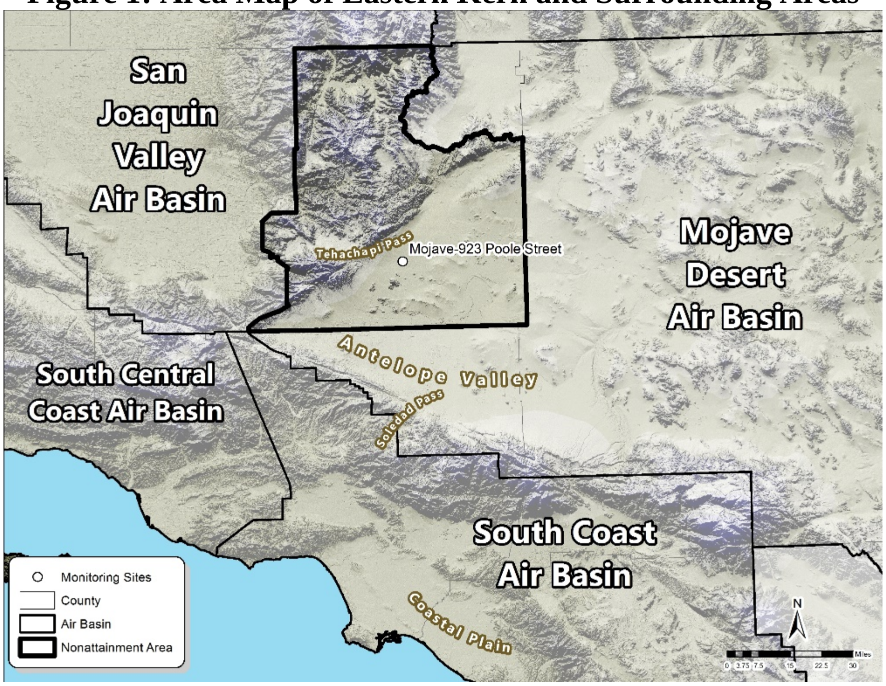
APPENDIX L
Weight of Evidence

Introduction

The Eastern Kern 8-Hour Ozone Nonattainment Area (Eastern Kern) includes the eastern portion of Kern County that lies outside of the San Joaquin Valley Air Basin (San Joaquin Valley) and is under the jurisdiction of the Eastern Kern Air Pollution Control District (District). The northeast corner of Kern County, as outlined by the watershed boundary and containing the China Lake Naval Air Weapons Station, is not included in Eastern Kern. Eastern Kern is currently classified as a severe nonattainment area for the 2008 federal 8-hour ozone standard (0.075 standard) of 0.075 parts per million (ppm) and as a serious nonattainment area for the 2015 federal 8-hour ozone standard (0.070 standard) of 0.070 ppm, with an attainment deadline of 2026 for both standards. For areas classified as moderate nonattainment or above, photochemical modeling is a required element of the State Implementation Plan (SIP) to ensure that existing and proposed control strategies provide the reductions needed to meet the federal standards by the relevant attainment deadlines.

Figure 1: Area Map of Eastern Kern and Surrounding Areas



To address the uncertainties inherent to photochemical modeling assessments, U.S. Environmental Protection Agency (U.S. EPA) guidance, Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze, recommends that supplemental analyses accompany all modeled attainment demonstrations. To complement regional photochemical modeling analyses included in the Eastern Kern Ozone SIP, the following Weight of Evidence (WOE) demonstration includes detailed analyses of ambient ozone data and trends, transport impacts, precursor emission trends and reductions, population exposure trends, and a discussion of conditions that contribute to exceedances of the federal standards. All analysis methods have inherent strengths and weaknesses; therefore, examining an air quality problem in a variety of ways helps offset the limitations and uncertainties associated with any one approach.

The impact of emissions generated in the upwind South Coast and San Joaquin Valley Air Basins, which are both classified as extreme ozone nonattainment areas, have a significant impact on air quality in Eastern Kern. Ozone air quality data, along with photochemical modeling results show that while Eastern Kern has made progress, the magnitude of emission reductions in the upwind area that are necessary to provide for attainment will not occur by the 2026 attainment date for the 0.070 standard.

