

Implementing a Collaborative Process to Improve the Consistency, Transparency, and Accessibility of the Nonpoint Source Emission Estimates in the 2008 National Emissions Inventory

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ABSTRACT

In an effort to improve the development and quality of the nonpoint source emissions needed for the National Emissions Inventory (NEI), the U.S. Environmental Protection Agency (EPA) teamed up with the Eastern Regional Technical Advisory Committee (ERTAC) to implement changes to enhance consistency, transparency, and accessibility of nonpoint source emission estimates. ERTAC, which is made up of emission inventory experts from State agencies, was created to coordinate emissions inventories needed for air quality modeling and to provide a technically driven process for developing and improving 2008 emission estimates.

The collaboration focused upon working with staff of regional and state air pollution control agencies to discuss (and ultimately agree upon) consistent sets of activity data, calculation methods, and emission factors. To facilitate information exchange between stakeholders and improve transparency and consistency, the EPA, through its subcontractor E.H. Pechan & Associates, Inc., constructed a publicly accessible nonpoint emissions website to house emission calculation workbooks and detailed documentation of calculation methodologies. The website can be found at http://projects.pechan.com/EPA/Non-Point_Emission_Estimates/index.html. The workbooks and documentation provided consistency between state calculations and the accessibility of information on the website enabled feedback on how methodologies should be modified to better reflect actual emissions.

Such collaborative development proved successful in leveraging existing knowledge and in yielding more practical insights than if the EPA acted alone. By fostering a more transparent and collaborative effort, the NEI production process is expected to become more efficient and timely, leading to better informed policy decisions.

INTRODUCTION

The NEI is a comprehensive inventory of the amount and types of criteria and hazardous air pollutants emitted into the atmosphere annually in the United States.¹ The Emissions Inventory and Analysis Group of the EPA compiles the NEI which consists of pollutant emissions from point, nonpoint, and mobile sources submitted by State, Local, and Tribal (S/L/T) agencies, estimates calculated by EPA, and emissions obtained from other sources. EPA, Regional Planning Organizations (RPOs), and S/L/T agencies use the NEI as a basis for various modeling and regulatory analyses as well as to evaluate emissions trends within and between states.

The nonpoint component of the NEI, traditionally referred to as the area source component, includes emission sources that are not incorporated into the mobile or point source components of the NEI. Such sources include agricultural production, construction dust, fertilizer application, and publicly owned treatment works to name a few. In previous years, EPA has prepared a default nonpoint NEI to assist S/L/T agencies in developing their emission inventories. The emission estimates included in the default inventory serve as a baseline for states to evaluate source category emissions. Where S/L/T

agencies have more detailed or better information, they are encouraged to replace the EPA's default emission estimates. One concern with the historical nonpoint NEI development process has been the lack of consistency and transparency in emission estimation methodologies between S/L/T agencies.

In 2008, Mark Janssen of the Lake Michigan Air Directors Consortium (LADCO), a regional organization established to provide technical assessments for and assistance to its member states on problems of air quality, identified improving area source emission inventories for the eastern states as a top priority project. Under the ERTAC umbrella, emission inventory experts from many eastern U.S. state agencies (see Table 1) formed a technical committee to focus on improvement of area source inventories. The committee asked EPA to join in the improvement effort and EPA subsequently agreed to facilitate the conference calls and to provide contractor support in developing county-level emission estimates based on ERTAC-approved emission estimation methodologies. For the 2008 NEI, the process instituted by ERTAC seeks to improve consistency and transparency through stakeholder involvement. The objectives of this new process are to: 1) develop consistent sets of activity data, calculation methods, and emission factors for use by S/L/T agencies when calculating emissions; 2) improve transparency by developing calculation workbooks and documentation for each source category that clearly display how EPA's default nonpoint emissions are calculated; 3) provide ready access to EPA's default calculation workbooks and documentation; and 4) track all changes/improvements made to the default nonpoint inventory.

