air pollution control district
SANTA BARBARA COUNTY

Agenda Date: August 15, 2019
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: Joel Cordes, Principal Monitoring Specialist (805-961-8816)

SUBJECT: 2018 Annual Air Quality Report

RECOMMENDATION:

Receive presentation and attached 2018 Annual Ambient Air Quality Report for Santa Barbara County.

BACKGROUND:

In 2018, the District operated a network of 17 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, after all of the air quality data has been reviewed and verified, the District prepares this annual air quality report.

DISCUSSION:

The United States Environmental Protection Agency (EPA) has established national ambient air quality standard (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.

In 2018, Santa Barbara County met the federal ambient air quality standards for all measured pollutants except $PM_{2.5}$. The 24-hour $PM_{2.5}$ standard of 35 $\mu g/m^3$ was exceeded on two days in August. As a result of the wildfires burning in August in Northern California, $PM_{2.5}$ levels countywide were elevated. The Lompoc H street station recorded values above the standard on

August 23. On August 24, four stations recorded values over the standard: Goleta, Santa Barbara, Santa Maria, and Lompoc H Street.

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 2018, Santa Barbara County met all of the state standards except for PM_{10}. The state has a 24-hour PM_{10} standard of 50 $\mu g/m^3$ and an annual PM_{10} standard of 20 $\mu g/m^3$. The state 24-hour PM_{10} standard was exceeded on 27 days countywide. Santa Maria exceeded the standard on 14 days and Santa Barbara was over the standard on 11 days. All other stations exceeded the 24-hour PM_{10} standard on 5 days or less. The state annual arithmetic mean PM_{10} standard was exceeded at the Santa Barbara, Santa Maria, El Capitan, and Goleta monitoring stations.

The attached 2018 Annual Air Quality 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 air quality trends for Santa Barbara County. The presentation to your Board will summarize the 2018 Annual Air Quality Report.

ATTACHMENT:

A. 2018 Annual Air Quality Report

air pollution control district
SANTA BARBARA COUNTY

Annual Air Quality Report

2018

Aeron Arlin Genet, Air Pollution Control Officer

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1 2018 AIR QUALITY SUMMARY

This annual report provides information on the measured air quality concentrations in Santa Barbara County for 2018, as well as information on air quality trends. The report is available for download at the District's website, www.ourair.org/air-monitoring.

- Air quality standards and monitoring station locations are discussed in Section 2.
- Detailed air quality data for 2018 are provided in Section 3 for gaseous pollutants, and Section 4 for particulate matter.
- Section 5 includes a discussion of air quality trends.

In 2018, Santa Barbara County met the federal ambient air quality standards for all measured pollutants except particulate matter less than 2.5 microns in diameter ($PM_{2.5}$). The 24-hour $PM_{2.5}$ standard of 35 µg/m^3 was exceeded on two days in August. As a result of the wildfires burning in August in Northern California, $PM_{2.5}$ levels countywide were elevated. The Lompoc H Street station exceeded the standard on August 23, and all four of the stations that measure $PM_{2.5}$ (Goleta, Santa Barbara, Santa Maria, and Lompoc H Street) were over the standard on August 24.

Santa Barbara County met the state ambient air quality standards in 2018 for all pollutants except PM_{10}. The state 24-hour PM_{10} standard of 50 µg/m^3 was exceeded on 27 days countywide, with Santa Maria contributing 14 days, and Santa Barbara contributing 11 days. All other stations had less than 5 exceedances. The state annual arithmetic mean PM_{10} standard of 20 µg/m^3 was exceeded at the Santa Barbara, Santa Maria, El Capitan, and Goleta monitoring stations.

Countywide, there were no exceedances of the federal or state ozone standard. All other areas within Santa Barbara County were below the federal and state ambient air quality standards during 2018. Table 1 presents a summary of the number of exceedances for each station in Santa Barbara County.

TABLE 1-1: SANTA BARBARA COUNTY EXCEEDANCE SUMMARY FOR 2018[1]

Number of Days that Exceeded Air Quality Standard								
Station	**O_3 (1hr)**	**O_3 (8hr)**	**NO_2**	**SO_2**	**CO**	**PM_{10} (state)**	**PM_{10} (federal)**	**$PM_{2.5}$ (federal)**
Carpinteria	0	0	0	-	-	-	-	-
El Capitan	0	0	0	0	-	3	0	-
Goleta	0	0	0	-	0	4	0	1
Las Flores Canyon	0	0	0	0	0	0	0	-
Lompoc H Street	0	0	0	0	0	2	0	2
Lompoc North	0	0	0	0	-	-	-	-
Nojoqui	0	0	0	-	-	-	-	-
Paradise Road	0	0	0	-	-	-	-	-
Santa Barbara	0	0	-	-	-	11	0	1
Santa Maria	0	0	0	-	0	14	0	1
Santa Ynez	0	0	-	-	-	-	-	-
Vandenberg South Base	0	0	0	0	0	4	0	-
Countywide Total	0	0	0	0	0	27	0	2

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

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 national primary 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 2018 can be found in Appendix A. During 2018, there were no changes to federal or state or ambient air quality standards.

Air Monitoring Stations

In 2018, there were 17 monitoring stations operating in Santa Barbara County. Thirteen stations measure ambient air and meteorological conditions, two stations measure odors, and two stations only measure meteorological conditions. Eight were operated by the Santa Barbara County Air Pollution Control District (APCD). 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 (IMS). The SLAMS stations are designed to monitor the air in the urban areas of the county while the IMS stations are required by several facility permits, in order to monitor air quality impacts from the operation of these facilities. Figure 1 shows the locations of all monitoring stations in Santa Barbara County operating in 2018. Table 2 lists the monitoring stations operating in Santa Barbara County during 2018 and the pollutants and parameters measured at each station.

