

Final Meeting Minutes

WRAP Technical Oversight Committee
February 10, 2003 @ Scottsdale, Arizona

The Technical Oversight Committee convened at the Paradise Valley DoubleTree Hotel in Scottsdale, Arizona at 1:00 PM and met through 5:00 PM on February 10th, 2003. Attendees included:

<u>Name</u>	<u>Affiliation</u>
Lee Gribovicz, TOC Co-Chair	Wyoming DEQ, Air Quality Division
Lewis McLeod, TOC Co-Chair	Confederated Salish & Kootenai Tribes of MT
Wayne Leipold, TOC Member	Phelps Dodge Copper Company
CV Mathai, TOC Member	Pinnacle West/Arizona Public Service
Steve Arnold, TOC Member	Colorado Health Dept./Air Quality Division
Mark Komp, TOC Member	EPA, Region VIII
Pat Cummins, WRAP Air Manager	Western Governor's Association
Tom Moore, WRAP Technical Coordinator.	Western Governor's Association
John Vimont, WRAP Modeling Forum Co-Chair	US National Park Service
Mary Uhl, WRAP Modeling Forum Co-Chair	New Mexico DEQ, Air Quality Division
Pete Lahm, WRAP Fire Forum Co-Chair	US Forest Service
Don Arkell, Visibility Program Coordinator	WESTAR
Shawn Kendall, Consultant	The Kendall Group, Inc

Meeting Details

★ Overview of §309 Workshop Review ★

To begin the meeting, Tom Moore went over the Agenda for the February 11-12th §309 TSD Workshop that was to follow the next day. At that TSD workshop, participants will make presentations explaining various elements of the WRAP technical work (fire, mobile, point & area source emission inventories; the assorted modeling runs completed, development of the Market Trading program & etc.) that have been completed over the last couple of years as support for developing §309 SIP/TIP's. Tom's December 9, 2002 §309 TSD Development Plan describes the parties responsible for the various sections of the TSD and the schedule for completing this document.

★ Modeling Problems ★

The TOC then turned its attention to problems that have recently surfaced regarding the WRAP's §309 modeling efforts. The problems fall into two categories; 1) a "layer fraction" problem, & 2) a problem with 2018 fire impacts.

Regarding the first problem, an error was recently discovered in the 2018 base and control case modeling runs that have been completed by the RMC at Riverside. The error involves the "layer height emissions allocations file", produced from the SMOKE emissions preprocessor (problem affects stationary point sources only). As part of its spatial distribution function, SMOKE allocates point source emissions into multiple atmospheric layers. In the 1996 base case model runs, the fractions of point source emissions going into the various layers were correct (ie/ the sum of the emissions in the various atmospheric layers added up to 100% of the point source emission totals). However in the 2018 runs (except for the last §309 "All Control Strategies" run), the fractions of point source emissions were

problematic (ie/ fractions going into the various layers did not add up to 100% of the point source emission totals). Therefore it was clear that *in the 2018 runs* some of the *stationary point source emissions were being dropped*.

Preliminary indications are that these modeled atmospheric layer emission deficiencies occurred primarily in Wyoming & North Dakota. This has something to do with the plume rise algorithms, which are affected by certain meteorological conditions and stack parameters, but no one seems to know yet exactly what specific factors exacerbate the problem. Also, this error appears to cause a pretty considerable change in modeled emissions, as preliminary indications are that the model dropped about 85% of the point source SO₂ in Wyoming due to this layer fraction problem. Losses were for other pollutants were about 85% of the Wyoming NO_x missing, 20% of the CO and 10% of the VOC lost.

The fallout from this error means that the WRAP may have to reconsider the conclusions presented at the Denver Technical Conference in July '02, because of the increased emissions that will be present in the 2018 simulations when this layer fraction problem is corrected.

There has been discussion with the WRAP Modeling Forum Co-Chairs and the WRAP modeling contractors on how to address this problem. The table below shows the various CMAQ model runs that have been completed, and indicates whether the experts perceive that a "layer height problem" may exist for that run. As can be seen, the only runs which currently show the correct stationary point source emissions in the various atmospheric layers are the 1996 Base Cases and the 2018 §309 "All Controls" scenario.

