



Legislative Council Staff

Nonpartisan Services for Colorado's Legislature

Memorandum

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TO: Interested Persons

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SUBJECT: Air Pollution Regulation in Colorado

Summary

This memorandum provides a brief history of the federal Clean Air Act; describes common air pollutants and their health impacts; outlines Colorado's air quality issues and state programs; and lists recently enacted state legislation that aims to improve the state's air quality.

Federal Clean Air Legislation

In the second half of the 20th century, concerns about the quality of outdoor air, or ambient air, increased as the potential impact of air pollutants on human health and the environment became more evident. In response to growing health concerns, the federal government created new programs to improve the nation's ambient air. Following the Air Pollution Act of 1955, the first federal action on clean air directed mostly at research and technical assistance, Congress passed the Clean Air Act of 1963, which expanded regulatory authority. In 1967, the Air Quality Act authorized the federal government to conduct extensive ambient monitoring studies and stationary source inspections. Three years later, the most ambitious amendments would follow in the Clean Air Act of 1970.¹

Clean Air Act of 1970

The Clean Air Act of 1970 (CAA) expanded enforcement authority and authorized the development of comprehensive federal and state regulations to limit emissions from both stationary sources and mobile sources.

¹ 42 U.S.C. § 7401



The major components of the law, some of which are discussed below, include:

- National Ambient Air Quality Standards (NAAQS);
- State Implementation Plans (SIPs);
- New Source Performance Standards;
- National Emission Standards for Hazardous Air Pollutants (HAPs); and
- Mobile Source Emission Standards.

National Ambient Air Quality Standards

Following passage of the CAA, in 1971, the U.S. Environmental Protection Agency (EPA) established the National Ambient Air Quality Standards (NAAQS) for [six pollutants](#) considered harmful to public health and the environment: carbon monoxide, lead, nitrogen dioxide, ozone, particle matter, and sulfur dioxide.

The CAA identifies both primary and secondary standards:

- **primary standards** protect public health, including for sensitive populations such as persons with asthma; and
- **secondary standards** protect public welfare, including mitigating decreased visibility and damage to animals and crops.

The CAA requires periodic review of the science on which the standards are based and the EPA has a process to update the standards in accordance with the review. Table 1 lists the current standards set for the six criteria air pollutants measured in parts per million (ppm), parts per billion (ppb), and micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$).

Table 1
Current National Ambient Air Quality Standards

Pollutant	Standard	Time	Concentration	Concentration Limit
Carbon monoxide (CO)	Primary	1 hour	35 ppm	Cannot be exceed more than once per year
		8 hours	9 ppm	
Lead (Pb)	Primary and Secondary	Rolling 3-month average	$0.15 \mu\text{g}/\text{m}^3$	Maximum arithmetic mean of 3 consecutive monthly means in a 3-year period



Pollutant		Standard	Time	Concentration	Concentration Limit
Nitrogen dioxide (NO ₂)		Primary	1 Hour	100 ppb	Annual 98th percentile of 1-hour daily maximum concentrations averaged over three years
		Primary and Secondary	1 Year	53 ppb	Cannot exceed the concentration averaged annually
Ozone (O ₃)		Primary and Secondary	8 Hours	0.070 ppm	Cannot exceed the annual fourth-highest daily maximum eight-hour concentration, averaged over three years
Particulate Matter (PM)	PM _{2.5}	Primary and Secondary	24 Hours	35 µg/m ³	98th percentile, averaged over 3 years
		Primary	1 Year	9.0 µg/m ³	Cannot exceed the annual mean averaged over three years
		Secondary	1 Year	15.0 µg/m ³	Cannot exceed the annual mean averaged over three years
	PM ₁₀	Primary and Secondary	24 Hours	150 µg/m ³	Cannot be exceeded more than once per year on average over three years
Sulfur Dioxide (SO ₂)		Primary	1 Hour	75 ppb	Annual 99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	1 Year	10 ppm	Annual mean, averaged over 3 years

Source: [NAAQS Table](#), EPA.

PM_{2.5} includes particulates smaller than 2.5 micrometers, and PM₁₀ includes particulates smaller than 10 micrometers.



State Implementation Plans

A [State Implementation Plan](#) (SIP) is a collection of regulations and documents used by a state, territory, or local air district to implement, maintain, and enforce the NAAQS, and to fulfill other requirements of the CAA. Each state must submit a SIP for EPA approval that demonstrates how the state will achieve and maintain the NAAQS. SIPs also address how the state plans to achieve certain NAAQS if they are not meeting the standards. States are responsible for developing air quality monitoring and data systems.

