Developing a Local-Scale Nonpoint Area Source Emissions Inventory: Cuyahoga County, Ohio

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ABSTRACT

The development of a nonpoint area source emissions inventory is often dictated by the time and resources available. As part of the National Emissions Inventory (NEI), EPA has developed county-level emission inventories of criteria and hazardous air pollutants (HAPs) for nonpoint area sources in the United States for the 1996 and 1999 base years using top-down methodologies. State, local, and tribal agencies have periodically had opportunity to provide comments, corrections, and bottom-up supplemental data to these inventories. The incorporation of bottom-up emissions data has always been encouraged by EPA to improve the NEI. Although the trend for data submissions increased from 22 agencies in 1996 to 40 agencies in 1999, lack of time and resources have been limiting factors for several agencies, preventing development of a bottom-up nonpoint area sources inventory for NEI submission.

Under a community grant from EPA's Integrated Air Toxics Strategy Program, ERG, Inc. prepared a 2002 nonpoint area sources inventory of 33 HAPs for Cuyahoga County, Ohio. Estimates for over fifty source categories were developed for this inventory, with most based on activity data specific to Cuyahoga County. This paper summarizes the bottom-up estimation methodologies used, discusses the resources needed to gather the necessary data, and compares the results to the top-down approaches used for the development of the 1999 NEI.

INTRODUCTION

An air toxics emission inventory was prepared for Cuyahoga County (representing the greater Cleveland, Ohio area) as a project under the Cleveland Clean Air Century Campaign. This Campaign and the associated inventory project is an outgrowth of the U.S. Environmental Protection Agency's (EPA's) Integrated Air Toxics Strategy program.[1] As part of its overall efforts to reduce air toxics, on July 19, 1999, the EPA released the Integrated Air Toxics Strategy.[2] The Strategy presented a framework for addressing air toxics in urban areas, including plans to conduct initiatives at both the national and local levels to address specific pollutants and to identify and address specific community risks.

The Cleveland pilot study is one of the first demonstrations of a community-based approach to air toxics emissions reduction that may serve as a national model. In 2001, the U.S. EPA's Office of Air and Radiation began a pilot effort (i.e., the Cleveland Air Toxics Pilot Program) to test whether an inclusive, local-scale decision-making process can result in voluntary reductions in air toxics exposure with wide-based acceptance and support in the community. The approach is intended to supplement, not replace, regulatory programs. The pilot is designed to address air toxics in an integrated manner, with projects directed at outdoor (stationary and mobile) and indoor sources. Its primary three goals are to reduce air toxics in Cleveland within a year, ensure the overall project is sustainable within the community, and ensure the approach can be replicated in other counties across the United States.[3]

The U.S. EPA made funds available to conduct risk reduction activities, facilitate and evaluate the stakeholder process, and perform limited assessment activities. After an extensive selection process, EPA proposed to conduct a pilot program in Cleveland, Ohio. Prior to the launch of the pilot program in

March 2001, EPA hired an independent facilitation firm to convene a Working Group that would be the project's decision-making body. The Working Group was formed in June 2001. It consists of Cleveland residents, and representatives from environmental groups, local area businesses and business organizations, governmental and non-governmental agencies, the Ohio EPA, U.S. EPA Region V, and U.S. EPA headquarters. Local citizen involvement is particularly strong from the Cleveland neighborhoods of Slavic Village and St. Clair-Superior. Work Group subcommittees were charged with developing project proposals that included a discussion of the air toxic pollutants to be potentially reduced, expected emissions reductions, length and difficulty of implementation, and other issues. In July 2002, the Working Group decided which project proposals to fund. One of the approved projects was the development of an air toxics emission inventory of the 33 urban HAPs (listed in Table 1) for Cuyahoga County, Ohio.

This paper focuses on the development of the stationary nonpoint sources portion of that inventory. The full inventory project also addressed stationary point and mobile sources.

Stationary Nonpoint Sources

Stationary nonpoint sources are defined in two ways: 1) small stationary point sources that can be grouped by a source category and whose emissions are usually not calculated for individual facilities because the category contains too many and/or too widely dispersed sources to make this reasonable; and 2) sources that do not really have a true "point" of emission.[4]

Stationary sources can be reported as an individual facility, which is referred to as "point," or at the county level, which is referred to as "nonpoint." Examples of stationary point sources that are commonly reported as nonpoint sources include dry cleaners, graphic arts, and autobody refinishing activities; these facilities are often reported by source category at the county level. Examples of sources that do not have a "point" of emission include forest fires, commercial pesticide usage, and traffic marking activities; these source categories are usually only delineated to the county level.