As shown in Table 1, the most recent design value for the site is 10 percent above the level of the 0.070 standard and 2.7 percent above the level of the 0.075 standard. The following sections of this WOE provide the documentation to support the District's reclassification as a severe nonattainment area for the 0.070 standard, with an attainment deadline of 2032.

Table 1: Ozone Design Values at the Western Mojave Monitoring Site

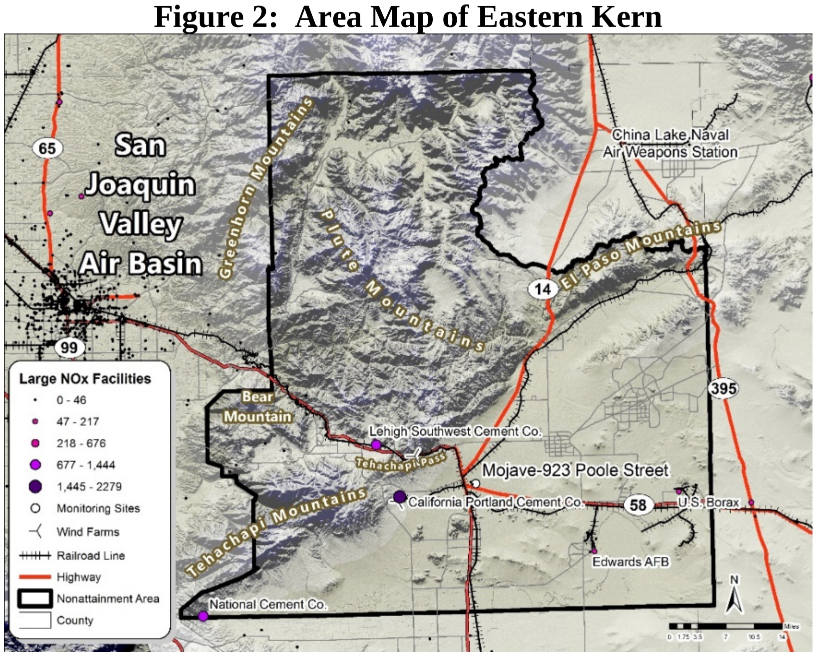
Site Name	AQS ID	2019 Design Value (ppm)*	2020 Design Value (ppm)*	% Above Standard in 2020
Mojave-923 Poole Street	060290011	0.078	0.077	10%**
Mojave-923 Poole Street	060290011	0.078	0.077	2.7%***

* with 2018 and 2020 wildfire days (as identified in the wildfire section of this document) removed.
** above 0.070 standard.
*** above 0.075 standard.

Area Description

Eastern Kern comprises the portion of Kern County located in the northwestern corner of the Mojave Desert Air Basin, in California's high desert, as shown in Figure 2. Eastern Kern, to the south, is separated from the South Coast Air Basin (extreme nonattainment area) by the Antelope Valley (severe nonattainment area) and San Gabriel Mountains. The Tehachapi and the Sierra Nevada Mountains separate Eastern Kern from the San Joaquin Valley (extreme nonattainment area), to the west and north. Directly to the east is San Bernardino County. The northeast portion of Kern County, where the China Lake Naval Air Weapons Station is located, in not included in Eastern Kern.

