



air pollution control district
SANTA BARBARA COUNTY

Annual Air Quality Report

2021

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1 2021 AIR QUALITY SUMMARY

This annual report provides information on the measured air quality concentrations in Santa Barbara County for 2021, as well as information on air quality trends. The report is available for download at the District website, www.ourair.org/air-monitoring.

- This section provides a summary of the air quality in 2021.
- Air quality standards and monitoring station locations are discussed in Section 2.
- Detailed air quality data for 2021 are provided in Section 3 for gaseous pollutants, and Section 4 for particulate matter.
- Section 5 includes a discussion of air quality trends.

In 2021, California experienced numerous wildfires and extended periods of high temperatures – both of which can result in increased air pollution. Even though California had nearly 10,000 fires that burned a record-setting 4.4 million acres in 2021, air quality in Santa Barbara County was much better in 2021 than the prior year. Smoke from the 2020 fires created conditions where Santa Barbara County’s air quality became unhealthy for several days of the year. In 2021, however, the state 24-hour PM₁₀ standard of 50 µg/m³ was only exceeded on October 11, 2021 at three different stations: Las Flores Canyon, Lompoc H Street, and Santa Barbara. It should be noted that the Santa Maria station was relocated during 2021 and only collected air quality samples during the first quarter; if this station had been sampling during the rest of the year, there would have likely recorded more exceedances of the particulate matter standards. There was only one exceedance countywide of the state and federal 8-hour ozone standard of 70 ppb at the Paradise Road station on June 17, 2021. The state ambient air quality standards were met for all other air pollutants in 2021. Table 1-1 presents a summary of the number of exceedances for each monitoring station in Santa Barbara County. A tabular summary of the federal and state ambient air quality standards is included in Appendix A.

TABLE 1-1: SANTA BARBARA COUNTY EXCEEDANCE SUMMARY FOR 2021¹

Number of Days that Exceeded Air Quality Standard									
Station	O ₃ -1hr (state)	O ₃ -8hr (state)	O ₃ -8hr (federal)	NO ₂	SO ₂	CO	PM ₁₀ (state)	PM ₁₀ (federal)	PM _{2.5} (federal)
Carpinteria	0	0	0	0	-	-	-	-	-
Goleta	0	0	0	-	-	-	0	0	0
Las Flores Canyon	0	0	0	0	0	0	1	0	-
Lompoc H Street	0	0	0	0	0	0	1	0	0
Lompoc North	0	0	0	0	0	-	-	-	-
Paradise	0	1	1	0	-	-	-	-	-
Santa Barbara	0	0	0	-	-	-	1	-	0
Santa Maria ²	0	0	0	0	-	0	0	0	0
Santa Ynez	0	0	0	-	-	-	-	-	-
Countywide Total	0	1	1	0	0	0	1	0	0

¹A dash indicates that the pollutant is not measured at this location.

²Sampled Q1 only.

2 AMBIENT AIR QUALITY STANDARDS AND AIR MONITORING STATIONS

Ambient Air Quality Standards

The Federal Clean Air Act (CAA) (Title 1, Section 109) requires the Environmental Protection Agency (EPA) to prescribe primary national ambient air quality standards (NAAQS) for certain air pollutants where public health criteria have been established. These pollutant levels were chosen to protect the health of the most susceptible individuals in a population, including children, the elderly, and those with chronic respiratory ailments. A secondary standard is also prescribed to protect human welfare (visibility, crop damage, building damage). These pollutants are known as criteria pollutants.

The EPA currently has NAAQS for six criteria pollutants: ozone (O₃), nitrogen dioxide (NO₂), carbon monoxide (CO), sulfur dioxide (SO₂), lead (Pb), particulate matter less than ten microns in diameter (PM₁₀) and fine particulate matter less than 2.5 microns in diameter (PM_{2.5}).

In addition to the EPA standards, the California Air Resources Board (CARB) has set air quality standards for the same federal criteria pollutants as well as four others: sulfates, hydrogen sulfide (H₂S), vinyl chloride (chloroethene, C₂H₃Cl), and visibility-reducing particles.

A list of the federal and state standards applicable in 2021 can be found in Appendix A. During 2021, there were no changes to federal or state or ambient air quality standards.

Air Monitoring Stations

In 2021, there were 12 monitoring stations operating in Santa Barbara County measuring ambient air and meteorological conditions. Two of the stations measured odors from industrial facilities. Eight were operated by the District. The remaining stations were operated by CARB and private industry. The monitoring stations are divided into two categories: State and Local Air Monitoring Stations (SLAMS) and Industrial monitoring stations. The SLAMS stations are designed to monitor the air in the urban areas of the county, while the Industrial stations are required by facility permits to monitor air quality impacts from the operation of these facilities. While Industrial stations are typically not compared to air quality standards, three in our network have their ozone monitors designated as SLAMS and are compared to the NAAQS. Figure 2-1 shows the locations of all monitoring stations in Santa Barbara County operating in 2021. Table 2-1 lists the monitoring stations operating in Santa Barbara County during 2021, the pollutants and parameters measured at each station, and their designations.