Several steps were needed to develop a Cuyahoga County air toxics nonpoint source inventory. The general steps needed were:

- Identifying nonpoint source categories;
- Gathering activity and HAP emission factors;
- Evaluating state, local, and federal regulations;
- Developing nonpoint source category estimates; and
- Resolving quality assurance/quality control (QA/QC) checks specific to nonpoint source inventories.

Data Sources Used to Compile the Inventory

The first step to developing a countywide nonpoint source inventory was to develop a comprehensive list of emission source categories. Table 2 summarizes the nonpoint source categories that were initially considered, and the ones finally developed. Nonpoint source categories and their associated emissions in the 1999 NEI for Cuyahoga County were the starting point for the 2002 inventory development effort.[4] An initial list of 73 source categories was compiled as potential candidates for emission estimation development after: 1) reviewing the 1999 category list for Cuyahoga County; 2) evaluating specific information for Cuyahoga County; and 3) reviewing other state/local inventories that provided estimates to the 1999 NEI.

After researching and contacting Ohio and Cuyahoga County programs, offices, and agencies, and reviewing data available to the point source portion of the inventory, this list was finalized to 54

source categories that emitted at least one of the 33 urban HAPs. Table 3 lists these source categories and the primary data sources of activity data. Table 4 provides a summary of the remaining 19 source categories not in this nonpoint inventory.

Estimation Procedures Used

County level estimates for the nonpoint source categories were developed using EPA-approved methodologies or through other peer-reviewed methodologies and models, such as those in the NEI, the Emission Inventory Improvement Program (EIIP), Compilation of Air Pollutant Factors (*AP-42*), and/or developed by other state and local agencies.[4,5,6,7]

In cases where multiple methodologies were available, the cost effectiveness of using an approach in terms of any locally-specific data requirements that existed were evaluated. For example, surveys can be useful tools for gathering county-specific activity data, especially for consumer products usage. However, due to limited time and resources needed to execute an effective survey, an alternate approach, purchasing marketing data for the Cleveland primary metropolitan statistical area (PMSA), was used instead for selected source categories. This proved to be a more cost-effective alternative to the survey approach for both time and resources, and still yielded acceptable emissions estimates.

Where county level data were not readily available, state or national data were collected and allocated to the county level using an appropriate surrogate, such as county business employment, population, or land use type. Locally-specific data enhanced the emissions inventory as compared to allocating national-level activity data via a Cuyahoga County surrogate. For example, using the NEI allocation approach for apportioning nationwide tetrachloroethylene (also called perchloroethylene) emissions from dry cleaning, which is based on the number of employees working at dry cleaning facilities, would have estimated Cuyahoga County emissions as 109.1 tons per year (tpy). The NEI allocation methodology was amended for this inventory to first allocate emissions by amount of money spent on dry cleaning in the Cleveland PMSA (made up of six counties, including Cuyahoga County) in comparison to the amount spent in the entire county. This approach was used because it was believed that consumer spending is more closely related to perchloroethylene consumption than number of employees. From the PMSA-level, emissions were then allocated to Cuyahoga County based on 2001 County Business Patterns (CBP) employment for dry cleaners.[8] This amended method provided an estimate of 92.21 tpy. The result is that county-wide emissions would have been overestimated by nearly 17 tons if only the NEI allocation method had been used. Table 5 is a summary of the allocation methods used for all source categories.

Expertise from the Cleveland Public Health Department staff was used to acquire activity data or provide contacts among other state/local agencies and programs. For example, the Department of Transportation (DOT) is typically responsible for the annual repainting of traffic lines (source category: traffic markings). Cuyahoga County lane miles were provided by the Cuyahoga County DOT, and, using national lane miles, a county-specific proportion was applied to the national-level estimates for traffic markings.

Other contacts included:

- The state Fire Marshall for the number of structure and motor vehicle fires in 2002;
- The Ohio Division of Surface Water for an estimate of the gallons of wastewater treated;
- The County auditor's office for number of homes with fireplaces and square footage of commercial/institutional buildings; and,

- The County Public Health Offices to for information on outdoor swimming pools.

Source categories that are affected by maximum achievable control technology (MACT) or volatile organic compound (VOC) rules that took effect prior to 2002 were also evaluated for mandatory emission source reductions. For example:

- The National Volatile Organic Compound Emission Standards for Consumer Products calls for a reduction of VOC content of 20% in many consumer products, such as hair sprays, insecticides, and household cleaning agents.[9] A number of the 33 urban HAPs can be speciated from the total VOCs being released from these emission sources.

