NESCAUM
www.nescaum.org

Northeast States for Coordinated Air Use Management
89 South Street, Suite 602 Boston, MA 02111
Phone 617-259-2000 Fax 617-742-9162
Arthur N. Marin, Executive Director

March 22, 2010

Lisa P. Jackson, Administrator
U.S. Environmental Protection Agency
Air and Radiation Docket
Mail Code 6102T
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
Attention: Docket No. EPA–HQ–OAR–2005–0172

Re: *Proposed Rule – National Ambient Air Quality Standards for Ozone*

Dear Administrator Jackson:

The Northeast States for Coordinated Air Use Management (NESCAUM) offer the following comments on the U.S. Environmental Protection Agency's (EPA's) proposal, published on January 19, 2010 in the Federal Register, entitled *National Ambient Air Quality Standards for Ozone* (75 FR 2938-3052). NESCAUM is the regional association of air pollution control agencies representing Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont.

EPA has, upon reconsideration, proposed revisions to the primary and secondary ozone National Ambient Air Quality Standards (NAAQSs) that are consistent with the scientific body of evidence and in keeping with the recommendations of the Clean Air Scientific Advisory Committee (known as CASAC) and EPA's own professional staff.

As in NESCAUM's earlier comments on the 2008 ozone NAAQS revision, we continue to support a revised primary ozone NAAQS within the CASAC-recommended range of 0.060 to 0.070 parts per million (ppm). When EPA revised the primary ozone NAAQS in the 1990s, the health effects information was less clear. CASAC members were divided in the recommendations they offered EPA regarding the appropriate level for ozone. This was no longer the case by 2006, when EPA revisited the primary ozone NAAQS. With the advent of a wealth of newer health studies, CASAC's membership made a unanimous recommendation to EPA to revise the primary ozone standard within the 0.060 to 0.070 ppm range.[1] While that recommendation was not followed in EPA's 2008 primary ozone NAAQS revision, it now has been upon EPA's reconsideration of its prior decision.

As with the primary ozone NAAQS, NESCAUM also continues to hold firm in regard to the secondary ozone NAAQS and the protection of welfare values. NESCAUM supports the

[1] Letter from Dr. Rogene Henderson, Chair, CASAC, to EPA Administrator Stephen L. Johnson, "Clean Air Scientific Advisory Committee (CASAC) Peer Review of EPA's 2nd Draft Ozone Staff Paper," October 24, 2006, EPA-CASAC-07-001 (p. 2).

concentration-weighted form proposed by EPA and supported by the CASAC, referred to as "W126," and recommends a secondary NAAQS of the W126 form at the lower end of the proposed range of 7 to 15 ppm-hours.

More detailed comments are found in the sections that follow.

1. Primary Ozone Standard

Recommendation

The NESCAUM states strongly support establishing a primary ozone NAAQS that does not exceed the upper end of the CASAC-recommended range of 0.060-0.070 ppm. There is ample scientific evidence to support revising the primary ozone NAAQS consistent with the CASAC-recommended range in order to reflect an adequate margin of safety in protecting public health.

Health Studies Support a More Stringent Primary Ozone NAAQS

A standard not higher than 0.070 ppm, averaged over 8 hours, can be justified based on current health data. For example, chamber data indicate significant effects at 0.08 ppm averaged over 6.6 hours in healthy adults; multi-city longitudinal data in asthmatic children show significant lung function decrements at ambient levels as low as 0.066 ppm averaged over 8 hours (99^{th} percentile); and a large body of significant single-city and multi-city epidemiological studies document respiratory effects and premature mortality at ambient air concentrations and supports revising the ozone NAAQS within the CASAC-recommended range. These and many other studies document the detrimental health effects associated with ozone exposure and demonstrate the need for a more stringent ozone NAAQS.

Leading up to the 2008 ozone NAAQS revision, EPA's staff analysis concluded that the existing health data:

1. "reinforces our judgments about causal relationships between [ozone] exposure and respiratory effects observed in the last review";

2. "broaden[s] the evidence of [ozone]-related associations to include additional respiratory-related endpoints, newly identified cardiovascular-related health endpoints, and mortality";

3. "advance[s]our understanding of potential mechanisms by which ambient [ozone], alone and in combination with other pollutants, is causally linked to a range of respiratory- and cardiovascular-related health endpoints"[2]; and

[2] EPA OAQPS Staff Paper, "Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information," EPA-452/R-07-007, July 2007, pp. 6-7 to 6-8.

4. "[n]ewly available evidence has also identified increased susceptibility in people with asthma."

Studies of healthy subjects likely underestimate ozone related effects on asthmatics and other sensitive groups. The evidence suggests that people with asthma, especially children, experience more serious health effects caused by ozone exposure. The health studies affirmatively demonstrate the need for an ozone NAAQS not exceeding 0.070 ppm.

Limitations of the Studies Underscore the Need for a Stringent NAAQS

Some limitations of the health studies done to date suggest that health effects may occur at even lower ozone concentrations than observed in chamber studies. Findings include the following:

1. Significant lung function decrements were observed at exposures of 0.08 ppm for 6.6 hours in chamber studies in healthy adults. In these healthy adult studies, some respiratory symptoms were increased at 0.06 ppm for 6.6 hours, although this increase was not statistically significant.
2. Evidence supports the expectation that asthmatics, particularly children, will be more sensitive to the effects of ozone. The ozone health risk assessment in EPA's 2007 Staff Paper focused only on four outcomes, and did not take a comprehensive look at the effects of ozone on children four years of age or younger. This is clearly a gap in the health data and may further underestimate the health risks from ozone.[3]
3. Chamber studies generally expose participants to ozone only, not to the mix of photochemical oxidants that is typically present in ambient air and for which ozone is used as an indicator. This may underestimate health risks from ozone.
4. The health risk assessment in EPA's 2007 Staff Paper focused on quantifying accrued health benefits of reducing the ozone standard in just 12 metropolitan statistical areas (MSA).[4] This likely underestimates aggregate health benefits because of the regional character of ozone that would extend benefits to adjacent areas beyond the MSA boundaries.

In addition, separate research groups recently analyzed the available health research in the U.S. and Europe, and independently and consistently found a strong linkage between increases in ozone and risk of premature death. Recent studies also indicate that ozone may contribute to

---

[3] EPA OAQPS Staff Paper, "Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information," EPA-452/R-07-007, July 2007, p. 5-10.

[4] EPA OAQPS Staff Paper, "Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information," EPA-452/R-07-007, July 2007, p. 5-11.

cardiac morbidity. These health consequences have not been accounted for previously, thus the costs of not reducing ozone pollution are far higher than once believed.

Form of the Primary NAAQS

For the primary ozone NAAQS, NESCAUM generally supports the form of the three-year average of the annual fourth highest daily maximum 8-hour concentration.

