

Annual Air Quality Report 2020

Aeron Arlin Genet, Air Pollution Control Officer



TABLE OF CONTENTS

| 1 | 2020 Air Quality Summary | 1 |
|-----|---|----|
| 2 | Ambient Air Quality Standards and Air Monitoring Stations | |
| 3 | Gaseous Pollutant Summary | 9 |
| 4 | Particulate Matter Summary | 11 |
| 5 | Air Quality Trends | 13 |
| App | pendix A – Ambient Air Quality Standards Table | A1 |

SANTA BARBARA COUNTY AIR POLLUTION CONTROL DISTRICT BOARD OF DIRECTORS

Supervisor Das Williams

First District

Santa Barbara County Board of Supervisors

Supervisor Gregg Hart

Second District

Santa Barbara County Board of Supervisors

Supervisor Joan Hartmann, Vice-Chair

Third District

Santa Barbara County Board of Supervisors

Supervisor Bob Nelson

Fourth District

Santa Barbara County Board of Supervisors

Supervisor Steve Lavagnino

Fifth District

Santa Barbara County Board of Supervisors

Mayor Holly Sierra

Alternate – Councilmember Ed Andrisek

City of Buellton

Vice Mayor Al Clark

Alternate – Mayor Wade Nomura

City of Carpinteria

Mayor Paula Perotte, Chair

Alternate - Councilmember Stuart Kasdin

City of Goleta

Mayor Ariston Julian

Alternate – Mayor Pro Tem Tony Ramirez

City of Guadalupe

Mayor Jenelle Osborne

Alternate - Councilmember Gilda Cordova

City of Lompoc

Mayor Cathy Murillo

Alternate - Councilmember Eric Friedman

City of Santa Barbara

Mayor Alice Patino

Alternate - Mayor Pro Tem Etta Waterfield

City of Santa Maria

Mayor Charlie Uhrig

Alternate – Councilmember Mark Infanti

City of Solvang

1 2020 AIR QUALITY SUMMARY

This annual report provides information on the measured air quality concentrations in Santa Barbara County for 2020, 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 2020 and the contributing factors.
- Air quality standards and monitoring station locations are discussed in Section 2.
- Detailed air quality data for 2020 are provided in Section 3 for gaseous pollutants, and Section 4 for particulate matter.
- Section 5 includes a discussion of air quality trends.

In the summer and fall of 2020 California experienced numerous wildfires and extended periods of high temperatures. During these periods, our monitoring stations recorded elevated fine particulate matter ($PM_{2.5}$) and ozone readings. California had over 10,000 fires that burned a record-setting 4.2 million acres. Smoke from these and other fires created conditions where Santa Barbara County's generally good air quality became unhealthy for several days of the year.

In August, several hundred fires were ignited across California due to dry lightning strikes. The Creek Fire began in the first week of September, among other fires, and burned through the rest of the year. In early September wildfires burning in California and other parts of the Pacific Northwest, aggravated by extreme winds, caused a large plume of smoke to blanket the entire West Coast. Eventually, that smoke reached our air monitors as indicated by elevated PM_{2.5} readings. Figure 1-1 is a satellite image from September 11th that shows the large plume covering all of Santa Barbara County. In early October, fires in Northern California, the Southern Sierras, and Southern California continued to affect air quality.

Figures 1-2 and 1-3 compare the PM_{2.5} and ozone air quality data from 2020 to an average from the previous four years to highlight the impacts of these wildfire and high temperature events.

FIGURE 1-1: SATELLITE IMAGE OF WILDFIRE SMOKE¹



¹Obtained using NOAA's NESDIS Satellite Maps Global Archive, https://staging.nesdis.noaa.gov/content/satellite-maps.

