

August, 2003 Monthly Progress Report

WRAP Regional Modeling Center

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Summary

The Western Regional Air Partnership (WRAP) is a partnership of 13 western states designed to promote cooperation in attaining Clean Air Act goals for improving visibility in Class I Areas. The Western Governors' Association (WGA) is supporting through WRAP a Regional Modeling Center (RMC) that includes a team of scientists from the University of California, ENVIRON Corporation, and the University of North Carolina. WRAP contracted to the RMC in 2001-2002 to develop model scenarios and data bases that were required by Section 309 of the CAA to support SIPs for states that opted to participate in the Section 309 process. In early 2003, WGA extended the RMC contract to complete modeling studies in support of Section 309 SIPs and to begin research and development on models and data sets to support SIPs and TIPS that will be prepared under Section 308 of the CAA. The RMC team works primarily with the WRAP Modeling Forum, however, the RMC also interacts with several other WRAP forums and state and tribe staff, and with other contractors who provide emissions data to the RMC.

This interim progress report is submitted by the RMC to WRAP describing progress during August, 2003. Tables 1 to 6 below summarize the status on each of the WRAP RMC 2003 major task areas identified in the 2003 work plan. Major accomplishments during August include the following:

- Completed additional 1996 CMAQ simulations with a beta version of the September 2002 CMAQ release.
- Performance evaluation with updated version of the CB4 mechanism in CMAQ.
- Setup and testing/debugging of MM5 for 2002 simulation.
- Parallelized source apportionment code.
- Revised and debugged model performance evaluation software, now includes support for all major monitoring networks (IMPROVE, CASTNet, STN, AQS, PAMS).
- Progress on emissions QA.

A workshop is planned for October 8-9 at Riverside to review progress to date. In particular, the workshop will review progress on emissions inventories and meteorology modeling for the 2002 annual simulation, and will determine a schedule for completing an initial CMAQ simulation for 2002.

Table 1. Major Work Topic 0 – Project Management, Computer systems administration and maintenance

<p>Purpose: This task include project management, meetings and phone calls with project sponsor, computer administration, repairs, maintenance and upgrades.</p>
<p>August Activities Biweekly conferences calls, project management, preparation of reports. Follow up activities for the Section 309 SIP were performed under this task since the Task 309 budget has been exhausted in previous reporting periods. Updates to computer operating systems: Upgraded disk storage on a RAID5 disk systems. Ordered 4 dual CPU Opteron machines (funding 80% from NSF, 20% from WRAP).</p>
<p>August Deliverables None</p>
<p>Activities Planned for September Biweekly conferences calls, project management, preparation of reports. Computer systems upgrades and maintenance, updates to computer operating systems, data backups, maintenance of website. Testing and benchmarks on new AMD 64 bit Opteron CPUs.</p>

Table 2. Major Work Topic 1 – Task 309 - Finish §309 modeling and TSD

Purpose: Complete modeling and analysis in support of Section 309 SIPs

August Deliverables

- Finalized the Section 309 inventory summary tables.

We continued to work with Tom Moore of WRAP on refinements to the Section 309 TSD write providing additional write ups and technical activities as needed. During August we provided Tom Moore projections of visibility changes based on the absolute modeling results, rather than the scaled modeling results in the draft TSD.

Activities Planned for September

Review and edits to TSD as needed.

Continue to place model results and QA on project website, as needed.

Table 3. Major Work Topic 2 – Tasks 4JKL, 5J, 6 - Develop/Document QA/QC for air quality modeling, Develop version control and case control system for model data sets, Perform diagnostic analyses to better understand the model performance, Model Analysis/Post-processing.

Purpose:

Task 4KL: Develop version control system for model data sets.

Task 5J: Perform diagnostic analyses to better understand the model performance.

Task 6CDE: Develop improved model performance evaluation tools.

August Activities

Task 4: none.

Task 5: Deferred until completing new model simulations.

Task 6: Continued to revise and debug model performance evaluation software.

