

# CRS Report for Congress

## Ozone Air Quality Standards: EPA's 2007 Proposed Changes

June 22, 2007

James E. McCarthy  
Specialist in Environmental Policy  
Resources, Science, and Industry Division



Prepared for Members and  
Committees of Congress

# Ozone Air Quality Standards: EPA's 2007 Proposed Changes

## Summary

EPA Administrator Stephen Johnson proposed changes to the National Ambient Air Quality Standard (NAAQS) for ozone on June 20, 2007. NAAQS are standards for outdoor (ambient) air that are intended to protect public health and welfare from harmful concentrations of pollution. If the standard is changed as proposed, EPA would be concluding that protecting public health and welfare requires lower concentrations of ozone pollution than it previously judged to be safe. This report discusses the standard-setting process, the specifics of the ozone standard, and issues raised by the proposal, and it describes the steps that will follow EPA's proposal.

The ozone standard affects a large percentage of the population: about half the U.S. population currently lives in ozone "nonattainment" areas (the term EPA uses for areas that violate the standard), 156 million people in all. If the standard is strengthened as a result of the current review, as proposed, more areas would be affected, and those already considered nonattainment might have to impose more stringent emission controls.

The proposal would lower the current standard from 0.08 parts per million (ppm) averaged over 8 hours to something in the range of 0.070 to 0.075 ppm. At the lower end of that range, 533 counties (83% of all counties with ozone monitors) would violate the proposed standard using the most recent three years of monitoring data. Only 104 counties exceed the current standard. Thus, a change in the standard could have widespread impacts in areas across the country.

The proposal follows a multi-year review of the science regarding ozone's effects on public health and welfare. If promulgated in the range proposed, the new standard will set in motion a long and complicated implementation process that has far-reaching impacts for public health, for sources of pollution in numerous economic sectors, and for state and local governments.

A number of issues arise as a result of the proposal, including whether the agency's proposed ranges for the primary and secondary standards are backed by the available science, and, within those ranges, where EPA should set the final standard. (In general, the proposed ranges are somewhat weaker than those proposed by an independent scientific review panel established under the Clean Air Act.) Whether the standards should lead to stronger federal controls on the sources of ozone pollution precursors is another likely issue, if the NAAQS is strengthened in the range proposed. EPA, the states, and Congress may also wish to consider whether the current monitoring network is adequate to detect violations of a more stringent standard. Only 639 of the nation's 3,000 counties have ozone monitors in place. With most of those monitors showing violations of the proposed standard, questions arise as to air quality in unmonitored counties.

## Contents

Introduction .....	1
What Are NAAQS? .....	1
The NAAQS Process .....	2
The Ozone Standard .....	3
The Primary Standard .....	3
The Secondary Standard .....	4
Controlling Ozone Pollution .....	6
Costs and Benefits of Control .....	6
Issues .....	7
Next Steps .....	8

## List of Figures

Figure 1. Counties with Monitors Violating the Current Primary Eight-Hour Ozone Standard, 0.08 parts per million .....	5
Figure 2. Counties with Monitors Violating Alternate Eight-Hour Ozone Standards, 0.070 and 0.075 parts per million .....	5

# Ozone Air Quality Standards: EPA's 2007 Proposed Changes

## Introduction

On June 20, 2007, the EPA Administrator signed proposed revisions to the National Ambient Air Quality Standard (NAAQS) for ozone, with final action expected in March 2008.<sup>1</sup> The proposal will appear in the Federal Register within a few weeks, setting in motion a 90-day public comment period, including public hearings in Los Angeles, Philadelphia, Houston, and Chicago in late August and early September. Because it has widespread implications for public health and for the pollution control measures that will be imposed on sectors of the economy, the proposal is likely to stir congressional interest.

This report provides background on NAAQS, the process used to establish them, the existing ozone standard, and EPA's proposal, as well as information regarding the potential effects of any revision to the standard.