EPA does not propose to change the method (Appendix P to Part 50, Section 3(b)) used to determine the daily maximum 8-hour average concentration, stating that "[g]enerally, overlapping daily maximum 8-hour averages are not likely, except in those non-urban monitoring locations with less pronounced diurnal variation in hourly concentrations"(75 FR 3049-3050). For high elevation sites and sites experiencing long range transport, however, overlapping daily maximum 8-hour averages have occurred for the current ozone standard and are likely to occur more often under a more stringent standard (see Appendix A, Figure 1). Based on an analysis of 2003-2009 8-hour ozone events (using the upper end of the CASAC-recommended range of 0.070 ppm) in the NESCAUM region, 21 monitoring sites recorded a total of 149 events where it was unclear as to which date should be assigned to the daily maximum 8-hour ozone concentrations (see Table 1).

Table 1. Monitoring Sites and Number of Events in the NESCAUM Region with Overlapping Daily Maximum 8-hour Ozone Averages (based on 2003-2009 data and a 0.070 ppm level)

State	Monitor Location	# of Events	Site Characteristics
ME	Summit of Cadillac Mountain	9	coastal high terrain – 466m
ME	McFarland Hill	2	coastal elevated terrain – 130m
NH	Summit of Mt Washington	23	inland high terrain -1917m
NH	Base of Mt Washington	2	inland high terrain – 1420m
NH	Haverhill	1	inland elevated terrain - 745m
NH	Summit of Pack Monadnock	4	inland high terrain – 695m
MA	Worcester	2	inland elevated terrain – 306m
MA	Truro	3	coastal cape – 41m
MA	Fairhaven	4	coastal – 4m
MA	Martha's Vineyard	5	coastal island -10m
MA	Adams	19	inland high terrain – 1140m
CT	Mohawk Mt	2	inland elevated terrain – 505m
NJ	Monmouth University	1	coastal – 6m
NY	Summit of Whiteface Mt	39	inland high terrain – 1480m
NY	Base of Whiteface Mt	15	inland high terrain – 625m
NY	Camp Georgetown	3	inland elevated terrain – 500m
NY	Grafton Lakes	4	inland elevated terrain – 500m
NY	Belleayre Mountain	2	inland elevated terrain – 610m
NY	Williamson	3	coastal Lake Ontario – 140m
NY	Westfield	3	coastal Lake Erie – 310m

Such events occurred mostly along shorelines of the Great Lakes and the Atlantic Ocean, as well as at rural elevated terrain sites. The latest example of this type of event occurred March 11-12,

2010 at the summit of Mt. Washington in New Hampshire. These types of events should not be considered "not likely," and may occur at greater frequency under a more protective standard. To the extent that a revised primary or secondary ozone NAAQS may require more rural monitoring locations in the future, we could reasonably expect such occurrences to be even more common.

Moreover, this issue could have significant policy ramifications, especially if the overlapping event is one of the ozone season's top four events affecting the design value for that site (see example in Appendix A, Figures 2 and 3). To address this particular situation for these types of sites, NESCAUM recommends that, when determining the daily maximum 8-hour average concentration for those sites, EPA factor in when the ozone production occurred and the associated 1-hour concentration pattern. If the 1-hour peak occurs before sunrise, then the 8-hour maximum should be assigned to the previous day (see Appendix A, Figures 2 and 3). As shown in Appendix A, Figure 4, determining the 8-hour maximum may be difficult. NESCAUM therefore recommends that the maximum determination be made on a case-by case basis.

Mandate to Solely Consider Health Effects when Setting a Primary NAAQS

EPA has an obligation under the Clean Air Act, as underscored in 2001 by the Supreme Court in *Whitman v. American Trucking*,[5] to set a NAAQS based solely on what is requisite to protect public health, without considering the costs of attainment. We expect EPA to uphold its obligation and set the ozone NAAQS at an appropriate level not exceeding the CASAC-recommended range that will protect public health with an adequate margin of safety.

We recognize that Executive Order # 12866 requires EPA to conduct a regulatory impact analysis (RIA) for the proposed ozone NAAQS revisions. Such an analysis may include information about costs under various NAAQS scenarios, but must not come into play in EPA's decision on setting the level of the NAAQS. Only after the level of the NAAQS has been established should EPA consider issues on how to implement the standard efficiently in order to achieve health benefits as expeditiously as practicable. Implementation issues must not be considered in setting the level of the NAAQS.

2. Air Quality Index

NESCAUM commends EPA for soliciting comment on changes to the Air Quality Index (AQI) to reflect changes to the ozone NAAQS (75 FR 2998) at this point in time. Since the AQI is the major risk communication tool used to inform the public of air quality events that could potentially affect health, it is critical that any updates to the AQI occur as expeditiously as possible.

[5] *Whitman v. American Trucking Associations, Inc.*, 531 U.S. 457 (2001).

NESCAUM recommends that the AQI yellow-to-orange breakpoint (AQI breakpoint of 101, "Unhealthy for Sensitive Groups") be set at a level to protect public health with an adequate margin of safety. EPA should therefore set this breakpoint at the same level as the primary ozone NAAQS.

Moreover, the AQI should undergo a comprehensive review and overhaul, given that it is now dealing with multiple pollutants and is being used for different purposes than when it was initially established. In 2007, the NESCAUM states requested that EPA conduct an overhaul of the AQI (see Appendix B), and stand ready to work with the agency on this effort.

3. Secondary Ozone Standard

Recommendation

NESCAUM supports EPA's proposal to establish a secondary ozone NAAQS in a different form than the primary ozone NAAQS. NESCAUM supports establishing a secondary ozone NAAQS of the W126 form as defined in the proposal and at the lower end of the CASAC-recommended range of 7-15 ppm-hrs. Based on observed ozone damage to forests in the NESCAUM region at current ozone levels, a secondary NAAQS of the W126 form towards the lower end of the CASAC-recommended range would provide better protection in the NESCAUM region.

Equating the Secondary NAAQS to the Primary NAAQS was Inappropriate in 2008

In the last revision of the secondary ozone NAAQS, NESCAUM did not support establishing the secondary ozone NAAQS identical to the primary NAAQS. In fact, NESCAUM has consistently expressed support for a cumulative secondary ozone NAAQS different in form from the primary NAAQS since 1997 when we filed comments on a previous ozone NAAQS revision.[6] A secondary NAAQS based on cumulative, seasonal ozone exposure is more biologically relevant to protecting economically or ecologically important forests, crops, and other sensitive vegetation, as compared to the shorter 8-hour averaged concentration form of the primary ozone NAAQS. The CASAC strongly endorsed the EPA 2007 Staff Paper recommendation that protection of vegetation "requires a secondary ozone NAAQS that is substantially different from the primary ozone NAAQS in averaging time, level and form."[7] The research community has also recognized for a number of years the need for a longer term

[6] NESCAUM comments on the proposed National Ambient Air Quality Standards (NAAQS) for ozone. Submitted to U.S. EPA, March 11, 1997 (Air Docket No. A-95-58).

[7] Letter from Dr. Rogene Henderson, Chair, CASAC, to EPA Administrator Stephen L. Johnson, "Clean Air Scientific Advisory Committee's (CASAC) Peer Review of the Agency's Final Ozone Staff Paper," March 26, 2007 (p. 3).

secondary ozone NAAQS to protect vegetation.[8] Conversely, there appears to be little scientific basis for a secondary ozone NAAQS based on an 8-hour form identical to the primary NAAQS.

