9. Air Quality

As part of GHD's scope of work, climate change greenhouse gas emissions will be estimated using the Emissions Calculator developed for the California Transportation Commissions (CATC) by California Air Resources Board (CARB) for competitive grant ATP and SB1 programs. The greenhouse gas (GHG) emission results will provide quantitative information that will supplement qualitative assessment of climate preparedness and infrastructure asset protection.

According to Fresno Council of Government's *Draft 2019 Conformity Analysis*, the San Joaquin Valley currently violates both the 2008 and 2015 ozone standards. The U.S. Environmental Protection Agency (EPA) and Federal Highway Administration (FHWA) have indicated that the San Joaquin Valley currently also violates both the 1997 annual and 24-hour, the 2012 annual PM2.5 standards and the 2006 24-hour PM2.5 standards. Since the RTTAP study area lies within the San Joaquin Valley boundaries, it is considered as a nonattainment area. In other words, it is considered as an area in the county that meet or violate air quality standards.

Laws

The following bills pertain to the RTTAP study area:

Assembly Bill 32

Assembly Bill 32[1] requires California to adopt a statewide greenhouse gas emissions limit equivalent to the statewide GHG emissions levels in 1990 to be achieved by 2020—a reduction of approximately 15% below emissions expected under a "business as usual" scenario[2]. Full implementation of AB 32 will help mitigate risks associated with climate change, while improving energy efficiency, expanding the use of renewable energy resources, cleaner transportation, and reducing waste. The bill requires the state board to monitor compliance with and enforce any rule, regulation, order, emission limitation, emissions reduction measure, or market-based compliance mechanism adopted by the state board, pursuant to specified provisions of existing law.

Assembly Bill 32 describes the following problems for California:

- Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.

[1] Assembly Bill No. 32 Chapter 488 (2006)

[2] California Air Resources Board *Assembly Bill 32 Overview*

- Global warming will have detrimental effects on some of California's largest industries, including agriculture, wine, tourism, skiing, recreational and commercial fishing, and forestry. It will also increase the strain on electricity supplies necessary to meet the demand for summer air-conditioning in the hottest parts of the state.

Senate Bill No. 375

The transportation sector is the largest contributor of greenhouse gases[3] as it contributes over 40% of California's GHG emissions; automobiles and light trucks contributing almost 30% alone. Senate Bill 375 seeks to reduce GHG emissions from vehicle trips by changing growth patterns in a way that reduces overall driving. Greenhouse gas emissions from automobiles and light trucks can be substantially reduced by new technology and by the increased use of low carbon fuel. However, even taking these measures into account, it will be necessary to achieve significant additional greenhouse gas reductions from changed land use patterns and improved transportation. SB 375 integrates land use, regional transportation plans and housing allocation to decrease GHG emissions from automobiles and light trucks. Without improved land use and transportation policy, California will not be achieve the goals of AB 32. Changes in the land use and transportation policy, based upon established modeling methodology, will provide significant assistance to California's goals to implement the federal state and Clean Air Acts and to reduce its dependence on petroleum.

SB 375 addresses that the planning models and analytical techniques used for making transportation infrastructure decisions and for air quality planning should be able to assess the effects of policy choices, such as residential development patterns expanded transit service and accessibility, the walkability of communities, and the use of economic incentive and disincentives. In addition, Section 65080 of the Government Code states that each transportation planning agency designated under Section 29532 or 29532.1 should prepare and adopt a regional transportation plan directed at achieving a coordinated and balanced regional transportation system, including, but not limited to, mass transportation, highway, railroad, bicycle, pedestrian, and goods movement. Each transportation planning agency shall consider and incorporate, as appropriate, the transportation plans of cities, counties, districts, private organizations, and state and federal agencies.

The policy element of transportation planning agencies with populations that exceed 200,000 people may qualify a set of indicators including, but not limited to, all of the following:

- Measures of mobility and traffic congestion, including, but not limited to, daily vehicle hours of delay per capita and vehicles miles traveled per capita.
- Measures of road and bridge maintenance and rehabilitation needs, including, but not limited to, roadway pavement and bridge conditions.
- Measures of means travel, including, but not limited to, percentage share trips (work and non-work) made by all of the following:

[3] Senate Bill No. 375 Chapter 728 (2008)

  - Single occupant vehicle.
  - Multiple occupant vehicle or carpool.
  - Public transit including commuter rail and intercity rail.
  - Walking.
  - Bicycling.
- Measures of safety and security, including, but not limited to, total injuries and fatalities assigned to each of the modes set forth above (bullet #3).
- Measures of equity and accessibility, including, but not limited to, percentage of the population served by frequent and reliable public transit, with a breakdown by income bracket, and percentage of all jobs accessible by frequent and reliable public transit service, with a breakdown by income bracket.