FIGURE 1-2: DAILY MAXIMUM 24-HOUR PM_{2.5} COMPARISON

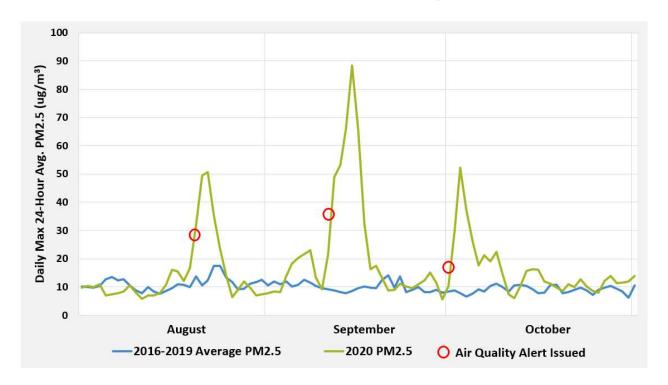
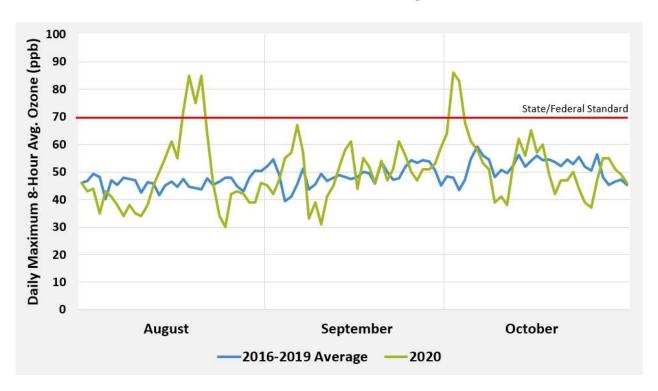


FIGURE 1-3: DAILY MAXIMUM 8-HOUR O₃ COMPARISON



Even with the impacts from wildfire smoke, Santa Barbara County still met the 24-hour federal ambient air quality standards for PM_{10} of $150\,\mu g/m^3$. The federal 24-hour $PM_{2.5}$ standard of 35 $\mu g/m^3$ was exceeded on 10 days countywide, and 9 of these exceedances occurred when wildfires were influencing local air quality. The Santa Maria station exceeded the federal $PM_{2.5}$ standard on 9 days, the Lompoc H Street station exceeded the standard on 8 days, and the Goleta and Santa Barbara stations each exceeded the standard on 6 days. If there are exceedances at multiple locations on the same day, that only counts as one exceedance of the air quality standard. Exceedances of the federal 24-hour $PM_{2.5}$ standard are unusual in our county except during extreme events like smoke from wildfires, which happened in 2020.

The state 24-hour PM_{10} standard of 50 $\mu g/m^3$ was exceeded on 33 days countywide. The Santa Maria station exceeded the standard on 32 days, the Lompoc H Street station exceeded the standard on 17 days, the Goleta and Santa Barbara stations each exceeded the standard on 11 days, and Las Flores Canyon exceeded the standard on 6 days. The state annual arithmetic mean PM_{10} standard of 20 $\mu g/m^3$ was exceeded at the Santa Maria, Lompoc, Goleta, and Santa Barbara monitoring stations.

The federal and state 8-hour ozone standards were exceeded on 6 days countywide. The Carpinteria, Las Flores Canyon, and Santa Barbara monitoring locations exceeded the standard on 2 days, and the Paradise location exceeded the standard on 4 days. All of these exceedances occurred during the months of August and October when California was experiencing extreme wildfires and local temperatures were elevated. Measured concentrations at all other areas within Santa Barbara County were below the federal and state ozone standards during 2020.

The federal and state ambient air quality standards were met for all other air 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 2020¹

| | | Number | of Days that | Exceeded | Air Quality | y Standard | l | | |
|-------------------|--------------------------------|--------------------------------|----------------------------------|-----------------|-----------------|------------|-----------------------------|-------------------------------|--------------------------------|
| Station | O ₃ -1hr (state) | O ₃ -8hr (state) | O ₃ -8hr (federal) | NO ₂ | SO ₂ | со | PM ₁₀ (state) | PM ₁₀ (federal) | PM _{2.5} (federal) |
| Carpinteria | 2 | 2 | 2 | 0 | - | - | - | - | - |
| Goleta | 0 | 0 | 0 | - | - | - | 11 | 0 | 6 |
| Las Flores Canyon | 0 | 2 | 2 | 0 | 0 | 0 | 6 | 0 | - |
| Lompoc H Street | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 0 | 8 |
| Lompoc North | 0 | 0 | 0 | 0 | 0 | - | - | - | - |
| Paradise | 2 | 4 | 4 | 0 | - | - | - | - | - |
| Santa Barbara | 2 | 2 | 2 | - | - | - | 11 | 0 | 6 |
| Santa Maria | 0 | 0 | 0 | 0 | - | 0 | 32 | 0 | 9 |
| Santa Ynez | 0 | 0 | 0 | - | - | - | - | - | - |
| Countywide Total | 4 | 6 | 6 | 0 | 0 | 0 | 33 | 0 | 10 |

 $^{^{\}mathrm{1}}\mathrm{A}$ 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 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 2020 can be found in Appendix A. During 2020, there were no changes to federal or state or ambient air quality standards.