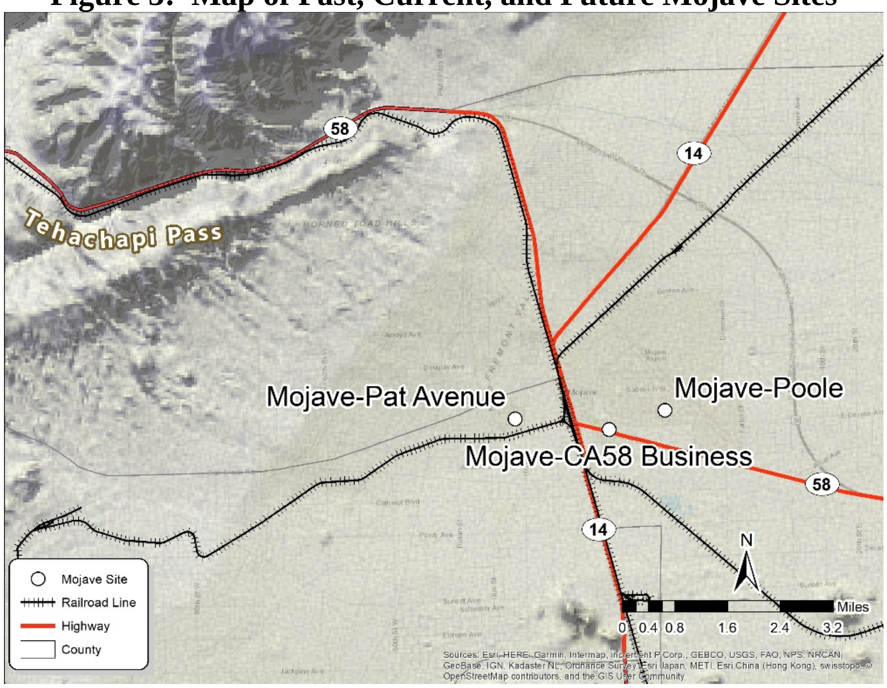
Figure 2: Area Map of Eastern Kern



Eastern Kern's population of 90,487 (Census, 2020) resides primarily in and around the major towns of Rosamond, Tehachapi, California City, and Mojave. Major highways serving Eastern Kern are U.S. Highways 58, 14, and 395. Eastern Kern is home to two large wind farms, one of which has a current capacity of over 1,500 megawatts and a planned future capacity of 3,000 megawatts by 2040. It is also home to approximately 40 large-scale commercial solar power generating facilities with many more scheduled for construction in the future. There are also two large cement facilities within 14 miles of the monitoring site, as is the Mojave Air and Space Port. A third large cement facility and California's largest open pit mine located in Boron, where borax is mined, are within 38 miles of the monitor.

Within Eastern Kern, there is one long-term monitoring site located in the town of Mojave. The ozone monitor was moved from the original location at 923 Poole Street to a temporary location at 1773 CA-58 Business starting from October 1, 2020. Currently, the plan is to move the site to a permanent spot located at 3200 Pat Avenue in Mojave (see Figure 3). In this analysis, the data from the 923 Poole Street and 1773 CA-58 Business are merged. In addition to the long term site, two special study sites were operated in 1995 at Boron-26965 Cote Street and Tehachapi-Jameson Road. However, because data for these sites are only for that single year, they are not included in this evaluation.

Figure 3: Map of Past, Current, and Future Mojave Sites



Conceptual Model

Weather in Eastern Kern is dominated by mostly sunny days, low humidity, and warm to hot temperatures during the spring and summer months. These conditions are conducive to the formation and buildup of ozone. However, limited local emissions sources, relative to the two neighboring extreme ozone nonattainment areas to the west/northwest and south of Eastern Kern, are not sufficient to produce the magnitude of peak ozone concentrations and the quantity of ozone exceedance days observed in the area. The transport of emissions from the San Joaquin Valley air basin, and to a lesser extent the South Coast air basin, is the predominant cause of high ozone concentrations and exceedances in Eastern Kern. The terrain, meteorology, regional transport, and distribution of emissions are important considerations for understanding the ozone challenges facing Eastern Kern.

I. Terrain and Meteorology

The nonattainment area includes the eastern half of Kern County and is located on the western edge of the Mojave Desert. Eastern Kern is separated from populated areas to the west and south by several mountain ranges and is considered high desert. The mountainous area of the County ranges between 2,000-7,000 feet above sea level. The town of Mojave is also elevated, with the flat, plateau area generally around 2,500-3,000 feet above sea level.

The mountains surrounding Eastern Kern contain a limited number of passes that act as conduits for transport from the neighboring San Joaquin Valley and South Coast air basins. The Tehachapi Pass, at around 4,000 feet above sea level, connects the Bakersfield area in the southern San Joaquin Valley and Eastern Kern. This pass provides the primary outlet for air from the San Joaquin Valley to overflow into Eastern Kern.