Senate Bill No. 743

Following the adoption of Chapter 728 of the Statues of 2008[4], popularly known as Sustainable Communities and Climate Protection Act of 2008, the Legislature signaled its commitment to encourage land use and transportation planning decisions and investments that reduce vehicle miles traveled and contribute to the reductions in GHG emissions required in the California Global Warming Solutions Act of 2006 (Divisions 25.5 (commencing with Section 38500) of the Health and Safety Code). Similarly, the California Complete Streets Act of 2008 (Chapter 657 of the Statues of 2008) requires governments to plan for a balanced multimodal transportation network that meets the needs of all users of streets, roads, and highways for safe and convenient travel.

CEQA requires that environmental impacts of development projects be identified and mitigated. The act guarantees the public on opportunity to review and comment on the environmental impacts of a project and to participate meaningfully in development of mitigation measures for potentially significant environmental impacts. New methodologies under CEQA are needed for evaluating transportation impacts that are better able to promote the state's goals of reducing greenhouse gas emissions and traffic-related air pollutions, promoting the development of a multimodal transportation system, and providing clean, efficient access to destinations.

SB 743 is intended to ensure that the environmental impacts to traffic, such as noise, air pollution, and safety concerns, continue to properly address and mitigate through CEQA and more appropriately balance the needs of congestion management with statewide goals related to infill development, promotion of public health through active transportation, and reduction of GHG emissions. From Section 65088.4 of the Government Code, the intention of the Legislature is to balance the need for level of service standards for traffic with the need to build infill housing and mixed use commercial developments within walking distance of mass transit facilities, downtowns, and town centers and to provide greater flexibility to local governments to balance these competing goods.

[4] Senate Bill No.743 Chapter 386 (2013)

New Guidelines under CEQA

A recent news article written by Sunny Tsou, “New Guidelines for Assessing Transportation Impacts Under CEQA Finalized”, discusses the new guidelines for transportation impacts assessments and its new Technical Advisory. By July 1, 2020, all California Environmental Quality Act (CEQA) lead agencies must analyze project transportation impacts using vehicle miles traveled (VMT). VMT measures the per capita of car trips generated by a project and distances cars will travel to and from a project, rather than congestion levels at intersections. Under CEQA, VMT is used to assess a project’s impact on GHG emissions, air quality, and energy. This will emphasize the reduction of the number of trips and distances vehicles are used to travel to, from, or within a development project. Ultimately, the shift to VMT analysis under CEQA is intended to encourage the development of jobs, housing, and commercial uses in closer proximity to each other and to transit.

As for the Technical Advisory, they will be an important reference for agencies in determining how to calculate VMT, setting significance thresholds, and identifying mitigation measures. Globally, the Technical Advisory suggests that agencies use consistent methodologies for setting thresholds, estimating project VMT, and estimating reductions from mitigations. They also provide guidance for setting screening thresholds and thresholds of significance.

- As stated by the new Guideline, projects within one-half mile of a major transit stop or high-quality transit corridor should be presumed to result in less-than-significant impact.
- Small projects that generate fewer than 110 trips per day may generally be assumed to cause a less-than-significant transportation impact.
- Agencies may develop map-based screening for residential and office projects where projected located near areas with low VMT may be presumed to have a less-than-significant transportation impact.
- Residential projects that result in per capita VMT that exceeds 85% of existing regional or city average VMT may indicate a significant impact.
- Office projects that result in per employee VMT that exceeds 85% of existing regional average VMT may indicate a significant impact.
- With retail projects, the Technical Advisory recommends that the analysis should be based on total change in VMT because retail projects usually re-route from other retail destinations.

Ambient Air Quality Standards

Ambient air quality standards (AAQS) define clean air, and are established to protect the health of the most sensitive group in communities. Air quality standard defines the maximum amount of a pollutant averaged over a specified period of time that can be present in outdoor air without any harmful effects on people or the environment.

In 1959, California enacted legislation requiring the State Department of Public Health to establish air quality standards and necessary controls for motor vehicle emissions. California law continues to mandate California ambient air quality standards (CAAQS), which are often more stringent than national standards. The California Legislature directed the State Department of Public Health to

develop CAAQS. The Air Resources Board was created by the legislature in 1967, and the CCAQS that had been set by the Department of Public Health were subsequently adopted by the Air Resources Board (ARB) in 1969. Therefore, the CAAQS predate the national ambient air quality standards (NAAQS) set by the EPA, issued in 1971. California now continues to mandate CAAQS even though attainment of the NAAQS has precedence over attainment of the CAAQS due to federal penalties for failure to meet federal attainment deadlines.

