Overview of the Exposure Assessment to Support the NO_2 Primary NAAQS

Presentation to CASAC

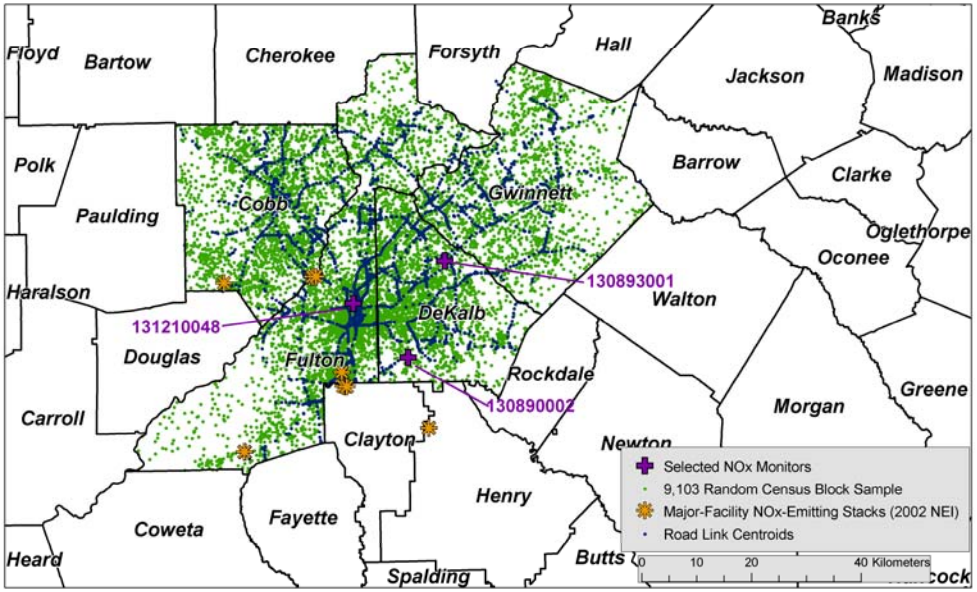
September 9, 2008

Background

- Philadelphia County
  - NO_2 Exposures estimated using combined AERMOD dispersion modeling and APEX exposure modeling approach
  - Summarized in Appendix B of 2nd draft REA
  - Results reviewed by CASAC in May 2008 , two important recommendations
    - improve the characterization of emissions
    - Improve comparison of modeled versus measured data

