15 AIR QUALITY

A. Introduction

This section discusses the overall regulatory framework for air quality management in California and the region, including national ambient air quality standards (NAAQS) and California ambient air quality standards (CAAQS), and describes existing air quality conditions in Butte County. Information presented in this section is based in part on guidance provided by the Butte County Air Quality Management District (BCAQMD).

B. Regulatory Setting

This section discusses the federal, State, and local policies and regulations that are relevant to air quality in Butte County.

The air quality management agencies of direct importance in Butte County include the U.S. Environmental Protection Agency (EPA), the California Air Resources Board (CARB), and the BCAQMD. The EPA has established federal standards for which CARB and BCAQMD have primary implementation responsibility. CARB and BCAQMD are responsible for ensuring that state standards are met, and the BCAQMD is responsible for implementing strategies for air quality improvement and recommending mitigation measures for new growth and development. At the local level, air quality is managed through land use and development planning practices, and measures addressing air quality are implemented in Butte County through the general planning process. The BCAQMD is responsible for establishing and enforcing local air quality rules and regulations that address the requirements of federal and State air quality laws.

1. Federal and State Ambient Air Quality Standards

This section discusses the local, State, and federal policies and regulations that are relevant to the analysis of air quality in Butte County.

Air-pollution control programs were established in California before federal requirements were enacted. However, federal Clean Air Act (CAA) legislation in the 1970s resulted in a gradual merging of State and federal air quality programs, particularly those relating to industrial sources. Air quality management programs developed by California since the late 1980s have generally responded to requirements established by the CAA.

The enactment of the California Clean Air Act (CCAA) in 1988 and the federal CAA amendments of 1990 have produced additional changes in the structure and administration of air quality management programs. The CCAA requires preparation of an air quality attainment plan for any area that violates California Ambient Air Quality Standards (CAAQS) for carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), or inhalable particulate matter (PM_{10}), and ($PM_{2.5}$).

California and the federal government have established standards for several different pollutants. For some pollutants, separate standards have been set for different measurement periods. Most standards have been set to protect public health. For some pollutants, standards have been based on other values (such as the protection of crops, the protection of materials, or the avoidance of nuisance conditions). State and federal standards for a variety of pollutants are summarized in Table 15-1.

TABLE 15-1 AMBIENT AIR QUALITY STANDARDS FOR CRITERIA POLLUTANTS

Pollutant	Averaging Time	California Standard [a]	Federal Primary Standard [b]	Major Pollutant Sources
Ozone (O_3) [c]	1 hour	0.09 ppm	*	Motor vehicles, paints, coatings, and solvents.
	8 hours	0.070 ppm	0.070 ppm	
Carbon Monoxide (CO)	1 hour	20 ppm	35 ppm	Internal combustion engines, primarily gasoline-powered motor vehicles.
	8 hours	9.0 ppm	9 ppm	
Nitrogen Dioxide (NO_2)	Annual Arithmetic Mean	0.030 ppm	0.053 ppm	Motor vehicles, petroleum-refining operations, industrial sources, aircraft, ships, and railroads.
	1 hour	0.18 ppm	0.100 ppm	
Sulfur Dioxide (SO_2)	Annual Arithmetic Mean	*	0.030 ppm	Fuel combustion, chemical plants, sulfur recovery plants, and metal processing.
	1 hour	0.25 ppm	0.075 ppm	
	24 hours	0.04 ppm	0.14 ppm	
Respirable Coarse Particulate Matter (PM_{10})	Annual Arithmetic Mean	20 µg/m³	*	Dust and fume-producing construction, industrial, and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	24 hours	50 µg/m³	150 µg/m³	
Respirable Fine Particulate Matter ($PM_{2.5}$) [d]	Annual Arithmetic Mean	12 µg/m³	12 µg/m³	Dust and fume-producing construction, industrial, and agricultural operations, combustion, atmospheric photochemical reactions, and natural activities (e.g., wind-raised dust and ocean sprays).
	24 hours	*	35 µg/m³	
Lead (Pb)	30-Day Average	1.5 µg/m³	*	Present source: lead smelters, battery manufacturing & recycling facilities. Past source: combustion of leaded gasoline.
	Calendar Quarter	*	1.5 µg/m³	
	Rolling 3-Month Average	*	0.15 µg/m³	
Sulfates (SO_4) [c]	24 hours	25 µg/m³	*	Industrial processes.
Visibility Reducing Particles	8 hours	ExCo =0.23/km visibility of 10≥ miles	No Federal Standard	Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, and salt.
Hydrogen Sulfide	1 hour	0.03 ppm	No Federal Standard	Hydrogen sulfide (H2S) is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. Also, it can be present in sewer gas and some natural gas, and can be emitted as the result of geothermal energy exploitation.

