apcd air pollution control district
SANTA BARBARA COUNTY

Agenda Item: G-2
Agenda Date: October 19, 2023
Agenda Placement: Regular
Estimated Time: 15 minutes
Continued Item: No

Board Agenda Item

TO: Air Pollution Control District Board

FROM: Aeron Arlin Genet, Air Pollution Control Officer

CONTACT: Dave Broggie, Air Quality Specialist, Planning Division, (805) 979-8332

SUBJECT: 2022 Annual Air Quality Report

RECOMMENDATION:

Receive and file a presentation and attached 2022 Annual Air Quality Report for Santa Barbara County.

BACKGROUND:

In 2022, the District operated a network of 12 ambient air quality and meteorological monitoring stations throughout Santa Barbara County. These stations are designed to measure concentrations of the following pollutants: ozone, nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter less than 10 microns in diameter (PM_{10}) and particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). Wind speed, wind direction, and ambient temperature are also measured at most stations. Each year, the District prepares an annual air quality report after all of the air quality data has been reviewed and verified.

DISCUSSION:

The United States Environmental Protection Agency (EPA) has established national ambient air quality standards (NAAQS) for certain air pollutants where public health criteria have been established. The EPA currently has NAAQS established for six pollutants: ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, lead, and particulate matter.

The California Air Resources Board (CARB) has established air quality standards for the same criteria pollutants as the NAAQS. The state standards are either the same or more restrictive than the federal standards. CARB has also adopted standards for four additional pollutants: sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles.

In 2022, the state 24-hour PM10 standard of 50 $\mu g/m^3$ was exceeded seven times in total, between four different stations: Santa Maria, Lompoc H Street, Santa Barbara, and Goleta. It should be noted that the Santa Maria station was relocated during 2022 and only sampled during the fourth quarter. If this station had been sampling during the rest of the year, there may have been more exceedances of the particulate matter standards. In 2022, there were no exceedances countywide of the state and federal 8-hour ozone standard of 70 ppb; as a result, the California Air Resources Board took action to designate Santa Barbara County as nonattainment-transitional for the state ozone standards, based on the three-year data set from 2019-2021. The state and federal ambient air quality standards were met for all other air pollutants in 2022.

The attached 2022 Annual Air Quality Report provides a brief discussion of our local air quality during 2022. The report summarizes the four highest concentrations for each pollutant at each monitoring station. Included in the report are maps and tables showing the locations of each monitoring station and the pollutants measured. The report also includes a discussion of long-term air quality trends for Santa Barbara County. The presentation to your Board will summarize the 2022 Annual Air Quality Report.

ATTACHMENT:

A. 2022 Annual Air Quality Report

ATTACHMENT A

2022 Annual Air Quality Report

October 19, 2023

Santa Barbara County Air Pollution Control District
Board of Directors

260 San Antonio Road, Suite A
Santa Barbara, California 93110

Annual Air Quality Report

2022

Aeron Arlin Genet, Air Pollution Control Officer

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1 2022 AIR QUALITY SUMMARY

This annual report provides information on the measured air quality concentrations in Santa Barbara County for 2022, as well as information on air quality trends. The report is available for download on the District's website at www.ourair.org/air-monitoring.

- Section 1 provides a summary of the air quality in 2022.
- Air quality standards and monitoring station locations are discussed in Section 2.
- Detailed air quality data for 2022 are provided in Section 3 for gaseous pollutants, and Section 4 for particulate matter.
- Section 5 includes a discussion of air quality trends.

In 2022, the state 24-hour PM_{10} standard of 50 µg/m^3 was exceeded seven times in total at four different stations. It should be noted that the Santa Maria station was relocated during 2022 and only sampled during the fourth quarter. If this station had been sampling during the rest of the year, there may have been more exceedances of the particulate matter standards. In 2022, there were no exceedances countywide of the state and federal 8-hour ozone standard of 70 ppb; as a result, the California Air Resources Board took action to designate Santa Barbara County as nonattainment-transitional for the state ozone standards, based on the three-year data set from 2019-2021. The state and federal ambient air quality standards were met for all other measured pollutants.

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 2022[1]

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	-	-	-	1	0	0
Las Flores Canyon	0	0	0	0	0	0	0	0	-
Lompoc H Street	0	0	0	0	0	0	1	0	0
Lompoc North	0	0	0	0	0	-	-	-	-
Paradise	0	0	0	0	-	-	-	-	-
Santa Barbara	0	0	0	-	-	-	4	0	0
Santa Maria[2]	0	0	0	-	-	-	3	0	0
Santa Ynez	0	0	0	-	-	-	-	-	-
Countywide Total	0	0	0	0	0	0	7	0	0

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

[2] *Sampled Q4 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 (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), lead (Pb), particulate matter less than ten microns in diameter (PM_{10}) 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 (H_2S), vinyl chloride (chloroethene, C_2H_3Cl), and visibility-reducing particles.

A list of the federal and state standards applicable in 2022 can be found in Appendix A. During 2022, there were no changes to federal or state ambient air quality standards.

Air Monitoring Stations

In 2022, there were 12 monitoring stations operating in Santa Barbara County measuring ambient air and meteorological conditions. Two of the twelve stations measured odors from industrial facilities. Eight were operated by the Santa Barbara County Air Pollution Control District (District). The remaining stations were operated by 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 those 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 2022. Table 2-1 lists the monitoring stations operating in Santa Barbara County during 2022, the pollutants and parameters measured at each station, and their designations.

FIGURE 2-1: 2022 SANTA BARBARA COUNTY AIR MONITORING STATIONS

TABLE 2-1: MONITORING STATION PARAMETER LIST FOR 2022

Station	O_3	NO_2	SO_2	CO	THC	H_2S	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
Santa Ynez	X											
West Campus			X		X	X	X			X	X	
SLAMS Monitors						Non-NAAQS Monitors						

*	Q4 Only	THC	Total Hydrocarbons
WS	Wind Speed	TRS	Total Reduced Sulfur
WD	Wind Direction	ATM	Ambient Temperature

Monitoring Station Changes During 2022

When operated by CARB, the original location of the Santa Maria monitoring station did not meet EPA siting criteria and ceased operation in Q1 2021 while relocation efforts were underway. The District relocated the station and it returned to operation in the forth quarter (Q4) of 2022.

