

Preparation of Fine Particulate Emissions Inventories

Chapter 5 – Point Source Inventory Development



How Do I Define a Point Source of PM Fine or NH₃ Emissions?

- Point sources are stationary sources included in a point source inventory
- Total plant (facility) emissions for a given pollutant is usually the criterion for deciding what sources to include in a point source inventory
- Criteria for including a stationary source in a point source inventory are determined by:
 - State, Local, or Tribal regulations or policy, and/or
 - Consolidated Emissions Reporting Rule (CERR)

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Filterable vs. Condensable

- Filterable PM are directly emitted
 - Solid or liquid
 - Captured on filter
 - PM₁₀ or PM_{2.5}
- Condensable PM is in vapor phase at stack conditions
 - Reacts upon cooling and dilution
 - Forms solid or liquid particle
 - Always PM_{2.5} or less

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Sources of Filterable versus Condensible Emissions

- Combustion sources typically emit both filterable and condensible PM emissions
 - Boilers
 - Furnaces/kilns
 - Internal combustion engines (reciprocating & turbines)
- Fugitive dust sources emit filterable emissions only
 - Storage piles
 - Unpaved roads at industrial sites

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Primary vs. Secondary PM

- Primary PM is directly emitted and the sum of filterable and condensable
- Secondary PM is formed through chemical reactions and formed downwind of the source
 - Precursors include SO₂, NO_x, and VOC
 - Should not be reported in the inventory

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Sources of NH₃ Emissions

- Industrial NH₃ emissions can be placed into 3 broad categories related to the nature of the emissions source:
 - Emissions from industrial processes
 - Use of NH₃ as a reagent in NO_x control
 - Refrigeration losses

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Sources of NH₃ Emissions (cont.)

- Examples of industrial processes that emit NH₃ include:
 - Combustion sources
 - Ammonium nitrate & ammonium phosphate production
 - Petroleum refining
 - Pulp and paper production
 - Beet Sugar Production
- These industrial processes represent the more significant emitters of NH₃ in 2000 Toxics Release Inventory (TRI)

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Resources for Identifying Point Sources of PM Fine and NH₃

- EIIP Point Source Guidance (Volume II)
 - List documents applicable to PM fine categories
- AP-42
- Existing Inventories
 - National Emissions Inventory
 - Toxics Release Inventory (TRI) for NH₃

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What to Report to EPA

- PM_{2.5}-PRI (or PM_{2.5}-FIL & PM-CON individually)
 - Note that all PM-CON is assumed to be PM_{2.5} size fraction
- PM₁₀-PRI (or PM₁₀-FIL & PM-CON individually)

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Implications

- Use the NIF 3.0 PM pollutant code extensions that identify the forms of PM (i.e., –PRI, –FIL, or –CON)
- Verify the form of the PM:
 - Emission factors you use to calculate emissions; and
 - PM emissions facilities report to you.
- Update your database management system to record these pollutant codes in NIF 3.0

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How Do I Identify the PM Form?

- Test Methods upon which emission factors or emissions are based determine the form of PM:
 - PM-FIL:
 - EPA Reference Method 5 series, Method 17, Method 201/201A
 - PM10-FIL/PM2.5-FIL:
 - Particles-size analysis of PM-FIL (e.g., AP-42 EFs)
 - Preliminary Method 4 being developed by EPA to measure both
 - PM-CON:
 - EPA Reference Method 202

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AP-42 Particle Size Data

- Provides particle size distribution data and particle-size-specific emission factors
 - Use AP-42 if source-specific data are not available
 - Use data in chapters for specific source categories first
 - Use Appendix B-1 data next
 - Use Appendix B-2 data last

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AP-42 Particle Size Data (cont.)

- AP-42 chapters not always clear on what source test methods were used to develop particle size data
 - See background documents for AP-42 chapters for details
- AP-42 available on EPA/OQAPS CHIEF web site
 - <http://www.epa.gov/ttn/chief/>

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AP-42 Particle Size Data (cont.)

