



CLEAN AIR RESEARCH PROGRAM

METHODS DEVELOPMENT AND EVALUATION SUPPORTS OUTDOOR AIR QUALITY MONITORING

Issue:

The nation's air quality monitoring networks, located across the country, are integral to the U.S. Environmental Protection Agency's efforts to protect public health and the environment. The data collected from monitors provide critical information needed to develop and implement air quality regulations and policies. Outdoor (ambient) air monitoring networks support air quality management activities such as:

- Monitoring for compliance with the National Ambient Air Quality Standards (NAAQS)
- Providing public information regarding ambient air quality levels
- Measuring trends in air quality
- Establishing relationships between exposure to pollutants and health effects to inform regulatory decisions

- Developing and evaluating air quality modeling tools

To achieve these objectives, monitoring networks require accurate and reliable methods for collecting and analyzing air pollution samples to ensure high quality data. These methods are the result of extensive scientific development and evaluation.

Studies are conducted to develop methods to support the ambient monitoring network. These methods include procedures for chemical and physical analyses of samples collected in the field.

Likewise, instruments for sample collection or for standard monitoring are also developed or evaluated for widespread use. Special field studies are designed to validate these methods under a variety of meteorological and geographical conditions and to

develop protocols for handling and shipping samples.

Scientific Objective:

The Clean Air Research Program in EPA's Office of Research and Development conducts research to develop and evaluate a variety of methods to support the air quality standards and programs. The primary research focus is the development of the Federal Reference Methods and Federal Equivalent Methods (FRM and FEM) used to ascertain compliance with the NAAQS. However, the Clean Air Research Program also includes research to develop, evaluate, and apply the methods required to support other air quality management activities.

The key research questions in methods development are driven by the various monitoring needs tied to compliance with the national air quality standards, real

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time public information, and support for atmospheric and health research studies. Specific methods-development needs related to current air quality management issues include:

- Continuous measurements of particulate matter (PM), including mass and PM components for fine and coarse PM.
- Dry deposition measurements for mercury.
- Measurement of lead in PM
- Measurement of air pollutants that contribute to the formation of other pollutants (e.g., ammonia's role in the formation of nitrate and sulfate particles).
- Measurement of air toxics, particularly acrolein and hexavalent chromium.

Many of these needs are being addressed through the FRM/FEM research program and related research efforts such as:

- Source apportionment studies, which include the development and evaluation of continuous speciation methods to determine the

contribution of various pollution sources to a given location. Outdoor, indoor, or personal exposure measurements are used to achieve these objectives.

- Coarse PM field studies evaluate coarse particle samplers and speciation methods while investigating the spatial (space) and temporal (time) variability of these particles.
- The Detroit Exposure and Aerosol Research Study (DEARS) provided the development and evaluation of low-cost passive sampling techniques for 1,3 butadiene and acrolein, relying on diffusion instead of an active pump to collect samples.
- The Near Roadway Study provides opportunities for methods development and evaluation of real-time methods as part of a multi-year study being conducted to improve understanding of the types of pollutants common near roadways as well as how people are exposed to them.

- Atmospheric mercury research has contributed to the development and evaluation of an ambient speciated mercury and dry deposition measurement methods.
- EPA's STAR grants program has awarded research grants that either directly or indirectly address methods development and evaluation for ambient carbon.

Application and Impact:

The Clean Air Research Program has made major contributions to the advancement of air quality monitoring methods, which are fundamental to the development and implementation of NAAQS designed to protect public and ecosystem health.

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