Air Monitoring Stations

In 2020, there were 13 monitoring stations operating in Santa Barbara County. Twelve stations measured ambient air and meteorological conditions, two stations measured odors, and one station only measured meteorological conditions. Eight were operated by the Santa Barbara County Air Pollution Control District (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 2020. Table 2-1 lists the monitoring stations operating in Santa Barbara County during 2020, the pollutants and parameters measured at each station, and their designations.

101 -LEGEND-Carpinteria Carpinteria Met Goleta Las Flores Canyon Las Flores Canyon Odor Lompoc Odor Paradise Road Santa Barbara Santa Maria 2 3 4 5 6 7 11 Guadalupe Santa Ynez 12 Lompoc North West Campus Santa Maria Pt. Sal SLAMS Stations ▲ Meteorological Monitoring Only **Industrial Stations** Vandenberg Odor Monitoring Stations Air Force Base 101 Lompoc Buellton Arguello Gaviota Goleta 3 Santa Barbara 13 Conception Ellwood Carpinteria -A Pacific Ocean

FIGURE 2-1: 2020 SANTA BARBARA COUNTY AIR MONITORING STATIONS

TABLE 2-1: MONITORING STATION PARAMETER LIST FOR 2020

| Station | O ₃ | NO ₂ | SO ₂ | СО | THC | H ₂ S | TRS | PM ₁₀ | PM _{2.5} | ws | WD | ATM | |
|------------------------|-----------------------|-----------------|-----------------|----|--------------------------|------------------------|-----|------------------|-------------------|-----------|--------------------|---------|--|
| Carpinteria | Х | Χ | | | | | | | | Х | Х | Х | |
| Carpinteria Met* | | | | | | | | | | Х | Х | Х | |
| Goleta | Х | | | | | | | Х | Х | Х | Х | Х | |
| Las Flores Canyon | Х | Χ | Х | Х | Х | | | Х | | Х | Х | Х | |
| Las Flores Canyon Odor | | | | | | Х | | | | Х | Χ | Х | |
| Lompoc H Street | Х | Х | Х | Χ | | | | Х | Х | Х | Х | Х | |
| Lompoc North | Х | Χ | Х | | Χ | | | | | Х | Χ | Х | |
| Lompoc Odor | | | | | | Х | Χ | | | Х | Х | Х | |
| Paradise Road | Х | Х | | | | | | | | Х | Х | Х | |
| Santa Barbara | Х | | | | | | | Х | Х | Х | Х | Х | |
| Santa Maria | Х | Х | | Х | | | | Х | Х | Х | Х | Х | |
| Santa Ynez | Х | | | | | | | | | | | | |
| West Campus | | | Х | | Х | Х | Χ | | | Х | Х | | |
| SLAMS | Moni | tors | | | | Non-NAAQS Monitors | | | | | | | |
| * | Q1 C | nly | | | | THC Total Hydrocarbons | | | | | | carbons | |
| WS | Wind | Speed | | | TRS Total Reduced Sulfur | | | | | ed Sulfur | | | |
| WD | Wind | Directi | on | | | ATM Ami | | | | | mbient Temperature | | |

Monitoring Station Changes During 2020

The Carpinteria meteorological monitoring station ceased operation in the second quarter of 2020. The District began operating the Carpinteria monitoring station in the third quarter of 2020.

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 2020, 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 2020 is provided in Tables 3-1 through 3-5. The tables show the four highest concentrations for each pollutant in 2020 and the dates they occurred.

