



**Western Regional Air Partnership (WRAP)  
Regional Modeling Center (RMC)**

**Monthly Progress Report  
for August 2006**

Prepared by

University of California, Riverside (UCR)

ENVIRON International Corporation

University of North Carolina's Carolina Environmental Program (UNC-CEP)

## Introduction

This is the August 2006 Monthly Progress Report that covers the activities of the Western Regional Air Partnership (WRAP) Regional Modeling Center (RMC).

## Background

The WRAP RMC is composed of staff from the University of California, Riverside (UCR), ENVIRON International Corporation, and the University of North Carolina's Carolina Environmental Program (UNC-CEP). The Principal Investigator and Project Manager for the RMC is Dr. Gail Tonnesen of UCR ([tonnesen@cert.ucr.edu](mailto:tonnesen@cert.ucr.edu)). Mr. Ralph Morris ([rmorris@environcorp.com](mailto:rmorris@environcorp.com)) and Mr. Zac Adelman ([zac@unc.edu](mailto:zac@unc.edu)) lead the RMC efforts at ENVIRON and UNC-CEP, respectively. The RMC is the contractor for meteorological, emissions, and air quality modeling and analysis performed for the WRAP region's states and tribes to provide the analytical results needed to address the requirements of the EPA Regional Haze Rule.

Current responsibilities of the RMC include:

- Emissions processing and modeling
- Air quality and visibility modeling simulations
- Analysis, display, and reporting of modeling results
- Storage and quality assurance of the modeling input and output files

The tasks and deliverables discussed in this report are based on the WRAP RMC 2005-06 work plan, which is available on the WRAP RMC web site:

<http://pah.cert.ucr.edu/aqm/308/docs.shtml>

The tasks are linked to and based on the WRAP Strategic Plan and the WRAP 2005 Work Plan, found at:

[http://wrapair.org/WRAP/meetings/031014board/Tab\\_4\\_Strategic\\_Plan\\_Final.pdf](http://wrapair.org/WRAP/meetings/031014board/Tab_4_Strategic_Plan_Final.pdf)

[http://wrapair.org/WRAP/documents/041207WRAP\\_CY05\\_Final\\_Workplan.pdf](http://wrapair.org/WRAP/documents/041207WRAP_CY05_Final_Workplan.pdf)

The WRAP Technical Coordinator (Tom Moore) and the cochairs of the WRAP Modeling Forum (John Vimont of the National Park Service, Mary Uhl of the New Mexico Environment Department, and Kevin Briggs of the Colorado Department of Public Health and Environment) provide day-to-day oversight of RMC activities, and the Modeling Forum oversees the activities of the RMC through monthly conference calls, topical conference calls, and periodic in-person meetings and workshops.

The WRAP is one of five Regional Planning Organizations (RPOs) consisting of states, tribes, federal and local agencies, and stakeholders charged with the responsibility for conducting technical analyses and assisting in the development of State Implementation Plans (SIPs) and Tribal Implementation Plans (TIPs) for regional haze in different areas of the United States.

## Overview of WRAP RMC 2005-06 Work Effort

The WRAP RMC 2005-06 work effort is focused on the following activities:

- 1) Finalize the 2002 base case input data and the selection of models to be used for future-year 2018 modeling.
- 2) Implement final performance metrics, displays, and methods to project future-year model results.
- 3) Complete and analyze a 2018 base case modeling scenario.
- 4) Complete and analyze several emissions reduction and emissions sensitivity scenarios.
- 5) Perform additional source apportionment model simulations.
- 6) Complete the visibility modeling effort for Alaska.

The 2005-06 work plan provides additional background information on these activities, and the revisions made to it in April 2006 provide specifics on the tasks being completed during 2006. The revisions are available at <http://pah.cert.ucr.edu/aqm/308/docs.shtml>.

The overall objective of the 2005-06 work plan is to complete all modeling studies and documentation needed for development of §308 SIPs and TIPs for regional haze. The WRAP visibility modeling system comprises the Sparse Matrix Operator Kernel Emissions (SMOKE) emissions model, the Fifth-Generation Mesoscale Model (MM5) meteorological model, and the Community Multiscale Air Quality (CMAQ) model. The WRAP modeling domain consists of a continental U.S. 36-km domain and a western U.S. 12-km domain. The WRAP RMC modeling efforts also include analysis of specific topics to support the other WRAP forums. The RMC's 2005-06 work effort as laid out in the work plan is divided into 12 tasks, listed below. Note that Task 3 below is not covered in this report because it was essentially completed by the end of project year 2004.