TABLE 15-1 AMBIENT AIR QUALITY STANDARDS FOR CRITERIA POLLUTANTS

Pollutant	Averaging Time	California Standard [a]	Federal Primary Standard [b]	Major Pollutant Sources
Vinyl Chloride	24 hours	0.01 ppm	No Federal Standard	Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Most vinyl chloride is used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents.

Notes: ppm: parts per million; μg/m3; micrograms per cubic meter; *Standard has not been established for this pollutant/duration by this entity.

a. California standards for O3, CO (except 8-hour Lake Tahoe), SO2 (1 and 24 hour), NO2, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.

b. National standards (other than O3, PM, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The O3 standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24-hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 μg/m3 is equal to or less than one. For PM2.5, the 24-hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

c. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.

d. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 μg/m3 to 12.0 μg/m3. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 μg/m3, as was the annual secondary standard of 15 μg/m3. The existing 24-hour PM10 standards (primary and secondary) of 150 μg/m3 also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.

e. On June 2, 2010, a new 1-hour SO2 standard was established and the existing 24-hour and annual primary standards were revoked. The 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.

Source: California Air Resources Board, 2016. Ambient Air Quality Standards. https://ww2.arb.ca.gov/resources/documents/ambient-air-quality-standards-0, accessed February 17, 2021.

2. Federal Regulations

The federal CAA, enacted in 1963 and amended several times thereafter (including the 1990 amendments), establishes the framework for modern air-pollution control. The CAA directs the EPA to establish National Ambient Air Quality Standards (NAAQS) for seven pollutants: ozone, CO, lead, NO_2, respirable particulate matter less than 10 microns in diameter (PM_{10}), fine particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and SO_2. The standards are divided into primary and secondary standards. Primary standards are designed to protect human health, including the health of "sensitive" populations, such as asthmatics, children, and the elderly, within an adequate margin of safety. Secondary standards are designed to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings.

The primary legislation that governs federal air quality regulations is the CAA amendments of 1990. The CAA amendments delegate primary responsibility for clean air to the EPA. The EPA develops rules and regulations to preserve and improve air quality, as well as to delegate specific responsibilities to State and local agencies.

Areas that do not meet the federal standards shown in Table 15-1 are called nonattainment areas. For these nonattainment areas, the CAA requires states to develop and adopt State Implementation Plans (SIPs), which are plans showing how air quality standards will be attained. SIPs, which are reviewed and approved by the EPA, must demonstrate how federal standards will be achieved. Failing to submit a plan or secure approval could lead to the denial of federal funding and permits for such improvements as highway construction and sewage-treatment plants. In California, the EPA has delegated authority to prepare SIPs to CARB, which, in turn, has delegated that authority to individual air districts. In cases in which an SIP is submitted by the State but fails to demonstrate achievement of the standards, the EPA is directed to prepare a federal implementation plan.

3. State Regulations

Responsibility for achieving California's air quality standards, which are more stringent than federal standards, is placed on CARB and local air districts and is to be achieved through district-level air quality management plans that will be incorporated into the SIPs. In California, the EPA has delegated authority to prepare SIPs to CARB, which in turn has delegated that authority to individual air districts.

CARB traditionally has established State air quality standards, maintaining oversight authority in air quality planning, developing programs for reducing emissions from motor vehicles, developing air-emission inventories, collecting air quality and meteorological data, and approving SIPs.

Responsibilities of air districts include overseeing stationary source emissions, approving permits, maintaining emissions inventories, maintaining air quality stations, overseeing agricultural burning permits, and reviewing air quality-related sections of environmental documents required by the California Environmental Quality Act (CEQA).

The CCAA of 1988 substantially added to the authority and responsibilities of air districts. The CCAA designates air districts as lead air quality planning agencies, requires air districts to prepare air quality plans, and grants air districts the authority to implement transportation control measures. The CCAA focuses on attainment of the CAAQS, which, for certain pollutants and averaging periods, are more stringent than the comparable federal standards.

