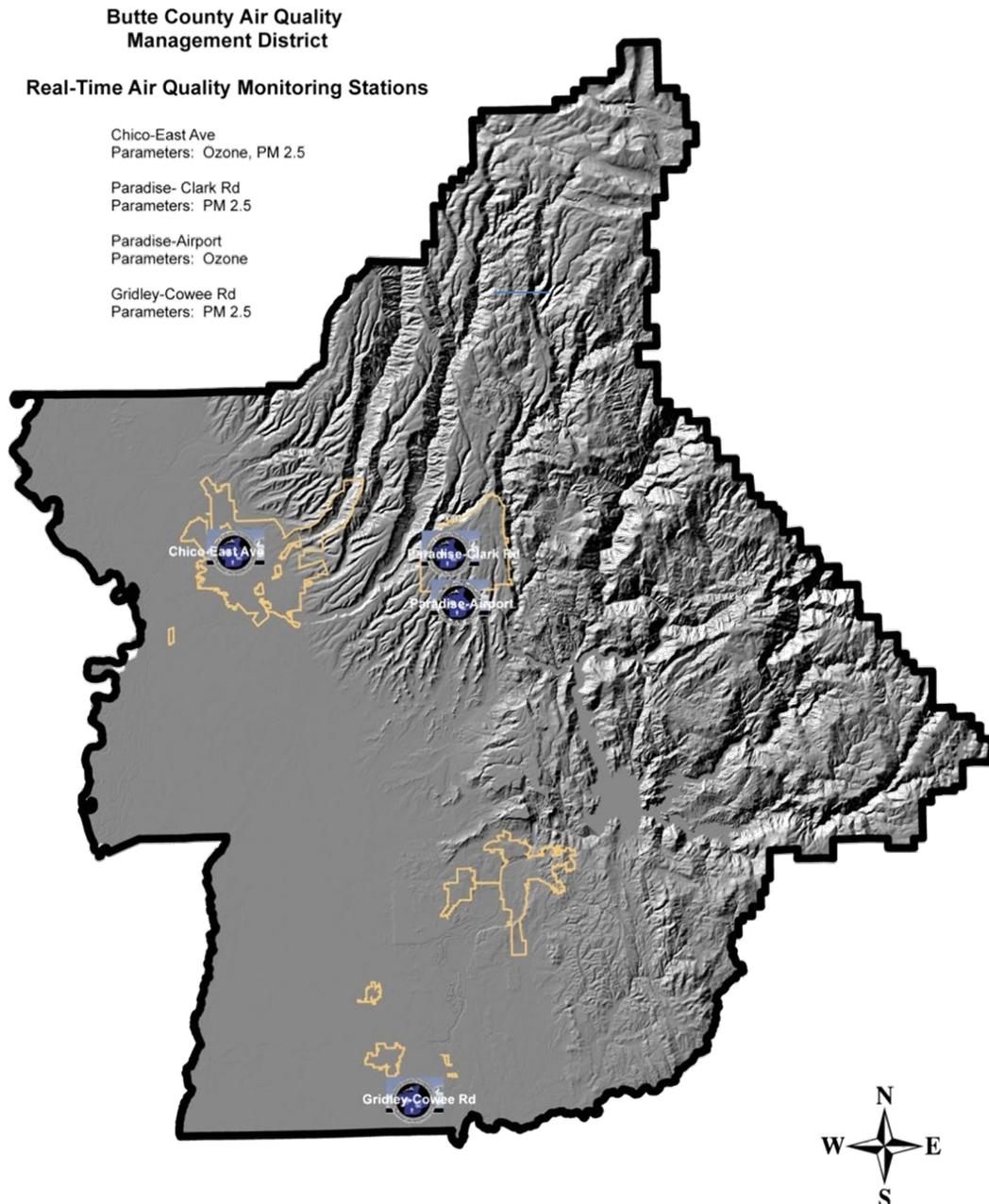


BUTTE COUNTY AIR QUALITY MANAGEMENT DISTRICT

Air Quality Summary for 2021 and 2021 – 2022 Check Before You Light Program Summary

