

MEMORANDUM

TO: Dan Olson, Air Quality Administrator

FROM: Lee Gribovicz, Regional Impacts/E.I. Coordinator

SUBJECT: WRAP Dust Emissions Joint Forum Meeting

DATE: November 22, 2004

Meeting Summary

On November 15-16, 2004, I attended a meeting of the WRAP Dust Emissions Joint Forum (DEJF) held in Las Vegas, Nevada. A major portion of the meeting was dedicated for the Forum Members to hear an overview of Attribution of Haze effort. Other technical presentations were given on new issues regarding dust research and technology, and members heard reports from contractors on the status of the major projects that the DEJF is currently undertaking. The five tasks that are currently being worked on by the DEJF are:

- ✓ Develop a Handbook & Website Resource for Compiling Contemporary Knowledge of Fugitive Dust
- ✓ Improve Estimates of the Fine Fraction (PM<sub>2.5</sub>) of Dust Emission Factors
- ✓ Refine the WRAP's Windblown Dust Model & Produce a 2002 Emission Inventory
- ✓ Examine the 20% Worst Visibility Days for Frequency and Magnitude of Dust Impacts and Their Probable Sources at WRAP Class I Areas
- ✓ Establish a Common Definition of Dust, with a Natural/Anthropogenic Split

Regarding the Fugitive Dust Handbook & Website the consultant distributed a hardcopy of the handbook to participants at this meeting and noted that this draft is now up and on display at the Handbook Website at:

[www.wrapair.org/forums/dejf/fdh](http://www.wrapair.org/forums/dejf/fdh)

Use of this Handbook Website was demonstrated for meeting participants, and suggestions for improvement/revisions were taken. Comments are to be taken though the end of November, and the handbook will be finalized December 15, 2004.

Regarding the Analysis of the PM Fine Fraction, there is now an RFP out and proposals are due by November 19, 2004.

Regarding the Windblown Dust Modeling, the contractor gave a status report on the Phase II model development, covering the data sets and assumptions used for soil reservoirs and responses to precipitation events. He described two model simulations that have been completed for two scenarios: first, where there was no limitation placed on the dust event duration, and second, where dust events were limited to 10 hours/day. Windblown dust emission totals were over 3 MM TPY for the WRAP states under with no limitation, dropping to a little less than 2.2 MM TPY with the limitation in place.

Regarding the Causes of Dust Analysis the Desert Research Institute contractor gave a presentation on the Causes of Dust Analysis. DRI has identified the 20% worst visibility days at WRAP Class I areas where dust is the dominant

component of impairment, and for each Worst Dust Day, the Scope of Work call for them to find appropriate criteria/tools to classify the causes as:

- Asian Origin
- Regional Windblown Dust (more than 1 site affected)
  - Dust mostly from "near" monitor
  - Dust mostly from other areas in region
- Local Windblown Dust (only 1 site affected)
- Wildfire?
- Other/Unknown

This date DRI reviewed the work they have completed looking at Asian Dust signatures and at the relationship between wind speed and dust for windblown dust generation.

Regarding the "Natural" vs Anthropogenic Definition of Dust, a Scope of Work has been developed to hire a contractor for "testing" the DEJF's definitions of dust. At this meeting we reviewed the content of this SOW, and noted that the proposals are due November 26<sup>th</sup>, for the project.

There was also a presentation on dust emission research in the Northern Chihuahuan Desert, which looked at the dust potential from various vegetation classes in the area. The conclusion was that most of the vegetation classes don't allow generation of large amounts of dust, but the mesquite class is the exception. And since the mesquite ecosystem is the dominant area in this Chihuahuan desert region, there is the potential for significant dust despite the fact that significant vegetation may be present.

Participants were reminded that in order to prepare §308 & §309 SIP's, the DEJF must make a Projection of the Dust Emission Inventory to 2018. There was discussion of planned WRAP inventory projection techniques for road dust and windblown dust, as well as for stationary & area sources, and there was discussion off the implications of dust issues on these projections. Mike Edwards volunteered to be the DEJF liaison to work on these projections with the Emission Forum and the Regional Modeling Center to ensure a consistent approach and assumptions regarding dust issues.

At the last meeting Gail Cooke of New Mexico, volunteered to coordinate a group to evaluate dust control strategies for the §308 & §309 SIP processes. This date it was reported that the effort is just getting under way.

