” as described in an NEI conference paper [ref 2]. The resulting methodology allows the EPA to derive missing PM₁₀-FIL or PM₂₅-FIL emissions from incomplete S/L/T agency submissions based on the SCC and PM controls that describe the emissions process. In cases where condensable emissions are not reported, conversion factors developed are applied to S/L/T agency reported PM species or species derived from the PM Calculator databases.

² We use the term “components” here rather than “species” to avoid confusion with the PM_{2.5} “species” that are used for air quality modeling (e.g., organic carbon, elemental carbon, sulfate, nitrate, and other PM).

3.1.4 Chromium speciation

An overview of chromium speciation, as it impacts both the point and nonpoint data category, is discussed in Section 2.2.2.

The EIS generates and stores an EPA dataset containing the resultant hexavalent and trivalent chromium species. The EPA then used this dataset in the 2019 NEI selection by adding it to the selection hierarchy shown in Table 3-1, excluding the S/L/T agency total chromium from the selection through a pollutant exception to the hierarchy. This EIS feature does not speciate chromium from any of the EPA datasets because the EPA data contains only speciated chromium.

For the 2019 NEI, the EPA named this dataset “2019EPA_CrAug.” Most of the speciation factors used in the 2019 NEI are SCC-based and are the same as were used for the 2008, 2011, 2014 and 2017 NEIs. There are some facility-specific factors resulting from reviews of previous year (e.g., 2014 and 2011) [National Air Toxics Assessment](#) (NATA) data. Facility-specific factors were also provided for several facilities by the state of Indiana. The factors “SLT_based_chromium_speciation.zip”, based on data that have long been used by the EPA for NATA and other risk projects, are available on the [2017 Supplemental data FTP site](#).

3.1.5 Use of the 2019 Toxics Release Inventory

The EPA used air emissions data from the 2019 TRI to supplement point source HAP and ammonia emissions provided to the EPA by S/L/T agencies. The resulting augmentation dataset is labeled as “2019EPA_TRI” in the Table 3-1 selection hierarchy shown above. For 2019, all TRI emissions values that could reasonably be matched to an EIS facility were loaded into the EIS for viewing and comparison if desired, but only those pollutants that were not reported anywhere at the EIS facility by the S/L/T agency were included in the 2019 NEI. The March 10, 2021 version of these data was used.

The basis of the 2019EPA_TRI dataset is the US EPA’s 2019 [Toxics Release Inventory \(TRI\) Program](#). The TRI is an EPA database containing data on disposal or other releases including air emissions of over 650 toxic chemicals from approximately 21,000 facilities. One of TRI’s primary purposes is to inform communities about toxic chemical releases to the environment. Data are submitted annually by U.S. facilities that meet TRI reporting criteria.

The approach used for the 2019 NEI was similar to the one used for the 2017 NEI. The TRI emissions were included in the EIS (and the NEI) as facility-total stack and facility-total fugitive emissions processes, which matches the aggregation detail of the TRI database. The 2019 NEI used the same software procedures as were introduced for the 2017 NEI inventory for how we avoid double-counting of TRI and other data sources (primarily the S/L/T data). Rather than tagging each individual TRI facility-based value for wherever the S/L/T had reported that pollutant at any process(es) within the same facility, the enhanced EIS selection software does not use values from a “Facility” level dataset if a more preferred dataset (the S/L/T datasets) has the pollutant at that facility. In addition to this “facility-based rule” in the selection software, we also used the “pollutant family rule”, also introduced for the 2017 NEI, which prevents pollutants defined as belonging to the same overlapping family of pollutants from being selected for use if a higher preference dataset has already provided a pollutant value for that family. This procedure had also been accomplished using tagging in previous NEI years.

The following steps describe in more detail the development of the 2019EPA_TRI dataset.

1. Update the TRI_ID to EIS_ID facility-level crosswalk

For the 2019 NEI, the same crosswalk list of TRI IDs that was used for the 2018 NEI was used as a starting point. A limited review of the 2019 TRI facilities was conducted to identify new facilities with significant

emissions that had not been previously matched to an EIS facility. A total of approximately 20 additional TRI facilities were added to the crosswalk for 2019.