Table 3-1: Four Highest 1-hour O₃ Concentrations For 2020¹

| | O ₃ 1-hour (ppb) | | | | | | | | | | | |
|-------------------|-----------------------------|-----------|-------|-----|------------|-------|-----|------------|-------|-----|------------|-------|
| Station | 1st | Date | Time | 2nd | Date | Time | 3rd | Date | Time | 4th | Date | Time |
| Santa Barbara | 105 | 10/3/2020 | 16:00 | 103 | 10/2/2020 | 13:00 | 71 | 10/4/2020 | 14:00 | 67 | 10/13/2020 | 15:00 |
| Carpinteria | 103 | 10/2/2020 | 15:00 | 101 | 10/3/2020 | 15:00 | 77 | 10/15/2020 | 12:00 | 75 | 5/7/2020 | 15:00 |
| Paradise | 101 | 8/21/2020 | 15:00 | 97 | 8/19/2020 | 15:00 | 88 | 8/20/2020 | 16:00 | 80 | 10/3/2020 | 13:00 |
| Las Flores Canyon | 91 | 8/20/2020 | 18:00 | 83 | 10/3/2020 | 13:00 | 81 | 10/2/2020 | 14:00 | 81 | 10/4/2020 | 20:00 |
| Goleta | 84 | 10/2/2020 | 13:00 | 76 | 10/3/2020 | 12:00 | 68 | 10/13/2020 | 14:00 | 66 | 10/1/2020 | 14:00 |
| Santa Ynez | 79 | 10/4/2020 | 13:00 | 77 | 8/19/2020 | 15:00 | 75 | 8/21/2020 | 15:00 | 74 | 10/1/2020 | 14:00 |
| Lompoc North | 70 | 10/4/2020 | 22:00 | 68 | 10/17/2020 | 15:00 | 67 | 10/1/2020 | 11:00 | 67 | 10/2/2020 | 12:00 |
| Santa Maria | 62 | 10/1/2020 | 11:00 | 61 | 5/6/2020 | 22:00 | 61 | 5/7/2020 | 12:00 | 57 | 10/15/2020 | 12:00 |
| Lompoc H Street | 38 | 10/1/2020 | 13:00 | 34 | 10/2/2020 | 14:00 | 34 | 10/27/2020 | 10:00 | 33 | 6/9/2020 | 10:00 |

¹State Standard = 0.09 ppm (95 ppb)

TABLE 3-2: FOUR HIGHEST 8-HOUR O₃ CONCENTRATIONS FOR 2020¹

| | O ₃ 8-hour (ppb) | | | | | | | | | | | |
|-------------------|-----------------------------|-----------|-------|-----|-----------|-------|-----|------------|-------|-----|------------|-------|
| Station | 1st | Date | Time | 2nd | Date | Time | 3rd | Date | Time | 4th | Date | Time |
| Carpinteria | 86 | 10/2/2020 | 10:00 | 83 | 10/3/2020 | 9:00 | 68 | 5/7/2020 | 10:00 | 65 | 6/10/2020 | 9:00 |
| Paradise | 85 | 8/19/2020 | 12:00 | 85 | 8/21/2020 | 10:00 | 75 | 8/20/2020 | 11:00 | 72 | 8/18/2020 | 14:00 |
| Santa Barbara | 81 | 10/3/2020 | 10:00 | 72 | 10/2/2020 | 9:00 | 61 | 10/4/2020 | 9:00 | 57 | 4/25/2020 | 9:00 |
| Las Flores Canyon | 74 | 10/2/2020 | 9:00 | 74 | 10/3/2020 | 9:00 | 67 | 9/6/2020 | 17:00 | 65 | 10/15/2020 | 11:00 |
| Santa Ynez | 67 | 8/19/2020 | 9:00 | 66 | 8/21/2020 | 11:00 | 65 | 10/4/2020 | 10:00 | 63 | 10/2/2020 | 10:00 |
| Goleta | 67 | 10/3/2020 | 10:00 | 66 | 10/2/2020 | 8:00 | 59 | 10/15/2020 | 9:00 | 56 | 10/13/2020 | 9:00 |
| Lompoc North | 64 | 10/1/2020 | 7:00 | 64 | 10/2/2020 | 8:00 | 63 | 10/4/2020 | 19:00 | 60 | 10/15/2020 | 21:00 |
| Santa Maria | 59 | 5/6/2020 | 21:00 | 54 | 10/1/2020 | 8:00 | 53 | 10/15/2020 | 9:00 | 48 | 5/8/2020 | 11:00 |
| Lompoc H Street | 33 | 10/1/2020 | 10:00 | 30 | 10/2/2020 | 9:00 | 27 | 10/28/2020 | 11:00 | 26 | 10/13/2020 | 8:00 |

