

Ozone Designation Recommendations for the 2008 Ozone National Ambient Air Quality Standards

Connecticut's Factors Analysis Attachment A



**Connecticut Department of Energy &
Environmental Protection
Bureau of Air Management**

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I. INTRODUCTION

On March 12, 2008, the United States Environmental Protection Agency (EPA) promulgated a more stringent National Ambient Air Quality Standard (NAAQS) for ozone, lowering the 8-hour ozone NAAQS from 0.08 parts per million (ppm) to 0.075 ppm. On September 22, 2011, EPA announced that it would resume the designation process for the 0.075 ppm ozone NAAQS by issuing “120-day letters” to the states. In keeping with the long-established collaborative working relationship between EPA and Connecticut, Connecticut’s Governor, pursuant to section 107(d) of the Clean Air Act (CAA), recommended that EPA establish a super-regional ozone nonattainment area to adequately address the phenomena of long- and short-range transported air pollution. In response, EPA rejected the establishment of a super-regional nonattainment area and instead asserted its intent to designate the entire state of Connecticut as nonattainment for the 2008 ozone standard, with two nonattainment areas having the same boundaries as the existing ozone nonattainment areas for the 1997 ozone NAAQS (namely, the New York-Newark-Bridgeport, NY-NJ-CT ozone nonattainment area and the Greater Connecticut ozone nonattainment area).

Accompanying the rejection of Connecticut’s super-regional nonattainment area recommendation, EPA submitted a Technical Support Document to Connecticut. This document outlined certain factors, as identified in EPA’s own guidance issued on December 4, 2008,¹ that EPA would consider in determining nonattainment area boundaries. As detailed further below, EPA’s factors solely focus on the Metropolitan Statistical Area or Consolidated Metropolitan Statistical Area (C/MSA) default area, biasing the analysis from including consideration of much larger areas. These factors include:

1. Air quality data (including the design value calculated for each federal reference method (FRM) or federal equivalence method (FEM) monitor in the area);
2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
3. Meteorology (weather/transport patterns);
4. Geography and topography (mountain ranges or other basin boundaries); and
5. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs)).

¹ The December 4, 2008 guidance memorandum “Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards” refers to 9 factors. In its Technical Support Document accompanying its rejection of Connecticut’s super-regional nonattainment area recommendation, EPA grouped the emissions-related factors together under the heading of “Emissions and Emissions-Related Data,” which resulted in five categories of factors. Connecticut’s response to this analysis will focus on those same five categories.

Based on this consolidated five-factor analysis, EPA concluded that its preliminary intent was to keep the nonattainment boundaries in Connecticut the same for the 2008 ozone NAAQS as for the 1997 ozone NAAQS. In its analysis, EPA gave considerable weight to Factor 5, concerning jurisdictional boundaries, defining that factor as the most important factor for determining which Connecticut counties are to be placed in which Connecticut nonattainment area. EPA ultimately decided to maintain the status quo by proposing the same nonattainment boundaries in Connecticut.

The Connecticut Department of Energy & Environmental Protection (DEEP) submits these factor-specific comments in response to EPA's preliminary conclusions regarding the nonattainment boundary designations in Connecticut for the 2008 ozone NAAQS.

II. EPA'S FACTORS ANALYSIS

Under § 107(d)(1) of the CAA, EPA may define a nonattainment area as "any area that does not meet (or contributes to ambient air quality in a nearby area that does not meet)" the applicable national standard. Connecticut asks that EPA use its discretionary authority pursuant to § 107(d)(1) to revise its historic interpretation that only geographically contiguous areas are "nearby" and thus subject to inclusion in a nonattainment area for an upwind source. In the context of ozone pollution, "nearby" must be interpreted in light of the nature of the pollutant. For ozone, this must include overwhelming transport, both short- and long-range.