FIGURE 2-1: 2018 SANTA BARBARA COUNTY AIR MONITORING STATIONS

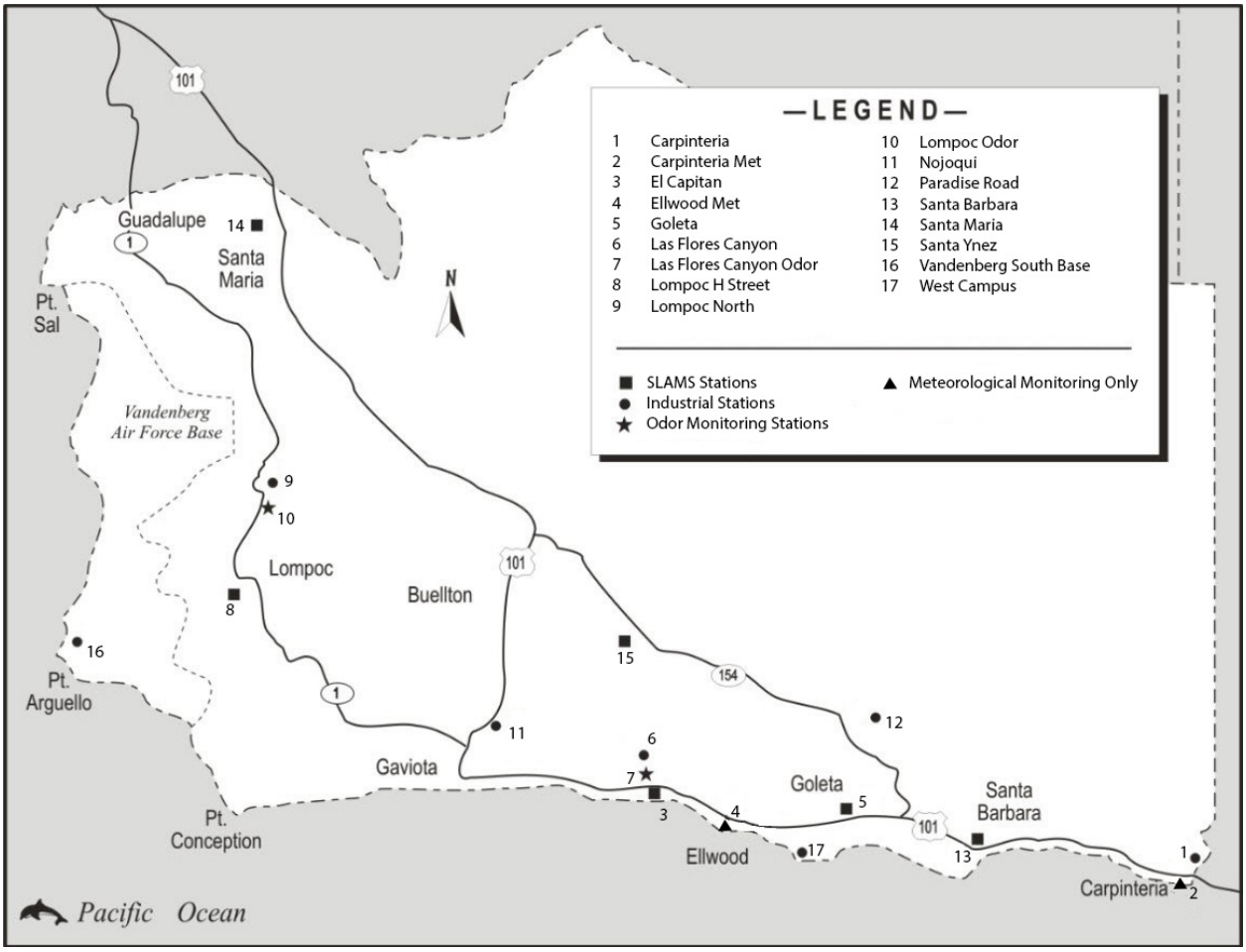


TABLE 2-1: MONITORING STATION PARAMETER LIST FOR 2018

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
Carpinteria Met										X	X	X
El Capitan	X	X	X					X		X	X	X
Ellwood Met										X	X	X
Goleta	X	X		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
Nojoqui	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											
Vandenberg South Base	X	X	X	X	X			X		X	X	X
West Campus			X		X	X	X			X	X	

THC	Total Hydrocarbons	TRS	Total Reduced Sulfur
WS	Wind Speed	ATM	Ambient Temperature
WD	Wind Direction	BAM	Beta Attenuation Monitor

Monitoring Station Changes During 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, in order 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 12 stations throughout the county during 2018, NO_2 was measured at 10 stations, SO_2 was measured at six stations, and CO was measured at five 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 2018 can be seen in Tables 3-1 through 3-5. The tables show the four highest concentrations for each pollutant in 2018 and the dates they occurred.

TABLE 3-1: FOUR HIGHEST 1-HOUR O_3 CONCENTRATIONS FOR 2018[1]

O_3 1-hour (ppb)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Carpinteria	84	7/8/2018	12:00	75	8/7/2018	14:00	75	11/4/2018	14:00	74	2/3/2018	13:00
Goleta	77	8/8/2018	13:00	62	11/4/2018	13:00	59	4/15/2018	14:00	59	11/18/2018	14:00
Paradise	76	8/7/2018	12:00	75	6/23/2018	14:00	69	8/8/2018	17:00	68	8/4/2018	13:00
Las Flores Canyon	75	8/7/2018	13:00	75	10/21/2018	15:00	73	8/8/2018	14:00	72	10/26/2018	21:00
Lompoc North	70	9/20/2018	11:00	65	10/20/2018	21:00	63	11/1/2018	16:00	62	10/19/2018	15:00
Vandenberg South Base	70	11/16/2018	15:00	61	11/1/2018	15:00	60	2/2/2018	15:00	60	11/11/2018	13:00
Santa Barbara	68	8/8/2018	14:00	67	4/22/2018	15:00	64	4/14/2018	14:00	63	2/3/2018	14:00
El Capitan	64	4/10/2018	15:00	64	11/11/2018	13:00	63	11/18/2018	14:00	60	4/14/2018	15:00
Santa Ynez	64	6/23/2018	14:00	64	8/4/2018	11:00	63	9/20/2018	13:00	62	3/30/2018	14:00
Nojoqui	56	7/10/2018	15:00	53	4/9/2018	15:00	52	10/26/2018	15:00	51	8/7/2018	10:00
Santa Maria	52	8/24/2018	14:00	52	10/19/2018	10:00	50	4/13/2018	16:00	50	4/14/2018	12:00
Lompoc H Street	44	2/2/2018	14:00	43	4/12/2018	13:00	42	1/14/2018	14:00	42	3/19/2018	13:00

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

TABLE 3-2: FOUR HIGHEST 8-HOUR O_3 CONCENTRATIONS FOR 2018[1]

O_3 8-hour (ppb)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Carpinteria	70	7/8/2018	9:00	63	4/14/2018	10:00	63	11/4/2018	9:00	62	8/8/2018	9:00
Las Flores Canyon	69	10/26/2018	21:00	65	8/6/2018	20:00	65	10/21/2018	10:00	63	10/24/2018	15:00
Paradise	68	6/23/2018	10:00	64	8/7/2018	7:00	62	8/8/2018	11:00	58	6/12/2018	9:00
Lompoc North	67	9/20/2018	9:00	60	11/1/2018	14:00	56	11/9/2018	12:00	58	11/11/2018	18:00
El Capitan	57	11/18/2018	09:00	56	4/14/2018	10:00	55	4/10/2018	10:00	54	4/13/2018	8:00
Santa Barbara	57	4/22/2018	10:00	56	4/13/2018	10:00	56	4/14/2018	10:00	55	4/12/2018	10:00
Santa Ynez	57	6/23/2018	10:00	57	8/8/2018	10:00	56	9/20/2018	10:00	54	2/3/2018	11:00
Vandenberg South Base	57	11/16/2018	11:00	56	2/2/2018	13:00	56	4/12/2018	11:00	56	8/24/2018	10:00
Goleta	56	8/8/2018	8:00	53	4/12/2018	9:00	53	4/13/2018	10:00	53	4/14/2018	9:00
Nojoqui	48	4/9/2018	12:00	48	7/10/2018	10:00	46	8/9/2018	12:00	44	4/14/2018	10:00
Santa Maria	48	8/24/2018	10:00	47	4/12/2018	8:00	47	5/13/2018	10:00	46	10/19/2018	9:00
Lompoc H Street	42	4/12/2018	9:00	38	4/5/2018	10:00	38	8/24/2018	10:00	37	3/19/2018	9:00

