WDEQ Modeling 101

Upper Green River Basin Air Quality Citizens Advisory Task Force

March 21, 2012

Pinedale, WY

Air Quality Modeling

- Mathematical descriptions of pollution transport, dispersion and related processes in the atmosphere
  - Considers emissions and emission source information, meteorology, topography, land use, etc.
- Estimates air pollutant concentration at many locations
- Used to estimate impacts from single source or many sources
- Informs strategies for and effectiveness of air quality management

Common Models

- AERMOD
  - Near field model
  - Often used for single source or in-field impact analysis
  - Does not predict secondary pollutants (ozone & $PM_{2.5}$)
- CALPUFF
  - Dispersion model
  - Used for regional (mid-field and far-field) analyses
  - Does not predict secondary pollutants (ozone & $PM_{2.5}$)
- CMAQ, CAMx, CALGRID
  - Photochemical Grid Model (PGM)
  - Used for regional analyses
  - Considers chemical processes that lead to secondary pollutants (ozone and $PM_{2.5}$)

UGRB Winter Ozone Modeling

Goal: To develop a winter ozone model configuration suitable for the Division's air quality management decisions

Modeling Completed or Underway:

- Meteorological Modeling Completed
  - Simulates meteorology of the 2008 winter ozone episodes
  - Drives meteorological inputs of dispersion and grid models
  - CALMET
  - WRF
- Completed Dispersion Modeling using CALPUFF
  - Used to inform conceptual understanding and inform decisions related to PGM
  - Analyzed vertical distribution of emissions from compressor stations and drilling rigs in the UGRB during 2008 winter ozone episode
- Underway PGM Analysis and Model Evaluation of CMAQ and CAMx
  - Base Case model performance evaluation focused on February and March 2008 (most data rich year)
  - Evaluation of both CMAQ and CAMx to determine best model for UGRB Winter Ozone Analysis
  - Better performing model used to inform control strategies and air quality management decisions for the UGRB
  - Target completion date of end 2012