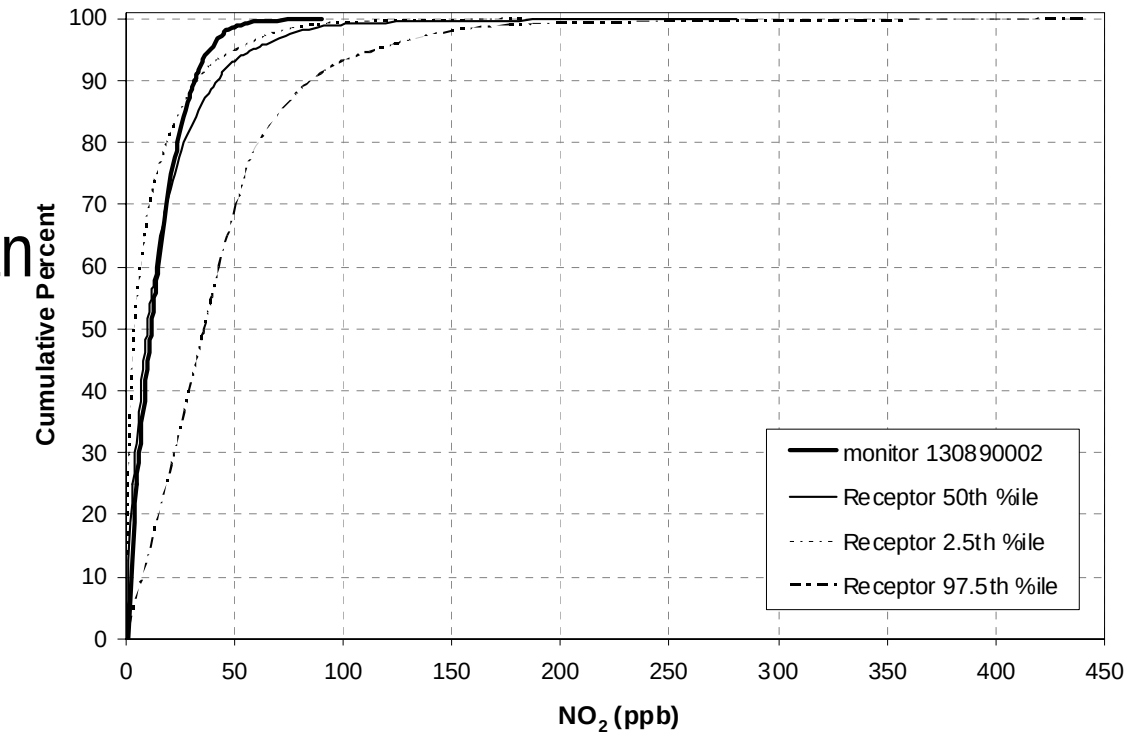
Atlanta MSA case-study

- Selection due to available health effects and personal exposure data and air quality analysis
- 4-county modeling domain
- On-road mobile sources (major and minor roads), stationary sources, airport
- Hourly NO_2 concentrations estimated at several thousand receptors for 2001-2003



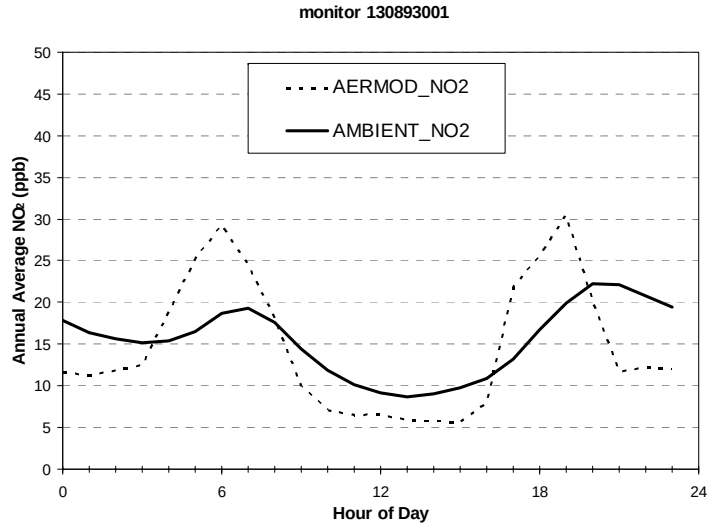
Initial Comparison of Estimated Air Quality with Monitor Data – monitor 130890002

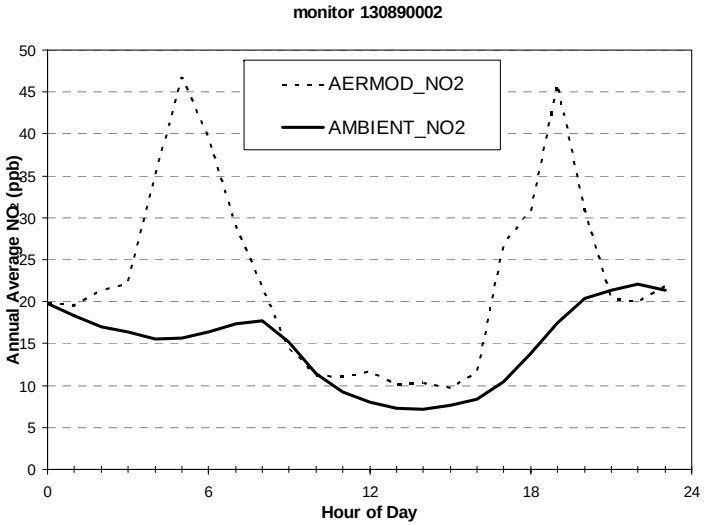
- 95% prediction envelope developed
- Upper percentile estimates greater than measured
- Concentration contribution indicated mobile source emissions a factor

