

# March 2008 Final National Ambient Air Quality Standards for Ground-level Ozone



## General Overview

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- On March 12, 2008, EPA significantly strengthened the National Ambient Air Quality Standards (NAAQS) for ground-level ozone
- These revisions reflect new scientific evidence about ozone and its effects on public health and the environment
- The final revisions affect two types of ozone standards:
  - *Primary standard* to protect public health, including the health of "sensitive" populations such as people with asthma, children, and older adults
  - *Secondary standard* to protect public welfare and the environment, including sensitive vegetation and ecosystems
- Specifically, EPA has:
  - Revised the level of the primary and secondary 8-hour ozone standards to 0.075 parts per million (ppm)
- For more information go to <http://www.epa.gov/groundlevelozone>

## *Regulating Ground-level Ozone Pollution*

- The Clean Air Act requires EPA to set primary and secondary NAAQS for common air pollutants:
  - Ground-level ozone (smog)
  - Carbon monoxide
  - Nitrogen dioxide
  - Particulate matter
  - Lead
  - Sulfur dioxide
- The law requires EPA to review the scientific information and the standards for each pollutant **every five years**, and to obtain advice from the Clean Air Scientific Advisory Committee (CASAC) on each review
- Different considerations apply to setting NAAQS than to achieving them
  - Setting NAAQS: health and environmental effects
  - Achieving NAAQS: account for cost, technical feasibility, time needed to attain
- EPA last revised the ozone standards in 1997. At that time, both the primary (health-based) and secondary (welfare-based) standards were set at 0.08 ppm (effectively 0.084 ppm due to rounding), with an 8-hour averaging time

## ***Ozone NAAQS Rulemaking Schedule***

- Proposal signed June 20, 2007 (as required by consent agreement)
- Public comment period ended October 9, 2007. EPA received thousands of public comments
- Public hearings held in Los Angeles and Philadelphia on August 30, 2007, and in Atlanta, Chicago, and Houston on September 5, 2007
- Final Rule signed March 12, 2008 (consent agreement required signature by March 12, 2008)

