SPECIATE Database

What is SPECIATE?
- Database of speciated emissions profiles by source category
- Disaggregated into particulate matter (PM) and total organic gases (TOG)
- Species include compounds, elements and PM size fractions
- Housed in MS Access

Why Do We Need A Speciated Emissions Database?
- Modeling
  - Air quality modeling
  - Source-receptor modeling
  - Emissions characterization
- Searchable repository
- Tool for data processing
- Can integrate with spreadsheets
- Export to other programs (e.g., GIS)

Brief History
- Paper and computerized versions available in 1988 for EPA applications
- First electronic (CD) version distributed to the user community in 1993
- SPECIATE 3.2 posted to EPA’s CHIEF website in November 2002
- SPECIATE 4.0 posted to EPA’s CHIEF website January 2007

Summary of Changes
- SPECIATE 3.2
  - 1513 PM profiles
  - 565 gas profiles
  - 890 unique species
- SPECIATE 4.0
  - Requires MS Access®
  - Website also has documentation and other pertinent information
    - VOC-to-TOG conversion factors
    - SCC-profile cross reference table
    - Protocol for expansion of the SPECIATE database
  - Standard reports and queries are available
  - Database available at http://www.epa.gov/ttn/chief/software/speciate/index.html

Example Fields in Access Tables
- Profile name and number
- Data quality rating
- Emissions controls
- Test year, notes
- Analytical method
- Weight percent
- Uncertainty indicator

Composite Profiles
- Merger of multiple data sets for a source category
- 48 source categories
- A single number to be used for the source
- Addresses large disparate datasets (e.g., Unpaved Road Dust)

SPECIATE Profiles in Unpaved Road Dust Category

PM-Simplified Profiles
- 95 simplified profiles added to database (EC/OC, sulfate, nitrate, and PM-other)
- Used by air quality models

Source Classification Code-to-Profile Mapping
- Allows correlation of profiles to individual source categories
- Covers all Source Categories in EPA’s 2002 National Emissions Inventory for VOC and PM emissions

Protocol for Database Expansion
- Full references are needed
- Electronic data preferred
- Send to beck.lee@epa.gov

Applications

Emission Inventory Enhancements
- SPECIATE 4.0 has been integrated into the Emissions Modeling Platform for air quality modeling applications
- Emission species changes impact air quality modeling concentrations as shown below

Source Receptor Modeling
- SPECIATE 4.0 has been integrated with the emission inventory to improve source apportionment and species characterization
- Improved species profiles lead to improved emission characterization for source-receptor modeling applications as shown below

Air Quality Modeling
- SPECIATE 4.0 has been integrated into the Emissions Modeling Platform for air quality modeling applications
- Emission species changes impact air quality modeling concentrations as shown below

PM$_{2.5}$ Emission by Types of Source Categories from SPECIATE

Summary
- SPECIATE 4.0 represents a significant enhancement of the data available to characterize emissions by species and source category
- Air quality modeling and source-receptor modeling applications are improved using these enhanced speciation profiles
- Additional efforts are needed to capture new data from current testing
  - SPECIATE 4.1 to include Canadian data
  - SPECIATE 4.2 to update mobile source profiles
- New profiles will be added in future revisions based on data submitted via the protocol for database expansion
- You can help by supplying data
  - Full references are needed
  - Electronic data preferred
  - Send to beck.lee@epa.gov

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