2. Map TRI pollutant codes to valid EIS pollutant codes and sum where necessary

Table 3-2 provides the pollutant mapping from TRI pollutants to EIS pollutants. Many of the 650 TRI pollutants do not have any EIS counterpart, and so are not shown in Table 3-2. In addition, several EIS pollutants may be reported to TRI as either of two TRI pollutants. For example, both Pb and Pb compounds may be reported to TRI, and similarly for several other metal and metal compound TRI pollutants. Table 3-2 shows where such pairs of TRI pollutants both correspond to the same EIS pollutant. In such cases, we summed the two TRI pollutants together as part of the step of assigning the TRI emissions to valid EIS pollutant codes. For the 2019 NEI, a total of 198 TRI pollutant codes were mapped to 186 unique EIS pollutant codes. Similar to prior year NEIs, we did not use TRI emissions reported for TRI pollutants: “Certain Glycol Ethers,” “Dioxin and Dioxin-like Compounds,” Dichlorobenzene (mixed isomers),” and “Toluene di-isocyanate (mixed isomers),” because they do not represent the same scope as the EIS pollutants: “Glycol ethers,” “Dioxins/Furans as 2,3,7,8-TCDD TEQs,” “1,4-Dichlorobenzene,” and “2,4-Di-isocyanate,” respectively. We maintained TRI stack and fugitive emissions separately during the summation step and maintained that separation through the storage of the TRI emissions in the EIS.

Table 3-2: Mapping of TRI pollutant codes to EIS pollutant codes

TRI CAS	TRI Pollutant Name	EIS Pollutant Code	EIS Pollutant Name
106945	1-BROMOPROPANE	106945	1-BROMOPROPANE
79345	1,1,2,2-TETRACHLOROETHANE	79345	1,1,2,2-TETRACHLOROETHANE
79005	1,1,2-TRICHLOROETHANE	79005	1,1,2-TRICHLOROETHANE
57147	1,1-DIMETHYL HYDRAZINE	57147	1,1-DIMETHYL HYDRAZINE
120821	1,2,4-TRICHLOROBENZENE	120821	1,2,4-TRICHLOROBENZENE
96128	1,2-DIBROMO-3-CHLOROPROPANE	96128	1,2-DIBROMO-3-CHLOROPROPANE
57147	1,1-DIMETHYL HYDRAZINE	57147	1,1-Dimethyl Hydrazine
106887	1,2-BUTYLENE OXIDE	106887	1,2-EPOXYBUTANE
75558	PROPYLENIMINE	75558	1,2-PROPYLENIMINE
106990	1,3-BUTADIENE	106990	1,3-BUTADIENE
542756	1,3-DICHLOROPROPYLENE	542756	1,3-DICHLOROPROPENE
1120714	PROPANE SULTONE	1120714	1,3-PROPANESULTONE
106467	1,4-DICHLOROBENZENE	106467	1,4-DICHLOROBENZENE
25321226	DICHLOROBENZENE (MIXED ISOMERS)		NA- pollutant not used
95954	2,4,5-TRICHLOROPHENOL	95954	2,4,5-TRICHLOROPHENOL
88062	2,4,6-TRICHLOROPHENOL	88062	2,4,6-TRICHLOROPHENOL
94757	2,4-DICHLOROPHENOXY ACETIC ACID	94757	2,4-DICHLOROPHENOXY ACETIC ACID
51285	2,4-DINITROPHENOL	51285	2,4-DINITROPHENOL
121142	2,4-DINITROTOLUENE	121142	2,4-DINITROTOLUENE
53963	2-ACETYLAMINOFLUORENE	53963	2-ACETYLAMINOFLUORENE
79469	2-NITROPROPANE	79469	2-NITROPROPANE
91941	3,3'-DICHLOROBENZIDINE	91941	3,3'- DICHLOROBENZIDINE
119904	3,3'-DIMETHOXYBENZIDINE	119904	3,3'- DIMETHOXYBENZIDINE
119937	3,3'-DIMETHYLBENZIDINE	119937	3,3'-DIMETHYLBENZIDINE
101144	4,4'-METHYLENEBIS(2-CHLOROANILINE)	101144	4,4'-METHYLENEBIS(2-CHLORANILINE)
101779	4,4'-METHYLENEDIANILINE	101779	4,4'-METHYLENEDIANILINE
534521	4,6-DINITRO-O-CRESOL	534521	4,6-DINITRO-O-CRESOL
92671	4-AMINOBIPHENYL	92671	4-AMINOBIPHENYL
60117	4-DIMETHYLAMINOAZOBENZENE	60117	4-DIMETHYLAMINOAZOBENZENE
100027	4-NITROPHENOL	100027	4-NITROPHENOL
75070	ACETALDEHYDE	75070	ACETALDEHYDE
60355	ACETAMIDE	60355	ACETAMIDE
75058	ACETONITRILE	75058	ACETONITRILE
98862	ACETOPHENONE	98862	ACETOPHENONE
107028	ACROLEIN	107028	ACROLEIN
79061	ACRYLAMIDE	79061	ACRYLAMIDE