FIGURE 2-1: 2021 SANTA BARBARA COUNTY AIR MONITORING STATIONS

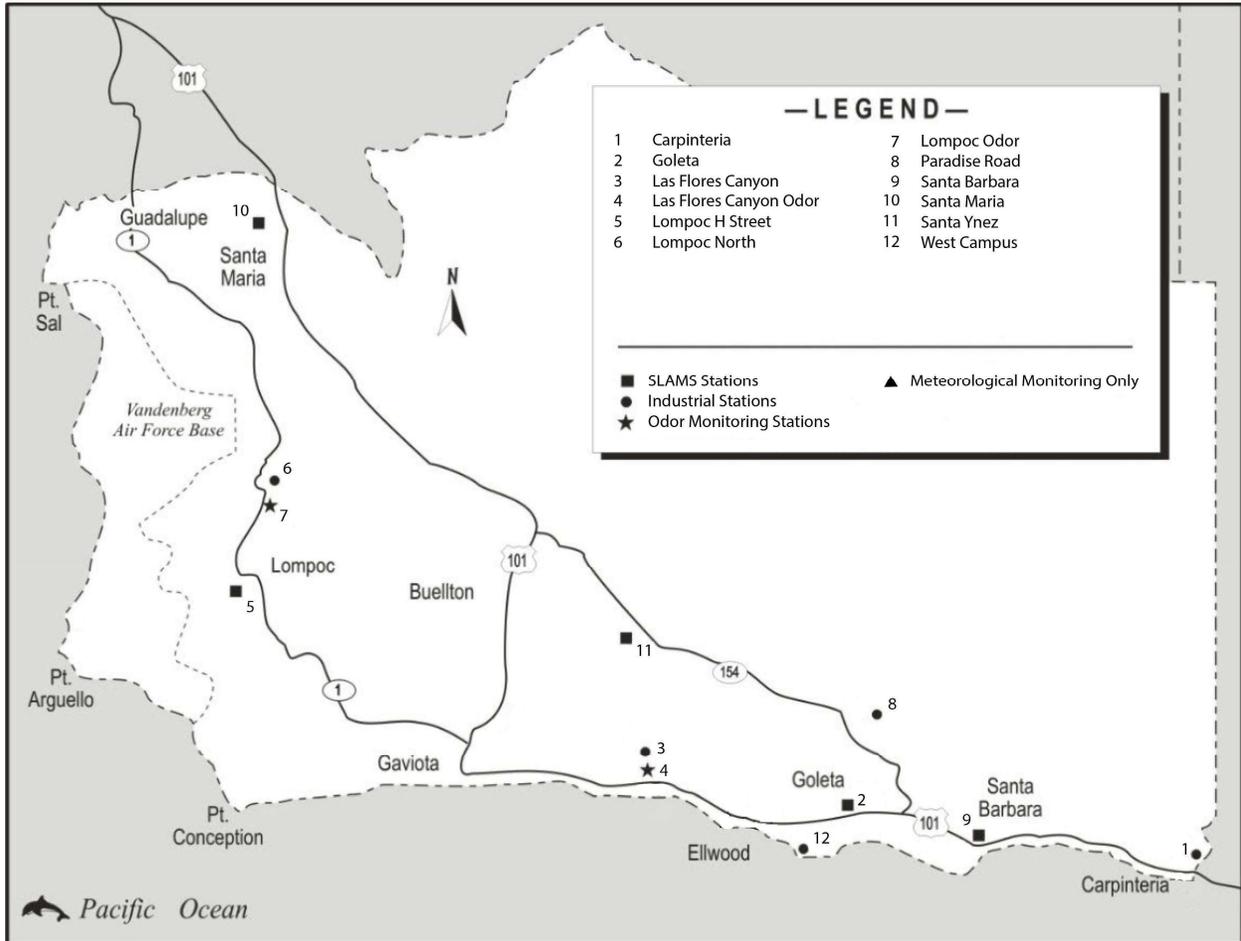


TABLE 2-1: MONITORING STATION PARAMETER LIST FOR 2021

Station	O ₃	NO ₂	SO ₂	CO	THC	H ₂ S	TRS	PM ₁₀	PM _{2.5}	WS	WD	ATM
Carpinteria	X	X								X	X	X
Goleta	X							X	X	X	X	X
Las Flores Canyon	X	X	X	X	X			X		X	X	X
Las Flores Canyon Odor						X				X	X	X
Lompoc H Street	X	X	X	X				X	X	X	X	X
Lompoc North	X	X	X		X					X	X	X
Lompoc Odor						X	X			X	X	X
Paradise Road	X	X								X	X	X
Santa Barbara	X							X	X	X	X	X
Santa Maria*	X	X		X				X	X	X	X	X
Santa Ynez	X											
West Campus			X		X	X	X			X	X	
SLAMS Monitors						Non-NAAQS Monitors						

*	Q1 Only	THC	Total Hydrocarbons
WS	Wind Speed	TRS	Total Reduced Sulfur
WD	Wind Direction	ATM	Ambient Temperature

Monitoring Station Changes During 2021

The Santa Maria monitoring station did not meet siting criteria and ceased operation in the first quarter while the station was relocated. The station did not return to operation in 2021. During this time, the APCD deployed portable air monitoring devices in Santa Maria to measure PM₁₀ and PM_{2.5} and presented this information on the agency’s website.

Ongoing Changes From 2018

The permit holders responsible for the operation of the Las Flores Canyon Odor site have received District approval to temporarily shut down the site while production at the associated processing plant is not in operation. The site was temporarily shut down in July 2018 and will be re-started when production at the associated processing plant resumes.

3 GASEOUS POLLUTANT SUMMARY

Gaseous air quality analyzers are operated in climate-controlled monitoring stations located throughout the county. These analyzers measure air quality 24 hours a day, except when they go through a nightly testing routine where they are challenged with known concentrations of calibration gas to ensure data precision and accuracy. They collect real-time measurements that are used to calculate 1-hour and 8-hour concentrations, as applicable, for comparison to air quality standards. Ozone was measured at nine stations throughout the county during 2021, NO₂ was measured at six stations, SO₂ was measured at four stations, and CO was measured at three stations. Section 2 of this report provides additional information on the monitoring network.

A summary of the highest gaseous pollutant values measured in Santa Barbara County during 2021 is provided in Tables 3-1 through 3-5. The tables show the four highest concentrations for each pollutant in 2021 and the dates they occurred.

TABLE 3-1: FOUR HIGHEST 1-HOUR O₃ CONCENTRATIONS FOR 2021¹

O ₃ 1-hour (ppb)												
Station	1st	Date	Time	2nd	Date	Time	3rd	Date	Time	4th	Date	Time
Paradise	82	6/17/2021	14:00	77	9/9/2021	12:00	74	6/30/2021	15:00	70	6/16/2021	19:00
Santa Ynez	76	9/9/2021	13:00	69	6/17/2021	12:00	69	10/3/2021	15:00	68	7/9/2021	15:00
Las Flores Canyon	73	10/3/2021	12:00	71	10/2/2021	16:00	68	10/1/2021	19:00	68	10/4/2021	13:00
Santa Barbara	69	10/4/2021	13:00	68	10/1/2021	16:00	64	9/20/2021	17:00	64	10/3/2021	15:00
Goleta	63	10/1/2021	15:00	63	10/4/2021	13:00	61	9/20/2021	15:00	61	10/3/2021	12:00
Lompoc North	62	10/3/2021	20:00	61	10/16/2021	19:00	61	10/4/2021	10:00	58	9/30/2021	21:00
Carpinteria	56	2/24/2021	15:00	56	3/31/2021	16:00	56	4/1/2021	12:00	56	10/3/2021	12:00
Santa Maria ²	51	1/15/2021	23:00	50	1/18/2021	16:00	46	1/28/2021	7:00	45	1/13/2021	19:00
Lompoc H Street	40	10/16/2021	13:00	34	10/15/2021	15:00	33	9/30/2021	13:00	29	10/12/2021	10:00

¹ State Standard = 0.09 ppm (95 ppb)

² Sampled Q1 only

TABLE 3-2: FOUR HIGHEST 8-HOUR O₃ CONCENTRATIONS FOR 2021¹

O ₃ 8-hour (ppb)												
Station	1st	Date	Time	2nd	Date	Time	3rd	Date	Time	4th	Date	Time
Paradise	71	6/17/2021	9:00	67	9/9/2021	10:00	65	10/3/2021	11:00	62	6/16/2021	10:00
Las Flores Canyon	67	10/3/2021	12:00	64	10/2/2021	16:00	62	4/1/2021	18:00	62	10/1/2021	12:00
Santa Ynez	61	6/17/2021	9:00	61	10/3/2021	10:00	60	10/2/2021	10:00	57	4/1/2021	10:00
Santa Barbara	60	10/4/2021	9:00	56	4/1/2021	10:00	56	4/2/2021	10:00	55	9/20/2021	11:00
Lompoc North	59	10/16/2021	13:00	58	10/3/2021	20:00	57	10/4/2021	7:00	55	10/2/2021	23:00
Goleta	55	10/16/2021	10:00	54	4/1/2021	9:00	54	10/3/2021	10:00	53	10/4/2021	8:00
Carpinteria	52	4/1/2021	9:00	50	3/31/2021	11:00	47	4/2/2021	10:00	45	4/18/2021	8:00
Santa Maria ²	48	1/15/2021	22:00	47	1/18/2021	14:00	45	1/28/2021	12:00	43	1/13/2021	16:00
Lompoc H Street	35	10/16/2021	10:00	31	10/15/2021	10:00	29	9/30/2021	11:00	25	9/17/2021	10:00