During the summer months, air frequently flows in a southwesterly direction in the San Joaquin Valley, from the delta region in the north towards the Tehachapi Mountains in the south. Some of this air and the pollutants it contains move through the Tehachapi Pass and into the Mojave Desert (see multiple citations from p16, ARB, 1996 Triennial Assessment Report). It was first noted as far back as 1982 that the Tehachapi Pass does not pose a significant barrier to transport due to its elevation of 4000 feet (Reible et al, 1982) compared to the rest of the southern Sierra Nevada Mountain range, which is generally much higher in altitude. From the south, the Soledad Pass allows air to flow from the South Coast into the Antelope Valley and then northeastward into the eastern portion of Eastern Kern.

Airflow from the San Joaquin Valley through the Tehachapi Pass to the west is dominant on many more days than airflow from the South Coast through the Soledad Pass to the south. Past CARB transport analyses of hourly surface winds documented that winds blow through the Tehachapi Pass from the San Joaquin Valley to the Mojave Desert on most days during the summer ozone season of April through October. Based on the high frequency and magnitude of this airflow, along with other in-depth transport analyses, CARB identified the San Joaquin Valley as an overwhelming transport contributor to State ozone exceedances in Eastern Kern.

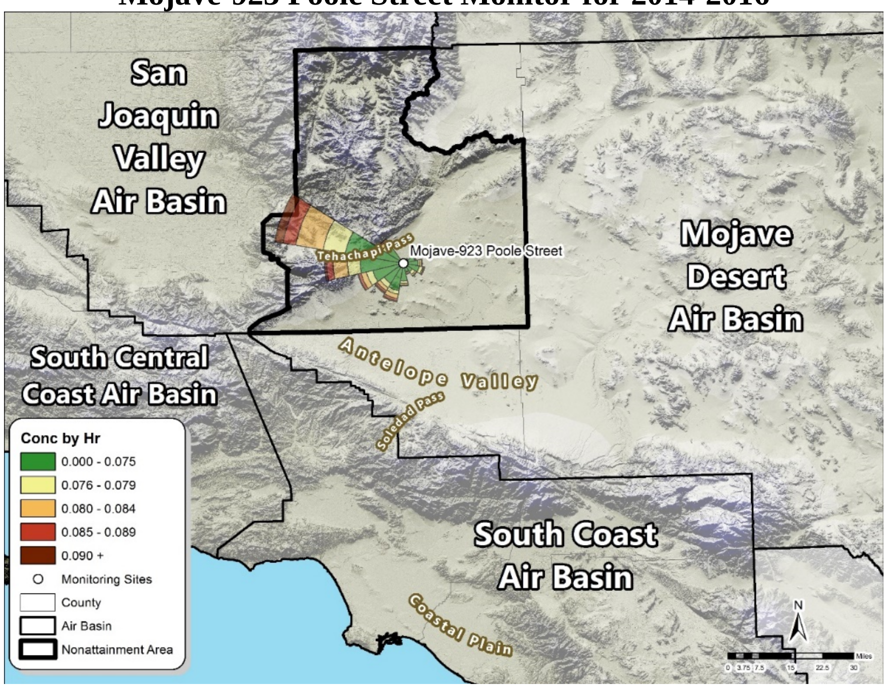
The close proximity of the Mojave-923 Poole Street monitor to the Tehachapi Pass allows it to capture ozone transported into Eastern Kern. However, due to the complexity of the terrain and variations in large-scale weather patterns, there are occasional periods when airflow from the South Coast could influence Eastern Kern. A previous CARB review of Edwards Air Force Base wind data indicated that during the summer months, a convergence of air from the Soledad Pass to the south and air parcels exiting the Tehachapi Pass to the west could occur in the eastern portion of the nonattainment area, potentially resulting in some surface or upper air transport impacts.