TRI CAS	TRI Pollutant Name	EIS Pollutant Code	EIS Pollutant Name
79107	ACRYLIC ACID	79107	ACRYLIC ACID
107131	ACRYLONITRILE	107131	ACRYLONITRILE
107051	ALLYL CHLORIDE	107051	ALLYL CHLORIDE
7664417	AMMONIA	NH3	AMMONIA
62533	ANILINE	62533	ANILINE
7440360	ANTIMONY	7440360	ANTIMONY
N010	ANTIMONY COMPOUNDS	7440360	ANTIMONY
7440382	ARSENIC	7440382	ARSENIC
N020	ARSENIC COMPOUNDS	7440382	ARSENIC
1332214	ASBESTOS (FRIABLE)	1332214	ASBESTOS
71432	BENZENE	71432	BENZENE
92875	BENZIDINE	92875	BENZIDINE
98077	BENZOIC TRICHLORIDE	98077	BENZOTRICHLORIDE
100447	BENZYL CHLORIDE	100447	BENZYL CHLORIDE
7440417	BERYLLIUM	7440417	BERYLLIUM
N050	BERYLLIUM COMPOUNDS	7440417	BERYLLIUM
92524	BIPHENYL	92524	BIPHENYL
117817	DI(2-ETHYLHEXYL) PHTHALATE	117817	BIS(2-ETHYLHEXYL)PHTHALATE
542881	BIS(CHLOROMETHYL) ETHER	542881	BIS(CHLOROMETHYL)ETHER
75252	BROMOFORM	75252	BROMOFORM
7440439	CADMIUM	7440439	CADMIUM
N078	CADMIUM COMPOUNDS	7440439	CADMIUM
156627	CALCIUM CYANAMIDE	156627	CALCIUM CYANAMIDE
133062	CAPTAN	133062	CAPTAN
63252	CARBARYL	63252	CARBARYL
75150	CARBON DISULFIDE	75150	CARBON DISULFIDE
56235	CARBON TETRACHLORIDE	56235	CARBON TETRACHLORIDE
463581	CARBONYL SULFIDE	463581	CARBONYL SULFIDE
120809	CATECHOL	120809	CATECHOL
57749	CHLORDANE	57749	CHLORDANE
7782505	CHLORINE	7782505	CHLORINE
79118	CHLOROACETIC ACID	79118	CHLOROACETIC ACID
108907	CHLOROENZENE	108907	CHLOROENZENE
510156	CHLOROBENZILATE	510156	Chlorobenzilate
67663	CHLOROFORM	67663	CHLOROFORM
107302	CHLOROMETHYL METHYL ETHER	107302	CHLOROMETHYL METHYL ETHER
126998	CHLOROPRENE	126998	CHLOROPRENE
7440473	CHROMIUM	7440473	CHROMIUM
N090	CHROMIUM COMPOUNDS (EXCEPT CHROMITE ORE MINED IN THE TRANSVAAL REGION)	7440473	CHROMIUM
7440484	COBALT	7440484	COBALT
N096	COBALT COMPOUNDS	7440484	COBALT
1319773	CRESOL (MIXED ISOMERS)	1319773	CRESOL/CRESYLIC ACID (MIXED ISOMERS)
108394	M-CRESOL	108394	M-CRESOL
95487	O-CRESOL	95487	O-CRESOL
106445	P-CRESOL	106445	P-CRESOL
98828	CUMENE	98828	CUMENE
N106	CYANIDE COMPOUNDS	57125	CYANIDE
74908	HYDROGEN CYANIDE	57125	CYANIDE
132649	DIBENZOFURAN	132649	DIBENZOFURAN
84742	DIBUTYL PHTHALATE	84742	DIBUTYL PHTHALATE
111444	BIS(2-CHLOROETHYL) ETHER	111444	DICHLOROETHYL ETHER
62737	DICHLORVOS	62737	DICHLORVOS
111422	DIETHANOLAMINE	111422	DIETHANOLAMINE
64675	DIETHYL SULFATE	64675	DIETHYL SULFATE
131113	DIMETHYL PHTHALATE	131113	DIMETHYL PHTHALATE
77781	DIMETHYL SULFATE	77781	DIMETHYL SULFATE
79447	DIMETHYLCARBAMYL CHLORIDE	79447	DIMETHYLCARBAMOYL CHLORIDE
N120	DIISOCYANATES		NA- pollutant not used
26471625	TOLUENE DIISOCYANATE (MIXED ISOMERS)		NA- pollutant not used
584849	TOLUENE-2,4-DIISOCYANATE	584849	2,4-TOLUENE DIISOCYANATE
N150	DIOXIN AND DIOXIN-LIKE COMPOUNDS		NA- pollutant not used
106898	EPICHLOROHYDRIN	106898	EPICHLOROHYDRIN