The idea has been raised for a Fugitive Dust Conference to be held in the Spring of 2005. This date the group discussed a number of potential conference topics, basically following the format of the Fugitive Dust Handbook (ie/ sources, emissions & control options). A subcommittee was drafted for organizing this conference.

A proposal to implement a "Dust Watch" system discussed, which would encourage "field observers" to report dust events to the web, to improve our

understanding of the occurrence of these events and their contribution to Regional Haze.

Highlights of the recent Asheville Visibility Conference were reviewed for participants, and it was noted that Vic Etyemezian gave a presentation on the WRAP dust work at the meeting.

Regarding the Attribution of Haze Report, the contractor explained that the purpose was to put together a compilation of WRAP monitoring, modeling and emission inventory data, and to analyze those data to show the geographic location and types of sources affecting each of the Class I areas in the WRAP region. There is a website set up for this project at:

[www.wrapair.org/forums/aoh/ars1/index.html](http://www.wrapair.org/forums/aoh/ars1/index.html)

Participants were given an explanation of the data sets that are being used for the project, and showed a variety of displays that the report will incorporate to explain the impacts to the WRAP Class I areas. The AoH Workgroup will have the Draft Final Report December 14<sup>th</sup>.

A discussion was held on some of the analytical techniques that might be used to identify "natural" source of dust in the Regional Haze attribution efforts, and how this information might be communicated to WRAP stakeholders.

The full Agenda for this November 15-16<sup>th</sup> meeting is attached under Appendix I of this memo.

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### Meeting Details

#### **★ Dust Emission Research in the Northern Chihuahuan Desert ★**

Dale Gillette began the meeting with a presentation on dust emission research in the Northern Chihuahuan Desert (Appendix II). He lead off by saying that the main focus of his talk was that there is dust generated not only by mechanical means from sources such as traffic on unpaved roads or industrial activity, but also from wind erosion in desert areas, even where significant vegetation is present. The work he described was completed in the Chihuahuan desert area of northern New Mexico. The vegetation classes in the area include mesquite, creosote bush, snakeweed, tarbush, playa gramma grasses, other upland grasses, yucca, mixed areas, and barren areas. Regarding dust potential, most of these vegetation classes don't have a lot of dust, but mesquite is the exception. And in acreage, the mesquite ecosystem is the dominant area in this Chihuahuan desert region (see map). The wind erosion begins about at a wind speed of about 100 cm/sec (2.2 mph).

★ Update on Fugitive Dust Handbook & Website ★

Richard Countess is the consultant with the contract for preparing the electronic Fugitive Dust handbook, and this date he gave an update of the project status (Appendix III). This date he distributed hardcopy of the draft handbook, which is now up and on display at the Handbook Website at:

[www.wrapair.org/forums/dejf/fdh](http://www.wrapair.org/forums/dejf/fdh)

He emphasized that the intent of this handbook was to compile at one location, as complete a resource as possible of dust emission sources, emission calculation methods, control options and control cost estimates. The 8 sources considered for this handbook are: mechanically generated sources -- agricultural tilling, construction/demolition, materials handling, paved & unpaved roads ...and... windblown dust sources from agricultural lands, other open areas and storage pile wind erosion.

He demonstrated the Handbook Website for meeting participants, and suggestions for improvement/revisions were taken. Comments are to be taken though the end of November, and the handbook will be finalized December 15, 2004.

★ Project Updates ★

❖ PM Fine Fraction ❖

The RFP is now out and proposals are due by November 19, 2004.

❖ Projection of 2018 Dust Emission Inventory ❖

To inform DEJF members on the WRAP inventory activities, Tom Moore led a discussion on the projection of the 2018 SIP inventories. His handout (Appendix IV) lists the various calculation methods for:

- 1) road dust → EF will adjust the current inventory w/ new VMT projections; no other data collection)
- 2) windblown dust → (RMC will use the 2002 inventory as is for 2018 ['02 met conditions, but no adjustments for climate trend, Ag acreage, etc])
- 3) stationary & area sources → (SSJF will contract projections, including the effects of "rules on the books)

There was a discussion on the implications of dust issues on these projections, and it was suggested that the DEJF should designate a liaison to work on these projections to ensure a consistent approach and assumptions. Mike Edwards volunteered to take on this task.

❖ Evaluating Dust Control Strategies ❖

Gail Cooke of New Mexico is coordinating a group to evaluate dust control strategies for the \$308 & \$309 SIP processes. This date it was reported that the effort is just getting under way.

