2020 National Emissions Inventory Technical Support Document: Overview

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2.1 What are EIS sectors?

First used for the 2008 NEI, EIS Sectors continue to be used for all 2020 NEI data categories. 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 2020 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 had been reported and compiled in EIS using five major data categories: point, nonpoint, onroad, nonroad and events. The event category was 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 had been a focus of the NEI creation effort and were the only emission sources contained in the event data category.

For the 2020 NEI, we have aggregated the wildfires and prescribed burning emissions into county-level estimates and loaded these into the nonpoint 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.

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. 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**
Agriculture - Crops & Livestock Dust		☑		
Agriculture - Fertilizer Application		☑		
Agriculture - Livestock Waste	☑	☑		

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

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

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, and onroad mobile. 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 AirToxScreen, 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 2020 Toxics Release Inventory (TRI) to supplement point source HAP and NH3 emissions provided to EPA by S/L/T agencies. For 2020, 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 2020 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 (Point Data category) provides more information on how TRI data was used to supplement the point inventory.

2.2.2 Chromium speciation

The 2020 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 2020 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 2020 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 2020 NEI selection by adding it to the data category-specific selection hierarchy and by excluding the S/L/T agency unspeciated chromium from the selection through a pollutant exception to the hierarchy.

Most of the speciation factors used in the 2020 NEI are SCC-based and are the same as were used in 2011 through 2017 NEI, based on data that have long been used by the EPA for NATA and other risk projects. However, some values are updated with every inventory cycle. New data may be developed by OAQPS during rule development or review of Air Toxics Screening Assessments. The speciation factors are 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, 3.1.5 – 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 an emissions ratio of HAP to CAP emission factors. For the 2020 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 typically does not equal 1 (100%) because not all of the VOC or PM mass will be a HAP. We try to ensure that the sum of HAP-VOC factors is less than 1 because it can't be more but it is sometimes close or equal to 1. HAP augmentation factors based on PM mass are typically much less than 1 for almost all SCCs. 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) and nonpoint sections of the 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 S/L/T agencies or from facility reports to the Toxics Release Inventory, but HAP augmentation is used as a last available option. Compliance test data does not usually provide an annual emissions total.

Because much 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 and AirToxScreen reviews. More discussion of the underlying data used for the 2020 NEI Point inventory 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 Particulate matter augmentation

Particulate matter (PM) emissions species in the NEI are primary PM10 (pollutant code 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 needs 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. In general, emissions for PM components missing from S/L/T agency inventories were calculated by applying factors to the PM emissions data supplied by the S/L/T agencies.

PM Augmentation is only run in EIS for point and nonpoint sources. Unlike the PM calculator/Augmentation tool used in previous NEIs, EIS PM Augmentation only gap-fills missing PM components, and does not overwrite existing S/L/T PM data, which already undergoes rudimentary EIS QA checks as the data is being loaded into EIS.

The complete set of conditional logic statement used in EIS PM Augmentation are displayed in Figure 2-1.

Figure 2-1: PM Augmentation computations based on S/L/T submitted pollutants

	Pollutant					
Combo #	**PM10-PRI**	**PM25-PRI**	**PM10-FIL**	**PM25-FIL**	**PM-CON**	**Action**
1	Y	Y	Y	Y	Y	No Action
2			Y	Y	Y	10PRI=10FIL+CON; 25PRI=25FIL+CON
3	Y	Y			Y	10FIL=10PRI-CON; 25FIL=25PRI-CON
4	Y	Y	Y	Y		CON=10PRI-10FIL
5	Y	Y	Y			CON=10PRI-10FIL; 25FIL=GREATEST(25PRI-CON, 0)
6	Y	Y		Y		CON=25PRI-25FIL; 10FIL=10PRI-CON
7	Y		Y	Y		CON=10PRI-10FIL; 25PRI=25FIL+CON
8	Y	Y		Y	Y	10FIL=10PRI-CON
9	Y	Y	Y		Y	25FIL=25PRI-CON
10		Y	Y	Y	Y	10PRI=10FIL+CON
11	Y		Y	Y	Y	25PRI=25FIL+CON
12		Y	Y	Y		CON=25PRI-25FIL; 10PRI=10FIL+CON
13		Y		Y	Y	10FIL=25FIL*RATIO; 10PRI=10FIL+CON
14	Y		Y		Y	25FIL=10FIL*RATIO; 25PRI=25FIL+CON
15		Y	Y		Y	10PRI=10FIL+CON; 25FIL=25PRI-CON
16	Y			Y	Y	10FIL=10PRI-CON; 25PRI=25FIL+CON
17	Y	Y				CON=25PRI*RATIO; 10FIL=10PRI-CON; 25FIL=25PRI-CON
18		Y		Y		CON=25PRI-25FIL; 10FIL=25FIL*RATIO; 10PRI=10FIL+CON
19				Y	Y	25PRI=25FIL+CON; 10FIL=25FIL*RATIO;10PRI=10FIL+CON
20		Y			Y	25FIL=25PRI+CON; 10FIL=25FIL*RATIO;10PRI=10FIL+CON
21	Y		Y			CON=10PRI-10FIL; 25FIL=10FIL*RATIO; 25PRI=25FIL+CON
22			Y		Y	10PRI=10FIL+CON; 25FIL=10FIL*RATIO; 25PRI=25FIL+CON
23	Y				Y	10FIL=10PRI-CON; 25FIL=10FIL*RATIO; 25PRI=25FIL+CON
24			Y	Y		CON=10FIL*RATIO; 10PRI=10FIL+CON; 25PRI25=FIL+CON
25		Y	Y			CON=25PRI*RATIO; 25FIL=25FIL-CON; 10PRI=10FIL+CON
26	Y			Y		CON=10PRI*RATIO; 10FIL=10PRI-CON; 25PRI=25FIL+CON
27		Y				Each of the 4 missing = 25PRI*Ratio
28	Y					Each of the 4 missing = 10PRI*Ratio
29				Y		Each of the 4 missing = 25FIL*Ratio
30			Y			Each of the 4 missing = 10FIL*Ratio
31					Y	Each of the 4 missing = CON*Ratio
32						No Action

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. New for 2020, as part of the NEI selection process, EIS generates speciated PM2.5 emissions for all sources with PM emissions. These PM species are a result of speciation where the NEI PM25-PRI emissions are split into five PM2.5 species: 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 commercial sterilizers amended via AirToxScreen review, landfills, railyards, electric generating units (EGUs), and aircraft.

2.2.6 Data Tagging

S/L/T agency data generally is 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. Since the 2017 NEI, a series of additional rules were added to the selection hierarchy to avoid such tagging. Point source datasets are 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 What are the sources of data in the 2020 NEI?

This section shows the contributions of S/L/T agency data to total emissions for the point and nonpoint data categories. Figure 2-2 shows the proportion of CAP, select HAPs, and HAP group emissions from various data sources in the NEI for point data category sources. Except for PM2.5 and PM10, most point CAP emissions come from S/L/T-submitted data. PM augmentation (see Section 2.2.4), which is based off incomplete S/L/T submittals of PM, accounts for a significant portion of PM point emissions. The data sources shown in the figure are described in more detail in Section 3.

Figure 2-2: Relative contributions for various data sources of Point emissions for CAPs and select HAPs

