Attainment Modeling Status Report

Metropolitan Washington Air Quality Committee (MWAQC)

March 22, 2006

Presented by: VA Department of Environmental Quality

Presentation Topics

- **Review of Modeling Process**
  - Purpose of attainment modeling
  - Attainment modeling steps
- **Review of 2009 Modeling Results**
  - Ozone Transport Commission (OTC) 2009 future base case
  - VADEQ “adjusted” future base case simulations
- **Next Steps**
  - Sensitivity analyses
  - Future control case modeling
- **Other Related Modeling Efforts**
- **Modeling Schedule**

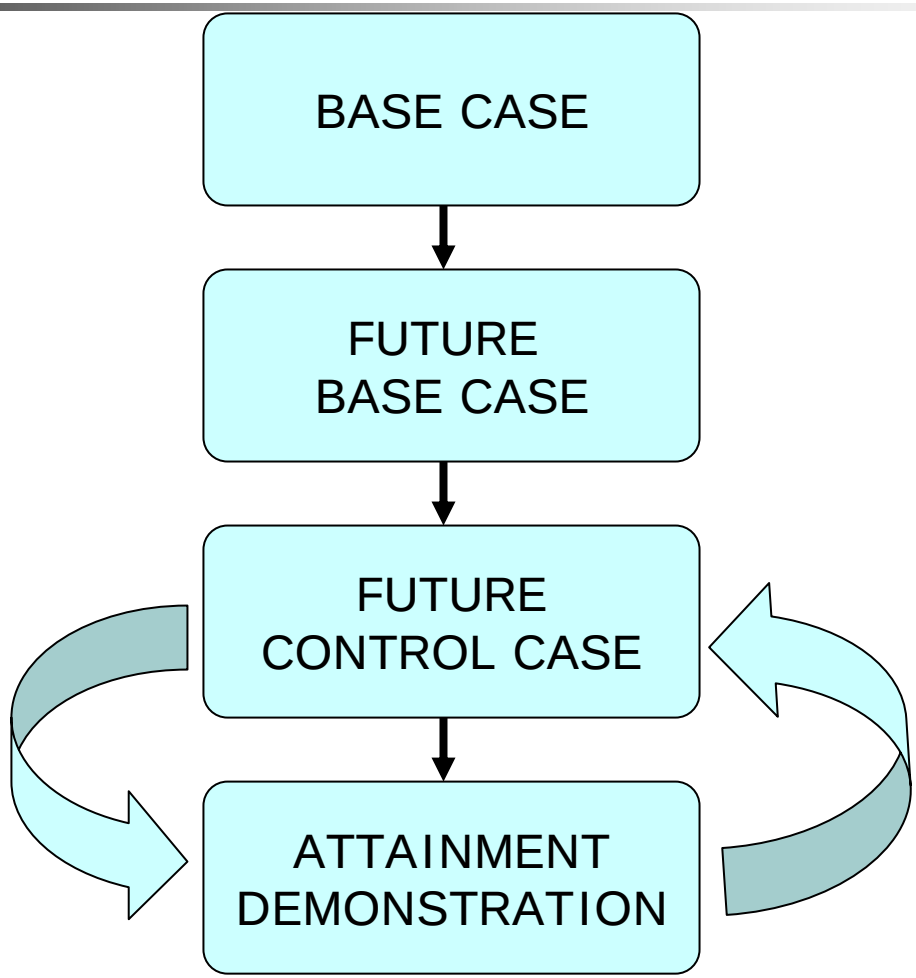
Purpose of Attainment Modeling

- **Meet EPA requirements & guidance**
- **Predict future air quality conditions**
- **Develop & test potential control strategies**
- **Translate emission reductions into air quality benefit**
- **Demonstrate desired air quality outcome**

Attainment Modeling Steps

- **Historical Base Case Modeling**
  - Select high ozone events/ozone season
  - Run event simulation(s)
  - Compare model results to observed levels (model validation)
- **Future Base Case Modeling**
  - Develop future year emissions
  - Include known existing/future control measures
  - Run simulation(s)
  - Perform sensitivity analyses
- **Future Control Case Modeling**
  - Develop potential control measures and reductions
  - Test control strategies (iterative process)
  - Perform attainment test

Attainment Modeling Steps (continued...)



