



Eight-Hour Ozone Maintenance Plan Modeling Protocol

Air Quality Trends in the Southwest Forum

June 4, 2008





Background

Maricopa Nonattainment Area

- Initially “Moderate” nonattainment area, and then subsequently “Serious” area for the One-Hour Ozone Standard.
- Submitted One-Hour Ozone Redesignation Request and Maintenance Plan (January, 2004).
- Revoked the One-Hour Ozone Standard on June 15, 2005.
- “Basic” Nonattainment Area for the Eight-Hour Ozone Standard with an attainment date of June 15, 2009.
- Submitted the Eight-Hour Ozone Plan for the nonattainment area on June 15, 2007.
- Need to submit an Eight-Hour Ozone Redesignation Request and Maintenance Plan to EPA.





Objectives of Protocol

- To serve as a means for planning and communicating up-front how a modeling demonstration will be performed.
- To build consensus among all interested parties concerning modeling issues.
- To enhance technical credibility.
- To encourage the participation of all interested parties.





Schedule

Table 1-1 Schedule for the Eight-Hour Ozone Modeling Demonstration for the MAG Eight-Hour Ozone Redesignation Request and Maintenance Plan for the Maricopa Nonattainment Area

8-Hour Ozone Maintenance Modeling Task List	2008											2009				
	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	
Prepare modeling protocol document	★															
Prepare meteorological, emissions pre-processing and CAMx modeling inputs		★														
Conduct MOBILES modeling for onroad mobile source emissions		★														
Develop emissions inventories for modeling three episodes in 2025			★													
Committed control measure evaluation				★												
Complete CAMx simulations						★										
Write draft TSD and maintenance plan								★								
Provide draft TSD for Air Quality Planning Team review								★								
Draft plan document available for public review									★							
Public hearing										★						
Air Quality Technical Advisory Committee recommendation											★					
Management Committee recommendation												★				
Regional Council action												★				
Submit to ADEQ/EPA												★				
EPA adequacy finding for conformity budgets																★

Note: Assumes no additional measures beyond those in the Eight-Hour Ozone Plan and the measures in SB 1552 passed by the Arizona Legislature in 2007.





Model Selection

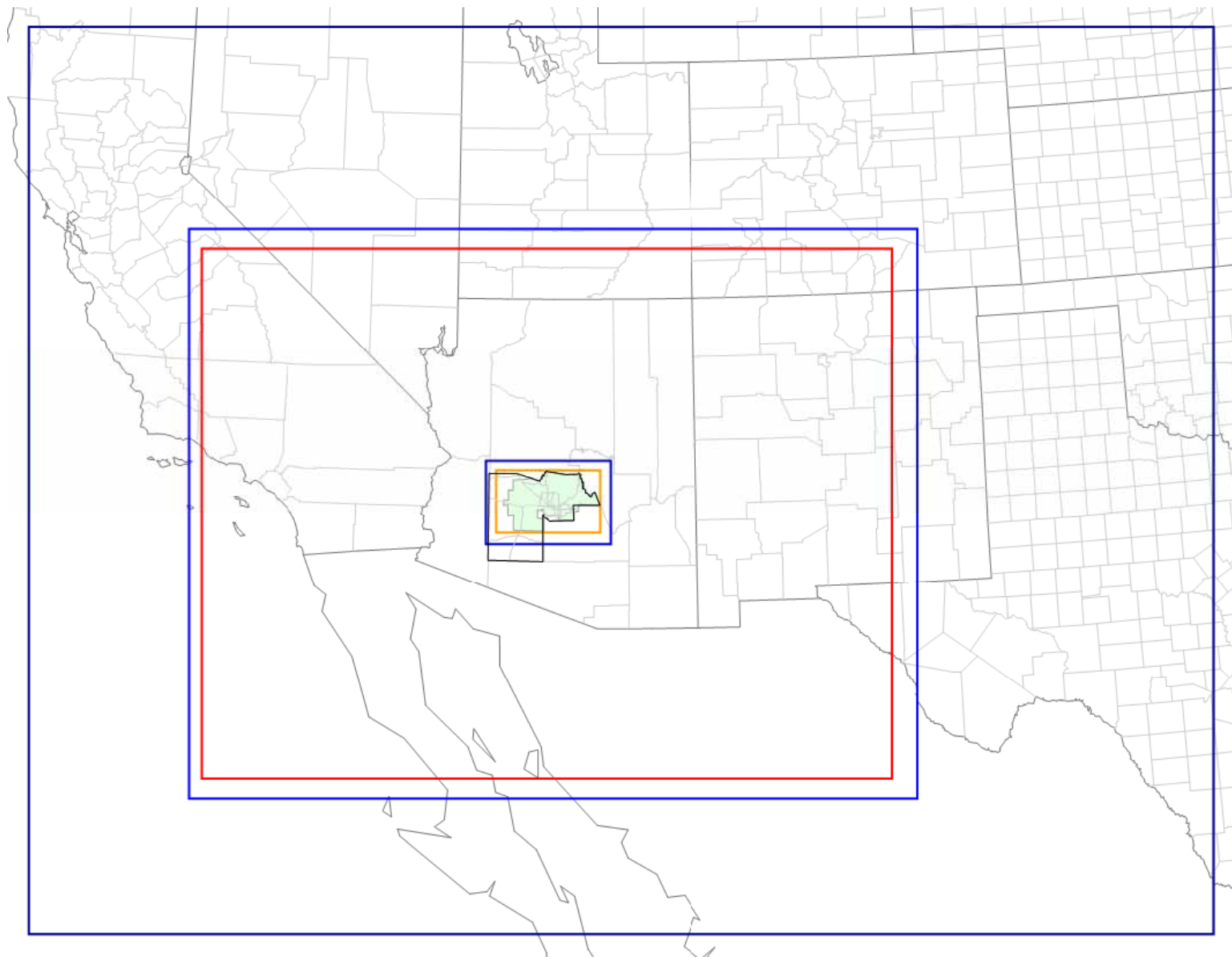
Table 2-1 Attributes of Candidate Air Quality Models