- Although Cuyahoga County was not designated as an ozone nonattainment area in 2002, certain emission sources in Ohio are required to install control equipment to reduce VOC emissions. For example, gasoline service stations in Cuyahoga County (among several counties) that distribute more than 10,000 gallons per month are required to install VOC vapor recovery units (VRUs) on their fuel nozzles.[10] The minimum control efficiency required for these VRUs is 95% VOC reduction, which is higher than the minimum 86% required by the federal government and used in the 1999 NEI.

- Additionally, the Cuyahoga County DOT confirmed the year-round ban on the use of cutback asphalt for their paving operations.[11] Thus, there are no HAP emissions from this source category.

For most of the source categories, no seasonal adjustments were needed to generate the annual emissions estimate. However, some assumptions were made for certain categories which are dependent upon season. Although "seasonal" activity information was available, emissions were calculated and reported on an annual basis. For example:

- Outdoor swimming pools are active during warmer times of the year. Information provided by the Cuyahoga County Health Department indicated that public outdoor pools are used during the four-month period from May to September. During the other eight months, it is assumed that the public outdoor pools are drained and/or covered. It was assumed that residential outdoor pools were active from May to October. Similar to public outdoor pools, the residential outdoor pools are assumed to be drained and/or covered during the other seven months. Thus, chloroform emissions from public outdoor pools presented in this inventory were indicative for the four-month active season, while residential outdoor pools were indicative of the five-month active season.

- Soil excavation for remediation of underground storage tanks (USTs) was assumed to occur during the summer season (June through August), when the soil is warm. Thus benzene emissions from leaking USTs were indicative of the three-month summer season.

- Residential/commercial/institutional/industrial fuel combustion for heating was assumed to be most active (if not all) during the colder, winter season.

Calculated Emission Estimates for Nonpoint Sources in Cuyahoga County

Annual emission estimates, in tons per year, for the 33 urban HAPs are shown in Figure 1 by source category. Over 476 tpy were emitted from 54 nonpoint source categories. All methodologies

containing references and assumptions for developing these estimates are described in the Final Report.[12] In most methodologies, an activity factor is multiplied by an emission factor to generate an emission estimate. For example, amount of natural gas consumed for heating and cooling institutional/ commercial buildings in million British Thermal Units (MMBtu) was multiplied by a natural gas emission factor in the format of pound of pollutant emitted per MMBtu consumed. Where applicable, emissions may were adjusted to account for control devices in place. For example, the VOC rule requirements for using VRUs are applied at gasoline dispensing facilities as mandated for Cuyahoga County to reduce emissions by 95%. Thus, the calculated emissions were multiplied by an adjustment factor of 0.05 to account for the control technology required.

Ninety percent of the nonpoint emissions in this inventory are emitted from nine source categories. The top three emitting-source categories are: consumer products usage of Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)-regulated chemicals, paint stripping operations, and perchloroethylene dry cleaners. These three categories represent over 57% of the nonpoint emissions. In the 1999 NEI, nationwide the top three emitting categories for the 33 urban HAPs are forest/wildfires (37.96%), prescribed burnings (10.03%), and perchloroethylene dry cleaners (5.26%).[4] Consumer products usage of FIFRA-regulated chemicals (4.91%) and paint stripping operations (4.73%) are the next highest categories. Since Cuyahoga County did not have any forest/wildfires in 2002 and prescribed burning is not allowed, the county profile matches well with the nationwide profile.

Figure 2 is a summary of the 33 urban HAP emissions from nonpoint sources by pollutant. Methylene chloride, 1,3-dichloropropene, and tetrachloroethylene sources comprise nearly 76% of the total emissions. In the 1999 NEI, nationwide the top three urban HAPs by emissions are formaldehyde (27.89%), benzene (22.67%), and methylene chloride (11.24%). Benzene and formaldehyde emissions are ranked 4th and 6th, respectively, in the Cuyahoga County nonpoint inventory. The difference in this profile is that in the NEI, those pollutants are driven by emission sources that didn't occur in 2002 in the county (forest/wildfires) or are not permitted in the county (prescribed burnings, residential burning of trash, etc.).

QA/QC Procedures Applied in the Derivation of Emission Estimates

Rigorous QA/QC approaches were applied to all emission estimates. The use of spreadsheets for calculations proved to be a favorable approach to check for computational and systematic errors. Specific QA/QC checklists were implemented for all estimates, and all calculations were peer reviewed by a senior staff member. Table 6 compares the 2002 estimates against the 1999 NEI Cuyahoga County emissions. For many source categories, there are significant differences. This reflects the use of more-accurate local activity data, for the most part.

