

## **DRAFT WORKPLAN FOR EMISSIONS FORUM 2005**

### **June 22, 2004**

The objective of the Emission Forum is to provide the WRAP with all emission information necessary to implement applicable provisions of the Federal Regional Haze Rule. This includes compiling Emission Inventories for mobile, point and area source emission sectors, for the WRAP states and adjacent areas of Canada and Mexico. The Emission Forum will also collect Emission Inventory data from other forums and combine in order to provide a complete inventory of all emissions of visibility impairing pollutants necessary to analyze visibility impacts within the WRAP region. The Emission Forum will work closely with the Tribal Data Development Workgroup to assure compatibility of information coming from Tribal sources, and to minimize duplication of effort between these similar data collection efforts.

The Emissions Forum will compile or estimate Emission Inventory information annually, to facilitate tracking of various emission related commitments under the Regional Haze Rule, such as the Market Trading Stationary Source Milestones or Clean Air Corridors tracking.

In order to store and retrieve this emission information, and make it available to public and private users, the Emission Forum is developing an Emissions Inventory Management System (EDMS) as a central database storage system for the WRAP. This database will initially be housed at the University of North Carolina Data Center. In order to assure the accuracy of any data stored in this central database, the Emission Forum is developing a Quality Assurance protocol to identify and resolve incorrect or incomplete information. Also, to improve the quality of the WRAP emissions inventory information, the Emission Forum will conduct investigations into the appropriateness of activity data and emission factors that are used in the calculation of these Emission Inventories, and provide guidance to state, local and tribal air quality agencies for the protocol to be used in preparation of proper data for submittal to the WRAP regional database.

Budgeted projects being performed in 2004 are described below, followed by a description of new budget requirements for 2005.

### **Budgeted Tasks for 2004**

#### EDMS Development

Development of a regional emissions database system is based upon a needs assessment which was completed in 2003. Development of the EDMS began in the second half of 2003 and is scheduled for operation by October 2004. This work includes development of a user manual and protocol to ensure consistency in data methods and emissions factors. State and tribal emission inventory staff that use the database or enter inventories will be given initial training during 2004. A team headed by E.H. Pechan has been selected as the contractor to develop and maintain the WRAP EDMS. A WRAP Steering Committee provides guidance to the contractor on software development and other implementation issues. The current contract does not utilize all the funds set aside for this project. The remaining 2004 funds will be used for independent contractor assistance to test the EDMS data system. This will provide an expert review of the software and enhance the forum's ability to identify any problems with the new system.

### Maintenance of an Emissions Inventory

Once the database has been developed, it will be necessary to have a long-term maintenance agreement with an entity to ensure quality control, assistance to states and tribes and to answer database queries. The current contract with E.H. Pechan provides for these services through 2004. States and tribes, through a web-based database, are expected to populate the database with inventory updates. The data will be used:

- To allow 309 states to track SO<sub>2</sub> emissions against milestones
- To allow emissions monitoring in the Clean-Air Corridor
- To allow 308 and 309 states to measure reasonable progress
- To provide input for visibility modeling

Annual costs of the EDMS include maintenance of the inventory system, performance of quality checks, answering queries, and preparation of standard and special reports. User access capability, consisting of a server and software, as well as initial costs of a Data Base Administrator and Analyst are included in current budget plans. The EDMS is hosted at the University of North Carolina Data Center and is scheduled for full startup in October 2004. Limited functionality will be available by July 2004 to allow for states and tribes to submit emission data. Security and archival services will be provided by UNC, while database administration services will be provided by Pechan.

### 2002 Base Year Inventory

In order to meet 308 requirements, a complete inventory of 2002 emissions for point, area and mobile sources is being prepared. It will include updates of dust and ammonia emissions or inputs to the modeling preprocessor. States are expected to compile and submit these data to the EDMS and NEI beginning in 2004, although a final inventory may not be available until early 2005. The mobile source projections for 2003 can be used to fulfill the needs of a 2002 EI. Point and area source inputs from states and tribes will require a full evaluation for accuracy, completeness and consistency. Data gaps are expected and must be addressed. In addition, an emission inventory of major SO<sub>2</sub> sources will be performed following operation of the EDMS in late 2004 in accordance with Annex requirements. Completion of QA work, missing data handling, and SO emissions reporting will be performed by Pechan as part of the 2004 EDMS development budget. However, due to the time constraints on EDMS development, a contingency of \$45,000 was set aside to perform these functions in the event the EDMS is not functional by Oct 1, 2004.