Scenario	Layer Height Problem	Rerun
1996 Base Case w/ Actual Wildfire	No	
1996 Base Case w/ Typical Wildfire	No	
2018 Base Case (a)	Yes	X
2018 Base Case (b)	Yes	X
2018 SO2 Annex	Yes	X
2018 BART w/ Uncertainty	Yes	X
2018 BART	Yes	X
2018 No Mobile	Yes	
2018 No Road Dust	Yes	
2018 PM/NO _x Runs	Yes	X
2018 Fire Runs	Yes	
2018 §309 All Control	No	

The modeling experts felt that we might not have to redo the Mobile & Fire significance runs because they don't deal with point sources. But the various 2018 MTF point source scenarios (2018 Base Case, Annex Milestones, BART & BART w/ uncertainty) and the PM/NO_x Sensitivity runs are suspect.

Tom Moore explained that the present plan is to rerun the 2018 base case, and compare that with the current flawed 2018 base case in order to attempt to quantify the magnitude of error introduced to the modeling results. Also, this rerun will more clearly define the spatial locations in the WRAP region where errors might surface. If this analysis shows that there are significant changes to the results, then it might be necessary to rerun the other 2018 scenarios.

Lewis McLeod was concerned with how much we might be paying for this additional modeling work. He was worried about the effect on long term 5 year budget. Lee Gribovicz noted that the RMC Director, Gail Tonnesen, had stated that this work represents contractor error, and should be free. However, it was noted that contractors generally ask for more money, when we have one of these "fire drills" to correct problems.

CV Mathai was concerned with how we assure that model results are accurate in the future. Lee Gribovicz noted that there will be a renewed emphasis on QA in the 2003 modeling contract, and Tom Moore noted that part of the problem was the hectic time requirements put on the modeling contractors to complete the §309 work. It was the general consensus that the WRAP must "beef up" the QA efforts on SMOKE processor results and subsequent modeling projects.

The second problem is thought to involve varying 2018 fire impacts from the CMAQ model. There now is a February 5, 2003 Modeling Forum DRAFT memo showing comparisons between the 1999 observed visibility, and the 2018 "All Control Strategies" run ("Preliminary" Glide Path Estimates for Reasonable Progress). In that memo, Reasonable Progress is defined as the improvement from 2004 visibility levels to natural visibility conditions for the worst days in 2064. ***With just nine exceptions, this memo shows that the 2018 projected visibility for the average Worst 20% days does not meet the 2018 visibility Glide Path target at the 122 western Class I Areas analyzed*** (8 CENRAP & MidWest RPO Class I areas are included in the analysis). ***Of those 122 areas, 52% (64 sites) actually show a degradation in visibility between 1999 and 2018 of up to 6 dV.*** For example, of the five Class I areas in Wyoming, with the exception of the Bridger Wilderness, all show a degradation in the worst 20% days, lead by Yellowstone Park with visibility degradation of 3.47 dV in 2018.

Fire emissions are thought to be the source of the increased visibility impairment, due to model predicted increases in organic and elemental carbon (5X and 2½ X, respectively), at some Class I Areas in Arizona. One possible cause of this problem is that 2018 "All Control Strategies" projections used the Optimum Smoke Management (OSM) prescribed fire emissions inventory prepared by the Fire Forum. This resulted in the model results from the 2018 OSM emissions being compared to the model results from the 1996 base case emissions. Wildfire was held the constant in both model years ("typical" wildfire used in both 1996 & 2018 base case runs), but the 2018 change in the fire emissions inventory seems to be drowning out the reasonable progress of the other control strategies. The Regional Modeling Center is carefully going back and looking at which fire inventories were used in both the 1996 and 2018 modeling runs.

Shown next are the emissions changes from the regional Pollution Prevention analysis, a refinement of the SO₂ Annex inventory, which was included in the 2018 All Control Strategies modeling run:

**2018 Pollution Prevention Emissions Inventory
Total New Plus Existing Source Changes (Annual Tons)**

State	NO_x Annual	SO₂ Annual
Arizona*	-3,267	5,558
Colorado	-1,370	-1,119
Nevada	-430	-307
New Mexico	-7,053	-5,135
Utah	-780	-595
Wyoming	-1,374	1,598
Total Changes	-14,274	0

* All new Tribal source emissions reductions (-990 for NO_x and -430 for SO₂) were assigned to Arizona.

Also, the 1996 stationary source emissions inventory has been modified to correct errors reported by some state and local air agencies. The "before and after" emissions are shown in Tables 4 and 5 at the end of this memo, and in an October 2002 Pechan QA memo found on the WRAP website under the Emissions Forum. These emissions changes are not included in the visibility modeling; they are fairly inconsequential.

