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Sent via E-mail to a-and-r-Docket@epa.gov
and Mary Ross at Ross.Mary@epa.gov Nov. 5th, 2003

Appalachian Mountain Club's comments on the 1st Draft of the Particulate Matter Staff Paper

The Appalachian Mountain Club (AMC) appreciates the opportunity to comment on the 1st Draft of the Particulate Matter Staff Paper. The AMC believes the Staff Paper and supporting Criteria Document are well documented and thorough. Our organization is encouraged that the Staff Paper proposes an improvement from the current particulate matter National Ambient Air Quality Standard (NAAQS) for $PM_{2.5}$ and is initiating a new standard for course $PM_{10-2.5}$. We urge EPA to adopt the more protective end of the ranges proposed for 24-hour and annual averages. The evidence is well documented in the Criteria Document and Staff Paper that $PM_{2.5}$ levels are of great concern to human health at significantly lower levels then the current standard. As many scientific studies report the impacts to human health do not show a lower limit threshold indicating that even very low levels of $PM_{2.5}$ negatively impact human health. The AMC is an outdoor recreation and conservation organization and we encourage our members to engage in healthy activities such as hiking. The EPA's own Air Quality Index health messaging for $PM_{2.5}$ indicates that health problems for subgroups of the population occur at levels below the current standard (Moderate and Unhealthy for Sensitive Groups) and recommends avoiding activities such as hiking and other cardiovascular exercise when $PM_{2.5}$ levels are high. Our constituency therefore supports the most stringent NAAQS level for PM proposed.

Primary NAAQS

We strongly urge EPA to change the 24-hour $PM_{2.5}$ standard from 65 to 30 $\mu g/m^3$ or lower and the annual standard from 15 to 12 $\mu g/m^3$ or lower. We support replacing the PM_{10} standard with a course PM standard ($PM_{10-2.5}$) of 13 and 30 $\mu g/m^3$ for the annual and 24-hour average standards respectively. As we have in the past, AMC request that EPA not use the 98th percentile form of the $PM_{2.5}$ and $PM_{10-2.5}$ standards. This method would result in acute health effects not be protected for more than 21 days over 3 years. In some areas, such a rural New England, a large percent of the dirtiest days arrive with the summer's warm weather coinciding with a time when people are commonly recreating outdoors. The 98th percentile form seems to thwart the function of the 24-hour standard, i.e. to protect people from days when PM pollution is highest. The number of allowable unhealthy days per year using this current form is unacceptable. AMC urges EPA to explore alternative forms such as a single exceedance form or the fourth highest concentration over 4 years.

Secondary NAAQS

The AMC also supports the stronger primary standard as it pertains to the secondary NAAQS to protect against the welfare effects of ambient airborne particulate matter. We urge EPA to adopt the same 24-hour and annual $PM_{2.5}$ standard of 30 $\mu g/m^3$ and 12 $\mu g/m^3$ respectively if not an even more stringent 24-hour level for the secondary standard. The AMC considers a strong secondary NAAQS essential to ensure restoration and protection of natural resources and the valuable outdoor experiences they provide. While the Regional Haze Rule provides a roadmap to improve visibility over the long term, in our National Parks and Wilderness Areas (Class I Areas), it does not provide timely relief for currently impaired ecological values nor deals with haze outside of Class I boundaries. The adverse effects on public welfare from particulate matter pollution and its precursors are clear.

Visibility

The AMC agrees with EPA that it is appropriate to consider revisions to the secondary NAAQS in this review to protect against PM-related effects on visibility. The AMC also agrees with EPA that visibility improvements would be more likely to occur if the low end of the proposed range for the primary standard were assumed and the secondary standard was consistent with that newly assumed level. The AMC further encourages EPA to promulgate an even stricter 24-hour secondary $PM_{2.5}$ NAAQS, than 30 $\mu g/m^3$, to protect sensitive areas and those severely affected from visibility impairment. AMC believes that just as the primary standard is set to levels that protect the most vulnerable in the human population that the secondary standard should protect the most sensitive natural resources. While the Regional Haze program now provides an appropriate regulatory mechanism to protect Class I areas it does not protect other areas nor does it's benefits occur in an expeditious timeframe. In addition, the Regional Haze program has yet to be fully engaged, most recently due to legal roadblocks, and historically there has been a lack of measures taken to protect Class I airsheds. Many of AMC's members live in, and often recreate near, urban areas which would benefit from a secondary standard for visibility.

