



Summary of Comments and Responses

Proposed Approach to the Calculation of Natural Background Visibility at MANE-VU Class I areas

June 10, 2004

Background

Each state containing a Class I Area must establish natural background visibility levels for that area after consulting with Federal Land Managers and with other states whose emissions affect visibility in the Class I area.

EPA has issued guidance establishing a “default method” for calculating natural background visibility. States may use the default method or modify it if other methods would be more representative of natural background levels.

On March 17, MANE-VU released and requested comments on a draft element of State Implementation Plans for Regional Haze entitled “Natural Background Visibility Conditions, Considerations and Proposed Approach to the Calculation of Natural Background Visibility Conditions at MANE-VU Class I Areas” (draft dated March 11, 2004). The document was posted on MANE-VU’s web site and distributed at a March 17 meeting held to brief stakeholders. Comments were requested by April 16.

The draft document recommended that MANE-VU Class I States use the default methods recommended in EPA guidance at this time, that MANE-VU actively participate in further research efforts on this topic, and that MANE-VU reconsider its position with respect to natural background visibility conditions as future scientific understanding warrants.

Comments Received

MANE-VU Received five comments on the draft proposed approach to the calculation of natural background visibility conditions at MANE-VU mandatory Class I areas. These comments included:

- A presentation by the Midwest Ozone Group (MOG) on behalf of the Electric Power Research Institute (EPRI) at the March 17, 2004 MANE-VU Stakeholder Briefing in Baltimore, Maryland,
- Written comments from MOG on behalf of MOG and EPRI,

- Written comments submitted jointly by the Appalachian Mountain Club and the National Parks Conservation Association,
- Written comments from the United States Department of Interior National Park Service, and
- Written comments from the United States Forest Service.

Copies of the written comments are available from the Ozone Transport Commission (OTC).

Issues Raised by Commenters

Comments tended to address five main areas: planning and reasonable progress, the visibility calculation equation, statistical issues related the 20% best and worst visibility days, inclusion of transboundary effects and fires, and the timing of when new information should be included.

The following is a more detailed description of the issues raised and MANE-VU's responses.

Planning Cycle and Reasonable Progress

One commenter stressed that RPOs should work together along with EPA and other stakeholders to better define the 2064 endpoint. All comments supported continued research and study of the scientific basis for estimating natural visibility conditions.

MANE-VU agrees that work to improve the state of the science related to natural conditions should continue. This issue is further discussed at the end of this document.

One commenter inferred that MANE-VU was proposing to not incorporate any improved science in the estimates of natural visibility conditions until the next planning cycle.

MANE-VU has indicated it will rely on improvements in the scientific understanding of natural visibility conditions whenever that information is available, including developments during the current planning cycle.

One comment implied that emissions from U.S. anthropogenic sources must be reduced to zero by 2064 under the Regional Haze Rule.

MANE-VU disagrees with this premise. The Regional Haze Rule and Section 169A of the Clean Air Act require states to develop and maintain long-term strategies to make reasonable progress toward the national goal. The Regional Haze Rule does require states to develop and present information about the "glide-path" between current and natural conditions in the SIP approval process so the public is fully informed, but leaves to the states the discretion of defining the content of the long-term strategy to assure reasonable progress toward the national goal based on the criteria for reasonable progress.

Visibility Calculation Equation

One commenter noted that any changes in the IMPROVE equation will not only change the 2064 endpoint, but will also change the slope of the glide path from 2004 to 2064.

MANE-VU agrees. Although changes in the calculations would affect both baseline and natural background conditions, the uniform rate of progress as determined by baseline and natural background conditions is most sensitive to absolute changes in natural background estimates (as opposed to baseline conditions).

One commenter noted that recent studies indicate that the IMPROVE conversion factor for organic carbon (measured) to organic carbon mass (used in extinction calculation) could understate the organic carbon mass, especially for aged aerosols. Also, other studies indicate that the IMPROVE extinction efficiency for dry sulfate and nitrate aerosols should be reduced from 3.0 to 2.5 m²/g. In addition, the current IMPROVE equation ignores the contribution from sea-salt which could be important for coastal sites. Finally, the commenter noted the IMPROVE reconstructed extinction may over-predict light extinction at low levels and under-predict light extinction at high values. Another commenter noted that due to the large uncertainties demonstrated in the MANE-VU analysis that MANE-VU should retain the proposed natural background estimates until better science is available. A third commenter noted that they will be performing additional studies to further investigate these issues and would like to work with MANE-VU on refining the estimates of natural conditions.

MANE-VU is aware of, and has been monitoring developments on these issues. MANE-VU will continue to monitor developments in these areas and may modify the initial approach to estimating natural visibility conditions later in the planning process based on improved science and technical understanding of the issues. MANE-VU believes using EPA's default approach is appropriate at this time.