The CCAA requires the designation of attainment and nonattainment areas with respect to CAAQS. The CCAA also requires that local and regional air districts expeditiously adopt and prepare an air quality attainment plan if the district violates State air quality standards for CO, SO_2, NO_2, PM_{10}, $PM_{2.5}$, or ozone. These clean-air plans are specifically designed to attain these standards and must be designed to achieve an annual five percent reduction in district-wide emissions of each nonattainment pollutant or its precursors. When an air district is unable to achieve a five-percent annual reduction, the adoption of "all feasible measures" on an expeditious schedule is acceptable as an alternative strategy.[1]

The CCAA requires that the State air quality standards be met as expeditiously as practicable, but, unlike the federal CAA, it does not set precise attainment deadlines. Instead, the act established increasingly stringent requirements for areas that will require more time to achieve the standards.

The CCAA emphasizes the control of "indirect and area-wide sources" of air-pollutant emissions. The CCAA gives local air-pollution control districts explicit authority to regulate indirect sources of air pollution and to establish transportation control measures (TCMs). The CCAA does not define indirect and area-wide sources. How-

[1] Health and Safety Code Section 40914[b][2].

ever, Section 110 of the federal CAA defines an indirect source as: "a facility, building, structure, installation, real property, road, or highway, which attracts, or may attract, mobile sources of pollution. Such term includes parking lots, parking garages, and other facilities subject to any measure for management of parking supply."

TCMs are defined in the CCAA as "any strategy to reduce trips, vehicle use, vehicle miles traveled, vehicle idling, or traffic congestion for the purpose of reducing vehicle emissions."

CARB's *Air Quality and Land Use Handbook: A Community Health Perspective*[2] provides recommendations for the siting of new sensitive land uses (including residences) near freeways, distribution centers, ports, refineries, chrome plating facilities, dry cleaners, and gasoline stations. The handbook recommends that new development be placed at distances from such facilities.

4. Butte County Air Quality Management District

The BCAQMD is the local air district responsible for local air quality regulation in Butte County. The BCAQMD's primary responsibility is to regulate stationary sources and develop plans to achieve and maintain air quality standards. CARB and the EPA have jurisdiction over controlling emissions from mobile sources. The BCAQMD has jurisdiction over air quality matters in Butte County. Formerly a department of the Butte County government, it is now an independent special district under California law.

BCAQMD's mission to improve air quality includes adopting and enforcing rules and regulations to attain and maintain air quality standards, issuing permits for and inspecting stationary sources of air pollutants, responding to citizen complaints, monitoring air quality and meteorological conditions, awarding grants to reduce mobile emissions, implementing public outreach campaigns, assisting Butte County jurisdictions in addressing climate change, and updating and evaluating consistency with the Northern Sacramento Valley Air Quality Attainment Plan.

The stationary "direct" sources of air contaminants over which the District has permit authority include, but are not limited to, power plants, gasoline stations, dry cleaners, internal combustion engines, and surface coating operations. BCAQMD does not, however, exercise permit authority over "indirect" emission sources. Indirect sources are contributors to air pollution and include facilities and land uses that

[2] California Air Resources Board. 2005, April. Air Quality and Land Use Handbook: A Community Health Perspective. https://ww3.arb.ca.gov/ch/handbook.pdf

may not emit significant amounts of pollution directly themselves, but are responsible for indirect emissions, such as:

- Motor vehicle trips attracted to or generated by a land use;
- On-site combustion of natural gas and propane for heating;
- Architectural coatings (paints, stains) and consumer products; and
- Landscape maintenance.

The BCAQMD works with the Butte County Association of Governments (BCAG) to ensure a coordinated approach in the development and implementation of transportation plans throughout the county. This coordination ensures compliance with pertinent provisions of the CAA and CCAA, as well as with related transportation legislation.

5. Air Quality Plans

The CCAA requires districts to adopt air quality attainment plans and to review and revise their plans to address deficiencies in interim measures of progress once every three years. The 2018 Triennial Air Quality Attainment Plan was created by the air districts within the Northern Sacramento Valley. The purpose of the plan is to achieve and maintain healthy air quality throughout the northern air basin. The plan addresses the progress made in implementing the original plan submitted to CARB in 1991 and has been updated every three years, most recently in 2018 and approved by the District' Governing Board in December 2019. The plan includes control strategies necessary to attain the California ozone standard at the earliest practicable date.[3]

6. Air Pollutants of Concern

a. Criteria Air Pollutants

The federal and State governments have established ambient air quality standards for the following seven criteria pollutants: ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. Ozone and NO_2 are generally considered "regional" pollutants, as these pollutants or their precursors affect air quality on a regional scale. Pollutants such as CO, SO_2,

