

May 2008 Proposal National Ambient Air Quality Standards for Lead



General Overview

Overview

- On May 1, 2008, EPA proposed to strengthen the national ambient air quality standards (NAAQS) for lead (Pb) to increase protection of public health and the environment
 - Since 1978, ambient air lead standards have been set at $1.5 \mu\text{g}/\text{m}^3$ (micrograms per cubic meter of air)
 - Now, EPA is proposing to strengthen the standards to a level between $0.10\text{-}0.30 \mu\text{g}/\text{m}^3$
 - The level is based on the concentration of lead in total suspended particles (TSP)
 - EPA also proposes corresponding changes to the lead monitoring network to ensure monitors are assessing air quality in all areas that might violate the new standards
- A 60-day public comment period for this proposal will end mid-July 2008
- On June 12, 2008, EPA will host public hearings on this proposal in St. Louis and Baltimore
- For more information go to <http://www.epa.gov/air/lead/>

Basic Information About Lead Air Pollution

- Lead is a metal found naturally in the environment as well as in manufactured products
- Lead can be emitted into the air in the form of particles small enough to stay suspended in the air
- EPA measures lead air pollution with monitors that capture all of those suspended particles, known as total suspended particles or TSP
- Lead emitted into the air can be inhaled directly or ingested after it settles onto surfaces or soils
 - Ingestion is the main route of human exposure
- Once in the body, lead is rapidly absorbed into the bloodstream and can affect many of the body's organ systems
 - Exposures to low levels of lead early in life have been linked to effects on IQ, learning, memory, and behavior

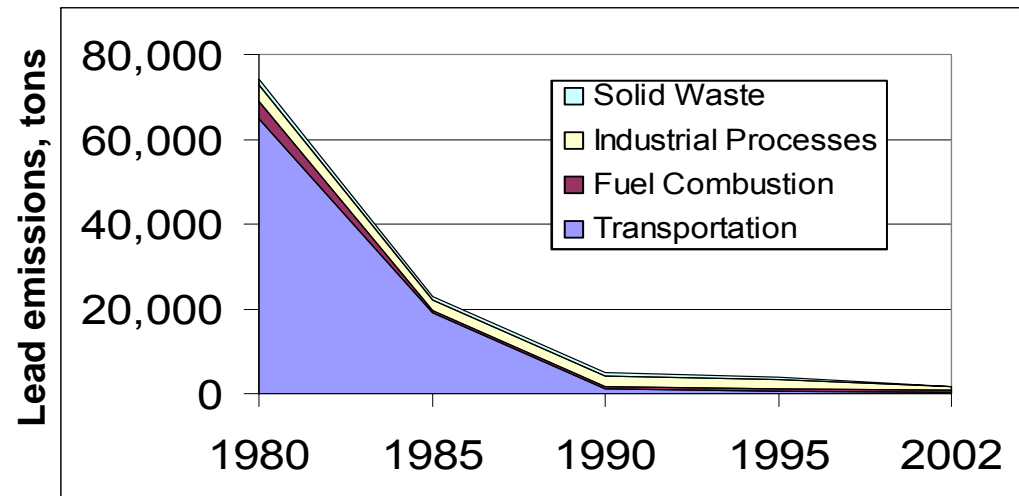
Regulating Lead Pollution

- The Clean Air Act requires EPA to set two types of national ambient air quality standards (NAAQS) for 'criteria' air pollutants
 - **Primary standards** to protect public health with an adequate margin of safety
 - **Secondary standards** to protect public welfare and the environment (visibility, wildlife, crops, vegetation, national monuments and buildings)
- EPA has set NAAQS for six common air pollutants:
 - **Lead**
 - Carbon monoxide
 - Nitrogen dioxide
 - Particulate matter
 - Ground-level ozone (smog)
 - 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: based on scientific evidence of health and environmental effects
 - Achieving NAAQS: account for cost, technical feasibility, time needed to attain
- EPA is reviewing the lead standards established in 1978. At that time, both the primary and secondary standards were set at $1.5 \mu\text{g}/\text{m}^3$ of lead in TSP, not to be exceeded as an average over a three month period

Reduction in Lead Pollution in the U.S.