We continue to urge EPA to avoid the flawed rationale employed in the previous ozone NAAQS reviews that many of the benefits of a secondary NAAQS would be achieved if the primary NAAQS were attained. This rationale is flawed in at least two ways: first, ozone damage to vegetation may persist in areas that attain the primary NAAQS; and second, the relationship between short-term 8-hour peak concentrations and longer-term seasonal aggregations is not constant, but varies over space and time. As EPA notes at 75 FR 3018-3019, nonattainment overlap between an 8-hour primary NAAQS and an appropriately set W126 secondary NAAQS is inconsistent from year-to-year, making comparisons between the two based on extent of overlap inappropriate. Setting a secondary NAAQS must be done on its own independent merits based on adverse welfare effects. Real or perceived relationships between primary and secondary nonattainment areas are irrelevant to setting the appropriate form and level of the secondary NAAQS.

Forest Ecosystem and Agriculture Sector Ozone Impacts

Scientific research shows that long-term, cumulative exposure to ozone reduces forest productivity.[9] Estimates of seasonal reductions in stem growth for many important eastern U.S. tree species exceeded 30% in recent average ozone years (2001, 2003), with additional growth decrements of 50% in a high ozone year (2002).[10] This not only has implications for forest health, but climate change as well. The reduced carbon uptake by trees and other vegetation due to damage from prolonged ozone exposure diminishes the potential effectiveness of forests as "carbon sinks" in removing carbon dioxide from the atmosphere. This is an important concern as policy makers evaluate and implement mitigation and adaptation options to address the threat of climate change.

A recent study also finds a linkage between decreased stream flows and increased water transpiration from forest canopies due to vegetation exposure to current ambient ozone levels in the eastern U.S.[11] This indicates that ozone pollution exposure, aggregated over the summer

---

[8] *See, e.g.,*Heck WW, Cowling EB. 1997. The need for a long term cumulative secondary ozone standard – an ecological perspective. *EM* January 1997: 23-33.

[9] Broadmeadow M. 1998. Ozone and forest trees. *New Phytologist* 139: 123–125; Chappelka AH, Samuelson L. 1998. Ambient ozone effects on forest trees of the eastern United States: a review. *New Phytologist* 139: 91–108.

[10] McLaughlin SB, Nosal M, Wullschleger SD, Sun G. 2007. Interactive effects of ozone and climate on tree growth and water use in a southern Appalachian forest in the USA. *New Phytologist* 174: 109-124.

[11] McLaughlin SB, Wullschleger SD, Sun G, Nosal M. 2007. Interactive effects of ozone and climate on water use, soil moisture content and streamflow in a southern Appalachian forest in the USA. *New Phytologist* 174: 125-136.

growing season, not only exacerbates the effects of drought upon forest growth, but upon stream health as well.

In 2005, the National Park Service published the "Handbook for Assessment of Foliar Ozone Injury on Vegetation in the National Parks."[12] The Handbook references studies conducted in a number of national parks that have documented ozone-related foliar injury of plants. It describes the different types of ozone-related foliar injury, identifies ozone-sensitive species, and provides guidance to park managers and biologists to assess the level of ozone-related impacts on plants. The Handbook lists 65 plant species considered to be sensitive to ozone, i.e., "typically exhibit foliar injury at or near ambient ozone concentrations in fumigation chambers and/or are species for which ozone foliar injury symptoms in the field have been documented by more than one observer."[13] The report also indicates that "highly sensitive species of plants are injured when exposure levels increase only slightly above background."[14]

Chronically high ozone occurs across large areas that are important for agriculture, with crop yield reductions of 5% to 10% as ozone levels reach 0.050 to 0.070 ppm, depending on a crop's sensitivity. Crop losses are higher with higher ozone concentrations above 0.070 ppm.[15] The EPA 2007 Staff Paper estimates that the agriculture sector would see benefits of $290-$630 million annually (2000 dollars) if a standard of 13 ppm-hrs based on the W126 form was achieved nationally.[16] Other studies have also estimated significant benefits for reducing ozone, with annual dollar benefits to the agriculture sector in the billions.[17] These benefits are substantial.

---

[12] National Park Service, Air Resources Division. Handbook for Assessment of Foliar Ozone Injury in the National Parks. Prepared by Robert Kohut, Boyce Thompson Institute, Cornell University. D-1688/ September 2005. See http://science.nature.nps.gov/im/monitor/protocoldb.cfm.

[13] Ibid, p. 15.

[14] Ibid, p. 13.

[15] Chameides WL, Kasibhatla PS, Yienger J, Levy H. 1994. The growth of continental-scale metro-agroplexes, regional ozone pollution, and world food production. *Science* 264: 74–77.

[16] EPA OAQPS Staff Paper, "Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information," EPA-452/R-07-003, January 2007 (pp. 7-51 & 7-52).

[17] *See* Adams RM, Crocker TD. 1989. The agricultural economics of environmental change: some lessons from air pollution. *J. Envtl. Mgmt.* 28: 295–307; Murphy JJ, Delucchi MA, McCubbin DR, Kim HJ. 1999. The cost of crop damage caused by ozone air pollution from motor vehicles. *J. Envtl. Mgmt.* 55: 273-289.

The Upper End of EPA's Secondary NAAQS Proposal does not Afford Sufficient Protection

We note that the map in Figure 7-6 of the EPA 2007 Staff Paper,[18] based on 2001 ozone data, indicated that much of the NESCAUM region may already be below 15 ppm-hours. Forest damage, however, occurs at these levels in this region. Trained observers in the national Forest Health Monitoring program routinely observe foliar ozone damage symptoms in sensitive tree species in sections of the NESCAUM region and elsewhere in the eastern U.S. at levels comparable to or below 15 ppm-hrs.[19] This indicates that a secondary ozone NAAQS of the W126 form towards the lower end of the CASAC-recommended range would provide better protection against current adverse impacts on forests in the NESCAUM region.

Annual versus Multi-year Averaging of Secondary Ozone NAAQS

EPA has proposed using a W126 averaged over three years for the form of the secondary standard. NESCAUM disagrees with using a three-year (or other multi-year) average, and instead supports a W126 secondary ozone NAAQS that is based on an annual cumulative index of exposure. Adverse vegetation damage occurs on an annual basis. Averaging over multiple years for NAAQS stability purposes can dilute the adverse affects of chronically high ozone occurring over a single year across a multi-year period where the other years may be relatively low. Research indicates that there can be significant year-to-year variations in the extent of observed vegetation damage due to ozone;[20] therefore the desire for a "stable" secondary NAAQS should not outweigh the need to set the NAAQS at an annual level protective of the welfare values at risk.