As noted, problem #1 will be dealt with by rerunning the 2018 Base Case, to determine the magnitude of change in results. If that run confirms that changes in impacts on the Colorado Plateau are small, then no further 2018 runs will be necessary. Regarding problem #2, it was eventually concluded to analyze other control strategies, we should hold fire constant. Thus this 2018 Base case rerun would use the 2018 Base Case prescribed and agricultural fire inventories, rather than using the Optimal Smoke Management (OSM) scenario (same as were used in the 1996 Base Case run). The "typical" wildfire inventory was used in both instances.

★ RMC Modeling Contract ★

Gail Tonnesen, Director of the Regional Modeling Center, submitted a February 10, 2002 dated proposal for 2003 modeling work activities & budget (Appendix II). This proposal followed the outline and numbering contained Tom Moore's January 20, 2002 "WRAP Regional Modeling Center 2003 Word Plan Outline". The RMC would like their contract finalized shortly (two weeks?), in order for them to begin 2003 work. The budget proposal was for approximately \$736K on the high side, with about \$85K dedicated for training (Task 7). The second training option dropped that training program down to \$41K, while another low cost option would spend about \$62.5K on the Emission Forum's NH₃ evaluation (Task 1A), compared to a full project budget of \$82,500. With the lower cost options, the budget range bottomed out at around \$672 for the 2003 calendar year.

Because this was the first opportunity that TOC members had to see this modeling center proposal, we took the time to review the individual line items of the proposal during this meeting. The following text describes the tasks, and provides a summary of the comment on these items.

Task O: Project Management - had an error of \$5K in the budget table

Task 1: NH₃ Research - the EF had recommended the full project at the \$82.5K high end)

Task 1CD: Temporal Allocation/Chemical Speciation - the TOC noted that the RMC will do this project cheaper at \$39K, than had been projected by the EF

Task 2ABC: Improve SMOKE Emission Processor System - no comment

Task 2E: Process & Compare '96 Emissions Grown to 2002 - the intent of this project is so the WRAP has a surrogate §308 inventory to work with

CV Mathai questioned how we know that the numbers we are growing are accurate, and Tom Moore reiterated that we will have new QA procedures in place. Pat Cummins noted that we will have actual 2002 utility & mobile source information at the end of the year, and he encouraged us to take advantage of any "real" information available, rather than to just "blanket" grow all 1996 data.

Task 3C: Develop/Process 2002 Met Fields, Identify/Document QA Procedures -we noted an error between the letter budget total (\$50K) & the spreadsheet (\$48K)

Task 4DEFH: Air Quality Model Development - we noted an error between the letter budget total (\$46K) & the spreadsheet (\$49K)

Pat Cummins noted that we won't use the §308 information until around 2007, therefore we might not need this information until later. John Vimont pointed out that we really want to do this work while we have time in 2003, in order to have confidence in how the modeling performs in the future. In addition, Wayne Leipold pointed out that the §308 SIP's may be due in 2005.

Task 4I: Source Apportionment Tool - Pat Cummins noted that Tasks 4,5 & 6 are essentially model development tasks at about \$400K price tag. John Vimont felt that we are in a "pay me now or pay me later" situation, where we now have a little time to do the work. And Mary Uhl noted that it is important for states to get the modeling information early. Don Arkell concurred with Mary.

Task 4I: Source Apportionment - no comment

Task 4J: QA for CMAQ - no comment

Task 4KL: Version Control & Modeling "Case" Control - no comment

Task 5AG: Revisit the 1996 Base Case Model w/New Emissions/Model Updates - no comment

Task 5B: Test CMAQ w/ Updated 2002 Data - no comment

Task 5C: Test SAPRC Chemical Mechanism - Several participants felt that \$53K for this task seemed rather high, and it was agreed that we should ask for clarification on this item.

Task 5J: Model Performance Diagnostics - no comment

Task 5MN: Lambert Conformal Projection Testing - no comment

Task 6: Model Analysis/Postprocessing - no comment

Task 7: Training - It was generally conceded that it makes sense to go with the higher training budget, but Tom Moore suggested that the training format/ scheduling may have to be changed so that states can actually learn the CMAQ/ SMOKE systems. Pat Cummins wondered whether we couldn't delete the training task all together, while saving the money in the WRAP budget for when we actually needed it. He pointed out that we can modify the contract any time we want to. The general consensus was that this was a good idea, and we should to hold these funds in the WRAP budget.

Pat Cummins also pointed out that we had some problems with contract supplements when we ask for Contractors to do relatively standard tasks like preparing presentations, traveling to meetings and etc. Therefore he urged the TOC to assure that these types of things were included in the budget.

There was discussion on the tribal portion of the training, and it was concluded that Lewis McLeod should take the question to the tribal caucus, to determine exactly what training the tribes want.