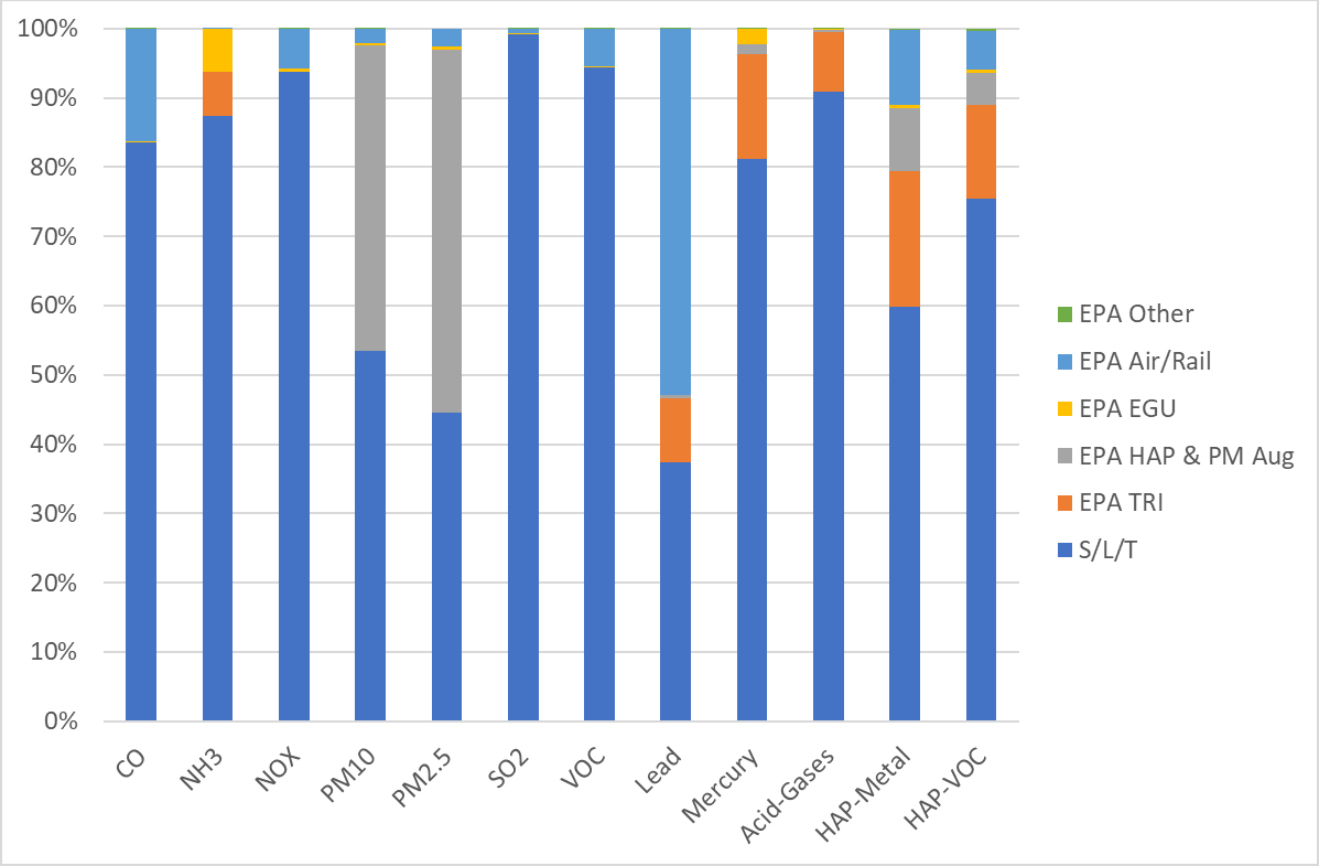
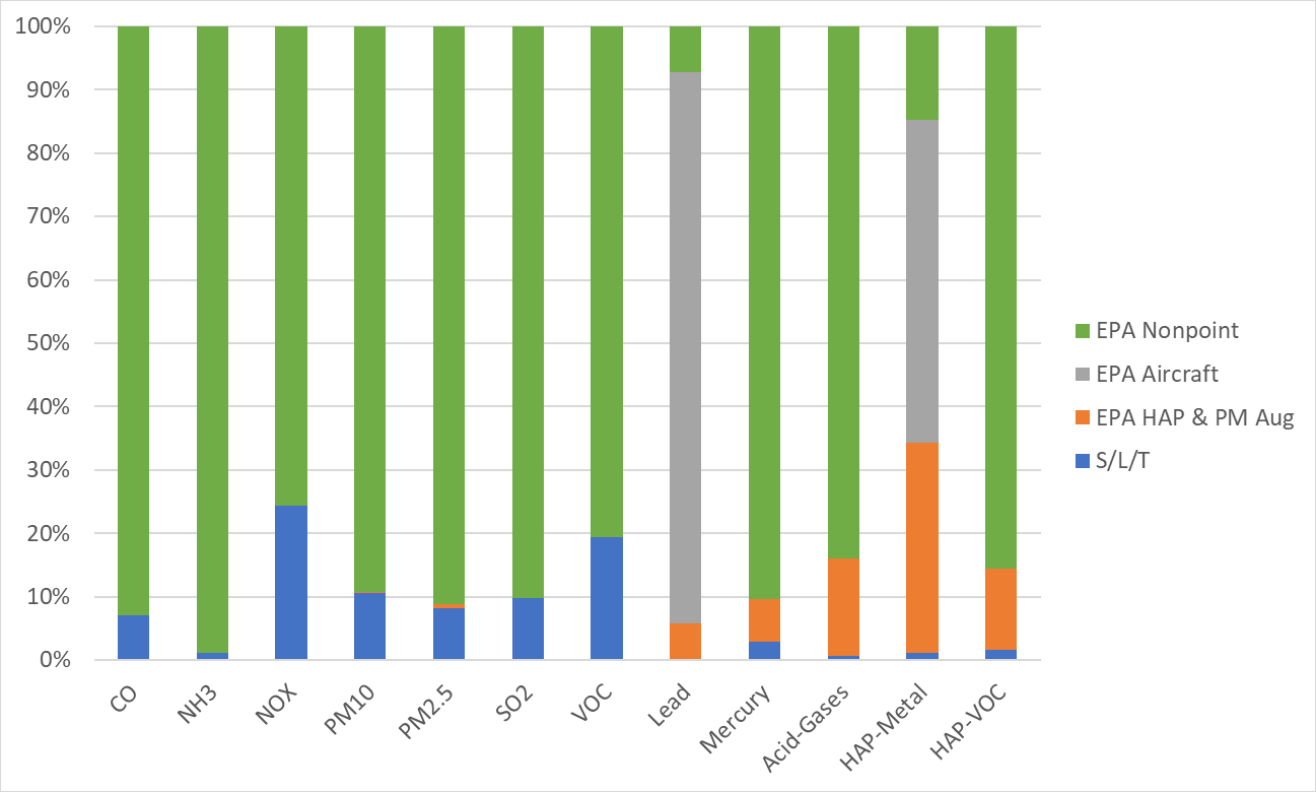


Figure 2-3 shows the proportion of CAP, select HAPs, and HAP group emissions from various data sources in the NEI for nonpoint data category sources. Biogenic sources, all EPA data, are not included in this table. Acid Gases include the following pollutants: hydrogen cyanide, hydrochloric acid, hydrogen fluoride, and chlorine. HAP VOC emissions consist of dozens of VOC HAP species, that in-aggregate, should be less than VOC in our QA checks. HAP metal emissions consist of the following compound groups: Antimony, Arsenic, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Mercury, Nickel and Selenium. More than 50% of nonpoint pollutant totals come from some type of EPA source; however, as discussed in Section 6, S/L/T-submitted nonpoint activity data is absorbed into EPA nonpoint tools and are therefore classified as "EPA" data. Nonpoint NH3 is dominated by the agricultural livestock waste and fertilizer application sectors. The large "EPA Nonpoint" bars for PM10 and PM2.5 are predominantly dust sources from unpaved roads, agricultural dust from crop cultivation, and construction dust.

Figure 2-3: Relative contributions for various data sources of Nonpoint emissions for CAPs and select HAPs



We did not compute relative contributions of emissions from nonroad and onroad data categories because of the nature in how emissions are created for these sources -via a mix of S/L/T and EPA activity data and processed through the MOVES model. California, which uses its own onroad and nonroad mobile models, was the only state that provided emissions rather than inputs for EPA models (this is in accordance with the AERR). All other states were required to provide inputs to the EPA models. Onroad and nonroad mobile data categories use the MOVES emissions model, and the EPA primarily collected model inputs from S/L agencies for these categories and ran the models using these inputs to generate the emissions. The S/L agencies that provided inputs are presented in the nonroad and onroad portions of the document, Section 4 and Section 5, respectively.

2.4 What are the top sources of some key pollutants?

Table 2-3 provides a summary of CAP and total HAP emissions for all EIS sectors, including the biogenic emissions from vegetation and soil. Emissions in federal waters and from vegetation and soils have been split out and totals both with and without these emissions are included. Emissions in federal waters include offshore drilling platforms and commercial marine vessel emissions outside the typical 3-10 nautical mile boundary defining state waters. All emissions values are bounded by the caveats and methods described by this documentation.