❖ 2005 Dust Conference ❖

Duane Ono discussed ideas for a Fugitive Dust Conference to be held in the Spring of 2005. His handout (Appendix V) lists a number of potential conference topics. Basically he thought the conference would basically follow the format of the Fugitive Dust Handbook, talking about the sources, the emissions and the control options. Volunteers for organizing this task included Rob Farber, Lee Alter, Susan Hardy and Jean-Paul Huys.

❖ Dust Watch Proposal ❖

Lee Alter discussed a proposal to implement a "Dust Watch" system, to improve our understanding of dust events and their contribution to Regional Haze (Appendix VII). Parameters of concern include frequency, magnitude, spatial extent, transport distance, source location, source type and comparison of events vs. background levels. He noted that dust events are highly episodic and difficult to document, but he felt that there is a large body of continuous data (FASTNET) which an inexpensive graduate student or intern could evaluate on a real time basis. The WRAP would encourage "field observers" to report events to the web, producing a log of events. This log would be used in conjunction with other assessments to identify the most appropriate control strategies for SIP's and TIP's.

★ Highlights of Asheville Visibility Conference ★

Lee Alter gave an brief overview of the Asheville Visibility Conference held earlier this month. He noted that Vic Etyemezian gave a presentation on the WRAP dust work at the meeting. There was a presentation on air pollution attribution for the City of Phoenix using receptor techniques, showing a major source of PM emissions is a mine on the edge of the city. There were maps presented of 2003 data for visibility components in the central portion of the United States. The winter months show nitrate being a dominant component in this CENRAP region, while Southern California is the only area of elevated nitrate in the WRAP. In general, sulfate trends show reductions over the bulk of the country.

Coarse mass also shows high values in the CENRAP region, but the data shows that Sycamore Canyon in Northern Arizona has the highest soil mass in the country. Mr. Alter did some further analysis on this Sycamore Canyon data, and found that the data appears to reflect true conditions. He compared the Sycamore Canyon data with Phoenix, and with the Grand Canyon, with results showing that Sycamore Canyon shows no linkage with either of these other sites. He tried to analyze the chemical composition of the soils data, but it will take more evaluation to draw good conclusions.

★ Overview of Attribution of Haze Report ★

Joe Adlhoch of Air Resource Specialists gave a presentation on the status of the Attribution of Haze report (Appendix VII). He explained that ARS was hired to put together a compilation of WRAP monitoring, modeling and emission

inventory data, and to analyze those data to show the geographic location and types of sources affecting each of the Class I areas in the WRAP region. There is a website set up for this project at:

[www.wrapair.org/forums/aoh/ars1/index.html](http://www.wrapair.org/forums/aoh/ars1/index.html)

This date Joe explained the data sets that are being used for the project, and showed a variety of displays that the report will incorporate to explain the impacts to the WRAP Class I areas. The full draft of the AoH report will be given to the AoH Workgroup at their meeting following this one, and ARS will submit the Draft Final to the workgroup by December 14<sup>th</sup>.

#### ★ Windblown Dust Modeling & Inventory Status ★

Gerry Mansell of ENVIRON gave a presentation (Appendix VIII) of status of development of Phase II for a WRAP windblown dust inventory. Phase II of the project was to improve the general wind tunnel based "MacDougall Method" for calculating windblown dust. ENVIRON was to update the gridded PM inventory for 2002, refine the threshold friction velocities for generating dust emissions, develop improved emissions flux, improve vacant land characterization (disturbance, land use, dust reservoirs), and then conduct a performance evaluation of the Phase to model. He covered the data sets that were used, and described the assumptions regarding soil reservoirs and responses to precipitation events.

Gerry then described the model simulations for two scenarios. Under Phase I, the threshold velocities were uniform, but these threshold velocities were varied under Phase II. Scenario "C" had no limitation on dust event duration, while Scenario "D" dust events were limited to 10 hours/day. They assumed that 10% of the lands were disturbed for Phase II. Threshold velocities were ½ of the values for undisturbed lands on grasses/shrublands and 27% of the undisturbed threshold velocities for barren lands. Windblown dust emission totals were over 3 MM TPY for the WRAP states under Scenario "C", dropping to a little less than 2.2 MM TPY under Scenario "D".