¹ Federal and State Standard = 0.070 ppm (70 ppb)

² Sampled Q1 only

TABLE 3-3: FOUR HIGHEST 1-HOUR NO₂ CONCENTRATIONS FOR 2021¹

NO ₂ (ppb)												
Station	1st	Date	Time	2nd	Date	Time	3rd	Date	Time	4th	Date	Time
Las Flores Canyon	62	10/12/2021	13:00	14	2/24/2021	10:00	14	11/23/2021	13:00	9	12/13/2021	15:00
Lompoc H Street	27	2/25/2021	6:00	24	12/1/2021	6:00	22	2/18/2021	6:00	22	11/22/2021	19:00
Santa Maria ²	25	1/15/2021	19:00	23	1/25/2021	8:00	20	1/19/2021	8:00	19	1/14/2021	20:00
Carpinteria	11	12/1/2021	15:00	10	12/6/2021	16:00	9	1/18/2021	16:00	9	10/29/2021	17:00
Lompoc North	5	10/29/2021	17:00	5	3/31/2021	6:00	5	10/28/2021	19:00	4	10/1/2021	7:00
Paradise	3	3/3/2021	15:00	3	3/1/2021	18:00	3	10/5/2021	7:00	3	12/23/2021	15:00

¹ Federal Standard = 0.100 ppm (100 ppb); State Standard = 0.18 ppm (180 ppb)

² Sampled Q1 only

TABLE 3-4: FOUR HIGHEST 1-HOUR SO₂ CONCENTRATIONS FOR 2021¹

SO ₂ (ppb)												
Station	1st	Date	Time	2nd	Date	Time	3rd	Date	Time	4th	Date	Time
Las Flores Canyon	11	10/12/2021	13:00	2	3/7/2021	3:00	2	4/1/2021	9:00	2	4/7/2021	3:00
Lompoc North	5	12/16/2021	3:00	4	12/15/2021	3:00	4	12/12/2021	3:00	4	12/17/2021	3:00
West Campus	3	7/13/2021	2:00	3	7/15/2021	2:00	3	7/14/2021	2:00	3	7/16/2021	2:00
Lompoc H Street	2	1/16/2021	3:00	2	1/17/2021	3:00	2	6/18/2021	3:00	2	6/28/2021	3:00

¹ Federal Standard = 0.075 ppm (75 ppb); State Standard = 0.25 ppm (250 ppb)

TABLE 3-5: FOUR HIGHEST 1-HOUR CO CONCENTRATIONS FOR 2021¹

CO (ppm)												
Station	1st	Date	Time	2nd	Date	Time	3rd	Date	Time	4th	Date	Time
Las Flores Canyon	4.5	10/12/2021	13:00	0.8	4/1/2021	9:00	0.5	2/24/2021	10:00	0.4	1/3/2021	10:00
Lompoc H Street	1.9	1/4/2021	9:00	1.5	1/24/2021	8:00	1.0	4/24/2021	3:00	1.0	12/4/2021	21:00
Santa Maria ²	0.75	1/15/2021	19:00	0.61	1/13/2021	8:00	0.527	1/29/2021	20:00	cool	1/16/2021	19:00

¹ Federal Standard = 35 ppm; State Standard = 20 ppm

² Sampled Q1 only

4 PARTICULATE MATTER SUMMARY

Five stations collected PM₁₀ data in 2021. The five stations used a PM₁₀ Beta Attenuation Monitor (BAM) sampler that operated 24 hours a day and provided real-time hourly values for ambient PM₁₀ concentrations. Four stations collected PM_{2.5} data using a PM_{2.5} BAM, collecting continuous hourly data. The hourly concentrations are used to calculate daily 24-hour concentrations for comparison with the air quality standards.

A summary of the highest particulate matter values in Santa Barbara County during 2021 is provided in Tables 4-1 through 4-4. The summaries contain the four highest 24-hour PM concentrations, and the annual averages for each station. The state air quality standards are based on data collected at local conditions (i.e., pressure and temperature measured at the time of the sampling), while the federal standards are based on data corrected to standard conditions (i.e., pressure and temperature corrected to standard conditions at sea level).

TABLE 4-1: FOUR HIGHEST 24-HOUR AVERAGE LOCAL PM₁₀ CONCENTRATIONS FOR 2021¹

Particulate Matter Less Than 10 Microns (µg/m ³)								
Station	1st	Date	2nd	Date	3rd	Date	4th	Date
Lompoc	76	10/11/2021	47	2/26/2021	45	6/16/2021	44	5/8/2021
Santa Barbara	61	10/11/2021	49	2/25/2021	48	5/20/2021	47	6/15/2021
LFC1	51	10/11/2021	46	2/25/2021	45	9/29/2021	41	1/19/2021
Goleta	49	1/19/2021	48	2/25/2021	48	10/11/2021	44	5/3/2021
Santa Maria ²	42	2/16/2021	37	1/19/2021	37	1/8/2021	36	2/3/2021

¹ State 24-Hour Standard = 50 µg/m³ at local conditions

² Sampled Q1 only

TABLE 4-2: FOUR HIGHEST 24-HOUR AVERAGE STANDARD PM₁₀ CONCENTRATIONS FOR 2021¹

Particulate Matter Less Than 10 Microns (µg/m ³)								
Station	1st	Date	2nd	Date	3rd	Date	4th	Date
Lompoc	73	10/11/2022	44	2/26/2021	43	6/16/2021	41	5/8/2021
Santa Barbara	59	10/11/2021	48	10/13/2021	47	5/20/2021	46	6/15/2021
Santa Maria ²	54	2/26/2021	44	2/27/2021	40	2/25/2021	39	2/16/2021
LFC1	48	10/11/2021	43	2/25/2021	43	9/29/2021	38	1/19/2021
Goleta	47	1/19/2021	46	10/11/2021	45	2/25/2021	42	6/16/2021

¹ Federal 24-Hour Standard = 150 µg/m³ at standard conditions

² Sampled Q1 only

TABLE 4-3: FOUR HIGHEST 24-HOUR AVERAGE PM_{2.5} CONCENTRATIONS FOR 2021¹

Particulate Matter Less Than 2.5 Microns (µg/m ³)								
Station	1st	Date	2nd	Date	3rd	Date	4th	Date
Santa Barbara	20	10/13/2021	18	10/14/2021	18	4/10/2021	18	4/12/2021
Goleta	19	10/14/2021	18	10/12/2021	17	12/7/2021	17	11/8/2021
Lompoc	18	9/5/2021	17	9/4/2021	16	9/3/2021	15	5/9/2021
Santa Maria ²	12	2/27/2021	11	2/26/2021	10	2/16/2021	10	2/24/2021