Table 2-3: EIS sectors and associated 2020 CAP and total HAP emissions (thousands of tons/year)

Sector	CO	NH3	NOX	PM2.5	PM10	SO2	VOC	Black Carbon	Lead	Total HAPs[1]
Agriculture - Crops & Livestock Dust				719	3,669			11		
Agriculture - Fertilizer Application		1,834								

Sector	CO	NH3	NOX	PM2.5	PM10	SO2	VOC	Black Carbon	Lead	Total HAPs[1]
Agriculture - Livestock Waste	3.74E-03	2,696	2.23E-03	0.04	0.09	2.67E-05	216	1.95E-03		40
Bulk Gasoline Terminals	0.93	0.03	0.37	0.06	0.07	0.02	119	5.48E-04	4.67E-04	5.58
Commercial Cooking	75			188	202		29	6.44		8.83
Dust - Construction Dust	9.52E-04	5.90E-07	3.21E-04	125	1,245	3.67E-05	0.06	1.13E-04	1.70E-04	0.07
Dust - Paved Road Dust				194	830			2.02		
Dust - Unpaved Road Dust				568	5,709			0.55		
Fires - Agricultural Field Burning	676	146	31	67	101	11	106	7.69		19
Fires - Prescribed Fires	8,384	135	149	779	909	71	1,936	38	7.84E-03	402
Fires - Wildfires	19,620	322	246	1,676	1,977	141	4,623	150	8.62E-03	937
Fuel Comb - Comm/Institutional - Biomass	24	0.18	10	16	18	1.10	0.96	0.59	2.71E-04	0.42
Fuel Comb - Comm/Institutional - Coal	1.11	2.10E-03	2.05	0.38	1.21	7.74	0.14	0.02	2.70E-04	0.33
Fuel Comb - Comm/Institutional - Natural Gas	115	1.28	140	4.22	4.47	1.27	9.31	0.29	2.21E-03	1.05
Fuel Comb - Comm/Institutional - Oil	21	0.26	44	2.93	3.21	2.94	3.47	0.44	4.41E-04	0.12
Fuel Comb - Comm/Institutional - Other	12	0.09	16	0.69	0.72	1.07	1.61	0.05	4.29E-04	0.29
Fuel Comb - Electric Generation - Biomass	13	0.38	8.73	1.28	1.43	3.16	0.70	0.05	1.16E-03	0.61
Fuel Comb - Electric Generation - Coal	268	2.28	575	49	62	773	11	1.90	0.02	6.82
Fuel Comb - Electric Generation - Natural Gas	83	15	178	30	31	5.74	12	2.03	1.50E-03	4.32
Fuel Comb - Electric Generation - Oil	6.84	0.55	55	3.31	4.25	38	1.39	1.10	1.40E-03	0.48
Fuel Comb - Electric Generation - Other	28	0.49	23	2.70	2.78	16	3.15	0.15	7.21E-04	1.82
Fuel Comb - Industrial Boilers, ICEs - Biomass	330	3.51	134	195	226	19	11	7.25	4.19E-03	5.66
Fuel Comb - Industrial Boilers, ICEs - Coal	15	0.36	42	4.53	15	112	0.46	0.19	5.74E-03	3.95
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	296	8.39	534	21	23	14	61	1.47	3.47E-03	22
Fuel Comb - Industrial Boilers, ICEs - Oil	24	0.21	70	4.69	5.23	12	5.03	1.20	0.01	0.35
Fuel Comb - Industrial Boilers, ICEs - Other	73	1.67	48	7.74	8.84	33	4.44	0.61	2.23E-03	1.46
Fuel Comb - Residential - Natural Gas	94	45	216	2.67	2.86	1.44	13	0.18	2.70E-06	0.18
Fuel Comb - Residential - Oil	8.37	1.52	28	3.23	3.60	0.63	1.10	0.38	1.92E-03	0.07
Fuel Comb - Residential - Other	10	0.13	37	0.15	0.18	0.17	1.44	0.01	3.68E-07	0.02
Fuel Comb - Residential - Wood	3,159	23	50	485	489	13	460	27		176
Gas Stations	0.03	2.36E-04	0.02	3.07E-03	4.90E-03	5.22E-04	336	1.35E-04	2.12E-04	35
Industrial Processes - Cement Manuf	90	1.33	107	7.14	11	28	5.48	0.21	1.90E-03	1.99
Industrial Processes - Chemical Manuf	138	27	59	21	26	91	90	0.54	3.09E-03	23
Industrial Processes - Ferrous Metals	200	0.19	44	17	22	18	9.25	0.33	0.03	1.53
Industrial Processes - Mining	16	0.05	4.19	49	369	0.67	1.07	0.05	3.53E-03	0.17
Industrial Processes - NEC	128	28	131	70	118	112	193	1.28	0.04	46
Industrial Processes - Non-ferrous Metals	175	0.27	12	8.75	12	22	9.98	0.14	0.03	4.78
Industrial Processes - Oil & Gas Production	673	0.23	612	12	13	165	2,680	0.65	8.64E-05	146
Industrial Processes - Petroleum Refineries	50	2.35	61	14	18	47	48	0.89	1.87E-03	8.64
Industrial Processes - Pulp & Paper	88	4.86	68	30	37	20	127	0.90	3.36E-03	48
Industrial Processes - Storage and Transfer	4.44	0.98	2.07	13	36	0.66	189	0.20	1.91E-03	11
Miscellaneous Non-Industrial NEC	97	1.79E-04	2.48	13	16	0.19	325	0.53	7.54E-04	20
Mobile - Aircraft	327		84	7.46	8.45	9.17	51	2.57	0.43	11
Mobile - Commercial Marine Vessels	28	0.09	218	4.79	5.03	4.70	8.70	3.64	5.90E-04	0.82
Mobile - Locomotives	98	0.30	463	11	12	0.37	20	8.84	9.00E-07	8.79
Mobile - Non-Road Equipment - Diesel	300	1.19	654	44	45	0.54	57	34	3.39E-07	27
Mobile - Non-Road Equipment - Gasoline	10,727	0.81	187	36	39	0.39	935	4.36	4.78E-12	294
Mobile - Non-Road Equipment - Other	212	0.01	37	2.04	2.04	0.27	7.12	0.75		1.45
Mobile - On-Road Diesel Heavy Duty Vehicles	569	8.97	1,324	40	67	1.59	69	22		13
Mobile - On-Road Diesel Light Duty Vehicles	183	1.43	143	6.53	9.19	0.16	24	4.49		4.26
Mobile - On-Road non-Diesel Heavy Duty Vehicles	538	2.41	31	1.34	3.70	0.28	27	0.22		7.49
Mobile - On-Road non-Diesel Light Duty Vehicles	12,972	77	847	32	110	7.84	835	6.70		229
Solvent - Consumer & Commercial Solvent Use							1,936			202

Sector	CO	NH3	NOX	PM2.5	PM10	SO2	VOC	Black Carbon	Lead	Total HAPs[1]
Solvent - Degreasing	4.64E-03	0.03	3.36E-03	0.05	0.06	1.29E-04	70	3.41E-04	3.21E-04	6.36
Solvent - Dry Cleaning	3.76E-03	1.00E-07	3.35E-03	0.04	0.04	5.04E-03	2.30	2.40E-04	1.00E-07	0.76
Solvent - Graphic Arts	0.06	0.04	0.08	0.06	0.06	1.36E-03	170	3.95E-04	3.56E-08	16
Solvent - Industrial Surface Coating & Solvent Use	5.56	0.30	2.44	3.67	4.06	0.22	381	0.04	1.72E-03	83
Solvent - Non-Industrial Surface Coating							201			73
Waste Disposal	1,479	92	84	227	253	36	191	24	8.83E-03	38
Sub Total (no federal waters)	**62,437**	**5,485**	**7,816**	**5,822**	**16,782**	**1,845**	**16,630**	**377**	**0.62**	**2,999**
Fuel Comb - Industrial Boilers, ICEs - Natural Gas	49	7.55E-03	44	0.41	0.41	0.03	1.16	0.03	1.18E-06	1.18E-06
Fuel Comb - Industrial Boilers, ICEs - Oil	1.15	2.83E-04	4.91	0.21	0.21	0.41	0.24	0.16	2.52E-06	2.52E-06
Fuel Comb - Industrial Boilers, ICEs - Other	4.02E-04	1.51E-05	4.81E-04	2.39E-05	2.39E-05	3.30E-06	4.31E-05	1.66E-06	2.36E-09	2.36E-09
Industrial Processes - Oil & Gas Production	1.50	5.42E-04	0.80	9.13E-03	9.29E-03	0.02	37	2.47E-05	8.46E-08	8.46E-08
Industrial Processes - Storage and Transfer							0.63			
Mobile - Commercial Marine Vessels	3.40	0.01	22	0.55	0.57	0.05	0.83	0.43	6.93E-05	0.09
Sub Total (federal waters)	**55**	**0.02**	**72**	**1.19**	**1.21**	**0.51**	**40**	**0.62**	**7.31E-05**	**0.09**
Sub Total (all but vegetation and soil)	**62,493**	**5,485**	**7,888**	**5,823**	**16,784**	**1,845**	**16,670**	**378**	**0.62**	**2,999**
Biogenics - Vegetation and Soil	3,660		1,029				29,519			2,968
Total	**66,153**	**5,485**	**8,916**	**5,823**	**16,784**	**1,845**	**46,189**	**378**	**0.62**	**5,968**

1 Total HAP does not include diesel PM, which is not a HAP listed by the Clean Air Act.

2.5 How does this NEI compare to past inventories?

Many similarities exist between the 2020 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 2020, S/L/T participation was again somewhat more comprehensive than the previous NEI. The NEI program continues with the 2020 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 2020 NEI has been created and the resulting emissions, which are described in the following two subsections.