If multi-year averaging is employed to promote a more "stable" NAAQS (as opposed to more stable ecological health), the level should be set lower than what otherwise would have been set for an annual NAAQS. A reduction of the needed annual level by at least one-third can help assure that the intended threshold is not exceeded in individual years. This is consistent with the CASAC recommendation that "if multi-year averaging is employed to increase the stability of the secondary standard, the level of the standard should be revised downward to assure that the desired threshold is not exceeded in individual years."[21] It would, however, be more

[18] EPA OAQPS Staff Paper, "Review of the National Ambient Air Quality Standards for Ozone: Policy Assessment of Scientific and Technical Information," EPA-452/R-07-003, January 2007 (p. 7-28).

[19] Smith G, Coulston J, Jepsen J, Prichard, T. 2003. A national ozone biomonitoring program: Results from field surveys of ozone sensitive plants in northeastern forests (1994–2000), *Environ. Monit. Assess.* 87(3): 271−291.

[20] McLaughlin SB, Nosal M, Wullschleger SD, Sun G. 2007. Interactive effects of ozone and climate on tree growth and water use in a southern Appalachian forest in the USA. *New Phytologist* 174: 109-124.

[21] Letter from Dr. Rogene Henderson, Chair, CASAC, to EPA Administrator Stephen L. Johnson, "Clean Air Scientific Advisory Committee's (CASAC) Peer Review of the Agency's Final Ozone Staff Paper," March 26, 2007 (p. 3).

straightforward to establish a protective level for the secondary NAAQS on an annual basis rather than as a multi-year average.

EPA Should Consider Exposure of Vegetation to Ozone over a Greater Period of Time, Including Nighttime Hours

As EPA notes, there is uptake of ozone by vegetation occurring at night outside the 8 a.m. to 8 p.m. daytime hours proposed for the secondary standard (75 FR 3013-3014). While EPA recognizes that nocturnal ozone exposure occurs, the EPA 2007 Staff Paper concluded that the scientific literature is preliminary regarding adverse effects to sensitive vegetation from this exposure. NESCAUM believes the literature on nighttime adverse ozone impacts is sufficiently strong to support a secondary ozone NAAQS that encompasses nighttime hours so that a 24-hour secondary standard may be more appropriate.

Several studies have appeared in the peer-reviewed scientific literature since the EPA 2007 Staff Paper that further implicate nocturnal ozone exposure as an important stress factor for vegetation. The studies reinforce and strengthen earlier findings that ozone exposure can slow stomata response such that the stomata do not fully close during nighttime. The partially open stomata can lead to vegetation damage not only through continued ozone flux at night, but also by contributing to greater water loss (dehydration) overnight, particularly during periods of drought.[22] This is consistent with earlier studies finding that even if ozone flux through leaf stomata is reduced at night relative to the day, it can still be high and is occurring when plant defenses are lower, thus contributing to greater oxidant injury and water loss.[23] As a result, even assuming lower ozone flux, adverse impacts to vegetation at night can still occur.

Accounting for an extended exposure period is important to the NESCAUM states as elevated nighttime ozone concentrations occur in many locations throughout the region. Examples include forested regions of coastal Maine as well as higher elevation sites in the Adirondacks of

---

[22] Mereu S, Finco A, Gerosa G, Fusaro L, Muys B, Manes F. 2009. Night-time ozone uptake by Mediterranean species. *Biogeosciences Discussions* 6: 2007–2038; Caird MA, Richards JH, Donovan LA. 2007. Nighttime Stomatal Conductance and Transpiration in C_3 and C_4 Plants. *Plant Physiology* 143: 4-10; Grulke NE, Neufeld HS, Davidson AW, Roberts M, Chappelka AH. 2007. Stomatal behavior of ozone-sensitive and -insensitive coneflowers (*Rudbeckia laciniata* var. *digitata*) in Great Smoky Mountains National Park. *New Phytologist* 173: 100-109, doi: 10.1111/j.1469-8137.2006.01872.x.

[23] Robinson MF, Heath J, Mansfield TA. 1998. Disturbances in stomatal behaviour caused by air pollutants. *J. Experimental Botany* 49: 461-469; Musselman RC, Minnick TJ. 2000. Nocturnal stomatal conductance and ambient air quality standards for ozone. Atmos. Envt. 34: 719-734; Oksanen E, Holopainen T. 2001. Responses of two birch (*Betula pendula* Roth) clones to different ozone profiles with similar AOT40 exposure. *Atmos. Envt.* 35: 5245-5254; Grulke NE, Alonso R, Nguyen T, Cascio C, Dobrowolski W. 2004. Stomata open at night in pole-sized and mature ponderosa pine: implications for O_3 exposure metrics. *Tree Physiology* 24: 1001-1010; Paoletti E. 2005. Ozone slows stomatal response to light and leaf wounding in a Mediterranean evergreen broadleaf, *Arbutus unedo*. *Atmos. Envt.* 134: 439-445, doi: 10.1016/j.envpol.2004.09.011.

New York, the Berkshires of Massachusetts, the Green Mountains of Vermont, and the White Mountains of New Hampshire, which have experienced prolonged elevated ozone concentrations during the overnight hours. NESCAUM further notes that the number of daylight hours during EPA's presumed 3-month growing season is greater than 12 hours at the latitudes of the NESCAUM region. At the latitudes of the NESCAUM region (39° N to 46° N), the number of daylight hours are greater than 12 from April to early September.

A secondary ozone NAAQS longer than the 12 daylight hours proposed by EPA is not inconsistent with the CASAC recommendations. The CASAC's recommendation to EPA for the secondary ozone NAAQS was "the (sigmoidally-weighted) W126 index, accumulated over *at least* the 12 'daylight' hours and over at least the three maximum ozone months of the summer 'growing season'" (italics added).[24] As such, the CASAC did not limit its recommendation solely to a daylight-only window.

NESCAUM does not Support Setting a Suite of Secondary NAAQS

To the extent EPA may be considering, as in the 2008 ozone NAAQS revision, setting a suite of secondary ozone NAAQS that could differ by region, NESCAUM does not support this approach. Due to the broad regional nature of ozone in the eastern United States, it makes little practical sense to establish a suite of ozone secondary standards according to vegetation type and location. Many rural agricultural and Class I areas are affected by pollution sources across a broad area. Attempting to plan for potentially different standards affected by a multitude of regional sources will be a difficult planning exercise and adds an unnecessary level of complexity. For a regional ozone problem, the control strategy will be driven by the most stringent standard in the region, making less stringent standards immaterial to establishing the needed level of controls.

4. Changes to Monitoring Data Treatment (Appendix P Revisions)

75% Data Completeness Requirement

NESCAUM supports applying the 75% monitoring data completeness requirement only to the ozone monitoring season, and to not consider missing data outside of the ozone season as part of the completeness requirement (75 FR 3028). Regardless of the completeness requirement, NESCAUM also supports the use of monitoring data from outside the ozone season in determining nonattainment status, subject to the data meeting the same QA/QC checks and other validity criteria applied to monitoring data from within the ozone season (75 FR 3029). Subject to the same QA/QC requirements, NESCAUM also supports for purposes of determining design values the use of data from years not meeting the data completeness requirements when the

[24] Letter from Dr. Rogene Henderson, Chair, CASAC, to EPA Administrator Stephen L. Johnson, "Clean Air Scientific Advisory Committee's (CASAC) Peer Review of the Agency's Final Ozone Staff Paper," March 26, 2007 (p. 3).

incomplete data could not possibly change the nonattainment status of an area (i.e., two years with complete data have high enough 4th maximum 8-hour values along with the 4th maximum of an incomplete third year to exceed the primary ozone NAAQS, therefore a more complete third year of data would not change the nonattainment status of the area).