¹ Federal 24-Hour Standard = 35 µg/m³ at local conditions

² Sampled Q1 only

**TABLE 4-4: ANNUAL ARITHMETIC MEAN
PM CONCENTRATIONS FOR 2021^{1,2}**

Particulate Matter ($\mu\text{g}/\text{m}^3$)		
Station	PM₁₀	PM_{2.5}
Santa Barbara	19.8	6.7
Goleta	18.8	5.7
Lompoc H Street	16.8	5.8
Las Flores Canyon	14.3	
Santa Maria ³	-	-

¹ State PM₁₀ Annual Arithmetic Mean Standard = 20 $\mu\text{g}/\text{m}^3$ at local conditions

² Federal and State PM_{2.5} Annual Arithmetic Mean Standard = 12 $\mu\text{g}/\text{m}^3$ at local conditions

³ Sampled Q1 only

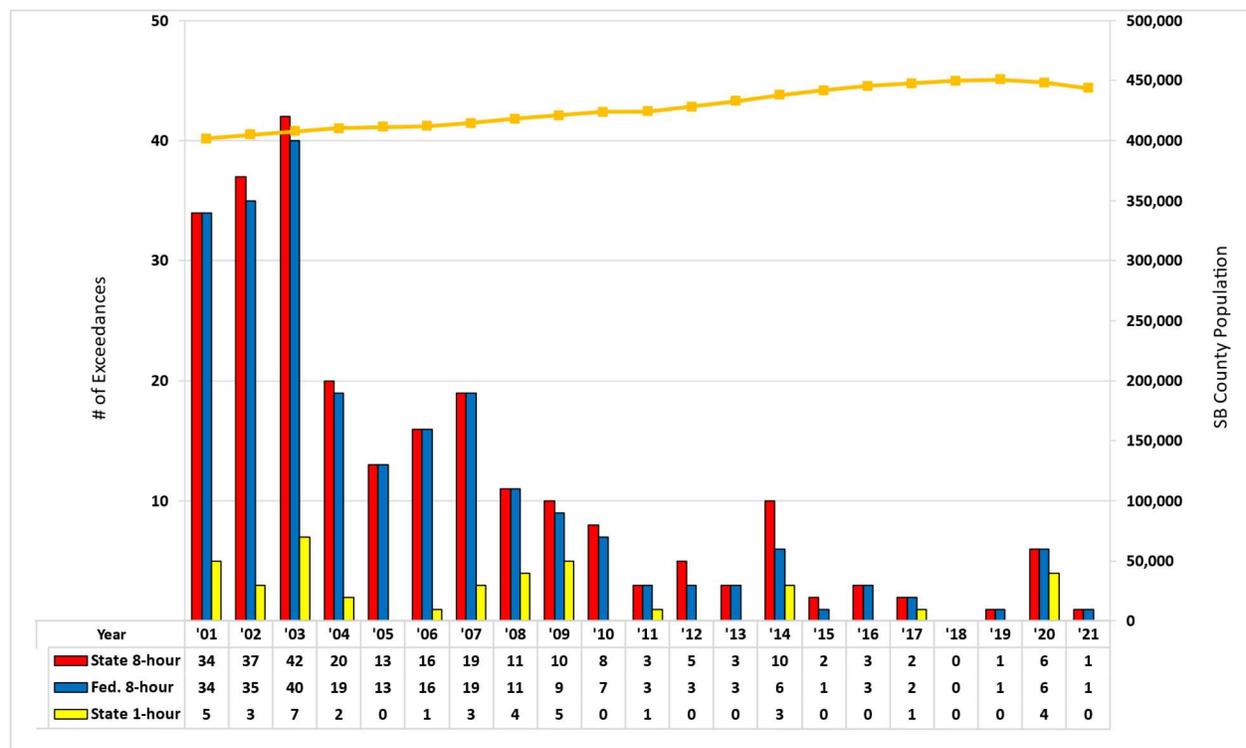
5 AIR QUALITY TRENDS

In 2021, Santa Barbara County generally had good air quality. While the impact of wildfire smoke was still present, historical data still show the progress that has been made. Over time, voluntary and regulatory measures, technology improvements, and better community- and transportation planning have led to tremendous improvements in Santa Barbara County’s air quality. This section provides information in several different formats to demonstrate the long-term trends for Santa Barbara County’s air quality.

Number of Days Exceeding Ozone Standards

Figure 5-1 indicates the number of days that the county exceeded the federal and state ozone standard since 2001. The downward trend from 34 days in 2001 to one day in 2021 demonstrates that the combined strategy of stationary and mobile source reductions of ozone precursor pollutants, in the form of both regulatory and voluntary measures, has achieved dramatic improvements in ozone levels. Figure 5-1 also includes information on population growth.