[3] Basin Control Council (BCC). 2018, December 7. Northern Sacramento Valley Planning Area 2018 Triannual Air Quality Attainment Plan. Prepared by the Sacramento Valley Air Quality Engineering and Enforcement Professionals (SVAQEEP). https://bcaqmd.org/wp-content/uploads/2018-Triennial-Report-2.pdf, accessed February 17, 2021.

and lead are considered to be local pollutants that tend to accumulate in the air locally. Particulate matter is considered to be a localized pollutant as well as a regional pollutant. Within Butte County, CO, PM_{10}, $PM_{2.5}$, and ozone (O_3) are considered pollutants of concern. Brief descriptions of these pollutants are provided below, and a complete summary of State and national ambient air quality standards (CAAQS and NAAQS, respectively) is provided in Table 15-1. Additional information regarding the County's attainment status for these various pollutants, and regarding the major stationary and mobile sources of air pollution in Butte County, is provided in Section C.

i. Ozone (O_3)

Ozone is a photochemical oxidant and the major component of smog. Although O_3 in the upper atmosphere is essential to life by shielding the earth from harmful ultraviolet radiation from the sun, high concentrations of O_3 at ground level represent a significant health and environmental concern, capable of causing damage to lung tissue and plants. O_3 is formed when precursor emissions of volatile organic compounds (VOC)/reactive organic gases (ROGs) and oxides of nitrogen (NOx) react in the presence of sunlight and higher temperatures. Peak O_3 levels thus generally occur during warm periods. VOCs are emitted from sources as diverse as autos, chemical manufacturing, dry cleaners, paint shops and other sources using solvents. NOx results from fuel combustion occurring with transportation and industrial sources.[4]

ii. Particulate Matter (PM_{10} and $PM_{2.5}$)

Respirable PM is fine material, metal, soot, smoke, and dust particles suspended in the air. For health reasons, we are most concerned with inhalable particulate matter less than 10 micrometers in diameter (PM_{10}), and less than 2.5 micrometers in diameter ($PM_{2.5}$). Particles of these sizes can permanently lodge in the deepest and most sensitive areas of the lung, and can aggravate many respiratory illnesses including asthma, bronchitis, and emphysema. Sources of directly emitted particulates in Butte County include soil from farming, construction dust, paved road dust, smoke from residential wood combustion, and exhaust from mobile sources such as cars and trucks. The valley can also be impacted by agricultural and residential burning.[5]

[4] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

[5] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

iii. Carbon Monoxide (CO)

CO is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon during fuel combustion. When CO enters the bloodstream, it reduces the delivery of oxygen to the body's organs and tissues. Health threats are most serious for those who suffer from cardiovascular disease, particularly those with angina or peripheral vascular disease. Exposure to elevated CO levels can cause impairment of visual perception, manual dexterity, learning ability and performance of complex tasks.[6]

iv. Lead (Pb)

Lead exposure can occur through multiple pathways, including inhalation of air and ingestion of lead in food, water, soil, or dust. Excessive lead exposure can cause seizures, mental retardation and/or behavioral disorders; low doses of lead can lead to damage of the central nervous system. Lead may also be a factor in high blood pressure and subsequent heart disease.[7]

v. Nitrogen Dioxide (NO_2)

NO_2 is a brownish, highly reactive gas that is present in all urban atmospheres. NO_2 can irritate the lungs, cause bronchitis and pneumonia, and lower resistance to respiratory infections. Nitrogen oxides are an important precursor both to ozone (O_3) and acid rain, and may affect both terrestrial and aquatic ecosystems. NO_2 is primarily formed in the atmosphere by oxidation of the primary air pollutant nitric oxide (NOx) which, in turn, reacts in the atmosphere with VOCs to produce O_3. The two major emission sources for NOx, which forms when fuel is burned at high temperatures, are transportation and stationary fuel combustion sources such as electric utility and industrial boilers.[8]

[6] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

[7] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

[8] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

vi. Sulfur Dioxide (SO_2)

Sulfur dioxide affects breathing and may aggravate existing respiratory and cardiovascular disease in high doses. Sensitive populations include asthmatics, individuals with bronchitis or emphysema, children, and the elderly. SO_2 is also a primary contributor to acid deposition, or acid rain, which causes acidification of lakes and streams and can damage trees, crops, historic buildings, and statues. In addition, sulfur compounds in the air contribute to visibility impairment in large parts of the country. Ambient SO_2 results largely from stationary sources such as coal and oil combustion, steel mills, refineries, pulp and paper mills, and nonferrous smelters.[9]

b. Toxic Air Contaminants

Under the CAA, toxic air contaminants (TACs) are airborne pollutants that may be expected to result in an increase in mortality or serious illness or that may pose a present or potential hazard to human health. TACs are also referred to as toxic air pollutants or hazardous air pollutants.