The 1990 Amendments to the CAA initially defined the C/MSA as the presumptive boundary for ozone nonattainment areas classified as serious, severe or extreme. CAA § 107(d)(4)(A)(iv).² The CAA is silent as to any presumptive boundary for nonattainment areas classified as moderate or marginal, such as EPA's two proposed Connecticut nonattainment areas for the 2008 ozone NAAQS. Yet, courts have held that EPA may exercise its discretion to modify state recommendations when it receives evidence on certain relevant factors which, together with data collected by the Agency, demonstrate that the presumptive boundary is inappropriate.³ Because EPA may exercise its discretion to modify the presumptive boundary delineated by the CAA for serious, severe or extreme nonattainment areas, it follows that EPA is not bound to maintain the same nonattainment boundaries defined for moderate or marginal nonattainment areas with respect to prior NAAQS. That is, if a state's analysis of EPA's factors evidences that the proposed boundary is inappropriate, EPA has the discretionary authority to modify such a boundary. EPA defined the factors relevant to its boundary designation methodology in the 2008 Guidance Memorandum, which requires states that seek to expand or minimize EPA's proposed nonattainment boundary designation to address each of several factors.

For Connecticut, those factors were further defined by EPA in its Technical Support Document accompanying the rejection of Connecticut's super-regional nonattainment area recommendation. Yet, EPA's current methodology fails to recognize ozone transport as a long-range regional phenomenon, fashioning its factor analysis in a manner that effectively ignores transported ozone pollution. As a result, EPA's nonattainment boundary designation

² See also *Pennsylvania v. EPA*, 429 F.3d 1125, 1127 (D.C. Cir. 2005).

³ *Id.* at 1129.

methodology is more appropriate for localized air pollution issues, but the process is ill-suited for addressing the effects of transported ozone.

Not only is EPA's current methodology untenable, it is also patently unfair to downwind states like Connecticut that are subject to overwhelming transport. By failing to address ozone transport at a regional level and maintaining the status quo of Connecticut's nonattainment area designations, EPA's action runs counter to both the 1990 Amendments to the CAA and EPA's own recent rulemakings such as the Clean Air Interstate Rule (CAIR) and Cross-State Air Pollution Rule (CSAPR). As a result, Connecticut presents the following factors analysis as support for Connecticut's initial recommendation to EPA to establish a super-regional nonattainment area. From this analysis, it is evident that the underpinnings of EPA's factors analysis fail to support the current methodology as an appropriate and effective process for designating nonattainment boundaries, especially with respect to areas affected by long-range ozone transport.

1. Air Quality Data

In its Technical Support Document, EPA considered 8-hour design values (in ppm) for air quality monitors in counties in the Connecticut portion of the New York-Newark-Bridgeport, NY-NJ-CT ozone nonattainment area based on data for the 2008-2010 period (i.e., the 2010 design value, or DV). A monitor's DV indicates whether that monitor attains a specified air quality standard. The 2008 ozone NAAQS are met when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years, is 0.075 ppm or less. For Connecticut, EPA found violations of the 2008 ozone NAAQS at monitors located in Fairfield, New Haven, Middlesex, New London and Tolland counties.⁴

Connecticut agrees that due to the violating monitors in Connecticut, a nonattainment boundary designation is necessary under the 2008 ozone NAAQS. However, EPA's air quality data factor alone is inappropriate to define where those boundaries should be set. Ambient air quality must be considered on a regional basis, not solely at a local level. Monitoring data of violations without considering the linkages to the source of those violations effectively treats ozone as a local-only problem, ignoring the well-established and documented contributions of transported ozone pollution. Interpreting air quality data without considering the effects of ozone transport leads to ineffective control strategy as states like Connecticut are unable to address the sources from which the majority of the state's monitored ozone originates.

Accordingly, the air quality data factor supports the establishment of a super-regional nonattainment area and is bolstered by EPA's own standard laid out under CSAPR to identify linkages and significant contributions to an area's ozone problem. This approach, vetted through notice and public comment, should be used in lieu of EPA's current boundary designation methodology with respect to air quality data.