FIGURE 5-1: OZONE STANDARD EXCEEDANCE DAYS

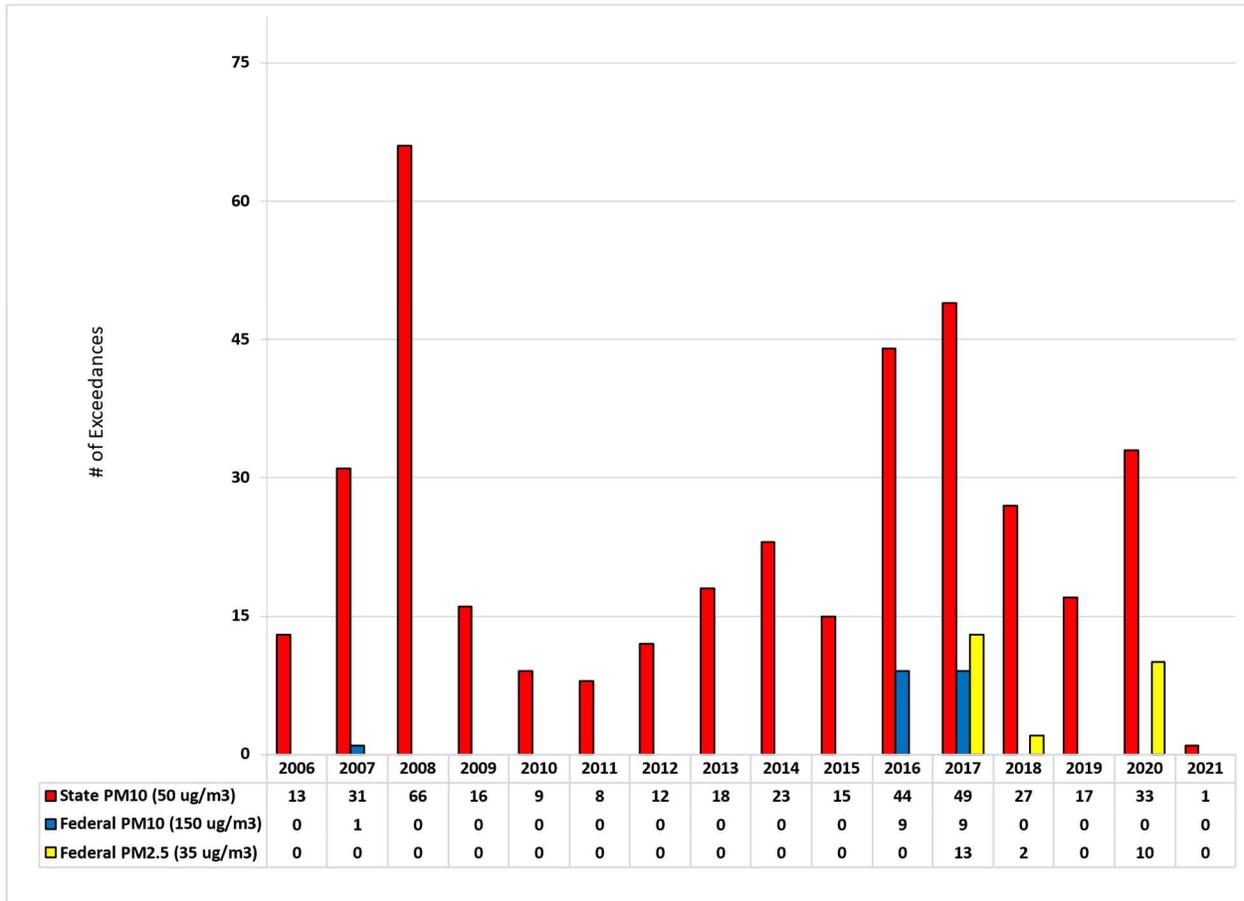


Number of Days Exceeding PM Standards

Prior to 2006, particulate monitoring in Santa Barbara County followed a six-day sampling schedule as set by federal and state agencies. Samples were taken over a 24-hour sampling period and required lab analysis to calculate the pollutant concentration. Our current network monitors PM data every day and every hour. The transition from six-day sampling to continuous sampling was phased in over a four-year period. The Santa Barbara and Santa Maria stations have continuously sampled both PM₁₀ and PM_{2.5} starting in 2006. The Lompoc station began continuous sampling for PM_{2.5} in 2007, and PM₁₀ was added in 2009. In 2010, continuous sampling for both PM₁₀ and PM_{2.5} was added at the Goleta station.

Figure 5-2 indicates the number of days that the county exceeded the state and federal PM standards since 2006. Data prior to 2006 is not provided because it does not compare well to the post-2006 PM data due to the difference in methods described above. Figure 5-2 shows that the county's particulate levels vary year-to-year, and the number of days that the county exceeds the air quality standards is influenced by natural events such as wildfires and droughts. Specifically, the Zaca Fire in 2007 burned for most of July and August and greatly affected particulate levels both locally and throughout the state. In 2008 and 2009, the Tea, Gap, and Jesusita Fires caused high particulate levels while burning. More recently, the Thomas Fire and several other California wildfires caused high particulate levels. While fires are burning and smoke is present, PM_{2.5} levels are generally high and may cause health concerns. After fires are extinguished, residual ash can be re-entrained by wind and cause high PM₁₀ levels. During California's prolonged droughts that occurred over the last 15 years, dry conditions likely contributed to many of these PM exceedances.

FIGURE 5-2: PARTICULATE MATTER EXCEEDANCES



Air Quality Index Trends

The Air Quality Index, or AQI, is a standardized value that was developed by the EPA to communicate to the public on whether air pollution levels are healthy or unhealthy. Ground-level ozone and particulate matter are the two pollutants that pose the greatest threat to public health; the AQI value is based on the pollutant with the highest measured levels at that time. The AQI levels range from “Good,” represented by a green color, to “Hazardous,” represented by a maroon color. More information on the AQI can be found on the District’s website at www.ourair.org/todays-air-quality.

Figure 5-3 shows the numbers of days each year that Santa Barbara County air quality was at each of the different AQI levels. As demonstrated in this figure, the majority of days (300 days, or 82.2%) in Santa Barbara County were green, or Good air quality, during 2021. The remainder of the days were Moderate (64 days, 17.5%), with one day being Unhealthy for Sensitive Groups (0.3%). A Moderate AQI means that there is a moderate health concern for individuals that are unusually sensitive to air pollution. The AQI trends in Figure 5-3 represent the highest AQI readings from all monitoring stations in the county each day.

FIGURE 5-3: AIR QUALITY INDEX TRENDS



Detailed Trends for Individual Pollutants

Figures 5-4 through 5-9 provide a more detailed picture of trends for each pollutant over time, and how the measured values for each pollutant have changed. These charts show trends for the highest measured values, using data from all monitoring stations in the county. Different types of values are referenced for each of the pollutants (e.g., 2nd and 4th maximum values for ozone), because each of the air quality standards define which values are relevant for that pollutant standard.

FIGURE 5-4: MEASURED OZONE LEVELS (PARTS PER BILLION)

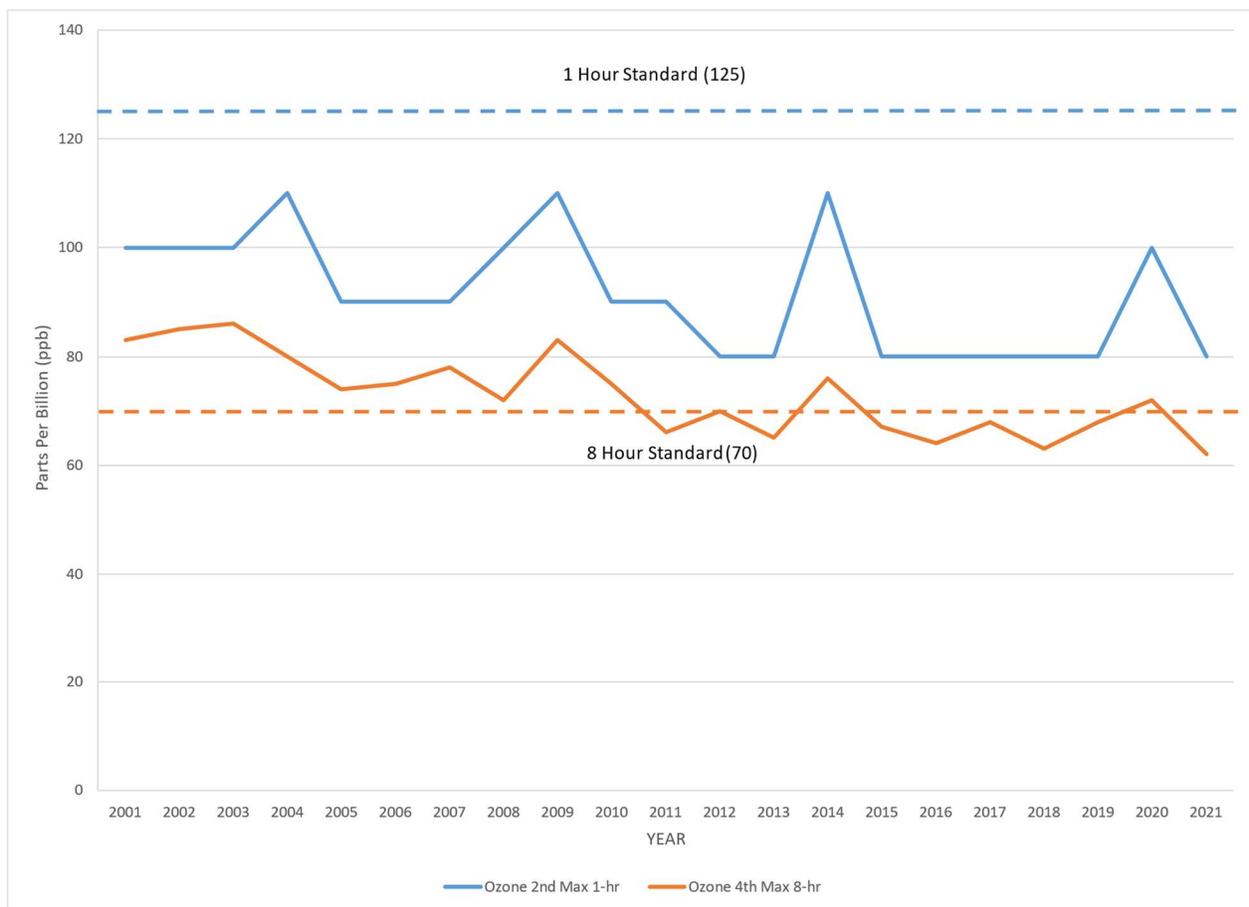


FIGURE 5-5: MEASURED NITROGEN DIOXIDE LEVELS (PARTS PER BILLION)