METHODS BY OBJECTIVE

This section provides a brief overview of the methods implemented to achieve the objectives of improving the nonpoint NEI development process. The reader is encouraged to visit the websites discussed to learn more about the process.

Consistency

Over the past year, EPA has collaborated with stakeholders in the emissions inventory community to improve the consistency in estimating nonpoint air pollutant emissions. Working with ERTAC, EPA developed a set of criteria pollutant emissions factors for many nonpoint source categories for states to use when developing emission estimates. The emissions factors were initially compiled from sources such as WEBFIRE, AP-42, and EIIP; however, some were modified based on recommendations from state-level emissions inventory experts. Each emissions factor was assigned an ERTAC ranking from 1 to 3 to provide the user with an understanding of which categories would be included in the default emissions inventory. A ranking of 1 for a source category indicates every state must include emission estimates for that source category in the NEI and that EPA will calculate default emissions. A ranking of 2 indicates that not every state will have emissions for the source category and that EPA will include default emission estimates where appropriate. A ranking of 3 indicates that EPA will not calculate default emissions for the source category, but that states are encouraged to assess the importance of the source category and include emissions where appropriate. The emissions factors are compiled in an Excel spreadsheet and are available through ERTAC's website.²

Transparency

For all nonpoint source categories for which emissions were calculated for the 2008 NEI (see Table 2), EPA prepared calculation workbooks and accompanying documentation of how the calculations were performed. The workbooks and documentation serve three purposes. First, they provide stakeholders with an easily digestible means to understand how EPA calculated emissions for a given source category. Second, the workbooks provide a template for revising calculations. For example, if an S/L/T agency feels that their activity data are more accurate than EPA's estimate, the EPA activity estimate can simply be replaced in the workbook and emissions will be automatically recalculated. Third, the workbooks and documentation enable third party quality assurance of the calculations.

The emission calculation workbooks contain multiple worksheets. The first worksheet provides the Source Classification Code (SCC) for the category of emissions, the general equation used to

calculate emissions, and instructions to S/L/T agencies regarding how to modify the calculations. The second worksheet provides descriptions for all the worksheets in the workbook. The middle worksheets contain activity data and, where applicable, information on how activity was allocated to the county-level. The second to last worksheet contains emissions factors and the last worksheet contains county-level throughput and emissions. Any activity data or data used to allocate emissions are highlighted in yellow since these are the most likely data elements that an S/L/T agency may wish to update. Replacement of data in the yellow highlighted cells will automatically update emissions in the county-level emissions worksheet. In addition to transparency, these workbooks also enable a consistent way to calculate emissions. The worksheets are available through the website mentioned in the abstract and discussed in the accessibility section below.

Each workbook is accompanied by a documentation file describing the details of the data and calculations. The documentation file provides a description of the source category, a discussion of the activity data, a discussion of the emissions factors (including a table of all emissions factors and associated references), whether the calculations take into account emissions control devices/strategies, a section of sample calculations, and a list of references. The documentation serves as a concise record of the emission estimation methodologies for each source category. The documentation files are also available through the website mentioned in the abstract and discussed in the accessibility section below.

Accessibility and Tracking

To ensure timeliness and accessibility to the emission estimates for all source categories in Table 2, EPA, through its subcontractor E.H. Pechan & Associates, Inc., established a nonpoint source website to host the calculation workbooks and associated documentation (<http://projects.pechan.com/EPA/Non-Point Emission Estimates/index.html>). The website contains links to all calculation workbooks and documentation, enabling users to download any workbook to their personal computer for review and/or modification. Promotion of the website has occurred through ERTAC communications and through EPA emails to select S/L/T agencies.