## *Ground-level Ozone is:*

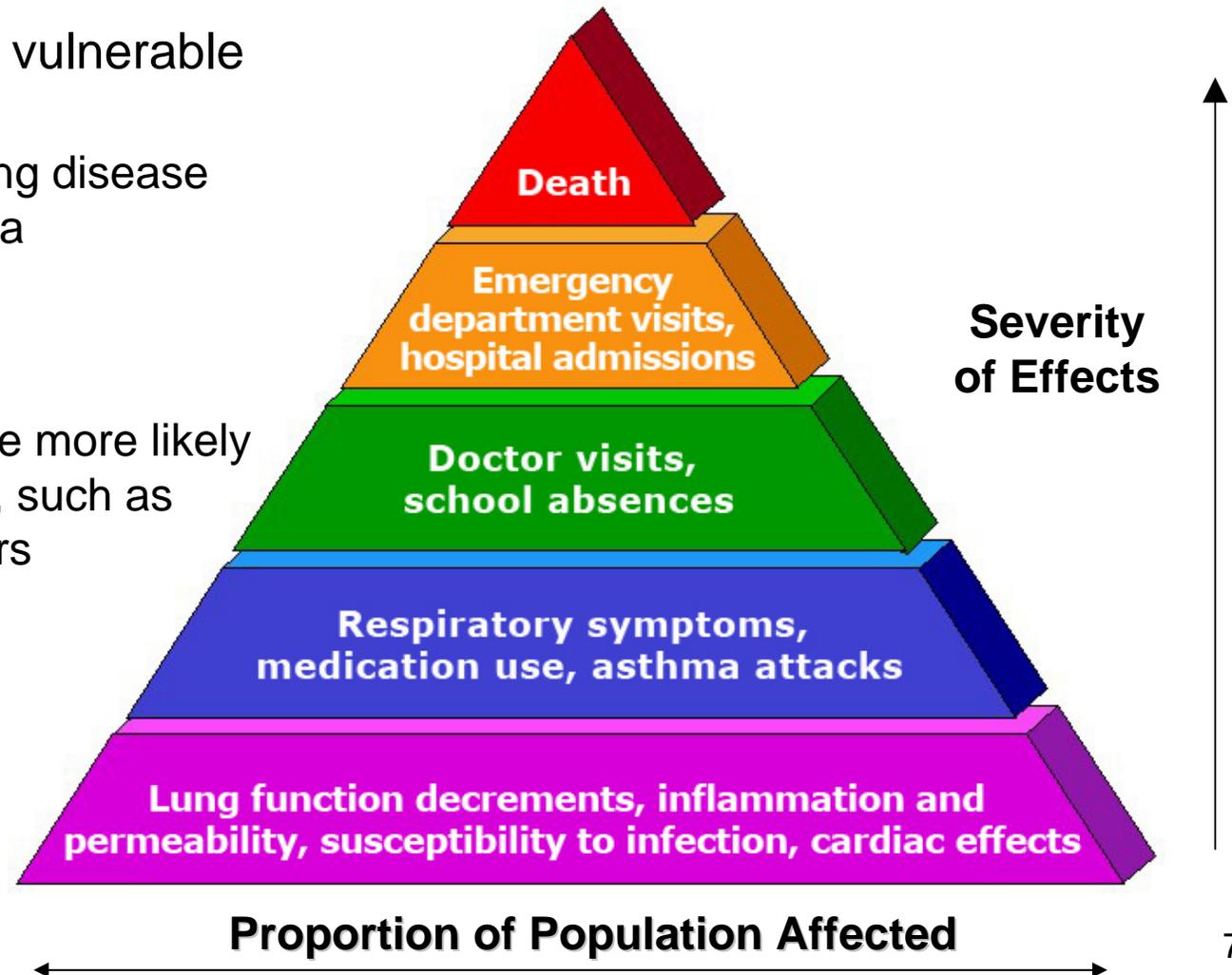
- The primary component of smog
- Sometimes called “bad ozone” to distinguish it from “good ozone”
  - Both types of ozone have the same chemical composition ( $O_3$ )
  - “Good ozone” occurs naturally in the upper portions of the earth’s atmosphere and forms a layer that protects life on earth from the sun’s harmful rays
  - “Bad ozone” at ground level is harmful to breathe
- Not emitted directly into the air, but forms when emissions of nitrogen oxides ( $NO_x$ ) and volatile organic compounds (VOCs) “cook” in the sun
  - Emissions from industrial facilities, electric utilities, motor vehicle exhaust, gasoline vapors, and chemical solvents are the major man-made sources of  $NO_x$  and VOCs
- Mainly a summertime pollutant, because sunlight and hot weather accelerate its formation
- Ozone levels can be high in both urban and rural areas, often due to transport of ozone, or the  $NO_x$  and VOC emissions that form ozone

## *Ozone and Health*

- Ozone can penetrate deep into the lungs and can:
  - Make it more difficult for people working or playing outside to breathe as deeply and vigorously as normal
  - Irritate the airways, causing: coughing, sore or scratchy throat, pain when taking a deep breath, and shortness of breath
  - Increase asthma attacks and use of asthma medication
  - Inflammation and damage the lining of the lung by injuring the cells that line the air spaces in the lung
  - Increase susceptibility to respiratory infection
  - Aggravate chronic lung diseases such as asthma, emphysema and bronchitis
- Repeated episodes of ozone-induced inflammation may cause permanent changes in the lung, leading to long-term health effects and a lower quality of life
- Ozone may continue to cause lung damage even when symptoms have disappeared

## Ozone Health Impacts: “Pyramid of Effects”

- Susceptible and vulnerable groups include:
  - People with lung disease such as asthma
  - Children
  - Older adults
  - People who are more likely to be exposed, such as outdoor workers