The following is a summary of Butte County's air quality for 2021 and a summary of the 2021-2022 Check Before You Light Program. This document gives the reader an overview of the two (2) criteria pollutants of greatest concern - ozone (O₃) and particulate matter (PM_{2.5} and PM₁₀). The data was obtained from the official air monitoring sites located within Butte County. PM_{2.5} is monitored in Chico, South Butte County southeast of Gridley, and Paradise. Ozone is monitored in Chico and Paradise. PM₁₀ is only monitored in Chico. Official air monitoring in Butte County is conducted by the California Air Resource Board (CARB).



The **Ambient Air Quality Standards** establishes the concentration at which a pollutant is known to cause adverse health effects to sensitive groups within the population, such as children and the elderly. Both the California and federal governments have adopted health-based standards for the *criteria pollutants*, which for this report include Ozone and PM_{2.5}. In general, the air quality standards are expressed as a measure of the amount of pollutant per unit of air. For example, the ozone standards are expressed as parts per million (ppm) and the particulate matter standards are expressed as micrograms of particulate matter per cubic meter of air (ug/m³).

Ozone

Ozone is a colorless gas with a pungent odor. It is the chief component of urban smog. The name “smog” was created from the words smoke and fog. Ozone is not directly emitted as a pollutant but is formed in the atmosphere when reactive organic gases (ROG) and nitrogen oxides (NO_x) precursor emissions react in the presence of sunlight. Meteorology and terrain play major roles in ozone formation. Generally, low wind speeds or stagnant air coupled with warm temperatures and cloudless skies provide for the optimum conditions. As a result, summer is generally the peak ozone season. Because of the reaction time involved, peak ozone concentrations often occur far downwind of the precursor emissions. Therefore, ozone is a regional pollutant that often impacts a widespread area. The largest contribution of ozone-forming pollution that is transported to Butte County comes from vehicle emissions in urban areas to the south. Wildfires can also create emissions that increase ozone concentrations. Ozone concentrations tends to peak where the subsidence inversion above the Sacramento Valley meets the foothills of the Sierra Nevada mountains. This is the reason why ozone concentrations at the Paradise monitoring station are historically higher than the Chico monitoring station.

Ozone impacts lung function by irritating and damaging the respiratory system. In addition, ozone causes damage to vegetation, buildings, rubber, and some plastics. Recognizing the health impacts of daylong exposure, the United States Environmental Protection Agency (U.S. EPA) promulgated an 8-hour ozone standard in 1997 as a successor to the 1-hour standard, which was established in 1979. EPA revised the 8-hour federal standard in 2008 and again in 2015. The CARB approved an 8-hour ozone state standard on April 28, 2005, which became effective in early 2006. Table 1 shows the State and National Ozone Standards effective in 2021.

TABLE 1 AMBIENT AIR QUALITY STANDARDS - OZONE	
State Ozone Standard: 0.09 ppm for 1 hour, not to be exceeded. 0.07 ppm for 8 hours, not to be exceeded.	National Ozone Standards: --- 0.070 ppm for 8 hours, not to be exceeded. Based on the fourth highest concentration averaged over three years.* * Federal 8-hour ozone standard revised October 2015.

In October 2016, CARB recommended to the U. S. EPA that Butte County be designated nonattainment for the 2015 federal ozone standard. Butte County was officially designated marginal nonattainment for the 2015 federal ozone standard in 2018 by the U. S. EPA. August 2021 was the deadline for marginal areas to attain the 2015 federal ozone standard. Butte County has tentatively met this goal pending approval by U.S. EPA that several exceedances in 2018 were due to exceptional events (wildfire impacts).

Table 2 shows the ozone air quality summary for 2021 and Figure 1 (attached) graphically shows the maximum 8-hour measurement for each day in Chico and Paradise. Based on preliminary data, the Chico monitoring location did not exceed the federal 8-hour ozone standard in 2021. The Paradise monitoring location exceeded the federal 8-hour ozone standard on nine (9) occasions in 2021. Preliminary analysis of

the data indicates that eight of the nine exceedances of the federal 8-hour ozone standard in Paradise occurred during wildfire impacts. The District is working with CARB and U.S. EPA to flag and report wildfire impacts as part of the Exceptional Events process.