Many source categories also have a point source component, such as perchloroethylene dry cleaners. Wherever possible, small stationary point estimates which overlapped with the nonpoint source categories were retained at the facility-level and submitted with the point sources inventory; the nonpoint source category was then adjusted to account for the point source contribution.

For example, calculated countywide perchloroethylene dry cleaning emissions were 92.21 tons. However, nearly one-third of the county facilities using perchloroethylene are included in the point source inventory, with perchloroethylene emissions totaling 19.642 tons. Thus, the nonpoint estimates were reduced by the point source contribution to yield a revised nonpoint estimate of 72.568 tons. Other source categories where point source adjustments were made are noted in Table 5.

Limitations of the Nonpoint Source Inventory

Three limitations are identified for those using this inventory. First, this inventory only covers the pollutants which are considered 33 urban HAPs, and not the full 188 HAPs classified by EPA from the Clean Air Act (CAA). Consequently, this inventory will significantly underestimate overall county level nonpoint emissions of air toxics. Some source categories in this inventory emit much higher emissions on a total HAP basis, such as autobody refinishing. This category is ranked 10^{th} for total HAPs in the 1999 NEI, yet ranked 25^{th} in this inventory. The highest emitting HAPs from autobody refinishing are xylene, toluene, methyl ethyl ketone, methyl isobutyl ketone, and glycol ethers. None of these HAPs are 33 urban HAPs.

Second, only sources that emit a 33 urban HAP are presented in this inventory. Additional source categories, such as graphic arts and industrial surface coatings, typically emit no 33 urban HAPs, according to speciation profiles used in the NEI. It is possible that some 33 urban HAPs are emitted from special solvents and coatings typically used in Cuyahoga County that are not identified in the current NEI methodologies.

Finally, certain source categories have higher quality activity data than others. Generally, locally-specific activity data have the highest quality, while allocation of a national emission estimate via a broad county-level surrogate has the lowest quality. Source categories that have the highest quality estimation methodologies include fireplaces (with and without inserts), and publicly owned treatment works. Estimation methodologies that have the lowest quality include paint stripping operations, autobody refinishing, chrome electroplating (all types), and some of the mercury-emitting source categories (lamp breakage, dental preparation and use, and general laboratory activities).

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KEYWORDS

Emission Inventory
Hazardous Air Pollutants
Urban-33 HAP
Cleveland, Ohio
Nonpoint Sources

Table 1. 33 Urban HAPs Identified By EPA Its Integrated Air Toxics Strategy

Acetaldehyde	Ethylene Oxide
Acrolein	Formaldehyde
Acrylonitrile	Hexachlorobenzene
Arsenic Compounds	Hydrazine
Benzene	Lead Compounds
Beryllium Compounds	Manganese Compounds
1,3- Butadiene	Mercury Compounds
Cadmium Compounds	Methylene Chloride
Carbon Tetrachloride	Nickel Compounds
Chloroform	Polychlorinated Biphenyls (PCBs)
Chromium Compounds	Polycyclic Organic Matter
Coke Oven Emissions	Quinoline
1,2-Dibromoethane	1,1,2,2-Tetrachloroethane
1,2-Dichloropropane	Tetrachloroethylene (also called Perchloroethylene)
1,3-Dichloropropene	Trichloroethylene
Dioxins and Furans	Vinyl Chloride
Ethylene Dichloride	

