

## **EPA's SPECIATE 4.4 Database: Development and Uses**

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SPECIATE is the U.S. Environmental Protection Agency's (EPA) repository of source category-specific particulate matter (PM), volatile organic gas, and other gas speciation profiles of air pollutant emissions. Abt Associates, Inc. developed SPECIATE 4.4 through a collaboration involving EPA's Office of Research and Development (ORD) and Office of Air Quality Planning and Standards (OAQPS) in Research Triangle Park, NC, and EPA's Office of Transportation and Air Quality (OTAQ) in Ann Arbor, MI. EPA released SPECIATE 4.4 in February 2014. In total, the SPECIATE 4.4 database includes 5,728 PM, volatile organic compound (VOC), total organic gases (TOG), and Other Gases profiles. 2,346 chemical species are included in SPECIATE 4.4. Data added to SPECIATE comes from many sources, including peer-reviewed journal articles and emissions testing conducted primarily by the EPA.

Some of the many uses of these source profiles include: (1) creating speciated emissions inventories for regional haze, PM, greenhouse gas (GHG), and photochemical air quality modeling; (2) estimating hazardous and toxic air pollutant emissions from PM and organic gas primary emissions; (3) providing input to chemical mass balance (CMB) receptor models; (4) verifying profiles derived from ambient measurements by multivariate receptor models (e.g., factor analysis and positive matrix factorization); and providing a repository of compounds searchable by source category and pollutant. For example, SPECIATE 4.4 added profiles to support two important OTAQ objectives – Tier III rulemaking (for the 2017 model year) and the release of the MOVES 2013 model -- by making associated profiles more accessible and increasing the transparency of the rulemaking process. SPECIATE emission profiles also underpin the newest data set used by OAQPS to run its emission inventory and other models (the 2011 NEI modeling platform). In particular, SPECIATE is being used to better characterize Pulp & Paper and other industrial emissions.

This paper describes the SPECIATE 4.4 database, provides specific examples of sources of data and the use of SPECIATE emission profiles, and makes recommendations for future improvements.

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