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

TABLE 3-3: FOUR HIGHEST 1-HOUR NO₂ CONCENTRATIONS FOR 2020¹

| NO ₂ (ppb) | | | | | | | | | | | | |
|-----------------------|-----|------------|-------|-----|-----------|-------|-----|-----------|-------|-----|------------|-------|
| Station | 1st | Date | Time | 2nd | Date | Time | 3rd | Date | Time | 4th | Date | Time |
| Santa Maria | 36 | 4/21/2020 | 5:00 | 34 | 1/3/2020 | 18:00 | 34 | 10/1/2020 | 19:00 | 31 | 12/20/2020 | 18:00 |
| Lompoc H Street | 28 | 10/16/2020 | 6:00 | 28 | 12/8/2020 | 9:00 | 27 | 2/4/2020 | 7:00 | 27 | 11/16/2020 | 18:00 |
| Carpinteria | 12 | 1/3/2020 | 15:00 | 9 | 1/10/2020 | 16:00 | 9 | 2/21/2020 | 13:00 | 9 | 12/22/2020 | 10:00 |
| Las Flores Canyon | 10 | 11/17/2020 | 7:00 | 8 | 9/12/2020 | 9:00 | 6 | 2/21/2020 | 13:00 | 6 | 9/5/2020 | 8:00 |
| Paradise | 7 | 2/21/2020 | 16:00 | 5 | 8/19/2020 | 20:00 | 5 | 8/20/2020 | 16:00 | 5 | 9/10/2020 | 17:00 |
| Lompoc North | 6 | 9/25/2020 | 6:00 | 5 | 10/1/2020 | 9:00 | 5 | 11/9/2020 | 20:00 | 5 | 11/16/2020 | 7:00 |

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

Table 3-4: Four Highest 1-hour SO₂ Concentrations For 2020¹

| | SO ₂ (ppb) | | | | | | | | | | | |
|-------------------|-----------------------|-----------|-------|-----|------------|-------|-----|------------|-------|-----|------------|-------|
| Station | 1st | Date | Time | 2nd | Date | Time | 3rd | Date | Time | 4th | Date | Time |
| Lompoc H Street | 26 | 4/16/2020 | 8:00 | 6 | 9/20/2020 | 21:00 | 4 | 8/19/2020 | 12:00 | 3 | 4/20/2020 | 7:00 |
| West Campus | 8 | 4/16/2020 | 9:00 | 3 | 11/22/2020 | 2:00 | 3 | 11/27/2020 | 2:00 | 3 | 11/28/2020 | 2:00 |
| Las Flores Canyon | 1 | 8/20/2020 | 18:00 | 1 | 9/15/2020 | 10:00 | 1 | 5/6/2020 | 7:00 | 1 | 9/13/2020 | 17:00 |
| Lompoc North | 0 | 1/1/2020 | 0:00 | 0 | 1/2/2020 | 0:00 | 0 | 1/3/2020 | 0:00 | 0 | 1/4/2020 | 0:00 |

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 2020¹

| | CO (ppm) | | | | | | | | | | | |
|-------------------|----------|------------|-------|-----|-----------|-------|-----|-----------|-------|-----|-----------|-------|
| Station | 1st | Date | Time | 2nd | Date | Time | 3rd | Date | Time | 4th | Date | Time |
| Lompoc H Street | 2.5 | 12/26/2020 | 8:00 | 2.4 | 9/20/2020 | 20:00 | 1.7 | 1/17/2020 | 5:00 | 1.6 | 4/2/2020 | 1:00 |
| Santa Maria | 1.3 | 12/20/2020 | 18:00 | 1.2 | 9/15/2020 | 6:00 | 1.1 | 10/2/2020 | 18:00 | 1.0 | 1/24/2020 | 7:00 |
| Las Flores Canyon | 1.0 | 8/20/2020 | 18:00 | 0.7 | 9/15/2020 | 10:00 | 0.6 | 5/6/2020 | 7:00 | 0.6 | 9/13/2020 | 17:00 |

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

4 PARTICULATE MATTER SUMMARY

Five stations collected PM_{10} data in 2020. 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 air quality standards.

A summary of the highest particulate matter values in Santa Barbara County during 2020 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 2020¹

| | Particulate Matter Less Than 10 Microns (μg/m³) | | | | | | | | | |
|-------------------|---|------------|-----|------------|-----|------------|-----|-----------|--|--|
| Station | 1st | Date | 2nd | Date | 3rd | Date | 4th | Date | | |
| Santa Maria | 117 | 9/14/2020 | 103 | 10/2/2020 | 92 | 9/15/2020 | 83 | 9/13/2020 | | |
| Lompoc H Street | 111 | 9/14/2020 | 85 | 10/2/2020 | 84 | 9/13/2020 | 73 | 12/8/2020 | | |
| Las Flores Canyon | 73 | 10/26/2020 | 68 | 8/21/2020 | 67 | 8/20/2020 | 58 | 9/14/2020 | | |
| Santa Barbara | 84 | 9/14/2020 | 79 | 9/15/2020 | 79 | 10/26/2020 | 71 | 8/20/2020 | | |
| Goleta | 86 | 9/14/2020 | 77 | 10/26/2020 | 73 | 8/21/2020 | 71 | 9/15/2020 | | |