Ongoing Changes From 2018

The permit holder 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 required to re-start 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 federal and state air quality standards. Ozone was measured at nine stations throughout the county during 2022, NO_2 was measured at five stations, SO_2 was measured at four stations, and CO was measured at two stations.

A summary of the highest gaseous pollutant values measured in Santa Barbara County during 2022 is provided in Tables 3-1 through 3-5. The tables show the four highest concentrations for each pollutant in 2022 and the dates they occurred.

TABLE 3-1: FOUR HIGHEST 1-HOUR O_3 CONCENTRATIONS FOR 2022[1]

O_3 1-hour (ppb)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Paradise	77	6/21/2022	14:00	74	5/25/2022	14:00	71	6/22/2022	14:00	69	9/23/2022	15:00
Santa Ynez	70	6/21/2022	13:00	65	9/23/2022	15:00	63	6/22/2022	14:00	63	9/3/2022	14:00
Goleta	70	10/20/2022	13:00	62	9/23/2022	13:00	61	9/5/2022	12:00	59	10/19/2022	15:00
Lompoc H Street	67	6/21/2022	12:00	61	4/7/2022	17:00	54	10/19/2022	16:00	52	3/9/2022	17:00
Las Flores Canyon	65	3/24/2022	16:00	65	6/28/2022	16:00	65	9/5/2022	12:00	64	3/23/2022	21:00
Santa Barbara	65	10/20/2022	13:00	63	9/5/2022	12:00	62	3/24/2022	15:00	61	3/3/2022	16:00
Lompoc North	62	9/5/2022	22:00	61	10/19/2022	17:00	61	9/6/2022	9:00	57	9/4/2022	12:00
Santa Maria[2]	57	10/19/2022	11:00	52	10/20/2022	13:00	50	10/18/2022	16:00	47	11/25/2022	12:00
Carpinteria	48	9/2/2022	14:00	48	9/5/2022	12:00	48	9/23/2022	12:00	46	4/8/2022	13:00

[1] State Standard = 0.09 ppm (95 ppb)

[2] Sampled Q4 only

TABLE 3-2: FOUR HIGHEST 8-HOUR O_3 CONCENTRATIONS FOR 2022[1]

O_3 8-hour (ppb)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Paradise	69	6/21/2022	10:00	68	5/25/2022	11:00	63	9/23/2022	10:00	61	6/28/2022	10:00
Santa Ynez	64	6/21/2022	10:00	59	9/23/2022	10:00	58	5/25/2022	11:00	58	9/3/2022	10:00
Las Flores Canyon	60	3/23/2022	14:00	59	3/24/2022	12:00	59	9/2/2022	11:00	58	9/5/2022	8:00
Goleta	59	10/20/2022	10:00	56	9/5/2022	9:00	54	9/23/2022	9:00	54	10/19/2022	9:00
Santa Barbara	58	9/5/2022	10:00	55	10/20/2022	9:00	54	9/4/2022	9:00	52	4/7/2022	10:00
Lompoc North	58	9/5/2022	19:00	56	10/19/2022	15:00	54	9/4/2022	9:00	54	9/6/2022	7:00
Lompoc H Street	55	4/7/2022	11:00	52	6/21/2022	8:00	49	9/4/2022	11:00	48	3/9/2022	15:00
Santa Maria[2]	54	10/19/2022	10:00	43	10/20/2022	9:00	43	11/25/2022	10:00	42	10/29/2022	10:00
Carpinteria	43	9/4/2022	10:00	43	9/5/2022	9:00	43	10/20/2022	10:00	41	9/23/2022	9:00

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

[2] Sampled Q4 only

TABLE 3-3: FOUR HIGHEST 1-HOUR NO_2 CONCENTRATIONS FOR 2022[1]

NO_2 (ppb)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Lompoc H Street	24	2/28/2022	6:00	24	11/20/2022	19:00	22	1/2/2022	21:00	22	11/21/2022	19:00
Carpinteria	16	1/13/2022	15:00	14	1/14/2022	0:00	12	1/11/2022	15:00	12	12/22/2022	13:00
Las Flores Canyon	12	9/7/2022	22:00	9	1/15/2022	0:00	9	9/8/2022	0:00	7	1/13/2022	18:00
Paradise	9	10/27/2022	13:00	8	3/17/2022	8:00	5	1/17/2022	14:00	5	3/3/2022	17:00
Lompoc North	6	1/17/2022	12:00	5	12/10/2022	14:00	4	2/17/2022	7:00	4	11/14/2022	7:00

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

TABLE 3-4: FOUR HIGHEST 1-HOUR SO_2 CONCENTRATIONS FOR 2022[1]

SO_2 (ppb)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Lompoc North	5	5/30/2022	7:00	4	4/17/2022	12:00	3	4/7/2022	6:00	2	3/18/2022	9:00
Lompoc H Street	2	1/2/2022	3:00	2	1/3/2022	3:00	2	1/4/2022	3:00	2	1/5/2022	3:00
Las Flores Canyon	1	8/16/2022	3:00	1	9/26/2022	3:00	1	11/1/2022	3:00	1	11/5/2022	3:00
West Campus	1	6/2/2022	9:00	1	5/28/2022	8:00	0	5/29/2022	8:00	0	12/22/2022	9:00

[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 2022[1]

CO (ppm)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Lompoc H Street	0.9	1/6/2022	7:00	0.9	2/3/2022	7:00	0.8	1/2/2022	21:00	0.8	1/4/2022	6:00
Las Flores Canyon	0.6	2/1/2022	13:00	0.6	3/3/2022	10:00	0.5	1/31/2022	12:00	0.5	2/6/2022	12:00

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

4 PARTICULATE MATTER SUMMARY

Five stations collected PM_{10} data in 2022. The five stations used a PM_{10} Beta Attenuation Monitor (BAM) sampler that operated 24 hours a day and provided real-time hourly values for ambient PM_{10} 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 federal and state air quality standards.