## *Ozone and the Environment*

- Ground-level ozone is absorbed by the leaves of plants, where it can:
  - Interfere with the ability of sensitive plants to produce and store food
    - This can lead to reduced growth, biomass production and/or yields
  - Make sensitive plants more susceptible to certain diseases, insects, harsh weather, other pollutants, and competition
  - Reduce or change the diversity of plant species
    - This can lead to damage to ecosystems dependent on those species
  - Visibly injure the leaves of plants, affecting the appearance of vegetation in national parks, recreation areas and cities

## *Revisions to the Primary Ozone Standard*

- EPA has concluded the 1997 primary standard is not adequate to protect public health with an adequate margin of safety
- EPA has strengthened the level of the 8-hour primary ozone standard to 0.075 parts per million (ppm)
  - More than 1700 new scientific studies available in this review indicate strong evidence of adverse health impacts of ozone at the level of the 1997 standard and below
    - Clinical studies show evidence of adverse respiratory responses in healthy adults at a level of 0.080 ppm and possibly lower
    - Large numbers of new epidemiological studies, including new multi-city studies, strengthen EPA's confidence in the links between ozone exposure and health effects observed in the last review, including emergency department visits and hospitalizations for respiratory causes
    - In addition, studies now link ozone exposure to other important health effects, including mortality, increased asthma medication use, school absenteeism, and cardiac-related effects
    - Studies of people with asthma indicate they experience larger and more serious responses to ozone that last longer than responses in healthy individuals
- EPA also specified the level of the standards to the nearest thousandth of a ppm (also referred to as the "third decimal place"), eliminating the need for rounding when comparing measured ambient levels to the new standard

## Revised Ozone AQI

- EPA is changing the Air Quality Index (AQI) to reflect the new primary standard
- The AQI is EPA's color-coded tool designed to inform the public about daily air pollution levels in their communities
- EPA is adjusting the 100-level, which is the upper end of the "moderate" category, to equal the new 0.075 ppm standard, and making proportional changes to other AQI values
- EPA encourages the States to use the new AQI breakpoints for air quality forecasting by the beginning of ozone season. In many areas this date is May 1, 2008

Category	AQI Value	1997 8-hour (ppm)	2008 8-hour (ppm)
Good	0-50	0.000-0.064	0.000-0.059
Moderate	51-100	0.065-0.084	0.060-0.075
Unhealthy for Sensitive Groups	101-150	0.085-0.104	0.076-0.095
Unhealthy	151-200	0.105-0.124	0.096-0.115
Very Unhealthy	201-300	0.125-0.374	0.116-0.374
Hazardous	301-400	No Change	No Change
	401-500	No Change	No Change

## *Revisions to the Secondary Ozone Standard*

- EPA has concluded the 1997 secondary standard is not adequate to protect public welfare
- EPA has strengthened the level of the 8-hour secondary ozone standard to 0.075 parts per million
- Ozone effects on sensitive species include reduced biomass, foliar injury, loss of vigor, and susceptibility to disease. This could lead to loss of plant diversity and change the types of plants in ecosystems
- Current ambient concentrations in many areas of U.S., including areas that attain the 1997 standard, are sufficient to cause adverse impacts
- Important new scientific information has been developed since 1997, however many significant uncertainties remain
- While EPA agrees with CASAC that cumulative, seasonal exposures are the most biologically relevant, the remaining uncertainties over how to best protect vegetation led the Administrator to conclude the secondary standard should be set equal to the primary

## *Regulatory Impact Analysis*

- EPA conducted a Regulatory Impact Analysis (RIA) to analyze the benefits and costs of reducing pollution to meet alternative ozone standards
- The RIA is required by Executive Order 12866 and guidance from the White House Office of Management and Budget
- The RIA is an illustrative analysis and provides information regarding example control strategies, air quality impacts and public health improvements
- The benefit and cost analysis is not used when selecting the proposed ozone standards
  - The Clean Air Act bars EPA from considering costs in setting or revising any NAAQS

