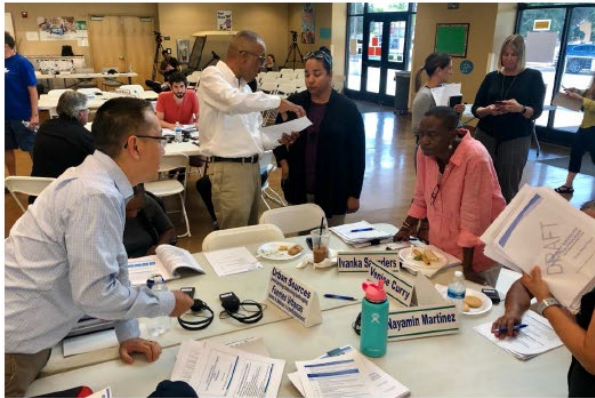




# San Joaquin Valley

AIR POLLUTION CONTROL DISTRICT

## South Central Fresno Community Air Monitoring Report 2021 3rd Quarter (July – September)



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## I. Background

Assembly Bill (AB) 617, signed into law in July 2017, has resulted in a statewide effort to reduce air pollution and improve public health in communities that experience disproportionate burdens from exposure to air pollutants statewide through new community-focused and community-driven actions. AB 617 provides mechanisms and resources to implement community-specific air quality monitoring networks, develop and implement emission reduction programs; improve availability of data and other technical information; and invest substantial funding in the community through voluntary incentive funding measures. South Central Fresno, a densely populated community within the city of Fresno, was selected as a first year community by CARB in September of 2018.

District staff provided assistance to the Community Steering Committee (CSC) members by helping them to develop their recommended air monitoring priorities. The District worked with CSC members as they reviewed and evaluated a variety of different resources, including maps of stationary sources, area sources, mobile sources, prevailing wind direction data, and sensitive receptor locations relative to sources of air pollution within the community. The CSC adopted their official recommendation in June 2019, including the deployment of various air monitoring platforms within the community as a part of the [South Central Fresno Community Air Monitoring Plan \(CAMP\)](#).

The District has invested an extensive amount of work into implementing the CAMP, including researching, developing, configuring, deploying, trouble-shooting, and maintaining new state-of-the-art high precision air monitoring equipment. This also includes the use of the mobile air monitoring van to take measurements in a variety of locations of interest and to respond to community concerns. The District has also contracted with analytical laboratories to conduct the needed analysis to speciate the VOC and PM<sub>2.5</sub> samples being taken in the community. In addition, the District has worked closely with organizations to negotiate leases to authorize the deployment of the equipment on site, followed by logistical, electrical, and site preparation work for the installation of the air monitoring equipment.

### **Access to Data from South Central Fresno Community Air Monitoring Network**

In addition to quarterly reports, the District is continuing its efforts to enhance the availability of air monitoring data and information to ensure that the community is fully apprised of the ongoing air monitoring efforts and are receiving the latest air quality information. This includes continued regular updates to the Community Steering Committee (CSC), continuously posting real-time and all historical air monitoring data, and bilingual weekly updates in South Central Fresno, which are all available on the [South Central Fresno Air Monitoring webpage](#). In addition, raw hourly data from the South Central Fresno community air monitoring network are also being sent to CARB and are expected to become available on CARB's statewide [AQView data portal](#) once the website is complete.

## II. Summary of Findings for the Quarter

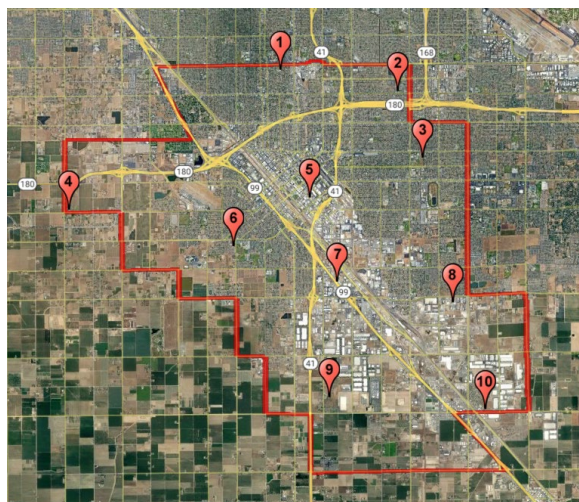
Through the continued implementation of the South Central Fresno CAMP during this period, the following was observed among the pollutants monitored:

- High pressure was prevalent across the District for the majority of the quarter. Wildfires sparked by thunderstorms caused elevated PM2.5 and Ozone concentrations.
- The 3rd quarter of 2021 was essentially dominated by high pressure systems that produced numerous days of triple digit temperatures, and poor dispersion across the Valley. Monsoonal moisture also streamed into California and produced thunderstorms that caused wildfires to erupt in the northern California and Sierra Nevada mountains.
- During this period, acetaldehyde, methanol, ethanol, 2-propanol, and acetone were the primary VOCs detected. Overall, during this monitoring period no concerning concentrations of VOCs were detected in the samples taken.
- Organic carbon was a large portion of the total as wildfires emissions, a source of organic carbon, and significantly impacted PM2.5 measurements during this quarter.
- See Appendix for further analysis including Heat Maps.

## III. Status of Community Air Monitoring Network

Consistent with the community recommended air monitoring network design, the District is now implementing the community air monitoring plan for South Central Fresno. The following map and table detail the network design for the South Central Fresno CAMP, as well as the status of implementing each specified air monitoring site.

**Figure 1 Design and Status of South Central Fresno Community Air Monitoring Network**



Location	Site Location	Monitoring Platform	Implemented (Y/N)
1	Heaton Elementary School	Real-time PM2.5	Y
2	Yosemite Middle School	Real-time PM2.5	Y
3	Roosevelt High School	Real-time PM2.5	Y
4	Madison Elementary School	Real-time PM2.5	Y
5	Bitwise South Stadium	Real-time PM2.5	Y
6	Edison High School	Compact Multi-Pollutant	Y
7	Fresno-Foundry Park	Real-time PM2.5	Y
8	Fresno-Drummond	Ozone, NO <sub>2</sub> , PM10	Y
9	West Fresno Middle School	Compact Multi-Pollutant	Y
10	Malaga Elementary School	Air Monitoring Trailer	Y

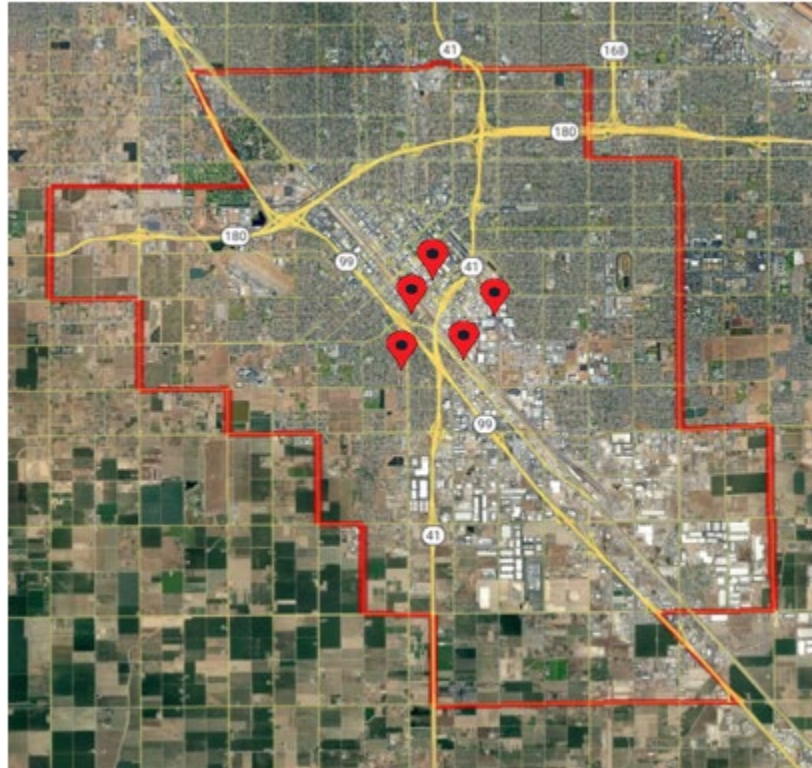
The District continues to work on implementing the South Central Fresno CAMP, as well as making changes as needed based on CSC member comments and other logistical reasons. During this period, the following highlights recent changes or continued work to implement the South Central Fresno CAMP:

- Edison High School: The District has placed a multi-pollutant air monitoring trailer at Edison High School. Operation of this trailer began on August 4, 2021. In the interim, the air monitoring van was utilized to monitor areas nearby this location.

#### IV. Mobile Air Monitoring Van Activities

During this quarterly air monitoring period, the District used the mobile air monitoring van to measure air quality at the following locations:

**Figure 2 Mobile Air Monitoring Locations**



The following table provides a summary of the results of the air quality data collected with the air monitoring van during this period. Green colored values represent pollutant concentrations that are below the applicable health standard or Reference Exposure Level (REL), while orange colored values represent elevated values or values above the applicable health standard or REL. For reference, a detailed table of all community air monitoring data collected with the mobile air monitoring van is available on the South Central Fresno community air monitoring [website](#).

**Table 1 Summary of Data Collected with Mobile Air Monitoring Van**

Pollutant	Peak 1-hour Average Value	Applicable Standard
PM2.5*	35.0 $\mu\text{g}/\text{m}^3$ *	35 $\mu\text{g}/\text{m}^3$ (24-hr average)
Ozone*	99.5 ppb*	70 ppb (8-hr average)
CO	0.6 ppm	35 ppm (1-hr average)
NO2	24.1 ppb	100 ppb (1-hr average)
SO2	6.3 ppb	75 ppb (1-hr average)

Benzene	0	8 ppb (Acute Risk Exposure Level) 1 ppb (Chronic Risk Exposure Level)
Toluene	0	9,818 ppb (Acute Risk Exposure Level) 80 ppb (Chronic Risk Exposure Level)
Ethylbenzene	0	461 ppb (Chronic Risk Exposure Level)
Xylene	0	5,067 ppb (Acute Risk Exposure Level) 161 ppb (Chronic Risk Exposure Level)
H2S	4.3 ppb	30 ppb (Acute Risk Exposure Level) 7 ppb (Chronic Risk Exposure Level)

\*Peak 1-hour values not directly comparable to 24-hour and 8-hour average standards for PM2.5 and ozone, respectively