### Emissions Inventory Improvements

#### 1. Spatial and Temporal Allocations

The WRAP currently uses the SMOKE emissions processor to prepare emission inventories for photochemical models to assess regional haze impacts. SMOKE incorporates a default profile to allocate emissions temporally and spatially for each source category. It is known that errors exist in the source category codes assigned to many sources, which produces errors in temporal and spatial allocations. In addition, the allocation profiles are national defaults and may not be representative of western sources. Further, profiles for individual sources may differ significantly within the same source category. These errors and shortcomings can produce potentially significant errors in visibility modeling. Accurate modeling is essential for visibility management plans. Phase I work currently being performed involves the assessment of the accuracy and

appropriateness of SCC profiles currently used in SMOKE. Sources with incorrect SCC's will be corrected. Inappropriate profiles will be identified for Phase II, which will be funded in 2005.

## 2. Ammonia

Significant uncertainty exists in the quality and application of ammonia data used in visibility modeling. The Regional Modeling Center has been contracted to improve emissions estimation methods, develop activity data for more accurate estimates, and develop temporal profiles for some activities. Work is expected to be completed in mid-2004.

### Canadian and Mexican Emissions

Emissions inventories from Canada for 2002 will be available by the end of 2004. Mexico emissions data for 1999 are now available. These data will likely not require QA review as anticipated or the act of changing the data would require additional approvals. The data is believed to be ready for incorporation into the 2002 inventory and modeling. The \$25,000 that had been budgeted for QA work in 2004 will not be needed for this project. The funds will be reprogrammed for other needs in 2005.

Based on current information related to the status and quality of the Canadian and Mexican emission inventories, it appears that this project is not critical for completion during 2004. It is proposed that funds earmarked for this project be reprogrammed to partially support an unanticipated project: CEMS data comparison (see separate 2005 project description).

### Representative Community Inventories Phase I (Alaska)

Alaska currently has no local emission information for smaller communities within the state. This includes 45 mid-sized communities (pop. 2,000 to 59,332) and 329 small communities (pop.<2,000). These small communities include roughly 57% of the state population and there is little organized information for use in generating emission information. Some of these communities are located near Alaskan Class I areas and will most likely be affected by controls for regional haze. This makes it important to fill this data gap using as much local information as possible.

This project focuses on data collection for emission sources in representative small and mid-sized communities within a 250-mile range from each of the four Alaska Class I areas. Surveys would be designed that are appropriate for the data collection effort for these communities. Activity data would then be collected in selected communities. The approach is to enlist the assistance of a tribal environmental coordinator or a local individual in each community in the collection of local data. Once the activity data is collected the results will be interpreted and emission estimates would be generated, shared with the local community, and included in the statewide emission inventory. It is desirable to coordinate this project with implementation of the TEISS project. Once the initial data collection for the community inventory is completed, the contractor will expand the coverage of the emission inventory to county level estimates within the full inventory and modeling domain by using the representative communities as surrogates for other similar communities.

Work on this task commenced in 2003 and is expected to be completed in early 2005. The team of Sierra Research and ANCET has been awarded the contract to provide technical assistance to this project in cooperation with the new WRAP Alaska tribal coordinator. The project is

underway and will be substantially complete by the end of 2004 with a few tasks remaining for completion in early 2005.

### Alaska Aviation Inventory

With terrain conditions that are often inhospitable to motor vehicle travel, a scarcity of roads, and large distances between communities, travel by aircraft is commonplace in Alaska. There are about 600 public airports and more than 3,000 airstrips throughout the state. Because of this, emissions from aircraft can have a substantial effect on the total emissions inventory of Alaska. This project would inventory a subset of the airports and airstrips within the state. The focus would be on facilities most likely to impact Class I areas. The estimated cost for the “below mixing height” emission inventory is \$50,000. This project is scheduled to commence in mid 2004 and be completed by the end of the year.

### Update Mobile Source Inventory for Nonroad Sources

The existing emissions inventory for off-road mobile sources does not include the new off road diesel fuel standards. These new standards will reduce emissions projections already conducted for the years 2008, 2013 and 2018 and, to some extent, 2003. The 2003 emission estimate will be used as a surrogate for the 2002 base year emission inventory. An estimated \$50,000 is needed in 2004 to re-project these emissions. This project is scheduled to commence in mid 2004 and be completed by the end of the year.

### **Budget Needs for 2005**

The work plan for 2005 consists primarily of operating the EDMS, finalizing the 2002 emission inventory, incorporating new ammonia and dust data, and updating SCC profiles. Phase II improvements to EDMS will also be carried out. This includes emission forecasting abilities, a core need for developing emission estimates for 2018. The main objectives are to provide the states and tribes with a usable database system to collect their emissions inventory data, to make data available for visibility modeling runs, forecast emissions for other years as well as monitor SO<sub>2</sub> emissions for milestone progress and the status of Clean Air Corridors.