The Clean Air Act Amendments of 1970 instructs the EPA to set primary NAAQS to protect public health, and secondary NAAQS to protect plants, forest, crops and materials from damage to exposure to six air pollutants: particulate matter, ozone, nitrogen oxides, sulfur oxides, carbon monoxide, and lead.

The following table (Ambient Air Quality Standards) shows NAAQS and CAAQS. Highlighted pollutants are currently exceeding the standard threshold in Fresno County. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone 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 $PM_{2.5}$, the 24 hour standard is attained when 98% of the daily concentrations, averaged over three years, are equal to or less than the standard[5]. The following sections will go over the classification of over exceeded criteria pollutants.

[5] California Air Resources Board *California Ambient Air Quality Standards*

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[11]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[11]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 14	Beta Attenuation and Transmittance through Filter Tape	**No National Standards**		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

California Air Resources Board

Major Pollutants

The EPA periodically reviews and establishes health-based national air quality standards for ozone, particulates, and other criteria air pollutants guided by the Clean Air Act. The San Joaquin Valley Air Pollution Control District has adopted several air quality attainment plans over the years that identify measures needed in the Valley to attain EPA's increasingly stringent NAAQS (U.S. National Ambient Air Quality Standards). The District has implemented plans and adopted over 600 rules that have resulted in significant emissions reduction.

The plans include emissions inventories that indent sources of air pollutants, evaluations for feasibility of implementing potential opportunities to reduce emissions, sophisticated computer modeling to estimate future levels of pollution, and strategy for how air pollutions will further reduced. District plans include, and not limited to, eco-driving, encouraging cleaner methods of generating electrical energy and mechanical power, and supporting urban heat island mitigation efforts. As a result of the District's stringent and comprehensive air quality management strategy with significant investments made by Valley businesses and residents, PM2.5 and ozone levels are now at historically low levels and providing Valley residents with the associated health benefits.

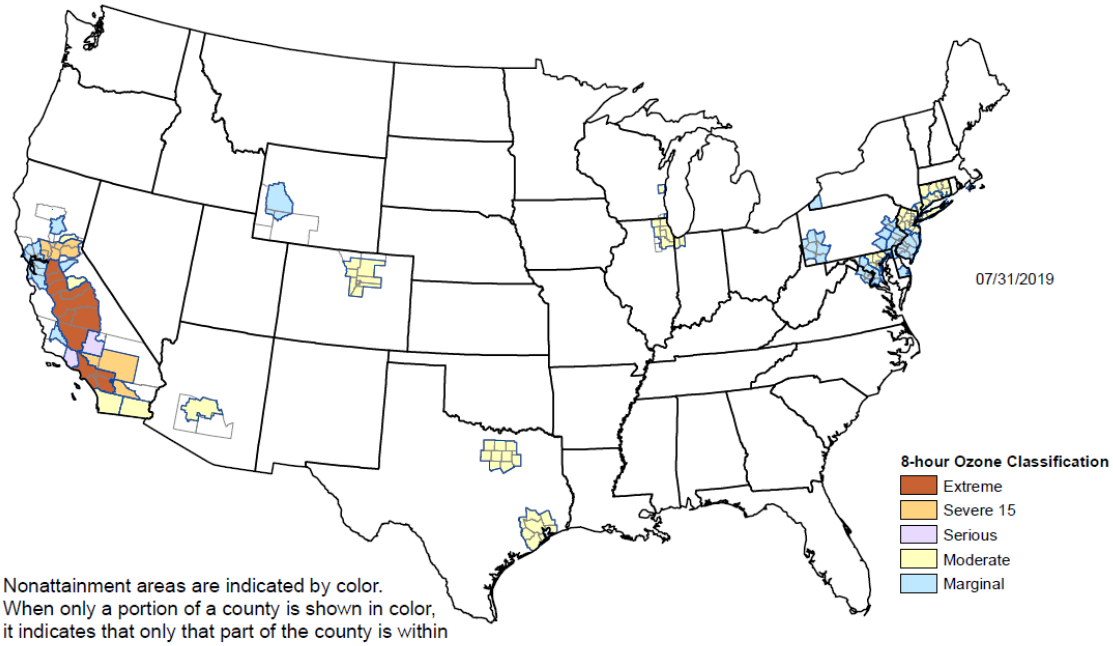
Ozone

Ozone is an important component to smog[6]. It is a highly reactive and unstable gas capable of damaging living cells, such as those present in the lining of the human lungs. Ozone is formed in the atmosphere though chemical reactions between pollutants emitted from vehicles, factories and other industrial sources, fossil fuels, combustion, consumer products, evaporation of paints, and many other sources. Hydrocarbon and nitrogen oxide gases react in the presence of sunlight to form ozone. Air quality regulators are concerned about ozone pollution because of its effects on public health and the environment.