A summary of the highest particulate matter values in Santa Barbara County during 2022 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 PM_{10} CONCENTRATIONS FOR 2022[1]

Particulate Matter Less Than 10 Microns (µg/m^3)								
Station	**1st**	**Date**	**2nd**	**Date**	**3rd**	**Date**	**4th**	**Date**
Santa Maria[2]	76	10/23/2022	61	10/30/2022	60	10/24/2022	45	10/4/2022
Santa Barbara	60	3/18/2022	55	4/9/2022	51	4/10/2022	51	9/8/2022
Lompoc	54	4/9/2022	49	5/20/2022	47	4/10/2022	46	9/9/2022
Goleta	51	4/9/2022	46	4/10/2022	40	10/24/2022	39	5/31/2022
LFC1	48	4/10/2022	42	4/9/2022	40	10/24/2022	35	5/18/2022

[1] State 24-Hour Standard = 50 µg/m^3 at local conditions
[2] Sampled Q4 only

TABLE 4-2: FOUR HIGHEST 24-HOUR AVERAGE STANDARD PM_{10} CONCENTRATIONS FOR 2022[1]

Particulate Matter Less Than 10 Microns (µg/m^3)								
Station	**1st**	**Date**	**2nd**	**Date**	**3rd**	**Date**	**4th**	**Date**
Santa Maria[2]	73	10/23/2022	60	10/30/2022	57	10/24/2022	44	10/4/2022
Santa Barbara	58	3/18/2022	53	4/9/2022	51	9/8/2022	49	4/10/2022
Lompoc	50	4/9/2022	46	5/20/2022	45	9/9/2022	44	4/10/2022
Goleta	49	4/9/2022	43	4/10/2022	38	10/24/2022	37	5/31/2022
LFC1	46	4/10/2022	41	4/9/2022	38	10/24/2022	34	6/15/2022

[1] Federal 24-Hour Standard = 150 µg/m^3 at standard conditions
[2] Sampled Q4 only

TABLE 4-3: FOUR HIGHEST 24-HOUR AVERAGE $PM_{2.5}$ CONCENTRATIONS FOR 2022[1]

Particulate Matter Less Than 2.5 Microns (µg/m^3)								
Station	**1st**	**Date**	**2nd**	**Date**	**3rd**	**Date**	**4th**	**Date**
Lompoc	21	4/9/2022	17	4/10/2022	16	9/9/2022	16	5/18/2022
Santa Barbara	20	9/1/2022	19	9/8/2022	18	9/3/2022	18	4/9/2022
Goleta	15	4/9/2022	15	4/10/2022	15	9/1/2022	14	9/2/2022
Santa Maria[2]	14	10/21/2022	13	11/27/2022	13	11/18/2022	11	11/16/2022

[1] Federal 24-Hour Standard = 35 µg/m^3 at local conditions
[2] Sampled Q4 only

TABLE 4-4: ANNUAL ARITHMETIC MEAN PM CONCENTRATIONS FOR 2022[1,2]

Particulate Matter (µg/m^3)		
Station	**PM_{10}**	**$PM_{2.5}$**
Santa Barbara	21.7	8.0
Santa Maria[3]	21.7	6.7
Goleta	19.6	5.2
Lompoc H Street	17.2	5.6
Las Flores Canyon	15.4	-

[1] State PM_{10} Annual Arithmetic Mean Standard = 20 µg/m^3 at local conditions
[2] Federal and State $PM_{2.5}$ Annual Arithmetic Mean Standard = 12 µg/m^3 at local conditions
[3] Sampled Q4 only

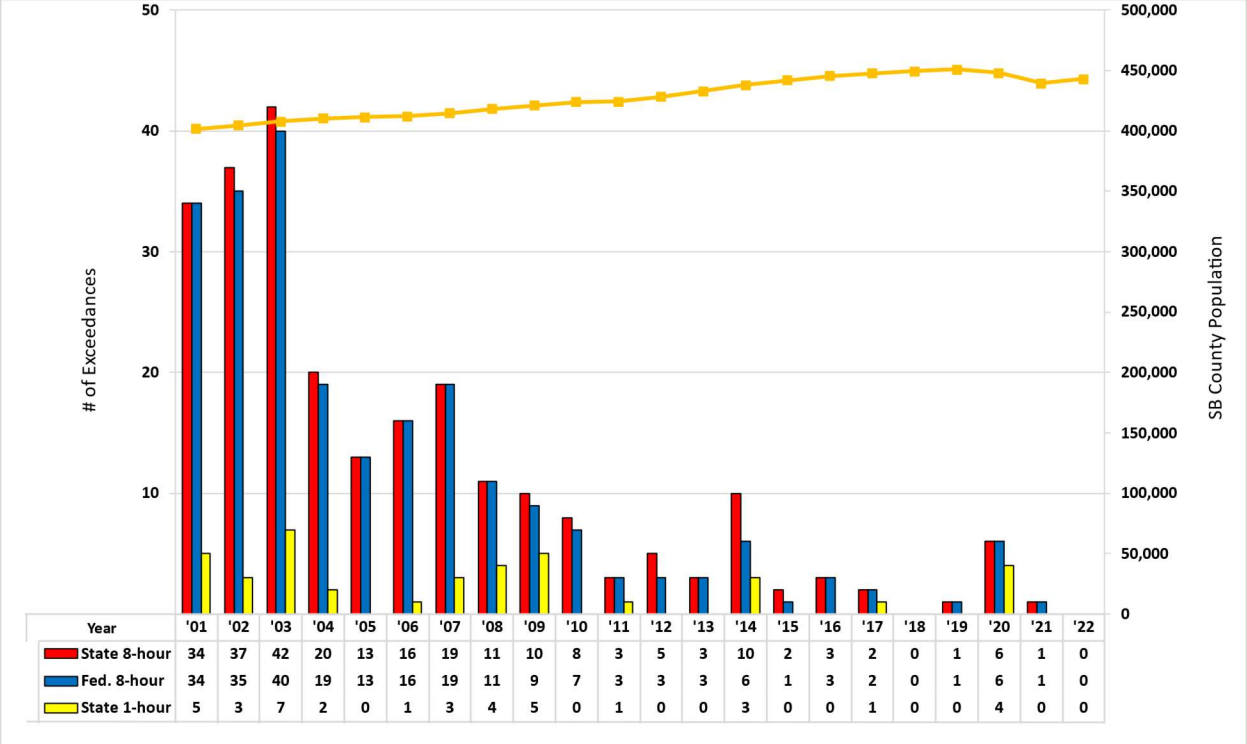
5 AIR QUALITY TRENDS

In 2022, Santa Barbara County generally had good air quality. While the impact of wildfire smoke was still present, historical data shows 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 no days in 2022 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