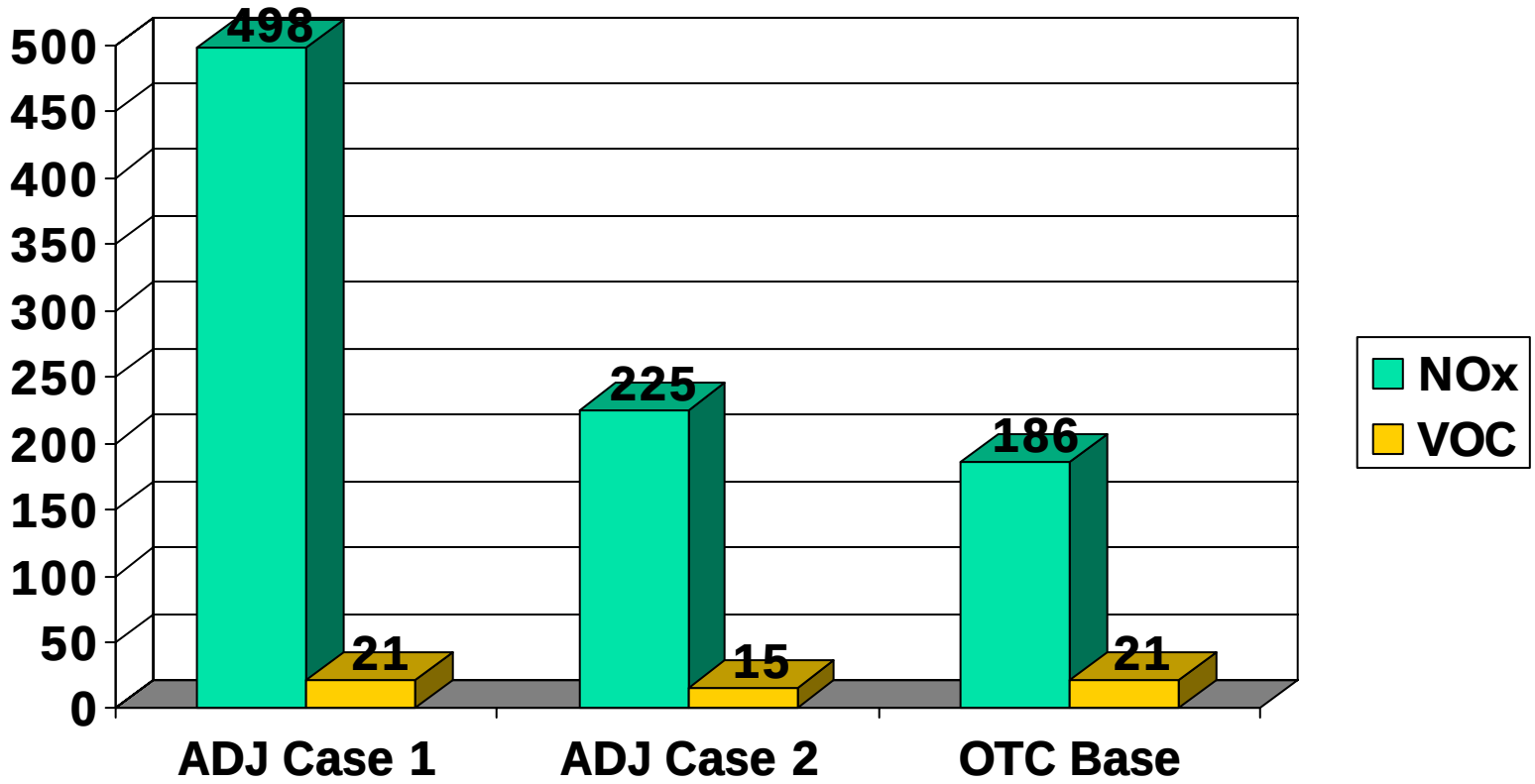
DC Ozone Attainment Modeling Platform & Status