TABLE 2 BUTTE COUNTY OZONE AIR QUALITY DATA SUMMARY 2021 (data is still preliminary as of March 2022)		
	Chico	Paradise
Max. 1-Hour Ozone Measurement Date	0.078 ppm 8/25/2021	0.093 ppm 8/16/2021
Days Above State Std. (0.09ppm)	0	1
Max. 8-Hour Ozone Measurement	0.068 ppm 8/25/2021, 8/29/2021, 8/30/2021	0.078 ppm 8/25/2021
4 th Highest 8-Hour Ozone Measurement (used for calculating Design Value)	0.067 ppm	0.074 ppm
Days Above State Std. (0.07ppm) – <i>rounding differs from Fed. Std.</i>	0	11
Days Above 2015 Fed. Std. (0.07ppm)	0	9

Particulate Matter (PM_{2.5})

Particulate Matter (PM_{2.5}) refers to particles with an aerodynamic diameter of 2.5 microns or smaller. For comparison, the average diameter of a human hair is about 70 microns. PM_{2.5} is a mixture of substances that can include elements such as carbon, lead, and nickel; compounds such as nitrates, organic compounds, and sulfates; and complex mixtures such as diesel exhaust and soil. These substances occur in the form of solid particles or as liquid droplets. Some particles are emitted directly into the atmosphere. Other particles, referred to as secondary particles, result from gases that are transformed into particles through physical and chemical processes in the atmosphere. Emissions are dominated by contributions from area-wide sources, primarily fugitive dust from construction and demolition, residential fuel combustion (woodstoves and fireplaces), and open burning.

Particulate matter can be directly emitted into the air (primary PM) or, similar to ozone, it can be formed in the atmosphere (secondary PM) from the reaction of gaseous precursors such as NO_x, sulfur oxides (SO_x), ROG, and ammonia. On an annual average basis, directly emitted PM_{2.5} emissions contribute approximately 70 percent of the ambient PM_{2.5} in the Sacramento Valley Air Basin.

The fine particles pose an increased health risk because they can deposit deep in the lung and contain substances that are particularly harmful to human health; therefore, this report will look at PM_{2.5} data and trends. Table 3 shows the State and National PM_{2.5} standards.

TABLE 3 AMBIENT AIR QUALITY STANDARDS – PM _{2.5}	
State PM _{2.5} Standards: 12 µg/m ³ annual arithmetic mean not to be exceeded	National PM _{2.5} Standards: 35 µg/m ³ for 24 hours, not to be exceeded, based on the 98 th percentile concentration averaged over three years and 12 µg/m ³ annual arithmetic mean averaged over 3 years

Butte County has continued to meet the federal PM_{2.5} standard since 2013 when the U. S. EPA officially recognized that Butte County’s monitoring data showed attainment of the standard. In October 2017, the District submitted a PM_{2.5} Redesignation Request and Maintenance Plan to CARB which was approved in November 2017 and submitted to the U.S. EPA. The U. S. EPA approved the Redesignation Request and Maintenance Plan effective August 2018.

Table 4 shows the Chico, Paradise, and South Butte County PM_{2.5} monitoring summary for 2021. The Chico air monitoring station includes a continuous PM_{2.5} monitor known as a Beta Attenuation Monitor (BAM). This monitor has been approved as a federal equivalency method (FEM) monitor and therefore can be used for determining attainment with the federal PM_{2.5} standards. Paradise and South Butte County monitor PM_{2.5} using a non-FEM BAM. This data is useful for public reporting and understanding diurnal and episodic behavior of fine particles, background monitoring, and transport assessment.