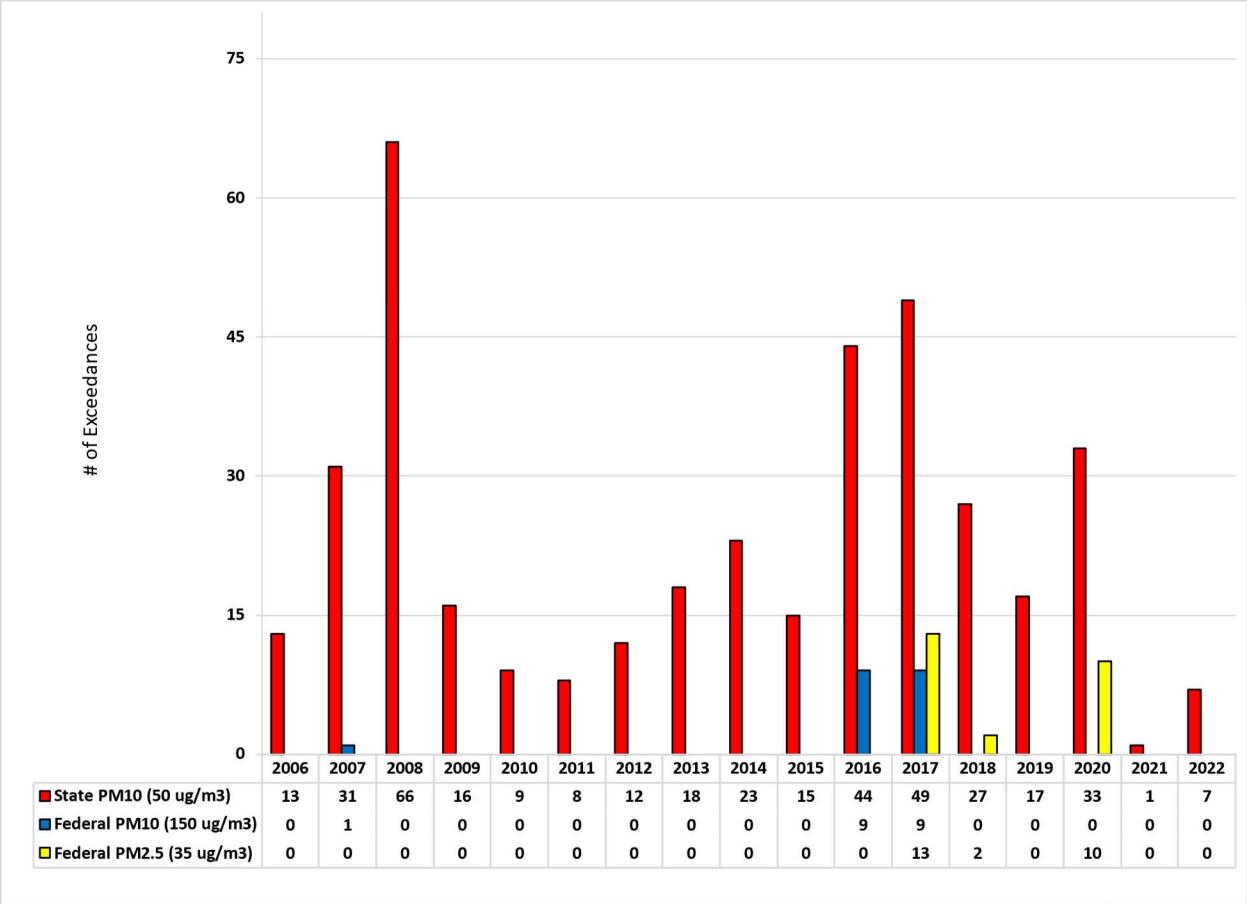
Year	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20	'21	'22
State 8-hour	34	37	42	20	13	16	19	11	10	8	3	5	3	10	2	3	2	0	1	6	1	0
Fed. 8-hour	34	35	40	19	13	16	19	11	9	7	3	3	3	6	1	3	2	0	1	6	1	0
State 1-hour	5	3	7	2	0	1	3	4	5	0	1	0	0	3	0	0	1	0	0	4	0	0

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 PM_{10} and $PM_{2.5}$ since 2006. The Lompoc station began continuous sampling for $PM_{2.5}$ in 2007, and PM_{10} was added in 2009. In 2010, continuous sampling for both PM_{10} and $PM_{2.5}$ were 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 PM_{10} levels. During California's prolonged droughts that occurred over the last fifteen years, dry conditions likely contributed to many of these PM exceedances.