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

TABLE 3-3: FOUR HIGHEST 1-HOUR NO_2 CONCENTRATIONS FOR 2018[1]

NO_2 (ppb)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Santa Maria	40	1/13/2018	17:00	38	11/15/2018	18:00	37	12/13/2018	18:00	35	1/29/2018	18:00
Carpinteria	29	2/9/2018	12:00	21	12/14/2018	16:00	17	11/26/2018	17:00	16	7/25/2018	7:00
Goleta	29	2/1/2018	9:00	26	2/15/2018	22:00	26	3/7/2018	9:00	26	11/13/2018	8:00
El Capitan	28	2/2/2018	18:00	26	11/19/2018	7:00	24	11/16/2018	7:00	23	1/3/2018	20:00
Lompoc H Street	28	3/27/2018	6:00	27	1/3/2018	17:00	26	1/26/2018	7:00	24	1/13/2018	19:00
Nojoqui	20	2/9/2018	16:00	19	11/16/2018	17:00	15	1/2/2018	15:00	15	12/14/2018	7:00
Lompoc North	16	4/10/2018	8:00	12	4/23/2018	6:00	6	12/4/2018	15:00	5	4/13/2018	20:00
Las Flores Canyon	15	2/9/2018	12:00	14	12/14/2018	7:00	9	2/1/2018	13:00	8	2/6/2018	18:00
Vandenberg South Base	7	1/8/2018	17:00	6	1/2/2018	18:00	6	1/7/2018	23:00	6	2/3/2018	15:00
Paradise	6	12/14/2018	15:00	5	1/3/2018	16:00	5	11/16/2018	15:00	5	12/4/2018	16:00

[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 2018[1]

SO_2 (ppb)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Lompoc H Street	3	11/27/2018	23:00	3	11/28/2018	0:00	2	11/5/2018	9:00	2	11/23/2018	2:00
El Capitan	2	7/1/2018	2:00	2	7/10/2018	2:00	2	7/11/2018	2:00	2	7/16/2018	4:00
Las Flores Canyon	2	7/11/2018	2:00	2	7/27/2018	2:00	2	7/30/2018	4:00	2	8/1/2018	2:00
Vandenberg South Base	2	10/8/2018	4:00	2	10/16/2018	2:00	2	10/20/2018	2:00	2	10/26/2018	2:00
West Campus	2	6/27/2018	2:00	2	6/29/2018	2:00	2	9/13/2018	11:00	2	9/14/2018	0:00
Lompoc North	1	1/3/2018	11:00	1	1/4/2018	2:00	1	1/17/2018	2:00	1	1/22/2018	2:00

[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 2018[1]

CO (ppm)												
Station	**1st**	**Date**	**Time**	**2nd**	**Date**	**Time**	**3rd**	**Date**	**Time**	**4th**	**Date**	**Time**
Santa Maria	3.4	5/25/2018	18:00	1.3	1/22/2018	8:00	1.1	9/21/2018	17:00	0.8	1/26/2018	7:00
Goleta	1.5	1/23/2018	8:00	1.3	7/8/2018	5:00	1.3	12/13/2018	9:00	1.1	3/19/2018	7:00
Lompoc H Street	1.1	1/22/2018	8:00	1.0	1/26/2018	7:00	1.0	1/29/2018	7:00	1.0	1/30/2018	9:00
Las Flores Canyon	0.8	11/11/2018	9:00	0.5	2/6/2018	2:00	0.5	2/9/2018	12:00	0.4	1/11/2018	10:00
Vandenberg South Base	0.7	8/23/2018	17:00	0.7	8/24/2018	0:00	0.7	11/16/2018	14:00	0.7	12/26/2018	11:00

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

4 PARTICULATE MATTER SUMMARY

Seven stations collected PM_{10} data in 2018. The seven 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 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 2018 is shown in Tables 4-1 through 4-4. The summaries contain the four highest 24-hour PM concentrations, and the annual averages for each site. The state air quality standards are based on data collected at local conditions (pressure and temperature measured at the time of the sampling), while the federal standards are based on data corrected to standard conditions (pressure and temperature corrected to standard conditions at sea level).

TABLE 4-1: FOUR HIGHEST 24-HOUR AVERAGE PM_{10} CONCENTRATIONS FOR 2018[1]

Particulate Matter Less Than 10 Microns (µg/m^3)								
Station	**1st**	**Date**	**2nd**	**Date**	**3rd**	**Date**	**4th**	**Date**
Santa Barbara	128	1/14/2018	108	1/13/2018	100	1/16/2018	78	1/15/2018
Goleta	72	7/6/2018	60	5/11/2018	58	7/7/2018	52	8/24/2018
Vandenberg South Base	69	12/19/2018	55	11/16/2018	53	2/6/2018	51	11/4/2018
Lompoc H Street	63	11/16/2018	52	8/24/2018	47	8/23/2018	44	10/30/2018
Santa Maria	62	7/6/2018	59	8/24/2018	59	7/7/2018	57	7/9/2018
El Capitan	56	7/7/2018	52	7/6/2018	52	8/7/2018	49	7/23/2018
Las Flores Canyon	45	8/24/2018	43	9/21/2018	42	8/7/2018	39	8/31/2018

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

TABLE 4-2: FOUR HIGHEST 24-HOUR AVERAGE PM_{10} CONCENTRATIONS FOR 2018[1]

Particulate Matter Less Than 10 Microns (µg/m^3)								
Station	**1st**	**Date**	**2nd**	**Date**	**3rd**	**Date**	**4th**	**Date**
Santa Barbara	122	1/14/2018	103	1/13/2018	95	1/16/2018	73	1/15/2018
Goleta	72	7/6/2018	57	7/7/2018	56	5/11/2018	50	8/24/2018
Vandenberg South Base	66	12/19/2018	55	4/22/2018	54	5/11/2018	53	6/23/2018
Santa Maria	61	7/6/2018	58	8/24/2018	57	7/7/2018	56	7/9/2018
Lompoc H Street	60	11/16/2018	50	8/24/2018	44	8/23/2018	42	10/30/2018
El Capitan	54	7/7/2018	53	7/6/2018	51	8/7/2018	48	7/23/2018
Las Flores Canyon	44	8/24/2018	42	8/7/2018	41	9/21/2018	38	8/31/2018

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

TABLE 4-3: FOUR HIGHEST 24-HOUR AVERAGE $PM_{2.5}$ CONCENTRATIONS FOR 2018[1]