Most air toxics originate from human-made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes, locomotives), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). Because it is not practical to eliminate all TACs, these compounds are regulated through risk management programs designed to eliminate, avoid, or minimize the risk of adverse health effects from exposure.

CARB regulates TACs under the California CAA. Under the federal CAA, the EPA regulates air toxic compounds as hazardous air pollutants, subject to various National Emission Standards for Hazardous Air Pollutants (NESHAPs). A chemical becomes a regulated TAC after it is identified by CARB's California Air Toxics Program or the EPA's National Air Toxics Assessments, analyzed for its potential for human exposure, and evaluated for its health effects on humans.

CARB maintains a list of approximately 200 toxic substances, including those identified by EPA and the California Air Toxics Program's TAC List, which may be accessed at: http://www.arb.ca.gov/toxics/id/taclist.htm.

[9] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

All federal air toxics are incorporated into the California lists by reference. In addition, California regulates a large number other substances not currently on the federal list. Key California-only air toxics related to large construction and transportation projects include diesel particulate matter (DPM) and naturally-occurring asbestos.

TACs include heavy metals, organic chemicals, pesticides, and radionuclides. Gaseous air toxics such as benzene are precursor VOCs that form ground-level ozone. Some common TACs include benzene (found in gasoline), perchloroethylene (emitted from some dry-cleaning facilities), and methylene chloride (used as a solvent and paint stripper). Other examples include dioxin, asbestos, toluene, and metals such as cadmium, mercury, chromium, and lead compounds.

Once emitted, TACs disperse through the atmosphere and, depending upon the TAC, meteorological conditions, and other factors, may expose people through various pathways, such as:

- Breathing contaminated air.
- Eating contaminated food products, such as fish from contaminated waters; meat, milk, or eggs from animals that feed on contaminated plants; and fruits and vegetables grown in contaminated soil on which air toxics have been deposited.
- Drinking water contaminated by toxic air pollutants.
- Ingesting contaminated soil. Young children are especially vulnerable because they often ingest soil from their hands or from objects they place in their mouths.
- Touching (making skin contact with) contaminated soil, dust, or water (e.g., during recreational use of contaminated water bodies).

Certain persistent TACs can accumulate in body tissues, leading to various health impacts.[10]

[10] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

C. Existing Conditions

1. Sacramento Valley Air Basin

CARB has delineated the jurisdiction of regional air basins and local air districts throughout the state. Butte County is located within the Sacramento Valley Air Basin (SVAB), comprising the northern half of California's 400-mile-long Great Central Valley. The SVAB encompasses approximately 14,994 square miles with a largely flat valley floor (excepting the Sutter Buttes), about 200 miles long and up to 150 miles wide, bordered on its east, north, and west by the Sierra Nevada, Cascade and Coast mountain ranges, respectively.

The SVAB, containing 11 counties and some 2 million people, is divided into two air quality planning areas based on the amount of pollutant transport from one area to the other and the level of emissions within each. Butte County is within the Northern Sacramento Valley Air Basin (NSVAB), which is composed of Butte, Colusa, Glenn, Shasta, Sutter, Tehama, and Yuba Counties.

Emissions from the urbanized portion of the basin (Sacramento, Yolo, Solano, and Placer Counties) dominate the emission inventory for the SVAB, and on-road motor vehicles are the primary source of emissions in the Sacramento metropolitan area. While pollutant concentrations have generally declined over the years, additional emission reductions will be needed to attain the State and national ambient air quality standards in the SVAB.

Air pollutants are not confined by jurisdictional boundaries as they disperse through the atmosphere. For example, depending upon the time of year and meteorological conditions, a significant share of Butte County's air pollutants may come from the Sacramento metropolitan area, which, in turn, may receive a share of its air pollutants from the San Francisco Bay Area or the San Joaquin Valley.[11]

2. Regional Climate and Meteorology

Seasonal weather patterns have a significant effect upon regional and local air quality. The Sacramento Valley and Butte County have a Mediterranean climate, characterized by hot, dry summers and cool, wet winters. Winter weather is governed by cyclonic storms from the North Pacific, while summer weather is typically subject to a high-pressure cell that deflects storms from the region.