## What Are NAAQS?

As defined in Section 109 of the Clean Air Act, NAAQS are standards that apply to ambient (outdoor) air. The act directs EPA to set both primary and secondary standards. Primary NAAQS are standards, "the attainment and maintenance of which in the judgment of the [EPA] Administrator ... are requisite to protect the public health," with "an adequate margin of safety." Secondary NAAQS are standards necessary to protect public welfare, a broad term that includes damage to crops, vegetation, property, building materials, etc.<sup>2</sup>

NAAQS are at the core of the Clean Air Act, even though they do not directly regulate emissions. In essence, they are standards that define what EPA considers to be clean air. Once a NAAQS has been set, the agency, using monitoring data and other information submitted by the states, identifies areas that exceed the standard and must, therefore, reduce pollutant concentrations to achieve it. After these "nonattainment" areas are identified, state and local governments have three years to produce State Implementation Plans which outline the measures they will implement

---

<sup>1</sup> The schedule was set by a consent decree that settled a lawsuit filed by the American Lung Association (*American Lung Association v. Leavitt*, D.D.C., No. 03-778, modified consent decree approved 12/16/04). EPA agreed that it would propose whether to retain or revise the ozone standard by June 20, 2007, and take final action by March 12, 2008.

<sup>2</sup> The Clean Air Act's definition of welfare is found in Section 302(h) of the act.

to reduce the pollution levels and attain the standards. Depending on the severity of the pollution, ozone nonattainment areas have anywhere from 3 to 20 years to actually attain the standard.

EPA also acts to control many of the NAAQS pollutants wherever they are emitted, through national standards for products that emit them (particularly mobile sources, such as automobiles) and emission standards for new stationary sources, such as power plants. Thus, establishment or revision of a NAAQS sets in motion a long and complicated implementation process that has far-reaching impacts for public health, for sources of pollution in numerous economic sectors, and for states and local governments.

The pollutants to which NAAQS apply are generally referred to as “criteria” pollutants. The act defines them as pollutants that “endanger public health or welfare,” and whose presence in ambient air “results from numerous or diverse mobile or stationary sources.”<sup>3</sup> Six pollutants are currently identified as criteria pollutants: ozone, particulates, carbon monoxide, sulfur dioxide, nitrogen oxides, and lead. The EPA Administrator can add to this list if he determines that additional pollutants meet the act’s criteria, or delete them if he concludes that they no longer do so.

The act requires the agency to review each NAAQS every five years. That schedule is rarely met, but it often triggers lawsuits that force the agency to undertake a review. In the case of ozone, the last review of the NAAQS was completed in 1997. As noted earlier, the American Lung Association filed suit over EPA’s failure to complete a review in 2003, and a consent decree established the schedule EPA is following.<sup>4</sup>

## The NAAQS Process

Reviewing an existing NAAQS is a long process that is described elsewhere in more detail.<sup>5</sup> To summarize briefly, EPA scientists review the scientific literature published since the last NAAQS revision, and summarize it in a report known as a Criteria Document. The review process for ozone identified 1,700 scientific studies on topics as wide-ranging as the physics and chemistry of ozone in the atmosphere; environmental concentrations, patterns, and exposure; dosimetry and animal-to-human extrapolation; toxicology; interactions with co-occurring pollutants;

---

<sup>3</sup> Authority to establish NAAQS comes from both Sections 108 and 109 of the act; this definition of criteria pollutants is found in Section 108. The authority and procedures for controlling the sources of criteria pollutants are found throughout Titles I, II, and IV of the act. Pollutants that are less widely emitted are generally classified as “hazardous air pollutants” and are regulated under a different section of the act (Section 112).

<sup>4</sup> See footnote 1.

<sup>5</sup> For a discussion of the process, and of changes to it that EPA is now implementing, see CRS Report RL33807, *Air Quality Standards and Sound Science: What Role for CASAC?*, by James E. McCarthy.

controlled human exposure studies; epidemiology; effects on vegetation and ecosystems; effects on UVB exposures and climate; and effects on man-made materials. A second document that EPA prepares, the Staff Paper, summarizes the information compiled in the Criteria Document and provides the Administrator with options regarding the indicators, averaging times, statistical form, and numerical level (concentration) of the NAAQS.