### Phase 2 Development, Operation, and Maintenance of the EDMS

The EDMS will be housed at the University of North Carolina Data Center, which will be responsible for hardware, security, maintenance and archival services. UNC servers will be publicly accessible through their web interface. Pechan will provide a Data Base Administrator (DBA) with the assistance of a Data Analyst to provide specified QA checks of input and output, coordinate with users to ensure data accuracy and consistency, assist with training and protocol development, prepare scheduled and unscheduled reports and data queries, ensure security, and provide estimates of emissions for non-reporting years. Operating costs are as follows:

- 1) Pechan’s DBA and Data Analyst: \$120,000 per year,
- 2) UNC hosting, security, backup and maintenance: \$60,000 per year.

Pechan will also be tasked with developing and implementing Phase 2 priorities to upgrade EDMS functions with emission projections, additional reporting features, etc. Phase 2 improvements are in three categories:

1. Inventory Enhancements: \$231,000 to \$346,000

2. Functionality Enhancements: \$110,000 to \$180,000
3. Data Storage/Reporting Enhancements: \$135,000

Total request for EDMS operations and enhancements in 2005 is \$656,000 to \$841,000. (Note: the Emissions Forum will review Phase 2 enhancement options at their July meeting and decide on an amended budget proposal.)

#### CEMS Data Comparison

This project would compare the real time monitoring data stored in the CAMD database as a check against the emissions stated in the EDMS database. The comparison could bring to light important discrepancies between reported emissions and data from CEMS. Resolving these discrepancies could assist in improving future modeling results. This work is anticipated to cost \$60,000 and would be performed by Pechan under the EDMS Phase 2 efforts (cost not included in EDMS estimate above).

#### Temporal and Spatial Profile Updates

SCC profile investigations and updates being performed by the RMC in 2004 may reveal the need to amend profiles for large source categories and for specific large point sources if it is shown that default profiles contained in SMOKE are inappropriate for Western sources. For those categories identified by RMC, new profiles will be compiled, based on existing source information available for Western sources. This is necessary to properly model visibility impacts, perform source apportionment and develop effective control strategies. Work would be performed in 2005. The deliverable would consist of hourly speciation profiles for major sources that deviate from the standard profile. New profiles would be incorporated into SMOKE. The estimated cost for the 2005 budget is \$100,000. This project and funds may be transferred to the Modeling Forum and be performed by RMC.

#### Representative Community Emission Inventory Phase 2 – Lower 48 WRAP Region

The second phase of this project is to expand the representative community emission inventory effort to Lower 48 states and tribes in the WRAP region. The project would look at 15 rural communities in the West. Rural emission inventories may not have as much detailed local activity data available as in urban areas. This project would allow detailed emission estimates to be generated in “representative” communities, which could be used to help fill data gaps, improve local emission estimates, or ground truth EPA emission estimates. Some of these rural communities are located near Class I areas and could be affected by local/state level controls for regional haze. This makes it important to have reasonable and complete emission estimates using as much local information as possible.

This project would focus on data collection for emission sources in representative small and mid-sized communities in the Lower 48 WRAP Region. Criteria for selecting communities would be developed and brought to the WRAP EI Forum for final agreement. Once agreement is reached on criteria, a work group will select the actual rural communities to inventory.

Surveys would be designed that are appropriate for the data collection effort for these communities. Activity data would then be collected in selected communities. The approach would be to enlist the assistance of a tribal environmental coordinator or a local individual in each community in the collection of local data. There is the possibility that a regional coordinator

would be hired to assist in this process. Once the activity data is collected the results would be interpreted and emission estimates would be generated, shared with the local community, and included in the tribal or statewide emission inventory and/or EPA NEI database.

Once these initial community emission inventories were completed, the WRAP could then work with states and tribes to use the new, in-depth information in a meaningful way in the regional haze SIP development process. This could include expansion of the coverage of the emission inventory information by using the representative communities as surrogates for other similar communities.

The estimated cost for this Phase 2 effort is estimated to be \$100,000.00.