- Task 1: Project Administration, Major Project Reports, and Computer Hardware and Systems Administration
- Task 2: Emissions Modeling, Processing, and Analysis
- Task 3: Test, Improve, Quality Control, Obtain External Peer Review, and Finalize 36-km and 12-km MM5 Simulations for Eventual Use in CMAQ (*completed in project year 2004*)
- Task 4: Air Quality Model Evaluation for 2002 Annual Simulation
- Task 5: Testing of and Further Improvements to the Windblown Dust Emissions Modeling Methodology

- Task 6: BART Source Sensitivity Screening Using CALPUFF
- Task 7: Sensitivity Studies Designed to Evaluate Uncertainties in Fire Emissions
- Task 8: Preliminary Meteorological, Emissions, and Air Quality Modeling Activities for Alaska
- Task 9: Further Analysis of Model Performance in Regard to the Contribution of Natural Emissions to Visibility Impairment
- Task 10: Preparation and Reporting of Geographic Source Apportionment Results
- Task 11: Technology Transfer
- Task 12: Computer Hardware

The list above was revised in April 2006 when the work plan was updated, based on revised priorities and funding. The changes are reflected in the rest of this report. The original Task 6 was renumbered to become Task 3, and Tasks 8 through 10 were deleted. Also, the focuses of some of the remaining tasks were changed. In May 2006, Task 5 was deleted from the list below because all work on it was completed.

## Highlights for the August 2006 Reporting Period

- *Task 1—Project Administration, Major Reports, and Computer Systems Administration:* We completed project management and Modeling Forum conference calls and additional conference calls on specific topics. We also prepared an outline and template for the 2006 report.
- *Task 2—Emissions Modeling, Processing, and Analysis:* While we did not complete any modeling during this project period, we began to plan the activities of the emissions modeling team for the next several months. We engaged in discussions about how to conduct the emissions modeling work through the next project year, what additional information we need to include to facilitate the BART selection process by the States and Tribes, and how to present information about the fire plume rise modeling sensitivities that we have completed over the past few months.
- *Task 3—BART Source Sensitivity Screening Using CALPUFF:* We updated the draft final WRAP BART modeling protocol dated August 15, 2006, and posted it to the WRAP RMC BART web page. BART emissions provided by WRAP States were processed for input into CALPUFF, and spreadsheets of the final emissions to be used were posted to the WRAP BART web page for final review by the States. We initiated the BART CALMET/CALPUFF modeling.
- *Task 4—Air Quality Modeling:* We completed the CAMx/PSAT 2002 and 2018 simulations. We processed the PSAT model results to show the major contributors to haze at each Class I area, and we provided ASCII files with these result to Air Resources.

- *Task 7—Fire Sensitivity, Phase 2: Regional and Mesoscale:* We began processing additional fire cases for alternative estimates of the fire plume rise height using the Fire Emissions Production Simulator (FEPS).
- *Task 11—Technology Transfer and Data Distribution:* We developed a plan for providing modeling results to the Technical Support System as ASCII files, and transferred some data.
- *Task 12—Computer Hardware:* We performed routine maintenance of computer hardware.

## **August 2006 RMC Status Report**

Below we discuss our progress during this monthly reporting period (August 2006) and expected activities during the next reporting period (September 2006). We also describe any difficulties encountered and their resolutions.

### ***Task 1: Project Administration, Major Reports, and Computer Systems Administration***

#### Purpose:

Within Task 1, the project administration subtask includes deliverables tracking and display, coordination with modeling efforts supported by other RPOs, attending meetings, participating in conference calls, and general project management. The major reports subtask covers preparation of several reports, including an RMC 2005-06 project final report. The computer systems administration subtask includes maintenance, updates, expansion, and optimization of the computing systems (software and hardware updates, maintenance of the project web site and listservs, and data backups and archiving).

#### Progress During This Reporting Period:

##### *Project Administration:*

UCR, ENVIRON, and UNC-CEP participated in monthly project administration and WRAP Modeling Forum conference calls. Each contractor also contributed to the monthly progress report and prepared invoices. We also had preliminary discussions about revisions to the 2006 work plan.

##### *Preparation of the 2006 report and final project report:*

We developed an outline and template for the 2006 final report.

#### Expected Progress During the Next Reporting Period:

We will conduct conference calls and prepare monthly progress reports. We will complete the first draft of the 2006 report. We will also begin work on the next iteration of the work plan, to cover October 2006 through calendar year 2007.

#### Difficulties Encountered and Resolutions:

None.

## **Task 2: Emissions Modeling, Processing, and Analysis**

### Purpose:

To develop final emissions inventories for the 2002 model performance evaluation case, a typical 2002 case, a 2018 base case, and several 2018 emissions control strategy cases.

### Progress During This Reporting Period:

#### *Technical Activities:*

We did not complete any technical work during this project period. We engaged in conference calls to discuss our plan for activities to be conducted through the end of this project year and into the next. The topics that we need to cover through this project year include the reporting of the fire plume rise sensitivity modeling to the WRAP Fire Emissions Joint Forum (FEJF), and the completion of a memo to describe how we will instruct the States and Tribes in using the BART selection worksheets that we have prepared to select sources for BART sensitivity modeling. We also initiated discussion on what to include in the 2007 WRAP-RMC work plan. For the plume rise sensitivity work, we agreed to include the results from another WRAP fire event in the draft manuscript written by Zac Adelman. We began work to prepare these data for modeling through SMOKE near the end of August. We discussed presenting these results at the FEJF meeting in Washington State in October.

