Kent & Queen Anne's Counties, Maryland Early Action Compact Modeling Submittal

Maryland Department of the Environment
March 31, 2004

1. Introduction

The following document serves as the modeling submittal for Kent and Queen Anne's Counties as is required of the March 31, 2004 Early Action Plan milestone submittal. The Washington County modeling report was submitted separately as part of a joint effort with Virginia, West Virginia, and Maryland. This detailed modeling report is provided in Appendix B. The Maryland Department of the Environment (MDE) is submitting the Kent and Queen Anne's modeling demonstration separately as the U.S. Environmental Protection Agency (EPA) has not yet signed the Early Action Compact (EAC) for Kent and Queen Anne's Counties. The MDE is hoping that EPA joins MDE and Kent and Queen Anne's Counties in partnership on the EAC before EPA makes final designations by April 15, 2004.

The EAC is an agreement with the EPA, in partnership with local areas and State agencies to enter into a commitment to develop state implementation plans (SIP) that will achieve local reductions earlier than otherwise required to demonstrate attainment of the 8-hour ozone standard. The submittal date for the EAC programs was December 31, 2002, which was formally announced to states in the EPA Holmstead Memorandum, dated November 14, 2002. The goal of the program is to meet attainment of the 8-hour ozone NAAQS by December 31, 2007.

The MDE and the local governments of Washington County, and Kent and Queen Anne's Counties submitted their respective EACs before the required December 31, 2002 deadline. All of the following milestones have been met for the Maryland EAC areas. The first submittal of the EAC process required the local areas to identify and describe the local control measures that will be considered during the local planning process by June 16, 2003 to remain eligible in the program. Semiannual progress reports were submitted to EPA in accordance with their guidance memorandum dated April 4, 2003. The first progress report due June 30, 2003, required local areas to assess and report the progress against milestones in a regular, public process. The next progress report due on December 31, 2003, required the list of control measures under consideration, likely implementation dates, and estimated emissions reductions. Table 1-1 demonstrates the EAC milestones that Kent and Queen Anne's Counties have met in good faith.

Table 1-1: Early Action Compact Milestones

December 31, 2002	Early Action Compact Signed and Submitted by K&QA Counties and MDE
June 16, 2003	Identify and describe local strategies being considered for inclusion in the Early Action Plan
June 30, 2003	Semi-annual status report
December 31, 2003	Semi-annual status report
March 31, 2004	Final Revisions to Modeled Control Cases
	Final Revisions to Local Control Strategies
	Final Revisions to Attainment Maintenance Analysis
	Submission of final EAP to MDE and EPA

The EAC provides the opportunity to meet the 8-hour ozone standard expeditiously through local actions to reduce ozone precursor emissions. If successful, Maryland's EAC areas will avoid EPA designations as "nonattainment" and any requirements of the designation and classification.

Maryland has submitted EACs for the following geographic areas:
Washington County, Maryland
Kent and Queen Anne's Counties, Maryland

The EAC process required photochemical modeling demonstrations to show attainment of the 8-hour ozone standard by December 2007. The technical modeling was a joint effort between Maryland, Virginia, and West Virginia and modeled under one modeling domain. It included a base case scenario using the 1999 National Emissions Inventory (NEI) and a future case that estimates the expected growth to 2007. The modeling exercise indicates that the desired result of reducing ozone concentrations to levels below the 8-hour ozone standard will be achieved by the implementation of the controls included in Maryland's Early Action Plans, and combined with the control strategies being implemented on the state and federal levels.

The lead agency that completed the EAC modeling for the previously mentioned EAC areas was the Virginia Department of Environmental Quality (DEQ). The modeling study followed the *Air Quality Modeling Analysis for Virginia, West Virginia and Maryland Early Action Ozone Compacts: Modeling Protocol, Episode Selection, and Domain Definition* prepared by the Virginia DEQ.

This modeling submittal documents the photochemical modeling results for 1999 base case and 2007 future case for the Kent and Queen Anne's EAC area and demonstrates attainment of the 8-hour ozone standard in the Kent and Queen Anne's EAC area by December 2007.

2. 8-Hour Ozone Photochemical Modeling Analysis and Attainment Demonstration

Photochemical modeling for the EAC area of Kent and Queen Anne's Counties was coordinated and completed by the Virginia DEQ with assistance from the MDE and the University of Maryland College Park (UMD). A detailed report on this modeling is provided in Appendix A[1].

The photochemical modeling analyses completed by the Virginia DEQ included base case modeling for 1999 and the future controlled case for 2007. The future controlled case was modeled using an emissions inventory that took into account controls that will be in place by 2007. Kent and Queen Anne's Counties have formally approved local control measures to help bring the EAC area into 8-hour ozone attainment by 2007. Future modeling will be completed using these formally approved local control measures.