Hazardous air pollutants

The EPA must also regulate the emissions of HAPs under the CAA. HAPs are pollutants that are known or suspected to cause cancer or other serious health and environmental effects, and include toxins such as asbestos, benzene, and mercury. According to the EPA, most of the [188 regulated HAPs](#) are emitted from man-made sources, such as cars, factories, and building materials. The EPA works with state and local governments to reduce the emission of HAPs from major industrial sources and from other nonpoint sources.

1977 and 1990 Amendments

Amendments to the CAA in 1977 established new requirements for areas that exceed the established thresholds of air pollutants according to the NAAQS, adjusted the auto emission standards, extended deadlines for the attainment of air quality standards, and added a program to protect air cleaner than national standards. The amendments also aimed to protect federal grant money to the states and set firm timelines for review of standards. The 1990 amendments to the CAA made changes to nonattainment classifications, established an acid rain “cap-and-trade” program, and focused on atmospheric ozone depletion, among other changes.

Health and Environmental Impacts

The EPA describes the following potential impacts for the six NAAQS pollutants.

Carbon Monoxide

Carbon monoxide is a colorless, odorless gas released from burning fossil fuels, as well as from volcanos and wildfires. The largest sources of carbon monoxide pollution are vehicles and industrial operations. High concentrations can cause dizziness, confusion, headaches, and rapid breathing. High concentrations are more common in enclosed spaces than in ambient air.



Lead

Lead is a naturally occurring metal found throughout the environment. Lead has been detected in some consumer products and is used in certain types of ammunition, building material, and is found in rechargeable lead-acid batteries. Lead can accumulate in the air, soil, or water. The health effects of large concentrations of lead are most concerning for children under the age of six and include anemia, kidney and brain damage, central nervous system damage, and, in extreme cases, death.

Nitrogen Dioxide

Burning fossil fuels releases nitrogen dioxide into the atmosphere. The largest sources of nitrogen dioxide emissions are vehicles, power plants, and off-road equipment. High concentrations can aggravate respiratory functions and cause of asthma and other respiratory diseases. High concentrations can also cause environmental effects, including ground-level ozone, increased haze, and water pollution.

Ozone

Ozone is a naturally occurring gas in the Earth's upper atmosphere, where it protects the Earth's surface from radiation. At ground level, however, ozone can cause health and environmental impacts. When sunlight reacts with nitrogen oxides and volatile organic compounds, it creates harmful ozone. Ozone is most likely to reach unhealthy levels on hot, sunny days in urban areas. Wind can also transport ground-level ozone. High concentrations of ozone can cause chest pain, throat irritation, and other respiratory issues. High levels can increase haze and harm vegetation.

Particulate Matter

Particulates are small particles found in the air, including both liquid droplets and solid particles. Some particulates, like soot, smoke, and dirt, are large enough to be visible. Most particulates are the result of activity at a pollution source, such as construction sites and fires, especially wildfires. They can be easily inhaled and cause severe lung and heart damage. Smaller particulates can cause harmful chemicals to be absorbed into a person's bloodstream. Particulates can also increase haze, make water more acidic, and damage crop growth.

Sulfur Dioxide

Sulfur dioxide (SO₂) is a colorless gas with a distinct odor. The burning of compounds that contain sulfur releases SO₂. Sources of pollution include burning coal, refining petroleum products, manufacturing cement, or refining and processing a variety of mineral ores, such as