## V. Summary of PM2.5 and VOC Speciation Analysis

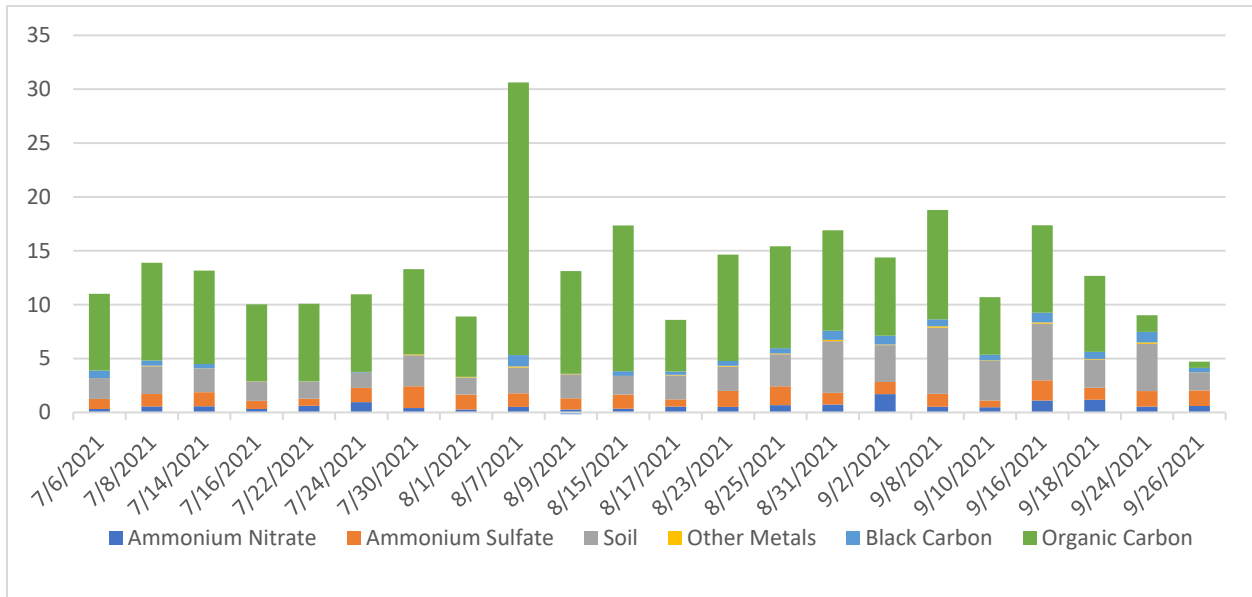
To build a better understanding of the various constituents that compose the overall PM2.5 and Volatile Organic Compound (VOC) concentrations in the South Central Fresno community, in November 2019 the District began operating PM2.5 and VOC speciation sampling at the Fresno-Foundry site near the intersection of Jensen Avenue and Highway 99. On June 23, 2020, VOC and PM2.5 speciation air monitoring efforts were shifted to the air monitoring trailer at Malaga Elementary School. The collected samples were sent to a third-party laboratory for analysis to determine the contribution of various species of PM2.5, as well as the various species of VOCs in the air sampled in the community.

Details on the types of species measured through this analysis, and potential activities, can be found in the appendix to this report.