Table 2. Initial Nonpoint Source Category List

Animal Cremation	Industrial Boilers: Natural Gas
Asphalt Paving - Cutback	Industrial Boilers: Residual Oil
Autobody Refinishing	Industrial Boilers: Waste Oil
Aviation Gasoline Distribution: Stage I	Institutional/Commercial Heating - Anthracite Coal
Aviation Gasoline Distribution: Stage II	Institutional/Commercial Heating - Bituminous Coal
Chromium Plating: Chromic Anodizing	Institutional/Commercial Heating - Distillate Oil
Chromium Plating: Decorative Chromium Plating	Institutional/Commercial Heating - Natural Gas
Chromium Plating: Hard Chromium Plating	Institutional/Commercial Heating - POTW Digester Gas
Commercial Agricultural Pesticide Application	Institutional/Commercial Heating - Residual Oil
Concrete, Gypsum, and Plaster Products Manufacturing	Lamp Breakage
Consumer Products Usage - Adhesives & Sealants	Leaking Underground Storage Tanks
Consumer Products Usage - Automotive Aftermarket	Miscellaneous Organic Chemical Processes
Consumer Products Usage - Coating & Related Products	Motor Vehicle Fires - Components
Consumer Products Usage - FIFRA-regulated	Motor Vehicle Fires - Tires
Consumer Products Usage - Household Products	Natural Gas Transmissions and Storage
Consumer Products Usage - Miscellaneous	Oil and Natural Gas Production
Consumer Products Usage - Personal Care Products	Open Burning - Forest and Wildfires
Dental Use and Preparation	Open Burning - Prescribed Burning
Fireplaces: General	Open Burning - Residential Trash
Fireplaces: Insert; EPA certified; catalytic	Open Burning of Scrap Tires
Fireplaces: Insert; EPA certified; non-catalytic	Outdoor Swimming Pools
Fireplaces: Insert; non-EPA certified	Paint Stripping Operations
Flexible Polyurethane Foam Fabrication	Perchloroethylene Dry Cleaning
Flexible Polyurethane Foam Production	Publicly Owned Treatment Works (POTWs)
Fluorescent Lamp Recycling	Residential Heating: Anthracite Coal
Gasoline Distribution - Stage I: Bulk terminals, Bulk plants, and Pipeline Facilities	Residential Heating: Bituminous & Lignite Coal
Gasoline Distribution - Stage I: Service Stations	Residential Heating: Distillate Oil
Gasoline Distribution - Stage II	Residential Heating: Liquefied Petroleum Gas
General Lab Activities	Residential Heating: Natural Gas
Grain Elevators	Structure Fires
Graphic Arts	Surface Coating: Architectural - water based
Halogenated Solvent Cleaning	Surface Coating: Industrial Maintenance
Hospital Sterilizers	Surface Coating: Traffic Markings
Human Cremation	Woodstoves: catalytic, general
Industrial Boilers: Anthracite Coal	Woodstoves: conventional
Industrial Boilers: Bituminous Coal	Woodstoves: non-cataylic, general
Industrial Boilers: Distillate Oil	

Table 3. Activity Data Sources for Nonpoint Source Categories

Source Category	Primary Activity Data Source
Animal Cremation	CLAA[a] Permit data/Personal Communication
Autobody Refinishing	EPA: Lead Locating & Estimating Document
Aviation Gasoline Distribution: Stage I	Airport-Specific Fixed Base Operations
Aviation Gasoline Distribution: Stage II	Airport-Specific Fixed Base Operations
Chromium Plating - Chromic Anodizing	EPA: MACT[b] data
Chromium Plating - Decorative Electroplating	EPA: MACT[b] data
Chromium Plating - Hard Chromium	EPA: MACT[b] data
Commercial Agricultural Pesticide Application	U.S. Department of Agriculture
Consumer Products Usage - Adhesives & Sealants	Cuyahoga County population
Consumer Products Usage - Automotive Aftermarket	Cuyahoga County population/Marketing data
Consumer Products Usage - Coating & Related Products	Cuyahoga County population
Consumer Products Usage - FIFRA-regulated	Cuyahoga County population/Marketing data
Consumer Products Usage - Household Products	Cuyahoga County population
Consumer Products Usage - Miscellaneous	Cuyahoga County population
Consumer Products Usage - Personal Care Products	Cuyahoga County population
Dental Use and Preparation	EPA: Mercury Report to Congress
Fireplaces: General	Cuyahoga County Auditor's Office
Fireplaces: Insert; EPA certified; catalytic	Cuyahoga County Auditor's Office
Fireplaces: Insert; EPA certified; non-catalytic	Cuyahoga County Auditor's Office
Fireplaces: Insert; non- EPA certified	Cuyahoga County Auditor's Office
Gasoline Distribution - Stage I - Service Station Filling	Ohio Department of Transportation
Gasoline Distribution - Stage II	Ohio Department of Transportation
General Lab Activities	EPA: Mercury Report to Congress
Hospital Sterilizers	Ethylene Oxide Industry Council
Human Cremation	Cremation Association of North America
Industrial Boilers: All Fuels[c]	DOE[d]: Energy Information Administration
Institutional/Commercial Heating – All Fuels[c]	DOE[d]: Energy Information Administration
Lamp Breakage	National Electrical Manufacturer's Association
Leaking Underground Storage Tanks	Ohio Bureau of Underground Storage Tanks
Motor Vehicle Fires - Components	Ohio Fire Prevention Bureau
Motor Vehicle Fires - Tires	Ohio Fire Prevention Bureau
Outdoor Swimming Pools	Cuyahoga County Health Department; Pool List USA
Paint Stripping Operations	Halogenated Solvent Industrial Alliance
Perchloroethylene Dry Cleaning	Halogenated Solvent Industrial Alliance
Publicly Owned Treatment Works (POTWs)	Ohio Division of Surface Water
Residential Heating: All Fuels[e]	DOE[d]: Energy Information Administration
Structure Fires	Ohio Fire Prevention Bureau
Surface Coating: Architectural - water based	Census Bureau Current Industrial Reports
Surface Coating: Traffic Markings	Census Bureau Current Industrial Reports
Woodstoves, Catalytic	DOE[d]: Energy Information Administration
Woodstoves: Conventional	DOE[d]: Energy Information Administration
Woodstoves: Non-catalytic	DOE[d]: Energy Information Administration