Gerry also went over the Model Performance Evaluation work that has been completed. The Next Steps recommended by ENVIRON include:

- complete model performance evaluation (end of 2004)
- address deficiencies in Ag data for Eastern States
- re-run model with the latest MM5 data
- make use of 12 KM resolution MM5 data
- apply the model to small regions for verification of assumptions
- apply the transport fraction by county for air quality modeling

#### ★ Causes of Dust Analysis ★

Vic Etyemezian then gave a presentation on the Causes of Dust Analysis that DRI is undertaking for the DEJF utilizing detailed evaluation of WRAP monitoring data (Appendix IX). DRI has identified the 20% worst visibility

days at WRAP Class I areas where dust is the dominant component of impairment. For each Worst Dust Day, the Scope of Work call for them to find appropriate criteria/tools to classify the causes as:

- Asian Origin
- Regional Windblown Dust (more than 1 site affected)
  - Dust mostly from "near" monitor
  - Dust mostly from other areas in region
- Local Windblown Dust (only 1 site affected)
- Wildfire?
- Other/Unknown

This date he reviewed the work that DRI has completed looking at Asian Dust events and at windblown dust. DRI has developed a scoring method for identifying the chemical signature of Asian Dust (Al/Si, Al/Ca, K/Fe) ratios.

Regarding windblown dust, they have been able to establish that a relationship exists between wind speed and dust for a limited number of sites. The basic approach is to associate as many WRAP IMPROVE sites as possible with a nearby meteorology stations (RAWS and ISH networks), and where a relationship exists between dust and wind, then they go through the 2001-2003 data set and flag sample days when dust has probable local windblown origin. They look at the spatial extent of the dust event to identify: sites where nearby sources cause dust, sites influenced by dust transport from upwind, or a combination of these two influences. Locally generated windblown dust considers only winds above a 14 mph threshold. This method identifies periods winds are high enough to cause local dust, and gives very approximate value for how much dust generated locally.

Dr. Etyemizian then gave a number of examples of implementation of this analytical technique. At the end of his presentation, he noted that DRI must "clean up" this method by tweaking, adding sites and checking for errors. Then the method would be used in conjunction with Asian dust flag, to assess apparent causes of dust for easy episodes.

**★ "Natural" vs Anthropogenic Definition of Dust ★**

This date Lee Alter reviewed the Scope of Work that has been developed to hire a contractor for "testing" the DEJF's definitions of dust. The tasks include:

- 1 - Feasibility Analysis (evaluate feasibility of implementing the definition)
- 2 - Refinement of the Definitions (recommend refinements based on feasibility)
- 3 - Definition Finalization (support in public review)
- 4 - Implementation Support (support in implementation of the final definition)

A clarification call for potential contractors was scheduled for November 16<sup>th</sup> and proposals are due November 26, 2004 under the project RFP.

**★ Attribution of Haze to "Natural" & Man-Made Sources ★**

Tom Moore & Joe Adlhoch lead a discussion on some of the analytical techniques that might be used to identify "natural" source in the Regional Haze attribution efforts, and how this information might be communicated to WRAP stakeholders.

A P P E N D I X I

Dust Emission Joint Forum Meeting Agenda

November 15-16, 2004 @ Las Vegas

A P P E N D I X    I I

Dust Emission Joint Forum November 15-16, 2004 Las Vegas Meeting

Dale Gillette Presentation Slides: Northern Chihuahuan Desert Dust Research

A P P E N D I X III

Dust Emission Joint Forum November 15-16, 2004 Las Vegas Meeting

Richard Countess Presentation Slides: Fugitive Dust Handbook Update

A P P E N D I X    I V

Dust Emission Joint Forum November 15-16, 2004 Las Vegas Meeting

Tom Moore Handout: 2018 Dust Projection Recommendations

A P P E N D I X V

Dust Emission Joint Forum November 15-16, 2004 Las Vegas Meeting

Duane Ono Handout: 2005 Fugitive Dust Conference

A P P E N D I X VI

Dust Emission Joint Forum November 15-16, 2004 Las Vegas Meeting

Lee Alter Presentation Slides: Dust Watch Proposal

A P P E N D I X VII

Dust Emission Joint Forum November 15-16, 2004 Las Vegas Meeting

Joe Adlhoch Presentation Slides: Attribution of Haze Project Update

A P P E N D I X VIII

Dust Emission Joint Forum November 15-16, 2004 Las Vegas Meeting

Gerry Mansell Presentation Slides: Phase II Windblown Dust Inventory Update

A P P E N D I X IX

Dust Emission Joint Forum November 15-16, 2004 Las Vegas Meeting

Vic Etyemezian's Presentation Slides: Causes of Haze Update