TABLE 4 BUTTE COUNTY PM _{2.5} AIR QUALITY DATA 2021 (data is still preliminary as of March 2022)			
	Chico (FEM)	Paradise (Non-FEM)	South Butte Co. (Non-FEM)
Max 24-Hour PM_{2.5} Measurement Date	102.7 ug/m ³ 8/7/2021	182.5 ug/m ³ 8/6/2021	82.8 ug/m ³ 8/7/2021
98th Percentile 24-Hour PM_{2.5} Value (used for calculating Design Value)	51 ug/m ³	n/a	n/a
Days Above Fed. Std. (35 ug/m³)	13	21	10
Annual Average	11.1 ug/m ³	n/a	n/a

Figure 2 (attached) charts the PM_{2.5} 24-hour average data for Chico, Paradise, and South Butte County. There were significant PM_{2.5} impacts throughout Butte County between mid-July and mid-September due to wildfire impacts from the Dixie Fire, Caldor Fire, and other wildfires throughout Northern California. All exceedances of the federal 24-hour PM_{2.5} standard at all monitoring locations occurred during these wildfire impacts. The District is working with CARB and U.S. EPA to flag and report wildfire impacts as part of the Exceptional Events process.

Particulate Matter (PM₁₀)

Particulate Matter (PM₁₀) refers to particles with an aerodynamic diameter of ten (10) microns or smaller. This measurement of particulate matter captures PM_{2.5} discussed above as well as coarser particulates that may still pose risks to human health at elevated concentrations. PM₁₀ includes larger particulates like dust from disturbed soil, rock crushing, traffic on dirt roads, or high wind events. Table 5 shows the State and National PM₁₀ standards.

TABLE 5 AMBIENT AIR QUALITY STANDARDS – PM ₁₀	
State PM₁₀ Standards: 20 µg/m ³ annual arithmetic mean not to be exceeded. 50 µg/m ³ for a 24-hour average not to be exceeded.	National PM₁₀ Standard: 150 µg/m ³ not to be exceeded more than once per year on average over 3 years.

The Chico monitoring location has the only permanent PM₁₀ monitor in Butte County. Table 6 shows the Chico PM₁₀ monitoring summary for 2021. The Chico air monitoring station includes a continuous PM₁₀ BAM that has been approved as a federal equivalency method (FEM) monitor, and therefore can be used for determining attainment with the federal PM₁₀ standards.

TABLE 6 BUTTE COUNTY PM₁₀ AIR QUALITY DATA 2021 <i>(data is still preliminary as of March 2022)</i>	
	Chico (FEM)
Max 24-Hour PM₁₀ Measurement	127.5 ug/m ³
Date	8/18/2021
Days Above Fed. Std. (150 µg/m³)	0
Days Above State Std. (50 µg/m³)	33
Annual Average	26.6 µg/m³

There were steady PM₁₀ impacts throughout Butte County between mid-July and mid-September due to wildfire impacts from the Dixie Fire, Caldor Fire, and other wildfires throughout Northern California.

2021-2022 Check Before You Light Program Season

The 2021-2022 Check Before You Light (CBYL) Program was effective November 1, 2021 through February 28, 2022. The CBYL Program requests that the public voluntarily refrain from using woodstoves and fireplaces when an area in Butte County is expected to exceed the federal 24-hr PM_{2.5} health standard (35ug/m³). These conditions generally occur on cold winter nights with little air movement and strong inversions. The federal standard is also the threshold for the Air Quality Index (AQI) level of 101 which is considered Unhealthy for Sensitive Groups. People with respiratory or heart disease, the elderly and children are the groups most at risk. Advisories are issued for the following day based on air quality and meteorological data measured in Chico, Gridley, and Paradise. When advisories are issued for the Chico area a mandatory no-burn ordinance adopted by the Chico City Council restricts burning in non-EPA certified wood burning devices within the city limits.

There were no advisories issued for the 2021-2022 CBYL season. There were also no exceedances of the federal 24-hr PM_{2.5} standard at the Chico, Paradise, or South Butte County monitoring locations during the 2021-2022 CBYL Season. Persistent weather systems through December and early January provided good dispersion during the holiday season which normally sees elevated particulate levels.