TRI CAS	TRI Pollutant Name	EIS Pollutant Code	EIS Pollutant Name
140885	ETHYL ACRYLATE	140885	ETHYL ACRYLATE
51796	URETHANE	51796	ETHYL CARBAMATE
75003	CHLOROETHANE	75003	ETHYL CHLORIDE
100414	ETHYLBENZENE	100414	ETHYL BENZENE
106934	1,2-DIBROMOETHANE	106934	ETHYLENE DIBROMIDE
107062	1,2-DICHLOROETHANE	107062	ETHYLENE DICHLORIDE
107211	ETHYLENE GLYCOL	107211	ETHYLENE GLYCOL
151564	ETHYLENEIMINE	151564	ETHYLENEIMINE
75218	ETHYLENE OXIDE	75218	ETHYLENE OXIDE
96457	ETHYLENE THIOUREA	96457	ETHYLENE THIOUREA
75343	ETHYLIDENE DICHLORIDE	75343	ETHYLIDENE DICHLORIDE
50000	FORMALDEHYDE	50000	FORMALDEHYDE
N230	CERTAIN GLYCOL ETHERS	171	N/A Pollutant not used
76448	HEPTACHLOR	76448	HEPTACHLOR
118741	HEXACHLOROBENZENE	118741	HEXACHLOROBENZENE
87683	HEXACHLORO-1,3-BUTADIENE	87683	HEXACHLOROBUTADIENE
77474	HEXACHLOROCYCLOPENTADIENE	77474	HEXACHLOROCYCLOPENTADIENE
67721	HEXACHLOROETHANE	67721	HEXACHLOROETHANE
110543	N-HEXANE	110543	HEXANE
302012	HYDRAZINE	302012	HYDRAZINE
7647010	HYDROCHLORIC ACID (1995 AND AFTER "ACID AEROSOLS" ONLY)	7647010	HYDROCHLORIC ACID
7664393	HYDROGEN FLUORIDE	7664393	HYDROGEN FLUORIDE
123319	HYDROQUINONE	123319	HYDROQUINONE
7439921	LEAD	7439921	LEAD
N420	LEAD COMPOUNDS	7439921	LEAD
58899	LINDANE	58899	1,2,3,4,5,6-HEXACHLOROCYCLOHEXANE
108316	MALEIC ANHYDRIDE	108316	MALEIC ANHYDRIDE
7439965	MANGANESE	7439965	MANGANESE
N450	MANGANESE COMPOUNDS	7439965	MANGANESE
7439976	MERCURY	7439976	MERCURY
N458	MERCURY COMPOUNDS	7439976	MERCURY
67561	METHANOL	67561	METHANOL
72435	METHOXYCHLOR	72435	METHOXYCHLOR
74839	BROMOMETHANE	74839	METHYL BROMIDE
74873	CHLOROMETHANE	74873	METHYL CHLORIDE
71556	1,1,1-TRICHLOROETHANE	71556	METHYL CHLOROFORM
74884	METHYL IODIDE	74884	METHYL IODIDE
108101	METHYL ISOBUTYL KETONE	108101	METHYL ISOBUTYL KETONE
624839	METHYL ISOCYANATE	624839	METHYL ISOCYANATE
80626	METHYL METHACRYLATE	80626	METHYL METHACRYLATE
1634044	METHYL TERT-BUTYL ETHER	1634044	METHYL TERT-BUTYL ETHER
75092	DICHLOROMETHANE	75092	METHYLENE CHLORIDE
60344	METHYL HYDRAZINE	60344	METHYLHYDRAZINE
121697	N,N-DIMETHYLANILINE	121697	N,N-DIMETHYLANILINE
68122	N,N-DIMETHYLFORMAMIDE	68122	N,N-DIMETHYLFORMAMIDE
91203	NAPHTHALENE	91203	NAPHTHALENE
7440020	NICKEL	7440020	NICKEL
N495	NICKEL COMPOUNDS	7440020	NICKEL
98953	NITROBENZENE	98953	NITROBENZENE
684935	N-NITROSO-N-METHYLUREA	684935	N-NITROSO-N-METHYLUREA
90040	O-ANISIDINE	90040	O-ANISIDINE
95534	O-TOLUIDINE	95534	O-TOLUIDINE
123911	1,4-DIOXANE	123911	P-DIOXANE
56382	PARATHION	56382	PARATHION
82688	QUINTOZENE	82688	PENTACHLORONITROBENZENE
87865	PENTACHLOROPHENOL	87865	PENTACHLOROPHENOL
108952	PHENOL	108952	PHENOL
75445	PHOSGENE	75445	PHOSGENE
7803512	PHOSPHINE	7803512	PHOSPHINE
7723140	PHOSPHORUS (YELLOW OR WHITE)	7723140	PHOSPHORUS
85449	PHTHALIC ANHYDRIDE	85449	PHTHALIC ANHYDRIDE
1336363	POLYCHLORINATED BIPHENYLS	1336363	POLYCHLORINATED BIPHENYLS