⁴ See Technical Support Document Tables 2a and 2b.

2. Emissions and Emissions-Related Data

EPA next evaluated emissions of ozone precursors (NO_x and VOC) and other emissions-related data to provide information on areas that contribute to violating monitors. EPA consulted Connecticut county-level emission data for NO_x and VOC derived from the 2008 National Emissions Inventory (NEI), the most recently available version. EPA asserted that significant emissions levels in a nearby area would indicate the potential for the area to contribute to observed violations. However, this factor has been extensively studied in the past by EPA. Both the NO_x SIP Call study and EPA’s own modeling analyses for CAIR and CSAPR have shown that major point sources located in areas upwind of the Ozone Transport Region (OTR) significantly contributed to OTR’s ozone nonattainment problems under both the 1997 and 2008 ozone standards. Notwithstanding EPA’s own findings of such significant contributions, many of these upwind areas have not been classified as nonattainment.

Connecticut generally agrees with EPA that significant emissions levels in a nearby area may indicate a potential for the area to contribute to observed violations. However, EPA’s focus on emissions data from strictly a state or local perspective to determine nonattainment area boundary designations misses the mark. This methodology fails to link Connecticut’s violating monitors with the upwind emissions sources that are responsible for the vast majority of Connecticut’s measured ozone. EPA’s own modeling analyses completed in support of both CAIR and CSAPR indicates that over 90% of Connecticut’s ozone problem is caused by emissions from outside of Connecticut. Table 1 below, based on EPA’s CSAPR modeling, summarizes the contributions from upwind states to projected 2012 ozone design values for the 11 Connecticut monitors included in EPA’s source apportionment modeling runs with CAMx.

Table 1. Contribution to 2012 Ozone Design Values.⁵

State	Maximum Contribution ppb (%)	Average Contribution ppb (%)	Range (ppb)
Biogenic / BC	24 (30%)	19 (24%)	15 – 24
Connecticut	12 (16%)	6 (8%)	2– 12
New York	11 (27%)	17 (21%)	11 – 21

⁵ Calculations are based on EPA’s Final Transport Rule (CSAPR) modeling data from (1) “Average and maximum design values by monitoring site for 8-hour ozone, annual PM_{2.5}, and 24-hour PM_{2.5} for the 2003-2007 base period, the 2012 base case, and the 2014 base and CSAPR control scenario” and (2) “Contributions of 8-hour ozone, annual PM_{2.5}, and 24-hour PM_{2.5} from each state to each monitoring site.” Available at <http://www.epa.gov/airtransport/techinfo.html>.

New Jersey	8 (15%)	9 (11%)	6 - 12
Pennsylvania	9 (11%)	7 (9%)	6 - 9
Virginia	5 (5%)	3 (4%)	2 - 5
Ohio	4 (5%)	3 (4%)	2 - 4
Maryland	4 (6%)	2 (3%)	2 - 4
West Virginia	3 (4%)	2 (2%)	1 - 3
Kentucky	3 (3%)	2 (2%)	1 - 3
Other OTR	2 (3%)	1 (2%)	1 - 2
Other Outside OTR	10 (14%)	8 (10%)	5 - 10

EPA's current methodology, including the emissions and emissions-related data factor, is untenable because of its failure to include the effects of transported emissions in its calculus. Without addressing ozone transport through strong federal or regional measures, Connecticut will be unable to meet attainment of the 2008 ozone NAAQS as over 90% of ozone levels in southwest Connecticut and at least 84% of ozone levels in Greater Connecticut are the result of emissions that originate from areas located out of Connecticut's jurisdiction and control. The Connecticut emissions that do contribute to Connecticut and downwind states' attainment and maintenance problems are already well-controlled after several rounds of federal and state regulation, many of which were accomplished at unreasonably high costs.

