

OVERVIEW OF EPA'S UPDATES TO THE AIR QUALITY STANDARDS FOR GROUND-LEVEL OZONE

On Oct. 1, 2015, the U.S. Environmental Protection Agency (EPA) strengthened the National Ambient Air Quality Standards (NAAQS) for ground-level ozone to 70 parts per billion (ppb), based on extensive scientific evidence about ozone's effects on public health and welfare. The updated standards will improve public health protection, particularly for at-risk groups including children, older adults, people of all ages who have lung diseases such as asthma, and people who are active outdoors, especially outdoor workers. They also will improve the health of trees, plants and ecosystems.

Highlights

- The updated health standard of 70 ppb will significantly reduce ozone air pollution and will provide an adequate margin of safety to protect at-risk groups.
- The standard is especially important for children and people with asthma, who are at increased risk from ozone exposure, and will prevent hundreds of thousands of asthma attacks.
- Public health benefits of the updated standards are significant – estimated at \$2.9 to 5.9 billion annually in 2025 and outweighing estimated costs of \$1.4 billion.
- EPA projections show the vast majority of U.S. counties will meet the standards by 2025 with federal and state rules and programs now in place or underway.
- EPA will work closely with states and tribes as they develop and implement clean air plans.

Updated Primary (Public Health) Standard

- Based on an expanded body of scientific evidence that includes thousands of studies on the effects of ozone on health, the EPA Administrator has concluded that the 2008 standard of 75 ppb is not requisite to protect public health with an adequate margin of safety, as required by law.
- As she determined what standard would provide that margin of safety, the Administrator considered the science, focusing on new studies that have become available since EPA last reviewed the standards in 2008. Those studies include new clinical studies, which provide the most certain evidence of health effects in adults. Those studies provide information clearly showing that ozone at 72 ppb can be harmful to healthy exercising adults.

- In addition, the Administrator examined results of analyses that look at people’s exposure to ozone and how different levels of a revised standard would reduce risk. These analyses take into account people’s activity patterns and how they are exposed to ozone in their daily lives.
- The Administrator focused on children’s exposure -- particularly repeated exposures. Repeated exposures are important, because the more times children are exposed to ozone, the more likely they will experience serious health effects.
- Children are at increased risk from ozone exposure because their lungs are still developing, and they are more likely to be active outdoors when ozone levels are high. Children also are more likely than adults to have asthma.
- Combined, the results of the clinical studies and risk and exposure analyses show that a standard of 70 ppb will protect public health.
 - A standard of 70 ppb is below the level shown to cause adverse health effects in the clinical studies.
 - A standard of 70 ppb essentially eliminates exposures that have been shown to cause adverse health effects, protecting 99.5 percent of children from even single exposures to ozone at 70 ppb.
- Several clinical studies have shown effects in some adults following exposure to ozone at levels as low as 60 ppb. However, the evidence is uncertain that those effects are harmful or “adverse.” In light of these uncertainties, the Administrator concluded that the science supported setting a standard that reduces exposure to ozone concentrations as low as 60 ppb but does not support a standard that eliminates them.
- The Administrator concluded that a standard of 70 ppb also will provide the adequate margin of safety the law requires. The updated standard will protect more than 98 percent of school-age children from repeated exposures to ozone concentrations as low as 60 ppb – a 60 percent improvement over the current standard.
- The standard accomplishes this because of the way it is structured. Areas meeting the updated standard will see ozone concentrations below 70 ppb on almost all days – and in many areas, on most days, concentrations will be even lower.

Protecting Public Health with an Adequate Margin of Safety

The Clean Air Act requires the EPA Administrator to set primary air quality standards to protect public health with an “adequate margin of safety,” including the health of at-risk groups.

In making this judgment, the Administrator considers factors such as the nature and severity of health effects, the size of the at-risk groups affected, and the degree of certainty and uncertainty in the science on ozone-related health effects. The law charges the Administrator with setting standards that are “requisite” -- neither more nor less stringent than necessary -- to accomplish this. The law does not require EPA to set primary standards at a zero-risk level.

The law requires EPA to review the standards -- and the science behind them -- every five years to determine whether changes are warranted. EPA last updated the standards in 2008.

- In selecting the level of the primary standard, the Administrator also considered advice from the agency’s independent science advisors, the Clean Air Scientific Advisory Committee (CASAC), and she considered public comment on the proposed standards.
- The CASAC concluded that the science indicates the 2008 standard is not adequate to protect public health and that science supports a standard within a range of 70 ppb down to 60 ppb. The panel noted that the decision about what standard provides the adequate margin of safety required by the Clean Air Act is a policy judgment left to the Administrator.