To ensure that these reviews meet the highest scientific standards, the 1977 amendments to the Clean Air Act required the Administrator to appoint an independent Clean Air Scientific Advisory Committee (CASAC). CASAC has seven members, largely from academia and from private research institutions. In conducting NAAQS reviews, their expertise is supplemented by panels of the nation's leading experts on the health and environmental effects of the specific pollutants that are under review. These panels can be quite large. The current ozone review panel, for example, has 23 members. CASAC and the public make suggestions regarding the membership of the panels on specific pollutants, with the final selections made by EPA. The panels review the agency's work during NAAQS-setting and NAAQS-revision, rather than conducting their own independent reviews.

## The Ozone Standard

The ozone standard affects a larger percentage of the population than any of the other NAAQS. About half the U.S. population lives in ozone nonattainment areas, 156 million people in all.<sup>6</sup> If the standard is strengthened as a result of the current review, as many expect, more areas would be affected, and those already considered nonattainment might have to impose more stringent emission controls.

### The Primary Standard

The current primary (health-based) standard, promulgated in 1997, is set at 0.08 parts per million (ppm), averaged over an 8-hour period. Allowing for rounding, EPA considers areas with readings as high as 0.084 to have attained the standard.

The current review has found evidence of health effects, including mortality, at levels of exposure below the current standard. As a result, both EPA staff and the Clean Air Scientific Advisory Committee (CASAC) have recommended strengthening the standard. According to CASAC, "There is no scientific justification for retaining the current primary 8-hr NAAQS ...."<sup>7</sup> The panel unanimously recommended a range of 0.060 to 0.070 ppm for the primary 8-hour standard.

---

<sup>6</sup> For information on the nonattainment areas, including maps and population data, see EPA's "Green Book" at [<http://www.epa.gov/oar/oaqps/greenbk/index.html>].

<sup>7</sup> Letter of Rogene Henderson, Chair, Clean Air Scientific Advisory Committee, to Hon. Stephen L. Johnson, EPA Administrator, October 24, 2006, available at [<http://www.epa.gov/sab/pdf/casac-07-001.pdf>].

EPA staff also recommended strengthening the standard, in wording not quite so direct. The staff stated, “The overall body of evidence on ozone health effects clearly calls into question the adequacy of the current standard.” They recommended “considering a standard level within the range of somewhat below 0.080 parts per million (ppm) to 0.060 ppm.”<sup>8</sup>

Based on these recommendations, and his own judgment regarding the strength of the science, the Administrator proposed to tighten the primary standard to a level within the range of 0.070-0.075 ppm. Doing so would likely add a large number of counties to those showing nonattainment. As shown in **Figure 1**, using 2003-2005 data (the latest available), 104 counties have monitors showing violation of the current 0.08 ppm primary standard. **Figure 2** shows what happens if the standard is strengthened as proposed (again using 2003-2005 data). If the standard were changed to 0.075 ppm, 398 counties would exceed it. If it were changed to 0.070, 533 counties would be in violation.

EPA notes that nonattainment designations will not actually be made until 2010, and will use data for the period 2006-2008. Given the trend toward cleaner air in recent years, and regulations on both mobile and stationary sources that will be taking effect in the next few years, the agency expects the number of counties exceeding the standard to be less than indicated by these projections. Nevertheless, because a strengthening of the standard would result in some (perhaps a substantial number of) additional areas being designated nonattainment, and would mean that current nonattainment areas might have to adopt additional pollution control measures in order to reach attainment, numerous industry groups are reported to have challenged the scientific conclusions in meetings with Administration officials.<sup>9</sup> EPA’s response to this challenge was apparently to make clear that it would also entertain comments on a wider range of primary standards, anything from 0.060 to retention of the current standard.

## The Secondary Standard

As part of its current review, EPA has also assessed the secondary (public welfare) NAAQS for ozone, which is currently identical to the primary standard. Ozone affects both tree growth and crop yields, and the damage from exposure is cumulative over the growing season. In order to provide protection against ozone’s adverse impacts, EPA staff recommended a new seasonal (3-month) average for the secondary standard that would cumulate hourly ozone exposures for the daily 12-hour daylight window (termed a “W126 index”). The staff recommended a standard in a range of 7 - 21 parts per million-hours (ppm-hrs). CASAC’s ozone panel agreed unanimously that the form of the secondary standard should be changed as the staff suggested, but it did not agree that the upper bound of the range should be as high as 21 ppm-hours. The panel recommended that the upper bound be no higher than 15