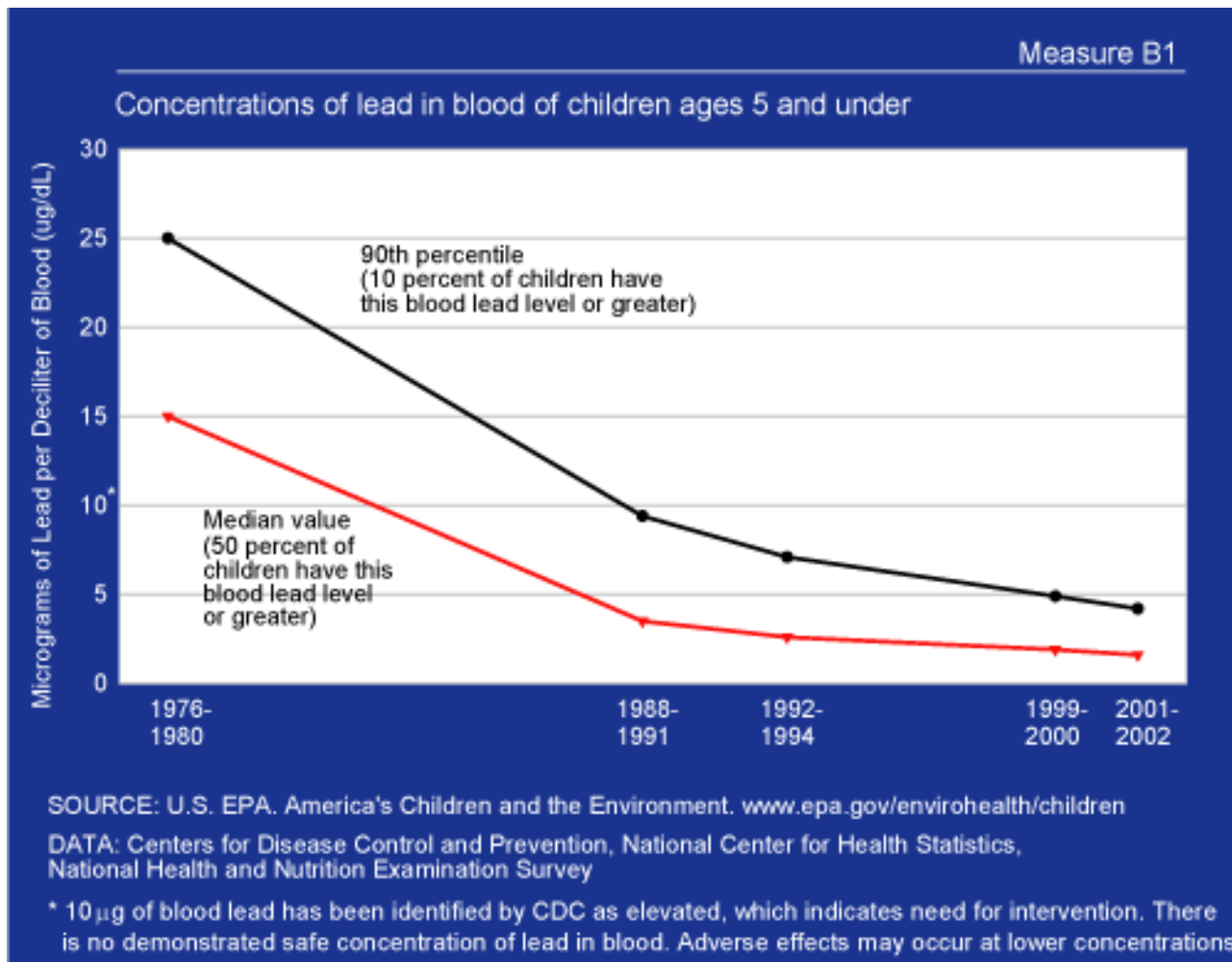
- As a result of the permanent phase-out of leaded gasoline, controls on emissions of lead compounds through EPA's air toxics program, and other national and state regulations, airborne lead concentrations in the U.S. have decreased 94 percent since 1980

Trend in U.S. Lead Emissions since 1980



- Lead is also regulated through other EPA programs including:
 - Standards for lead-based paint hazards and lead dust cleanup in most pre-1978 housing and child-occupied facilities (such as daycare centers)
 - Standards for managing lead in solid and hazardous waste
 - Requirements for cleanup of lead contamination at Superfund sites
 - Standards for lead in drinking water
- In addition, the Agency's Lead Awareness Program works to protect human health and the environment by making people aware of the dangers of lead pollution

Changes in Children's Blood Lead Levels Since 1978



- Concentrations of lead in children's blood have dropped significantly, from a median level of 15 µg/dL in the late 1970s to less than 2 µg/dL today