Truncation vs. Rounding

NESCAUM supports the EPA proposal to not round or truncate the calculated 8-hour ozone averages obtained from the hourly monitoring data, and to round, rather than truncate, the 3-year average of the fourth maximum annual 8-hour values. This brings the convention for calculating ozone concentration averages in line with how other NAAQS are calculated.

Data Selection

The EPA proposes that all quality assured ozone monitoring data collected with approved monitoring methods and known to EPA, but not submitted to EPA's Air Quality System (AQS), "shall be" compared to the revised NAAQS (75 FR 3032). This could include data from monitors not run by state or local air quality agencies, as well as ozone data collected outside the ozone monitoring season not reported to the AQS.

NESCAUM supports the use of the highest possible quality ozone monitoring data for NAAQS comparison purposes. This level of quality can be found by using certified data in AQS that have been submitted by state or local monitoring agencies with primary reporting authority for the area. Using data from sources that do not have to abide by the strict quality system in place for criteria pollutant monitoring would lead to less defensible non-attainment decisions. The NAAQS monitoring program has been very successful for more than 30 years because the quality and source of the data have been strictly controlled. EPA must not relax the criteria for environmental data for such an important analysis as comparison to the NAAQS.

NESCAUM has concerns regarding the potential use of CASTNET (Clean Air Status and Trends Network) ozone data to help supplement the ozone monitoring network in rural areas. The CASTNET program has, in recent years, attempted to improve the quality assurance of its ozone data. The program, however, is operated by a contractor, and as future contracts are awarded to the same or a different contractor, the quality of the data is likely to vary.

5. Potential Monitoring Network Changes

While EPA is not proposing in this rulemaking changes to the previously published ozone monitoring regulations (74 FR 34525, July 16, 2009), moving to a primary ozone NAAQS of 0.070 ppm or lower may result in the need for additional sites to properly reflect non-urban population exposures. NESCAUM supports efforts that would better characterize public exposure to ozone, and urges that EPA be prepared to provide funding support for states to carry out such efforts.

NESCAUM encourages EPA to establish a uniform extended ozone monitoring season that is comprehensive and regionally consistent. It should encompass all reasonably foreseeable high ozone days (i.e., moderate and higher AQI levels or levels reaching 80% of the primary ozone NAAQS, whichever is lower) and put all similarly situated states on equal footing. As a recent example, there were many days in March 2010 where ozone levels within and above the CASAC-recommended range of 0.060 to 0.070 ppm were recorded throughout the eastern U.S. This supports the need for a regionally consistent ozone monitoring season that encompasses, at a minimum, the entire eastern U.S. This would also avoid penalizing states that choose to monitor outside the current ozone season yet still record ozone exceedances (as has been the case in Maine within the NESCAUM region) versus states that do not do so but may be likely to experience similar ozone levels. It would also provide greater protection for public health by encouraging more comprehensive monitoring.

Setting a new, distinct and protective secondary standard to protect vegetation and other welfare impacts will also have monitoring program impacts. This will present challenges to EPA and the states, especially as rural ozone monitoring has not been an EPA priority in recent years. Rural monitors are scarce in some states and the EPA needs to assist in the deployment of new rural monitors. The EPA regional offices need to coordinate the local network design for the proposed rural monitors so that adjacent states can come to an agreement on the representativeness of the new monitors and whether three monitors per state is appropriate in every situation. EPA also needs to provide guidance concerning the installation of new rural monitors to addresses issues such as altitude, fetch, and distance to local pollution sources, as these factors are particularly important for non-urban monitors.

6. Implementing the Proposed NAAQS

NESCAUM supports the accelerated schedule proposed by EPA to implement the new primary ozone NAAQS (75 FR 3036) that is less than the maximum allowable 2-year period. It has been reasonably foreseeable since the last ozone NAAQS revision that additional strategies will be needed to meet a revised primary ozone NAAQS, regardless of the final level. While the need for reconsideration of the previous ozone NAAQS revision was necessary, the additional time required threatens to stall momentum in air quality planning. An expedited implementation schedule will maintain momentum in planning and implementing air pollution control programs that will minimize the threat to public health caused by the additional time during EPA's reconsideration.

For the secondary ozone NAAQS, EPA proposes two implementation options: 1) designating areas on the same schedule as the primary ozone NAAQS, or 2) designating areas on the maximum allowed 2-year schedule. NESCAUM supports the second option of using the full 2-year period. While treating the primary and secondary NAAQS on the same schedule could have the potential to streamline planning processes, it is reasonably foreseeable that a revised

secondary ozone NAAQS of a different form from the primary NAAQS will create its own set of unique issues that will require some extra time to address.

Under either designation schedule, NESCAUM supports the use of 2008-2010 ozone monitoring data for determining final ozone nonattainment areas. States should have sufficient knowledge of those areas not meeting the revised ozone NAAQS by early 2011 based on the 2010 ozone monitoring season, and certainly should know well before EPA announces final designations in July 2011.

7. Greenhouse Gas Considerations: Ozone and Methane

We also encourage EPA in reconsidering or reviewing future ozone NAAQS to give consideration to ozone as a short-lived greenhouse gas (GHG). Ozone is a recognized contributor to atmospheric warming, and its global background levels have been rising due to increased anthropogenic precursor emissions. Addressing short-lived GHGs helps buy time by mitigating near term climate change as ongoing deliberative processes proceed to address the longer-lived GHGs like carbon dioxide.

As an added co-benefit, an ozone NAAQS to address its rising global background's impact on climate change (as well as air quality) would include methane reduction strategies. Methane is a GHG in its own right, but is not typically considered in current ozone attainment strategies due to its relatively low chemical reactivity in the context of shorter term episodic peak ozone levels (e.g., 8-hour averages). In the global background context, however, methane can have a significant influence on ozone levels.[25] For example, we have done a preliminary modeling assessment of methane's influence on broad regional ozone concentrations in the eastern United States using the summed ozone W126 statistic that EPA proposes for the secondary ozone NAAQS. We performed two runs of the Community Multiscale Air Quality (CMAQ) model for the month of July 2002 to examine how a change in methane concentrations might affect ground-level ozone levels in the eastern U.S. Our results presented in Figure 1 show the July 2002 W126 ozone differences between the base case simulation with a methane concentration of 1.85ppm (the CMAQ default value) and the "low methane" simulation with a methane concentration of 0.70 ppm, the mean pre-industrial concentration of methane.[26]