CARB has approved an 8-hour standard for ozone of 0.070 (part per million) ppm and retained the 1-hour 0.09 ppm standard previously established in 1987. According to "California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants", Fresno County ozone levels for the year of 2019 is classified as "extreme" for both 2008 8-hour standards and 2015 8-hour standards. The following diagrams, from the EPA's website, shows the 2008 and 2015 8-hour ozone classifications for 2019.

[6] California Air Resources Board *Ozone & Health*

8-Hour Ozone Nonattainment Areas (2008 Standard)

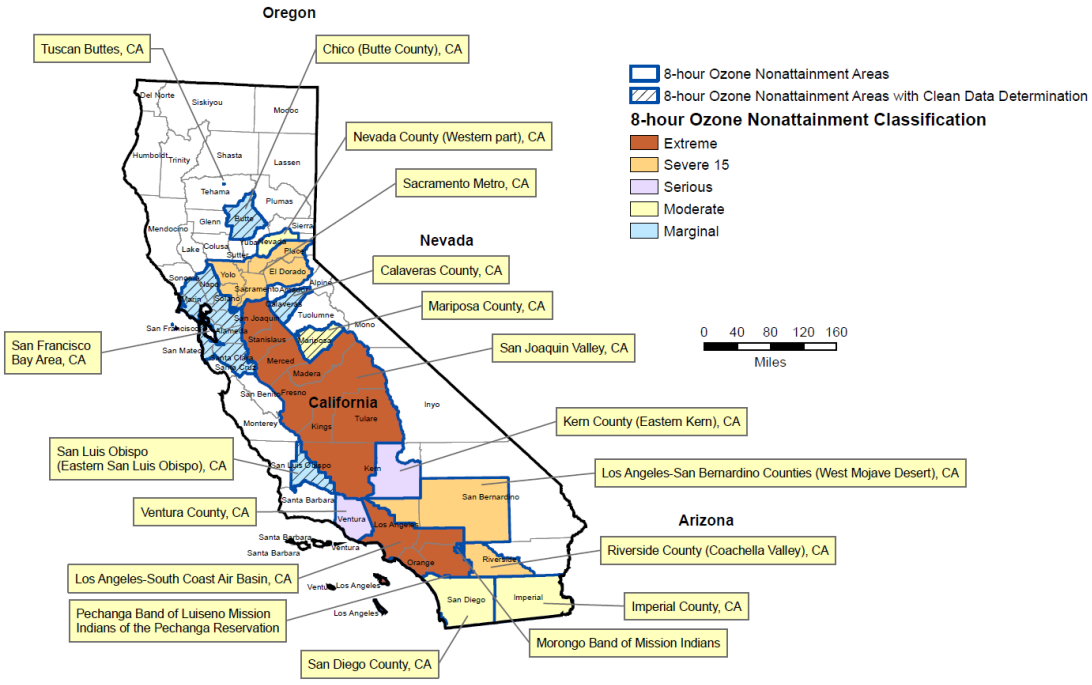


Nonattainment areas are indicated by color.
When only a portion of a county is shown in color, it indicates that only that part of the county is within a nonattainment area boundary.

For the 8-hour Ozone (2008) Washington, DC-MD-VA nonattainment area, the Maryland and Virginia portions were redesignated on May 15, 2019. The DC portion has not been redesignated.
The entire area is not considered in maintenance until all states in a multi-state area are redesignated.

California 8-hour Ozone Nonattainment Areas (2008 Standard)