[a] = CLAA: Cleveland Local Air Agency

[b] = MACT: Maximum Achievable Control Technology

[c] = Fuel types: anthracite coal, bituminous coal, distillate oil, natural gas, and residual oil

[d] = DOE: Department of Energy

[e] = Fuel types: anthracite coal, bituminous coal, distillate oil, liquefied petroleum gas, and natural gas

Table 4. Categories Not Included in the Nonpoint Sources Inventory

Source Category	Reason Not Included
Asphalt Paving - Cutback	Banned in Cuyahoga County
Concrete, Gypsum, and Plaster Products Manufacturing	Covered in point sources data (TRI[a] data)
Flexible Polyurethane Foam Fabrication	Covered in point sources data (TRI[a] data)
Flexible Polyurethane Foam Production	Covered in point sources data (TRI[a] data)
Fluorescent Lamp Recycling	Not practiced in Cuyahoga County
Gasoline Distribution - Stage I: Bulk Terminals, Pipelines, and Bulk Plants	Covered in point sources data (CLAA[b] data)
Grain Elevators	No Urban-33 HAP
Graphic Arts	No Urban-33 HAP
Halogenated Solvent Cleaning	Covered in point sources data (CLAA[b] data)
Industrial Boilers: Waste Oil	No activity data available
Institutional/Commercial Heating: POTW Digester Gas	No activity data available
Miscellaneous Organic Chemical Processes	Covered in point sources data (TRI[a] data)
Natural Gas Transmissions and Storage	Covered in point sources data (TRI[a] data)
Oil and Natural Gas Production	Covered in point sources data (TRI[a] data)
Open Burning - Forest and Wildfires	No activity in 2002
Open Burning - Prescribed Burning	Banned in Cuyahoga County
Open Burning - Residential Trash	Banned in Cuyahoga County
Open Burning of Scrap Tires	No activity in 2002
Surface Coating - Industrial Maintenance	No Urban-33 HAP

[a] = TRI: Toxic Release Inventory

Table 5 – Allocation Methods for Nonpoint Sources

Source Category	Allocation Data[a]
Animal Cremation	County-level animal cremation data
Autobody Refinishing	*County employment*
Aviation Gasoline Distribution: Stage I	County-level AvGas sold
Aviation Gasoline Distribution: Stage II	County-level AvGas sold
Chromium Plating - Chromic Anodizing	Number of county-facilities
Chromium Plating - Decorative Electroplating	Number of county-facilities
Chromium Plating - Hard Chromium	Number of county-facilities
Commercial Agricultural Pesticide Application	*County farm acres available for planting*
Consumer Products Usage - Adhesives & Sealants	*County-level population*
Consumer Products Usage - Automotive Aftermarket	PMSA[b] marketing data/County-level population
Consumer Products Usage - Coating & Related Products	*County-level population*
Consumer Products Usage - FIFRA-regulated	PMSA[b] marketing data/County-level population
Consumer Products Usage - Household Products	*County-level population*
Consumer Products Usage - Miscellaneous	*County-level population*
Consumer Products Usage - Personal Care Products	*County-level population*
Dental Use and Preparation	*County-level employment*
Fireplaces: General	County-level number of fireplaces
Fireplaces: Insert; EPA certified; catalytic	County-level number of fireplaces
Fireplaces: Insert; EPA certified; non-catalytic	County-level number of fireplaces
Fireplaces: Insert; non- EPA certified	County-level number of fireplaces
Gasoline Distribution - Stage I - Service Station Filling	County-level gallons gasoline dispensed
Gasoline Distribution - Stage II	County-level gallons gasoline dispensed
General Lab Activities	*County-level employment*
Hospital Sterilizers	County-level number of hospital beds
Human Cremation	*County-level population*
Industrial Boilers: All Fuels[c]	*County-level employment*
Institutional/Commercial Heating – All Fuels[c]	County-level institutional/commercial heated square footage
Lamp Breakage	*County-level population*
Leaking Underground Storage Tanks	State-level cubic yards excavated/County-level number of soil excavations
Motor Vehicle Fires - Components	County-level number of vehicle fires
Motor Vehicle Fires - Tires	County-level number of vehicle fires
Outdoor Swimming Pools	County-level number of residential and public pools
Paint Stripping Operations	*County-level population*
Perchloroethylene Dry Cleaning	PMSA[b] Marketing data/County-level employment
Publicly Owned Treatment Works (POTWs)	County-level gallons of water treated at POTWs
Residential Heating: All Fuels[d]	*County-level number of homes using different fuels*
Structure Fires	County-level number of structure fires
Surface Coating: Architectural - water based	*County-level population*
Surface Coating: Traffic Markings	County-level lane miles
Woodstoves, Catalytic	*HDD[e] county climate profile*
Woodstoves: Conventional	*HDD[e] county climate profile*
Woodstoves: Non-catalytic	*HDD[e] county climate profile*