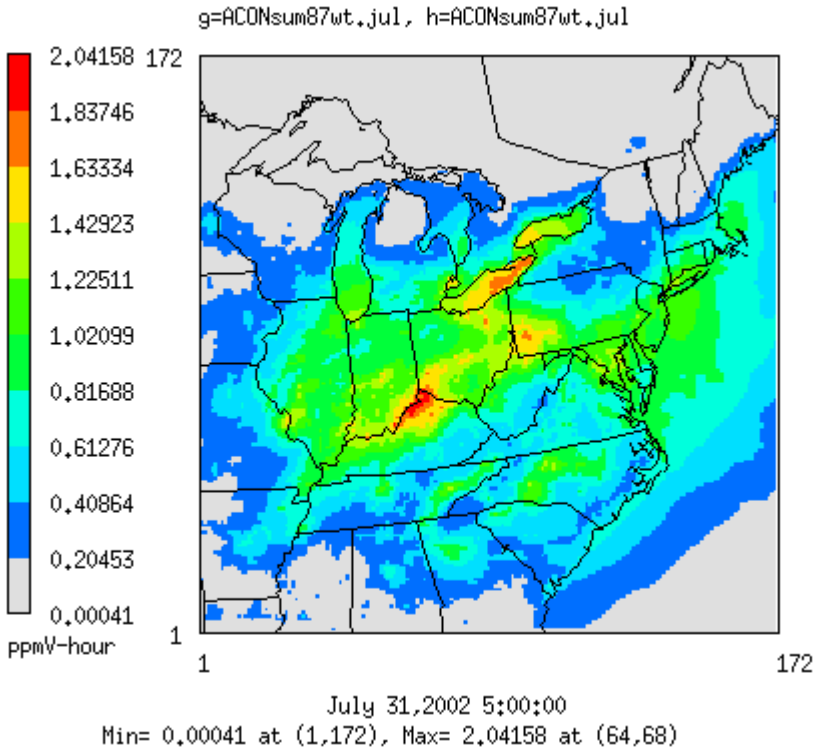
Using the proposed secondary ozone NAAQS in the range of 7 – 15 ppm-hrs summed over three months as a point of comparison, the change in modeled monthly ozone due to methane reductions is not insignificant, with reductions of 1 to 2 ppm-hrs modeled across large parts of the eastern U.S. Note that the modeled ozone change is for only one month, whereas the

[25] Fiore AM, Jacob DJ, Field BD, Streets DG, Fernandes SD, Jang C. 2002. Linking ozone pollution and climate change: The case for controlling methane. *Geophys. Res. Lett.* 29: 1919, doi: 10.1029/2002GL015601.

[26] Blunier T, Chappellaz JA., Schwander J, Barnola JM, Desperts T, Stauffer B, Raynaud D. 1993. Atmospheric methane, record from a Greenland Ice Core over the last 1000 year. *Geophys. Res. Lett.*, 20: 2219-2222.

proposed secondary ozone NAAQS is summed over three months. Therefore, the impact of methane reductions relative to the secondary ozone NAAQS may be significantly larger than the one month differences we model.

Figure 1. Difference in CMAQ-modeled W126 summed 12-hour (8 a.m. – 7 p.m.) ozone (ppm-hrs) during July 2002 where only methane is reduced from the CMAQ-default value of 1.85 ppm to a mean pre-industrial level of 0.70 ppm.



Our preliminary modeling indicates that methane can have a significant impact on cumulative ozone (e.g., summed W126 levels) in the eastern U.S., hence an impact on "background" ozone. In this light, a methane reduction strategy has "triple" benefits by reducing ozone as a GHG, reducing ozone as a criteria air pollutant, and reducing methane both as a GHG and ozone precursor.

8. Regulatory Impact Analysis Use of "Buffers"

As previously mentioned, we recognize that Executive Order # 12866 requires EPA to conduct a regulatory impact analysis (RIA) for the proposed ozone NAAQS revisions. In EPA's 2010 RIA supplement, however, we take strong exception to EPA's assumptions of a 200 km "buffer" for applying NOx reductions and a 100 km "buffer" for applying volatile organic compound (VOC) reductions around counties not projected to meet a revised ozone NAAQS by 2020. We know of

no scientific basis for compressing the regional scale of ozone and precursor transport based on the 2020 status of counties relative to the presumed level of a revised ozone NAAQS.

The concept of a restricted "buffer" around nonattainment counties for applying precursor reductions is problematic on two levels. First, the chemistry and physics of the atmosphere (e.g., ozone formation and transport) are not physically linked to the regulatory status of a county relative to an ozone NAAQS, hence there is no scientific basis for reducing the regional scope of the ozone problem. Second, as ozone NAAQS levels become more stringent, the contribution of the regionally diffuse ozone background becomes relatively greater. The ozone background is the collective result of a natural component and the cumulative impact of anthropogenic ozone precursor emissions occurring regionally and globally. While the natural component (typically 10-25 ppb) may not be "controllable," the anthropogenic enhancement is.[27,28] In recognition of this broad background, a more stringent ozone NAAQS would call for continued and potentially expanded regional approaches (see discussion on methane above), especially when these have had a demonstrated track record of success since their initial implementation in the 1990s with the NOx SIP Call.

Thank you for the opportunity to comment. If you or your staff has any questions regarding the issues raised in this letter, please contact Paul Miller, NESCAUM Deputy Director, at 617-259-2016.

Sincerely,

Arthur N. Marin
Executive Director

Appendix A: Summary of Maine DEP's Analysis Determining Daily Maximum 8-hour Ozone Average Concentrations
Appendix B: February 8, 2007 Letter from NESCAUM to U.S. EPA on the Air Quality Index

Cc: NESCAUM Directors
Susan Stone, EPA/OAQPS

---

[27] Fiore AM, Jacob DJ, Field BD, Streets DG, Fernandes SD, Jang C. 2002. Linking ozone pollution and climate change: The case for controlling methane. *Geophys. Res. Lett.* 29: 1919, doi: 10.1029/2002GL015601.

[28] Fiore A, Jacob DJ, Liu H, Yantosca RM, Fairlie TD, Li Q. 2003. Variability in surface ozone background over the United States: Implications for air quality policy. *J. Geophys. Res.* 108: 4787, doi:10.1029/2003JD003855.

NESCAUM
www.nescaum.org

Northeast States for Coordinated Air Use Management
89 South Street, Suite 602 Boston, MA 02111
Phone 617-259-2000 Fax 617-742-9162
Arthur N. Marin, Executive Director

NESCAUM COMMENTS ON EPA'S PROPOSED NAAQS FOR OZONE
APPENDIX A

Summary of Maine DEP's Analysis Determining Daily Maximum 8-Hour Ozone Average Concentrations

Figure 1.