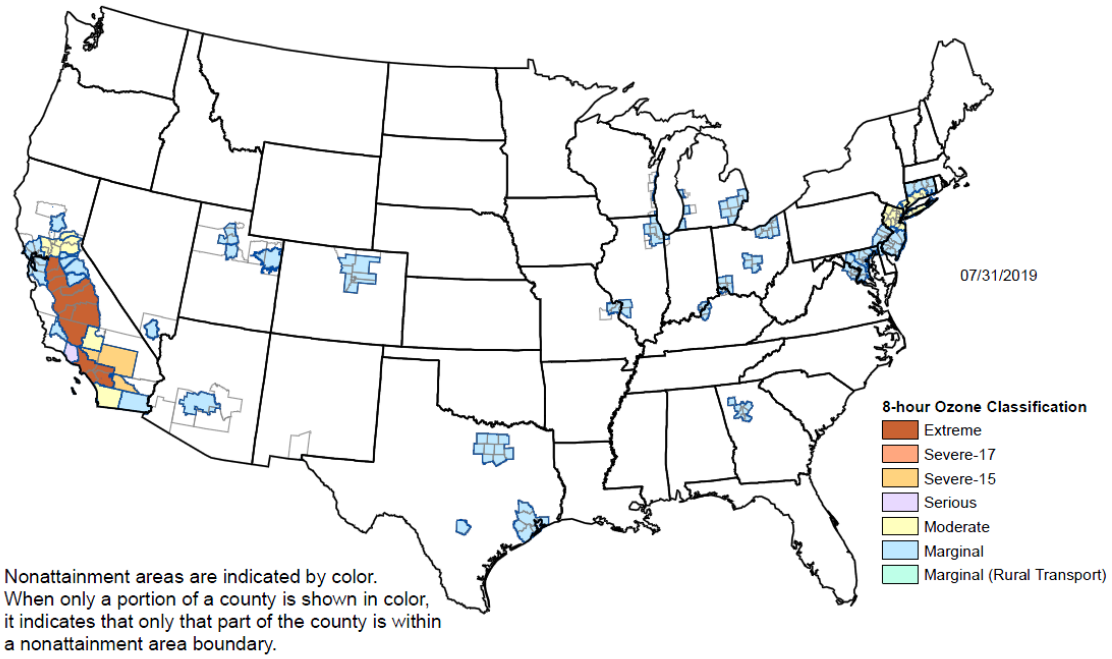
07/31/2019



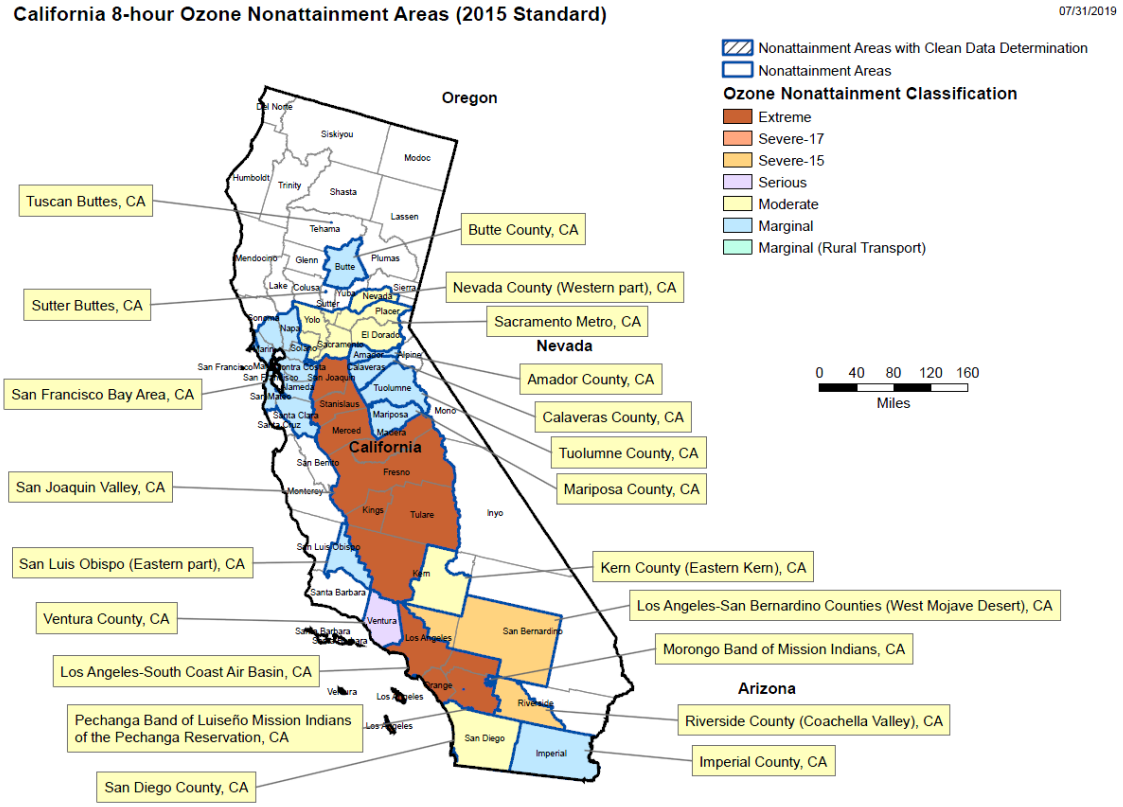
EPA: Green Book 8-Hour Ozone (2008) Area information

Existing Conditions – Air Quality

8-Hour Ozone Nonattainment Areas (2015 Standard)



California 8-hour Ozone Nonattainment Areas (2015 Standard)



EPA: Green Book 8-Hour Ozone (2015) Area information

PM 2.5

Defined by EPA, PM2.5 are fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller. Particle matter may be either emitted from source (primary particles) or formed in the atmosphere through chemical reactions of gases (secondary particles) such as sulfur dioxide (SO_2), nitrogen oxides (NO_x), and certain organic compounds. These organic compounds can be emitted by both natural sources, such as trees and vegetation, as well as from man-made sources, such as industrial processes and motor vehicle exhaust[7].