- **All analyses conducted with OTC modeling platform**
  - Community Multi-scale Air Quality (CMAQ) Modeling System
  - 12-km horizontal grid resolution
  - University of Maryland 2002 MM5 Meteorology
  - Shorter time period used to speed up the process
- **Modeling tasks already completed**
  - Modeling protocol
  - 2002 base case
  - Base case model validation – valid for planning purposes

2009 Ozone Base Case Modeling Scenarios

- **Adjusted base case #1**
  - Current controls plus growth for power plants
- **Adjusted base case #2**
  - Additional power plant controls (state estimates)
  - OTC measures in Northern VA
- **OTC base case**
  - Additional power plant controls (EPA estimates)
  - Reductions may be “overly optimistic”

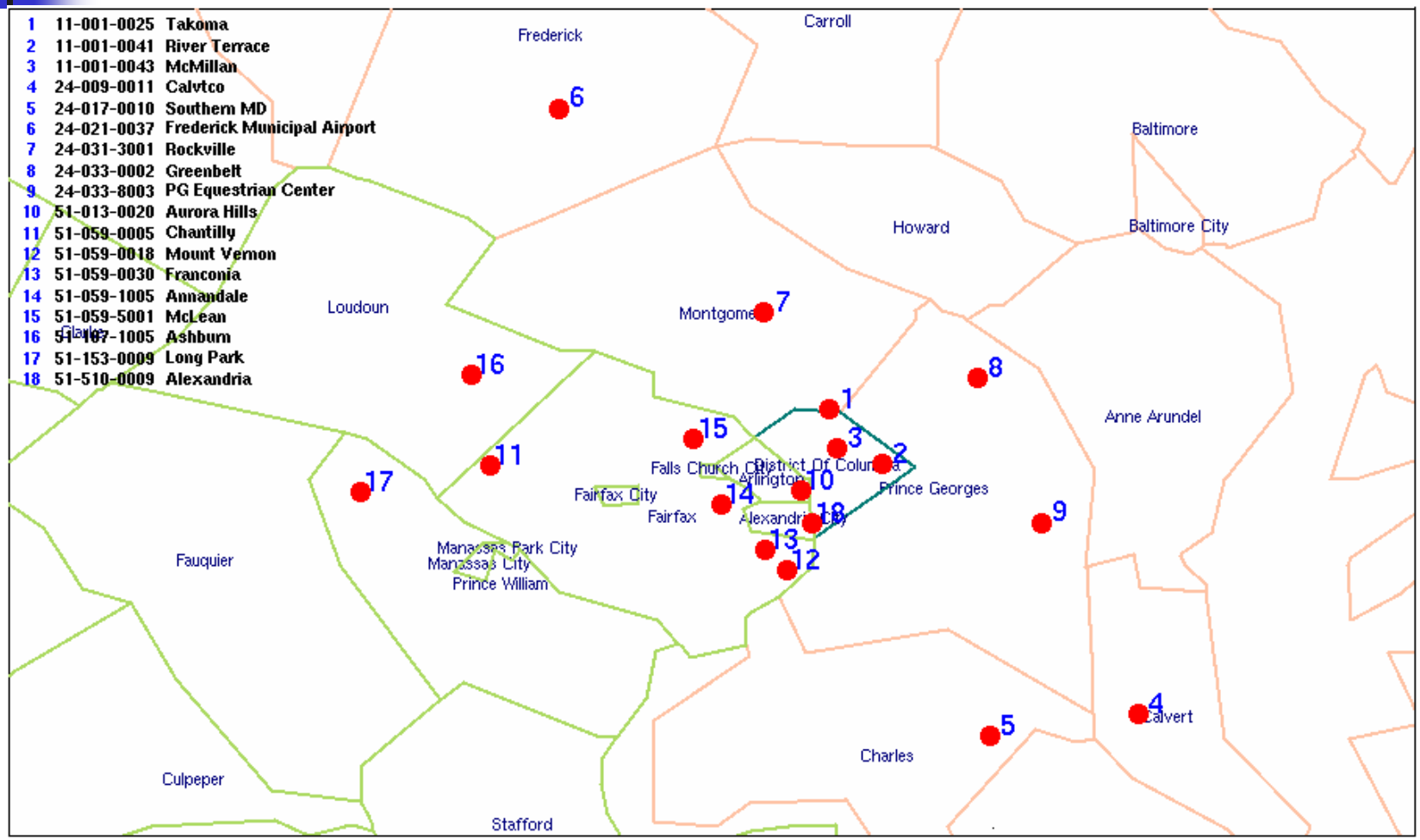
Summary of Adjusted Emissions for 2009 *(Tons Per Day)*