Selection Criteria	CAMx	CMAQ	UAM-V
Documentation and Track Record	3	3	3
Advanced Technical Features	3	3	3
Recent Applications	3	3	2
Experience of MAG Staff	3	1	0
Computational Efficiency	3	3	3
Flexibility (Proprietary vs. Open Source)	3	3	0
Total	18	16	11
Scoring: 3 = highest and 0 = lowest			





CAMx and MM5 Modeling Domains





Modeling Configuration

- Three Episodes (including three spin-up days)
 - August 2-11, 2001 (10 days),
 - May 31-June 7, 2002 (8 days),
 - July 5-14, 2002 (10 days)
- Air Quality data - obtained from the MCAQD, PCAQD, ADEQ monitoring networks
- Meteorology data - AZMET, NWS, and FSL networks
- Vertical Resolution
 - Top Height - approximately 16 km
 - 35 layers - MM5 Domain
 - 20 layers - CAMx 12km Domain
 - 23 layers - CAMx 4km Domain
- Initial and Boundary Condition (IC/BC) Data
 - 12 km IC/BC data will be provided by ENVIRON
 - 4 km IC/BC data will be obtained from the CAMx output for the outer 12km domain.





Model Performance Evaluation

- **Operational Evaluation:**
Assessing how accurately the model predict observed concentration (e.g., statistics, plot/graphics)
- **Diagnostic Evaluation:**
Evaluating how well the model characterize the sensitivity of ozone to changes in emissions (e.g., sensitivity tests).





Maintenance Modeling

- Maintenance Demonstration Year: 2025
- Point Source
 - Power plants: Potential to Emit (PTE)
 - Other point sources: 2025 Socio-economic growth factors (e.g., population, employment).
- Area Source: 2025 socio-economic growth factors.
- Onroad Mobile Source: 2025 transportation network data derived by a transportation model (i.e., TRANSCAD).
- Nonroad Mobile Source: 2025 projected vehicle activity and population data.
- Biogenic Source: Assume the same level of biogenic emissions as was used in the 8-Hour Ozone Plan for the three high ozone episodes.





Maintenance Modeling

- 2025 Emissions Inventory for 12 km: Extrapolated from 2002 and 2018 Western Regional Air Partnership (WRAP) data.
- Chemical Mechanism: Carbon Bond-IV (CB-IV) mechanism.





Committed Control Measures

Eight-Hour Ozone Plan

- Phased-in Emission Test Cutpoints
- Develop Intelligent Transportation Systems
- Rule 358: Polystyrene Foam Operation
- Coordinate Traffic Signal Systems
- Tougher Enforcement of Vehicle Registration
- One Time Waiver from Vehicle Emission Test
- Summer Fuel Reformulation (California Phase II and Federal Phase II Reformulated Gasoline with 7 psi from May 1)

New Control Measures (Senate Bill 1552)

- Ban Open Burning during Ozone Season
- Liquid Leaker Test – Vehicle Inspection





Maintenance Demonstration

- Maintenance Test: 2025 Design Value < 85 ppb
 - 2025 Design Value: Baseline Design Value x RRF
 - Baseline Design Value: Three year average of 4th highest daily maximum monitored ozone concentrations
 - RRF (Relative Response Factor): the ratio of the Future Prediction to Current Prediction
- Uncertainties:
 - Meteorological Variability
 - Emissions Variability
 - Growth Projections
 - Control Measure Effectiveness
 - Model





Supplemental Analysis

➤ Corroboratory Tests:

(e.g., Unmonitored Area Analysis, Absolute Model Forecast, or Indicator Species, etc.)

➤ Weight of Evidence Approach:

(e.g., emission trend, monitored 1-hour and 8-hour ozone concentration trends, etc.)





For more information

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