FIGURE 5-2: PARTICULATE MATTER EXCEEDANCES



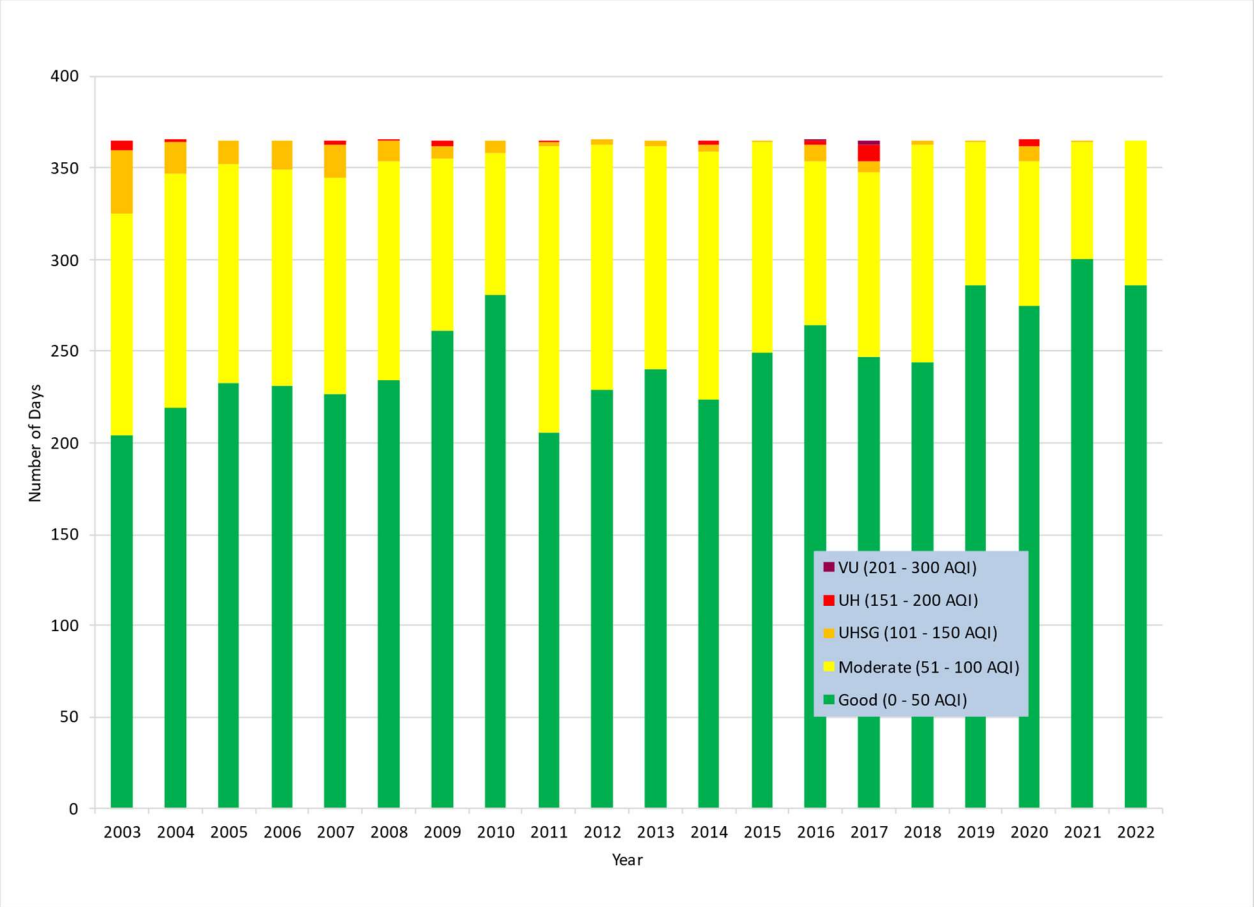
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
State PM10 (50 ug/m3)	13	31	66	16	9	8	12	18	23	15	44	49	27	17	33	1	7
Federal PM10 (150 ug/m3)	0	1	0	0	0	0	0	0	0	0	9	9	0	0	0	0	0
Federal PM2.5 (35 ug/m3)	0	0	0	0	0	0	0	0	0	0	0	13	2	0	10	0	0

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 (286 days, or 78.4%) in Santa Barbara County were green, or good air quality, during 2022. The remainder of the days were moderate (79 days, 21.6%), with no days in unhealthy for sensitive groups or higher. 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)

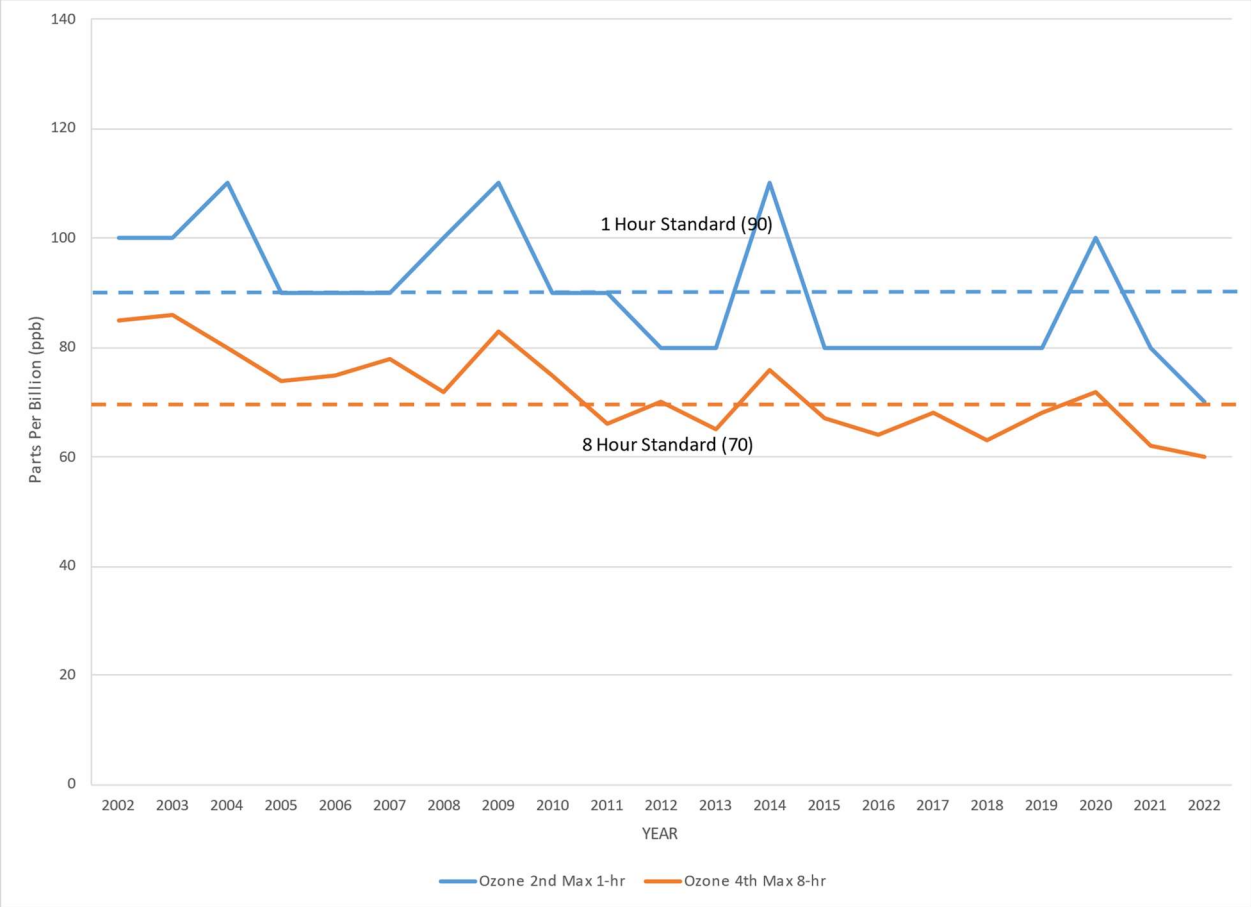


FIGURE 5-5: MEASURED NITROGEN DIOXIDE LEVELS (PARTS PER BILLION)

