Chapter 5 – Point Source Inventory Development

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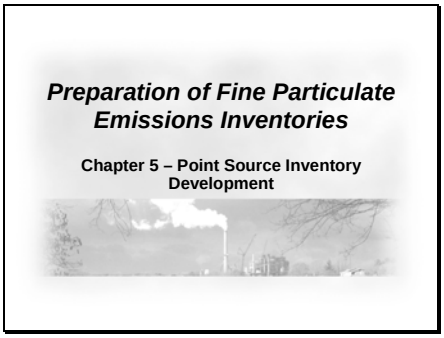

After completing this lesson, participants will be able to:

- identify point sources for inclusion in an emissions inventory, including the form of the particulate matter and the particle size
- describe methods used to estimate emissions
- explain overlap issues associated with point and nonpoint source emission inventories

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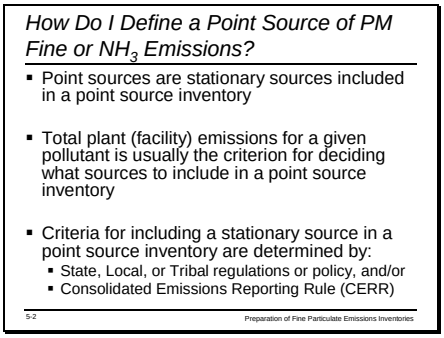

Point sources are stationary sources that are included in a point source inventory.

Total plant or facility emissions for a given pollutant is usually the criterion for deciding if a specific source should be included in a point source inventory or an nonpoint source inventory.

The criteria are defined by either state, local, or tribal regulations or policy. They may also be defined by the reporting thresholds contained in the Consolidated Emissions Reporting Rule.

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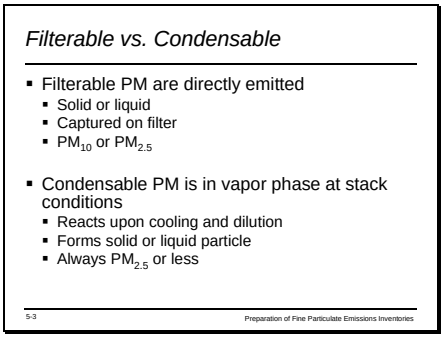

Filterable PM:

- solid or liquid particles directly emitted at stack or release conditions
- captured on the filter of a stack test train
- may be PM_{10} or $PM_{2.5}$

Condensable PM:

- material that is in the vapor phase at stack conditions
- condenses and/or reacts upon cooling and dilution in the ambient air
- forms a solid or a liquid particulate immediately after discharge from the stack
- usually $PM_{2.5}$ or less

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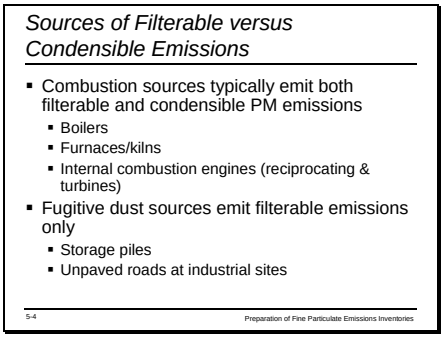

Combustion sources typically emit both filterable and condensable emissions.

Examples include boilers, furnaces and kilns, and both reciprocating internal combustion engines and turbines.

Fugitive dust sources emit filterable emissions only.

Examples of fugitive dust sources include storage piles and unpaved roads at industrial sites.

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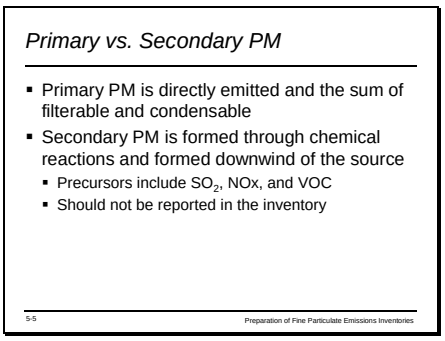

Primary PM:

- the sum of the filterable and the condensable PM
- particles are emitted directly from a stack

Secondary PM:

- particles that form through chemical reactions in the ambient air after dilution and condensation has occurred
- formed downwind of the source
- precursors include SO_2, NO_x, ammonia and VOC
- should not be reported in the emission inventory (only precursor emissions are reported)