[11] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

In Butte County, winters are generally mild with daytime average temperatures in the low 50s and nighttime temperatures in the upper 30s. Temperatures range from an average January low of approximately 36°F to an average July high of approximately 96°F, although periodic lower and higher temperatures are common. Rainfall between October and May averages about 26 inches but varies considerably year to year. Heavy snowfall often occurs in the northeastern mountainous portion of the County. Periodic rainstorms contrast with occasional stagnant weather and thick ground or "tule" fog in the moister, flatter parts of the valley. Winter winds generally come from the south, although north winds also occur.

Diminished air quality within Butte County largely results from local air pollution sources, transport of pollutants into the area from the south, the NSVAB topography, prevailing wind patterns, and certain inversion conditions that differ with the season. During the summer, sinking air forms a "lid" over the region, confining pollution within a shallow layer near the ground that leads to photochemical smog and visibility problems. During winter nights, air near the ground cools while the air above remains relatively warm, resulting in little air movement and localized pollution "hot spots" near emission sources. Carbon monoxide, nitrogen oxides, particulate matters and lead particulate concentrations tend to elevate during winter inversion conditions when little air movement may persist for weeks.

As a result, high levels of particulate matter (primarily $PM_{2.5}$) and ground-level ozone are the pollutants of most concern to the NSVAB Districts. Ground-level ozone, the principal component of smog, forms when ROG and NOx – together known as ozone precursor pollutants – react in strong sunlight. Ozone levels tend to be highest in Butte County during late spring through early fall, when sunlight is strong and constant, and emissions of the precursor pollutants are highest. [12]

3. Ambient Air Quality Conditions

Existing air quality conditions in Butte County can be characterized in terms of the ambient air quality standards that the federal and State governments have established for various pollutants, as shown in Table 15-1, and by monitoring data collected in the region. Monitoring data concentrations are typically expressed in terms of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$).

[12] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

The local air districts within the NSVAB (under the auspices of CARB) maintain 14 monitoring stations to continuously measure criteria air pollutants. In Butte County, CARB monitors air quality at the following stations: Chico (East Avenue); Paradise (4405 Airport Road and Paradise Theater); and Gridley (Cowee Avenue). The Paradise Theater and Gridley Cowee Avenue monitoring sites do not have official air quality data on record. The Paradise 4405 Airport Road site has data for ozone and the Chico East Avenue site has data for ozone, CO, NO_2, and PM.[13] Data from the Chico East Avenue site and the Paradise Airport monitoring stations are shown in Table 15-2 for the last three available years.

[13] Butte County Air Quality Management District. 2014, October 23. CEQA Air Quality Handbook, Guidelines for Assessing Air Quality and Greenhouse Gas Impacts for Projects Subject to CEQA Review.

TABLE 15-2 AMBIENT AIR QUALITY MONITORING DATA

	Chico			Paradise Airport Road		
Pollutant Standards	**2017**	**2018**	**2019**	**2017**	**2018**	**2019**
Ozone						
State 1-Hour ≥ 0.09 ppm	0	0	0	0	2	0
State/Federal 8-hour ≥ 0.070 ppm	0	0	0	17	20	0
Maximum 1-Hour Conc. (ppm)	0.076	0.076	0.072	0.091	0.108	0.075
Maximum 8-Hour Conc. (ppm	0.069	0.069	0.063	0.080	0.098	0.069
Nitrogen Dioxide (NO_2)						
State 1-Hour ≥ 0.18 (ppm)	0	0	0	n/a	n/a	n/a
Maximum 1-Hour Conc. (ppb)	37.5	51.9	42.1	n/a	n/a	n/a
Particulate Matter (PM10)						
State 24-Hour ≥ 50 μg/m³	14	40	4	n/a	n/a	n/a
Federal 24-Hour ≥ 150 μg/m³	0	9	0	n/a	n/a	n/a
Maximum 24-Hour Conc. (μg/m³)	101.4	478.7	55.7	n/a	n/a	n/a
Particulate Matter (PM2.5)						
Federal 24-Hour ≥ 35 μg/m³	2	18	0	n/a	n/a	n/a
Maximum 24-Hour Conc. (μg/m³)	47.0	417.0	34.6	n/a	n/a	n/a

Notes: ppm = parts per million; ppb = parts per billion; μg/m3 = micrograms per cubic meter; * = insufficient data; n/a = Not Available
Data may include exceptional events (e.g., wildfires).
Source: California Air Resources Board, 2021, Air Pollution Data Monitoring Cards (2017, 2018 and 2019). http://www.arb.ca.gov/adam/index.html, accessed February 18, 2021.