Supplemental comments provided by R. Poirot on the Criteria Document, 3rd review, and that presented in the final draft Criteria Document suggest that there is enough available information to set a secondary PM standard to protect visibility. Poirot points out that the 98th percentile daily maximum 24-hour has a threshold range of approximately 30-40 $\mu g/m3$ consistent across urban areas nation-wide. He notes that related photographic documentation of these levels still show unpleasantly hazy conditions. Poirot discusses that further work needs to be done in urban areas to link increments in deciview visibility to $PM_{2.5}$ concentrations which this Staff Paper indicates that there is sufficient photographic documentation to make an informed decision. Using IMPROVE data across the nation Poirot also demonstrates that a strong relationship exists between $PM_{2.5}$ concentration and reconstructed extinction even with confounding variables such as different regions and RH levels and varying compositions making up the $PM_{2.5}$. This allows a calculation of an approximate average visual range would be across all sites at $PM_{2.5}$ concentrations of 30 to 40 $\mu g/m^3$, which he reports is about 9-12 miles. Using the same formula the current standard of 65 $\mu g/m^3$ results in a calculated average visual range of 6 miles. AMC conducted a survey of visitors to the White Mountains showing them photographs of Great Gulf Wilderness under different haze conditions and found that a visual range of 33 miles or less was unacceptable. While we recognizing that the

Regional Haze program will address haze in Class I areas, the information presented by Poirot still supports a strong secondary NAAQS as urban areas experience regional haze plus more locally generated urban haze. The focus group study EPA conducted for this NAAQS review reported in a preliminary draft that the participants had a threshold for acceptable/unacceptable visibility for an urban vista in the range of 20-30 $\mu g/m^3$. All of this information together seems to provide the impetus EPA needs to set the secondary standard for $PM_{2.5}$ at the very least to 30 $\mu g/m^3$ and 12 $\mu g/m^3$ for the 24-hour and annual averages respectively.

Ecosystem Impacts

The AMC agrees strongly with the conclusions of the final Criteria Document that indeed there is sufficient scientific evidence that demonstrates that sulfur and nitrogen forms of particulate matter profoundly disrupt many of ecological processes EPA describes as essential ecological attributes. We urge the board to maintain this warranted conclusion and believe the information presented provides evidence for a strong secondary $PM_{2.5}$ standard to protect against PM-related effects on ecological attributes.

The AMC appreciates that EPA included a more extensive discussion, compared to the previous 1997 review, of the impact of fine particulate and wet acidic deposition to ecosystems. It is a well-known scientific fact that acid deposition, both dry and wet, is caused by acid aerosols--the *dominant* part of fine particulate matter in the sensitive areas of the Northeast. We disagree with EPA that there is not sufficient evidence for a secondary NAAQS pertaining to ecosystem impacts. The AMC recognizes the challenge to quantify the relationship between observed PM-related adverse ecosystem impacts across the US with the levels of PM in the ambient air. However, we believe the evidence for a strong secondary NAAQS to protect ecological attributes is demonstrated in the Staff Paper through its discussion of the *cumulative* and *pervasive* impacts of acid aerosols in the Eastern US and specifically in mountain ecosystems. Acid deposition, ozone pollution, and nitrogen saturation are occurring across the Appalachian mountain chain and can all be linked to the atmospheric transport of acid aerosols sulfate and nitrate.

The Staff Paper recognizes the impact of long-term cumulative deposition of sulfur and nitrogen compounds and discusses this in relation to nitrogen saturation and loss of important base cations, which provide buffering capacity and meet nutritional needs of plants and other organisms. The temporal cumulative impact is of great significance to regions with low buffering capacity as slow recovery is expected due to the recent decline in cation atmospheric inputs and slow rate of chemical weathering that is another significant source of cations. The 2003 EPA report "Response of Surface Water Chemistry to the Clean Air Act Amendments of 1990" discusses that while improvements have been observed that "the 20 year decline in base cations in surface waters continued, offsetting some of the declines in surface sulfate." It also reports that lakes in New England show little recovery and the Ridge/Blue Ridge region may even be slightly more acidified and is identified as the region most likely to undergo further acidification. A point that was not discussed in this Staff Paper related to long-term impacts is that recovery of streams, and the watershed it drains, is slowed by the *retention* of sulfur and nitrogen as well as slow recovery of the pool of base cations in soils. Driscoll et al. (2001) hypothesize that slow leaching of sulfur and nitrogen will delay a response in

stream water from the declines in emissions[1]. A lag in ecosystem recovery from less acidic deposition is also discussed in the Acid Rain Program Annual Progress Report, 2001, p. 37.