2.5.1 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 2020 cycle are highlighted here.

To improve the process, we learned from the prior triennial inventories (for 2008, 2011, 2014, and 2017) 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 but retained the same Nonpoint Survey functionality used in the 2017 NEI (introduced for the 2014 NEI) to assist with S/L/T and EPA data reconciliation for the nonpoint 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.

2.5.1.1 *Point data category*

For point sources, the only major change for 2020 was our incorporation of the Air Toxics Screening (AirToxScreen) assessment between the draft NEI and this 2020 NEI release. AirToxScreen provided SLTs a review of high-risk air toxic facilities. More information on point source improvements is available in Section 3.

2.5.1.2 *Nonpoint data category*

We made method improvements for several stationary nonpoint sectors (Section 6). The EPA creates and provides emissions estimation tools for two purposes: 1) as tools for S/L/T agencies to use themselves, and 2) to backfill emissions values where not provided by S/L/T agencies.

As part of the 2017 NEI development process, we introduced "Input Templates" for S/L/Ts to provide activity data for several nonpoint data category tools. By allowing a simple template where S/L/Ts can review the previous year's data, the data source, and easily update values at a county or state level, that then feeds into EPA's emissions estimation tools, assures that the calculations and methods are identical. For the 2020 NEI, we centralized the input template download and upload process, and enabled S/L/Ts to directly load their inputs into EPA tools to generate draft emission estimates prior to submittal to the NEI. EPA provided default Input Templates to S/L/T inventory developers for them to modify and return to EPA. We encouraged S/L/Ts to submit inputs rather than direct emission submittals for many nonpoint categories.

We also continued to streamline the Nonpoint Survey (Section 6), first introduced for the 2014 NEI development cycle, to simplify the options and improve transparency. In particular, we added a button on the NP survey that indicates whether an agency submitted an input template. This helped us QA our data twofold: 1) did the agency intend to submit an input template, and 2) did they actually submit a template. By default, all Nonpoint Survey responses were set to "Yes -Supplement my data with EPA Estimates" to ensure complete coverage in the absence of S/L/T feedback.

As discussed in Section 25, for the 2020 NEI, we added default fuel consumption data for nonpoint Industrial and Commercial/Institutional (ICI) fuel combustion, based partially on S/L/T-submitted Point carbon monoxide emissions; this greatly reduced the potential double-counting of ICI fuel consumption estimates for S/L/Ts that did not submit direct nonpoint emissions or an input template. Similar to the 2017, we continue to use estimated point fuel consumption for reconciling the nonpoint component of ICI fuel consumption/emissions - we no longer allow point emissions subtraction. We provided S/L/Ts with cross-references from point inventory facilities to existing U.S. Energy Information Administration (EIA) ICI sector assignments and fuel mapping. We relied on S/L/Ts to provide EPA with these state-level inputs via 4 different Input Template options.

Emissions for residential wood consumption (Section 27) were affected by an updated methodology in the wood consumption estimates obtained from the State Energy Data System (SEDS), which reflected updated national survey data and allocation scheme based on heating degree days which distributed emissions from warmer (southern) states to cooler (northern) states. In addition, we updated to use higher PM emission factors for certified wood stoves as the old emissions were deemed inappropriate for continued use.

The methods used to estimate nonpoint solvent utilization emissions (Section 32) were updated using a new emissions model. This model uses national-level product usage estimates to subsequently estimate speciated emissions, that are further allocated to the county-level using geographically specific sources of data and modulated if the locality reports control mechanisms for select SCCs. In addition, a new SCC (2460030999) was

added to this category to reflect emissions from lighter fluids, fuel starters, and other consumer product fuel sources.

Most states saw a significant increase in CO, PM2.5 and VOC from commercial cooking, a result of an improvement in the activity data on the number of restaurants. Large decreases in residential fuel combustion for SO2 is a result of a continued decrease in consumption and more significantly, more widespread inclusion of a lower default sulfur content for distillate fuel oil.

All fires data are now included in the nonpoint data category for the 2020 NEI. This is simply a format issue as the underlying methodology for computing wildland fires (wildfires and prescribed burning) are still developed using satellite data for location and day-specific fires, but for 2020 NEI, are subsequently aggregated to the county-level. Overall, national-level agricultural field burning increased but was mostly offset by corresponding decreases in prescribed fire estimates.

The 2020 NEI introduces (VOC and associated VOC HAPs) from agricultural silage and new asphalt paving processes and methodology. Agricultural fertilizer application (NH3) estimates significantly increased due to several updates: new emission factor measurements, change in how landcover was modeled, improved meteorological data, and an error correction. Oil and gas production increased significantly in the Permian basin; otherwise, most VOC changes result from new Solvents methodology (Section 32), which also includes pesticide application.

For all nonpoint categories, we updated the activity data to use the newest data available, at the time, to represent the 2020 inventory year; in most cases, this is year-2020 activity data. Most emission changes for all nonpoint sources not otherwise discussed in this section resulted from these activity data updates -be they from EPA or new for 2020, provided directly from S/L/Ts.

The Biogenic database incorporated a new version of the Biogenic Emissions Landcover Database (BELD5) and provides updates for all states, including Alaska, Hawaii, Puerto Rico and the U.S. Virgin Islands.

2.5.1.3 *Onroad and nonroad data categories*

For mobile sources, onroad methodology used an updated version of the MOVES model with updated mobile source activity data such as vehicle miles travelled (VMT), age distributions, and fuel type mix, and improved idling computations; we also received new telematics data from StreetLight Data, Inc. For both onroad and nonroad, we relied on model inputs provided by S/L/T agencies and other sources, except for California and Tribes, who submitted emissions estimates. Sections 5 (nonroad mobile) and 6 (oroad mobile) provide more detail on these improvements.

2.5.2 Differences in emissions between 2020 and 2017 NEI

This section presents a comparison from the 2017 NEI to the 2020 NEI. Table 2-4 compares CAP emissions for the 2020 minus 2017 NEI for seven highly aggregated emission sectors. Table 2-5 compares emissions for select HAPs for the 2020 minus 2017 NEI-for the same seven highly aggregated emission sectors. Emissions from the biogenic (natural) sources are excluded, and the wildfire sector is shown separately for CAPs and HAPs. While Pb is a CAP for the purposes of the NAAQS, due to toxic attributes and inclusion in previous national air toxics assessments (NATA) and screenings (Air Toxics Screening) assessements, it is reviewed here with the HAPs. The HAPs selected for comparison are based on their national scope of interest as defined by Air Toxics Screening

Assessments. With a couple notable exceptions, CAP emissions are lower overall in 2020 than in 2017. Some specific sector/pollutants increased in 2020 from 2017.

The increases in fuel combustion for most pollutants are primarily a result of increases in residential wood combustion where the underlying source of activity data (fuel consumption) increased significantly via methodology and geographic distribution changes. Conversely, the significant decrease in electric generating unit (EGU) emissions account for the decrease in overall NOX and SO2 fuel combustion. Increases in Miscellaneous CO are from increased prescribed and agricultural field burning. Increases in nonroad gasoline engine lawn and garden and commercial estimates explain the increases in Nonroad Mobile CO. Large increases in agricultural fertilizer application explain the large Miscellaneous NH3 increase. Large Industrial Processes VOC increases are primarily from increased oil and gas activity in the Permian Basin.

As expected, the pandemic contributed to significant decreases in 2020 for all Highway Vehicle pollutants. As discussed in Section 7, there were comparatively more wildfires in 2020 than 2017, explaining the significant increases in wildfire emissions for 2020. Year 2017 was a generally quiet year for such fires.