Particulate Matter Less Than 2.5 Microns (µg/m^3)								
Station	**1st**	**Date**	**2nd**	**Date**	**3rd**	**Date**	**4th**	**Date**
Lompoc H Street	41	8/24/2018	36	8/23/2018	30	11/17/2018	29	11/18/2018
Santa Maria	40	8/24/2018	34	8/23/2018	26	11/18/2018	25	11/17/2018
Santa Barbara	38	8/24/2018	30	2/6/2018	24	8/25/2018	22	11/18/2018
Goleta	36	8/24/2018	27	2/6/2018	25	8/25/2018	22	11/18/2018

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

TABLE 4-4: ANNUAL ARITHMETIC MEAN PM CONCENTRATIONS FOR 2018[1,2]

Particulate Matter (µg/m^3) Local Conditions		
Station	**PM_{10}**	**$PM_{2.5}$**
Santa Barbara	25.2	8.5
Santa Maria	23.9	6.9
El Capitan	20.7	-
Goleta	20.2	7.9
Lompoc H Street	18.1	6.6
Las Flores Canyon	15.0	-
Vandenberg South Base*	-	-

[1] Federal and State $PM_{2.5}$ Annual Arithmetic Mean Standard = 12 µg/m^3

[2] State PM_{10} Annual Arithmetic Mean Standard = 20 µg/m^3

* insufficient data

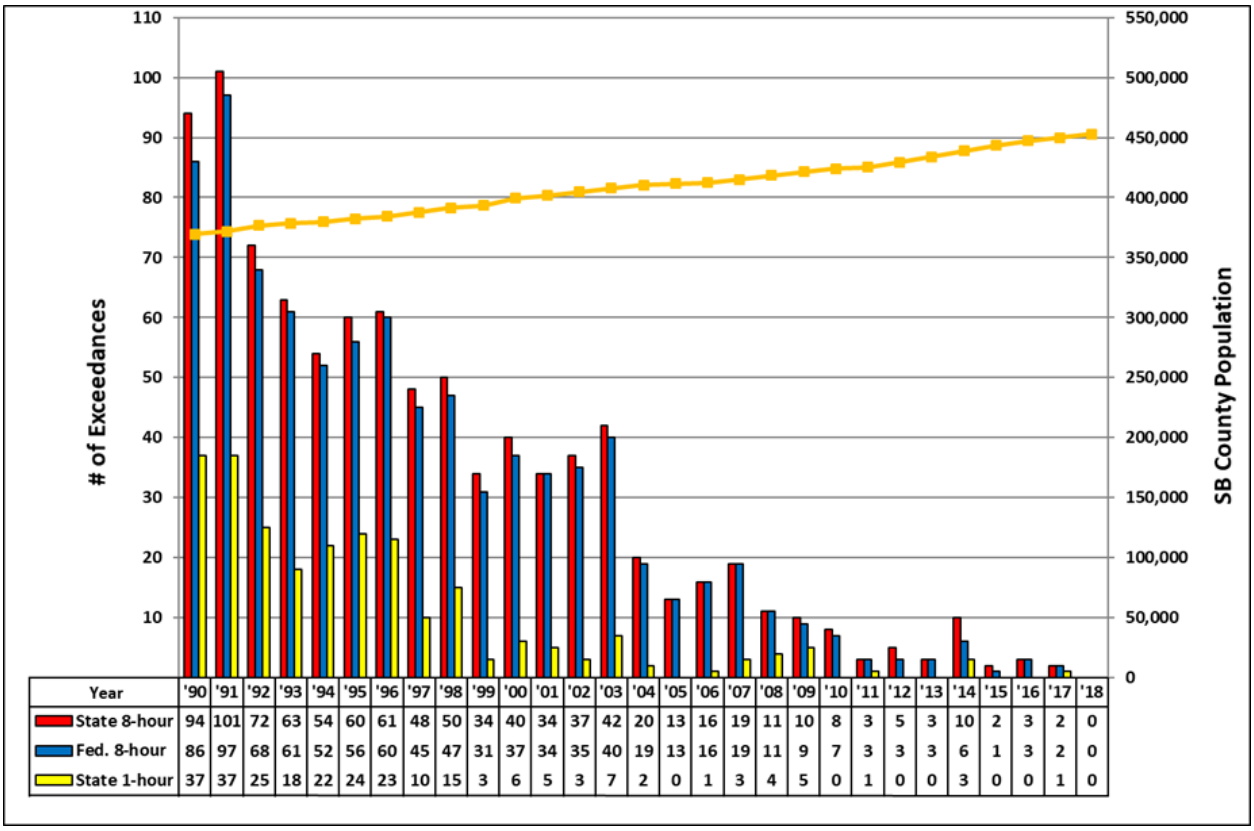
5 AIR QUALITY TRENDS

In 2018, Santa Barbara County generally had very good air quality, as evidenced by the data presented in this annual report. However, historical data show that this was not always the case. Over time, both voluntary and regulatory measures, as well as 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 1990. The downward trend, from 101 days in 1991 to zero days in 2018, is a clear demonstration 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 EXCEEDANCES



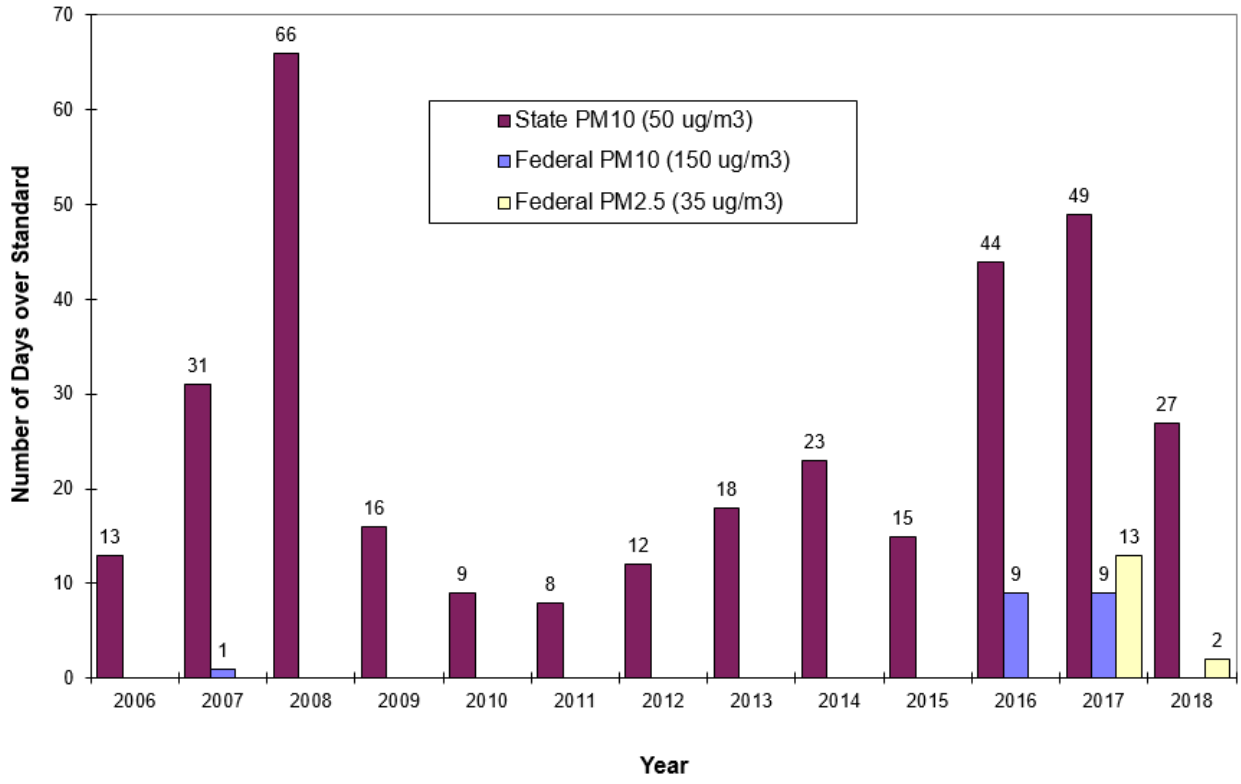
Year	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18
State 8-hour	94	101	72	63	54	60	61	48	50	34	40	34	37	42	20	13	16	19	11	10	8	3	5	3	10	2	3	2	0
Fed. 8-hour	86	97	68	61	52	56	60	45	47	31	37	34	35	40	19	13	16	19	11	9	7	3	3	3	6	1	3	2	0
State 1-hour	37	37	25	18	22	24	23	10	15	3	6	5	3	7	2	0	1	3	4	5	0	1	0	0	3	0	0	1	0