Statistical Issues Related to 20% Best and Worst Visibility Days

The current EPA approach for developing estimates for natural background is based on the assumption that the distribution of haziness index (deciview) values is approximately a normal distribution. The Regional Haze Rule focuses on the average of the 20% best and 20% worst days. These averages actually correspond to the 8th percentile and 92nd percentile of the distribution of values for a normal distribution. The use of a factor of 1.28 standard deviations above and below the annual average would result in estimates for the 10th percentile and 90th percentile. Other studies have suggested that different standard deviations based on examination of actual measurements scaled to "natural levels." One commenter suggested modifying the EPA assumption to reflect this while another commenter felt the current proposed application of the EPA approach was adequate given the large uncertainty in estimates of the distribution of natural visibility conditions.

MANE-VU is aware of, and has been monitoring developments on these issues. MANE-VU will continue to monitor developments in these areas and may modify the initial approach to estimating natural visibility conditions later in the planning process based on improved science and technical understanding of the issues. MANE-VU believes using EPA's default approach is appropriate at this time.

Inclusion of Transboundary and Fire Emissions

One commenter believes the contribution of anthropogenic emissions from sources outside the jurisdiction of the U.S. should be included in the 2064 endpoint for natural conditions.

EPA acknowledged in the preamble to the 1999 Regional Haze Rule that states were not expected to place additional burdens on domestic sources to offset contributions from international sources. MANE-VU plans to estimate the degree of contribution from these international sources when developing long-term strategies so the public, and EPA, are aware of the contributions from sources outside the jurisdiction of the states, tribes, and EPA. It is MANE-VU's position that these matters affect the reasonableness of a given reduction strategy, not the definition of natural conditions.

One commenter suggested the use of global chemistry models to estimate natural and background (international transport) levels of aerosols to improve understanding of both of these issues.

If the predictions from global models utilizing all anthropogenic and natural sources are shown to be consistent with ambient measurements (i.e., through model validation), then use of such models to estimate contributions from only natural sources would be useful as part of a "weight-of-evidence" approach to refine estimates for natural conditions and contributions from international sources. MANE-VU is providing partial support for an inter-RPO project to investigate the use of global models as part of the regional haze planning process. MANE-VU will consider the results of this project as they become available.

One commenter noted that emissions from wildfire and natural dust events may occur more frequently in spring and summer and that estimates of natural background contributions from these source categories should be developed on a seasonal rather than an annual basis to account for this fact.

MANE-VU is aware of, and has been monitoring developments on these issues. MANE-VU will continue to monitor developments in these areas and may modify the initial approach to estimating natural visibility conditions later in the planning process based on improved science and technical understanding of the issues. MANE-VU believes using EPA's default approach is appropriate at this time.

Inclusion of New Information: State of the Science

Many of the issues raised above address concerns with "State of the Science." In addition, several specific comments are summarized here.

One commenter offered recommendations for specific revisions to the default natural background estimation procedures, based on recent measurement studies, data analyses and modeling efforts. Other commenters believed that the current MANE-VU proposal to rely on the EPA default guidance values should be used initially, with modifications incorporated later as additional scientific studies are completed and result become available to further inform MANE-VU's estimates of natural visibility conditions.

There are several recently completed and on-going research initiatives that MANE-VU plans to monitor to better inform the estimates of natural visibility conditions. A selected list is provided below.

- A VISTAS analysis suggested that natural background soil estimates were likely too high at northern VISTAS sites (near the southern MANE-VU border).
- The IMPROVE program is conducting major studies of ion measurement methods and coarse particle composition, which will provide better information on natural sources like sea salt, soil, and organics, and on the interactions between current natural and manmade emissions.
- IMPROVE will also be conducting a carbon-14 study at selected sites over the next 2 years, which will provide additional information on biogenic and manmade influences on organic carbon.
- A "natural background sensitivity analysis," supported by WRAP on behalf of all the RPOs, will be commencing shortly and will provide site-specific estimates of natural source influences and uncertainties at each IMPROVE site.
- A 2002 global modeling exercise, including natural source estimates, is currently being planned through VISTAS and other RPOs, with a primary objective of defining boundary conditions for refined regional modeling, which also has a potential to provide additional information on natural source influences.

Because the ongoing work mentioned above will provide much more detailed site-specific information in the near future, and while we agree there are data developing that may warrant a change to one or more of the default values, MANE-VU does not believe it would be appropriate to make specific revisions to (and develop extensive technical justifications for changing) the EPA default values at the present time. MANE-VU believes that any refinements to the default method should be broadly accepted by the scientific community, substantial, practical to implement, and not create arbitrary inconsistencies. In addition, any refinements should be implemented so as to not side-track technical efforts on other aspects of the regional haze program. In response to the comments received, MANE-VU has revised the document to clarify that it will continue to coordinate with other Regional Planning Organizations to monitor developments in these areas and may modify the initial default approach to estimating natural visibility conditions based on improved science and technical understanding of the issues.