TRI CAS	TRI Pollutant Name	EIS Pollutant Code	EIS Pollutant Name
120127	ANTHRACENE	120127	ANTHRACENE
191242	BENZO(G,H,I)PERYLENE	191242	BENZO[G,H,I]PERYLENE
85018	PHENANTHRENE	85018	PHENANTHRENE
N590	POLYCYCLIC AROMATIC COMPOUNDS	130498292	PAH, TOTAL
106503	P-PHENYLENEDIAMINE	106503	P-PHENYLENEDIAMINE
123386	PROPIONALDEHYDE	123386	PROPIONALDEHYDE
114261	PROPOXUR	114261	PROPOXUR
78875	1,2-DICHLOROPROPANE	78875	PROPYLENE DICHLORIDE
75569	PROPYLENE OXIDE	75569	PROPYLENE OXIDE
91225	QUINOLINE	91225	QUINOLINE
106514	QUINONE	106514	QUINONE
7782492	SELENIUM	7782492	SELENIUM
N725	SELENIUM COMPOUNDS	7782492	SELENIUM
100425	STYRENE	100425	STYRENE
96093	STYRENE OXIDE	96093	STYRENE OXIDE
127184	TETRACHLOROETHYLENE	127184	TETRACHLOROETHYLENE
7550450	TITANIUM TETRACHLORIDE	7550450	TITANIUM TETRACHLORIDE
108883	TOLUENE	108883	TOLUENE
95807	2,4-DIAMINOTOLUENE	95807	TOLUENE-2,4-DIAMINE
8001352	TOXAPHENE	8001352	TOXAPHENE
79016	TRICHLOROETHYLENE	79016	TRICHLOROETHYLENE
121448	TRIETHYLAMINE	121448	TRIETHYLAMINE
1582098	TRIFLURALIN	1582098	TRIFLURALIN
108054	VINYL ACETATE	108054	VINYL ACETATE
75014	VINYL CHLORIDE	75014	VINYL CHLORIDE
75354	VINYLDENE CHLORIDE	75354	VINYLDENE CHLORIDE
108383	M-XYLENE	108383	M-XYLENE
95476	O-XYLENE	95476	O-XYLENE
106423	P-XYLENE	106423	P-XYLENE
1330207	XYLENE (MIXED ISOMERS)	1330207	XYLENES (MIXED ISOMERS)

3. Split TRI total chromium emissions into hexavalent and trivalent emissions

The TRI allows facilities to report either “Chromium” or “Chromium compounds,” but not the hexavalent or trivalent chromium species that are needed for the NEI (see Section 3.1.4). Because the only characterization available for the TRI facilities or their emissions is the facilities’ NAICS codes, we created a NAICS-based set of fractions to split the TRI-reported total chromium emissions into the hexavalent and trivalent chromium species. A table of Standard Industrial Classification (SIC)-based chromium split fractions was available from earlier year NEI usage of TRI databases, which had been compiled by SIC rather than NAICS. The earlier SIC-based fractions were used wherever they could be re-assigned to a closely matching NAICS description.