Number of Days Exceeding PM Standards

In the past, particulate monitoring followed a six-day sampling schedule as set by federal and state agencies. Particulate samples were taken over a 24-hour sampling period and involved lab analysis and different sampling and calculation methods. More recently, technology improvements have allowed the District to gradually switch to using particulate monitors that do not require lab analysis, and provide real-time data. Our current network collects PM data continuously (i.e., every day and every hour). The transition from six-day sampling to continuous sampling was phased in during the 2006 to 2010 time period. In 2006, continuous sampling began at the Santa Barbara and Santa Maria stations for both PM_{10} and $PM_{2.5}$. 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 $PM_{2.5}$ 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 methodological differences described above. Figure 5-2 shows that the county's particulate levels vary year-to-year, and the number of days that the county exceeded the air quality standards was 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 in the region, as well as other parts of the state, during that time. In 2008 and 2009, the Tea, Gap and Jesusita Fires caused high particulate levels while they were burning. More recently, the Thomas Fire and several other fires throughout the state 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 drought that occurred between December 2011 and March 2017, dry conditions likely contributed to many of these PM exceedances.

FIGURE 5-2: PARTICULATE MATTER EXCEEDANCES

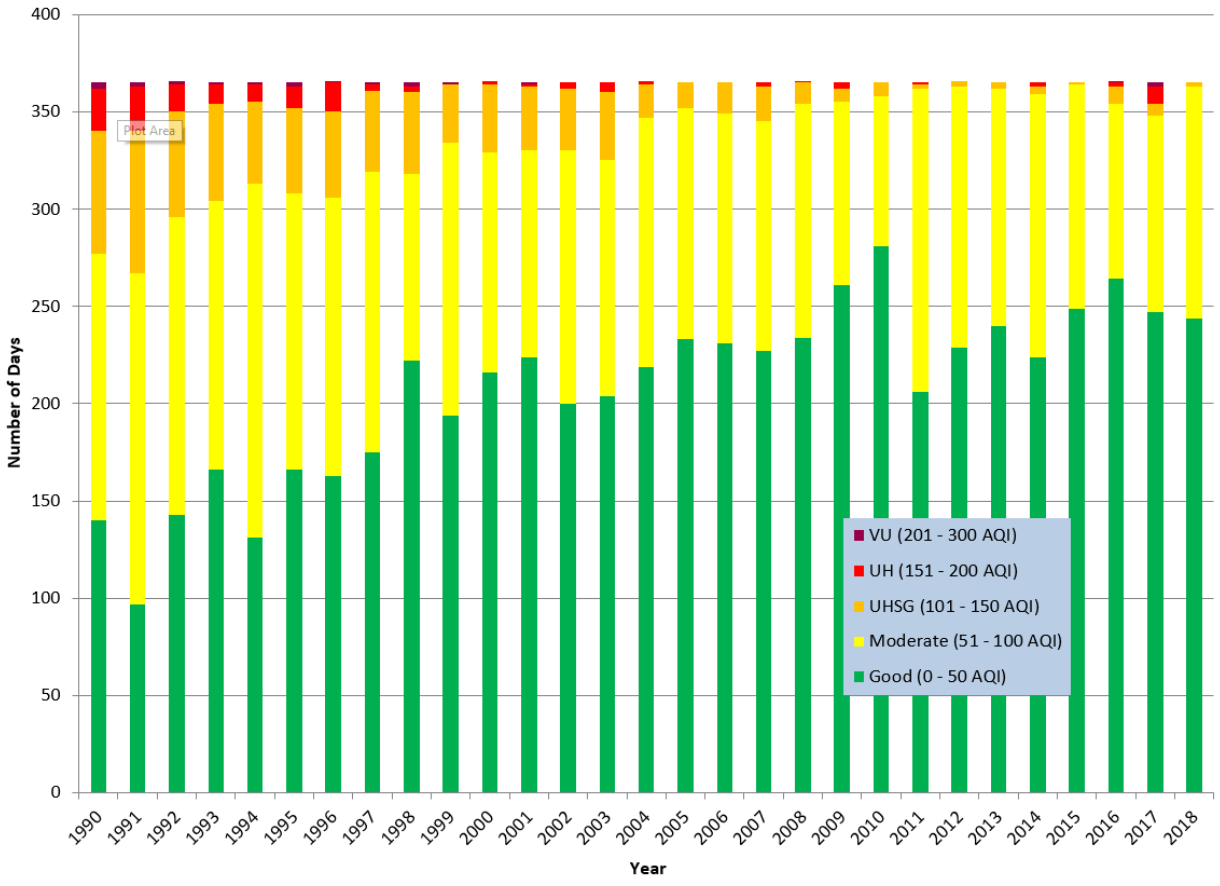


Air Quality Index Trends

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, in 2018 a majority of the days (244 days, or 66.8%) in Santa Barbara County were green, or good air quality. The remainder of the days were moderate (119 days, 32.6%) or unhealthy for sensitive groups (2 days, or 0.5%). 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 of the 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 of the 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)

