

# Status of the Guideline on Air Quality Modeling

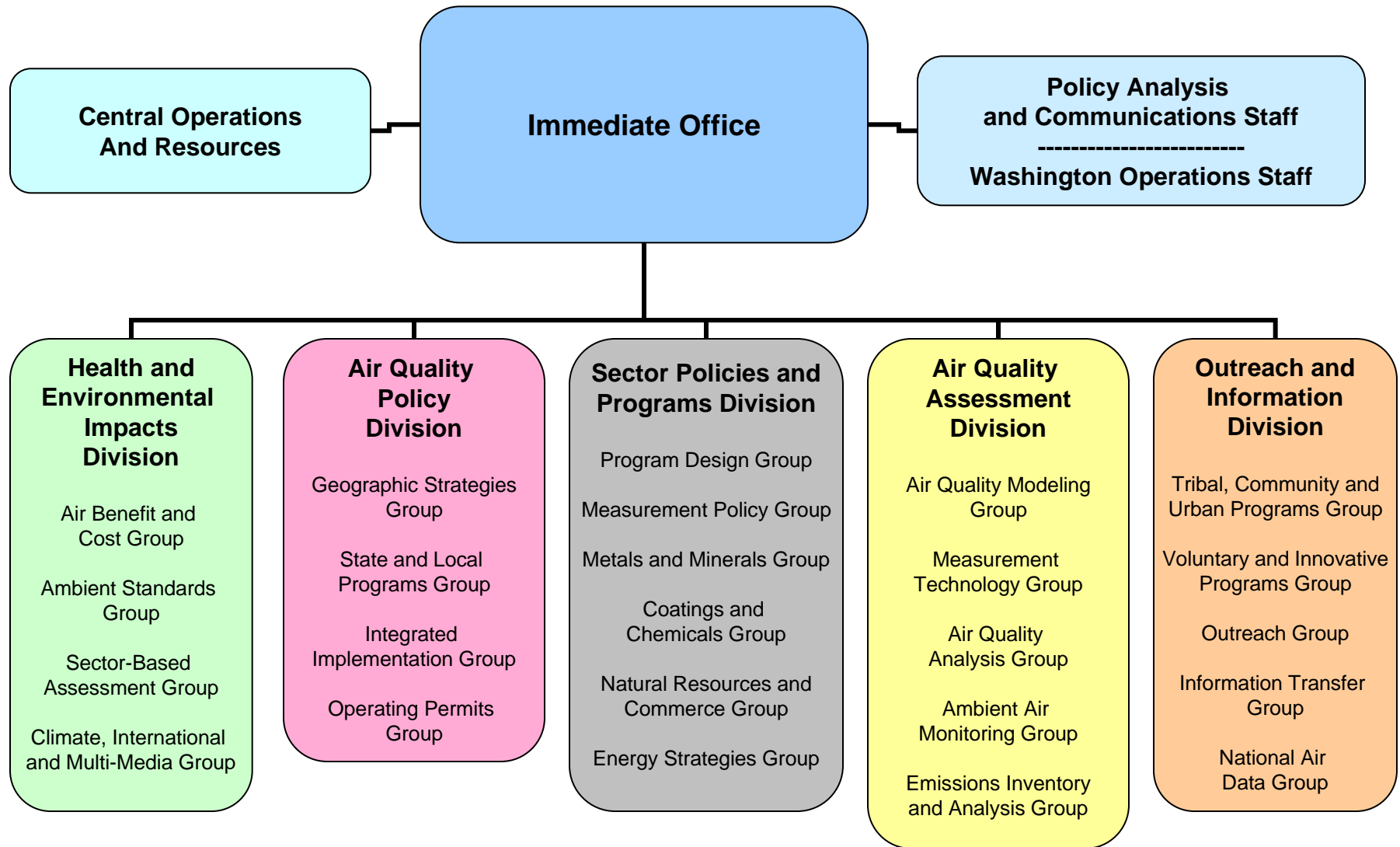
R/S/L Workshop

May 16, 2006

# Outline

- OAQPS Reorganization
- Air Quality Modeling Group
- AERMOD Modeling System
- Dispersion Modeling Futures
- Protocol for Model Updates
- Summary

# Office of Air Quality Planning and Standards



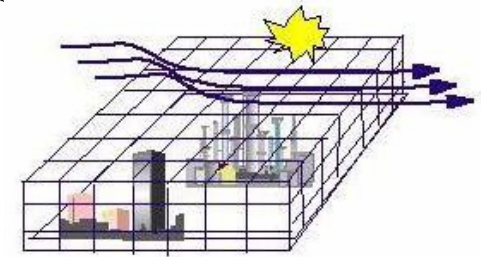
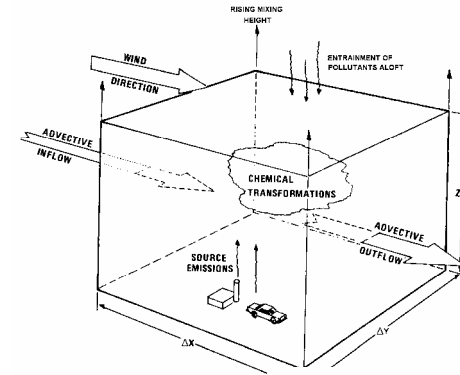
# Air Quality Modeling Group