Unfortunately, not all SIC-based fractions could be assigned this way, so we computed NAICS-based split fractions for any NAICS codes in the 2017 TRI data that did not already have an SIC-to-NAICS assigned split fraction. These factors were used for the remaining TRI-reported chromium. To calculate the NAICS-based factors, we summed by NAICS the total amounts of chromium III and chromium VI for the entire U.S. in the 2014 draft NEI data. These 2014 NEI S/L/T emissions were either reported directly by the S/L/T agencies as chromium III and chromium VI, or they had been split from S/L/T agency-reported total chromium by the EPA using the procedures described in Section 3.1.4. Those procedures largely rely on either SCC-based or Regulatory code-based split factors. The derived NAICS split factors, therefore, represent a weighted average of the SCC and Regulatory code-based split factors, weighted according to the mass of each chromium valence in the 2014 NEI for that NAICS.

After all TRI facilities with chromium had been assigned a NAICS-based split factor, the factors were applied separately to both the TRI stack and fugitive total chromium emissions. This resulted in speciated chromium emissions for each facility's stack and fugitive emissions that were included in the EIS as part of the 2019EPA_TRI dataset.

Similar to S/L/T chromium speciation data, the TRI chromium speciation data includes some facility-specific values resulting from 2011 and/or 2014 NATA reviews or provided by S/L/T for use in the 2017 NEI. The TRI-chromium speciation data "TRI_based_chromium_speciation.zip" is available on the [2017 Supplemental data FTP site](#).

4. Write the 2019 TRI emissions to EIS Process IDs with stack and fugitive release points

The total facility stack and total facility fugitive emissions values from the above steps were written to a set of EIS process IDs created to reflect those facility total type emissions. In most cases, the EIS process IDs for a given facility already existed in EIS as a result of an earlier NEI.

5. Revise SCCs on the EIS Processes used for the TRI emissions

The 2002 and 2005 NEIs had assigned all the TRI emissions to a default process code SCC of 39999999, which caused a large amount of HAP emissions to be summed to a misleading "miscellaneous" sector. The 2008 NEI approach reduced this problem somewhat because it apportioned all TRI emissions to the multiple processes and SCCs that were used by the S/L/T agencies to report their emissions, but this apportioning created other distortions. The 2011 NEI, and all NEIs since, reverted back to loading the TRI emissions as the single process stack and fugitive values as reported by facilities to the TRI, but we revised the SCCs on those single processes to something other than the default 39999999 wherever possible. The purpose of this is to allow the TRI emissions to map to a more appropriate EIS sector.

3.1.6 HAP augmentation based on emission factor ratios

The 2019EPA_HAP-augmentation dataset was used for gap filling missing HAPs in the S/L/T agency-reported data. We calculated HAP emissions by multiplying the appropriate surrogate CAP emissions (provided by S/L/T agencies) by an emissions ratio of HAP to CAP EFs. For point sources, these EF ratios were largely the same as were used in the 2008 NEI v3, though additional quality assurance resulted in some changes. The ratios were computed using the EFs from [WebFIRE](#) and are based solely on the SCC code. The computation of these point HAP to CAP ratios is described in detail in the [2008 NEI documentation](#), Section 3.1.5.

For pollutants other than Hg, we computed ratios for only the SCCs in WebFIRE that met specific criteria: 1) the CAP and HAP WebFIRE EFs were both based on uncontrolled emissions and, 2) the units of the EF had to be the same or be able to be converted to the same units. In addition, for Hg, we added ratios for point SCCs that were not in WebFIRE for both PM10-FIL (the CAP surrogate for Hg) and Hg by using Hg or PM10-FIL factors for similar SCCs and computing the resulting ratio. That process is described (and supporting data files provided) in the [2008 NEI documentation](#) (Section 3.1.5.2), since these additional Hg augmentation factors were used in the 2008 NEI v3 as well.

A HAP augmentation feature was built into the EIS for the 2011 cycle, and the HAP EF ratios are available to the EIS users through the reference data link "Augmentation Profile Information." The same tables provide both the HAP augmentation factors and chromium speciation factors and were discussed in Section 2.2.2.