CARB is concerned about air-borne particles because of their effects on the health of Californians and the environment. Fine particles (PM2.5) are the main cause of reduced visibility in parts of the United States, including many national parks and wilderness areas, and are also adversely affect climate, ecosystems and materials. PM2.5 affects visibility by altering the way light is absorbed and scattered in the atmosphere.

Ambient air quality standards define the maximum amount of pollutant that can be present in outdoor air without harming human health. In 2002, the Board adopted a new annual average standard for PM2.5 ppm. The national annual average PM2.5 standard was most recently revised in 2012 following an exhaustive review of new literature pointed to evidence for increased risk of premature mortality at lower PM2.5 concentrations than the existing standard. In 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$.

According to “California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants”, Fresno County PM2.5 levels for the year of 2019 is classified as “serious” for both 1997 and 2006 standards, and “moderate” for 2012 standards. The following diagrams, from the EPA’s website, shows the 1997, 2006, and 2012 PM2.5 classifications for 2019.

[7] California Air Resources Board *Inhalable Particulate Matter and Health (PM2.5 and PM10)*

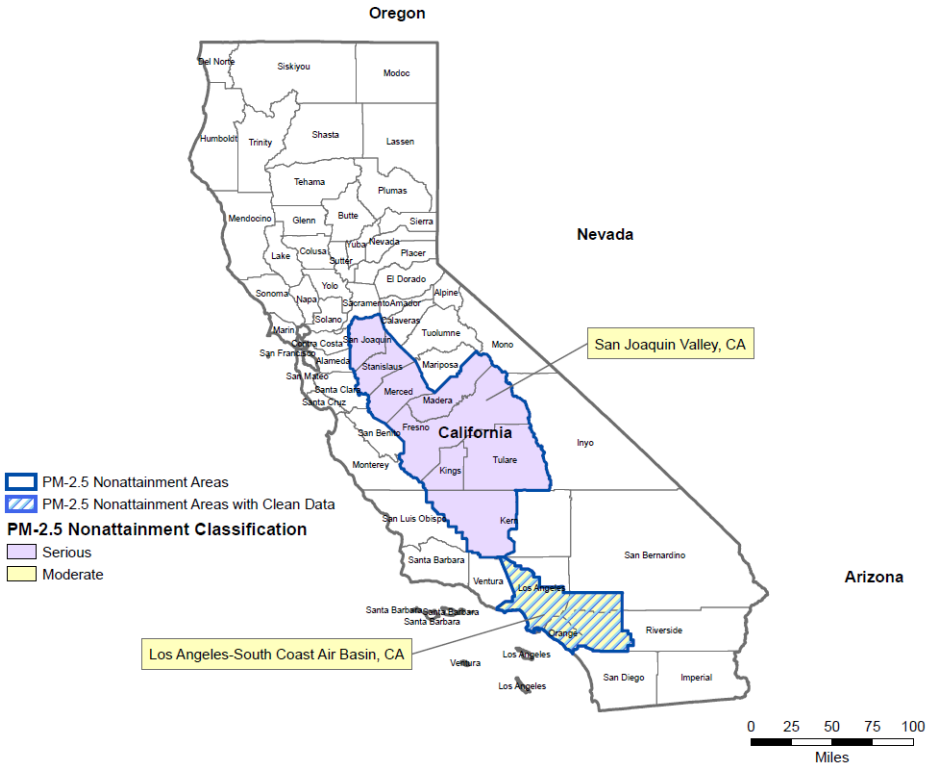
PM-2.5 Nonattainment Areas (1997 Standard)

Nonattainment areas are indicated by color.
When only a portion of a county is shown in color,
it indicates that only that part of the county is within
a nonattainment area boundary.

07/31/2019

California PM-2.5 Nonattainment Areas (1997 Standard)