The frequency of transport from the San Joaquin Valley to Eastern Kern is evident in the evaluation of pollution roses. Figure 4 shows hourly measurements of ozone concentration and coincident resultant wind direction on all federal 8-hour exceedance days (2014-2016) on a relief map. This map provides a visual representation of the dominance of transport from the San

Joaquin Valley through the Tehachapi pass as compared to the South Coast. These data are from the ARB Air Quality and Meteorological Information System (AQMIS) for the ozone monitor wind instruments at the Mojave-923 Poole Street monitoring site.

Exceedance days in Eastern Kern that are attributable to San Joaquin Valley emissions are generally characterized by afternoon surface winds from the west/northwest, resulting from strong temperature differences between the San Joaquin Valley and the desert. The pollution/wind rose in Figure 4 shows that the majority of the wind flow on exceedance days is coming from the direction of the southern part of the San Joaquin Valley, giving a clear indication of ozone or ozone precursors transported from the San Joaquin Valley to Eastern Kern through the Tehachapi Pass. Figure 4 also shows that the winds can be from the southwest during periods of higher ozone concentrations, indicating that the South Coast Air Basin may be an ozone source region at times; however, the frequency of winds from this direction is much lower than the San Joaquin Valley (from west and northwest directions).

Figure 4: Exceedance Day Pollution Roses for the Mojave-923 Poole Street Monitor for 2014-2016



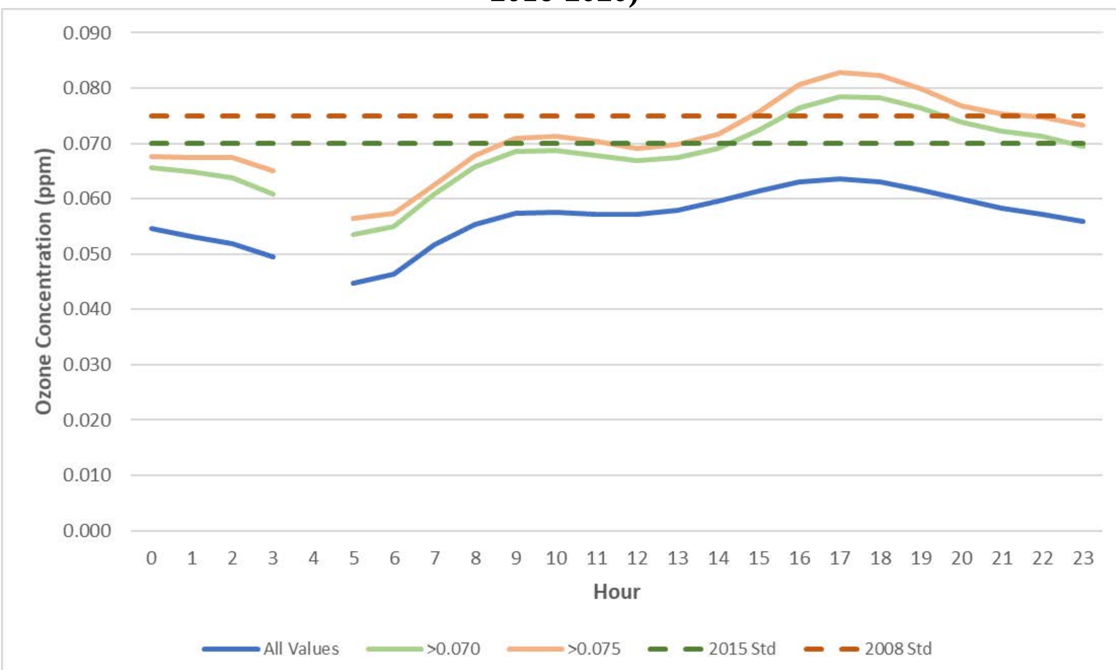
Wind roses represent hourly concentrations on 8 hour ozone exceedance days. Hourly measurements on exceedance days can include both values above and below the standards.

In addition, research has shown that the air masses moving through mountain gaps and passes in Southern California contain multiple, distinct pollutant layers at various altitudes (Smith and Edinger, 1983). As air moves through these gaps and passes at various altitudes, it warms and accelerates. Upon exiting the gaps and passes, the accumulated momentum is depleted causing air masses to slow and disperse. As these layers disperse, transported pollution may become entrained in the near-surface air of downwind areas. Alternatively, air masses can be lofted and transported over mountain peaks into the high desert (VanCuren 2015).