Ozone and Health

- Scientific evidence shows that ozone can cause a number of harmful effects on the respiratory system, including difficulty breathing and inflammation of the airways. For people with lung diseases such as asthma and COPD (chronic obstructive pulmonary disease), these effects can aggravate their diseases, leading to increased medication use, emergency room visits and hospital admissions.
- Evidence also indicates that long-term exposure to ozone is likely to be one of many causes of asthma development. In addition, studies show that ozone exposure is likely to cause premature death.
- An estimated 23 million people have asthma in the U.S., including an estimated 6.1 million children. Asthma disproportionately affects children, families with lower incomes, and minorities, including Puerto Ricans, Native Americans/Alaska Natives and African-Americans.
- Children -- including teenagers -- are among those most at risk from ozone exposure for several reasons:
 - Their lungs are still developing (this occurs until adulthood);
 - They breathe more air per pound of body weight than adults. That means if the air contains ozone, children get a higher “dose” of ozone for their weight than adults;
 - They are active outside more than adults; and
 - They also are more likely to have asthma.

Benefits of the Final Standards Outweigh Costs

- Setting air quality standards is about protecting public health and the environment. By law, EPA cannot consider costs in doing that. States ultimately will decide the best mix of measures to meet the standards in their nonattainment areas. However, to inform the public, EPA analyzes the benefits and illustrative costs of implementing the standards as required by Executive Orders 12866 and 13563 and guidance from the White House Office of Management and Budget (OMB). In conducting these analyses, EPA uses widely accepted, peer-reviewed economic practices and follows OMB guidance on economic analyses.

- EPA estimates that meeting the 70 ppb standards will yield health benefits valued at \$2.9 to \$5.9 billion annually in 2025 nationwide outside of California. These annual benefits include the value of avoiding a range of harmful health effects, including:
 - 320 to 660 premature deaths
 - 230,000 asthma attacks in children
 - 160,000 days when kids miss school
 - 28,000 missed work days
 - 630 asthma-related emergency room visits
 - 340 cases of acute bronchitis in children
- EPA analyzed the benefits and costs for California separately, because a number of areas in California would have longer to meet the final standards, based on their ozone levels. A number of California counties likely would have attainment dates ranging from 2032 to late 2037.
- Benefits of meeting the standards in California add to the nationwide benefits after 2025, with the value of the additional benefits estimated at \$1.2 to \$2.1 billion annually after 2025. This includes the value of avoiding harmful health effects, including:
 - 120 to 220 premature deaths
 - 160,000 asthma attacks among children
 - 120,000 days when kids miss school
 - 5,300 missed work days
 - 380 asthma-related emergency room visits
 - 64 cases of acute bronchitis among children
- While states ultimately decide what measures to implement to meet a standard, EPA has developed illustrative measures in order to estimate costs. Those estimates are \$1.4 billion in 2025 nationwide except for California. Estimated costs in California post-2025 are \$800 million.
- Estimated net benefits range from \$1.5 to \$4.5 billion nationwide, except California. In California, net benefits are estimated at \$0.4 to \$1.3 billion.

Updated Secondary (Public Welfare) Standard

- EPA also is strengthening the secondary standard to improve protection for trees, plants and ecosystems. Like the primary, an area will meet the standard if the fourth-highest maximum daily 8-hour ozone concentration per year, averaged over three years, is equal to or less than 70 ppb.
- New studies since the last review of the standards add to evidence showing that exposure to ozone reduces growth and has other harmful effects on plants and trees. These types of effects have the potential to harm ecosystems and the benefits they provide.
- The agency has assessed ozone exposure to vegetation using a seasonal index known as a “W126 index.” A W126 index, named after portions of the equation used to calculate it, is a weighted index designed to reflect the cumulative exposures that can damage plants and trees during the consecutive three months in the growing season when daytime ozone concentrations are the highest and plant growth is most affected.

- EPA determined that a W126 index level of 17 parts per million-hours (ppm-hours) is sufficient to protect the public welfare based on the latest science.
- Analyses of data from air quality monitors show that an 8-hour standard of 70 ppb will limit cumulative, seasonal exposures above a W126 index level of 17 ppm-hours, averaged over three years.
- Based on consideration of all the information in this review, including CASAC advice and judgments about uncertainties, the Administrator concluded that an updated secondary standard of 70 ppb will provide the requisite protection for public welfare that the Clean Air Act requires.