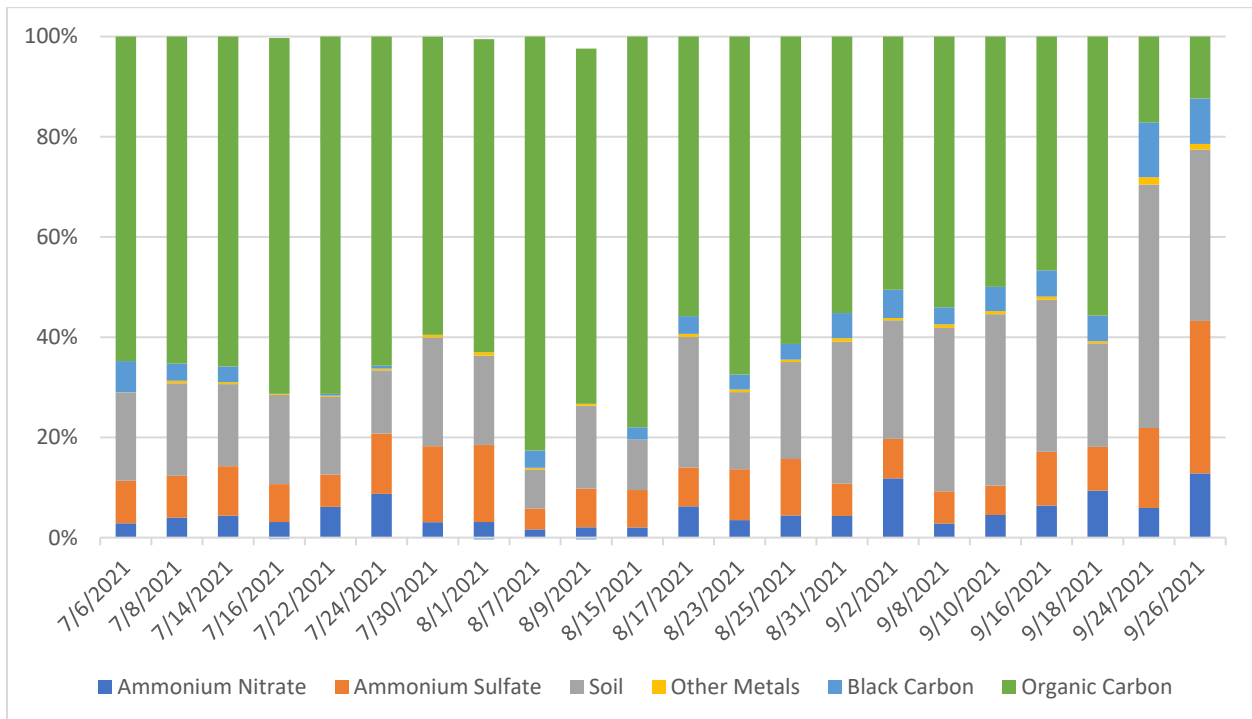
### **PM2.5 Speciation Analysis**

The following figures show the concentration levels and relative comparison of the various PM2.5 species sampled at the Malaga Elementary School air monitoring site. Samples were taken through the entire three month period. Note that in the speciation results below, organic carbon was a large portion of the total as wildfires emissions, a source of organic carbon, significantly impacted PM2.5 measurements during this quarter. Soil elements were also a significant contributor to overall PM2.5 concentrations during this period.

**Figure 3 Speciated PM2.5 Concentrations at Malaga Elementary School**



**Figure 4 Relative Comparison of PM2.5 Species Measured at Malaga Elementary School**





**VOC Speciation Analysis**

During this period, the District collected 22 air samples for laboratory analysis. The VOC laboratory analysis is capable of isolating concentrations of 83 VOC species, however during this period most VOCs were not detected in the atmosphere. The following figure displays the small number of VOCs that were detected during this period, with most of these reporting only trace levels.

During this period, acetaldehyde, methanol, ethanol, 2-propanol, and acetone were the primary VOCs detected. Of these, only acetaldehyde and methanol have an associated Reference Exposure Level (REL), a health risk metric established by the Office of Environmental Health Hazard Assessment (OEHHA). Below is a summary of the potential sources and a comparison of the peak concentration with the associated OEHHA REL. Green colored values represent pollutant concentrations that are below the applicable REL, while orange colored values represent elevated values or values above the applicable REL.

**Table 2 Summary of VOC Speciation Analysis**

Pollutant	Potential Sources of Emission	Highest 24-hour Average Concentration Detected (ppb)	OEHHA Acute REL (ppb)	OEHHA Chronic REL (ppb)
Methanol	Automobile exhaust, solvent use, and naturally from vegetation and microbes	85.1	21,367	3052
Acetaldehyde	Wood combustion in fireplaces and woodstoves, coffee roasting, burning of tobacco, vehicle exhaust fumes, and coal refining and waste processing	12.7	261	78

Overall, during this monitoring period no concerning concentrations of VOCs were detected in the samples taken.

## VI. Appendix of Pollutant Species and Comparative Analysis

### Overview of PM2.5 Species

The nature and formation of PM2.5 in the San Joaquin Valley is highly complex as it can be composed of any material that has a diameter of 2.5 microns or less. PM2.5 can be emitted directly as primary PM2.5 from various sources or formed secondarily through chemical reactions in the atmosphere. The resulting ambient PM2.5 mixture can include aerosols (fine airborne solid particles and liquid droplets) consisting of components of nitrates, sulfates, organic carbon, black carbon, soil, trace metals, and more.