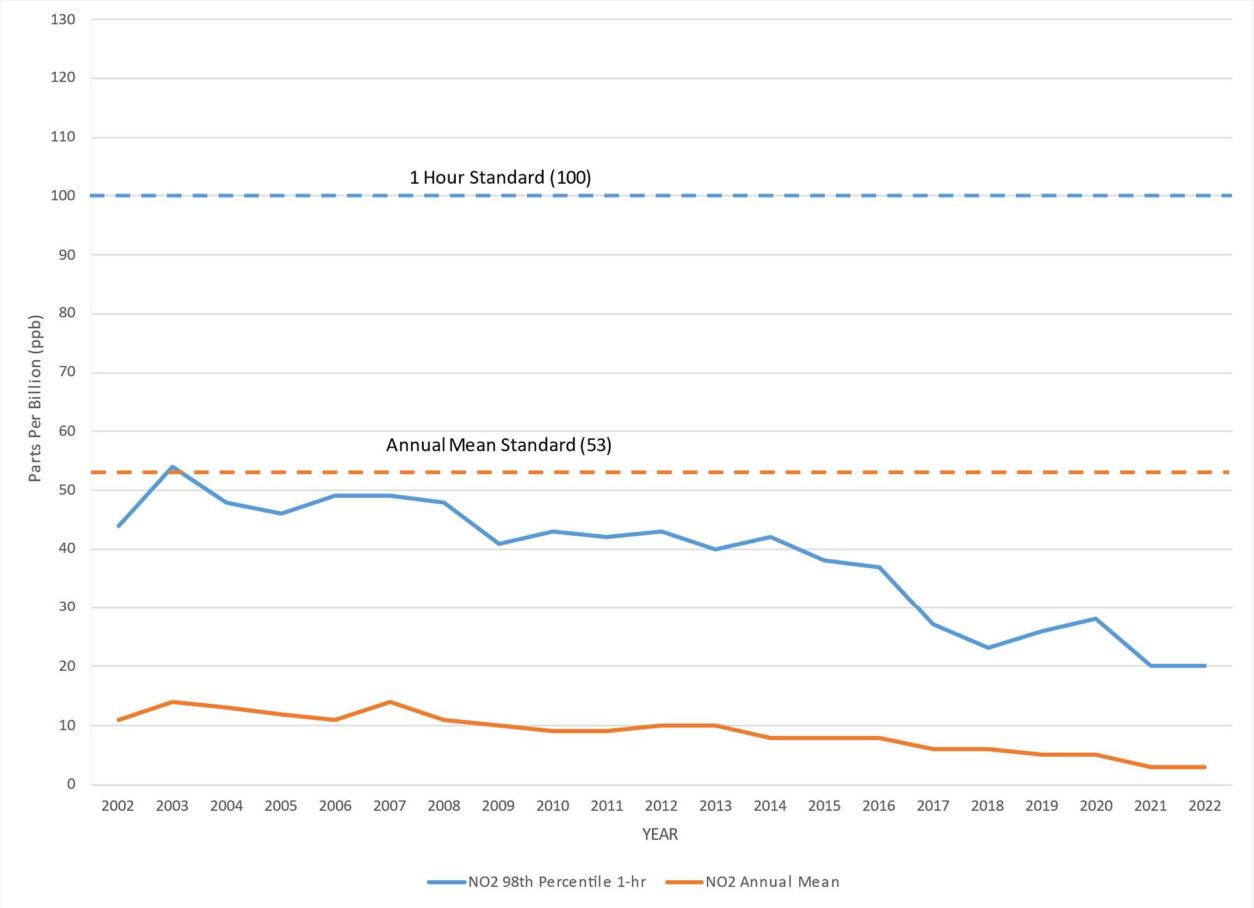
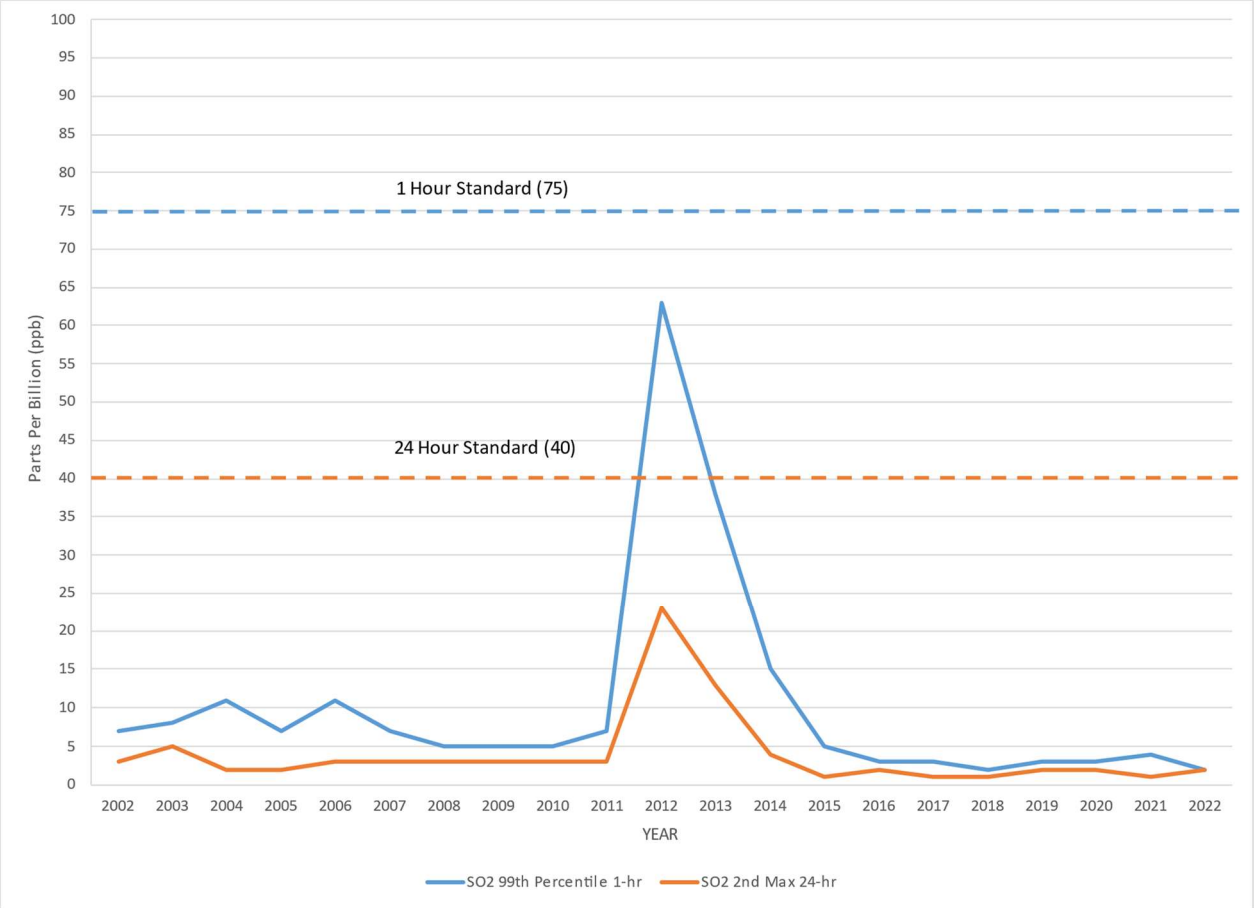