Table 2-4: 2020 and 2017 NEI CAP emissions and broad sector changes (2020 minus 2017) in tons

Broad Sector	**CO**	**NH3**	**NOX**	**PM10**	**PM2.5**	**SO2**	**VOC**
Fuel Combustion	649,629	17,300	-340,670	173,719	195,152	-675,635	121,797
Highway Vehicles	-5,250,922	-10,392	-1,149,841	-49,133	-34,808	-15,635	-719,802
Industrial Processes	-125,816	5,662	-84,008	-113,491	-25,872	-7,932	219,865
Miscellaneous	83,207	1,172,618	3,294	-260,334	12,452	10,725	-107,556
Nonroad Mobile	343,796	-21	-467,017	-27,387	-26,135	-11,972	-113,617
Total 2020 NEI, excluding wildfires	42,817,505	5,163,803	7,569,405	14,805,366	4,146,613	1,703,698	12,007,615
Total 2017 NEI, excluding wildfires	47,117,611	3,978,637	9,607,648	15,081,992	4,025,823	2,404,147	12,606,929
Total Difference, excluding wildfires	**-4,300,107**	**1,185,167**	**-2,038,243**	**-276,626**	**120,790**	**-700,449**	**-599,313**
Total % Difference, excluding wildfires	**-9%**	**30%**	**-21%**	**-2%**	**3%**	**-29%**	**-5%**
Wildfires	132,876	2,904	15,702	24,066	20,332	5,510	44,743

Table 2-5: 2020 and 2017 NEI select HAP emissions and broad sector changes (2020 minus 2017) in tons

Broad Sector	**Acrolein**	**Benzene**	**Ethylene Oxide**	**Formaldehyde**	**Hexavalent Chromium**	**Lead**
Fuel Combustion	1,064	-4,472	0.40	16,293	-1.58	11
Highway Vehicles	-977	-23,321		-14,619	0.03	
Industrial Processes	1,022	5,109	-17	16,050	-5.41	-23
Miscellaneous	1,468	-2,817	-1.83	1,157	-1.29	1
Nonroad Mobile	-1,013	-1,497		-7,723	-0.02	-41

Broad Sector	Acrolein	Benzene	Ethylene Oxide	Formaldehyde	Hexavalent Chromium	Lead
Total 2020 NEI, excluding wildfires	36,331	126,794	92	274,713	25	613
Total 2017 NEI, excluding wildfires	34,767	153,792	111	263,554	33	665
Total Difference, excluding wildfires	**1,563**	**-26,998**	**-19**	**11,158**	**-8**	**-52**
Total % Difference, excluding wildfires	**4%**	**-18%**	**-17%**	**4%**	**-25%**	**-8%**
Wildfires	-1,475	-9,027		-18,559		

2.6 How well are tribal data and regions represented in the 2020 NEI?

Nine tribes submitted data to the EIS for 2020 as shown in Table 2-6. 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 and PM in the same manner as facilities under the state and local jurisdictions, as explained in Section 3, therefore, Tribal Nations in Table 2-6 with just a CAP flag will also have some HAP emissions in most cases. Eight additional tribal agencies, shown in Table 2-7, which did not submit any data, are represented in the point data category of the 2020 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. Furthermore, many nonpoint datasets included in the NEI are presumed to include tribal activity. Most notably, the oil and gas nonpoint emissions have been confirmed to include activity on tribal lands because the underlying database contained data reported by tribes.

Table 2-6: Tribal participation in the 2020 NEI

Tribal Agency	Point	Nonpoint	Onroad	Nonroad
Coeur d'Alene Tribe	CAP, HAP	CAP, HAP	CAP, HAP	
Kootenai Tribe of Idaho		CAP, HAP	CAP, HAP	CAP, HAP
Morongo Band of Cahuilla Mission Indians of the Morongo Reservation, California			CAP	
Nez Perce Tribe	CAP, HAP	CAP, HAP	CAP, HAP	CAP, HAP
Northern Cheyenne Tribe	CAP	CAP	CAP	
Salt River Pima Maricopa Indian Community (SRPMIC) EPNR	CAP, HAP, GHG	CAP		
Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho	CAP, HAP	CAP, HAP	CAP, HAP	CAP, HAP
Southern Ute Indian Tribe	CAP, HAP, GHG	CAP, HAP, GHG		
Ute Mountain Tribe of the Ute Mountain Reservation	CAP, HAP			

Table 2-7: Facilities on Tribal lands with 2020 NEI emissions from EPA only

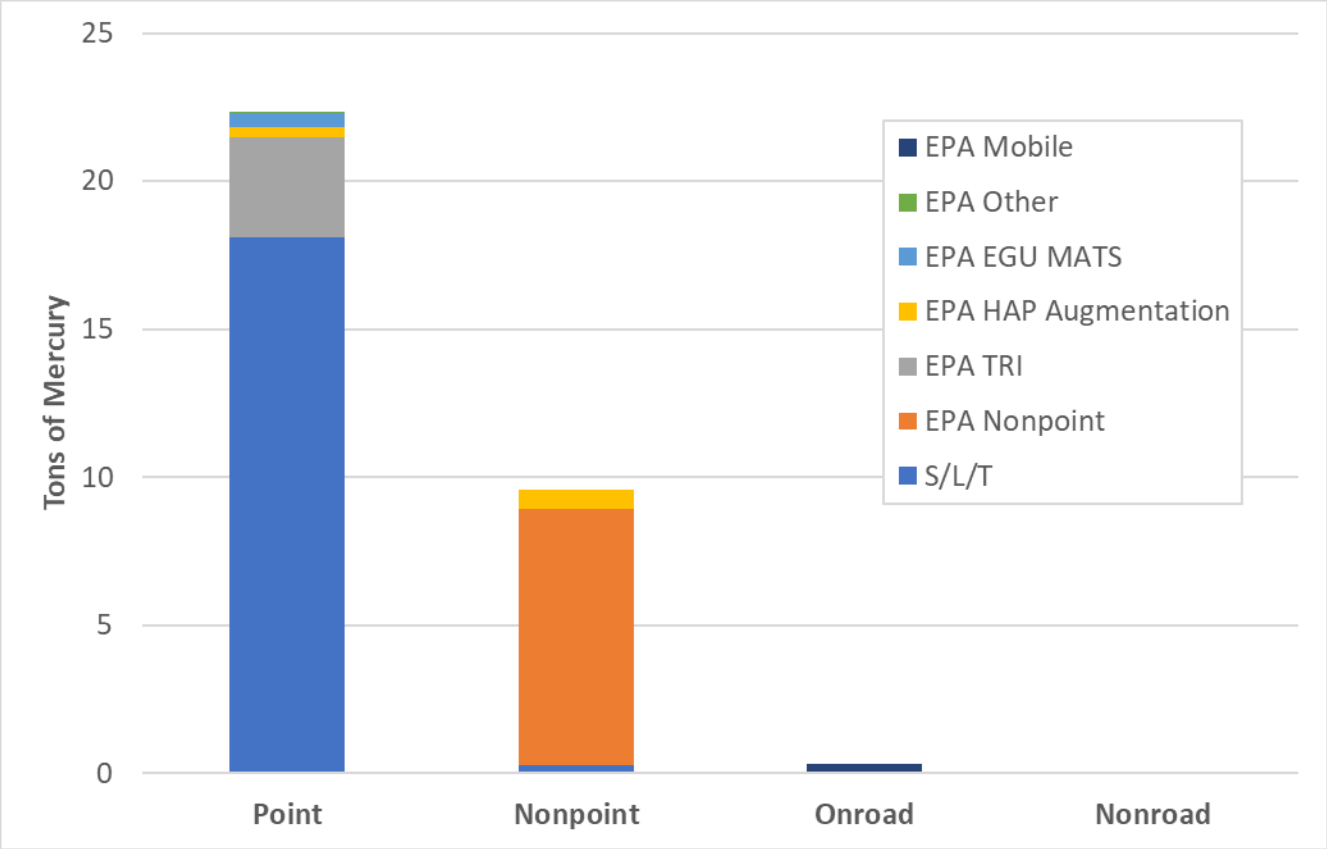
Tribal Agency	EPA data used
Assiniboine and Sioux Tribes of the Fort Peck Indian Reservation, Montana	Airports
Coeur d'Alene Tribe	TRI
Confederated Tribes and Bands of the Yakama Nation, Washington	TRI
Fond du Lac Band of Lake Superior Chippewa	Airports
Fort Mojave Indian Tribe of Arizona, California & Nevada	GHG, EGUs
Gila River Indian Community	TRI
Navajo Nation	GHG, EGUs, TRI
Nez Perce Tribe of Idaho	TRI
Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, Montana	Airports
Omaha Tribe of Nebraska	Airports
Southern Ute Indian Tribe	GHG, Airports
Tohono O-Odham Nation Reservation	TRI
Ute Indian Tribe of the Uintah & Ouray Reservation, Utah	GHG, EGUs, Airports

2.7 What does the 2020 NEI tell us about mercury?

The NEI documentation includes this Hg section because of the importance of this pollutant and because the sectors used to categorize Hg are different than the sectors presented for the other pollutants. The Hg sectors primarily focus on regulatory categories and categories of interest to the international community; emissions are summarized by these categories at the end of this section, in Table 2-10.