Working With States and Tribes to Implement the Updated Standards

- Protecting air quality is a federal/state partnership, and EPA, states and tribes have made significant progress reducing ozone. Nationwide, ozone levels have dropped by a third since 1980 at monitor sites that track ozone trends. More than 90 percent of the areas originally designated as nonattainment for the 1997 ozone standard now meet that standard. And 2014 data show that more than a third of areas designated in 2012 as nonattainment for the 2008 ozone standards have air quality meeting that standard.
- EPA has a long history of working closely with states as they develop State Implementation Plans (SIPs) to reduce emissions of ozone precursors within individual jurisdictions. The agency will continue these collaborative efforts for the updated ozone standards, including working closely with states in reviewing air quality during the designations process, which is the first step in implementing the updated standards.
- Recognizing that its partners have significant workloads and resource constraints, the agency has provided an outline of how EPA will work with state, tribal, local and federal agencies to implement the updated standards in a way that maximizes common sense, flexibility and cost-effectiveness, while following the requirements of the Clean Air Act.
- The “Implementation Memo” issued with the revised standards, outlines the agency’s plans for addressing issues related to:

Addressing Background Ozone

“Background ozone” refers to ozone that forms from pollution from natural sources, such as wildfires or stratospheric intrusions, and ozone that forms from man-made pollution from sources outside the U.S.

On high ozone days, most ozone is produced locally or regionally from man-made domestic sources. Reducing emissions of the pollutants that form ozone will reduce ozone broadly across the country and improve public health protection.

EPA analyses do not indicate that background ozone will prevent areas from meeting the updated ozone standards of 70 ppb. The Clean Air Act and EPA policies provide a number of tools to help states in the limited number of areas where background ozone may contribute to high ozone concentrations on a few days. These tools may help areas avoid a nonattainment designation, or minimize attainment control requirements where appreciable levels of background ozone influence air quality.

- Guidance available to agencies;
 - Ensuring major source permitting is effective and efficient;
 - Designating areas;
 - Background ozone;
 - Interstate ozone transport;
 - The challenges of reducing ozone in California;
 - Managing monitoring networks;
 - Community involvement;
 - Multi-pollutant clean air planning;
 - Emissions from wildland fires;
 - Transportation planning; and
 - The Ozone Advance Program.
- California has unique air quality challenges, due to the combination of meteorology and topography, population growth, and the pollution burden associated with mobile sources. EPA will continue working closely with the state, tribes and local air quality officials, nongovernmental organizations, interested commercial representatives and other federal agencies to explore strategies and technologies to reduce pollution and improve public health protection for California residents.

Rules and guidance to help states and tribes

- The agency plans to propose rules and guidance over the next year to help states with potential nonattainment areas implement the revised standards. The agency also plans to update its Exceptional Events Rule, which outlines the requirements for excluding air quality data (including ozone data) from regulatory decisions if the data are affected by events outside an area’s control, such as a wildfire or stratospheric intrusion.
- The Exceptional Events Rule is one of several tools available to states for addressing “uncontrollable pollution,” including background ozone, as they develop their clean air plans. Background ozone is ozone that forms from sources other than manmade U.S. emissions.
- In addition, EPA is developing guidance to address Exceptional Events Rule criteria for wildfires that could affect ozone concentrations. The agency anticipates receiving additional fire-related exceptional events demonstrations as climate change leads to increases in wildfires.
- To ensure a smooth transition to the updated standards, EPA is including a grandfathering provision to ensure that compliance with the updated ozone standards will not delay final processing of certain pending preconstruction permit applications.

- As required by the Clean Air Act, EPA anticipates making attainment/nonattainment designations for the revised standards by late 2017; those designations likely will be based on 2014-2016 air quality data.
- For more information on the designations schedule: see <http://www3.epa.gov/ozonepollution/actions.html>.

Federal rules will help most areas meet the standards without additional reductions.

- Nonattainment areas will have until 2020 to late 2037 to meet the health standard, with attainment dates varying based on the ozone level in the area. Most states can build off work they are already doing to reduce pollution to help them meet the standards.
- Existing and proposed federal rules will help states meet the standards by reducing ozone-forming pollution. These rules include: requirements to reduce the interstate transport of air pollution, Regional Haze regulations, the Mercury and Air Toxics Standards, the Clean Power Plan, the Tier 3 Vehicle Emissions and Fuels Standards, the Light-Duty Vehicle Tier 2 Rule, the Mobile Source Air Toxics Rule, the Light-Duty Greenhouse Gas/Corporate Average Fuel Efficiency Standards, the Heavy-Duty Vehicle Greenhouse Gas Rule, the Reciprocating Internal Combustion Engines (RICE) NESHAP, and the Industrial/Commercial/Institutional Boilers and Process Heaters MACT and amendments.
- EPA's analysis shows that pollution reductions resulting from these rules will help the vast majority of counties meet the updated standards by 2025 without additional action.