II. Regional Transport

Areas impacted by transport generally show ozone concentrations peaking in the late afternoon or evening. Figure 5 shows the average diurnal pattern for 1 hour ozone concentrations from May-September on all days, days when 8 hour ozone concentrations were above 0.070 ppm, and days when 8-hour ozone concentrations were above 0.075 ppm. The diurnal patterns for all three data sets show the same pattern of a modest morning peak and then a higher peak occurring in the late afternoon/evening. This is unlike typical patterns for photochemical production of ozone from local sources which have one bell curve shaped peak in the early afternoon.

Figure 5: Average Hourly Ozone Concentrations at Mojave-923 Poole Street (May - Sept; 2016-2020)



The profiles at Mojave are indicative of rural, transport dominated monitoring sites where pollutants transported into the area the previous evening remain in place during the morning, leading to ozone formation under a shallow temperature inversion. As the temperatures quickly rise, the mixing depth increases and ozone concentrations remain level or even drop. However, as the heating induces low-level winds to develop, transport from neighboring nonattainment areas move into Eastern Kern producing the second and more significant ozone peak a few hours later.

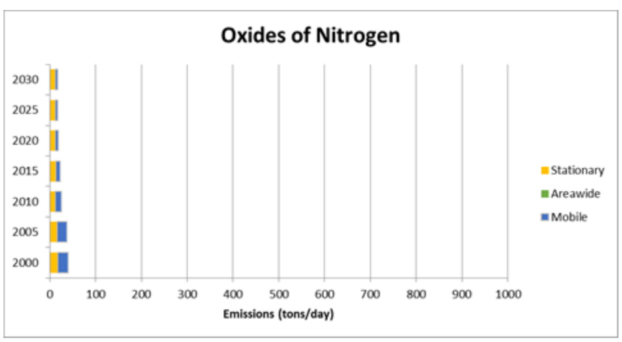
Another factor leading to persistently elevated ozone concentrations at the Mojave-923 Poole Street monitor is the lack of widespread combustion emissions, which would otherwise tend to break down ozone during the nighttime hours when sunlight is not available to drive ozone formation processes. Without the continuous influx of fresh emissions that are emitted in metropolitan areas, ozone concentrations remain high overnight, requiring fewer hours to reach higher concentrations the following day. Because locally generated emissions in Eastern Kern are lower than in neighboring metropolitan areas, the morning peak and early afternoon ozone concentrations at the Mojave monitor are lower than they would be in the metropolitan areas.

III. Regional Distribution of Precursor Emissions

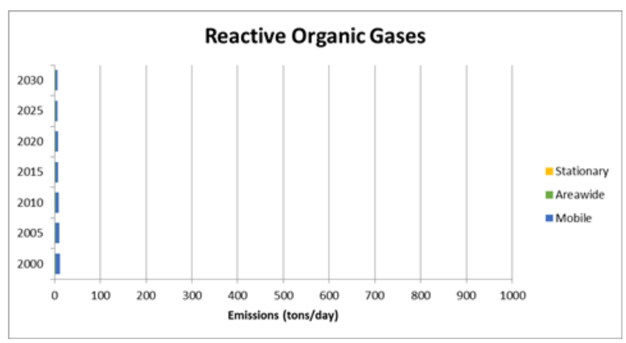
Precursor emissions generated in the San Joaquin Valley overshadow those from Eastern Kern. The emissions inventory, summarized in Figure 6, indicates that the emissions of oxides of nitrogen (NOx) and reactive organic gases (ROG) in Eastern Kern are a fraction of emissions generated in the San Joaquin Valley. Eastern Kern's NOx and ROG emissions in 2021 amounted to only 10 and 2 percent, respectively, of San Joaquin Valley emissions. Additionally, the South Coast surpasses both the San Joaquin Valley and Eastern Kern in terms of emissions. While more transport days are shown to come from the San Joaquin Valley, it is clear that on the minority of days showing transport from the South Coast that this transport comes from an area with higher emissions levels. The difference in emissions between these areas helps explain the important role of transport in Eastern Kern's ozone air quality.