### Cruising Height Aviation Inventory

Typically, airport and aircraft emissions are estimated below the default mixing height of 3,000 feet in the EDMS model. While this may be appropriate for a non-attainment area inventory, regional haze is focused on transport of pollutants over long ranges at altitude. The exclusion of emissions at cruising altitude may considerably underestimate the aircraft emission inventories. Little has been done on analyzing cruising emissions from aircraft. The California Air Resources Board 1997 Southern California Ozone Study (SCOS97) looked at cruising emissions from aircraft and found that emissions for SO<sub>x</sub> and NO<sub>x</sub> were higher than the emissions below the mixing height.

The WRAP Emission Forum requests that the Modeling Forum consider undertaking a sensitivity analysis to help determine the potential impact that cruising emissions from aircraft could have on visibility in the WRAP region. If these emissions appear to be worth characterizing in greater detail a project would be developed to estimate the emissions with work expected to be performed in 2005.

The WRAP Emission Forum could look at estimating cruising emissions from aircraft in two different ways. The first requires a higher degree of effort as it results in a tool for further use. However, the resultant product from that effort might be of use to other states within the WRAP region. This option would also need extensive coordination from the Federal Aviation Administration to get the source code for modification. The two proposals are as follows:

1. The EDMS 4.01 model could be modified to include the addition of a cruising engine operating mode. The model could then be set up to estimate both cruising and non-cruising emissions. The process would involve preparing estimates for the cruising emission factor, the cruising fuel flow rate, and the cruising time-in-mode (TIM).

As with the CARB SCOS97 analysis, cruising emission factors and fuel flow rate or usage could be estimated as the average of the climb-out and approach emission factors and fuel use. Estimating cruising TIM for air carrier and military aircraft would not be as straight forward since it will vary not only by aircraft type and airport, but also by flight number, weather conditions, and air traffic situation. To estimate cruising TIM, at least four design days would be chosen (one for each season) for each representative airport chosen per group for modeling the air carrier emissions inventory. The flight track data files can be obtained and used in the analysis.

For general aviation and air taxi aircraft, the cruising emissions could be estimated using the EPA fleet-average emission factors multiplied by the cruising factors developed based on the SCOS97 analysis. This assumes that general aviation and air taxi relative cruising and non-cruising emissions contributions are comparable to air carrier emissions found in the SCOS97 analysis.

The estimated cost to complete this option (#1) is not known at this time and requires further investigation.

2. Based on CARB's SCOS97 analysis, non-cruising multiplicative factors have been developed to estimate cruising emissions. Using the factors would require less effort, but would assume that the air carrier relative cruising and non-cruising emission levels in SCOS97 are comparable to relative cruising and non-cruising emission levels for air carrier, general aviation, air taxi, and military aircraft throughout the WRAP region.

The estimated cost to complete this option (#2) is \$100,000. The WRAP Emission Forum will not undertake this project until the modeling forum can provide information related to the potential impact of these emissions within the WRAP region.

### Draft Emission Forum Budget for CY04 and CY05

	<b>Projects</b>	<b>CY04</b>	<b>Proposed CY05</b>	<b>Notes</b>
1	Emission Inventory Data Base System – Development, QA, training, testing, hardware, manual and DBA.	\$475,000	\$476,000- \$661,000	Phase I of project to be completed and operational by Oct1, 2004. CY05 Phase 2 Development Costs only – Operations on separate line item
2	Update Non-Road Projections to Reflect new Diesel Fuel Regulations	\$50,000		
3	Develop & Expand Representative Community EIs	\$50,000	\$100,000	CY03-04: Phase 1, Alaska CY05: Phase 2, remaining WRAP region
4	EI Improvements for Spatial and Temporal Allocations	\$25,000	\$100,000?	CY03-04 in RMC contract (ask Modeling Forum to include in their on-going work plan?)
5	Canadian and Mexican Emissions – to project, QA, and prepare EI for 2002 base case	\$25,000		Drop this and reprogram the \$25,000 to CEM Data project?
6	2002 Interim Emission Inventory – for geographic apportionment exercise to be completed by TOC in late 2004			Work began in CY03, completed in CY04
7	EDMS Hosting and Operation		\$180,000	Includes \$60,000 for CEP and \$120,000 for Pechan
8	CEMS Data Comparison		\$60,000	To be performed under EDMS contract
9	2002 Base Year Emission Inventory – gap fill and QA. SO2 inventory for Annex	\$45,000		Back up in event Pechan doesn't do it by end of 2004. If not needed, funds will be reprogrammed.
10	Alaska Aviation Inventory	\$50,000		Start in 04
11	Aviation Cruising Emissions	\$0	\$100,000 ?	Est. \$100,000 in FY05. Need cost for sensitivity runs from RMC
<b>Total CY Funds</b>		<b>\$720,000</b>	<b>\$1,016,000- \$1,201,000</b>	