Attainment Demonstration Data & Calculations

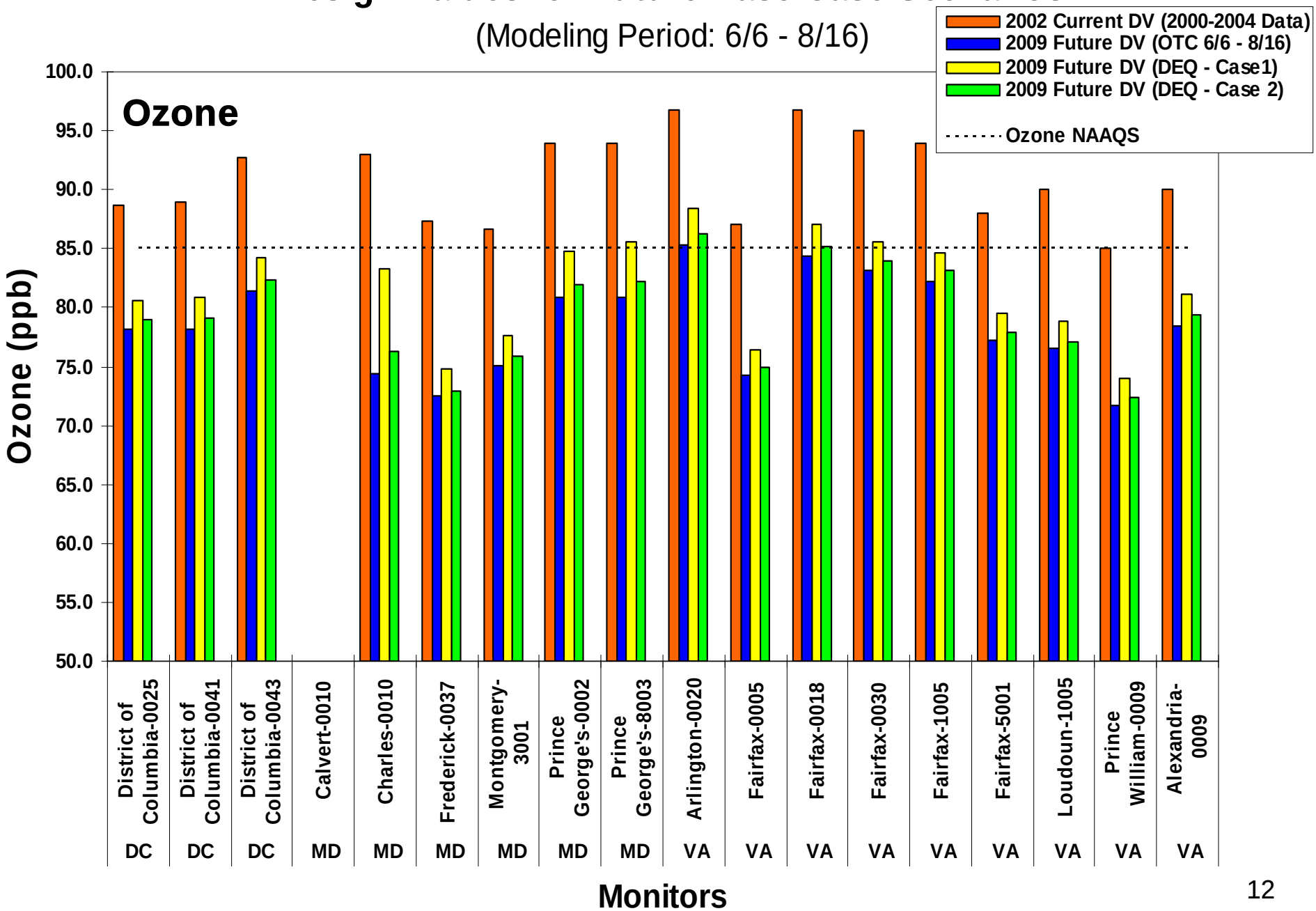
- **Current design value (DV)**
  - Monitor specific average of observed ozone
  - Covers three three-year periods centered on 2002
- **Relative reduction factor (RRF)**
  - Percent reduction in ozone predicted by model between base & future year scenarios
- **Future design value**
  - Current DV multiplied by the RRF
  - Attainment predicted if future DV is < 85 parts per billion
  - Test applied to each monitor and surrounding area