PM2.5 in the Valley is comprised of many species that contribute to the total PM2.5 mass. This complex mixture is attributable to emissions from stationary, mobile, and area-wide sources, as well as naturally occurring emissions. Although the list of species contributing to PM2.5 in the Valley is lengthy, it can be grouped into larger representative categories. The following is a brief description of each of these larger species categories:

- **Ammonium Nitrate:** Ammonium nitrate is formed from the reaction of ammonia and nitric acid, where the nitric acid is formed from emissions of nitrogen oxides.
- **Ammonium Sulfate:** Ammonium sulfate is formed from the reaction of ammonia and sulfuric acid, where the sulfuric acid is formed primarily from emissions of sulfur dioxide, with smaller amounts forming from direct emissions of sulfur.
- **Organic carbon:** Organic carbon (OC) are generated as primary organic aerosol, predominantly through the combustion of hydrocarbons. Key sources include cooking, industrial processes, mobile source exhaust, tire wear, and wood burning. Secondary organic aerosols are formed from the oxidation of motor vehicle hydrocarbons, wood burning, solvent use, and industrial processes.
- **Black Carbon:** Black carbon is also known as soot or elemental carbon, and is formed during incomplete combustion in fuels, including mobile exhaust (mainly diesel) and wood burning.
- **Soil:** This category consists of road dust and soil dust that are entrained in the air from activity, such as soil disturbance or airflow from traffic.
- **Other Metals:** Identified as components from soil emissions or found in other particulates having been emitted in connection with combustion from engine wear, brake wear, and similar processes. Certain metals are also emitted from the use of fireworks.

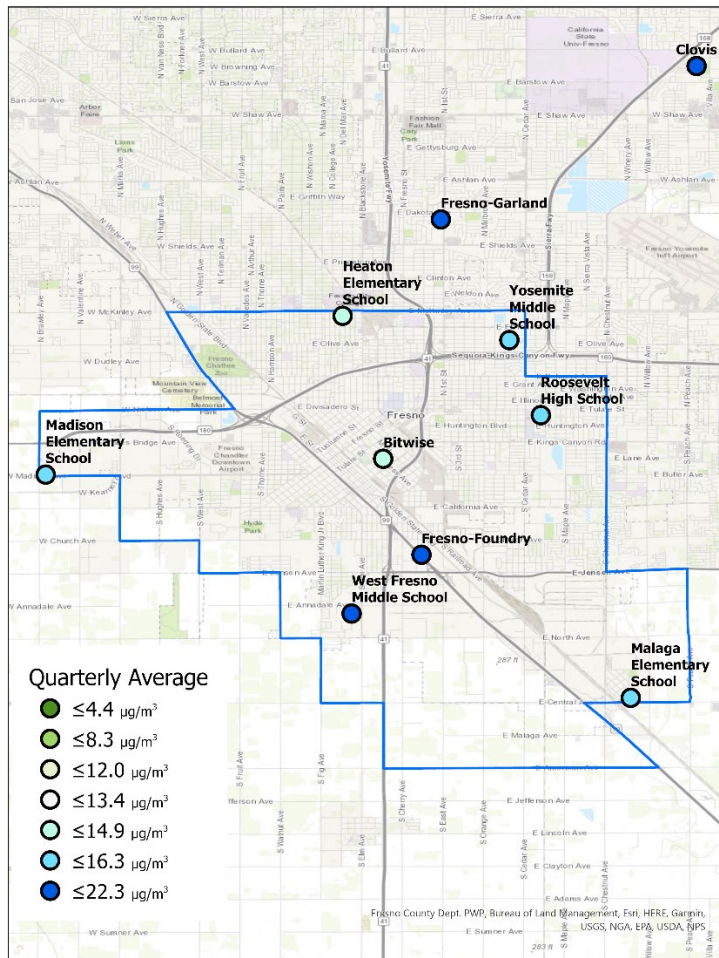
**Comparative Analysis of Measured Pollutants**

The following table and spatial comparison map depicts the quarterly PM2.5 averages and locations of each site within the community, and other nearby air monitoring sites. Good air quality is represented by a dark green color and lightens as quarterly averages rise. Moderate air quality and above is represented by a blue color which continues to darken based on how high the quarterly average is for that site. During this period, the Fresno-Foundry and West Fresno Middle School monitors recorded the highest average PM2.5 across the community. Note that much of the data during this period was impacted by wildfires, and does not represent normal ambient air quality conditions across the urban area.