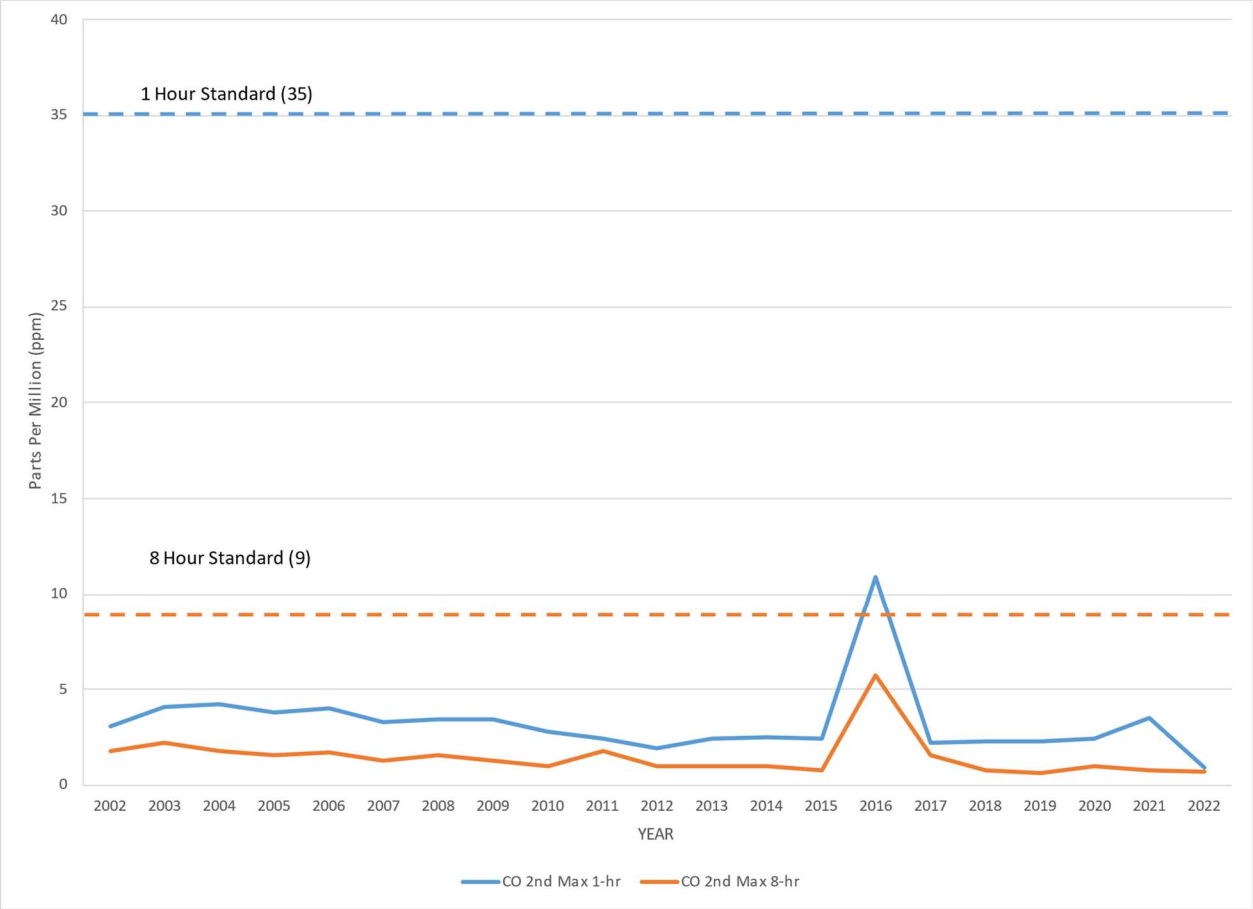