The connection between ozone, a secondary pollutant, and emissions of ozone precursor compounds is characterized by considerable temporal and spatial variability. In general, as air masses travel downwind, entrainment of fresh emissions, atmospheric reactions, depositional processes, and dilution increase the ROG

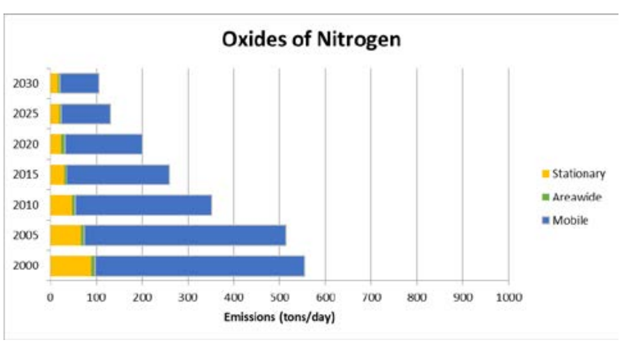
Figure 6: Inventory of Eastern Kern, San Joaquin Valley, and South Coast Emissions by Source Category



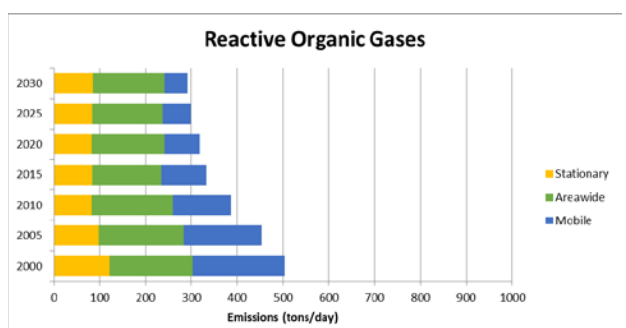
Eastern Kern



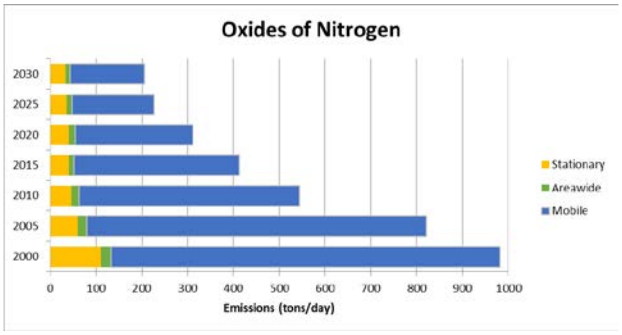
Eastern Kern



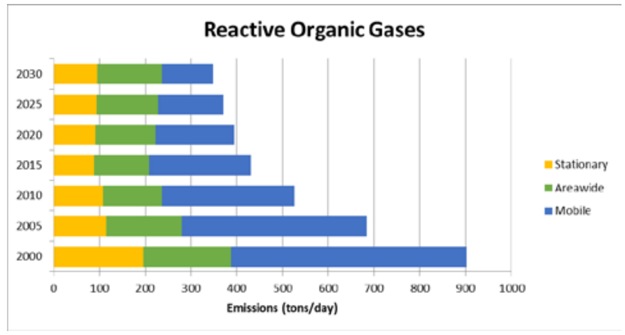
San Joaquin Valley



San Joaquin Valley



South Coast



South Coast

<u>Anthropogenic Emission Trends</u>

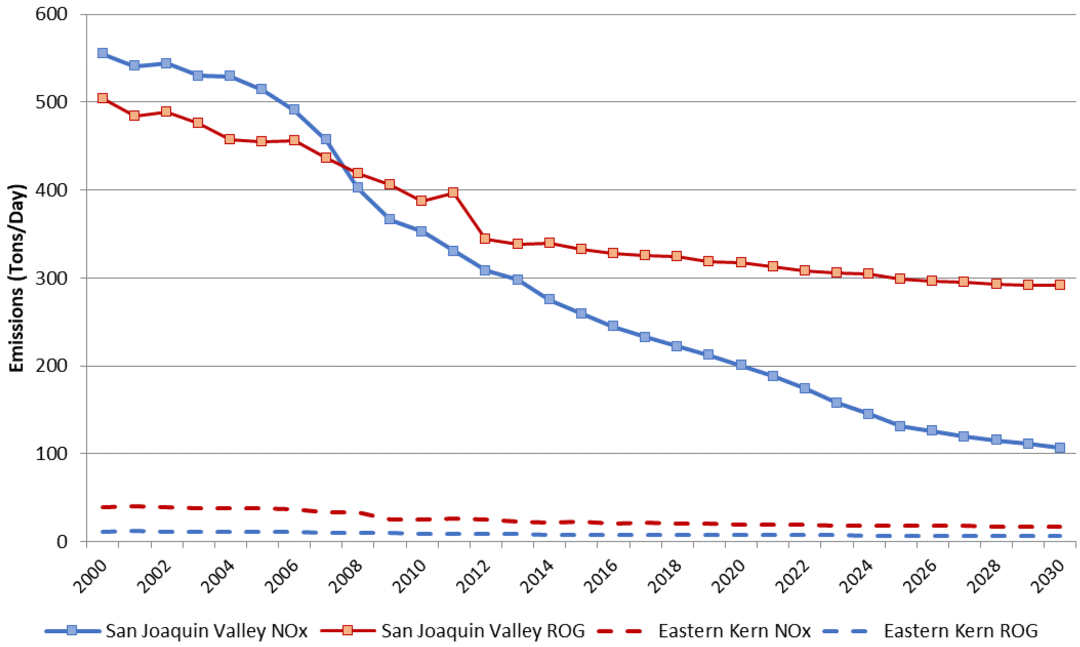
In 2020, NOx summer emissions generated within Eastern Kern were dominated by mineral processes (which includes cement manufacturing), heavy-duty diesel trucks, trains, and manufacturing and industrial. The primary contributing categories of ROG summer emissions within Eastern Kern were aircraft, consumer products, recreational boats, and degreasing. As previously discussed and shown in Figure 7, emissions in Eastern Kern are a fraction of those in the San Joaquin Valley. By comparison, the San Joaquin Valley NOx and ROG emissions are, respectively, 10 and 43 times those in Eastern Kern. It is important to note that a substantial portion of the San Joaquin Valley (60 to 82 percent) and Eastern Kern (87 to 96 percent) ROG emissions come from biogenic sources and when included in comparisons can mask the reductions attributable to emission control programs. As such, statistics in this section only represent anthropogenic sources of precursor emissions[1].