For the BART selection process, we will draft a memo that uses examples from Colorado as a case study of how we will integrate information that we receive from the states in selecting BART sources. This memo will be circulated with a worksheet for the states to fill in to select the BART sources that will be considered in the RMC BART sensitivity studies.

#### *Preparation of the 2006 report and final project report:*

None.

### Expected Progress During the Next Reporting Period:

We will complete the first draft of the 2006 report, conduct an additional fire plume rise simulation using a prescribed fire in the WRAP region, and draft a memo for the BART selection process to circulate to the States and Tribes.

### Difficulties Encountered and Resolutions:

None.

## **Task 3: BART Source Sensitivity Screening Using CALPUFF**

### Purpose:

To assist states in addressing the modeling requirements of the Best Available Retrofit Technology (BART) component of the Regional Haze Rule (RHR).

Progress During This Reporting Period:

*Technical Activities:*

Based on comments from the States and others, the BART modeling protocol was updated. The draft final version was posted to the WRAP RMC BART web page on August 15. BART emissions obtained from the States were processed for input into CALPUFF. The emissions were also posted on the WRAP RMC BART web page using a common format for final review and verification by the States. CALMET/CALPUFF modeling was initiated, starting with Nevada.

*Preparation of the 2006 report and final project report:*

None.

Expected Progress During the Next Reporting Period:

We will continue BART CALMET/CALPUFF modeling.

Difficulties Encountered and Resolutions:

- The WRAP BART screening modeling has assumed for months that no meteorological observations would be used. A recent request that observations be used has affected schedule and budget. It is unclear whether there is sufficient funding available in the WRAP RMC BART task to complete the modeling at this time.
- BART emissions for Arizona have not been received yet.

**Task 4: Air Quality Modeling**

Purpose:

To complete the 2002 base-year air quality modeling performed with CMAQ and CAMx, 2000-2004 typical-year modeling, 2018 base case modeling, and a series of 2018 control strategy modeling runs. Also, to perform model bug fixes, model version updates, sensitivity experiments, and source apportionment modeling.

Progress During This Reporting Period:

*Technical Activities:*

We completed the CAMx/PSAT 2002 Planning version B annual and the CAMx/PSAT 2018 simulations, and we finished processing the PSAT model results. These results included monthly average spatial plots showing the impact of each source region/emissions source group, and bar plots showing the largest 20 contributors to visibility impairment at each receptor site for the average of the best 20% visibility days and also for the average of the worst 20% visibility days, where the worst 20% days were determined using three different metrics: the worst total light extinction; the worst extinction days for sulfate; and the worst extinction days for nitrate. These results are posted on the RMC web site and have been provided to the Technical Support System (TSS) as ASCII files. The bar plots were prepared using Microsoft Access software. We found an error in the initial set of Access-produced plots for PSAT 2018 because a laptop computer was used to produce those results. We reprocessed the 2018 PSAT on a desktop machine and verified that these plots were correct. Apparently the MS Access performance was not stable on the laptop machine.

*Preparation of the 2006 report and final project report:*  
None.

Expected Progress During the Next Reporting Period:

We will discuss with the WRAP Modeling Forum whether to complete any of the additional modeling activities described in the 2006 work plan.

Difficulties Encountered and Resolutions:

None.

***Task 7: Fire Sensitivity, Phase 2: Regional and Mesoscale***

Purpose:

To perform additional modeling studies to evaluate sensitivity to uncertainty in the fire emissions inventory. Major uncertainties include the effect of the plume rise height for fire emissions, and the effects of small fires in or near Class I areas.

Progress During This Reporting Period:

*Technical Activities:*

We began processing additional fire cases using the Fire Emissions Production Simulator (FEPS).

*Preparation of the 2006 report and final project report:*  
None.

Expected Progress During the Next Reporting Period:

We plan to complete the analysis of the plume rise algorithm for additional fire cases.

Difficulties Encountered and Resolutions:

None.

***Task 11: Technology Transfer and Data Distribution***

Purpose:

To transfer the models, model evaluation tools, and data sets to the states and tribes so that they can perform additional studies of emissions reduction strategies, including supporting these groups in model setup and operation.

Progress During This Reporting Period:

*Technical Activities:*

We replied to several requests for data and information about the visibility modeling. The web page for tracking data requests is [http://pah.cert.ucr.edu/aqm/308/data\\_transfer.shtml](http://pah.cert.ucr.edu/aqm/308/data_transfer.shtml). We developed a plan for distributing modeling data to the TSS.

*Preparation of information on the availability of data and tools, to be included in the 2006 report and final project report:*

None.

Expected Progress During the Next Reporting Period:

We will perform routine updates to the web site, and respond to data requests from WRAP member states and tribes, as needed.

Difficulties Encountered and Resolutions:

None.

**Task 12: Computer Hardware**

Purpose:

To acquire new/additional equipment to support the RMC's work on the above tasks.

Progress During This Reporting Period:

We conducted routine maintenance and repair of computers and data storage systems.

Expected Progress During the Next Reporting Period:

We need to purge old data from the data storage systems to free up disk space for the CALPUFF simulations.

Difficulties Encountered and Resolutions:

None.