A summary of all data sources used to create the 2020 Hg inventory are shown in Figure 2-4.

Figure 2-4: Data sources of Hg emissions (tons) in the 2020 NEI, by data category



Mercury emission estimates in the 2020 NEI sum to 29.6 tons, with 29.1 tons from stationary sources[1] and 0.5 tons from mobile sources (including aircraft, commercial marine vessels and locomotives). In the above figure the "EPA mobile" accounts for all EPA datasets in the onroad mobile and nonroad mobile data categories: onroad mobile and nonroad equipment sources; this does not include emissions from commercial marine vessel and locomotive (also referred to as rail) emissions which reside in the EPA Nonpoint dataset.

Due to large decreases of emissions from sources within the regulated categories, most of the emissions are from sources other than the regulated categories. The "other" includes includes, but is not limited to, landfills, primary and secondary metal production, gas turbines, chemical manufacturing processes, production of gypsum and other mineral products, flash steam geothermal power plants, petroleum refineries, human cremation, residential fuel combustion, and fluorescent lamp breakage. Of the regulatory categories trended, the three with highest emissions in the 2020 NEI are: electric arc furnaces (3.8 tons), coal -fired EGU with units larger than 25 megawatts (MW) (3.6 tons) portland cement production (1.6 tons), and boilers and process heaters (1.4 tons). Coal-fired EGUs no longer comprise the largest portion of the mercury emissions in NEI.

Most of the mercury emissions from coal and oil-fired electric generating units subject to the Mercury and Air Toxics Standards (MATS) originate from SLT submitted mercury emissions estimates and from the

[1] Outlier Hg emissions at 2 facilities (EIS Faciliy IDs 8542311 and 8452311) were not included for the purpose of this analysis.

"2020EPA_EGU" data reported to the Clean Air Markets Division (CAMD). A very small fraction originates from the TRI dataset. An insignificant fraction is derived from HAP augmentation.

In addition to Figure 2-4, Table 2-8 lists the emissions by data source with the above data sets further broken out. More information on these datasets is available in Section 3 for point, Section 4 for nonroad mobile, Section 5 for onroad mobile sources, and Section 6 for nonpoint sources.

Table 2-8: 2020 NEI Hg emissions (tons) for each dataset type and group

Data Category	Data Set	Brief Description	Hg emissions (tons)
Point	S/L/T	State, local, tribal agency-submitted	18
	2020EPA_TRI	Toxics Release Inventory	3.4
	2020EPA_EGU	Mercury and Air Toxics Rule	0.5
	2020EPA_HAPAug	Computed based on S/L/T CAPs	0.2
	2020EPA_HAPAug-PMAug	Computed based on S/L/T Augmented PM	0.08
	2020EPA_Rail_HAPAug	Computed based on EPA Rail PM	0.007
	2020EPA_LF	Landfills	0.004
	2020EPA_ATS_SLT	SLT contributions from Air Toxics Screening review	0.000004
Nonpoint	2020EPA_NONPOINT	All EPA nonpoint tool estimates, including commercial marine vessels and rail lines	8.7
	2020SLT_HAPAug_NP	Computed based on S/L/T CAPs	0.5
	S/L/T	State, local, tribal agency-submitted	0.3
	2020EPA_HAPAugWWSLIT	Computed based on EPA tool PM	0.13
	2020EPA_HAPAug-PMAug	Computed based on S/L/T Augmented PM	0.00010
Nonroad	2020EPA_Nonroad	EPA MOVES model	0.04
Onroad	2020EPA_Onroad	EPA MOVES model	0.3

The point and nonpoint data category datasets are described in more detail starting in Sections 3 and 6 respectively, and we highlight some key datasets here.

For point sources, we gap-filled Hg that was not reported by S/L/Ts in the same way as other HAPs – including use of the TRI (see Section 3), EPA HAP Augmentation or "HAP Aug" in the figure (see Section 2.2.3), and other EPA data developed for gap filling. Electric arc furnaces (EAFs) were gap filled using HAP aug and TRI only. The HAP augmentation used facility specific augmentation factors developed so that the resultant emissions would be the same as was used in 2014 and 2017. This approach was used to provide a more automated approach than to submit the same emissions year after year, that would (via the use of CAPs) account for changes in activity. The 2014 estimates were developed by applying a 34% reduction to 2011 NEI emissions (process level). The 2011 NEI emissions were based on data developed for the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Area Sources: Electric Arc Furnace Steelmaking Facilities (subpart YYYYY). The 34% value was the average reduction from a limited 3 facility test program in 2016 (the range was 11-70%) -based on personal communication with Donna Lee Jones, EPA lead for the NESHAP. The sum of HAP aug mercury for EAFs is about 0.07 tons. We used the same approach as in 2017 and 2014 for using TRI data associated EAFs in that we excluded S/L/T estimates at non-EAF processes if they were significantly lower than the TRI Hg value. The

sum of TRI Hg for EAFs is about 0.65 tons. The largest contribution to total EAF emissions is S/L/T data which sum to about 3.0 tons.

The nonpoint non-combustion-related and cremation categories used the same or very similar approaches as were used for the 2014 NEI and 2017 NEI, though activity data was updated. These nonpoint non-combustion mercury methodologies are described in Section 15. EPA estimates for these categories are included in the "2020EPA_NONPOINT" (along with other EPA nonpoint category estimates) shown in Figure 2-4 and Table 2-8. Some of these categories have a point contribution, though the specific categories do not exactly line up between the nonpoint and point data categories. They are summarized below:

- switches and relays – emissions from the shredding and crushing of cars containing Hg components at auto crushing yards, SCC = 2650000002: Waste Disposal, Treatment, and Recovery; Scrap and Waste Materials; Scrap and Waste Materials; Shredding (1.33 tons nonpoint; 4.6 lbs point)
- landfill "working face" emissions associated with the release of mercury via churning/crushing of new material added to the landfill, SCC= 2620030001: Waste Disposal, Treatment, and Recovery; Landfills; Municipal; Dumping/Crushing/Spreading of New Materials (working face) (0.511 tons nonpoint, total point landfill Hg is 0.06 tons)
- thermometers and thermostats – the portion that emit mercury prior to disposal at landfills or incinerators, SCC=2650000000: Waste Disposal, Treatment, and Recovery; Scrap and Waste Materials; Scrap and Waste Materials; Total: All Processes (0.117 tons nonpoint)
- dental amalgam – emissions at dentist offices and from evaporation in teeth, SCC=2850001000: Miscellaneous Area Sources; Health Services; Dental Alloy Production; Overall Process (0.46 tons nonpoint)
- general laboratory activities, SCC = 2851001000: Miscellaneous Area Sources; Laboratories; Bench Scale Reagents; Total (0.32 tons nonpoint)
- fluorescent lamp breakage, SCC= 2861000000: Miscellaneous Area Sources; Fluorescent Lamp Breakage; Non-recycling Related Emissions; Total (0.967 tons nonpoint)
- fluorescent lamp recycling, SCC= 2861000010: Miscellaneous Area Sources; Fluorescent Lamp Breakage; Recycling Related Emissions; Total (less than 0.1 lb nonpoint, point sum of breakage and recycling = 13 lbs)
- animal cremation, SCC= Miscellaneous Area Sources; Other Combustion; Cremation; Animals (2.4 lbs nonpoint, 11 lbs point)
- human cremation – emissions primarily due to mercury in dental amalgam, SCC=2810060100: Miscellaneous Area Sources; Other Combustion; Cremation; Humans (2.33 tons nonpoint, 0.22 tons point). This is a 31% increase from 2017 emissions.