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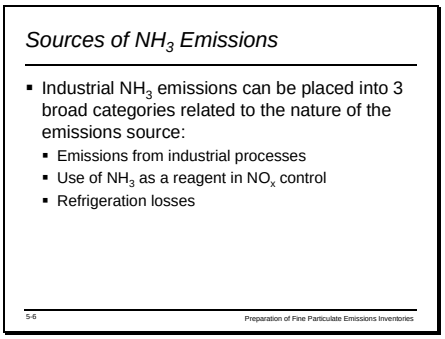

Sources of ammonia emissions fall into three broad categories:

- industrial processes,
- use of ammonia as a reagent in NO_x control (e.g., selective catalytic reduction or selective non-catalytic reduction), and
- refrigeration losses.

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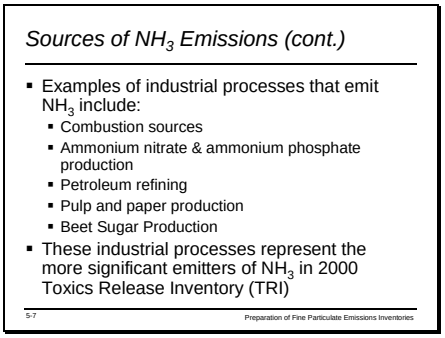

The industrial processes shown here contribute significant amounts of ammonia emissions, as reported in the 2000 Toxics Release Inventory.

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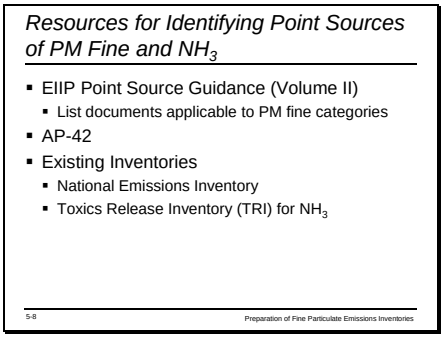

Resources for identifying point sources of fine PM and ammonia include:

- Volume II of the Emissions Inventory Improvement Program guidance document for point sources,
- AP-42 emission factors document, and
- existing inventories such as the NEI and the TRI (for ammonia).

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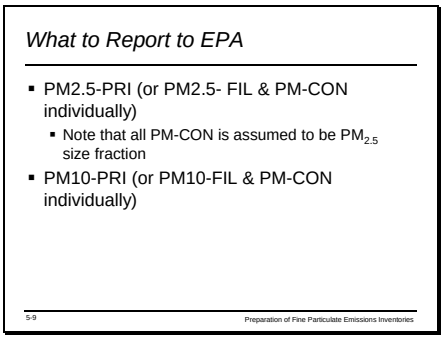

States may report their $PM_{2.5}$ primary emissions to the EPA as either $PM_{2.5}$ primary or the $PM_{2.5}$ filterable and PM condensable components.

All PM condensable is assumed to be in the $PM_{2.5}$ size.

States may report their PM_{10} primary emissions to the EPA as either PM_{10} primary, or as PM_{10} filterable and PM condensable components.

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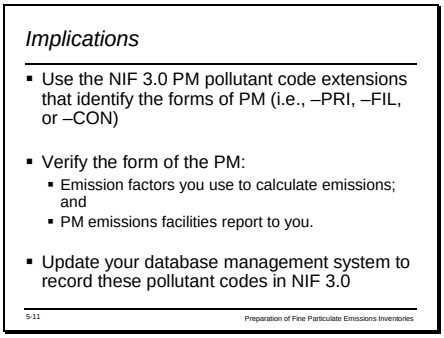

The NIF 3.0 PM pollutant code extensions:

- identify forms of the PM, should be used for reporting.
- include PRI for primary filterable, FIL for filterable, and CON for condensable

The form of the PM should be verified to ensure that PM emissions that are recorded as PM_{10} or $PM_{2.5}$ are correctly identified as filterable, condensable, or primary emissions. This may require an examination of the emission factors.

If the emissions were reported by facilities, the verification will require that States contact the facilities to ask them what emission factors were used to calculate the emissions.

