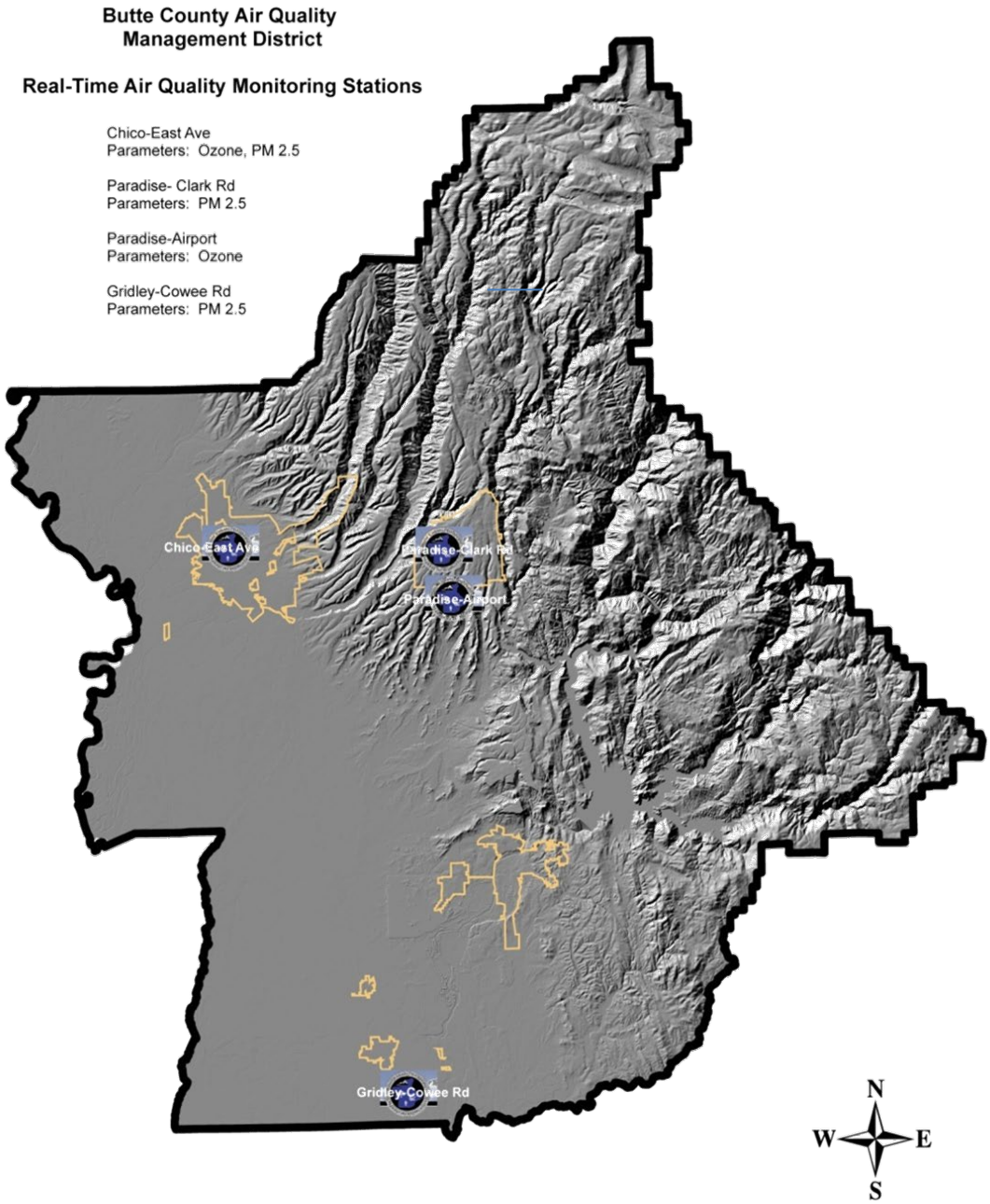
BUTTE COUNTY AIR QUALITY MANAGEMENT DISTRICT