 $^{^{1}}$ State 24-Hour Standard = 50 μ g/m 3 at local conditions

Table 4-2: Four Highest 24-hour Average Standard PM₁₀ Concentrations For 2020¹

| Particulate Matter Less Than 10 Microns (μg/m³) | | | | | | | | | |
|---|-----|------------|-----|------------|-----|-----------|-----|-----------|--|
| Station | 1st | Date | 2nd | Date | 3rd | Date | 4th | Date | |
| Santa Maria | 112 | 9/14/2020 | 103 | 10/2/2020 | 88 | 9/15/2020 | 80 | 9/13/2020 | |
| Lompoc H Street | 106 | 9/14/2020 | 84 | 10/2/2020 | 80 | 9/13/2020 | 69 | 12/8/2020 | |
| Goleta | 83 | 9/14/2020 | 74 | 10/26/2020 | 71 | 8/21/2020 | 68 | 9/15/2020 | |
| Santa Barbara | 82 | 9/14/2020 | 77 | 10/26/2020 | 76 | 9/15/2020 | 71 | 8/20/2020 | |
| Las Flores Canyon | 70 | 10/26/2020 | 66 | 8/20/2020 | 66 | 8/21/2020 | 57 | 9/14/2020 | |

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

Table 4-3: Four Highest 24-hour Average PM_{2.5} Concentrations For 2020¹

| | Particulate Matter Less Than 2.5 Microns (μg/m³) | | | | | | | | | |
|-----------------|--|-----------|-----|-----------|-----|-----------|-----|-----------|--|--|
| Station | 1st | Date | 2nd | Date | 3rd | Date | 4th | Date | | |
| Santa Maria | 88 | 9/14/2020 | 66 | 9/13/2020 | 65 | 9/15/2020 | 53 | 9/12/2020 | | |
| Lompoc H Street | 86 | 9/14/2020 | 63 | 9/13/2020 | 49 | 9/12/2020 | 49 | 9/11/2020 | | |
| Santa Barbara | 63 | 9/14/2020 | 60 | 9/15/2020 | 47 | 9/12/2020 | 46 | 9/13/2020 | | |
| Goleta | 61 | 9/14/2020 | 52 | 9/15/2020 | 51 | 8/21/2020 | 46 | 9/13/2020 | | |

 $^{^{1}}$ Federal 24-Hour Standard = 35 μ g/m 3 at local conditions

TABLE 4-4: ANNUAL ARITHMETIC MEAN PM CONCENTRATIONS FOR 2020^{1,2}

| Station | PM ₁₀ | PM _{2.5} |
|-------------------|------------------|-------------------|
| Santa Maria | 26.6 | 8.0 |
| Santa Barbara | 24.1 | 9.3 |
| Goleta | 22.1 | 7.4 |
| Lompoc H Street | 21.9 | 6.5 |
| Las Flores Canyon | 15.1 | |

 $^{^{1}}$ State PM_{10} Annual Arithmetic Mean Standard = 20 $\mu g/m^{3}$ at local conditions

 $^{^2}$ Federal and State PM_{2.5} Annual Arithmetic Mean Standard = 12 μ g/m³ at local conditions

5 AIR QUALITY TRENDS

In 2020, with the exception of several days where wildfire smoke was affecting local conditions, Santa Barbara County generally had good air quality. While the impact of wildfire smoke was significant, 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 2000. The downward trend from 40 days in 2000 to 6 days in 2020 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.