A tracking log of all changes made to the calculation workbooks or documentation resulting from internal quality assurance procedures or from third party review of the files is maintained on the website. Recorded in the tracking log are the dates of all changes as well as descriptions of the changes. This keeps users informed of improvements made to the nonpoint source calculations and enables new users to understand how the files have been modified since their inception. After state review of the workbooks, a copy of the calculation files and documentation are transferred to the EPA and hosted on the EPA's website (<http://www.epa.gov/ttn/chief/net/2008inventory.html#inventorydata>).

CONCLUSIONS

As stated in EPA's Public Involvement Policy, to achieve EPA's mission to protect human health and the environment, EPA needs to integrate "the knowledge and opinions of others into its decision-making process. Effective public involvement can both improve the content of the Agency's decisions and enhance the deliberative process."^{3,4} With an effective process that involves stakeholders, a strong base of emission inventory experts can be built at the outset that enables a more productive and well-informed outcome. This process can ultimately unlock synergies yielding a timelier and more consistent nonpoint emissions inventory. The development of calculation workbooks, documentation, and the nonpoint source emissions website has begun to lay the foundation for such a process. The transparency and accessibility of the new process proved successful in stimulating dialogue among stakeholders, ultimately leading to improvements in the 2008 nonpoint source emissions estimates.

FUTURE IMPROVEMENTS

EPA, through participation in national conferences and additional outreach, anticipates that more stakeholders will become aware of the new nonpoint emissions calculation process. Moving forward, EPA seeks the involvement of these additional stakeholders to further tap S/L/T agency expertise. EPA also anticipates creating an additional nonpoint source website to host proposed emission calculation methodologies for comment prior to proceeding with the development of emissions estimates for the

default nonpoint NEI. This would enable stakeholder feedback earlier in the process, potentially reducing errors and further improving the timeliness of the inventory.

REFERENCES

1. “Documentation for the Final 2002 Nonpoint Sector (Feb 06 Version) National Emission Inventory for Criteria and Hazardous Air Pollutants”; Pechan Report No. 05.10.001/9014.401, Prepared for U.S. Environmental Protection Agency by E.H. Pechan & Associates, Inc., Durham, NC 2006.
2. Eastern Regional Technical Advisory Committee (ERTAC) website;
http://ertac.us/compare/state_comparison_ERTAC_SS_version7.2_23nov2009.xls
3. *Public Involvement Policy of the U.S. Environmental Protection Agency*, U.S. Environmental Protection Agency, Washington, DC, 2003; EPA 233-B-03-002, p 1.
4. Dalton, D. and Harter, P.J., “Better Decisions through Consultation and Collaboration”; prepared for the U.S. Environmental Protection Agency, 2009.

Table 1. List of states and RPOs participating in the ERTAC process.

States
Delaware
Georgia
Illinois
Maine
Maryland
Massachusetts
Michigan
New Jersey
New York
North Carolina
Ohio
Pennsylvania
Rhode Island
Virginia
Washington, D.C.
West Virginia
Wisconsin
RPOs
LADCO
MARAMA

Table 2. Nonpoint source categories for which EPA has estimated air pollutant emissions or activity levels for the 2008 National Emissions Inventory.