The photochemical modeling demonstration and the calculation of relative reduction factors (RRFs) and future design values (DVs) was completed using the *Draft Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS, U.S. EPA Office of Air Quality Planning and Standards, EPA-454/R-99-004, May 1999*. The RRFs and base-year DVs are the basis for projecting future-year DVs (DVF). The draft modeling guidance recommends using all episode days within the modeled base year where the daily maximum 8-hour ozone concentration exceeds 84 ppb be used to calculate the RRF. Due the brief number of days being modeled it was decided to use the more conservative 8-hour ozone concentration of 70 ppb to calculate the RRF.

[1] The Maryland Department of the Environment and UMD worked closely with the Virginia DEQ in performing this modeling and are currently running CAMx using the Virginia DEQ files to begin to refine this modeling demonstration.

The Millington monitor (EPA AIRS ID # 240290002) represents the Kent and Queen Anne's Counties EAC area.

The Millington monitor design scaling was calculated using the following methodology:

- The Millington monitor's cell location was determined.
- For that cell the maximum 8-hour ozone values greater than or equal to 70 ppb for the entire episode for both the base case and future case.
- Average the daily maximum 8-hour ozone values across days with daily maximum 8-hour ozone greater or equal to 70 ppb for the base case and future case.
- The RRFs for the Millington monitor was calculated.
- The future year DV for the Millington monitor was calculated.

Provided in Table 2-1 is the 8-hour DV for the Millington monitor.

Table 2-1. 8-Hour Ozone Design Value For Kent and Queen Anne's Counties

MDE's 1997 – 1999 4th Highest 8-Hour Ozone Averages					
AIRS ID	Monitor	1997	1998	1999	3 year Average
240290002	Millington	105 ppb	98 ppb	99 ppb	101 ppb

Provided in Table 2-2 is the 8-hour ozone attainment demonstration for Kent and Queen Anne's Counties EAC area.

Table 2-2. Attainment Demonstration Results for Kent and Queen Anne's Counties EAC Area

Monitor	Modeled Average Base-Year Daily Maximum Ozone Concentration (ppbv)	Modeled Average Future-Year Daily Maximum Ozone Concentration (ppbv)	RRF	Current-Design Value (ppbv)	Future-Design Value (ppbv)	Status Pass/Fail
Millington	78.91	64.35	.815	101	82.4	Pass

As shown in Table 2-2 the Kent and Queen Anne's Counties EAC area has demonstrated attainment for the 8-hour ozone standard by 2007.

3. Revising and Refining the Modeling Demonstration

The photochemical modeling effort to this point has involved the MDE and the UMD working closely with the Virginia DEQ in completing this photochemical modeling. The MDE through the UMD has

started the process of using the input modeling files developed by the Virginia DEQ to begin performing refined CAMx photochemical modeling. This revised and refined modeling effort by the UMD will use updated emissions inventory files for the 2007 control case and it's anticipated that these modeling runs will show the Kent and Queen Anne's Counties EAC area will have even lower ozone levels than those predicted by the current photochemical modeling.

Future photochemical modeling will also include other more recent ozone episodes that occurred in 2002. This photochemical modeling will include updated MM5 meteorological modeling completed by the UMD and EPA's NEI 2002 processed through the SMOKE model.

4. Critical New Data

The photochemical modeling was required to be completed on a very aggressive schedule, thus several conservative assumptions had to be made to complete the photochemical modeling effort on time. In this case, conservative means that the model results will more than likely over-predict ozone than under-predict ozone. More importantly, several key pollution control programs in and around Kent and Queen Anne's Counties could not be included in the future year inventory that were developed.

When these programs are included in the revised modeling, the predicted ozone levels should be even lower than those predicted by the current modeling. The levels predicted by the current modeling show that the Kent and Queen Anne's EAC area will attain the 8-hour ozone standard by December 31, 2007.

Local and area control programs that were not included in the current modeling include:

- OTC Consumer Products in adjacent counties
- OTC Architectural and Industrial Maintenance adjacent counties
- OTC Portable Fuel Containers
- Enhanced Ridesharing Program
- Park and Ride Lots
- Inter/Intra County Bus Service
- Kent and Queen Anne's Telecommuting/Flexible Work Hours/Compressed Work Week
- Enhanced Non-Motorized Transportation
- Kent and Queen Anne's Energy Saving Plan

5. Summary

At this point in time Kent and Queen Anne's Counties have met all required EAC milestones in good faith. The results of photochemical modeling completed by the Virginia DEQ with the assistance of the MDE and the UMD show that by implementing the planned regional and local control measures the Kent and Queen Anne's EAC area is expected to attain the 8-hour ozone standard by 2007.

Appendix A

Virginia, West Virginia and Maryland Early Action Compact Modeling Report