Figure 1 - 2021 Air Quality Summary: 8-hour Average Ozone Measurements

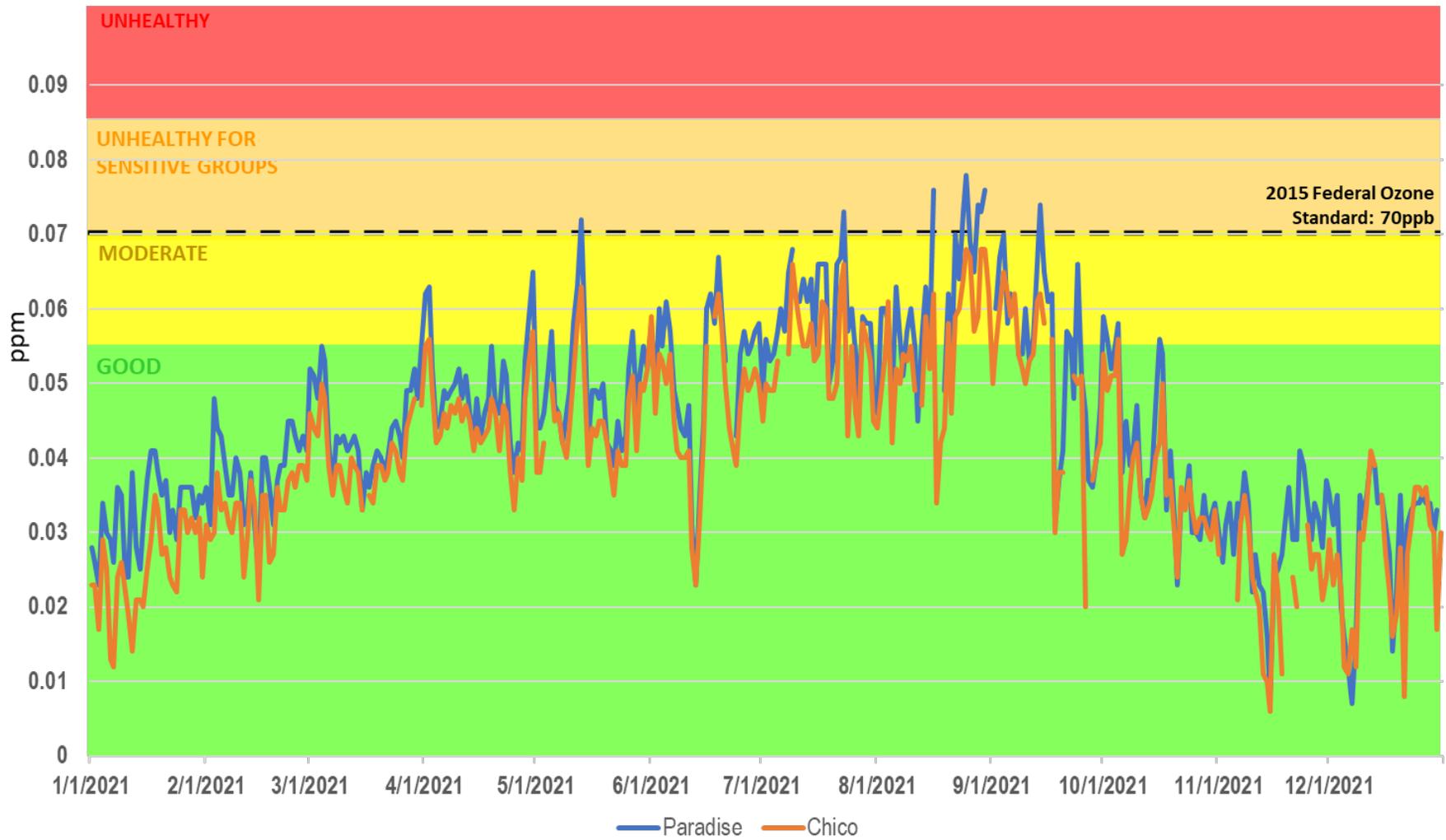


Figure 2 - 2021 Air Quality Summary: 24-hour Average PM2.5 Measurements