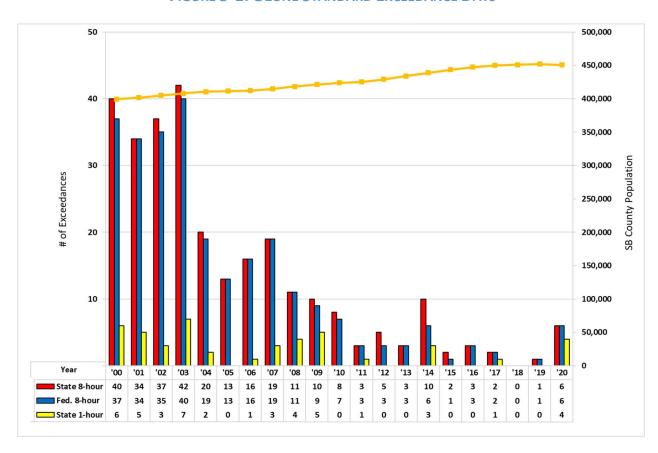


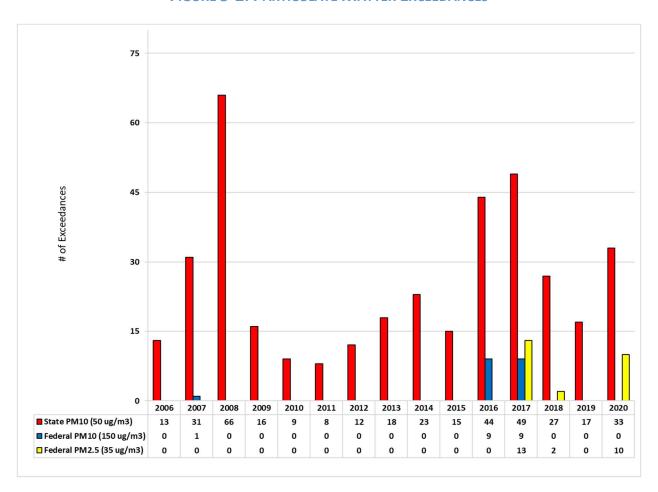
FIGURE 5-1: OZONE STANDARD EXCEEDANCE DAYS

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 PM_{10} and $PM_{2.5}$ starting in 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 $PM_{2.5}$ 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 fifteen 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 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 (275 days, or 75.1%) in Santa Barbara County were green, or good air quality, during 2020. The remainder of the days were moderate (79 days, 21.6%), unhealthy for sensitive groups (8 days, or 2.2%), or unhealthy (4 days, or 1.1%). 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.

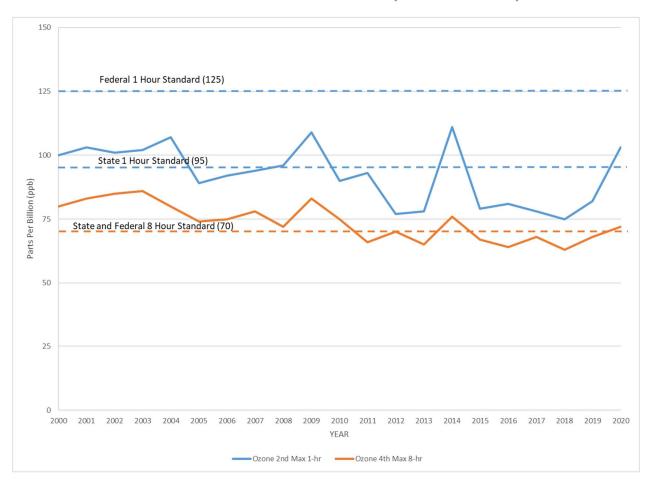


FIGURE 5-4: MEASURED OZONE LEVELS (PARTS PER BILLION)