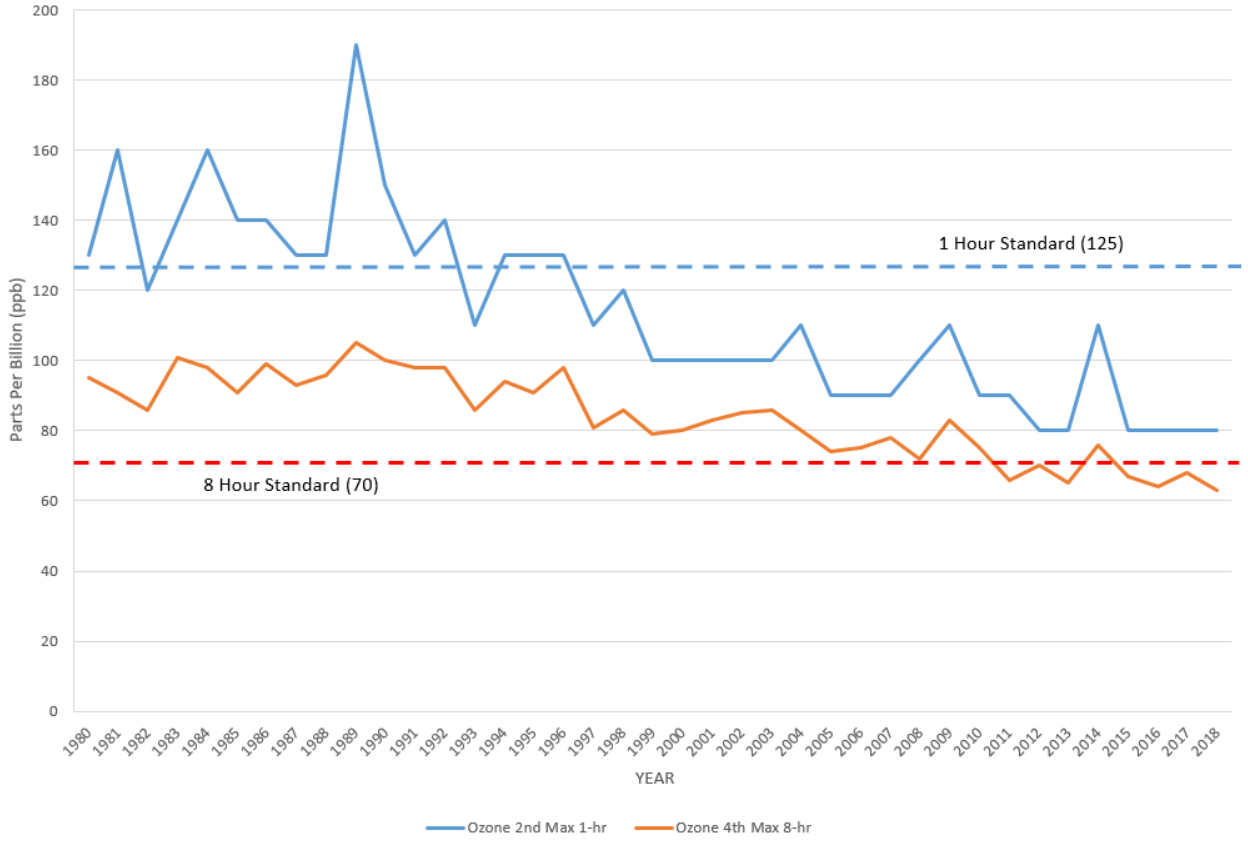


FIGURE 5-5: MEASURED NITROGEN DIOXIDE LEVELS (PARTS PER BILLION)