Modernizing Monitoring Requirements

- The final rule streamlines and modernizes the Photochemical Assessment Monitoring Stations (PAMS) network to use monitoring resources most efficiently. The PAMS network measures ozone, the pollutants that form it, and meteorology in order to better understand ozone formation and to evaluate national and local ozone-reduction options.
- In addition, EPA is updating the Federal Reference Method for ozone to include an additional method for measuring ozone in the outdoor air. State, local and tribal air agencies will be able to continue operating their existing ozone monitors.

Notifying the Public: Updates to the Ozone Monitoring Season and Air Quality Index

- EPA is updating the Air Quality Index (AQI) to reflect the updates to the ozone health standard to provide the public with the most up-to-date information about air quality where they live. The AQI is EPA's color-coded tool for communicating air quality to the public.
- Also to help alert the public, EPA is extending the ozone monitoring season for 32 states and the District of Columbia to match the times of year when ozone is most likely to approach unhealthy levels. A review of all available ozone data from 2010 to 2013 shows that ozone can be elevated at times when some states were not required to measure it: earlier in the spring and later in the fall – and even in the wintertime in some western states.

- The monitoring season extensions will range from one additional month in 22 states and the District of Columbia, to an additional seven months in Utah.
- For more information on the AQI and monitoring season updates, see: <http://www3.epa.gov/ozonepollution/actions.html>

Background on Developing the Ozone Standards

- The Clean Air Act requires EPA to review the ozone standards every five years to determine whether they should be revised in light of the latest science. Reviewing the NAAQS is a lengthy undertaking and includes the following major steps before EPA issues a proposed rule: planning; a comprehensive review, synthesis and evaluation of the science on ozone (referred to as the Integrated Science Assessment); risk and exposure assessments for public health and the public welfare; and a staff policy assessment.
- Scientific review during the development of each of these documents is thorough and extensive. Drafts of all documents are reviewed by EPA's independent science advisers (CASAC), and the public has an opportunity to comment on them.
 - In June-July 2014, CASAC provided its advice to EPA on the policy assessment, the health risk and exposure assessment, and the welfare risk and exposure assessment.
- The EPA Administrator evaluates all of this information, along with advice from the CASAC, in determining whether to propose revisions to a standard. Proposed rules are made available for public comment, and the agency holds public hearings. EPA carefully considers all comments received on the proposal before issuing a final rule.
- EPA issued the first national air quality standards for ozone in 1971. The agency has revised the standards three times – in 1979, 1997 and 2008 – to ensure they continue to protect public health and welfare. The agency has not revised the standards on two other occasions:
 - In 1993, EPA reviewed the standards but determined that revisions were not warranted;
 - In 2010, the agency proposed, but did not finalize, revisions as part of a reconsideration of the 2008 standards.
- In July 2013, the U.S. Court of Appeals for the D.C. Circuit upheld the 2008 primary ozone standard but remanded the secondary standard to EPA, on the grounds that the agency had not adequately explained how the secondary standard provided the required public welfare protection. The revisions to the secondary standard respond to this remand.
- On Jan. 21, 2014, the Sierra Club, American Lung Association, Environmental Defense Fund and Natural Resources Defense Council sued EPA for not completing the review of the standards within five years - by March 2013. The groups asked the U.S. District Court for the Northern

District of California to order EPA to complete the five-year review of the 2008 standards. The court ordered the agency to sign a proposed rule by Dec. 1, 2014 and a final rule by Oct. 1, 2015.

- On Nov. 25, 2014, EPA proposed to strengthen the ozone standards. The agency proposed to set both the primary and secondary standards as 8-hour standards of 65 to 70 ppb. EPA received more than 430,000 comments on the proposed standards and held three public hearings.

Where to Get More Information:

- To read the final rule and additional fact sheets, visit <http://www3.epa.gov/airquality/ozonepollution/actions.html> .
- For technical documents related to this review of the standards, see: http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_index.html
- A table of historical ozone standards is available at: http://www.epa.gov/ttn/naaqs/standards/ozone/s_o3_history.html
- For your local air quality forecasts and information on current air quality, visit www.airnow.gov