4. Attainment Status and Air Quality Planning

If monitored pollutant concentrations meet State or federal standards over a designated period of time, the area is classified as being in attainment for that pollutant. If monitored pollutant concentrations violate the standards, the area is considered a nonattainment area for that pollutant. If data are insufficient to determine whether a pollutant is violating the standard, the area is designated unclassified. Attainment status for various pollutants is summarized in Table 15-3.

TABLE 15-3 STATE AND FEDERAL ATTAINMENT DESIGNATIONS FOR BUTTE COUNTY

Pollutant	Federal Standards	State Standards
1-hour ozone	No Standard [a]	Nonattainment
8-hour ozone	Nonattainment	Nonattainment
Carbon monoxide (CO)	Attainment	Attainment
Nitrogen dioxide (NO_2)	Attainment	Attainment
Sulfur dioxide	Attainment	Attainment
24-hour Inhalable particulate matter (PM_{10})	Attainment	Nonattainment
24-hour Inhalable particulate matter ($PM_{2.5}$)	Attainment	No Standard
Annual Inhalable particulate matter (PM_{10})	No Standard	Attainment
Annual Inhalable particulate matter ($PM_{2.5}$)	Attainment	Nonattainment

Notes: n/a = not applicable.
[a] The federal ozone 1-hour standard was revoked by the EPA and is no longer applicable for federal standards.
Source: Butte County AQMD. 2018. Air Quality Standards & Air Pollutants. https://bcaqmd.org/planning/air-quality-standards-air-pollutants/ Accessed February 17, 2021.

5. Existing Air Quality Inventory

Butte County is home to many industries, processes, and actions that generate emissions of criteria pollutants. CARB compiles an emissions inventory for all sources of emissions within the county as part of the SIP. This inventory is used by the BCAQMD and CARB for regional air quality planning purposes, and is the basis for the region's air quality plans, and includes such sources as *stationary sources* (e.g., fuel combustion, waste disposal/landfills, industrial petroleum production and marketing, and industrial/mineral processes), *area-wide sources* (e.g. cleaning and surface coating, solvent evaporation, and miscellaneous processes such as farming operations, construction/demolition activities, and residential fuel combustion), *mobile sources* (e.g., on-road motor vehicles and other mobile sources such as aircraft, trains, and

off-road equipment), and *natural sources* (e.g., biogenic sources, geogenic sources, and wildfires). A summary of emissions of criteria pollutants for 2019 is provided in Table 15-4.

TABLE 15-4 2019 BUTTE COUNTY AIR QUALITY MANAGEMENT DISTRICT AIR QUALITY INVENTORY

	Annual Emissions (Tons Per Year)					
Source Type Subcategory	**ROG**	**CO**	**NO_x**	**SO_x**	**PM_{10}**	**$PM_{2.5}$**
Stationary Sources						
Fuel Combustion	0.2445	7.3963	1.5272	0.086	0.1943	0.0996
Petroleum Production and Marketing	0.4704	0.0149	0.0098	0	0.0006	0.0006
Industrial Processes	0.0785	0.0138	0.0583	0.0156	3.1347	0.9085
Waste Disposal	0.2431	0.0219	0.0181	0.0022	0.0512	0.0109
Area-Wide Sources						
Cleaning and Surface Coating	1.0299	0.0004	0.0011	0	0	0
Miscellaneous Processes	3.3178	20.9149	1.12	0.1142	15.0972	4.207
Solvent Evaporation	2.8689	0	0	0	0	0
Mobile Sources						
On-Road Motor Vehicles	1.7535	12.9089	5.2186	0.029	0.3637	0.1695
Other Mobile Sources	2.0584	15.4417	4.7074	0.0365	0.2877	0.2556
Natural Sources						
Natural Sources	142.366	0	0	0.5891	11.0285	9.3449
Butte County Total	**154.431**	**56.7128**	**12.6605**	**0.8726**	**30.1579**	**14.9966**

Notes:
Source: California Air Resources Board 2018, July 18. California Emissions Projection Analysis Model (CEPAM). 2016 SIP Standard Emissions Tool. Emissions Projections By Summary Category Base Year: 2012. https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssum-cat2016.php?_ga=2.54144430.769138297.1613597872-2090683374.1613240111, accessed February 18, 2021.

6. Agricultural Open Burning

Agricultural open burning has been an important waste management tool for farmers as well as forest and wildland managers in Butte County. Such burning helps farmers remove crop residues left in the field after harvesting grains such as rice, wheat or corn, and for orchard prunings and removal. Burning is also helpful in removing weeds, preventing disease, and controlling pests. For some crops, particularly rice, the burning of straw or stubble is the most efficient and effective way to control disease. In the Sacramento Valley, rice has historically accounted for the majority of local agricultural burning, with corn and wheat close behind.