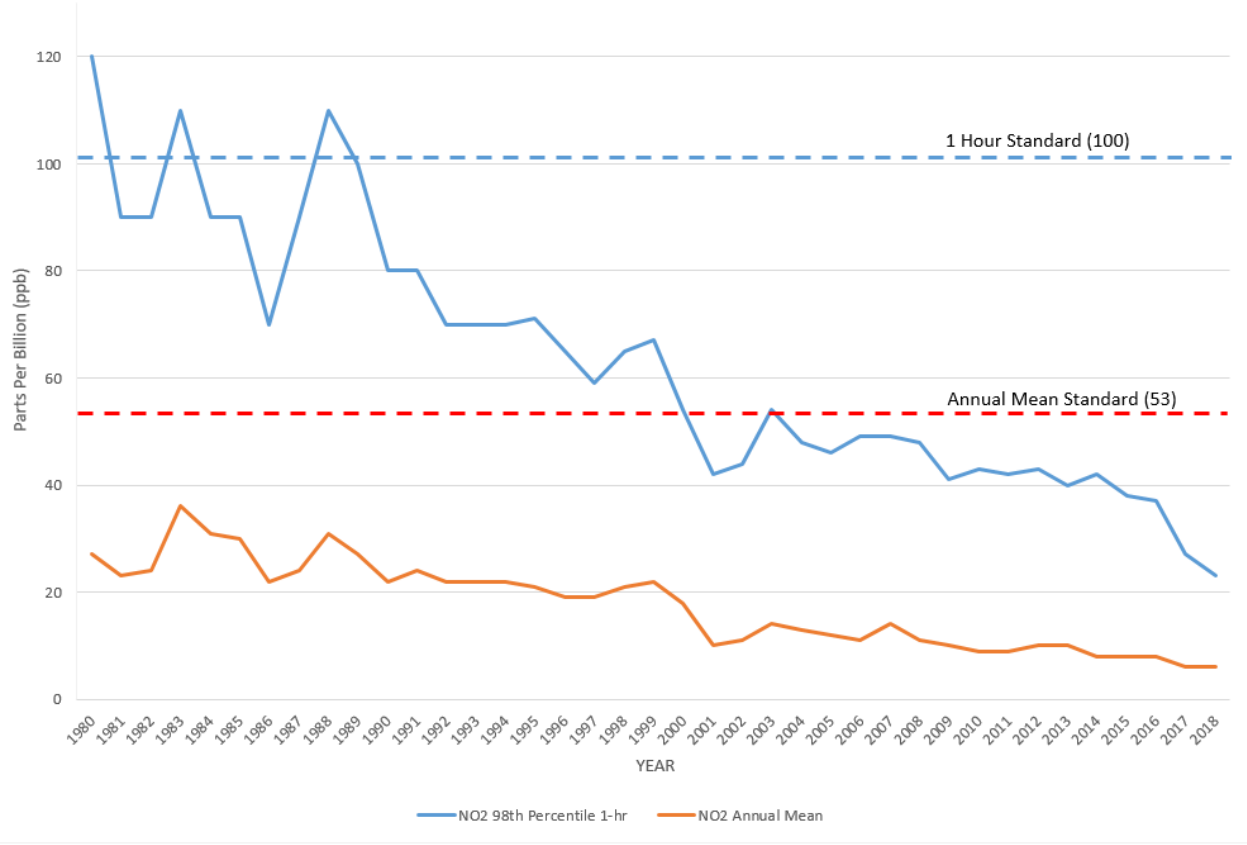
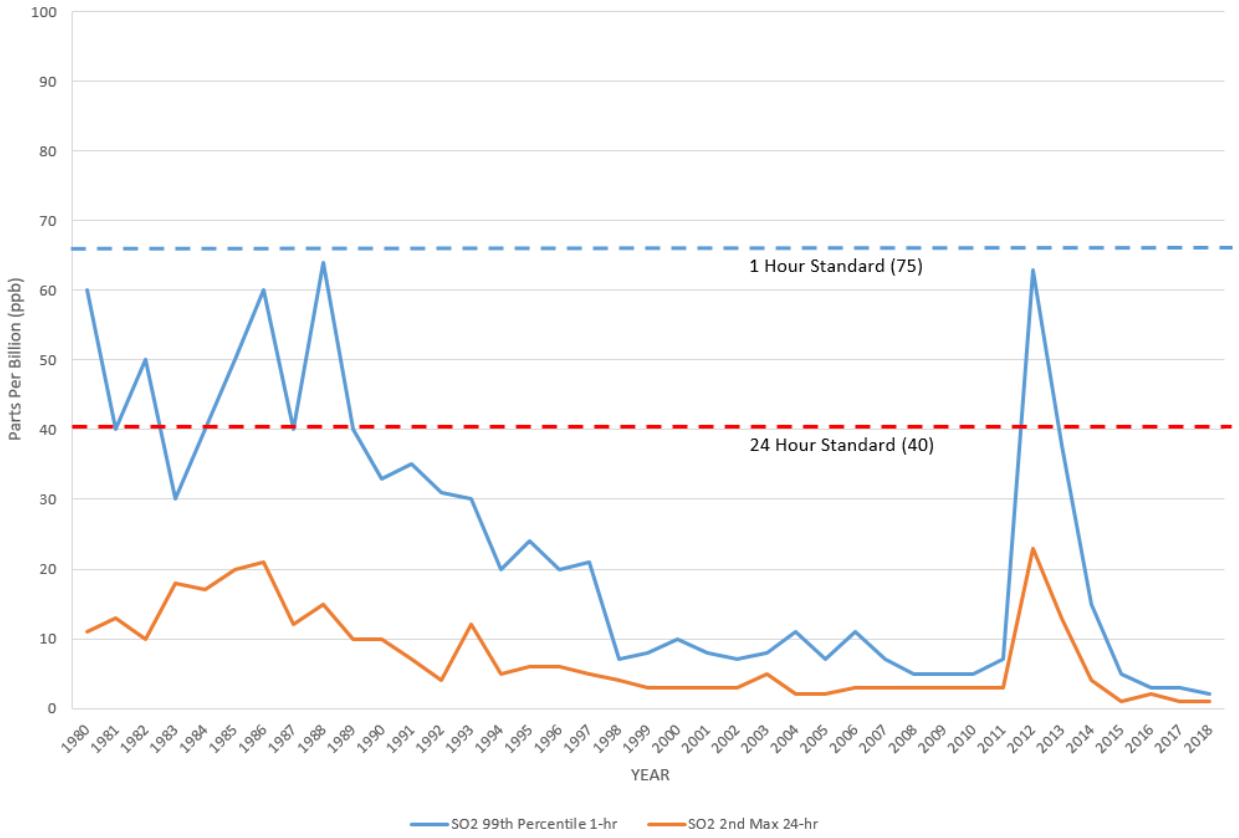
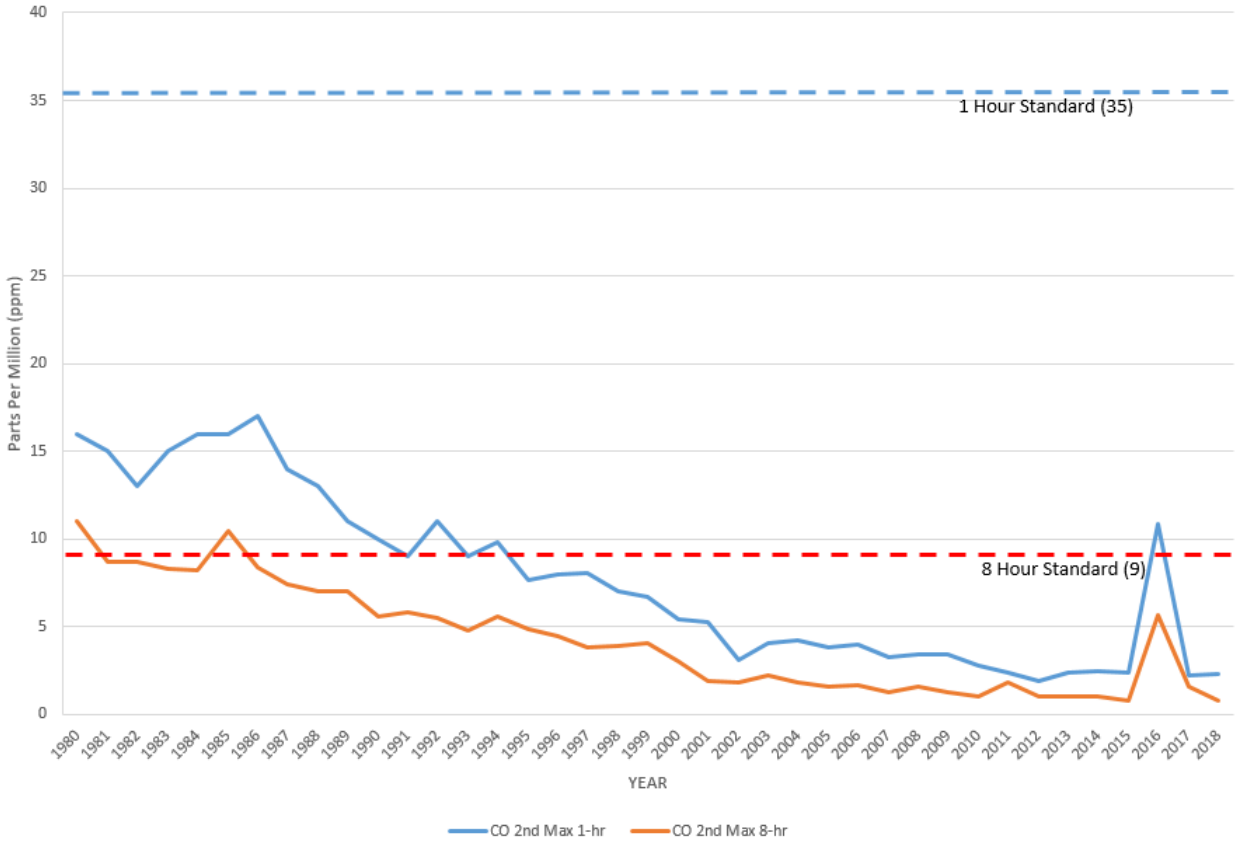


FIGURE 5-6: MEASURED SULFUR DIOXIDE LEVELS (PARTS PER BILLION)[1]