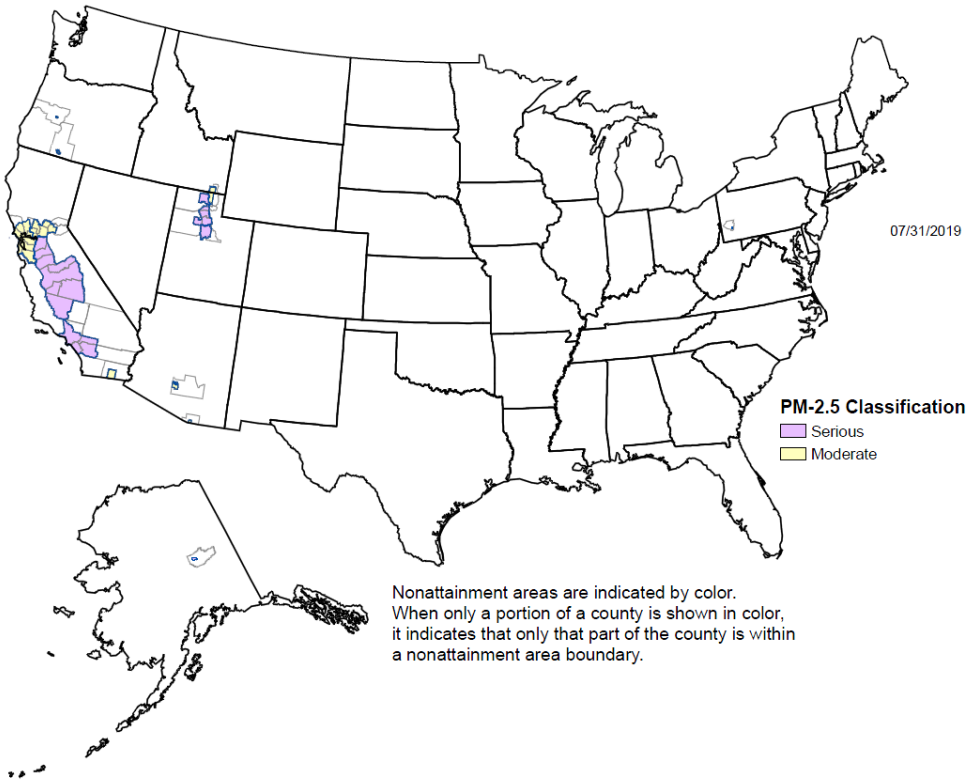
07/31/2019



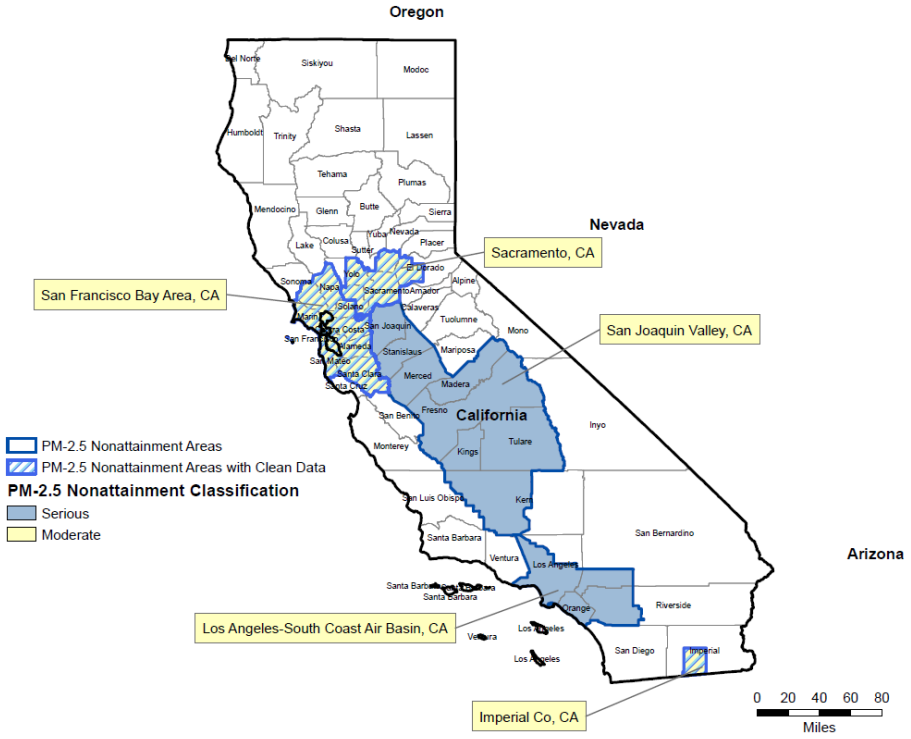
EPA: Green Book PM-2.5 (1997) Area information

Existing Conditions – Air Quality

PM-2.5 Nonattainment Areas (2006 Standard)