- Appendix B-1 (Particle Size Distribution Data and Sized Emission Factors for Selected Sources)
 - Based on documented emission data available for specific processes
- Appendix B-2 (Generalized Particle Size Distributions)
 - Based on data for similar processes generating emissions from similar materials
 - Generic distributions are approximations
 - Use only in absence of source-specific distributions

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Factor Information Retrieval (FIRE) Data System

- Latest version available was last updated October 2000 (Version 6.23)
- Currently being updated to:
 - Incorporate revisions to 10 AP-42 chapters
 - Add more PM10-FIL, PM25-FIL, and PM-CON emission factors

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PM Calculator

- EPA tool for calculating uncontrolled/controlled filterable PM_{2.5} and PM₁₀ emissions using AP-42 particle size distributions
- For point sources only
- Contains 2,359 SCCs with PM₁₀ emissions in 1996 NEI

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PM Calculator (cont.)

- Limitations
 - AP-42 particle size data not available for many sources; generic AP-42 profiles are used for many source categories
- Available on EPA/OQAPS CHIEF web site
 - <http://www.epa.gov/ttn/chief/software/index.html>

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Point & Area Source Emissions Inventory (EI) Overlap Issues

- For categories included in Point and Area EIs:
 - Subtract total point activity from total state activity to obtain total area activity

$$\text{Total Area Activity} = \text{Total Activity} - \sum \text{Total Point Activity}$$

- Example for Fuel Combustion Sources:
 - Point activity: fuel throughput from point source EI survey
 - Total activity: fuel throughput from State/local gov. agencies or U.S. DOE/EIA State Energy Data reports

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Point & Area Source EI Overlap Issues (cont.)

- Basis of Point Source Subtraction
 - Activity-based calculation is preferred
 - Emissions-based calculation is acceptable when activity is not available:
 - Total source category activity and point activity need to be on same control level (usually uncontrolled)
 - Back-calculation of uncontrolled emissions for controlled processes may overstate uncontrolled emissions

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Point & Area Source EI Overlap Issues (cont.)

- Geographic level of calculation may affect results:
 - Issue when using surrogate activity data (e.g., employment, housing, population) to allocate total State activity to counties
 - Subtracting county totals may produce negative results due to inaccuracy of allocation method
 - Subtracting State totals less likely to produce negative results at county level
 - Point source adjustments to surrogate allocation data (e.g., employment) should be done if available from point EI survey

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Point & Area Source EI Overlap Issues (cont.)

- QA/QC Results
 - Review county-level area source estimates for reasonableness
 - Make adjustments based on experience of your agency's personnel:
 - If allocation method places area source activity in a county for which you know there is no activity, exclude the county from your allocation
 - If all of a county's activity is covered by the point EI, set the activity for the county to zero

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*Point & Area Source EI Overlap Issues
(cont.)*

- Reporting of small point sources in area CERR submittal:
 - If your point EI includes sources with emissions below the CERR point EI reporting thresholds, you may include the emissions for these small sources in the area EI
 - To avoid double counting in the area EI, subtract total point source activity or emissions from total State-level activity or emissions before rolling up emissions for small point sources to be included in your area EI

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Reading List

- *Stationary Source Control Techniques Document for Fine Particulate Matter*, EPA/OAQPS, Oct. 1998
(<http://www.epa.gov/ttn/oarpg/t1/meta/m32050.html>)
- *Emission Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) AND Regional Haze Regulations*, EPA/OAQPS
(<http://www.epa.gov/ttn/chief/eidocs/publications.html>)
- *Introduction to Stationary Point Source Emission Inventory Development*, EIIP Vol. 2, Chapter 1, May 2001
- *How to Incorporate Effects of Air Pollution Control Device Efficiencies and Malfunctions into Emission Inventory Estimates*, EIIP Vol. 2, Chapter 12, July 2000

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