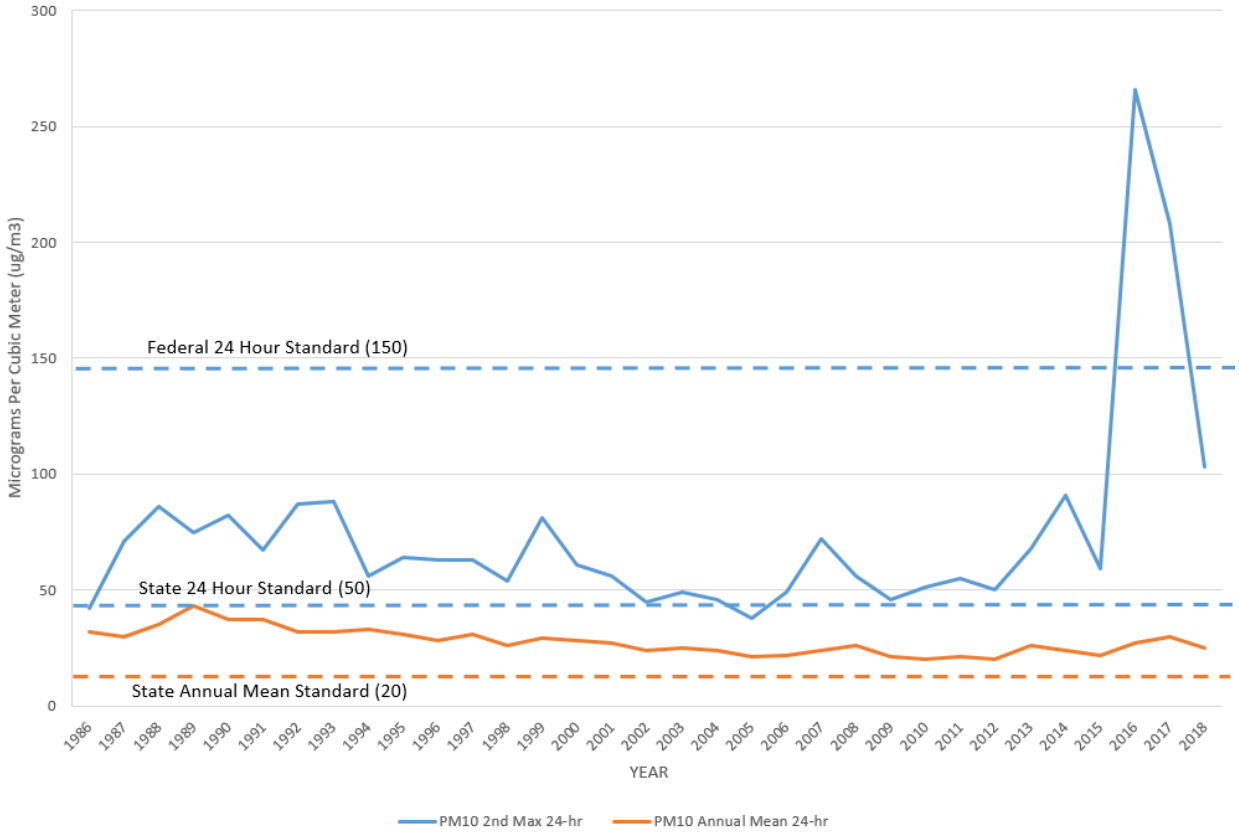
[1] High SO_2 levels recorded at the Las Flores Canyon site in 2012 were related to an SO2 release at the stationary source facility.

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



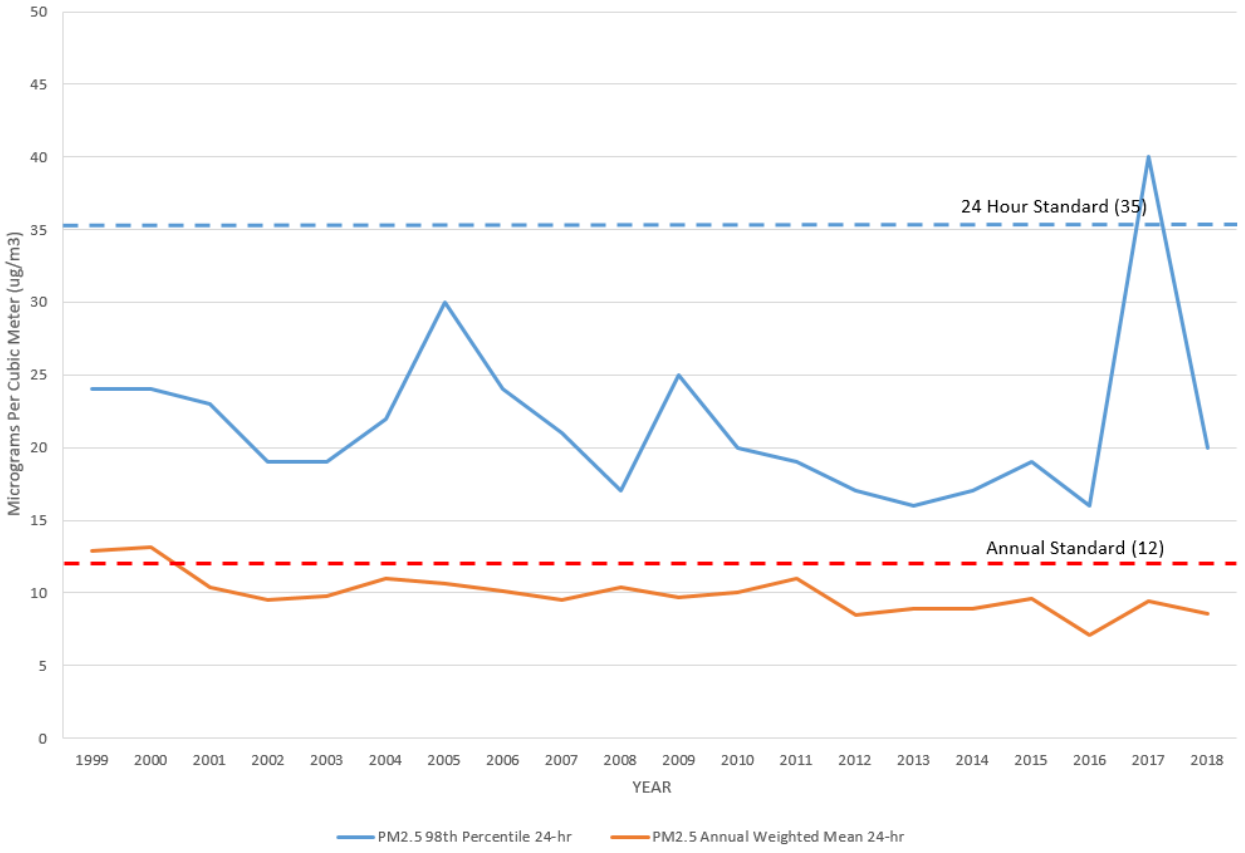
[1] High CO values recorded at the Las Flores Canyon site in 2016 were the result of the Sherpa wildfire burning near the monitoring station.

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



[1] High PM_{10} values recorded at the Las Flores Canyon site in 2016 were the result of the Sherpa wildfire burning near the monitoring station. High PM10 values in 2017 were related to the Thomas and Canyon wildfires.

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



[1] High $PM_{2.5}$ values in 2017 were related to the Thomas and Canyon wildfires.

APPENDIX A

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.

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (5/4/16)**