Since the initial set of HAP augmentation factors, factors and/or SCC-assignments were added including facility-specific HAP augmentation factors resulting from past NATA reviews. New for the 2017 NEI were facility-specific

coke oven to SO₂ ratios used to compute coke oven emissions for specific facilities with operating coke ovens that were missing coke oven emissions. We have been also using test-based emission factor ratios in place of WebFIRE-based ratios where data are sufficient to do so. Users interested in the few test-based factors that do not have access to EIS can download the full set of HAP augmentation factors from the [2017 Supplemental data FTP site](#) (“HAPaugmentation.zip”) and peruse the metadata information (data source and factor comments) to extract them.

3.1.7 Cross-dataset tagging rules for overlapping pollutants

Several HAPs can be reported as individual chemicals or chemicals that reflect a group which can overlap with individual chemicals, e.g., o-Xylene and Xylenes (mixed isomers). In previous NEI cycles, we tagged out data to prevent double counting of pollutants across datasets that overlap one another. For the 2017 NEI, a software solution that occurs during the blending process was developed so that overlapping pollutants would be excluded from the selection. The business rules were documented as part of the [2017 NEI plan](#) (see [Appendix 5](#)). One change to these “Proposed” rules that we implemented for the 2017 NEI is that we allow individual xylene isomers to be reported with Xylenes (mixed isomers) within the same dataset. The cross-data business rules remain unchanged in that they do not allow any individual isomer from one dataset to be used in a selection when the mixed isomers pollutant appears in a higher ranked dataset, and vice-versa.

3.2 Airports: aircraft-related emissions

For the 2019 NEI Point data category we relied on the last dataset in the selection hierarchy (“2017NEI_NOV2020_PT”) to gap fill the aircraft-related emissions. The 2019 aircraft-related emissions are therefore the same as the 2017 NEI aircraft emissions. See Section 3.2 in the [2017 NEI TSD](#) for a description of how those emissions were developed.

3.3 Rail yard-related emissions

For the 2019 NEI Point data category we relied on the last dataset in the selection hierarchy (“2017NEI_NOV2020_PT”) to gap fill the rail yard-related emissions. The 2019 rail yard-related emissions are therefore the same as the 2017NEI rail yard emissions. See Section 3.3 in the [2017 NEI TSD](#) for a description of how those emissions were developed.

3.4 EGUs

The EPA developed a single combined dataset of emission estimates for EGUs to be used to fill gaps for pollutants and emission units not reported by S/L/T agencies. For the 2019EPA_EGU dataset, the emissions were estimated at the unit level, because that is the level at which the CAMD heat input activity data and the MATS-based emissions factors (EFs) and the CAMD CEMS data are available. The 2019EPA_EGU dataset was developed from three separate estimation sources. The three sources were the 2010 MATS rule development testing program EFs for 15 HAPs; annual sums of SO₂ and NO_x emissions based on the hourly CEMS emissions reported to the EPA’s CAMD database; and heat-input based EFs that were built from AP-42 EFs and fuel heat and sulfur contents as part of the 2008 NEI development effort. We used the 2019 annual throughputs in BTUs from the CAMD database with the two EF sets to derive annual emissions for 2019.

As shown above in Table 3-1, the selection hierarchy was set such that S/L/T-submitted data was used ahead of the values in the 2019EPA_EGU dataset. In the 2011 NEI, the EPA EGU estimated emissions that were derived from the MATS testing program were used ahead of the S/L/T values, unless the S/L/T submittal indicated that the value was from either a CEM or a recent stack test. For the 2019 NEI, we used the S/L/T-reported values

wherever they were reported (unless they were tagged out as an outlier), including where a MATS-based value existed in the 2019EPA EGU dataset. In addition, we made the MATS emission factors available to S/L/T agencies far in advance of the data being submitted so that facilities and/or S/L/T agencies could choose to use that information to compute emissions if it was most applicable.

We assumed that all heat input came from the primary fuel, and the EFs used reflected only that primary fuel. This introduces a small amount of uncertainty as many EGU units use a small amount of alternative fuels. The resultant unit-level estimates had to be loaded into EIS at the process-level to meet the EIS requirement that emissions can only be associated with the most detailed level. To do this for the EGU sectors, we needed to bridge the unit level (i.e., the boiler or gas turbine unit as a whole) to the process level (i.e., the individual fuels burned within the units). So, the EPA emissions were assigned to a single process for the primary fuel that was used by the responsible S/L/T agency for reporting the largest portion of their emissions. A part of the selection software includes a “unit-based” rule that prevents the need to tag out EPA emissions estimates for EGUs that do not align at exactly the same process ID that the S/L/T may have used. This approach prevented double counting of a portion of the S/L/T-reported emissions in cases where the S/L/T agency may have reported a unit’s emissions using two different coal processes and a small oil process, for example.