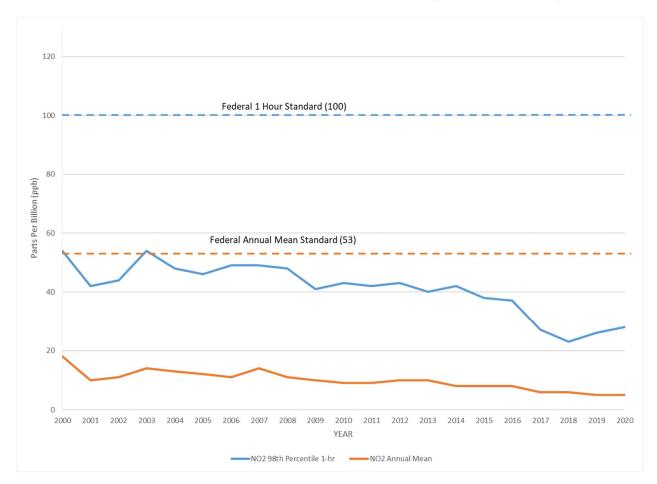




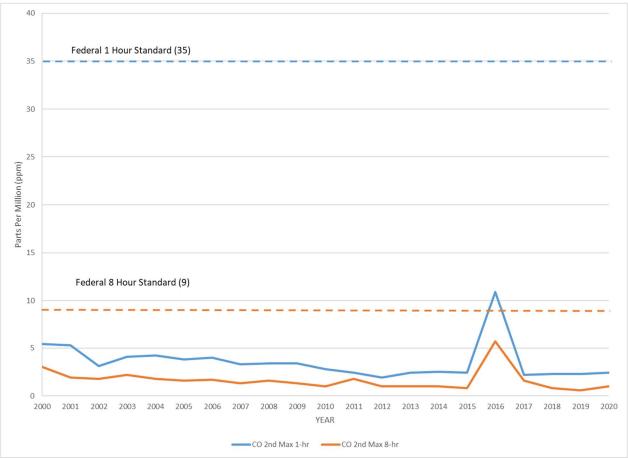
FIGURE 5-6: MEASURED SULFUR DIOXIDE LEVELS (PARTS PER BILLION)¹

SO2 99th Percentile 1-hr SO2 2nd Max 24-hr

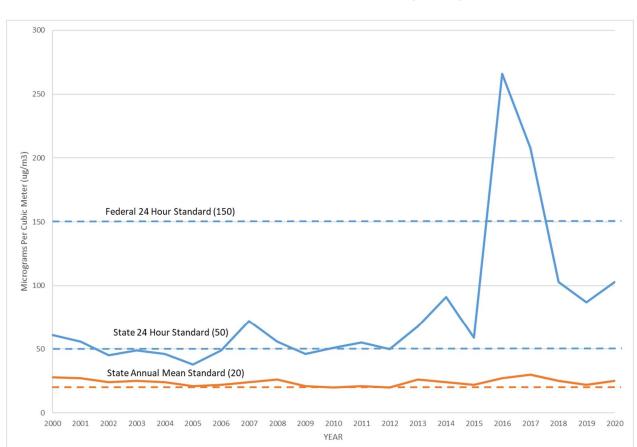
2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020
YEAR

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





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



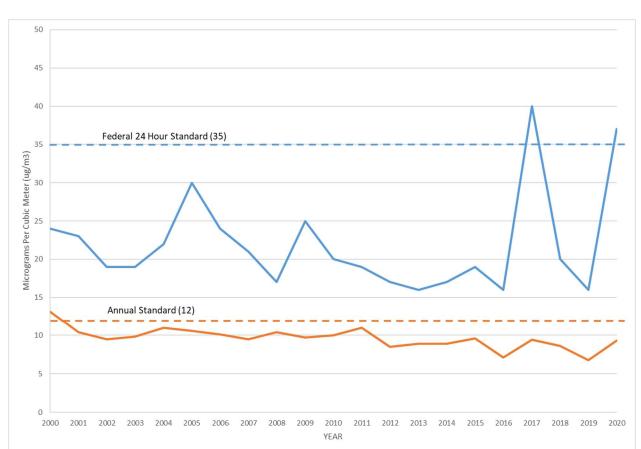
PM10 Annual Mean 24-hr

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

PM10 2nd Max 24-hr

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.



PM2.5 Annual Weighted Mean 24-hr

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

PM2.5 98th Percentile 24-hr

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.

| 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/m³) | Fillinary Grandard | |
| 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 | | ī | | |
| 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/m³ | |
| 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) | Ī | |
| | 8 Hour (Lake Tahoe) | 6 ppm (7 mg/m ³) | | 1 | _ | |
| Nitrogen Dioxide (NO ₂) ¹⁰ | 1 Hour | 0.18 ppm (339 µg/m³) | Gas Phase Chemiluminescence | 100 ppb (188 µg/m³) | - | Gas Phase Chemiluminescence |
| | Annual Arithmetic Mean | 0.030 ppm (57 µg/m³) | | 0.053 ppm (100 µg/m³) | Same as Primary Standard | |
| Sulfur Dioxide (SO₂) | 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 1.5 μg/m³ (for certain areas)¹² Same as Primary Star | - | - | |
| | Calendar Quarter | - | | | Same as | High Volume Sampler and Atomic Absorption |
| | Rolling 3-Month Average | ı | | Primary Standard | | |
| Visibility Reducing Particles | 8 Hour | | Beta Attenuation and Transmittance through Filter Tape | No National | | |
| Sulfates | 24 Hour | 25 μg/m ³ | Ion Chromatography | | | |
| Hydrogen Sulfide | 1 Hour | 0.03 ppm (42 μg/m³) | Ultraviolet Fluorescence | | | |
| Vinyl Chloride ¹² | 24 Hour | 0.01 ppm (26 µg/m³) | Gas Chromatography | | | |

For more information please call ARB-PIO at (916) 322-2990 $\,$

California Air Resources Board (5/4/16)

- 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 µg/m³ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. 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.
- 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.
- National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
- 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.
- 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 μg/m³ to 12.0 μg/m³. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 μg/m³, as was the annual secondary standard of 15 μg/m³. The existing 24-hour PM10 standards (primary and secondary) of 150 μg/m³ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
- 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 SO₂ 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 SO₂ 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 µg/m³ 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)