Air Quality Summary for 2018
and
2018 – 2019 Check Before You Light Program Summary

The following is a summary of Butte County's air quality for 2018 and a summary of the 2018-2019 Check Before You Light Program. This document gives the reader an overview of the two (2) criteria pollutants of greatest concern - ozone (O_3) and particulate matter ($PM_{2.5}$ and PM_{10}). The data was obtained from the air monitoring sites located within Butte County. $PM_{2.5}$ is monitored in Chico, Gridley, and Paradise. Ozone is monitored in Chico and Paradise. PM_{10} is only monitored in Chico. 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 hydrocarbons (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 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 2018.

TABLE 1
AMBIENT AIR QUALITY STANDARDS - OZONE

State Ozone Standard:	**National Ozone Standards:**
0.09 ppm for 1 hour,	---
not to be exceeded.	0.070 ppm for 8 hours, not to be exceeded.
0.07 ppm for 8 hours.	Based on the fourth highest concentration averaged over three years.*
not to be exceeded.	* 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 nonattainment for the 2015 federal ozone standard in 2018 by the U. S. EPA; however, the U. S. EPA projects that Butte County will attain the 2015 federal ozone standard by 2025 with current emission trends.

Table 2 shows the ozone air quality summary for 2018 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. The Paradise monitoring location measured twenty (20) days that exceeded the 2015 federal and state ozone standards.

TABLE 2 BUTTE COUNTY OZONE AIR QUALITY DATA SUMMARY 2018 *(data is still preliminary as of April 2018)*		
	Chico	**Paradise**
Max. 1-Hour Ozone Measurement Date	.076 ppm 8/10/2018	.108 ppm 8/1/2018
Days Above State Std. (0.09ppm)	**0**	**3**
Max. 8-Hour Ozone Measurement	.069 ppm 8/10/2018	.098 ppm 8/1/2018
4th Highest 8-Hour Ozone Measurement (used for calculating Design Value)	0.061 ppm	0.084 ppm
Days Above State Std. (0.07ppm) – ***rounding differs from Fed. Std.***	**0**	**20**
Days Above 2015 Fed. Std. (0.07ppm)	**0**	**20**

The ozone exceedances measured in Paradise during the summer of 2018 occurred during the time of year that ozone concentrations are typically elevated, however most exceedances occurred while Butte County was being impacted by smoke from the County Fire (Yolo County), Mendocino Complex Fires (Mendocino / Lake / Colusa Counties), and Carr Fire (Shasta County). The U.S. EPA has a process that allows for the exclusion of air quality monitoring data influenced by exceptional events such as wildfires from use in determinations of exceedances or violations of the national ambient air quality standards. The District will work with CARB to identify the exceedances that were caused by exceptional events.

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 includes 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 waste 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 NOx, sulfur oxides (SOx), 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 $\mu g/m^3$ annual arithmetic mean not to be exceeded	**National $PM_{2.5}$ Standards:**35 $\mu g/m^3$ for 24 hours, not to be exceeded, based on the 98th percentile concentration averaged over three years and 12 $\mu g/m^3$ 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 in May 2018.

Table 4 shows the Chico, Gridley and Paradise $PM_{2.5}$ monitoring summary for 2018. The Chico air monitoring station includes a filter-based $PM_{2.5}$ monitor that has been approved as a federal reference method (FRM) monitor, and therefore can be used for determining attainment with the federal $PM_{2.5}$ standards. Paradise and Gridley monitor $PM_{2.5}$ using a continuous monitor known as a BAMM. This data is useful for public reporting and understanding diurnal and episodic behavior of fine particles, background monitoring, and transport assessment. Continuous monitors also provide 24-hour average data for the days when filter-based samplers are not operating. Continuous $PM_{2.5}$ monitors have not been approved as a FRM therefore cannot be used to determine attainment status.