Nonpoint Source Category	Source Classification Code	Description
Agriculture Production - Livestock	28050nnnnn	Livestock
Asphalt Paving	2461021000	Cutback Asphalt
	2461022000	Emulsified Asphalt
Aviation Gasoline Distribution	2501080050	Airports : Aviation Gasoline; Stage 1: Total
	2501080100	Airports : Aviation Gasoline; Stage 2: Total
Commercial Cooking	2302002nnn & 2302003nnn	Commercial Cooking
Construction Dust	2311010000	Residential Construction
	2311020000	Non-residential Construction
	2311030000	Road Construction
Commercial/Institutional Fuel Combustion	2103001000	Commercial/Institutional Anthracite Coal
	2103002000	Commercial/Institutional Bituminous Coal
	2103004000	Commercial/Institutional Distillate Oil
	2103005000	Commercial/Institutional Residual Oil
	2103006000	Commercial/Institutional Natural Gas
	2103007000	Commercial/Institutional LPG
	2103011000	Commercial/Institutional Kerosene
Fertilizer Application	28017000nn	Fertilizer Application
Gasoline Distribution	25010110nn & 25010120nn	Portable Fuel Containers
	2501050120	Gasoline Distribution Stage I; Bulk Terminals
	2501055120	Gasoline Distribution Stage I; Bulk Plants
	250106005n	Gasoline Distribution Stage I; Gasoline Service Station Unloading
	2501060100	Gasoline Distribution Stage II; Gasoline Service Stations
	2501060201	Gasoline Distribution Stage I; Underground storage tank, breathing and emptying
	2505030120	Gasoline Distribution Stage I; Tank Trucks in Transit
	2505040120	Gasoline Distribution Stage I; Pipelines
Industrial Fuel Combustion	2102001000	Industrial Anthracite Coal
	2102002000	Industrial Bituminous Coal
	2102004000	Industrial Distillate Oil
	2102005000	Industrial Residual Oil
	2102006000	Industrial Natural Gas
	2102007000	Industrial LPG
	2102011000	Industrial Kerosene
Open Burning	2610000100	Open Burning - Yard Waste - Leaves
	2610000400	Open Burning - Yard Waste - Brush
	2610000500	Open Burning - Land Clearing Debris
	2610030000	Open Burning - Household Waste
	2830000000	Open Burning - Scrap Tires
Paved and Unpaved Roads	2294000000	Paved Road Dust
	2296000000	Unpaved Road Dust

Nonpoint Source Category	Source Classification Code	Description
Publicly Owned Treatment Works (POTW)	2630020000	Publicly Owned Treatment Works (POTW)
Residential Heating	2104001000	Residential Anthracite Coal
	2104002000	Residential Bituminous Coal
	2104004000	Residential Distillate Oil
	2104006000	Residential Natural Gas
	2104007000	Residential LPG
	2104008nnn & 2104009000	Residential Wood Combustion and Wax Firelogs
	2104011000	Residential Kerosene
Solvent Usage - Surface Coatings	2401001000	Surface Coating - Architectural Coatings
	2401005000	Surface Coating - Automobile Refinishing
	2401008000	Surface Coating - Traffic Paints
	2401015000	Surface Coating - Factory Finished Wood
	2401020000	Surface Coating - Wood Furniture and Fixtures
	2401025000	Surface Coating - Metal Furniture
	2401030000	Surface Coating - Paper, Film and Foil
	2401040000	Surface Coating - Metal Cans
	2401045000	Surface Coating - Metal Sheet, Strip and Coils
	2401055000	Surface Coating - Machinery and Equipment
	2401060000	Surface Coating - Appliances
	2401065000	Surface Coating - Electronic and Other Electrical Coatings
	2401070000	Surface Coating - Motor Vehicles
	2401075000	Surface Coating - Aircraft
	2401080000	Surface Coating - Marine coatings
	2401085000	Surface Coating - Railroads
	2401090000	Surface Coating - Misc. Manufacturing
	2401100000	Surface Coating - Industrial Maintenance Coatings
	2401200000	Surface Coating - Other Special Purpose Coatings
Solvent Usage - Other	2415000000	Cleaning Products: Industrial and Institutional
	2420000000	Dry Cleaning
	2425000000	Graphic Arts
	2460100000	Consumer & Commercial - Personal Care Products (Cosmetics and Toiletries)
	2460200000	Consumer & Commercial - Household Cleaning Products
	2460400000	Consumer & Commercial - Automotive Aftermarket
	2460500000	Consumer & Commercial - Coatings and Related Products
	2460600000	Consumer & Commercial - Adhesives and Sealants
	2460800000	Consumer & Commercial - FIFRA Regulated Products
	2460900000	Consumer & Commercial - Misc. Products

KEY WORDS

criteria air pollutants, nonpoint, area, ERTAC, transparency, consistency, collaboration