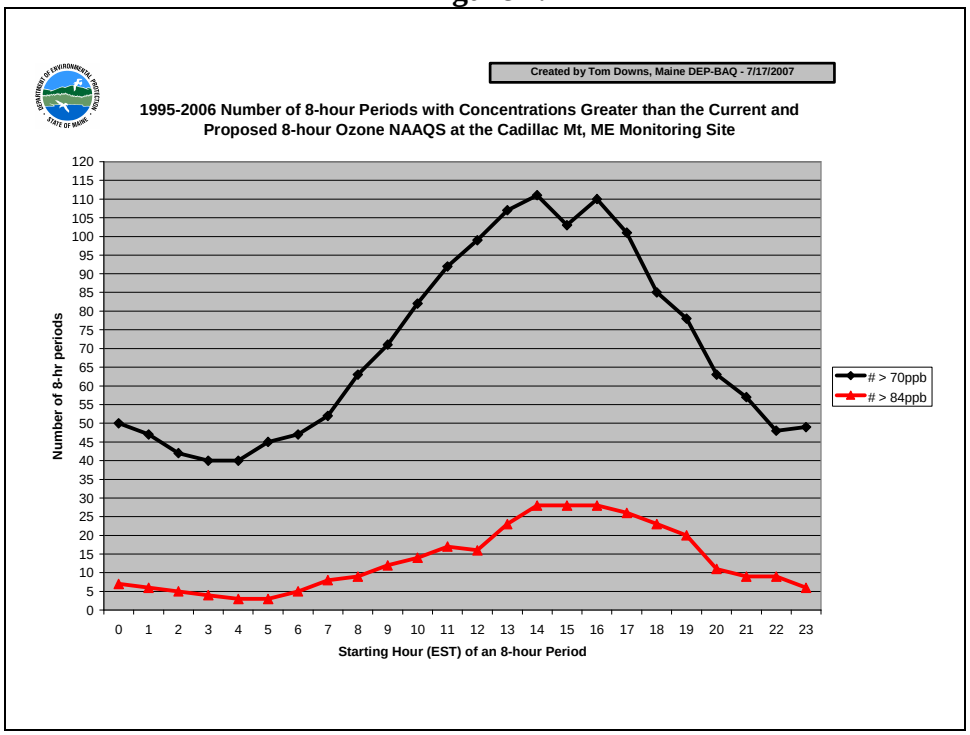


Figure 2.

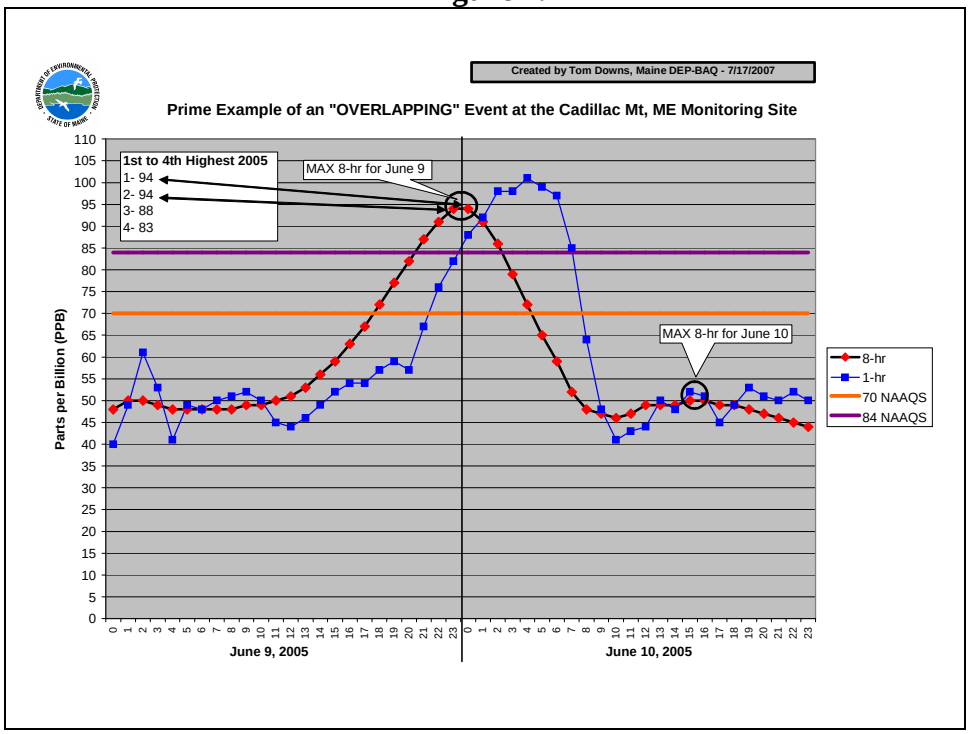


Figure 3.

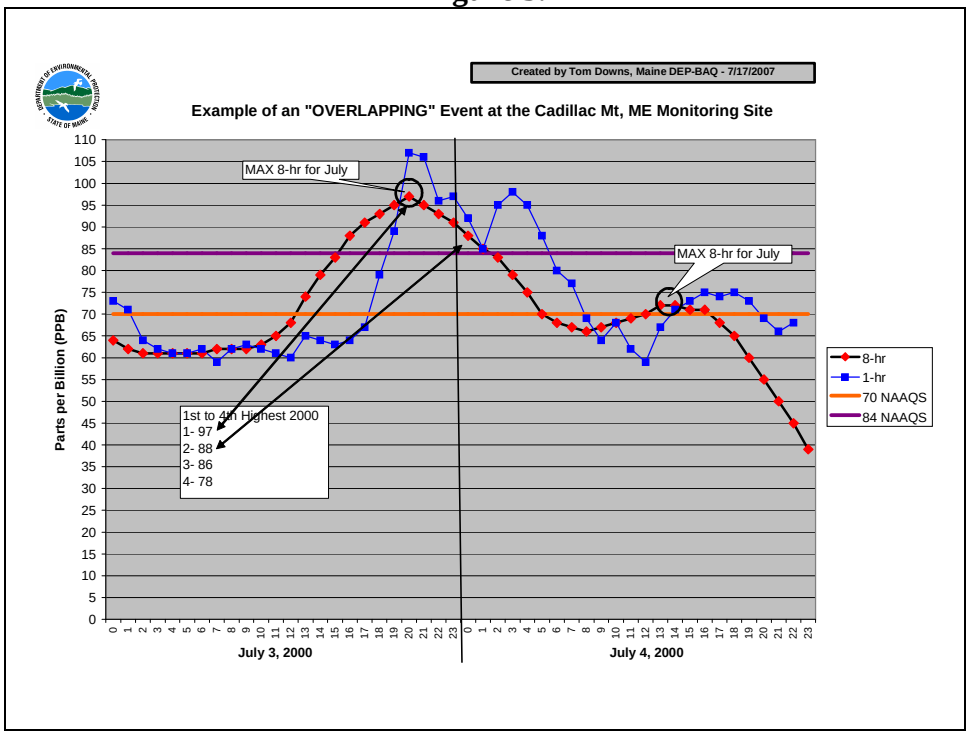
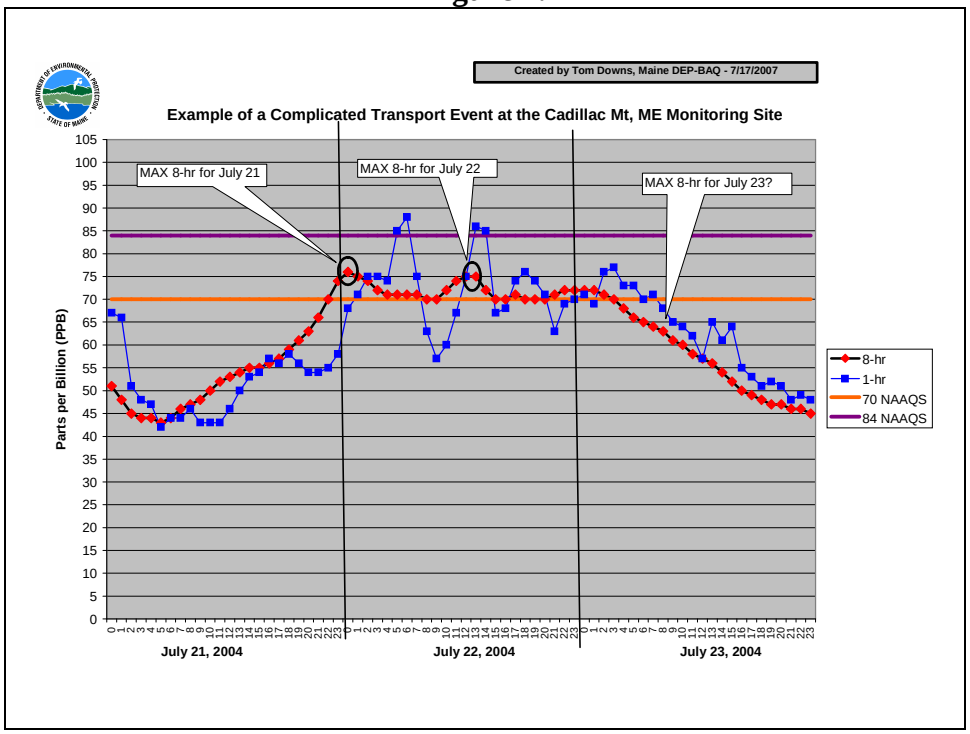