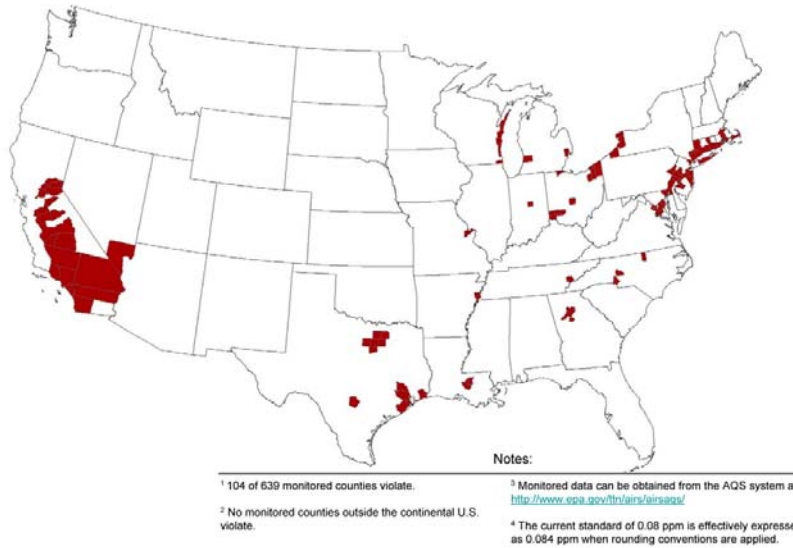
---

<sup>8</sup> “Review of National Ambient Air Quality Standards for Ozone Final Staff Paper, Human Exposure and Risk Assessments and Environmental Report,” Fact Sheet, at [[http://www.epa.gov/ttn/naaqs/standards/ozone/data/2007\\_01\\_finalsp\\_factsheet.pdf](http://www.epa.gov/ttn/naaqs/standards/ozone/data/2007_01_finalsp_factsheet.pdf)].

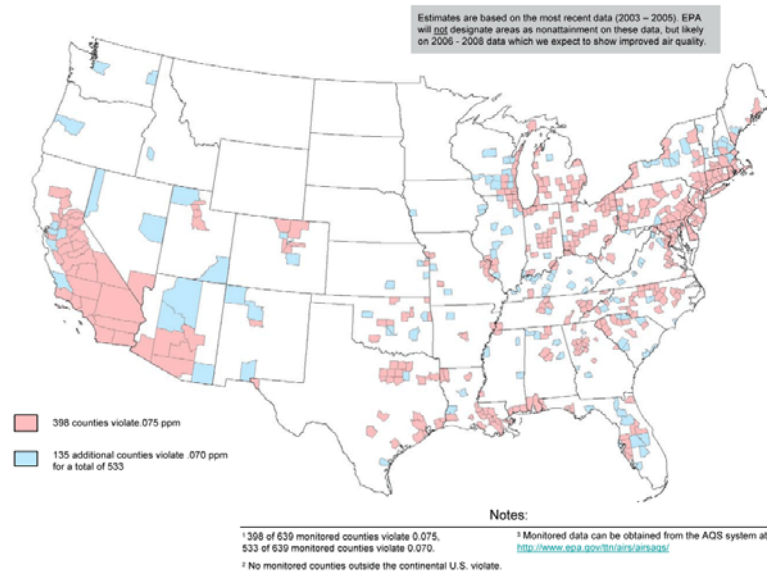
<sup>9</sup> “Activists, Industry Offer Competing Data as EPA Ozone Deadline Nears,” *InsideEPA Clean Air Report*, June 14, 2007.

ppm-hours.<sup>10</sup> The Administrator’s proposal is in line with the staff recommendation, 7 - 21 ppm-hrs.

**Figure 1. Counties with Monitors Violating the Current Primary Eight-Hour Ozone Standard 0.08 parts per million (Based on 2003-2005 Air Quality Data)**



**Figure 2. Counties with Monitors Violating Alternate Eight-Hour Ozone Standards 0.070 and 0.075 parts per million**



<sup>10</sup> Letter of Rogene Henderson, Chair, Clean Air Scientific Advisory Committee, to Hon. Stephen L. Johnson, EPA Administrator, March 26, 2007, p. 3, available at [http://www.epa.gov/sab/pdf/casac-07-002.pdf].