- Conducts air quality modeling for regulatory and policy assessments
  - e.g., NO<sub>x</sub> SIP Call, Heavy Duty Diesel, Nonroad Rule, Clear Skies, CAIR, CAMR, NAAQS RIAs
- Provides guidance for the application of air quality models for SIP demonstrations and NSR/PSD permitting
  - Appendix W, O<sub>3</sub>/PM/RH Guidance
- Partners and coordinates w/ others (e.g, ORD, scientific community, etc) on model evaluations and development efforts
- NOAA Branch w/in our division provide meteorological & dispersion modeling expertise

# Air Quality Modeling

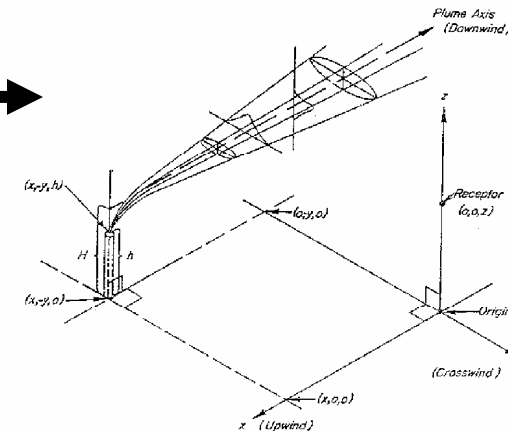
- **Photochemical models:** large-scale air quality models that account for chemical and physical atmospheric processes in predicting pollutant concentrations. →

- Can be applied at multiple spatial scales (local, regional/national, and global)
- Examples include CMAQ, CAMx, REMSAD, UAM, etc



- **Dispersion models:** source-oriented models that characterize atmospheric processes by dispersing a directly emitted pollutant to predict concentrations at selected downwind receptor locations. →

- Typical of permit applications for new sources but can be run for multiple sources at once (like for PM NAAQS, NATA)
- Examples include AERMOD, ISC, and ASPEN



# Choosing an Air Quality Model: SIP Demonstrations

- There is no “preferred model”
  - Models should meet Appendix W requirements for “alternative models”
- Models should be:
  - Peer reviewed
  - Demonstrated to be applicable to the problem being addressed
  - Adequate data bases should be available to run the model
  - Model should be shown to have performed adequately in the past
  - Source code must be available at no cost (or for reasonable cost)
- Almost all States will use the latest version of either CMAQ or CAMx
  - Both models can simulate ozone, PM, regional haze, and mercury

# Status of O<sub>3</sub> & PM/Reg Haze Modeling Guidance

- “Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS”
  - Original draft released in 1999
  - Revised Final version in Oct 2005
- “Guidance for Demonstrating Attainment of Air Quality Goals for PM<sub>2.5</sub> and Regional Haze”
  - Original draft released in January, 2001
  - Revised draft for RO review within next month
- Available on EPA’s website at:  
<http://www.epa.gov/ttn/scram/guidance/>
- Plan to incorporate final version of ozone and PM<sub>2.5</sub> guidance into a single document

# Choosing an Air Quality Model: NSR/PSD Modeling

- Guideline on Air Quality Models (App W to CFR Part 51)
  - Ensures consistency and equity in NSR/PSD modeling.
  - Revised periodically to include new models & techniques
  - Modeling workshops and training provided by EPA
- AQAD (former EMAD) defined the modeling practices and trained the staff – leadership role.
- In addition to NSR/PSD, these dispersion models are also applied for Air Toxics and Homeland Security analyses and potentially PM<sub>2.5</sub> SIPs.

# AERMOD Background & History

## Better Science than ISC

- PLANETARY BOUNDARY LAYER CONCEPTS – CONTINUUM OF ATMOSPHERES
- MORE ADVANCED BUILDING DOWNWASH ALGORITHMS
- ATMOSPHERIC PROFILING FOR MORE VARIABLES

## Brief History

- **April 2000**      **AERMOD proposal (version 99351)**
- **June 2000**      **7<sup>th</sup> modeling conference**
- **Sept 2003**      **Notice of Data Avail. (02222)**
- **Oct 2005**      **Promulgation (04300)**
- **Dec 9, 2005**    **Federal Register Notice**