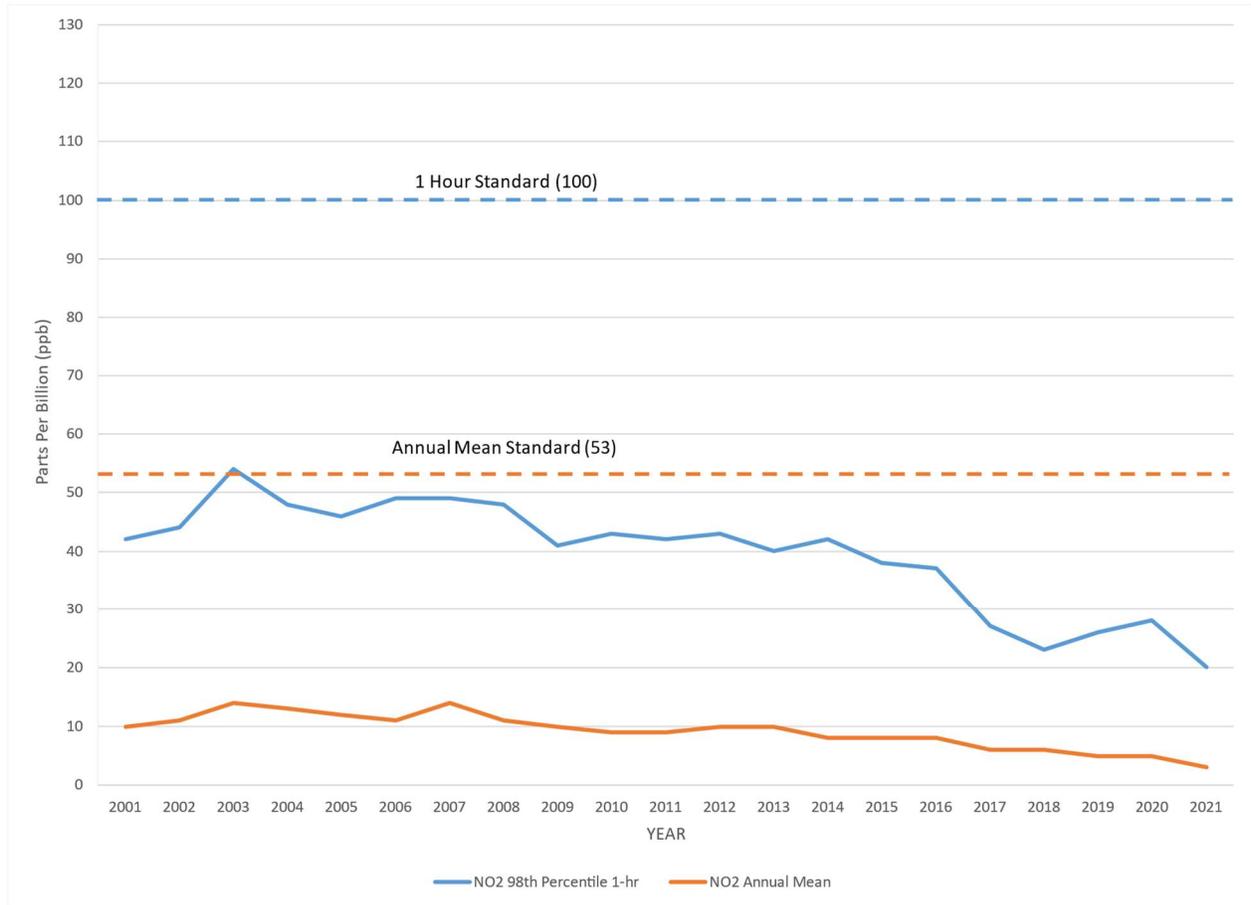
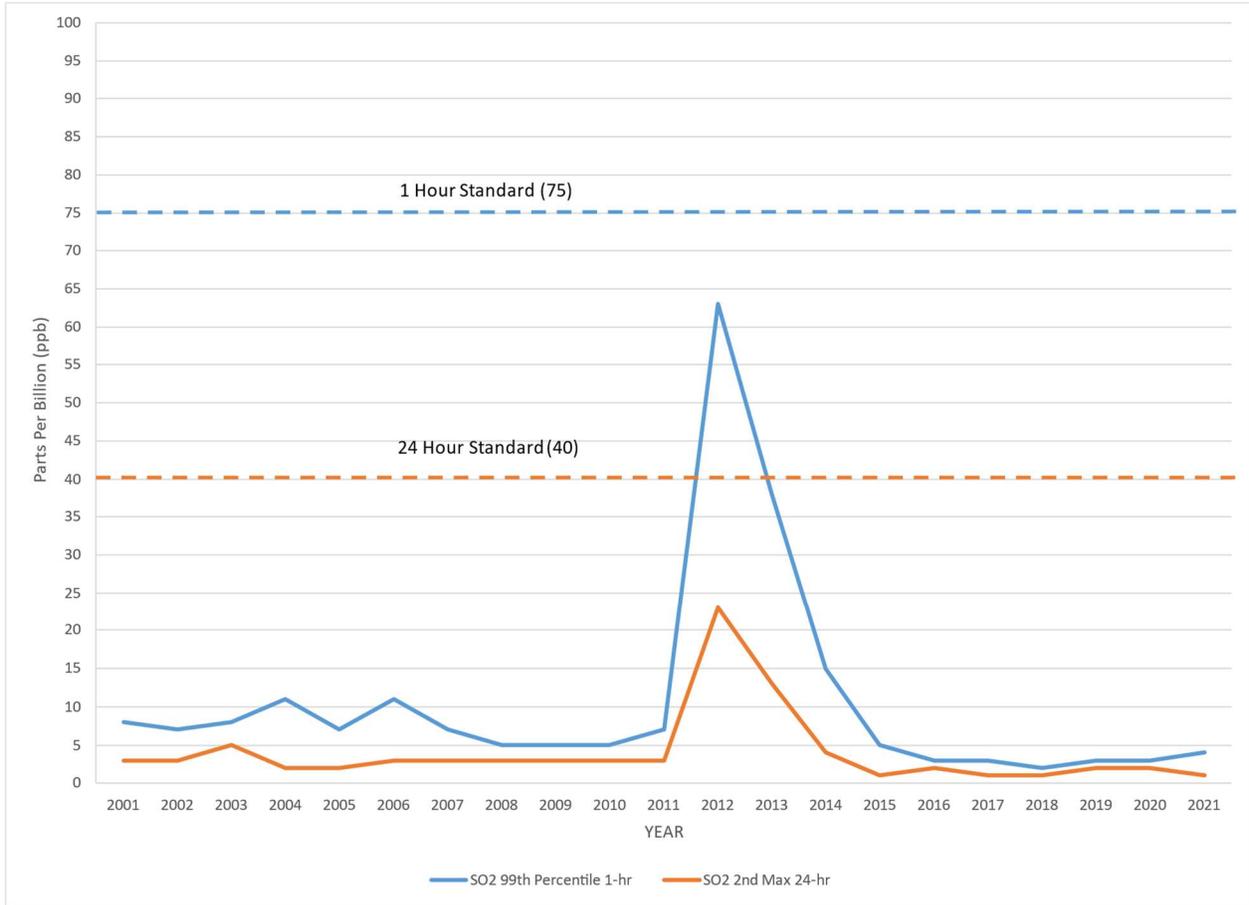
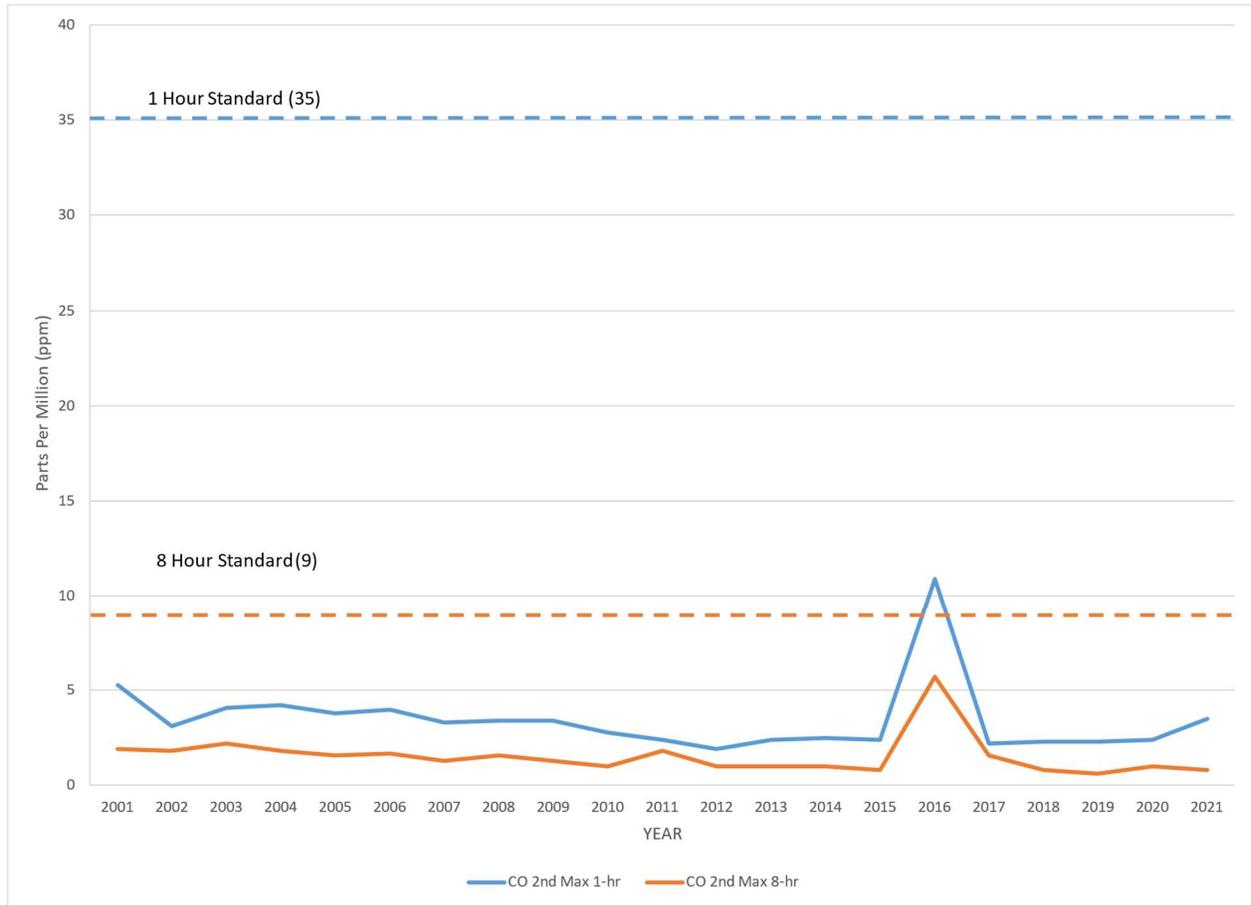