August Deliverables

Task 6: Revised source code for model performance evaluation is available on the project website.

Activities Planned for September

Task 4: Investigate utility of cvs for large binary data sets.

Task 5&6: Begin model performance evaluation for redo of the 1996 performance evaluation case.

Table 4. Major Work Topic 3 – Task 4I - Air Quality Model Source Apportionment Capabilities

Purpose: Develop algorithms for the CMAQ model to attribute pollutants to source categories in air quality model simulations.

August Activities

Continued development of tagged species source apportionment (TSSA) algorithm for use in the CMAQ model. Major activities include:

- Parallelized source code.
- Testing and debugging.

August Deliverables:

Test case will be presented at the October modeling forum meeting.

Activities Planned for September

Testing and evaluation of the algorithm. Begin mobile source sensitivity simulations to compare with TSSA code.

Table 5. Major Work Topic 4 – Tasks 1ACD, 2ABC - Ammonia Inventory Improvement, Temporal Allocation and Chemical Speciation Improvements to the WRAP Point and Area Sources' Inventories, Improve SMOKE Emission Processing System

Purpose:

Task 1A: Develop improved NH₃ Inventory

1CD Temporal Allocation and Chemical Speciation Improvements to the WRAP Point and Area Sources' Inventories

2ABC Improve SMOKE Emission Processing System

August Activities

Task 1A: NH₃ emissions inventory improvements: Collecting data for the GIS based ammonia inventory.

Task 1CD and Task 2ABC:

Work on QA protocol and developing chemical/spatial/temporal allocation process summaries is in progress.

Installed and benchmarked SMOKE versions 1.5 on the RMC computing system

September Deliverables. Initial review of the SCC and chemical/spatial/temporal QA reports by CEP. SCC and chemical/spatial/temporal QA reports to the RMC and WRAP states for review.

Draft QA protocol completed by the CEP.

Activities Planned for September

Continue collecting data for Task 1A NH₃ inventory.

Finalize and implement QA protocol.

Implement inventory changes as determined by the SCC/SIC review.

Update chemical/spatial/temporal profiles per the SCC review.

Table 6. Major Work Topic 5 – Tasks 2E, 3C, 4DEFH - Process and compare 1996 emissions grown to 2002, Develop and process 2002 meteorological fields, identifying and documenting QA/QC procedures, Air Quality Model Development

Purpose: Develop and test improved and/or alternative model inputs and model formulation.

2E Process and compare 1996 emissions grown to 2002.

3C Develop and process 2002 meteorological fields, identifying and documenting QA/QC procedures.

4DEFH Air Quality Model Development: test PING; nested 12 km grid.

5AGI Revisit 1996 base case model performance with new emissions and model updates

5C Test SAPRC99 chemistry and compare with CB4.(NOTE: We are evaluating an updated CB4 v2002 before completing the SAPRC99 simulations.)

5MN Test REMSAD and CAMx4 and compare with CMAQ

August Activities

2002 36 km MM5 results for the Unified RPO grid were set up on both the UCR and ENVIRON computer systems. Scripts for running MM5 on the WRAP 12 km grid on the RMC computer systems were developed and transferred to the WRAP RMC computers at UCR.

August Deliverables

None

Activities Planned for September

Begin 12 km 2002 MM5 simulations.

Preliminary evaluation of 12 km MM5 simulations and comparison to 36 km results.

Process 1996 36 km MM5 data for input into REMSAD and CAMx4 using the same horizontal Lambert grid and 18 layer vertical layer structure as used by CMAQ.

Refine CMAQ-to-REMSAD and CMAQ-to-CAMx emissions, initial concentrations and boundary conditions processors.

Modify REMSAD and CAMx4 code to read in three-dimensional coordinates of point source emissions to be consistent with the CMAQ emissions, rather than internal calculation of plume rise as is done in the standard model.

Initial testing and evaluation of REMSAD and CAMx4 for January 1996. Run BEIS3 with 36 km MCIP results and compare back to 1996 results