TABLE 4
BUTTE COUNTY $PM_{2.5}$ AIR QUALITY DATA 2018
(data is still preliminary as of April 2019)

	Chico (FRM)	**Paradise (BAMM)**	**Gridley (BAMM)**
Max 24-Hour $PM_{2.5}$ Measurement Date	411.7 ug/m3 11/16/2018	68.0 ug/m3* 7/30/2018	266.9 ug/m3 11/15/2018
98th Percentile 24-Hour $PM_{2.5}$ Value (used for calculating Design Value)	61 ug/m3	n/a	n/a
Days Above Fed. Std. (35 ug/m3)	**28**	**11***	**18**
Annual Average	13.7 ug/m3	n/a	n/a

*Note: The Paradise PM2.5 monitor was offline due to the Camp Fire from November 8 through the end of the year.

Figure 2 (attached) charts the $PM_{2.5}$ 24-hour average data for Chico, Paradise, and Gridley. Much of Butte County was impacted by wildfire smoke from late July though August due to the Carr Fire (Shasta County) and the Mendocino Complex (Mendocino / Lake / Colusa Counties) which was the largest wildfire in California state history by acreage.

The Camp Fire in November 2018 became the deadliest and most destructive wildfire in California state history. The Chico and Gridley monitoring stations measured 11 days that were between Unhealthy and Hazardous on the AQI scale. Portable $PM_{2.5}$ monitors, particulate sensors, and visual accounts indicate that most of Butte County experienced similar conditions. Note that the Paradise monitor was offline while the fire was active. The Chico monitoring station on East Avenue measured a 24-hour $PM_{2.5}$ average of 411.7 micrograms per cubic meter on November 16, 2018 which, pending data certification, is the highest 24-hour $PM_{2.5}$ average measured at an official station on record for Butte County. The Gridley monitoring station experienced its highest 24-hour $PM_{2.5}$ average on record on November 15, 2018 with a value of 266.9 micrograms per cubic meter.

Chico recorded 28 days that exceeded the 24-hour $PM_{2.5}$ federal standard in 2018 while Gridley measured 18 days in exceedance and Paradise measured 11 days in exceedance. All exceedances except one (1) day in Gridley are likely due to wildfire smoke impacts. The District will work with CARB to identify the exceedances that were caused by exceptional events.

Particulate Matter (PM_{10})

Particulate Matter (PM_{10}) 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. PM_{10} 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 PM_{10} standards.

TABLE 5
AMBIENT AIR QUALITY STANDARDS – PM_{10}

State PM_{10} 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 PM_{10} 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 PM_{10} monitor in Butte County. Table 6 shows the Chico PM_{10} monitoring summary for 2018. The Chico air monitoring station includes a filter-based PM_{10} monitor that has been approved as a federal equivalency method (FEM) monitor, and therefore can be used for determining attainment with the federal PM_{10} standards. Exceedances of the federal PM_{10} standard tracked with exceedances of the federal $PM_{2.5}$ standards were likely due to impacts from wildfire smoke. The District will work with CARB to identify the exceedances that were caused by exceptional events.

TABLE 6
BUTTE COUNTY PM_{10} AIR QUALITY DATA 2018
(data is still preliminary as of April 2019)

	Chico (FEM)
Max 24-Hour PM_{10} Measurement Date	453 ug/m3 11/16/2018
Days Above Fed. Std. (150 µg/m^3)	**9**
Days Above State Std. (50 µg/m^3)	**41**
Annual Average	**31 µg/m^3**

2018-2019 Check Before You Light Program Season

The 2018-2019 Check Before You Light (CBYL) Program was effective November 1, 2018 through February 28, 2019. 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.

During the 2018-2019 CBYL season there were five (5) advisories issued for both the Chico and Gridley areas. All five (5) advisories were issued due to ongoing smoke impacts from the Camp Fire. All exceedances of the federal 24-hr $PM_{2.5}$ standard during the CBYL season (12 in Chico, 11 in Gridley) were due to smoke impacts from the Camp Fire. Once the Camp Fire was contained, there were no advisories issued and no exceedances of the 24-hr $PM_{2.5}$ standard in Butte County for the remainder of the CBYL season.