Location of Ozone Monitors



Design Values for Future Base Case Scenarios

(Modeling Period: 6/6 - 8/16)



2009 Base Case Modeling Summary of Results

- **Adjusted base case #1**
  - Four DC area monitors above standard (85 to 88 ppb)
- **Adjusted base case #2**
  - Two monitors above standard (85 to 86 ppb)
- **OTC base case**
  - One monitor above standard (85 ppb)

Attainment Modeling Next Steps

- **Perform sensitivity analyses**
  - What's more effective to further reduce ozone?
  - What pollutants & source categories?
- **ASIP sensitivities performed for DC**
  - Ground level NO_X reductions most effective
  - Point source NO_X reductions less effective
  - VOC reductions are least effective
- **Additional reductions needed for attainment may be difficult**
  - Not much left to control
  - Model not very sensitive to "local" reductions

Attainment Modeling Next Steps (continued…)

- **Future Control Case Modeling**
  - Identify & Quantify additional control emissions
  - Run control case model to test these control strategies
  - Perform attainment test (using Relative Reduction Factors)
  - Repeat process as needed to demonstrates attainment
  - Perform Supplemental analyses & Weight of Evidence (WOE)
  - Document results for inclusion in SIP

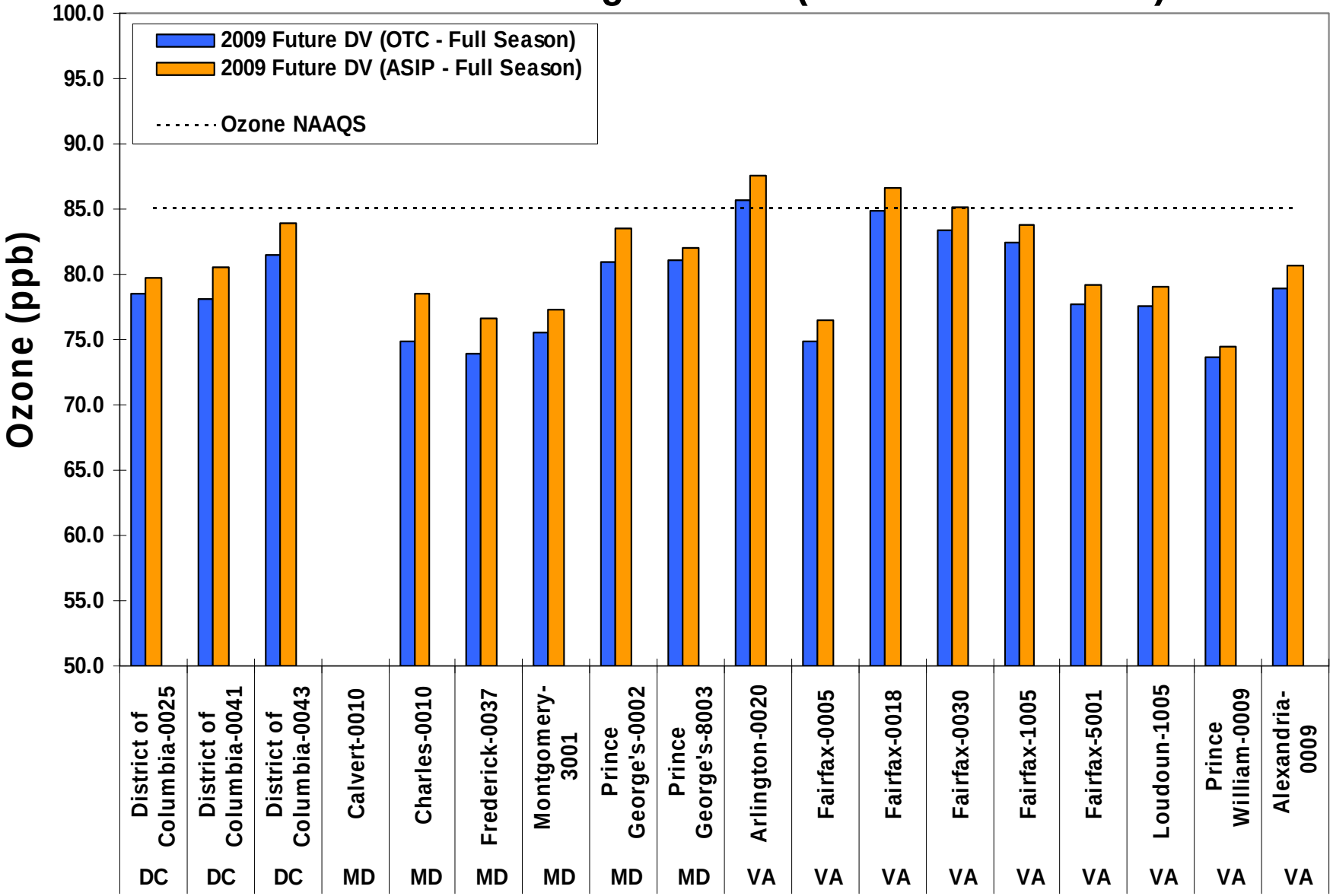
Weight of Evidence (WOE)

- **Analyses that support the attainment demonstration**
  - Air quality and emissions trends
  - Meteorology analysis
  - Other modeling analyses
- **Required when results are in or near attainment**
  - Future DVs from 82 to 87 part per billion
- **Need to develop DC specific list**

