

Integrating Dispersion and Photochemical Modeling Results for Primary PM_{2.5}



3rd PM/RH/O₃ Modeling Workshop

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PM2.5 Modeling

- Photochemical models will be the primary tool for PM2.5 model attainment demonstrations
- Details of the modeling requirements are contained in: “Draft Guidance for Demonstrating Attainment of Air Quality Goals for PM2.5 and Regional Haze”
(http://www.epa.gov/ttn/scram/guidance/guide/draft_pm.pdf)
- The draft PM/RH modeling guidance will be finalized later this year



PM2.5 Attainment Modeling

- Attainment of the PM2.5 standards will be shown by applying a monitored based “relative” attainment test
 - Ambient concentration X modeled % change= future concentration
 - Extreme details of the test will be shown later in the PM portion of the modeling workshop
- The guidance recognizes that PM2.5 “hot spots” may occur in unmonitored areas
 - Likely due to **primary** PM point, mobile, or area sources
- If hot spots do occur, photochemical models may not be the best tool to address them
 - A combination of dispersion models and photochemical models may be needed to address the problem



PM2.5 “Hot Spot” Modeling- Draft Attainment Guidance

- Identify areas where hot spots may exist
 - Examine primary PM2.5 inventory and/or ambient data
- The primary PM2.5 components (organic carbon, elemental carbon, and inorganic particulate) can be modeled with a dispersion model
- The background secondary PM2.5 concentrations (secondary organic carbon, sulfate, nitrate, ammonium) can be provided from a photochemical model
 - Total concentration of PM2.5 can be determined by summing the primary dispersion derived component and the secondary grid model component
 - Need to be careful not to double count



Questions

- How can this type of modeling be accomplished?
 - Several possible approaches
 - Fine scale grid modeling
 - Separate plume/puff and grid models
 - Plume/puff model embedded into a grid model
 - Details need to be worked out
- Is there an “easy” way to identify potential hot spot areas?
- Should the modeling results be used in a relative sense or an absolute sense?
 - Dispersion models have always been used in an absolute sense
 - The PM_{2.5} (and ozone) modeled attainment test is a relative test



PM2.5 Modeling

- Models will need to address many different PM2.5 modeling issues
 - PM2.5 “hot spots” as identified in the current modeling guidance (4-12 km model resolution)
 - PM2.5 “hot spots” with respect to transportation conformity requirements
 - May be finer scale issues (sub-grid scale)
 - PM2.5 NSR/PSD modeling



Combining Dispersion and Photochemical Modeling Outputs- Current Efforts

- Several groups are studying the issue of fine scale “hot spot” concentrations
- Most applications to date have focused on toxics
 - EPA/ORD
 - CMAQ- fine scale (~1 km) and sub-grid scale variability
 - EPA/OAQPS
 - CMAQ/ASPEN
 - EPA/Region 3
 - CMAQ/ISC
- Same principles used for toxics modeling can be applied to PM_{2.5} and its components



Example Application

- Modeling for the Philadelphia Air Toxics Study can serve as an example that can be applied to PM_{2.5}
 - CMAQ and ISC modeling
- Take it away, Al....