Sources Contributing to Lead Pollution

- More than 1,300 tons of lead are still emitted each year from about 16,000 sources, many of which emit a fraction of a ton
- The highest levels of lead in air are generally found near lead smelters
- Other sources of current lead emissions include:

- Iron and steel foundries
- Copper Smelting
- Metal mining
- Industrial/commercial/utility boilers
- Gasoline for small planes
(not used in commercial passenger aircraft)
- Waste incinerators
- Cement manufacturing
- Glass manufacturing

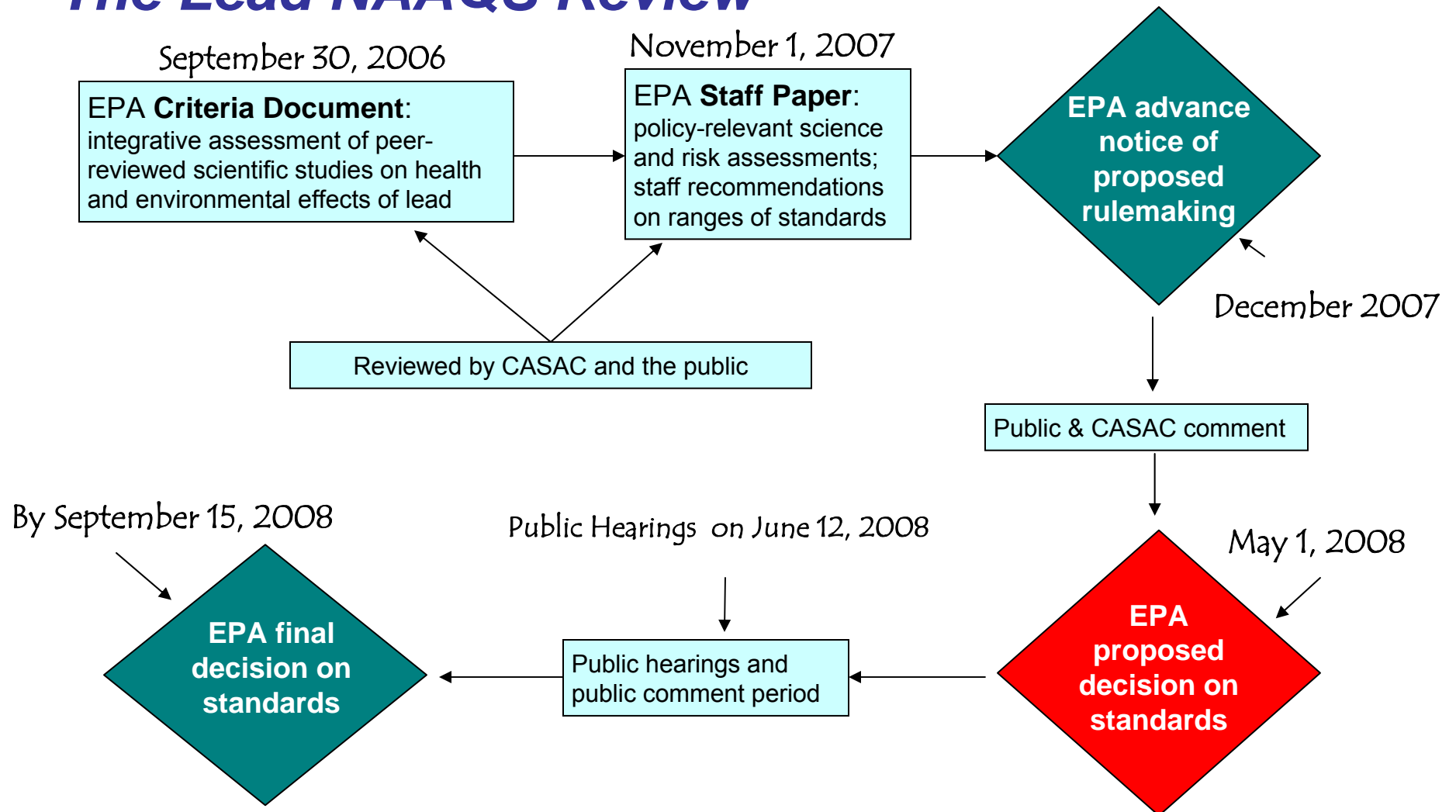


- Lead particles emitted into the air from these and other sources can end up in water, soil and dust, and over time can re-enter the air
- This cycling of lead in the environment means people can be exposed to lead that was emitted just yesterday or years ago