## Controlling Ozone Pollution

Controlling ozone pollution is more complicated than controlling many other pollutants, because ozone is not emitted directly by pollution sources. Rather, it forms in the atmosphere when volatile organic compounds (VOCs) react with nitrogen oxides (NO<sub>x</sub>) in the presence of sunlight. The ozone concentration is as dependent on the temperature and amount of sunshine as it is on the presence of the precursor gases. Ozone is a summertime pollutant, in general. Other factors being equal, a cool, cloudy summer will produce fewer high ozone readings than a warm, sunny summer.

There are also complicated reactions that affect ozone formation. In general, lower emissions lead to less ozone, particularly lower emissions of VOCs. But under some conditions, *higher* emissions of NO<sub>x</sub> lead to lower ozone readings. This makes modeling ozone air quality and predicting attainment more difficult and contentious than the modeling of other air pollutants.

Most stationary and mobile sources are considered to be contributors to ozone pollution. Thus, there are literally hundreds of millions of sources of the pollutants of concern and control strategies require implementation of a wide array of measures. Among the sources of VOCs are motor vehicles (about 40% of total emissions), industrial processes, particularly the chemical and petroleum industries, and any use of paints, coatings, and solvents (about 40% for these sources combined). Service stations, pesticide application, dry cleaning, fuel combustion, and open burning are other significant sources of VOCs. Nitrogen oxides come overwhelmingly from motor vehicles and fuel combustion by electric utilities and other industrial sources.

## Costs and Benefits of Control

EPA is prohibited from taking cost into account in setting NAAQS, but to comply with an executive order, the agency generally produces a Regulatory Impact Analysis (RIA) analyzing in detail the costs and benefits of new or revised NAAQS standards. In preparation for proposing the ozone NAAQS, EPA is reported to have analyzed three alternatives: 0.074 ppm, 0.070 ppm, and 0.064 ppm.<sup>11</sup> EPA estimated the extent to which these alternatives might reduce adverse health effects, focusing on 12 urban areas. This information will be available in a forthcoming RIA, but EPA notes that the RIA will not capture national-scale public health impacts or quantify the full range of ozone-related adverse health effects.<sup>12</sup> EPA expects to release the RIA in July.

---

<sup>11</sup> “With June Deadline Looming, EPA Sends Revisions of Ozone Standard to White House,” *Daily Environment Report*, May 30, 2007, p. A-11.

<sup>12</sup> U.S. EPA, “June 2007 Proposal to Revise the National Ambient Air Quality Standards for Ground-Level ozone,” General Overview, p. 10.

## Issues

The major issues raised by the proposal concern whether the Administrator has made appropriate choices, i.e., whether his proposed ranges for the primary and secondary standards are backed by the scientific studies, and, within the ranges he has chosen, where the final standard should be set. In general, the proposed ranges seem somewhat weaker than those proposed by CASAC. The range of secondary standards includes an upper bound number that is substantially weaker, and the proposed range for the primary standard has almost no overlap with CASAC's recommendation: the most stringent end of the Administrator's range for the primary standard just matches the least stringent end of CASAC's range. So, depending on the Administrator's final choice, there may or may not be a conflict with the scientific judgment of the agency's independent scientific advisors.

In explaining the Administrator's proposal for the primary standard, agency briefers stressed that the Administrator felt there was too much scientific uncertainty at levels below a standard of 0.070 ppm. At 0.080 ppm and immediately below it, they maintained, a standard would be supported both by clinical studies of the effects of a given ozone concentration on lung function in individuals, and by epidemiological studies showing overall effects on large populations. At levels below 0.070, a standard would be based almost entirely on epidemiological studies, and would not be as well supported, they maintain.<sup>13</sup> In past years, the Administrator has generally chosen standards within CASAC's ranges, but not always — a recent example being the NAAQS for particulate matter promulgated in October 2006. That standard is currently being challenged in the D.C. Circuit Court of Appeals.<sup>14</sup>