Figure 1 - 2018 Air Quality Summary: 8-hour Average Ozone Measurements

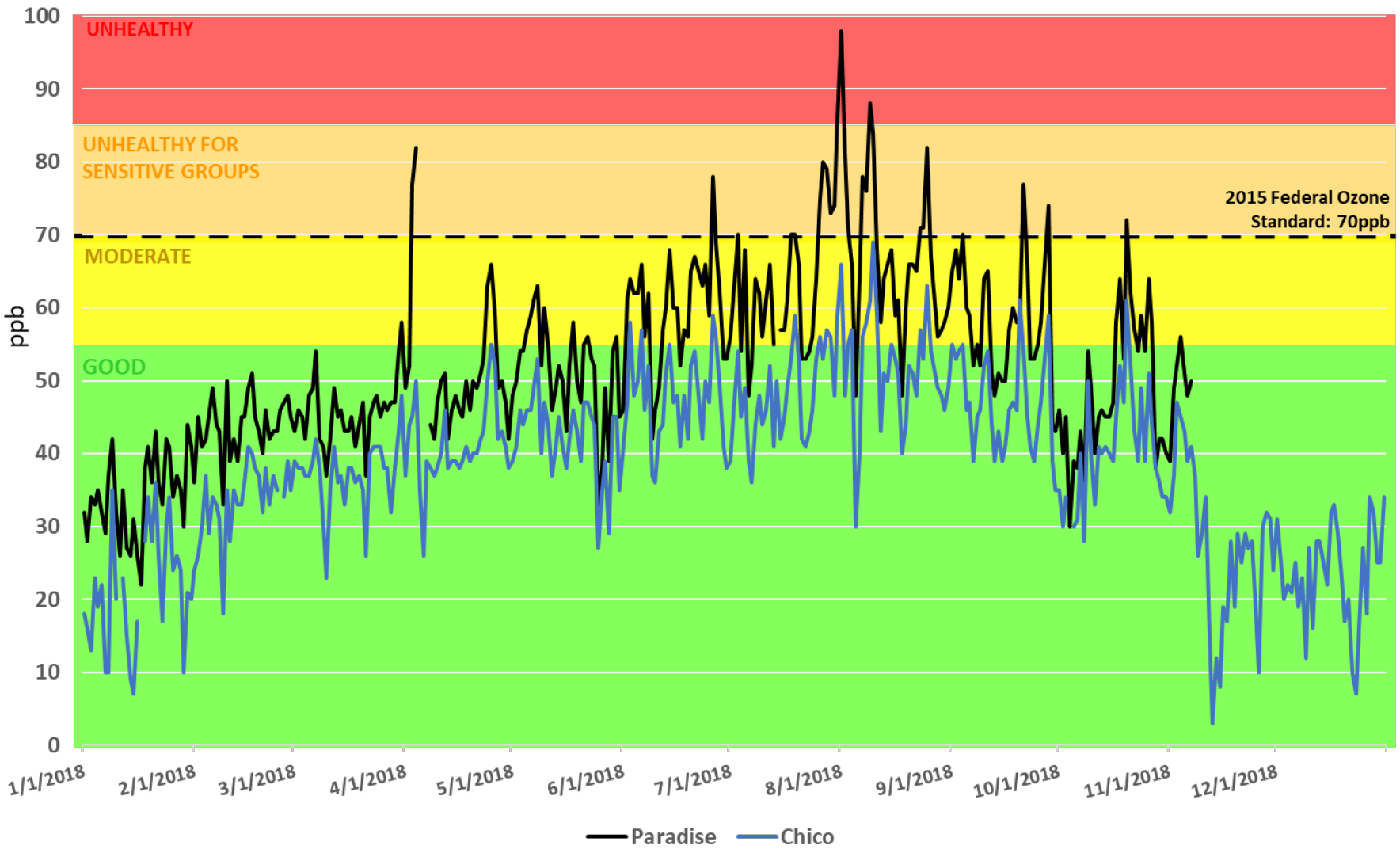


Figure 2 - 2018 Air Quality Summary: 