FIGURE 5-6: MEASURED SULFUR DIOXIDE LEVELS (PARTS PER BILLION)¹



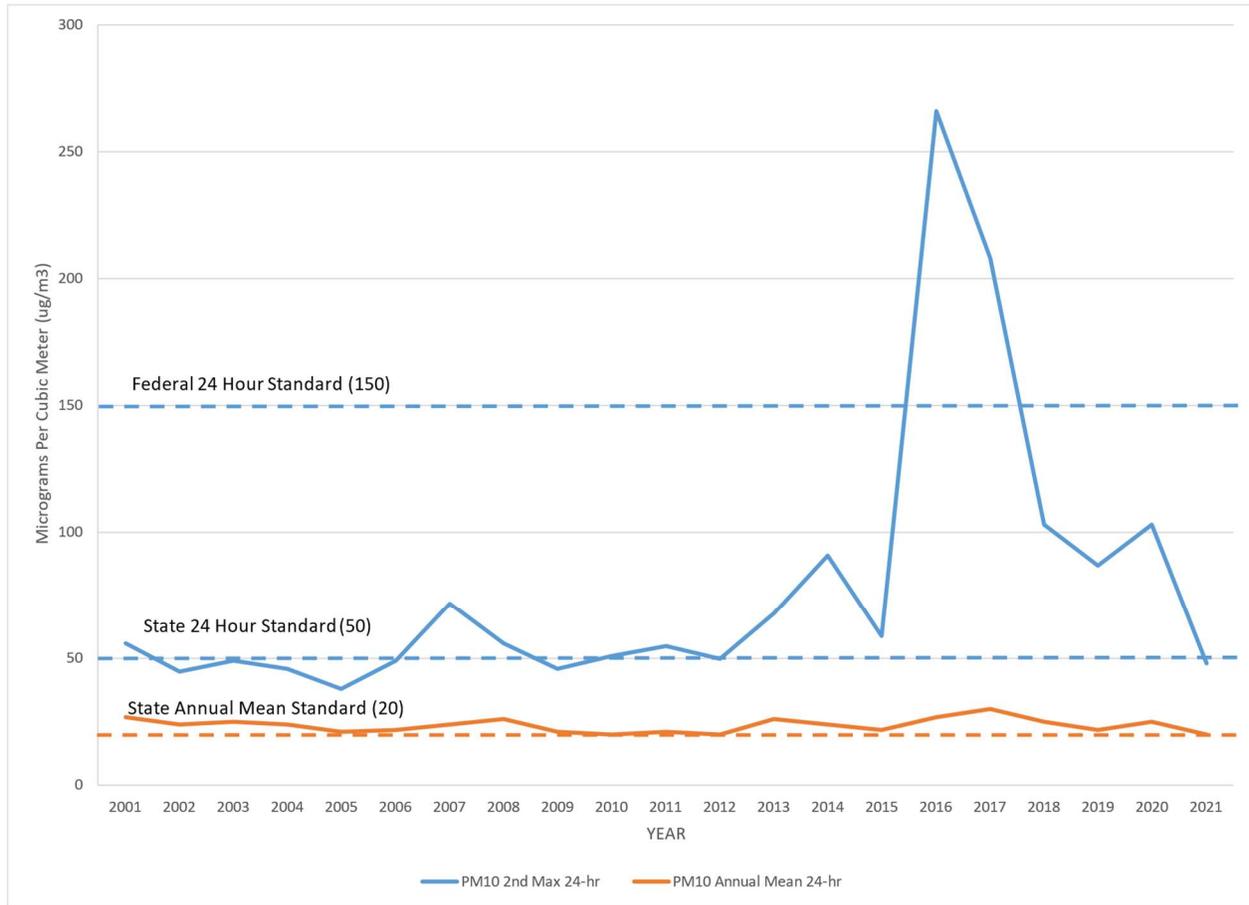
¹ High SO₂ levels recorded in 2012 were related to a release at the stationary source facility at Las Flores Canyon.