Quarter	Clovis	Fresno-Garland	Roosevelt High School	Bitwise South Stadium	Fresno-Foundry
2021 Q3	17.4	16.5	15.1	14.6	18.7

Quarter	Heaton Elementary School	Yosemite Middle School	Malaga Elementary School	West Fresno Middle School	Madison Elementary School
2021 Q3	13.7	16.0	15.6	19.2	15.8

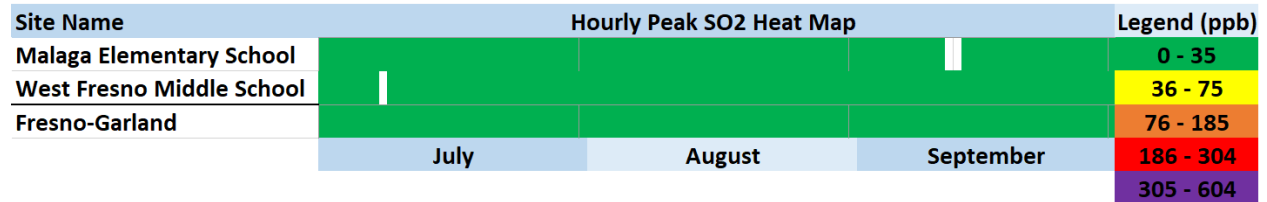
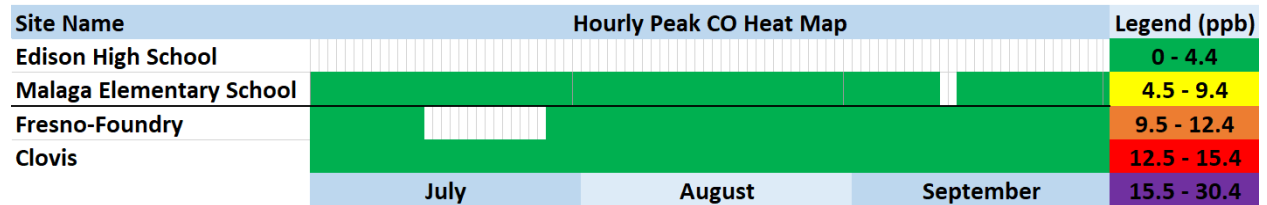
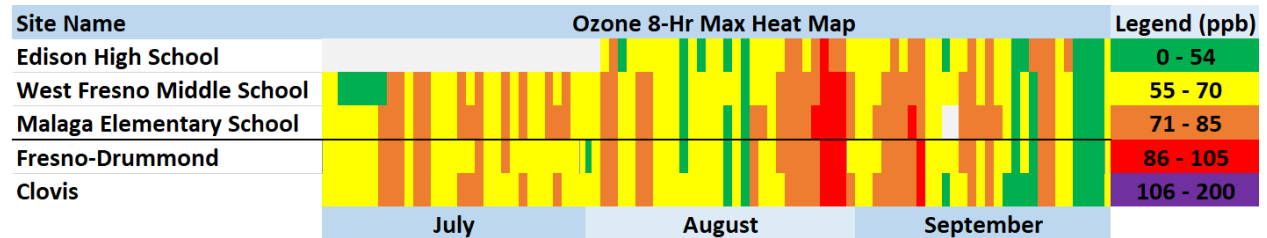
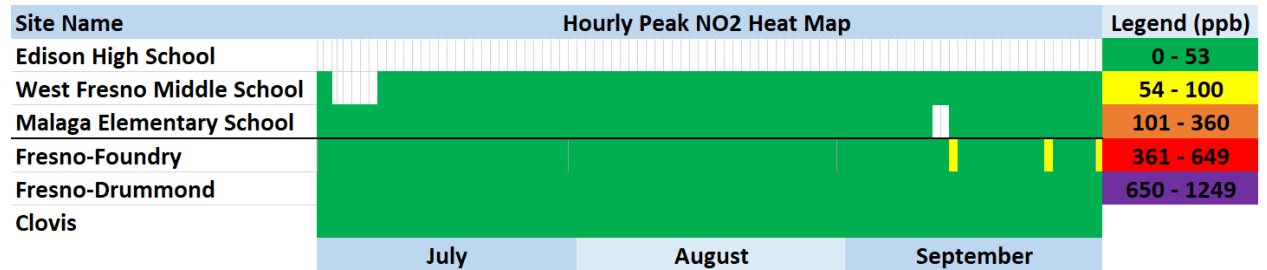
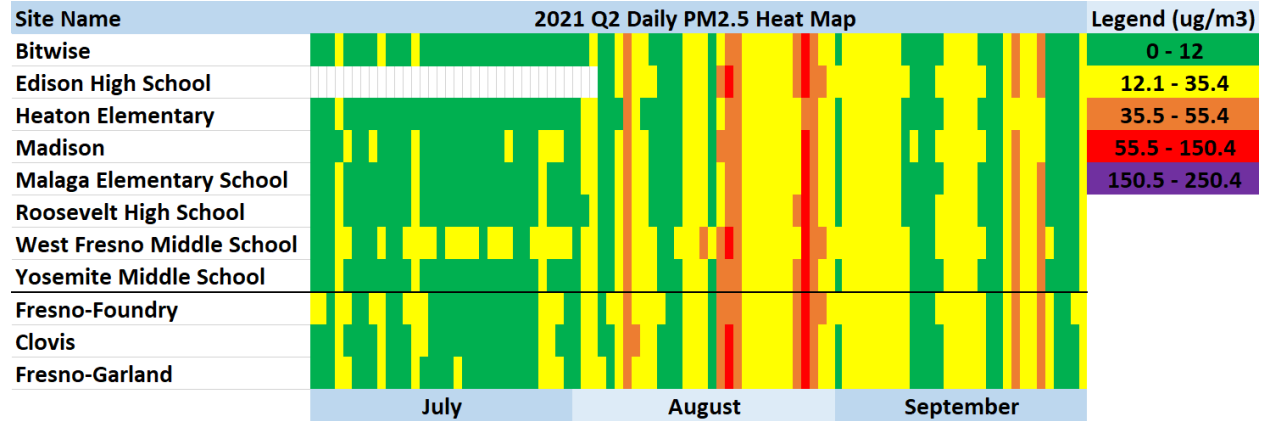
**Spatial Comparison of PM<sub>2.5</sub> Quarterly Averages**