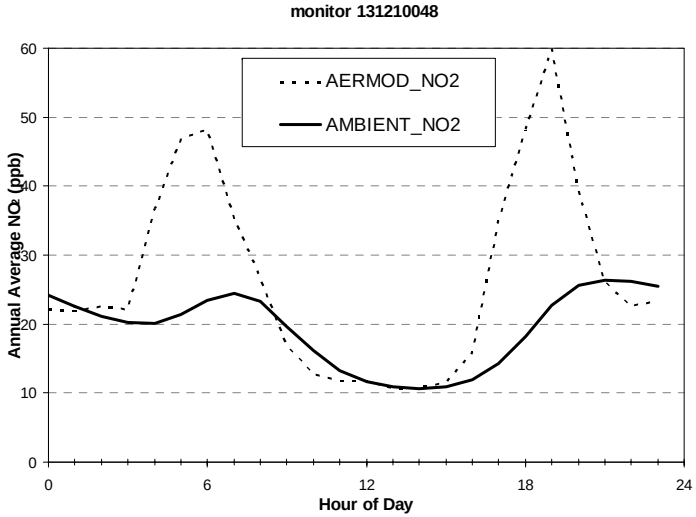


Model input evaluation: mobile source emission estimates

- Adjustment of step-function used to represent diurnal emission profile

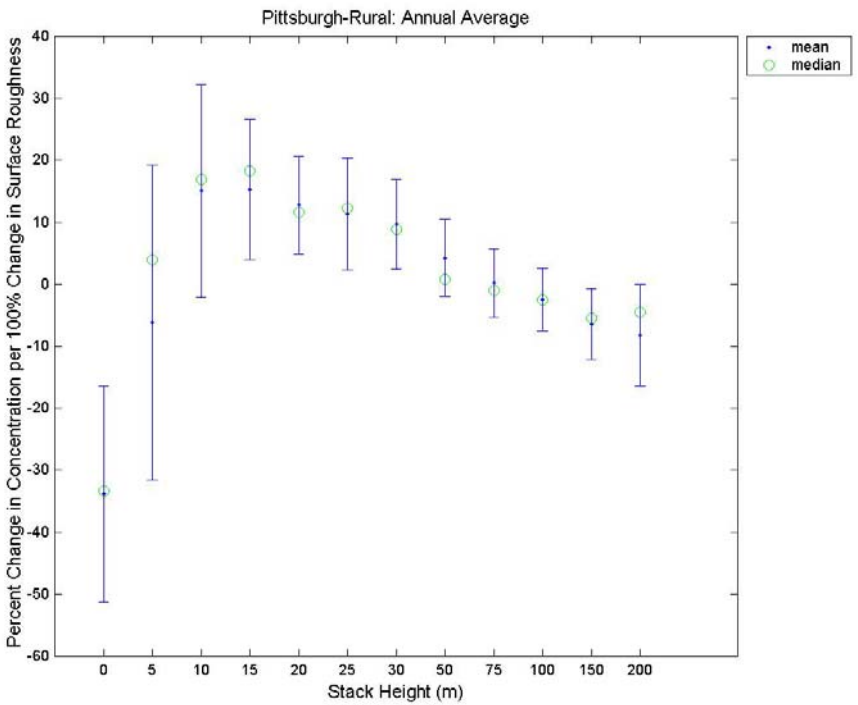






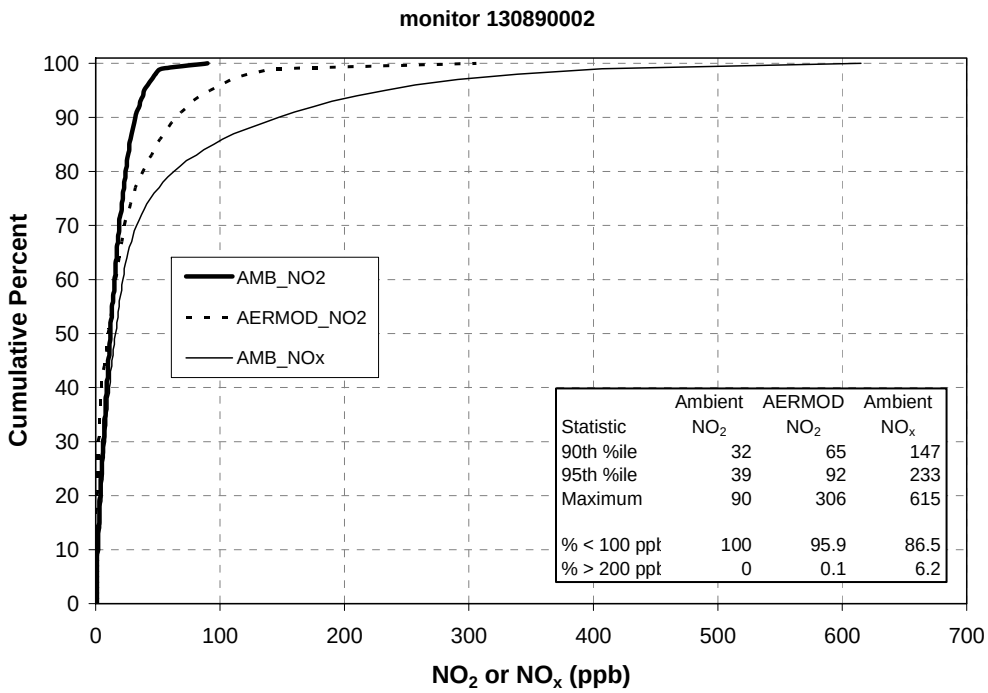
Model input evaluation: meteorological data representativeness

- Currently using Atlanta airport
  - Surface roughness ~ 0.1 m used
  - Can influence dispersion at low level emission sources
  - Investigating additional MET data in areas with similar surface characteristics



Model input evaluation: NO_x chemistry

- Ozone Limiting Method (OLM) option used for mobile sources
- Investigating grouping sources rather than individual modeling for each source



Statistic	Ambient NO_2	AERMOD NO_2	Ambient NO_x
90th %ile	32	65	147
95th %ile	39	92	233
Maximum	90	306	615
% < 100 ppt	100	95.9	86.5
% > 200 ppt	0	0.1	6.2

Model input evaluation: mobile source characteristics

- Links modeled as an elongated area source
- Emission points more variable than stationary sources
  - Vehicles move – variable aerodynamic influence
  - Release heights - light duty vs. heavy duty
  - Initial vertical dilution

What would follow: Chapter 8 and additions to Appendix B

- Overview of exposure modeling approach
  - Location (4 counties Atlanta)
  - Population (2.7M), focus on asthmatics (~210k of which ~64K asthmatic)
  - 3 full years (2001-2003)
  - Scenarios (as is, current and alternative standards, also indoor gas cooking)
- Dispersion modeling
  - Emissions from
    - Major and minor roads
    - Stationary sources
    - Atlanta airport
  - Model comparisons
- Exposure modeling
  - Microenvironments modeled
  - Indoor source inputs
  - Results
    - Number of Exceedances of benchmarks per year
    - Comparison with 24-hour personal exposures (gas stove and non-gas stove)
    - Comparison with AQ characterization in Atlanta
  - Uncertainty analysis