FIGURE 5-7: MEASURED CARBON MONOXIDE LEVELS (PARTS PER MILLION)¹



¹ High CO values recorded in 2016 were the result of the Sherpa wildfire burning near the Las Flores Canyon monitoring station.

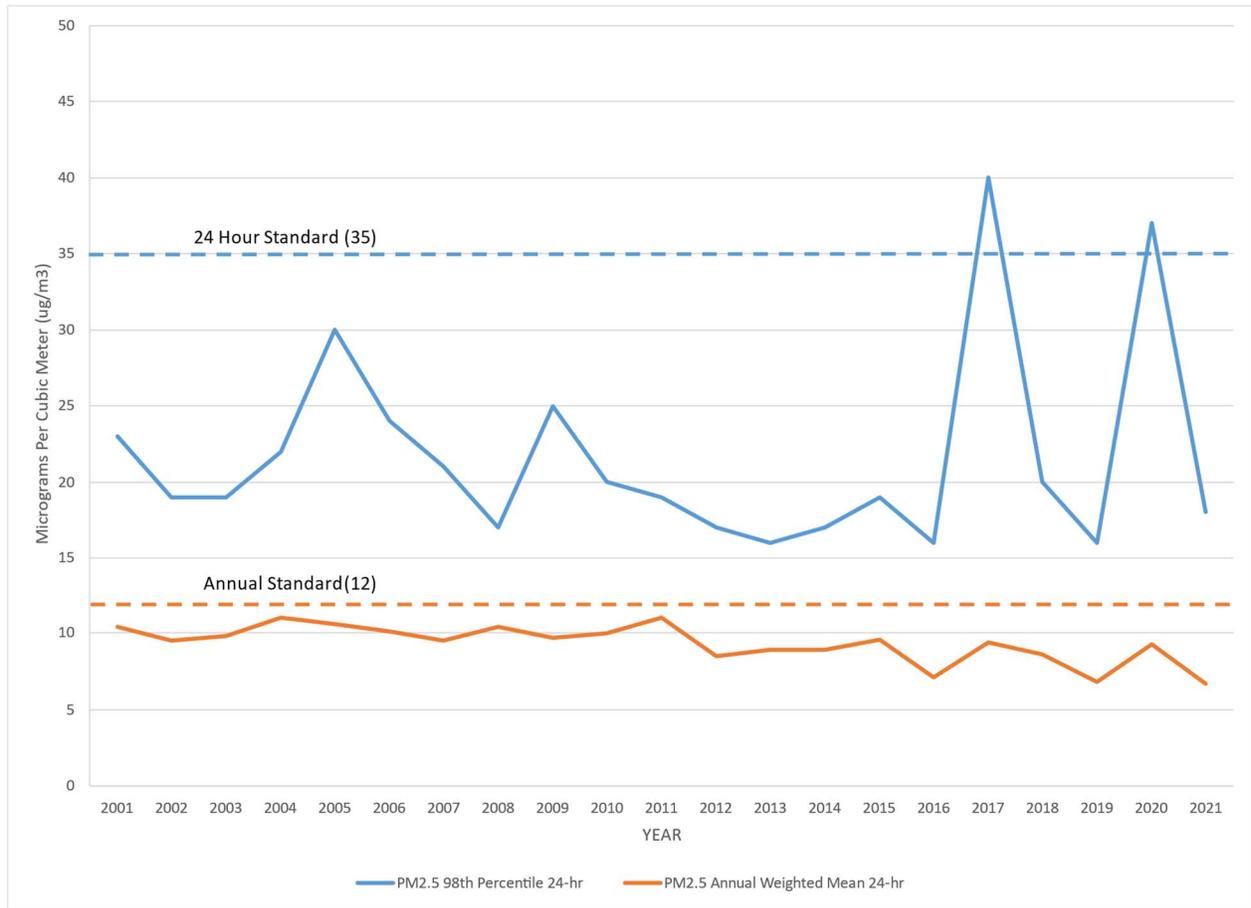
FIGURE 5-8: MEASURED PM₁₀ LEVELS ($\mu\text{g}/\text{m}^3$)^{1,2}



¹ Prior to 2006, samples were collected every 6 days. By 2010 all samples were continuous.

² High PM₁₀ values recorded in 2016 and 2017 were the result of wildfires.

FIGURE 5-9: MEASURED PM_{2.5} LEVELS ($\mu\text{g}/\text{m}^3$)^{1,2}



¹ Prior to 2006, samples were collected every 6 days. By 2010 all samples were continuous.

² High PM_{2.5} values recorded in 2017 and 2020 were the result of wildfires.

APPENDIX A

Ambient Air Quality Standards							
Pollutant	Averaging Time	California Standards		National Standards			
		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 (PM ₁₀)	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 (PM _{2.5}) 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)	1 Hour	0.25 ppm (655 µg/m ³)	Ultraviolet Fluorescence	75 ppb (196 µg/m ³)	—	Ultraviolet Fluorescence; 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)			—
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)			—
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	8 Hour		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				

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1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, 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.
2. 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 PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above $150 \mu\text{g}/\text{m}^3$ 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. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from $15 \mu\text{g}/\text{m}^3$ to $12.0 \mu\text{g}/\text{m}^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at $35 \mu\text{g}/\text{m}^3$, as was the annual secondary standard of $15 \mu\text{g}/\text{m}^3$. The existing 24-hour PM10 standards (primary and secondary) of $150 \mu\text{g}/\text{m}^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.
Note that 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.
12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard ($1.5 \mu\text{g}/\text{m}^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

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