Other Related Ozone Modeling Efforts

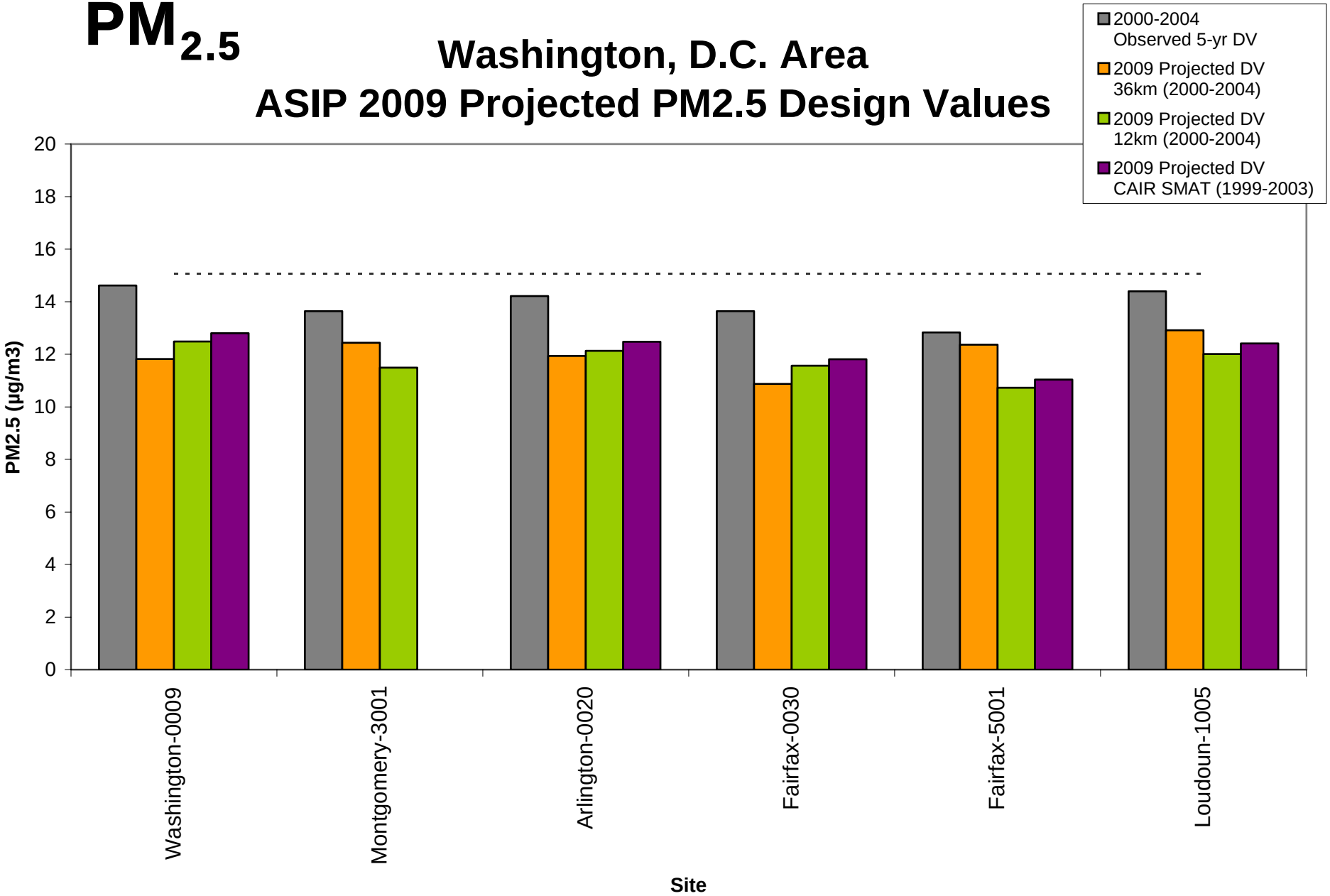
- **Ozone Transport Commission (NY, NJ, MD, VA & NESCAUM)**
  - On a similar schedule for completion
  - Should be consistent with DC modeling since same platform
- **Association for Southeastern Integrated Planning (ASIP)**
  - Based on VISTAS modeling platform (emissions, met. data)
  - Preliminary 2009 base case results available
  - Have conducted series of sensitivity runs
  - Will be used in WOE analysis

Comparison of OTC & ASIP
2009 Future Design Values (Full Ozone Season)



$PM_{2.5}$

Washington, D.C. Area
ASIP 2009 Projected PM2.5 Design Values



Ozone Attainment Modeling Schedule