Impacts of Lead Pollution on Public Health

- Exposure to lead pollution is associated with a broad range of health effects, including damage to the central nervous system, cardiovascular system, kidneys, immune system and red blood cells
- Children are more likely to be exposed to lead because they exhibit greater hand-to-mouth activity
- Children are also the most vulnerable to damaging effects of lead because their bodies are developing rapidly
- Effects in children include:
 - Effects on developing nervous system, including the brain
 - IQ loss
 - Poor academic achievement, permanent learning disabilities, increased risk of delinquent behavior
 - Effects generally persist into early adulthood; can affect lifetime education and achievement
 - Weakened immune system
- Adults can also experience effects of lead exposure such as:
 - Increased blood pressure
 - Cardiovascular disease
 - Decreased kidney function

The Lead NAAQS Review



New Health Evidence in this Review

- More than 6,000 studies on lead health effects, environmental effects and lead in the air have been published since 1990
 - More than 2,000 studies from across health disciplines, including epidemiology and animal toxicology, provide robust evidence of adverse health effects
- Body of evidence indicates serious health effects occurring at blood lead levels well below those recognized as harmful when 1978 standard set
 - Strong evidence of adverse effects at blood lead levels well below 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$)
 - No threshold or “safe” level for lead in blood has been identified
- Large number of studies focus on effects in children, with epidemiological evidence associating elevated blood lead levels with loss of IQ and other neurocognitive effects
 - Remarkable consistency across numerous studies with varying designs, populations
 - Some studies of children with mean blood lead levels well below 5 $\mu\text{g}/\text{dL}$ indicate no discernable threshold for these effects
 - Children with lower blood lead levels experience a more significant IQ loss with a 1 $\mu\text{g}/\text{dL}$ increase in blood lead than children with higher blood lead levels

New Welfare Evidence in this Review

- A significant number of new studies available since 1978 regarding the ways lead moves through the environment and impacts plant and animal species
- These studies indicate lead may persist in the environment for decades, and may damage the reproduction and growth of birds, mammals, and organisms living in the soil
- Limited available data suggest lead build-up in ecosystems may be linked to a wide variety of effects, including reduced species diversity, damage to vegetation, changes in community composition, reduced ecosystem productivity, and increased number of invasive species
- While overall deposition rates of lead air pollution have decreased dramatically since the phase-out of leaded gasoline, lead from the air continues to deposit in aquatic and terrestrial ecosystems, contributing to lead in soils and sediments
- Ecosystems may continue to be affected by lead when soils and sediments on land and in water are disturbed

CASAC Advice and Recommendations

- Current standards of $1.5 \mu\text{g}/\text{m}^3$ quarterly average are not adequate to protect public health and welfare
- Population loss of 1-2 IQ points is highly significant from a public health perspective
- EPA should substantially strengthen the primary lead NAAQS to a level no higher than $0.2 \mu\text{g}/\text{m}^3$
- EPA should revise the averaging time from quarterly to monthly
- The secondary standard should be revised to a level at least as low as that recommended for the revised primary standard
- EPA should transition to measuring lead particles with PM_{10} monitors (as opposed to TSP monitors) for quantifying ambient lead concentrations, taking into account that fewer lead particles are captured by a PM_{10} monitor

Proposed Revisions to the Lead Standards: Level

- Based on the new evidence available in this review, the Administrator proposes to conclude:
 - The current lead standards ($1.5 \mu\text{g}/\text{m}^3$) are not adequate and should be revised to provide increased protection for public health, especially the health of children, and public welfare
 - An air-related population mean IQ loss of 1-2 points could be significant from a public health perspective, and a standard level should be selected to avoid IQ loss in excess of this range
- EPA proposes to strengthen the primary standard to a level within the range of $0.10\text{-}0.30 \mu\text{g}/\text{m}^3$
 - The upper and lower boundaries of this range reflect alternative interpretations of what existing scientific evidence indicates about:
 - the relationship between ambient air lead concentrations and blood lead levels (air-to-blood ratio)
 - the quantitative relationship between blood lead levels and IQ loss (concentration-response (C-R) relationship)

Proposed Revisions to the Lead Standards: Level (cont.)