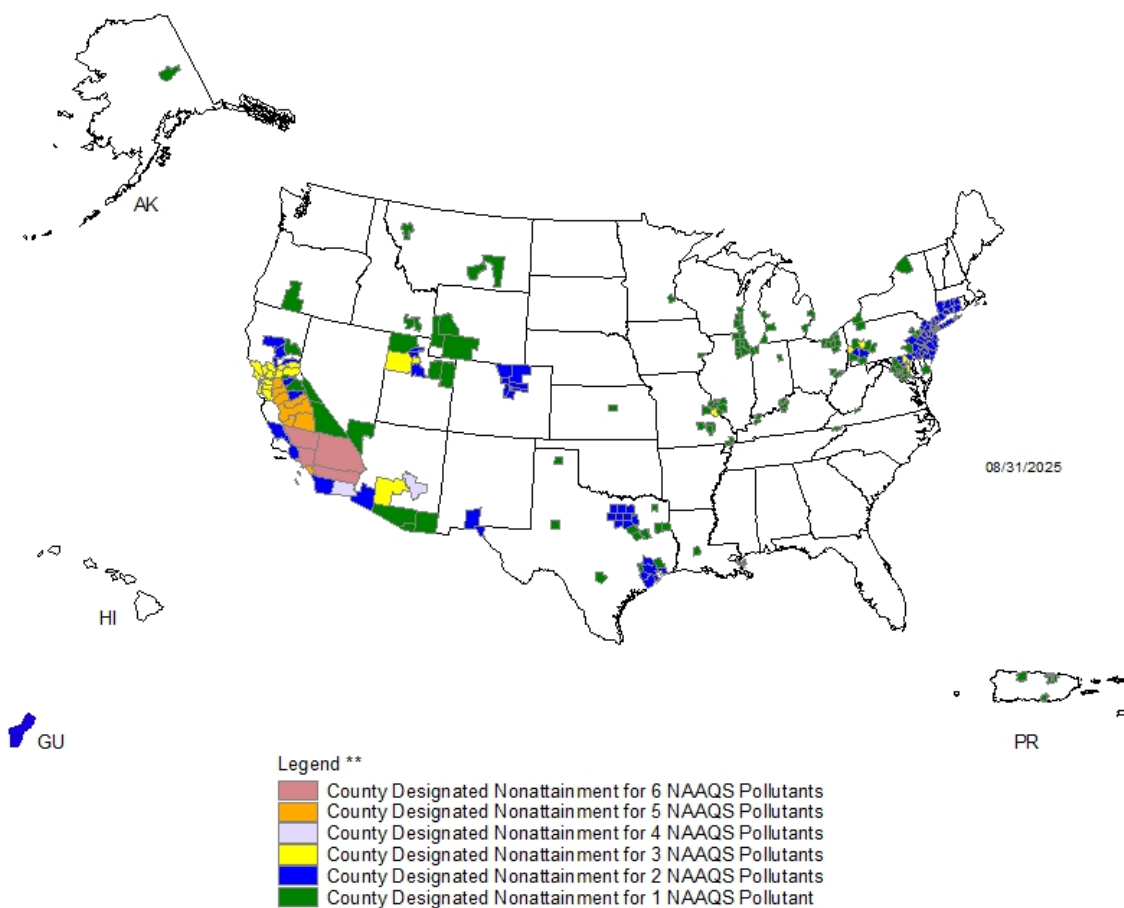


aluminum, iron, and zinc. High levels of SO₂ can cause a burning sensation when breathing, shortness of breath, and decreases in lung functionality. SO₂ can also dissolve into water when released into the environment, which causes acid rain. Acid rain can damage forests, crops, and cause bodies of water to become too acidic to support wildlife.

Colorado Air Quality

The EPA designates any county that exceeds the threshold of any of the six criteria air pollutants as a “nonattainment area.” States that have nonattainment areas must outline how to reduce air pollutant levels in their SIPs. Figure 1 shows the nonattainment areas in the United States.

Figure 1
Counties Designated Nonattainment Areas
August 2025



Source: [Counties Designated Nonattainment](#), EPA.



Nine Colorado counties are part of the Denver Metro–North Front Range (DM/NFR) Ozone Nonattainment Area: Adams, Arapahoe, Boulder, Broomfield, Denver, Douglas, Jefferson, Larimer, and Weld. Colorado has submitted multiple SIP provisions for its nonattainment areas. Contributors to ozone and particulate pollution in these areas include industrial operations, vehicles, power plants, refineries, airports, and unique meteorological conditions.

The EPA lowered the 8-hour standard for ozone pollution to 75 parts per billion in 2008, and again lowered that standard to 70 parts per billion in 2015. The DM/NFR Ozone Nonattainment Area does not meet either standard according to the [Colorado Department of Public Health and Environment](#) (CDPHE). In July 2024, the EPA approved the state’s voluntary request to update its nonattainment classification for the 2015 standard. This update reclassified the DM/NFR Ozone Nonattainment Area from a “moderate” to a “serious” nonattainment status.

State and Regional Programs

Air Quality Control Commission

The [Air Quality Control Commission](#) (AQCC), a Governor-appointed, Senate-confirmed body, oversees Colorado’s air quality program. Among [its responsibilities](#) is the development and adoption of an air pollution regulatory program, and hearing appeals of Air Pollution Control Division decisions. The AQCC also oversees the [SIPs](#) for the nonattainment areas in the state.