FIGURE 5-6: MEASURED SULFUR DIOXIDE LEVELS (PARTS PER BILLION)[1]



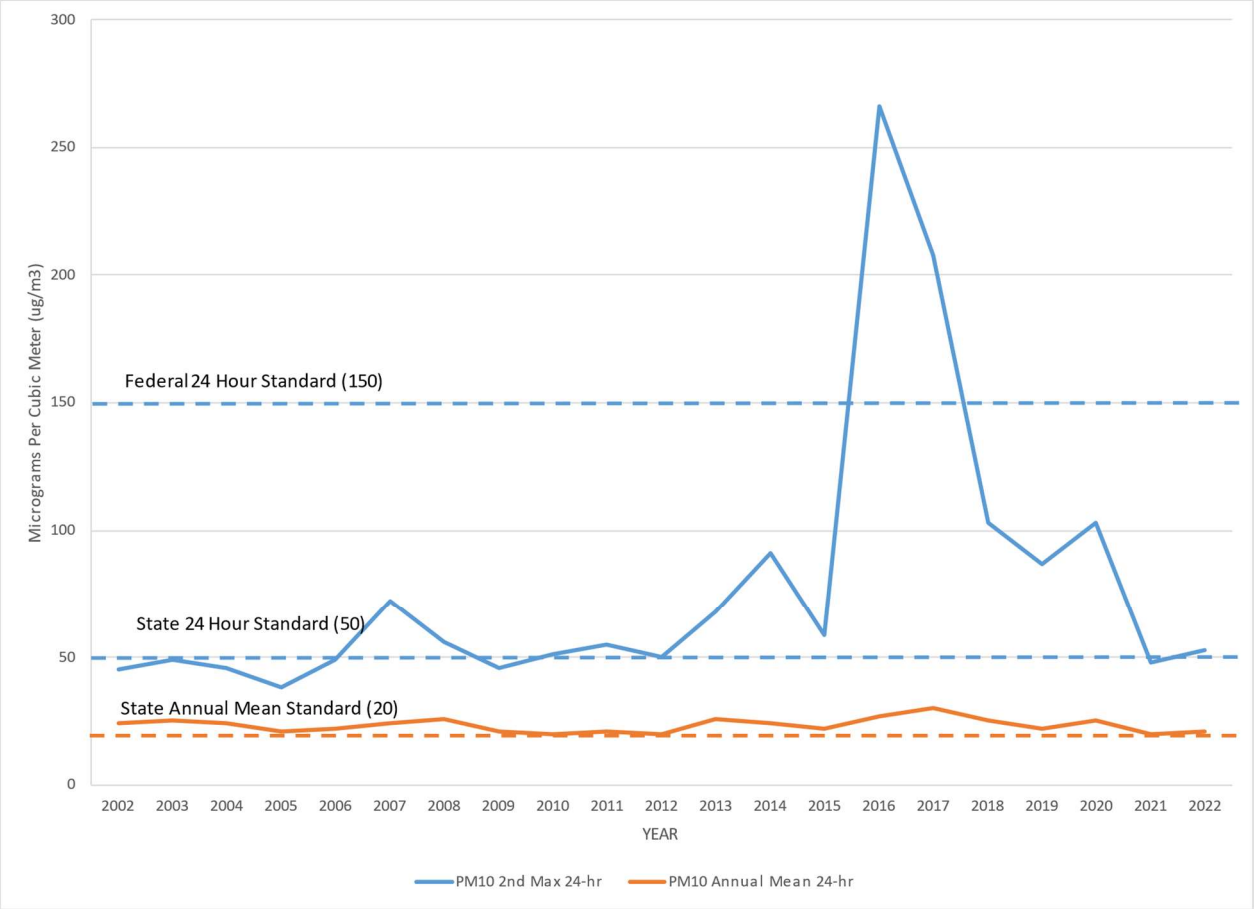
[1] High SO_2 levels recorded in 2012 were related to a release at the stationary source facility at Las Flores Canyon.

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



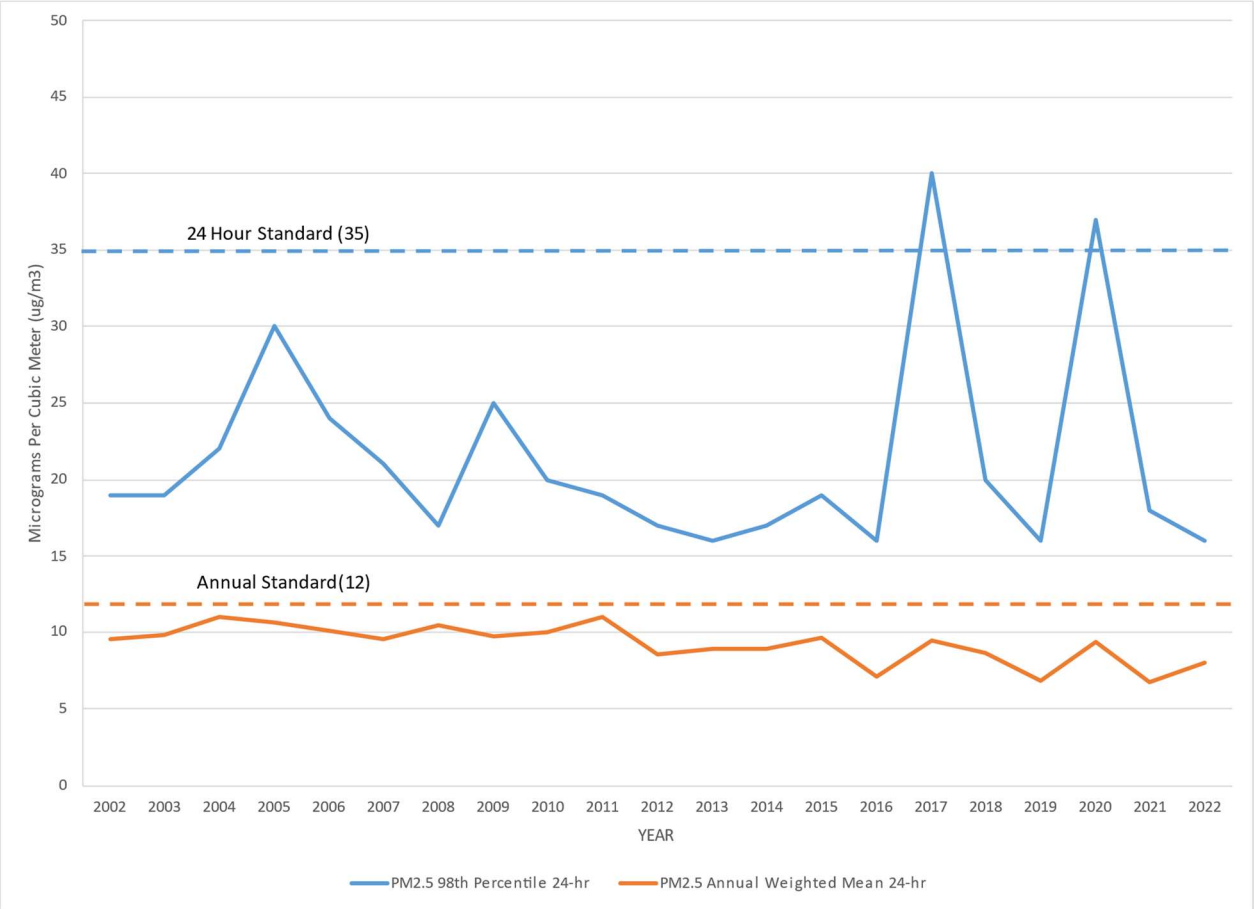
[1] High CO values recorded in 2016 were the result of the Sherpa wildfire burning near the Las Flores Canyon monitoring station.

FIGURE 5-8: MEASURED PM_{10} LEVELS ($\mu g/m^3$)[1,2]



[1] Prior to 2006, samples were collected every 6 days. By 2010 all samples were continuous.
[2] High PM_{10} values recorded in 2016 and 2017 were the result of wildfires.

FIGURE 5-9: MEASURED $PM_{2.5}$ LEVELS ($\mu g/m^3$)[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 (PM10)	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)	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)	—	
	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 $\mu g/m^3$ 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 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ 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 $\mu g/m^3$ 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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