**Pollutant Concentration Heat Maps**

The following Heat Maps provide a comparative analysis of various pollutants being measured at the air monitoring sites as a part of the community air monitoring network. The color scales for each table are based on the Air Quality Index (AQI) or the associated Reference Exposure Level (REL).

The 3rd quarter of 2021 was essentially dominated by high pressure systems that produced numerous days of triple digit temperatures, and poor dispersion across the Valley. Monsoonal moisture also streamed into California and produced thunderstorms that caused wildfires to erupt in the northern California and Sierra Nevada mountains. Wind flow patterns and strong temperature inversions associated with the high pressure systems exacerbated smoke impacts in the Valley. A few low pressure systems did pass through the Pacific Northwest and improved dispersion enough to lift some of the smoke out of the Valley but the respites were short-lived. Poor dispersion and smoke impacts essentially characterized the 3<sup>rd</sup> quarter and kept PM<sub>2.5</sub> concentrations elevated through the most of the period.



Benzene				Acute REL (ppb)
Peak 1-Hour Peak BTEX Heat Map				
Site Name				0
West Fresno				≥8
Malaga Elementary School				
Toluene				Acute REL (ppb)
Site Name				0
West Fresno				≥9818
Malaga Elementary School				
Ethylbenzene				Chronic REL (ppb)
Site Name				0
West Fresno				≥461
Malaga Elementary School				
Xylene				Acute REL (ppb)
Site Name				0
West Fresno				≥5067
Malaga Elementary School				
	July	August	September	
Site Name	Hourly Peak H2S Heat Map			Acute REL (ppb)
Malaga Elementary School				0
	July	August	September	≥30