Alternatively, if the emissions estimates provided by the sources are based on stack test data, the states must ask what method was used to measure the emissions in order to determine the form of PM.

The database management system should be updated to record these pollutant code extensions.

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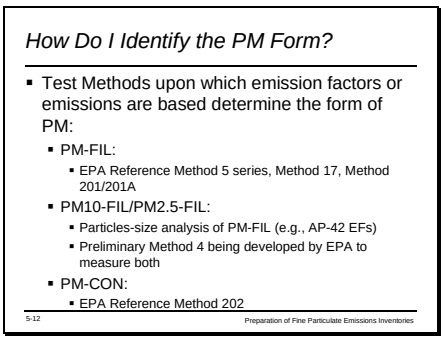

Examining the test method used to collect the data can identify the form of the PM.

EPA's Reference Method 5 series:

- used to measure total PM filterable emissions
- basis for most AP-42 emission factors (represent PM-filterable)

Method 17 is similar to the Method 5, however it is infrequently used. Method 201/201A is designed for PM_{10} filterable.

To calculate or measure the PM_{10} filterable or the $PM_{2.5}$ filterable:

- conduct a particle size analysis of the total PM to develop the size fractions or cut points for PM_{10} or $PM_{2.5}$.
- use this information to develop particle size specific emission factors in AP-42

However, most of the emission factors in AP-42 are for filterable emissions, although there are some condensable emission factors for combustion sources. Sum the filterable and condensable emission factors to obtain a PM primary emission factor.

There are some exemptions so it is important to always understand the form of the PM that the emission factor represents.

The EPA is developing Preliminary Method 4 to measure both $PM_{2.5}$ filterable and condensable.

Method 202 is a method for condensable PM, but it is not used frequently, mainly because regulations do not require sources to measure condensable emissions.

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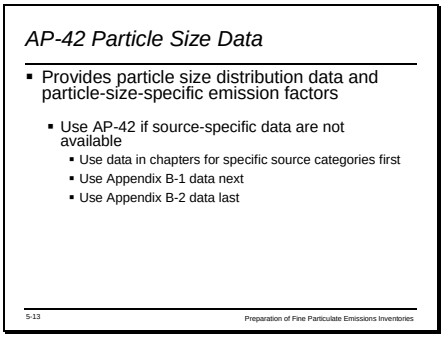

AP-42 provides particle size distribution data and particle size specific emission factors.

Some source categories (e.g., combustion) in AP-42 have particle size specific emission factors for PM. That data should be used first.

Examine source specific data at the local or state level prior to consulting AP-42, since this is usually the best data.

If such data does not exist, consult the resources listed.

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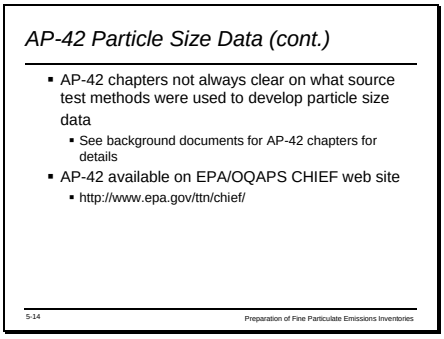

AP-42 chapters are not always clear on what source test methods were used to develop the particle size data.

You may need to consult the background information documents that were used to develop the chapters for AP-42.

AP-42 is available in EPA's Clearinghouse for Inventories and Emission Factors website.

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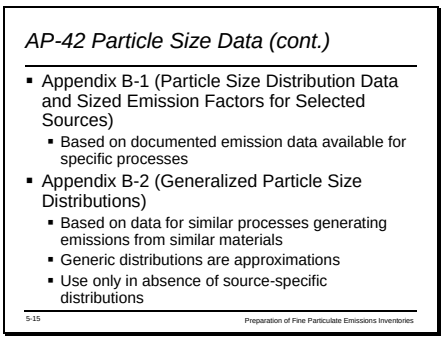

Appendix B1:

- use for source categories that do not have particle size specific emission factors
- contains particle size distribution data and particle size emission factors for selected sources
- based on documented emissions data available for specific processes

If Appendix B1 does not have particle size data for the source category of interest, use Appendix B2.

Appendix B2 contains generalized particle size distributions that are based on data for similar processes.