Connecticut generally agrees with EPA that population density, degree of urbanization and traffic and commuting patterns are predictors of nonattainment contributions. The factors are typically good indicators for defining traditional C/MSA boundaries, as well as effective factors for designing control strategies within a nonattainment area. However, they are not effective in designating attainment or nonattainment areas in light of the overwhelming effect of transported ozone. EPA should instead also analyze other factors, including but not limited to flow of electricity and goods shipments, to appropriately define nonattainment areas to include all sources that significantly contribute to upwind states' nonattainment. Currently, Connecticut is conducting a study to develop a strategy to reduce freight emissions in the state. The results are expected to be available by the summer of 2012; however, preliminary findings indicate that over half of the freight truck movement on Connecticut's roads is associated with goods moving through the state on interstate shipments, not goods destined for Connecticut. By analyzing these additional factors, EPA's analysis will more accurately evaluate the linkages between Connecticut's ozone problem and the out-of-state sources that significantly contribute to it.

Emissions data together with the regional nature of air quality demonstrates that ozone nonattainment boundary designations must not be based on a source's locality, but instead on a

source's impact and contribution to the regional nonattainment problem. Accordingly, the weight given this factor as justification for establishing the same nonattainment boundary designations for the 2008 ozone NAAQS as for the 1997 standard in Connecticut is misplaced. Instead of maintaining the status quo and designating nonattainment boundaries with disregard to the well-documented phenomenon of ozone transport, EPA should focus on establishing federal regional measures to address the issue. Such federal measures will level the playing field as the current system places an exceedingly heavy burden on upwind states to shoulder the economic and public health consequences of emissions from downwind sources that may not even be required to be controlled.

3. Meteorology

EPA evaluated meteorological data to determine how weather, transport patterns and stagnation conditions affect the fate and transport of precursor emissions contributing to ozone formation. Because EPA ultimately designated all of Connecticut as nonattainment, separating the state into two distinct nonattainment boundary designations, the weight that EPA assigned to this factor is uncertain. Connecticut believes that the meteorology factor supports an ozone area designation encompassing a large multistate nonattainment area because EPA's current method, focusing on climatological surface wind direction, does little to address long-range ozone transport. Ozone is a regional rather than a local problem.

Ozone exceedances in Connecticut are generally classified into four categories based on spatial patterns of measured ozone and contributing meteorological conditions. Typically, most exceedances occur on sunny summer days with inland maximum surface temperatures approaching or above 90° F, surface winds from the south and west (favorable for transport of pollutants from the Northeast Megalopolis) and aloft winds from the west-southwest to west-northwest (favorable for transport of pollutants from Midwest power plants). The four common transport regimes are discussed further below.

- **Inland-only Exceedances:** Ozone is transported aloft from the west and mixed down to the surface as daytime heating occurs. At times, transport from the southwest can also occur overnight at lower levels aloft due to the formation of a nocturnal low-level jet which can transport ozone and precursor pollutants hundreds of miles directly in line with major urban centers from North Carolina to Boston. Strong southerly surface winds during the day bring in clean maritime air from the Atlantic Ocean, resulting in relatively low ozone levels along the coast. The maritime front may not penetrate very far inland, allowing transported and local pollutants to contribute to inland exceedances.
- **Coastal-only Exceedances:** Strong westerly surface winds transport dirty air down Long Island Sound from source regions to the west (e.g., New York and New Jersey). The relatively cool waters of Long Island Sound confine the pollutants in the shallow and stable marine boundary layer. Afternoon heating over coastal land creates a sea breeze with a southerly component carrying in pollutants from the confined maritime layer, resulting in ozone exceedances along the coast. Inland winds from the west

prevent sea breeze penetration and can sometimes contribute to the formation of a convergence ozone that can further concentrate ozone along the coast.

- **Western Boundary-only Exceedances:** South-southwest surface winds from upwind urban areas result in exceedances along Connecticut's western boundary.
- **Statewide Exceedances:** This is the classic worst-case pattern, with flow at the surface in the Northeast up the Interstate-95 corridor, transport at mid-levels also from the southwest via the nocturnal low-level level jet and flow at upper levels from the west. All of these flows are from emission-rich upwind areas, serving to transport ozone precursors and previously formed ozone into Connecticut.