Agricultural burning is not prohibited under state law but CARB and local air districts strictly regulate this activity. As part of the effort to reduce air pollution in the SVAB, agricultural burning is controlled through a process of permits, rules, and regulations. Penalties for violating California air pollution regulations can be expensive—as much as $50,000 per day. Keeping agricultural burning operations within the legal requirements not only avoids costly penalties, but also helps provide a healthier environment for the public.

In addition to a fire agency-issued burn permit, a BCAQMD Burn Permit is required for burning agricultural waste; land clearing waste; or levee, ditch, timber harvesting operations, prescribed burning, and right-of-way clearing waste.. Burning is allowed only on permissive burn days, when forecasted weather conditions create enough air movement to permit good smoke dispersal. CARB determines permissive burn days and the number of acres allocated for agricultural and open burning based on meteorological and air quality factors. When conditions have been met, CARB authorizes burning in the SVAB. Burning is also restricted to certain times of the day. All burn permit holders must comply with local fire protection agency permit requirements.

The BCAQMD handles the day-to-day implementation of the agricultural burning program by issuing burn permits, informing growers and land managers of when and how much they can burn, conducting complaint investigations, conducting enforcement procedures in violation cases, and publishing educational materials on air quality issues.

The Rice Straw Burning Reduction Act was enacted in 1991 by the California Legislature to phase down—but not phase out—burning of rice straw in the Sacramento Valley Air Basin. Beginning in 2001, rice straw burning was limited to 25 percent of the planted acres. To burn, however, growers must show proof of crop loss due to disease, and only 125,000 acres per year will be allocated basinwide. Because of the phase down, growers are seeking alternatives to burning.

Aside from burning related directly to agricultural processes, burning activities in Butte County also pertain to the operation or maintenance of water delivery systems, wildland burning, forest management burning including silviculture and timber operations, and prescribed burning.

7. Residential/Dooryard Open Burning

Residential or "dooryard" burning is the burning of vegetative waste in a 4-foot by 4-foot pile and is regulated by local, state, and federal fire protection agencies as well as the BCAQMD. It is allowed only on permissible burn days, as determined by the

BCAQMD. Before burning in Butte County, individuals must check the burn day status on the day that they are burning by calling 530-332-9407 (toll free: 855-332-9407) or by going to www.bcaqmd.org. Commercial entities are allowed to use open burning if the burning is performed for the purpose of fire hazard reduction to comply with local fire agencies, commercial land clearing for future development and sale or fire hazard reduction.

Only vegetative waste or *clean* dry paper products may be burned in accordance with local fire agency requirements. District Rule 300 and State law prohibit the burning of garbage, tires, trash, construction materials, plastic, bedding or furniture, paint, rubber, cotton, wool, petroleum products, other similar smoke or toxic fume producing items, and fireworks.

CARB has identified smoke and ash from burning residential waste as contributors of toxic air pollutants. As a result, CARB adopted the Residential Waste Burning Airborne Toxic Control Measure. The regulation restricts residential burning statewide to the burning of dry, natural vegetation and prohibits the use of burn barrels. Burn barrels have been prohibited because they were found to contain household garbage that produces toxic smoke and fumes when burned.

8. Wildfires and Air Quality

As a source of air pollution, smoke can pose a threat to human respiratory systems. Smoke particles are very small droplets of condensed organic vapors, unburned fuel, soot, and ash that escape from fire. These can cause and aggravate lung damage, chronic lung disease, and cancer. Smoke contains ozone-forming compounds (volatile organic compounds and oxides of nitrogen) and significant amounts of fine particles and other pollutants. Toxic residue from compounds in smoke can remain in the air for weeks; if inhaled, it can lodge deep in the lungs, causing irritation and coughing.

The major air pollutant of concern during wildfire events is fine particulate matter, also known as $PM_{2.5}$. While all persons may experience varying degrees of symptoms, the more sensitive individuals, such as the young, the elderly, pregnant women, smokers, and those with respiratory conditions, are of greatest risk at experiencing more aggravated symptoms. These symptoms may include, but are not limited to coughing, watery and itchy eyes, and difficulty in breathing.[14]

[14] Butte County Air Quality Management District. 2021, accessed. Wildfires and Air Quality. https://bcaqmd.org/resources-education/wildfires/