Since mercury is a HAP, it is reported voluntarily by S/L/T agencies. For the point data category of the 2020 NEI, 47 states and 2 local agencies reported mercury emissions. Table 2-9 provides the tons of emissions from EPA, the SLT, and the resulting percent of emissions for the point data category.

Table 2-9: Point inventory emissions by reporting agency

State	Agency Type	Agency	From EPA (tons)	From Agency (tons)	Percent from Agency
AK	State	Alaska Department of Environmental Conservation	7.89E-02	0.00E+00	0.00%
AL	State	Alabama Department of Environmental Management	2.04E-01	8.42E-01	80.51%
AR	State	Arkansas Department of Environmental Quality	4.69E-01	3.24E-01	40.86%
AZ	State	Arizona Department of Environmental Quality	1.05E-02	1.27E-01	92.38%
AZ	Local	Maricopa County Air Quality Department	8.42E-02	0.00E+00	0.00%
CA	State	California Air Resources Board	2.91E-02	7.95E-01	96.47%
CO	State	Colorado Department of Public Health and Environment	1.24E-01	2.81E-02	18.51%
CT	State	Connecticut Department of Energy and Environmental Protection	4.11E-05	7.02E-02	99.94%
DC	State	DC-District Department of the Environment	2.40E-03	4.68E-03	66.15%
DE	State	Delaware Department of Natural Resources and Environmental Control	2.43E-04	9.43E-03	97.49%
FL	State	Florida Department of Environmental Protection	1.02E-01	3.55E-01	77.66%
GA	State	Georgia Department of Natural Resources	1.18E-01	4.14E-05	0.04%
HI	State	Hawaii Department of Health Clean Air Branch	1.54E-02	1.10E-02	41.61%
IA	State	Iowa Department of Natural Resources	2.81E-02	2.78E-01	90.80%
ID	State	Idaho Department of Environmental Quality	4.55E-01	4.10E-03	0.89%
IL	State	Illinois Environmental Protection Agency	1.10E-02	6.84E-01	98.41%
IN	State	Indiana Department of Environmental Management	1.56E-01	6.55E-01	80.80%
KS	State	Kansas Department of Health and Environment	1.21E-02	2.52E-01	95.41%
KY	State	Kentucky Division for Air Quality	1.05E-01	1.62E-01	60.62%
KY	State	Louisville Metro Air Pollution Control District	5.37E-05	4.59E-02	99.88%
LA	State	Louisiana Department of Environmental Quality	2.09E-01	1.07E-01	33.90%
MA	State	Massachusetts Department of Environmental Protection	1.35E-02	0.00E+00	0.00%
MD	State	Maryland Department of the Environment	1.03E-01	0.00E+00	0.00%
ME	State	Maine Department of Environmental Protection	0.00E+00	4.93E-02	100.00%
MI	State	Michigan Department of Environmental Quality	7.26E-03	2.27E-01	96.91%
MN	State	Minnesota Pollution Control Agency	3.04E-04	4.34E-01	99.93%
MO	State	Missouri Department of Natural Resources	2.34E-02	4.95E-01	95.48%
MS	State	Mississippi Dept of Environmental Quality	2.80E-03	2.28E-01	98.79%
MT	State	Montana Department of Environmental Quality	7.74E-02	4.00E-04	0.51%
NC	State	North Carolina Department of Environmental Quality	6.89E-03	6.02E-01	98.87%
ND	State	North Dakota Department of Health	2.70E-01	2.40E-01	47.02%
NE	State	Nebraska Environmental Quality	2.36E-02	1.31E-01	84.71%
NH	State	New Hampshire Department of Environmental Services	8.83E-05	1.63E-02	99.46%
NJ	State	New Jersey Department of Environment Protection	5.77E-04	6.48E-02	99.12%
NM	Local	City of Albuquerque	7.16E-03	0.00E+00	0.00%

State	Agency Type	Agency	From EPA (tons)	From Agency (tons)	Percent from Agency
NM	State	New Mexico Environment Department Air Quality Bureau	7.51E-03	0.00E+00	0.00%
NV	Local	Clark County Department of Air Quality and Environmental Management	1.05E-02	0.00E+00	0.00%
NV	State	Nevada Division of Environmental Protection	3.75E-01	4.75E-01	55.89%
NV	Local	Washoe County Health District	1.31E-05	0.00E+00	0.00%
NY	State	New York State Department of Environmental Conservation	9.17E-04	2.87E+00	99.97%
OH	State	Ohio Environmental Protection Agency	2.39E-01	1.60E+00	86.98%
OK	State	Oklahoma Department of Environmental Quality	7.81E-03	1.74E-01	95.71%
OR	State	Oregon Department of Environmental Quality	3.06E-03	1.07E-01	97.21%
PA	State	Pennsylvania Department of Environmental Protection	2.31E-01	7.76E-01	77.03%
PR	Territory	Puerto Rico	5.22E-02	0.00E+00	0.00%
RI	State	Rhode Island Department of Environmental Management	7.60E-05	2.31E-02	99.67%
SC	State	South Carolina Department of Health and Environmental Control	8.65E-05	6.74E-01	99.99%
SD	State	South Dakota Department of Environment and Natural Resources	1.77E-02	0.00E+00	0.00%
TN	Local	Chattanooga Air Pollution Control Bureau (CHCAPCB)	1.12E-02	6.21E-07	0.01%
TN	Local	Knox County Department of Air Quality Management	1.02E-01	1.20E-02	10.51%
TN	State	Memphis and Shelby County Health Department - Pollution Control	7.85E-02	1.01E-03	1.28%
TN	Local	Metro Public Health of Nashville/Davidson County	5.05E-05	0.00E+00	0.00%
TN	State	Tennessee Department of Environmental Conservation	7.94E-02	6.37E-02	44.53%
TX	State	Texas Commission on Environmental Quality	9.97E-03	2.34E+00	99.58%
UT	State	Utah Division of Air Quality	3.71E-02	3.66E-01	90.79%
VA	State	Virginia Department of Environmental Quality	2.32E-02	4.46E-01	95.05%
VT	State	Vermont Department of Environmental Conservation	4.63E-04	0.00E+00	0.00%
WA	State	Washington State Department of Ecology	1.32E-01	4.71E-02	26.21%
WI	State	Wisconsin Department of Natural Resources	5.22E-03	2.77E-01	98.15%
WV	State	West Virginia Division of Air Quality	6.09E-04	2.24E-01	99.73%
WY	State	Wyoming Department of Environmental Quality	1.15E-02	3.99E-01	97.20%
	Tribe	Coeur dAlene Tribe	3.65E-04	0.00E+00	0.00%
	Tribe	Navajo Nation	9.81E-03	0.00E+00	0.00%
	Tribe	Nez Perce Tribe	3.80E-05	0.00E+00	0.00%
	Tribe	Southern Ute Indian Tribe	2.19E-06	0.00E+00	0.00%
	Tribe	Tohono O-Odham Nation Reservation	4.98E-06	0.00E+00	0.00%
	Tribe	Ute Indian Tribe of the Uintah & Ouray Reservation, Utah	2.85E-04	0.00E+00	0.00%

Eight states (CA, ID, MN, OH, RI, TX, VA, WV), 2 local agencies (Knox County, TN and Washoe County, NV) and 4 tribal agencies reported Hg to the nonpoint data category. The tribal agencies are Coeur d'Alene Tribe, Kootenai Tribe of Idaho, Nez Perce Tribe, and Shoshone-Bannock Tribes of the Fort Hall Reservation of Idaho.

Table 2-10 and Figure 2-5 show the 2020 NEI mercury emissions for the key categories of interest in comparison to other triennial inventory years and the baseline HAP inventory of 1990. The 2005 data are from the MATS 2005 modeling platform. Two comma-separated values included in the zip file (to be posted in early April 2023), 2020nei_supdata_mercury.zip, provide the category assignments at the facility-process level for point sources, and the county-SCC level for nonpoint, onroad and nonroad sources. Individual point source processes were matched to categories based on the process-level or unit-level category assignments used in the previous triennial NEI (2017 NEI) as a starting point, and then supplemented with manual assignments considering SCC, NAICS, facility category codes, emission factor information (e.g., fuel combusted) and facility names.