Figure 4.



NESCAUM
www.nescaum.org

Northeast States for Coordinated Air Use Management
89 South Street, Suite 602 Boston, MA 02111
Phone 617-259-2000 Fax 617-742-9162
Arthur N. Marin, Executive Director

NESCAUM COMMENTS ON EPA'S PROPOSED NAAQS FOR OZONE APPENDIX B

February 8, 2007 Letter from NESCAUM to EPA on the Air Quality Index

NESCAUM
www.nescaum.org

The Clean Air Association of the Northeast States
101 Merrimac Street, 10th Floor Boston, MA 02114
Phone 617-259-2000 Fax 617-742-9162
Arthur N. Marin, Executive Director

February 8, 2007

Steven Page, Director
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Mail Code C404-04
Research Triangle Park, NC 27711

Lydia Wegman, Director
Health and Environmental Impacts Division
Office of Air Quality Planning and Standards
U.S. Environmental Protection Agency
Mail Code C504-02
Research Triangle Park, NC 27711

Dear Mr. Page and Ms. Wegman:

I am writing on behalf of the NESCAUM member agencies to urge the U.S. Environmental Protection Agency (EPA) to revise the Air Quality Index (AQI) for fine particulate matter (PM-2.5). The goal is to ensure that this key risk communication tool continues to provide effective guidance to the public regarding the threat posed by elevated levels of air pollution. The Northeast states support lowering the category cut points to levels that ensure adequate public health protection in light of recent revisions to the PM-2.5 National Ambient Air Quality Standard (NAAQS). We also urge EPA to reexamine and reassess overall AQI methodologies, including considering other pollutants or surrogates, to better protect public health.

NESCAUM supported EPA establishing health protective AQI cut points for the 1997 PM-2.5 NAAQS and believes that a conservative approach should be used for the new standards. Under the 1997 PM NAAQS, EPA set the PM-2.5 cut point between yellow (unhealthy for unusually sensitive populations) and orange (unhealthy for sensitive groups) at a level below the NAAQS, reflecting the significant health risk posed by PM-2.5. In the short term, EPA should consider this approach when establishing AQI cut points for the 2006 PM-2.5 NAAQS revisions.

We understand that EPA is considering modest changes to the PM-2.5 AQI, shifting the yellow to orange transition from 40 to 35 $\mu g/m^3$, changing the orange to red cut point from 65 to 45 $\mu g/m^3$, and leaving the green to yellow cut point at 15 $\mu g/m^3$. Doing so would not adequately reflect the change in the daily NAAQS (65 to 35 $\mu g/m^3$, both at the 98^{th} percentile). NESCAUM believes that a conservative AQI is warranted and recommends the cut points listed in the table below:

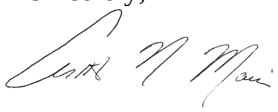
Category Cut Point	NESCAUM Recommendation (daily mean in $\mu g/m^3$)
Green – Yellow	12
Yellow – Orange	30
Orange – Red	40

This recommendation is consistent with the EPA staff paper's upper limit of 35 $\mu g/m^3$ at the 99th percentile for the daily standard, which is approximately equivalent to 30 $\mu g/m^3$ at the 98^{th} percentile. The orange-to-red cut point should be lowered to a level slightly above the daily NAAQS, to 40 $\mu g/m^3$. Even a daily mean of 40 $\mu g/m^3$ will likely reflect much higher shorter term concentrations that are well over the 35 ug/m^3 daily NAAQS. Therefore, a stringent cut point for this category would better protect public health. We also support setting the green-to-yellow cut point (where health messaging begins) at 12 $\mu g/m^3$, based on the Clean Air Scientific Advisory Committee recommendations (12-14 $\mu g/m^3$ annual), the California annual standard (12 $\mu g/m^3$), and the NESCAUM states' general support for an annual standard of 12 $\mu g/m^3$. We understand that such changes in the AQI may make it more challenging for our state air quality forecasters, but the trade-off in public health protection is well worth the effort.

In addition, we believe it is time for EPA to undertake a substantial review of the AQI and its methodologies in light of its more recent uses and the new controlling form of the daily PM NAAQS. While the AQI worked well for its earlier usages (e.g., presenting air quality data from the previous day and making general forecasts), it is not well designed to for its current uses (e.g., forecasting real-time exposures with additional messaging at lower levels approaching the standard). Public health protection would be better served if EPA and the states worked together to overhaul the AQI in light of the multiple purposes it now serves. This should include looking at adjustments of the AQI to reflect shorter averaging times and to consider additional contaminants.

We would appreciate the opportunity to discuss NESCAUM's recommendation with you in greater detail. Since it is unclear whether representatives from our member states will be attending the February 2007 National Air Quality Conference in Orlando, we would appreciate your considering other options to solicit input from the Northeast states. Please contact George Allen at 617-259-2035 or me at 617-259-2017 if you have any questions.

Sincerely,



Arthur N. Marin
Executive Director

cc: NESCAUM Directors
Susan Stone - EPA/OAQPS
Richard Wayland - EPA/OAQPS
John E. White - EPA/OAQPS
Phil Dickerson - EPA/OAQPS