California PM-2.5 Nonattainment Areas (2006 Standard) 07/31/2019



EPA: Green Book PM-2.5 (2006) Area information

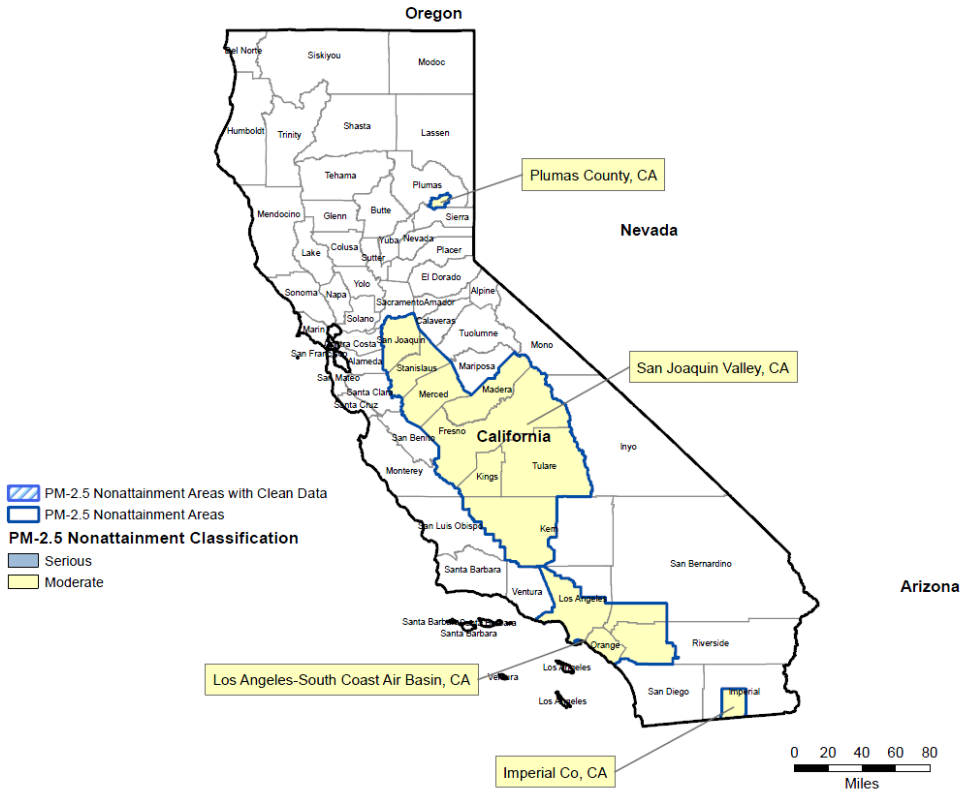
Existing Conditions – Air Quality

PM-2.5 Nonattainment Areas (2012 Standard)

Nonattainment areas are indicated by color.
When only a portion of a county is shown in color,
it indicates that only that part of the county is within
a nonattainment area boundary.

California PM-2.5 Nonattainment Areas (2012 Standard)

07/31/2019



EPA: Green Book PM-2.5 (2012) Area information

Existing Conditions – Air Quality

Environmental Justice

Environmental justice, as stated by EPA, is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement or environmental laws, regulations, and policies. In other words, no group of people should bear a disproportionate share of the negative environmental consequences resulting from industrial, governmental and commercial operations or policies. This goal will be achieved when everyone enjoys the same degree of protection from environmental and health hazards, and equal access to the decision-making process to have a healthy environment in which to live, learn, and work.

According to the Federal Transit Administration website, there has been an increasing concern over environmental impacts in minority and low-income populations. Evidence suggests that some communities face disproportionately high and adverse human health and environmental effects. Environmental justice builds upon Title VI of the Civil Rights Act of 1964 (42 U.S.C 2000d) that requires nondiscrimination in federally assisted programs by emphasizing the need to identify and address disproportionate effects of federal programs, policies, and activities.

EPA[8] has come up with the EJ 2020 Action Agenda (EJ 2020), the U.S. Environmental Protection Agency's 2016-2020 strategic plan for advancing environmental justice. This plan focuses on the environmental and public health and challenges confronting the nation's minority, low-income, tribal and indigenous populations. EJ 2020 builds on the foundation established by EPA's Plan EJ 2014, as well as decades of significant environmental justice practice by the Agency, communities and partners. Through Plan EJ 214, EPA developed a comprehensive suite of basic guidance and tools that integrate environmental justice in EPA's programs and policies.

By 2020, it is envisioned that EPA integrates environmental justice into everything we do, cultivates strong partnerships to improve on-the-ground results, and charts a path forward for achieving better environmental outcomes and reducing disparities in the nation's most overburdened communities. Achieving this vision will help make out vulnerable, environmentally burdened, and economically disadvantaged communities healthier, cleaner and more sustainable places in which to live, work, play, and learn.

To achieve the vison for 2020, EPA will focus on a set of priorities that the Agency has identified for high-level attention over the next five years to strategically move EPA's environmental justice to the next level. The priorities are structured around these three goals:

- Deepen environmental justice practice within EPA programs to improve the health and environment of overburdened communities;
- Work with partners to expand our positive within overburdened communities; and
- Demonstrate progress on significant national environmental justice challenges.

[8] U.S. Environmental Protection Agency *Environmental Justice*

Overall, through EJ 2020, EPA will advance our environmental justice efforts to a new level in improving the health and environment of overburdened communities.