Air Pollution Control Division

The [Air Pollution Control Division](#) (APCD) in the CDPHE enforces Colorado air pollution laws, handles air quality-related permitting and inspections of Colorado's regulated entities, and proposes new regulations under existing state laws. The APCD collects information from monitoring stations to provide real-time information about air quality. It uses the air quality index (AQI) to rate the expected daily air quality and its associated level of health concerns for locations around the state. Table 2 summarizes the AQI ratings for ozone and particulates.



Table 2
Air Quality Index Values and Descriptions

AQI Color	Level of Concern	Index Value	Air Quality Description
Green	Good	0 – 50	Air quality is satisfactory, and air pollution poses little or no risk
Yellow	Moderate	51 – 100	Air quality is acceptable. However, there may be a risk for some people, particularly those who are unusually sensitive to air pollution.
Orange	Unhealthy for Sensitive Groups	101 – 150	Members of sensitive groups may experience health effects. The general public is less likely to be affected.
Red	Unhealthy	151 – 200	Some members of the general public may experience health effects; members of sensitive groups may experience more serious health effects.
Purple	Very Unhealthy	201 – 300	Health alert: The risk of health effects is increased for everyone.
Maroon	Hazardous	301 and higher	Health warning of emergency conditions: everyone is more likely to be affected.

Source: [AQI Basics](#), AirNow.

APCD [posts the AQI for monitored locations daily](#) to provide information about the potential impacts of that day's air quality. The division also posts burning restrictions and air advisories, including those due to wildfires, to notify the public of any potential health concerns. Table 3 shows the number of days in Colorado counties with monitoring stations at which the AQI was ranked below "Good" due to ozone pollution in 2024.



Table 3
Number of Days Ranked Below “Good” in 2024

County	Number of Days	County	Number of Days
Adams	219	Garfield	148
Alamosa	40	Gilpin	123
Arapahoe	170	Gunnison	123
Archuleta	17	Jefferson	174
Boulder	154	La Plata	125
Broomfield	Not measured	Larimer	210
Clear Creek	149	Mesa	151
Denver	237	Montezu	104
Douglas	155	Rio Blanco	100
El Paso	164	Weld	217

Source: [Daily Air Quality Index](#), EPA.

Bold indicates counties in the Denver Metro – North Front Range (DM/NFR) Ozone Nonattainment Area

Regional Air Quality Council

Finally, the [Regional Air Quality Council](#) (RAQC) was established in 1989 to serve as the lead air quality planning agency for the Denver metropolitan area. In 2019, the RAQC’s region was extended to the DM/NFR Ozone Nonattainment Area.

Recent Legislation in Colorado

Table 3 provides an overview of certain bills enacted in Colorado since 2020 related to air quality. Notable bills prior to 2020 include [House Bill 19-1261](#), which established statewide greenhouse gas reduction goals, and [Senate Bill 19-181](#), concerning regulation of oil and gas production in the state.



Table 3
Select Colorado Legislation Related to Air Quality
2020–2025

Bill	Summary
<u>Senate Bill 20-204</u> <i>Additional Resources To Protect Air Quality</i>	Creates the Air Quality Enterprise to conduct air quality modeling, monitoring, assessment, data analysis, and research, and to provide its data to fee payers and state regulators.
<u>House Bill 21-1189</u> <i>Regulate Air Toxics</i>	Requires monitoring of certain facilities emitting covered air toxics, including hydrogen cyanide, hydrogen sulfide, and benzene; creates a community monitoring program; and ensures air quality data is publicly accessible.
<u>House Bill 22-1244</u> <i>Public Protections from Toxic Air Contaminants</i>	Creates a new program in the CDPHE to regulate toxic air contaminants based on adverse health effects. Toxic air contaminants may be designated by the AQCC.
<u>Senate Bill 23-016</u> <i>Greenhouse Gas Emission Reduction Measures</i>	Makes various changes to state statute relating to air pollution, including updating greenhouse gas reduction goals and modifying the powers and duties of the Colorado Energy Office.
<u>Senate Bill 24-229</u> <i>Ozone Mitigation Measures</i>	Requires rulemaking to reduce certain emissions of nitrogen oxides generated by upstream oil and gas operations in certain areas of the state and changes how CDPHE enforces emissions violations.
<u>Senate Bill 25-286</u> <i>Petroleum Products Fees and Penalties</i>	Allows civil penalties up to \$5,000 per day for the retail distribution of reformulated gasoline that violates the applicable EPA fuel quality specification in a nonattainment area.

Compiled by Legislative Council Staff.