In light of these four regimes, each of which is heavily influenced by transport, it is evident that the meteorology factor in fact supports the establishment of a super-regional nonattainment area. As mentioned above, EPA's CSAPR analysis of identifying linkages and significant contributions to an area's ozone problem should be adopted by EPA in its boundary designation methodology. This approach to identifying meteorology-based linkages is consistent with the science of ozone formation and transport, especially in light of Connecticut's unique meteorology as a result of the sea breezes off of Long Island Sound. Therefore, the meteorology supports the establishment of a large super-regional nonattainment area for ozone.

4. Geography and Topography

EPA concluded that the Connecticut portion of the New York-Newark-Bridgeport, NY-NJ-CT ozone nonattainment area does not have any geographical or topographical barriers significantly limiting air pollution transport within its air shed. However, there is an air basin boundary not addressed by the EPA analysis: the Atlantic Ocean and the Long Island Sound.

The coastal-only and statewide exceedance regimes described above both involve sea breezes from the Atlantic Ocean and Long Island Sound. Under those conditions, pollutants injected into the marine layer of Long Island Sound largely originate from New York City and northern New Jersey, possibly from as far west as Pennsylvania and as far south as Washington D.C., and are carried into Long Island Sound on west-southwest winds.⁶ Those pollutants are then carried into Connecticut's coastal monitors as the afternoon sea breeze creates a southerly flow. The geography of Connecticut's coastline, therefore, supports the establishment of a large super-regional nonattainment area for ozone.

⁶ The state of Maryland has similarly documented the significant role that the Chesapeake Bay has had on preventing pollution from blowing out to sea, channeling it back toward the Washington, D.C. and Baltimore areas. Of interest to Maryland is the easterly breeze created by the interaction of the cooler air over the Bay and the warmer air over the land. Because ozone is typically transported in from the west, this Bay breeze stops the pollution and allows it to build up on the west side of the Bay.

5. Jurisdictional Boundaries

Where existing jurisdictional boundaries are not adequate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates are considered. In its response, EPA stated that this factor was the most important factor for determining which Connecticut counties are to be included in which Connecticut nonattainment area.

Connecticut agrees with EPA that this factor is of major importance with respect to nonattainment area boundary designation but for very different reasons than that stated by EPA. As a state affected by overwhelming transported ozone, Connecticut is limited by the state's own jurisdictional boundaries to address upwind, out-of-state emissions sources that impact Connecticut's air quality. The previous discussions regarding air quality and emissions data demonstrate the necessity of designating ozone nonattainment boundaries beyond historical jurisdictional boundaries. Connecticut appreciates EPA's efforts to minimize the confusion of the Connecticut's regulated community, but on balance, the relevance of such confusion pales in comparison to the public health and economic burdens imposed upon Connecticut and its citizens as a result of EPA's current nonattainment boundary designations. The alternative means identified by EPA to address transport (i.e., §§ 126, 176A and 184) are insufficient and neither capable of ensuring that Connecticut meet its mandatory CAA time frames nor adequate to protect the public health of Connecticut's citizens.

III. CONCLUSION

Connecticut believes that the establishment of a super-regional nonattainment area represents the most effective and economical and fundamentally fair solution to address ozone nonattainment, specifically with respect to transport. Because of Connecticut's unique situation as the only state with over 90% of its ozone attributable to transport, maintaining the status quo will no longer suffice. Connecticut's analysis of EPA's factors demonstrates that the boundaries by which EPA intends to define Connecticut's nonattainment areas are in fact inappropriate inasmuch as those boundaries fail to account for transported ozone. EPA must establish a nonattainment area that fully encompasses all areas that significantly contribute to ozone nonattainment. Moreover, Connecticut's analysis of EPA's factors in fact supports the recommendation of establishing a super-regional nonattainment area.