These distributions are approximations and should only be used in the absence of source specific particle size distribution data.

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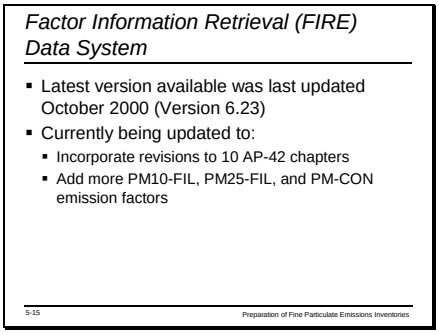

The Factor Information Retrieval System (FIRE) is a compilation of emission factors from AP-42 and other documents.

It is an electronic database that is available on the CHIEF web site.

EPA is in the process of developing a more complete set of PM_{10} and $PM_{2.5}$ filterable and PM condensable emission factors that will be incorporated into FIRE.

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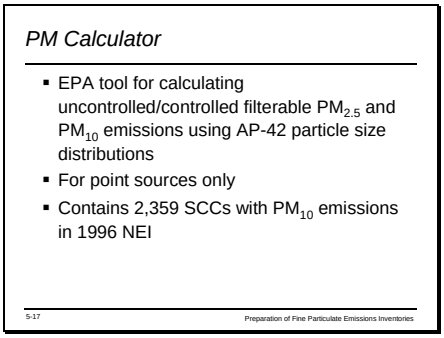

The PM Calculator is a tool developed by EPA to calculate uncontrolled and controlled filterable $PM_{2.5}$ and PM_{10} emissions using AP-42 particle size data.

For example, it can be used to calculate the $PM_{2.5}$ filterable emissions based on the PM_{10} filterable emissions contained in an inventory.

You can also calculate PM_{10} and $PM_{2.5}$ from the total PM filterable emissions.

The calculator only deals with the filterable emissions (i.e., it does not address the condensable portion) and is for point sources only. It contains over 2300 SCCs.

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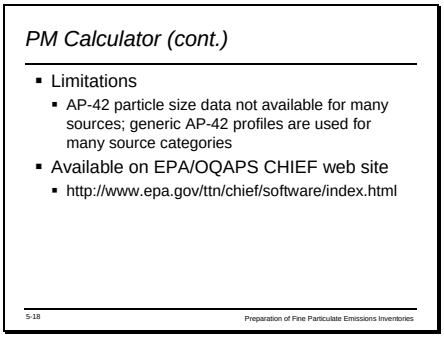

Although it contains over 2300 SCCs, the PM calculators main limitation is that it is based on AP-42 particle size data that is not available for many sources.

As a result, many times it uses the generic particle size data contained in Appendix B2 of AP-42 or other sources. It is also available on the CHIEF web site.

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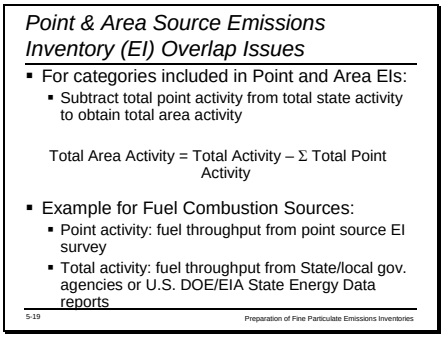

For categories included in the point and nonpoint source emission inventories, subtract total point activity from the total state activity to obtain a total nonpoint source activity.

Using the fuel combustion category as an example, the point source activity is the fuel throughput from the point source inventory.

Total activity is the statewide fuel throughput obtained from the state or local government agency, or from the state energy data reports published by the Interior Energy Administration in the U.S. Department of Energy.

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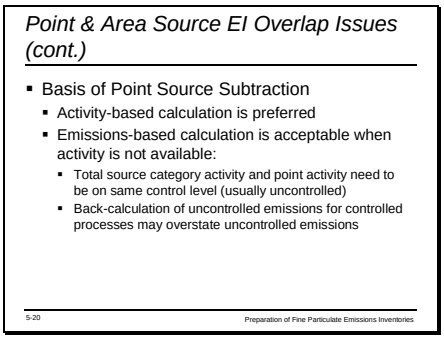

Ideally, the point source subtraction is based on activity data. For example, the point source fuel throughput for a given year is subtracted from the total statewide fuel consumption for the same year.