[a] = *italics* indicates NEI methodology

[b] = PMSA: Primary Metropolitan Statistical Area; includes Cuyahoga, Ashtabula, Geauga, Lake, Lorain, and Medina Counties

[c] = Fuel types: anthracite coal, bituminous coal, distillate oil, natural gas, and residual oil

[d] = Fuel types: anthracite coal, bituminous coal, distillate oil, liquefied petroleum gas, and natural gas

[e] = Heating Degree Days

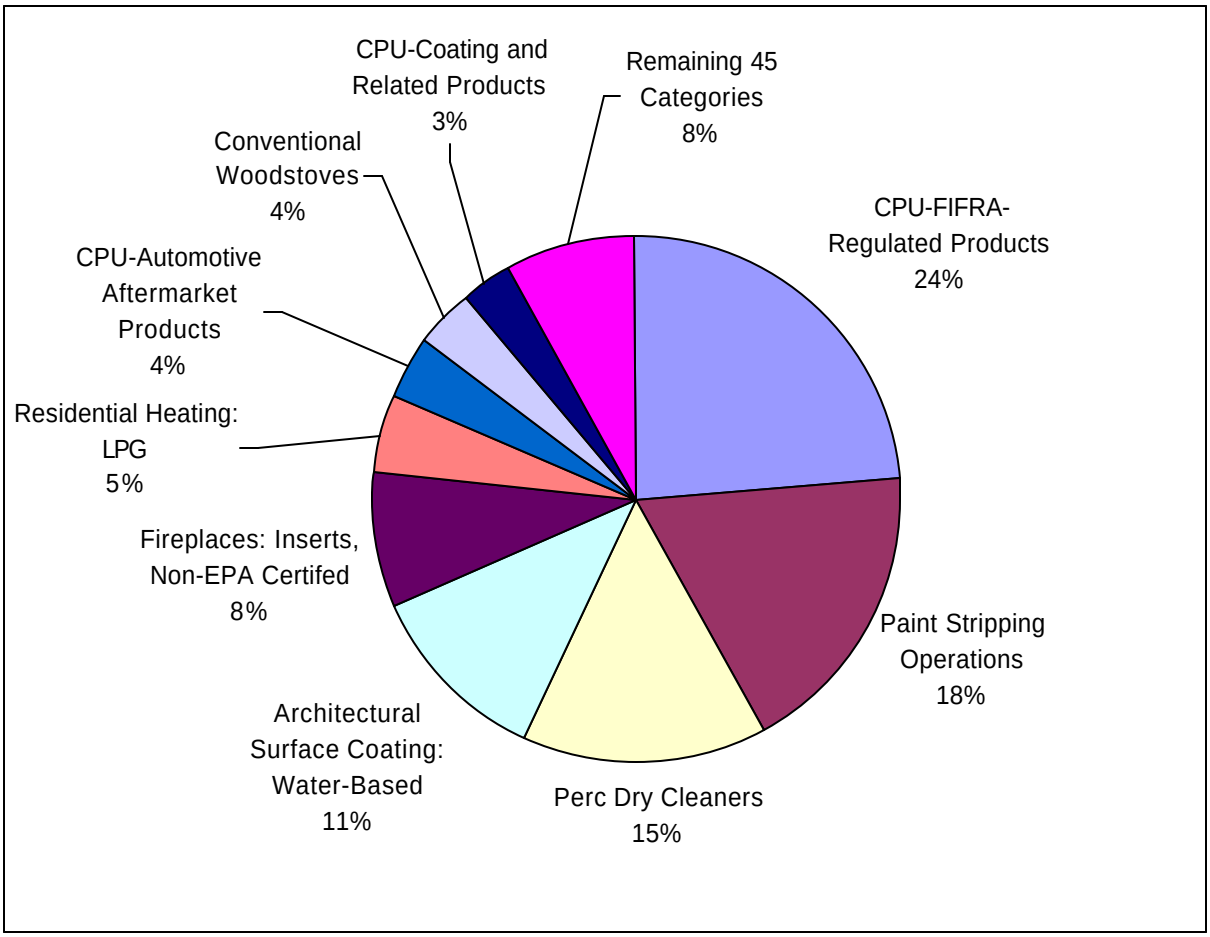
Table 6. Comparison of 1999 NEI and 2002 Nonpoint Source HAP Emissions