The matching of the 2019EPA_EGU dataset to the responsible agency facility, unit and process IDs was done largely by using the ORIS plant and CAMD boiler IDs as found in the CAMD heat input activity dataset and linking these to the same two IDs as had been stored in EIS. We also compared the facility names and counties for agreement between the S/L/T-reported values and those in CAMD, and we revised the matches wherever discrepancies were noted. As a final confirmation that the correct emissions unit and a reasonable process ID in EIS had been matched to the EPA data, the magnitudes of the SO₂ and NO_x emissions for all preliminary matches were compared between the S/L/T agency-reported datasets and the EPA dataset. We identified and resolved several discrepancies from this emissions comparison.

Alternative facility and unit IDs needed for matching with other databases

The 2019 NEI data contains two sets of alternate unit identifiers related to the ORIS plant and CAMD boiler IDs (as found in the CAMD heat input activity dataset) for export to the Sparse Matrix Operator Kernel Emissions (SMOKE) modeling file. The first set is stored in EIS with a Program System Code (PSC) of “EPACAMD.” The alternate unit IDs are stored as a concatenation of the ORIS Plant ID and CAMD boiler ID with “CAMDUNIT” between the two IDs. These IDs are exported to the SMOKE file in the fields named ORIS_FACILITY_CODE and ORIS_BOILER_ID. These two fields are used by the SMOKE processing software to replace the annual NEI emissions values with the appropriate hourly CEM values at model run time. The second set of alternate unit IDs are stored in EIS with a PSC of “EPAIPM” and are exported to the SMOKE file as a field named “IPM_YN.” The SMOKE software that prepares emissions data for air quality modeling uses this field to determine if the unit is one that will have future year projections provided by the integrated planning model (IPM). The storage format of these alternate EPAIPM unit IDs, in both EIS and in the exported SMOKE file, replicates the IDs as found in the National Electric Energy Data System (NEEDS) database used as input to the IPM model. The NEEDS IDs are a concatenation of the ORIS plant ID and the CAMD boiler ID, with either a “_B_” or a “_G_” between the two IDs, indicating “Boiler” or “Generator.” The ORIS Plant IDs and CAMD boiler IDs as stored in the CAMD Business System (CAMDBS) dataset and in the NEEDS database are almost always the same, but there are occasional differences in the numbering used for the same unit. The EPACAMD alternate unit IDs available in EIS are believed to be a complete set of all those that can safely be used for the purpose of substituting hourly CEM values without double-counting during SMOKE processing. The EPAIPM alternate unit IDs in the 2019 NEI are not a complete listing of all the NEEDS/IPM units, although most of the larger emitters do have an EPAIPM alternate unit ID. The NEEDS database includes a much larger set of smaller, non-CEM units.

3.5 Landfills

For the 2019 NEI Point data category we relied on the last dataset in the selection hierarchy (“2017NEI_NOV2020_PT”) to gap fill the landfill emissions. The 2019 landfill emissions are therefore the same as the 2017NEI landfill emissions. See Section 3.5 in the [2017 NEI TSD](#) for a description of how those emissions were developed.

3.6 PM species

For the 2019 NEI PT inventory, the five species (EC, OC, SO₄, NO₃, and other) of PM_{2.5}-PRI and diesel PM (which are estimated for diesel mobile engines such as locomotives and diesel-fueled ground support equipment) were developed and included using a new part of the selection software. A separate dataset for these species is therefore not included in the hierarchy. These species were generated using the same multiplication ratios as in the 2017 NEI using the PM speciation ratios as found on the [Air Emissions Modeling website](#).

3.7 References for point sources

1. Dorn, J, 2012. *Memorandum: 2011 NEI Version 2 – PM Augmentation approach*. Memorandum to Roy Huntley, US EPA. (PM augmt 2011 NEIv2 feb2012.pdf, accessible in the file “2008nei_references.zip” on the [2008v3 NEI FTP site](#)).
2. Strait et al. (2003). Strait, R.; MacKenzie, D.; and Huntley, R., 2003. [PM Augmentation Procedures for the 1999 Point and Area Source NEI](#), 12th International Emission Inventory Conference – “Emission Inventories – Applying New Technologies”, San Diego, April 29 – May 1, 2003.

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