However, in many cases, the activity data for performing that calculation may not be available. In this case, an emissions based calculation is acceptable.

Under the emissions based approach:

- the total source category activity and the point activity should be on the same control level
- the control level should be an uncontrolled emissions basis because since total statewide activity represents uncontrolled sources

In this case, it is important to ensure that the point source emissions represent uncontrolled levels. It is also important to check the uncontrolled emissions to ensure that they seem reasonable.

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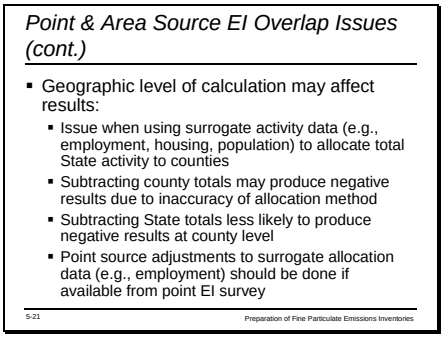

The geographic level of the point source adjustment used to calculate the nonpoint source activity is an issue when surrogate activity data is used to allocate total state activity to the county level.

The EIIP method:

- uses employment for specific SIC codes to allocate total statewide natural gas combustion to the county level at industrial and commercial institutions
- requires you to sum point source throughput for a county and subtracting it from the total activity for the county may produce negative results
- indicates that point source consumption fuel use is higher than that calculated for the nonpoint sources
- can be an artifact of the allocation data used

The preferred approach:

- sum up the point source fuel throughput consumption on the state level
- subtract this sum from the total consumption for the state prior to doing the county-level allocation

It is also preferable to obtain activity data such as employment data for the point sources included in the inventory.

In this way it is possible to make point source adjustments to the surrogate allocations to account for the amount of employment that is associated with the point sources.

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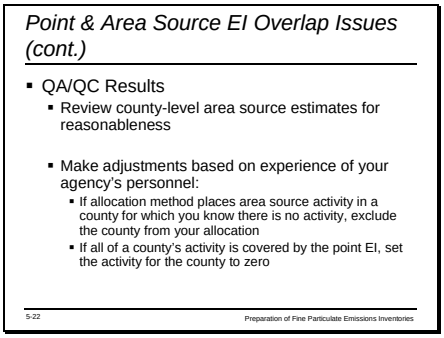

The county level nonpoint source estimates should be reviewed for reasonableness after the adjustment has been made.

Adjustments should be based on the experience of the agency personnel.

For example, if the allocation method places nonpoint source activity in a county for which it is known that there is no activity, that county should be excluded from the allocation.

Also, if all of a county's activity is covered by the point source emission inventory, the nonpoint source emissions should be zero.

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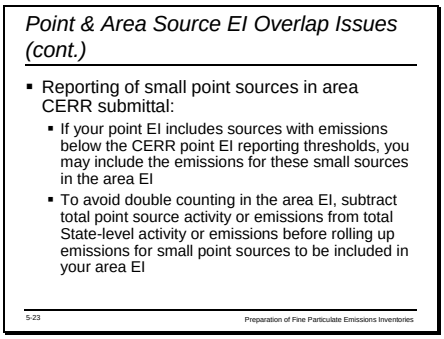

If the point emission inventory includes sources with emissions below the CERR point emission inventory reporting thresholds, the emissions for these small sources can be included in the nonpoint source emissions.

To avoid double counting in the nonpoint source inventory:

- subtract total point source activity from the total state activity, then
- roll up the small point source data to add to the inventory.

In this way the emissions for the small point sources in the area are not double counted.

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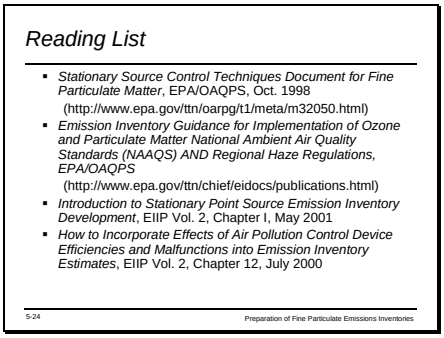

A suggested reading list for preparing point source inventories for fine PM is presented here.

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