Many other issues will undoubtedly be raised as affected industries, state environmental agencies, public interest and environmental groups, and the Congress review what EPA has proposed, including the potential impacts of the proposal on public health and on the economy. In looking at potential impacts, EPA projected air quality to the year 2020, incorporating the expected reductions in emissions from a slew of federal regulations, including the Clean Air Interstate Rule (CAIR), the Clean Air Visibility Rule, the Tier 2 auto and light truck emission standards, several rules affecting diesel engines, and some state and local measures. Even with these controls, the agency projected that 82 counties (including many of the nation's biggest cities) would violate the weakest of the proposed standards (0.075) in 2020. If the standard were set at 0.070 ppm, 203 counties are projected to exceed it. About 200 other counties fell into a category for which the agency said it could not project future levels at this time, so some of them might also violate the standard.<sup>15</sup> This

---

<sup>13</sup> Briefing on the June 2007 Proposal to Revise the National Ambient Air Quality Standards for Ground-Level Ozone for staff of the Senate Committee on Environment and Public Works, June 21, 2007.

<sup>14</sup> For additional information on the particulate NAAQS, see CRS Report RL33254, *Air Quality: EPA's 2006 Changes to the Particulate Matter (PM) Standard*, by Robert Esworthy and James E. McCarthy.

<sup>15</sup> For a map showing the 2020 projections, see EPA's briefing materials at (continued...)

widespread failure to attain could support a case for stronger federal controls on the sources of ozone precursors if the NAAQS is strengthened in the range proposed.

Another issue arises from a close inspection of EPA's maps: i.e., whether the current monitoring network is adequate to detect violations of a more stringent standard. Only 639 of the nation's 3,000 counties have ozone monitors in place. If 533 of them (83%) show violations of a proposed standard, using current data, how confident is the agency that the 2,400 counties without monitors would all be in attainment? EPA has recently proposed budget cuts, including reductions in funding for the monitoring network. For FY2007 and FY2008, the President's budget requests significant reductions in grants to states and local governments for air quality management, which includes funding for monitoring.<sup>16</sup> Given these reductions, increasing the number of monitors would appear to be a task that the agency views as falling on state and local government resources.

The current monitors are generally found in urban areas, because of the larger population potentially affected, and because most of the sources of ozone precursor emissions are located in such areas. But, as noted earlier, ozone is not emitted directly by polluters. It forms in the atmosphere downwind of emission sources. Thus, rural areas can have high ozone concentrations, unless they are located a substantial distance from any urban area.

## Next Steps

After the Administrator signs a proposed regulation, the proposal goes to the *Federal Register* for publication, a process that may take several weeks. Section 307(d) of the Clean Air Act sets out the procedures for proposal and promulgation. It requires the establishment of a rulemaking docket; it requires that the notice of proposed rulemaking in the *Federal Register* be accompanied by a statement of the proposal's basis and purpose, including a summary of the factual data on which the proposed rule is based, the methodology used in obtaining and analyzing the data, and the major legal interpretations and policy considerations underlying the proposed rule. The statement is required to set forth or summarize and provide a reference to any pertinent findings, recommendations, and comments by CASAC and the National Academy of Sciences, and, if the proposal differs in any important respect from any of these recommendations, provide an explanation of the reasons for such differences. The act also requires that any drafts of proposed and final rules submitted by the Administrator to the Office of Management and Budget (OMB) prior to proposal or promulgation, all documents accompanying those drafts, and all written comments thereon and EPA responses to such comments, be placed in the docket no later than the date of proposal.

---

<sup>15</sup> (...continued)

[[http://www.epa.gov/groundlevelozone/pdfs/20070621\\_maps.pdf](http://www.epa.gov/groundlevelozone/pdfs/20070621_maps.pdf)].

<sup>16</sup> For additional information, see CRS Report RL34011, *Interior, Environment, and Related Agencies: FY2008 Appropriations*, coordinated by Carol Hardy Vincent, p. 52.

Publication in the *Federal Register* will set in motion a public comment period of 90 days, which will include public hearings in Los Angeles and Philadelphia on August 30, and Houston and Chicago September 5. Upon completion of the public comment period, the agency reviews and summarizes the public comments and the Administrator makes a final choice regarding the standard. Under the consent agreement between EPA and the American Lung Association, the Administrator is required to do so by March 12, 2008.