# AERMOD MODELING SYSTEM

- Regulatory Components
  - **AERMOD** – THE DISPERSION MODEL
  - **AERMET** – THE METEOROLOGICAL PREPROCESSOR
  - **AERMAP** – THE TERRAIN DATA PREPROCESSOR
  - Support Tools (In development)
    - **AERSURFACE** – PROCESSES SURFACE CHARACTERISTICS DATA
    - **AERSCREEN** – PROVIDES A SCREENING TOOL

# AERMOD Updates

- **Updates since proposal to obtain AERMOD (version 02222)**
  - Added PRIME
  - Modified complex terrain algorithms
  - Modified urban dispersion for low-level sources and minimum mixing heights for calculating dispersion
  - Added meander for all stable and unstable point source conditions
- **Updates to obtain version 04300**
  - Minor bug fixes

# AERMOD Implementation

## Workgroup: Members

Al Cimorelli (Rg 3) co-chair  
Warren Peters (OAQPS) co-chair  
Carol Bohnenkamp (Rg9)  
Herman Wong (Rg 10)  
Ian Cohen (Rg 1)  
Stan Krivo (Rg 4)  
Erik Snyder (Rg 6)  
Matt Will (IL)  
Scott Leopold (IL)  
Phil Allen (OR)  
Mary Anderson (ID)  
Kevin Schilling (ID)  
Alan Schuler (AK)  
David Ross (Mecklenburg, NC)  
Ken McBee (VA)

Joe Sims (AL)  
Leigh Bacon (AL)  
Jim Owens (AL)  
Lori Hanson (IA)  
Brad Aston (IA)  
Eric Milligan (OK)  
Mike Woodman (MD)  
Chris Arrington (WV)  
Maudood Khan (GA)  
Gail Good (WI)  
Frank Forsgren (NV)  
Peter Mayes (NJ)  
James Boylan (GA)  
Peter Courtney (GA)  
Richard Monteith (GA)

# AERMOD Implementation Workgroup: Products/Recs

- Developed AERMOD Implementation Guide (available on SCRAM website)
  - Ever-evolving document
- Providing recommendations to OAQPS
  - Re-institute the Model Clearinghouse
  - Ad Hoc Technical Support Group
  - Specified model updates w/ prioritization
    - Bugs, improvements, tools

# Model Clearinghouse

- Background: It's role faded due to retirements and broad understanding of ISC
- We are re-instituting the M/C per March 2005 memo to ROs
  - Dennis Atkinson, Director (replaced Warren Peters, retired)
- Regional Offices may request assistance from the Model Clearinghouse concerning the application of a model, analytical technique or data base in a particular regulatory action.
- Operational steps included
  - State agency contacts EPA Regional Office
  - Regional Office making decision requests assistance
  - Provides initial evaluation and decision for review
  - Clearinghouse response delivered to the specific Regional Office with a cc to the other Regional Offices
- Involved and lengthy process due to expert review and concurrence across Regions.
- Insured “acceptance” to EPA management, i.e., in accord with policy.

# Dispersion Modeling Futures: Vision Statement

“Lead and promote collaborative efforts on near-field air quality modeling to improve source culpability assessments”

Discussion of 4 Essential Elements at our  
8<sup>th</sup> Modeling Conference, September 22-23,  
2005

# First Essential Element

Foster a collaborative environment aimed at strengthening our technical expertise and working relationships across EPA, other Federal agencies, and the scientific community to regain our leadership role and promote use of best science and evaluation methods.

# Second Essential Element

Promote and facilitate the use of gridded meteorological data including “state-of-practice” National Weather Service (NWS) meteorological analyses to improve modeling science and performance for near-field modeling applications (permits, toxics, direct PM).

# Third Essential Element

Promote continual development of appropriate model evaluation methods to identify areas of improvement in our modeling system (emissions, MET, science), prioritize the research agenda across the modeling community, and ultimately improve model performance in critical policy and science areas.

# Fourth Essential Element

Promote a community approach to model development and acceptance that champions the use of best science, supports continual improvement in modeling science and data, and timely model acceptance for use in regulatory arena.

# Draft Protocol for Model Updates

- Historically, slow and time intensive process
- Establishing new protocol and analysis tool
  - 8<sup>th</sup> Modeling Conference presentation by Desmond Bailey and Roger Brode wrt CALPUFF
  - Applicable to AERMOD too
- New approach will streamline process and allow for more timely and transparent updates

# Next Steps: Items of Interest

- AERMOD & CALPUFF updates
- AERSCREEN & AERSURFACE release
- PM/Regional Haze Guidance
- Potential for “Interim” Modeling Conference

# Next Steps: Future is now

- Complex air quality issues
  - Requires best science with continuing pursuit of what we need to improve
  - Greater demand and need for strong analytical capabilities and policy-relevant research
- Declining resources (FTE, budgets)
  - Need to continue working effectively and efficiently together by leveraging our efforts
    - Effective communication and planning
    - Identify synergies, reduce redundancies
    - Technical and project collaboration