In combination with the cumulative impacts is the pervasiveness of PM pollution impacts, albeit in different forms. While AMC recognizes that $PM_{2.5}$ is made up of a variety of pollution the major player for the Northeast is acidic sulfate aerosols. Acidic sulfate deposition contributes to many ecological impacts as discussed in the Criteria Document and Staff Paper. And while nitrate aerosols make up a smaller percent of the total $PM_{2.5}$ the nitrogen, unfortunately, is much more disruptive on many levels of an ecosystem as demonstrated in the Nitrogen Cascade model included in the Staff Paper. This not only shows how nitrogen impacts many different environmental reservoirs but the same nitrogen molecule can get handed off through the system, hence having a large pervasive and cumulative effect.

As stated above the AMC supports setting a secondary NAAQS that protects the most sensitive natural resources. Montane ecosystems contain fragile and unique vegetation communities and yet are receiving the greater doses of pollution compared to low elevation sites. Atmospheric deposition rates increase with elevation, and cloud deposition becomes significant above 1000 meters[2]. AMC has collected cloud and rainwater deposited near the summit of Mount Washington where we have documented pH of cloud water ranging from 3.6 to 4.1 and rain water from 4.0 to 4.4. The lowest pH value the AMC has recorded for cloud water is 2.6 (approximately the same acidity as lemon juice), while the lowest rainwater pH was 3.1 (approximately the acidity of vinegar). Chemical analyses of AMC's high elevation rain and cloud water samples showed that about two-thirds of the acidic input was due to sulfuric acid and about one-third from nitric acids. Heavy loading of these pollutants often result in acidification of soils and adversely affects vegetation and aquatic systems across the landscape. Class I areas such as the Great Gulf and Presidential/Dry River wilderness areas in NH contain unique alpine vegetation as well as high elevation streams and lakes. From 1995-1997 AMC collected stream water in the Great Gulf Wilderness at high elevation and found some of the highest nitrate levels in the region, along with elevated calcium and magnesium concentrations, signs of nitrogen saturation and leaching of base cations. Similar trends are found elsewhere at high elevations. A study of stream chemistry in the Catskill Mountains of New York over an elevation range of 817-1234 meters have shown a strong positive correlation between elevation and concentrations of nitrates and sulfates while concurrently showing a strong negative correlation between elevation and concentrations of exchangeable base cations[3]. Low concentrations of base cations at this study area indicate that the system has already been depleted partly due to the higher acid loading at high elevations. Low elevation ecosystems in Class I areas and other valued lands are not exempt from the effects of acid deposition. Driscoll

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[1] Driscoll CT, Lawrence GB, Bulger AJ, Butler TJ, Cronan CS, Eagar C, Lambert KF, Likens GE, Stoddard JL, Weathers KC. 2001. Acidic deposition in the northeastern United States: sources and inputs, ecosystem effects, and management strategies. *BioScience* 51(3): 180-198.

[2] Weathers KC, Lovett GM, Likens GE, Lathrop R. 2000. The effect of landscape features on deposition to Hunter Mountain, Catskill Mountains, New York. *Ecological Applications* 10(2): 528-540.

[3] Lawrence GB, David MB, Lovett GM, Murdoch PS, Burns DA, Stoddard JL, Baldigo BP, Porter JH, Thompson AW. 1999. Soil calcium status and the response of stream chemistry to changing acidic deposition rates. *Ecological Applications* 9(3): 1059-1072.

et al. (2001) recently summarized the body of scientific evidence that acid deposition is damaging forested ecosystems across the Northeast on many levels, including declines in the health of sugar maple and red spruce stands, the death of aquatic organisms, and poor water quality in streams and lakes.

The argument that it is difficult to determine the exact secondary standard to protect ecological values due to the varying mix of compounds that compose PM and difference in sensitivities of ecosystems does not stand in the weight of evidence that shows the cumulative and pervasive impacts from the dominant acidic species found in $PM_{2.5}$ in the East. AMC believes there is bountiful information available to EPA to soundly set secondary standard of 30 and 12 $\mu g/m^3$ for a 24-hour and annual $PM_{2.5}$. The Acid Rain program, while successful in meeting its targets, has not solved the problem. Other related regulatory programs, such as the summertime NO_x SIP Call, only deal with a portion of the problem or have timelines that are far to long, i.e. the Regional Haze program. Prevention of Significant Deterioration increments have yet to be upgraded to protective levels for NO_x or PM. This is an opportunity for EPA to properly protect our natural resources and quality of our outdoor experiences.

Thank you for the opportunity to present our comments on this Staff Paper and we urge EPA to expeditiously set strong primary and secondary $PM_{2.5}$ and course $PM_{10-2.5}$ standards.

Sincerely,

Georgia Murray
Staff Scientist
Appalachian Mountain Club