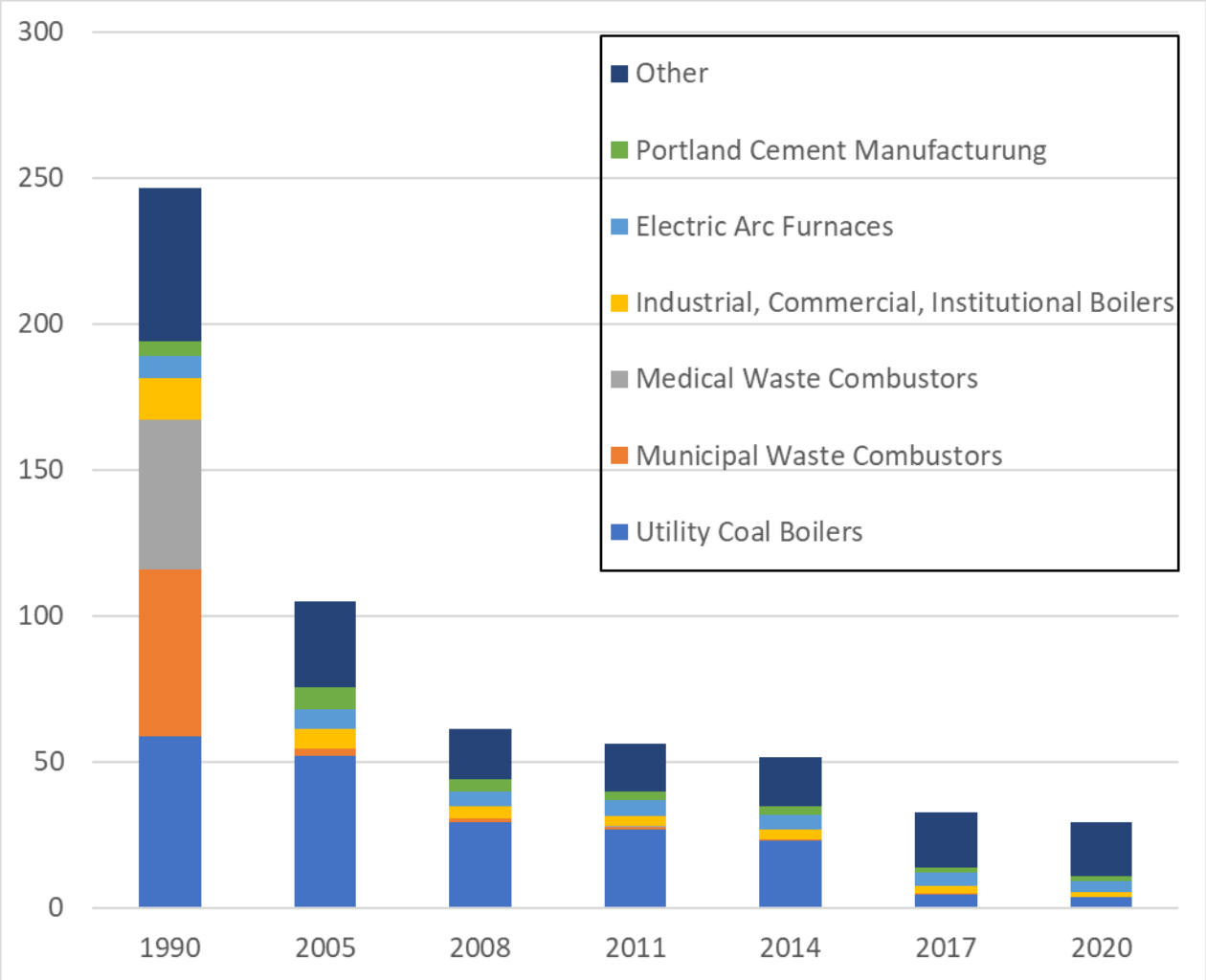
Table 2-10: Trends in NEI mercury emissions – 1990, 2005, 2008 v3, 2011v2, 2014v2 NEI, 2017 NEI, and 2020 NEI

Source Category	1990 (tpy) Baseline 11/2005	2005 (tpy) MATS 3/2011	2008 (tpy) 2008v3	2011 (tpy)	2014 (tpy)	2017 (tpy)	2020 (tpy)	Notes
Utility Coal Boilers (Electricity Generation Units – EGUs, combusting coal)	58.8	52.2	29.4	26.8	22.9	4.4	3.6	This category includes coal-fired utility boilers and integrated gasified coal combustion units greater than 25 MW, excluding small Hg estimated for startup or cofired gas/oil. The following utility and independant power plant units are included in the "Other" category: non-coal fired boilers, coal fired boilers <25MW, gas turbines, geothermal units, and combined cycle units).
Hospital/Medical/ Infectious Waste Incineration	51	0.2	0.1	0.1	0.02	0.003	0.010	
Municipal Waste Combustors	57.2	2.3	1.3	1.0	0.6	0.4	0.3	

Source Category	1990 (tpy) Baseline 11/2005	2005 (tpy) MATS 3/2011	2008 (tpy) 2008v3	2011 (tpy)	2014 (tpy)	2017 (tpy)	2020 (tpy)	Notes
Industrial, Commercial/Institutional (ICI) Boilers and Process Heaters	14.4	6.4	4.2	3.6	3.2	2.5	1.4	Sum of nonpoint ICI boiler and point emissions. Change in category: Previously included some electricity generating units less than 25 MW. Currently includes strictly industrial units and industrial cogenerating units. Electricity generating units other than those in the Utility Coal Boilers category are now included in the "Other" category along with large non-coal fired electric generating units. Decrease from 2017 is due in part to this change in category definition.
Mercury Cell Chlor-Alkali Plants	10	3.1	1.3	0.5	0.1	0.1	0.1	
Electric Arc Furnaces	7.5	7.0	4.8	5.4	5.0	4.7	3.8	
Commercial/Industrial Sold Waste Incineration	Not available	1.1	0.02	0.01	0.01	0.06	0.03	Possibly an underestimate due to missing sources and overlap in categorization of cement kilns and hazardous waste incineration in facilities that can burn multiple fuels
Hazardous Waste Incineration	6.6	3.2	1.3	0.7	0.8	1.0	0.2	Possibly an underestimate due to missing sources and overlap in categorization of cement kilns and commercial/industrial solid waste incineration in facilities that can burn multiple fuels
Portland Cement Non-Hazardous Waste	5.0	7.5	4.2	2.9	3.2	1.7	1.6	
Gold Mining	4.4	2.5	1.7	0.8	0.6	0.9	0.9	Includes fugitive emissions at mines such as TRI emissions at fugitive release points that were not reported by S/L/T
Sewage Sludge Incineration	2	0.3	0.3	0.3	0.3	0.4	0.2	

Source Category	1990 (tpy) Baseline 11/2005	2005 (tpy) MATS 3/2011	2008 (tpy) 2008v3	2011 (tpy)	2014 (tpy)	2017 (tpy)	2020 (tpy)	Notes
Mobile Sources	Not available	1.2	1.8	1.3	1.0	0.6	0.5	Sum of all onroad, nonroad, locomotives and commercial marine vessels. Decrease likely due to decrease in mobile source activity in 2020.
Other Categories	29.5	18	10.7	13	14.0	16.0	16.9	Sum of nonpoint {ICI fuel combustion other than boilers, residential fuel combustion, industrial processes, cremation, dental alloy production, fluorescent lamp breakage} and point emissions. Increase due in part to inclusion of electric generating units previously included in the ICI Boilers and Process Heaters Category.
Total (all categories)	**246**	**105**	**61**	**56**	**52**	**33**	**30**	

Figure 2-5: Trends in NEI Mercury emissions



As shown in Table 2-10, 2020 Hg emissions are 3 tons lower than in the 2017. This difference is primarily due to lower Hg emissions from EGUs covered by MATS; industrial, commercial/institutional boilers and process heaters; and Electric Arc Furnaces. For EGUs, the decrease is a combination of fuel switching to natural gasthe installation of Hg controls to comply and the co-benefits of Hg reductions from control devices installed for the reduction of SO_2 and PM. For industrial and commercial/institutional boilers, there appears to be fewer boilers using coal.

2.8 References for 2020 inventory contents overview

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2. U.S. Environmental Protection Agency, 2018. Residual Risk Assessment for the Coal- and Oil-Fired EGU Source Category in Support of the 2019 Risk and Technology Review Proposed Rule, Office of Air Quality Planning and Standards, Docket No. EPA-HQ-OAR-2018-0794-0070, December 2018.

3. Email from Nabanita Modak, EPA, to Janice Godfrey, EPA (cc: Madeleine Strum, EPA and Eric Goehl, EPA) with attached spreadsheet “Facility FRS_NEI IDS For CISWI Units030917.xlsx” emailed 9/6/2019.

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