It was concluded that the Modeling Co-Chairs (John, Mary & Kevin) and Tom Moore will take back the comments to the RMC (reserve the training budget, ask for explanation of some of the expenses (SAPRC), ask for some clarification of some expense correlation errors & put some additional pressure on the modelers to have a much better QA effort and evaluation of the problems that have been identified. Tom Moore will ask Dr. Tonnesen to put together a revised and improved proposal.

★ Liaisons ★

On our January 17th TOC call it was noted that we had assigned liaisons to the technical forums, with assignments set up as follows:

Dust Emissions Forum	.....	Lewis McLeod
Fire Emissions Forum	.....	Rich Fisher
Tribal Data Workgroup	.....	Ondrea Barber
Modeling Forum	.....	Steve Arnold
Ambient Monitoring Forum	.....	Wayne Leipold
Emissions Forum	.....	Lee Gribovicz & Bob Saunders

However, the TOC members felt that they would like feedback from the Forum Chairs, on what they would like to see from the liaisons. Lee Gribovicz explained that he had sent out the request to all the technical forum Co-Chairs, but had received no responses on the question. It was noted that the previous liaison program had been set up prior to WRAP staff being hired (Technical Coordinator: Tom Moore), and there was some question as to the continued need for this structure.

There was uncertainty as how to proceed with the program, but Pete Lahm spoke up to say that he felt the system had been valuable to the Fire Forum. He noted that the FEJF always had a TOC liaison (as well as an IOC liaison) and he felt that this provided good communication with the Oversight Committees. However, he felt that it would be good, if there was another TOC member who was interested in fire projects, as Rich Fisher had been pretty tied up in recent years and unable to participate fully in the Forum activities.

In the end it was decided to leave TOC members assigned, and the individual liaisons would decide how best to interact with their Forums. Also, they would be the primary contact person for Tom Moore, when feedback was desired on any particular questions that come up in the various technical disciplines.

★ Emission Related Forums Status ★

The agenda called for an assessment of the status of Forum activities. It was noted that Tom Moore had committed to providing the TOC with a quick summary of the most recent activities on a monthly basis. Thus all TOC members could get a better handle on the emissions related work being performed by the forums (Emissions, Fire, Dust Forums, Tribal Data Workgroup).

It was noted that the WRAP is trying to get an Emission Inventory Management & Database System developed by the end of 2003. To do that, EA Engineering has been selected to conduct a "Needs Assessment" of WRAP forums and the WRAP stakeholders and data users. It was noted that they will hold two Workshops, the first during the Santa Fe "WRAP Forums Summit" on March 20th. The second workshop will be focused more on state/tribal data users and stakeholders. They will take that "needs"

information and evaluate the types of GIS-based EI data system technology currently available, to come back to the WRAP with 3 optional configurations of an emissions data management system for the WRAP.

★ Ambient Monitoring Data ★

It was also noted that the primary activity of the Ambient Monitoring & Reporting Forum remains to prepare the "Causes of Haze" report. This contract costs approximately \$200K/year, and has been awarded to the Desert Research Institute. The main questions that the report will attempt to answer are:

- what are the aerosol component responsible for haze?
- what is the role of meteorology in the cause of haze?
- what are the emission sources responsible for haze?
- are there any detectable and/or statistically significant multi-year trends apparent in the causes of haze?

Lewis McLeod once again emphasized that we need very strict QA on this project, and he wants to find a way to get more timely reporting of monitoring data (IMPROVE data delay is currently around two years). He was concerned that the data is systematically reviewed at key development points.

★ Near Future TOC Activities ★

The next TOC call was scheduled for March 14th, but since the WRAP Board Meeting will take place the first of May, it was decided to move that call up a week to March 7th. The call will take place at 2:00 pm MST.

For the next meeting, items of consideration would be the results of the Santa Fe Forums Summit, review of the 5 year & 1 year workplans, 2004 budget kickoff, and a comprehensive look at status of 2002 projects. The timing was tentatively set for May 5 (afternoon) through May 6 (all day). Denver was the consensus for location, with final details to be developed by the WRAP Staff.