## *Benefit and Cost Results*

- The EPA analysis shows that benefits are likely greater than costs for the selected standard
- The RIA estimates a standard of 0.075 ppm would prevent the following additional adverse health effects annually in 2020:
  - 380 cases of chronic bronchitis
  - 890 nonfatal heart attacks
  - 1,900 hospital and emergency room visits
  - 1,000 cases of acute bronchitis
  - 11,600 cases of upper and lower respiratory symptoms
  - 6,100 cases of aggravated asthma
  - 243,000 days when people miss work or school
  - 750,000 days when people must restrict their activities
- EPA estimates the value of these and other health benefits would range from a low of \$2 billion to a high of \$19 billion per year in 2020
- EPA estimates the costs of implementing a standard of 0.075 ppm would range from a low of \$7.6 billion to a high of \$8.5 billion in 2020

## *Expected Implementation Timeline for Revised Ozone NAAQS*

<b>Milestone</b>	<b>Date</b>
<b>Signature—Final Rule</b>	March 12, 2008
<b>State Designation Recommendations to EPA</b>	No later than March 12, 2009
<b>Final Designations</b>	No later than March 12, 2010*
<b>Attainment Demonstration SIPs Due</b>	2013*
<b>Attainment Dates</b>	2013-2030 (depends on severity of problem)

\* In the event the Administrator has insufficient information to promulgate the designations by March 12, 2010, the date of final designations may be extended up to one year, but no later than March 12, 2011. SIPs will be due three years from final designations.

# *Implementation Considerations For Revised Ozone Standards*

- Designations
  - No later than one year after EPA issues a revised standard, the Clean Air Act requires States and gives Tribes the option to recommend to EPA which areas **are** and which areas **are not** meeting the new standards
  - EPA is required to issue final designations within 2 years after establishing revised standards, but may take up to another year if insufficient data is available for designation
  - EPA is reviewing existing designations guidance and will be communicating with States and Tribes if additional guidance is needed.
- 1997 Ozone Standards
  - For now, the 1997 8-hour ozone NAAQS and all the associated regulatory requirements will remain in place
  - States should continue their plans for implementing the 1997 NAAQS
  - EPA will address any transition issues in a separate rulemaking

## *Monitoring Considerations Related to Revised Ozone Standards*

- EPA did not propose any specific changes to existing monitoring requirements, but invited comment on a number of issues. EPA will consider the following issues in a proposed monitoring rule in June 2008, and a final rule in approximately March 2009
  - Requirements in urban areas, including whether to require ozone monitors in smaller Metropolitan Statistical Areas (cities) of between 50,000 and 350,000 population that do not currently have monitors
  - Requirements in rural areas to address the large spatial gaps that exist in the current network, including whether to require a minimum number of rural monitors per state
    - Such monitors would likely be located in areas with ozone sensitive plant species and where resulting vegetation damage would adversely affect land usage, with special focus on public lands that are protected areas of national/state/tribal interest (e.g., National parks, wilderness areas)
  - The length of the required ozone monitoring season, including whether the season should be lengthened in some areas to capture relevant measurements in calculating the revised NAAQS and the Air Quality Index

## *Progress toward Clean Air*

- While ozone's impacts on human health and the environment are more damaging than previously understood, and occur at lower ozone concentrations, EPA, States and Tribes have been making steady progress to lower the amount of ozone in the air
- In recent years, ozone air quality trends have been improving:
  - Ground level ozone declined 9% nationwide between 1990 and 2006
  - In the eastern U.S., the cap-and-trade NO<sub>x</sub> Budget Program has proven very successful
    - 60% decline in eastern ozone season NO<sub>x</sub> emissions between 2000 (when program initiated) and 2006
    - 13% decline in eastern O<sub>3</sub> concentrations between 2002-2006 alone
  - Nationwide, 89 of the original 126 areas designated nonattainment for the 1997 standard met that standard during the 2004-2006 period
  - The Clean Air Interstate Rule (CAIR), issued in March 2005, will continue this progress using a similar cap-and-trade approach in the Eastern United States