US EPA Workshop on Ultrafine Particles: Summary and Potential Next Steps

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Overview

- Purpose and scope of Feb 2015 workshop
- Key discussion topics
- Next steps under consideration

Workshop Purpose and Scope

- Gather international experts to review current state of the science, across scientific disciplines
  - Sources and emissions
  - Ambient measurements
  - Air quality modeling
  - Control strategies
  - Health effects assessment
- Consider how information has been used within different policy contexts to date, including internationally
- Provide opportunity to explore options for future research collaborations

Key Discussion Topics

- UFPs represent a complex mixture derived from many sources (emitted directly or formed in the atmosphere)
  - Combustion and atmospheric chemistry constantly generate UFPs
- Regulating by mass provides significant public health protection
  - Continued evaluation of constituents and unique physical attributes of UFPs warranted
- Size makes a difference – may alter deposition site, translocate systemically
- UFPs contribute little to mass but can have high surface reactivity
- Uncertainty related to characterizing UFP exposures
  - Limited routine monitoring
  - Potentially strong spatial and temporal variability
- Need to improve our understanding of potential health effects related to UFP exposures and the role the ultrafine fraction plays in the air pollution "story"
  - Evidence suggestive but limited for cardiovascular and respiratory effects associated with short-term exposures; inadequate for long-term exposures
  - Need to expand our understanding of UFPs within broader ambient mixture; specifically, differentiating effects of UFP from $PM_{2.5}$ and other co-pollutants

Key Issue

- Methods and metrics for identifying and characterizing emissions and impacts from UFP exposures have not been consistent
  - Size, number, surface area, mass, EC…???

As a result, integrating information across studies has been difficult and not conducive to adequately assessing potential health effects attributed to UFPs

- There may be more than one “right” metric

Various Metrics and Indicators Used

Current ambient PM Standards

Mass

- UFP contributes very little to mass of $PM_{2.5}$
- Varying fractions considered (e.g., $PM_{0.1}$; $PM_{0.25}$)
- Currently, bulk of health outcomes are tied to $PM_{2.5}$ mass

Surface Area / Reactivity

- High UFP surface area may increase toxicity

Number

- UFP's exceedingly abundant
- Different cutoff diameters used (e.g., 100 nm, 200 nm, 500 nm)
- Solid particle count >23 nm (European PMP method for emissions)

Next Steps Under Consideration

- Develop workshop summary report (in progress)
- Identify strengths and limitations of available metrics
  - Explore options for developing consensus for metric(s) that will better integrate emissions and ambient measurements with future exposure and health studies
  - Evaluate and, as needed, develop refined methods to measure UFPs
- Consider options, as appropriate, for expanding existing ambient monitoring networks
- Promote international collaborations and information exchange to improve our understanding of:
  - Emissions and control strategies
  - Air quality
  - Exposures
  - Health impacts
  - Role of UFPs vs. co-pollutants

Additional Information

- Workshop materials available at: https://sites.google.com/site/2015ufpworkshop/home
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