Table 4
Total 1996 WRAP Point Source Emissions by State: Original File

State	FIPS Code	Annual Emissions Totals, tons per year								
		Number of Facilities	Number of Records	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	NH ₃
Arizona	04	231	7,718	10,472	108,736	17,990	195,851	22,242	11,670	19
Arkansas	05	111	745	14,863	72,439	101,790	112,096	31,855	19,324	15,032
California	06	10,197	68,640	69,562	134,844	96,397	43,353	30,135	17,535	15,304
Colorado	08	4,649	16,259	37,789	130,551	34,324	106,003	19,931	11,942	246
Idaho	16	21	76	482	6,292	4,522	23,957	12,976	8,035	2
Iowa	19	67	914	11,087	106,310	11,724	243,494	11,333	6,314	8,122
Kansas	20	278	2,772	26,548	195,309	81,756	131,192	14,632	9,900	12,593
Louisiana	22	907	14,479	127,270	349,255	700,613	262,458	37,308	27,690	62,797
Minnesota	27	677	9,901	39,138	169,841	82,626	127,067	81,954	36,690	1,006
Missouri	29	739	10,570	60,194	214,365	107,127	482,636	49,385	19,407	21,884
Montana	30	222	2,051	7,682	42,517	48,553	45,925	14,366	7,635	405
Nebraska	31	901	7,442	11,221	61,532	13,933	72,303	8,976	3,867	19
Nevada	32	109	281	1,717	65,005	14,403	55,858	16,235	6,153	54
New Mexico	35	318	2,000	16,493	146,022	38,374	158,646	10,149	3,044	83
North Dakota	38	58	220	1,128	114,230	13,222	243,670	4,992	3,328	22
Oklahoma	40	1,884	11,649	56,948	208,955	221,065	140,950	11,882	7,490	16,614
Oregon	41	394	1,565	16,180	26,004	76,001	15,212	11,384	8,439	16
South Dakota	46	16	45	1,387	22,022	366	16,077	906	485	1
Texas	48	1,710	48,269	272,912	920,366	470,866	962,042	57,873	40,596	2,907
Utah	49	207	5,073	16,935	100,434	38,404	43,091	19,381	11,544	1,185
Washington	53	258	1,811	21,242	56,771	171,132	120,436	12,706	8,716	4,618
Wyoming	56	238	1,991	23,460	131,552	57,827	128,470	32,565	19,535	1,050
Totals			844,710	3,383,352	2,403,015	3,730,789	513,176	289,342	163,982	

Table 5
Total 1996 WRAP Point Source Emissions by State: Revised File

State	FIPS Code	Annual Emissions Totals, tons per year								
		Number of Facilities	Number of Records	VOC	NO _x	CO	SO ₂	PM ₁₀	PM _{2.5}	NH ₃
Arizona	04	91	3,863	6,762	108,053	17,570	179,128	16,327	6,291	19
Arkansas	05	111	745	14,863	72,439	101,790	112,096	31,855	19,324	15,032
California	06	10197	68,640	69,562	134,844	96,397	44,090	30,135	17,535	15,304
Colorado	08	4649	16,264	37,789	130,551	34,324	106,337	19,931	11,942	246
Idaho	16	22	80	482	6,292	4,522	22,438	12,976	8,035	2
Iowa	19	67	914	11,087	106,310	11,724	243,494	11,333	6,314	8,122
Kansas	20	278	2,772	26,548	195,309	81,756	131,192	14,632	9,900	12,593
Louisiana	22	907	14,479	127,270	349,255	700,613	262,458	37,308	27,690	62,797
Minnesota	27	677	9,901	39,138	169,841	82,626	127,067	81,954	36,690	1,006
Missouri	29	739	10,570	60,194	214,365	107,127	482,636	49,385	19,407	21,884
Montana	30	222	2,051	7,682	42,517	48,553	45,925	14,366	7,635	405
Nebraska	31	901	7,442	11,221	61,532	13,933	72,303	8,976	3,867	19
Nevada	32	109	281	1,717	49,891	14,403	52,096	16,235	6,153	54
New Mexico	35	319	2,001	16,496	147,130	38,412	159,756	10,326	3,044	83
North Dakota	38	58	220	1,398	118,878	16,004	238,249	5,424	3,325	22
Oklahoma	40	1884	11,649	56,948	208,955	221,065	140,950	11,882	7,490	16,614
Oregon	41	394	1,548	16,161	25,345	74,129	9,888	10,747	7,891	16
South Dakota	46	16	45	1,387	21,613	366	16,077	906	485	1
Texas	48	1710	48,269	272,912	920,366	470,866	962,042	57,873	40,596	2,907
Utah	49	208	4,480	9,388	86,826	36,409	43,947	13,610	7,789	1,124
Washington	53	257	1,806	21,242	56,493	171,065	120,360	12,457	8,890	4,618
Wyoming	56	238	1,991	23,460	131,552	57,827	128,425	32,565	19,610	1,050
Totals			833,707	3,358,357	2,401,481	3,700,956	501,213	279,906	163,921	