- EPA is requesting comment on alternative levels for the primary lead standard as high as $0.50 \mu\text{g}/\text{m}^3$ and down to levels below $0.10 \mu\text{g}/\text{m}^3$
- EPA also invites comment on when, if ever, it would be appropriate to set a NAAQS for lead at a level of zero
- EPA is proposing to make the secondary standard identical to the proposed primary standard
- EPA is not considering revoking the lead NAAQS or removing lead from the list of criteria pollutants

Proposed Revisions to the Lead Standards: Averaging Time and Form

- EPA is also proposing to revise the averaging time and form used to determine whether an area meets the standard, and has proposed two alternatives:
 - Retain the current form of a maximum (not-to-be-exceeded) quarterly average and evaluate whether an area meets the standard using 3 years (12 quarters) of data (“max quarterly”)
 - Shift to a monthly averaging time and evaluate whether an area meets the standard using the second highest monthly average over 3 years (“2nd max monthly”)

Proposed Revisions to the Lead Standards: Indicator

- EPA is proposing to retain the current indicator based on measuring lead in the air using total suspended particles (TSP) monitors
 - EPA's traditional approach of measuring lead in TSP reflects evidence that all lead particles, regardless of size, pose health risks.
- EPA is considering whether to allow the use of PM₁₀ monitoring data to determine compliance with the proposed TSP standard
 - PM₁₀ monitors, by design, do not capture particles larger than 10 micrometers in diameter
 - However, many of the lead particles measured in TSP are 10 micrometers or less in diameter, and PM₁₀ monitors are more precise than TSP monitors
 - EPA is considering whether it would be appropriate to adjust lead PM₁₀ data for use in comparison to a TSP-based standard, and if so, how to make those adjustments
 - EPA proposing to allow states to establish site-specific scaling factors for purposes of adjusting PM₁₀ data based on data from co-located monitors
 - EPA taking comment on establishing default scaling factors
- EPA is also requesting comment on the alternative approach of basing the level of the standard on the concentration of lead in PM₁₀

Proposed Revisions to the Lead Monitoring Requirements

- The current monitoring network is inadequate to assess national compliance with the proposed revised lead standards
- EPA proposes to improve the lead monitoring network by focusing on sources of lead emissions such as smelters, metallurgical operations, battery manufacturers, fugitive dust sources (e.g., mine tailings piles) and airports
 - EPA proposes to require monitors near all sources that exceed an emission threshold of between 200 and 600 kilograms (441 and 1,323 pounds) per year, depending on the stringency of the standard
 - Requirement may be waived for sources emitting less than 1,000 kilograms (2,200 pounds) of lead per year through demonstration that ambient levels will not exceed 50% of the lead NAAQS
 - Depending on the number of new monitors that are necessary, either all will be required to be operational by January 1, 2010, or half of the new monitors will be required to be operational by January 1, 2010, with the other half operational by January 1, 2011
- EPA also proposes to require a small network of monitors to be placed in urban areas with populations greater than 1 million to gather information on the general population's exposure to lead in air
- In addition, EPA proposes changes to sampling and analysis methods (including quality assurance requirements), sampling schedule, data reporting and other miscellaneous requirements

Implementation Issues

- Proposal provides EPA's suggested implementation approach and schedule
- Key elements of the proposal for public comment include:
 - Timing for designating areas, including deadlines for processing exceptional events claims
 - Using county boundaries as default nonattainment area boundaries. EPA will take comment on the alternative approach of using Metropolitan Statistical Area boundaries
 - Appropriate thresholds for reasonably available control technology (RACT) analysis and emissions inventory development
 - Retaining the 1978 lead NAAQS until one year after designations for the new standard, except in current nonattainment areas where it will be retained until those areas submit and EPA approves attainment demonstrations for the new standard
- The proposal also explains the following Clean Air Act requirements:
 - Timing for developing required state implementation plans (SIPs)
 - Program elements States must include in their SIPs
 - infrastructure requirements
 - attainment planning requirements
 - deadlines for attaining new or revised lead standards

Anticipated Timeline For Revised Lead NAAQS

Milestone	Date
Signature—Final Rule	September 15, 2008
State Designation Recommendations to EPA	No later than September 2009 (based on 2006-2008 data)
Monitoring Network	Operational by January 1, 2010* <small>*If a large number of new monitors are necessary, half of the new monitors must be operational by January 1, 2010, with the other half operational by January 1, 2011</small>
Final Designations Signature	No later than September 2011
Attainment Demonstration SIPs Due	No later than Spring 2013
Attainment Date	No later than Fall 2016