24-hour Average PM2.5 Measurements

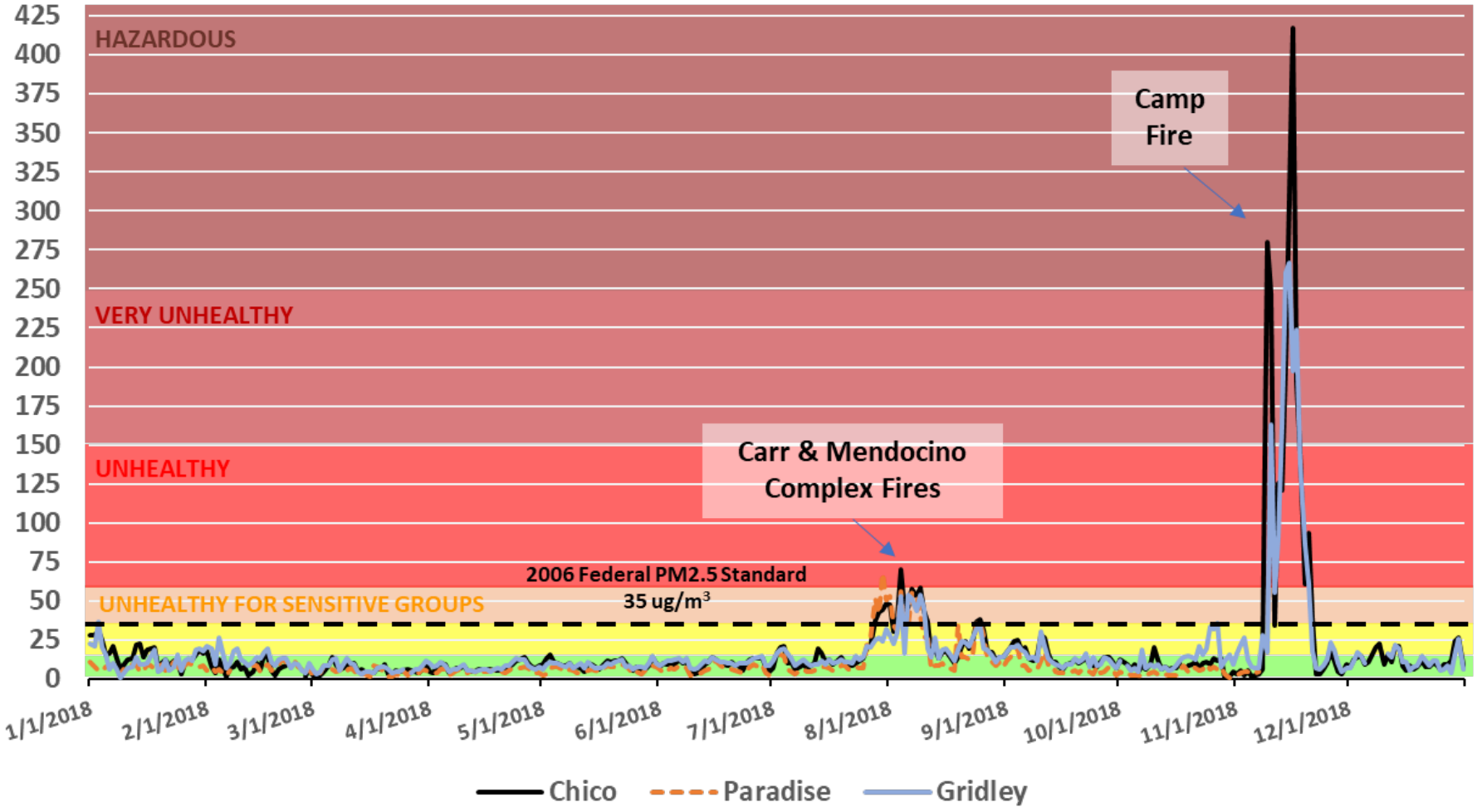


Figure 3 - 2018 Air Quality Summary: 24-hour Average PM10 Measurements