Nonpoint Source Category	1999 NEI Cuyahoga County Emissions (tpy)	2002 Cuyahoga County Emissions (tpy)	% Change
CPU - FIFRA-regulated Products[a]	110.60	113.30	2.45%
Perchloroethylene Dry Cleaners[b]	108.58	72.57	-33.17%
Paint Stripping Operations	97.40	85.84	-11.87%
Architectural Surface Coating	57.23	53.89	-5.84%
Outdoor Swimming Pools	25.66	6.59	-74.31%
Fireplaces: Inserts - non-EPA certified	23.87	38.68	62.04%
Residential Heating - Conventional Woodstoves	20.37	17.42	-14.49%
CPU - Automotive Aftermaket Products	17.89	19.08	6.64%
CPU - Coating and Related Products	14.97	14.94	-0.18%
Publicly Owned Treatment Works	10.67	0.02	-99.82%
Structure Fires	8.10	8.62	6.42%
Stage II Aviation Gasoline Distribution	0.01	0.02	263.84%
CPU - Adhesives and Sealants	6.00	6.02	0.35%
CPU - Household Products	3.30	3.32	0.52%
Hospital Sterilizers	1.76	1.40	-20.37%
Stage I Gasoline Distribution: Service Station Filling	1.62	0.50	-68.98%
Residential Heating - Natural Gas	1.55	2.12	36.91%
Stage I Aviation Gasoline Distribution	0.96	0.80	-16.82%
Institutional/Commercial Heating: Natural Gas	0.86	0.76	-11.87%
Industrial Boilers: Residual Oil	0.84	0.28	-67.17%
Industrial Boilers: Natural Gas	0.74	1.28	73.19%
Stage II Gasoline Distribution	0.67	1.47	121.23%
CPU - Miscellaneous	0.53	0.54	0.30%
Institutional/Commercial Heating: Distillate Oil[b]	0.46	0.18	-59.97%
Fireplaces: Inserts - EPA certified	0.45	0.73	62.16%
Residential Heating - Catalytic Woodstoves	0.39	0.33	-14.39%
Residential Heating - Distillate Oil	0.35	0.03	-92.44%
Autobody Refinishing and Paint Application	0.27	0.35	30.52%
Traffic Markings	0.19	0.01	-94.40%
Institutional/Commercial Heating: Residual Oil	0.12	2.26E-04	-99.81%
Industrial Boilers: Distillate Oil	0.05	0.20	285.85%
Hard Chromium Electroplating[b]	0.03	1.53E-03	-95.05%
Residential Heating - Bituminous and Lignite Coal	0.02	1.38E-03	-91.38%
Fireplaces: Inserts - Non-catalytic, EPA-certified	0.01	0.02	56.43%
Institutional/Commercial Heating: Bituminous and Lignite	0.01	0.05	255.19%
Residential Heating - Anthracite Coal	7.00E-03	4.97E-04	-92.90%
Lamp Breakage	6.00E-03	3.57E-03	-40.48%
Dental Preparation and Use	4.68E-03	6.82E-03	45.72%
General Laboratory Activities	4.52E-03	6.19E-03	36.97%
CPU - Personal Care Products	3.00E-03	2.80E-03	-6.67%
Decorative Chromium Electroplating[b]	2.00E-03	5.21E-04	-73.97%
Institutional/Commercial Heating: Anthracite Coal	1.98E-03	6.86E-03	246.44%
Human Cremation[b]	1.60E-03	1.12E-03	-29.71%
Chromic Acid Anodizing[b]	7.66E-04	0.02	2680.83%
Animal Cremation	9.78E-06	1.29E-08	-99.87%
Commercial Agricultural Pesticide Application	3.79E-07	2.65E-07	-30.09%
Fireplaces	1.21E-08	3.38E-08	179.27%

[a] CPU - consumer product usage.

[b] Estimate does not reflect point source contribution.

Figure 1 – Cuyahoga County Nonpoint Source Category Emissions



Note: CPU = Consumer Products Usage

Figure 2 – Cuyahoga County Nonpoint Source HAP Emissions