

WRAP Approach for Estimating Natural Background Contributions by Fire  
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The WRAP Ambient Monitoring and Reporting Forum is charged with developing an approach for estimating the haze levels associated with natural sources by January 1<sup>st</sup> 2002. The overall approach selected for doing that is to estimate the natural contributions to each of the six major aerosol components that are responsible for visibility impacts (i.e., sulfate, nitrate, fine soils, organic and elemental carbon, and coarse mass). Particle monitoring data can be used to determine the contributions of each of the components to haze, but emissions information is needed to estimate the fraction of each components contribution that is natural as opposed to man-made.

Smoke from biomass burning contributes significantly to organic and elemental carbon aerosol. Emissions from fire are estimated from the size of the area burned, the fuel loading, and characteristics of the burning (e.g. smoldering, flaming, etc.). The locations, magnitude and timing of forest and range fires are highly sporadic causing an extremely irregular distribution of smoke impacts for any particular visibility protected areas. Monitoring data shows that what seems to be fire-dominated impacts are responsible for most of the cases of extremely unusually and high haze level (i.e. more than twice as high as the next highest impact day over a three year period). No doubt fire sources impact most protected areas on many days in a significant though less dramatic manner. However, distinguishing fire impact from those of other organic and elemental carbon sources is much more difficult on those less extreme days.

The Ambient Monitoring and Reporting Forum believes following steps must be taken to estimate natural emissions from fire for the WRAP.

1. The Fire Emissions Forum needs to provide a data tracking system that estimates fire emissions of organic and elemental carbon. The magnitude of the emissions (mass of elemental and organic carbon) should be estimated as a function of time and location (e.g., center of the fires to the nearest 10 kilometers each day). This should be provided for the entire western US and any parts of Western Canada and Northern Mexico where arrangements can be worked out and should cover all of calendar year 2000 and beyond. The fire emissions system needs to be established and maintained so that fire emissions can be combined by the Emissions Forum with other emissions and made available to other forums including modeling and monitoring.
2. The Fire Emissions Forum needs to develop a policy recommendation that allows for the classification of all fire emissions into natural and man-made source categories. The classification scheme needs to be applied to every fire that is tracked by the system described in #1 so that amount of natural and man-made emissions are documented for each fire in the inventory.

3. The Ambient Monitoring and Reporting Forum in collaboration with the Modeling Forum will estimate the natural and man-made contributions to haze from fire using the emissions information including the distinction of natural and man-made emissions described in #1 and #2 above. A preliminary estimate of annual average natural fire emissions can be developed within a few months of having completed #2 by using aggregate data, but the information in #1 will be required along with about a 6 to 9 month lead time to refine the estimates. Thus the Fire Emissions Forum must complete #2 no later than April 2001 and #1 shortly afterwards for the Ambient Monitoring and Reporting Forum to meet their schedule. A greater period of time (i.e., several years depending on available resources) may be needed to develop a methodology for assessing the natural and man-made fire contributions for each particle sample, which will be needed to assess the visibility trends and progress towards the visibility protection goal as needed after 2005.