Figure 7 shows the estimated trend in Eastern Kern and San Joaquin Valley precursor emissions from 2000 to 2030. Throughout the San Joaquin Valley, emissions controls have substantially reduced the amounts of both ROG and NOx emitted by various sources. Since 2000, there has been a significant reduction in ozone precursor emissions:

- Total NOx emissions declined by 66 percent, and
- Total ROG emissions declined by 38 percent.

[1] Data source: ARB 2019 Ozone SIP Inventory for summer (Version 1.04 with approved external adjustments)

Figure 7: Eastern Kern and San Joaquin Valley Estimated NOx and ROG Emissions 2000 to 2030 (without biogenics)



In Eastern Kern, NOx and ROG emissions show a slightly downward trend respectively, over the entire period. Similarly, in Eastern Kern since 2000 there has been a reduction in ozone precursor emissions:

- Total NOx emissions declined by 50 percent, and
- Total ROG emissions declined by 38 percent.

However, it is important to keep in mind that estimates for 2026 show NOx and ROG emissions for Eastern Kern still as only 14 and 2 percent, respectively, of the NOx and ROG emissions totals for the San Joaquin Valley.

Local sources of ozone precursor emissions in Eastern Kern have historically been dominated by stationary and mobile sources (see Table 2). These include passenger vehicles, trains, and heavy-duty trucks. However, as federal and State mobile source control programs have been implemented, stationary sources are emerging as an increasingly significant portion of NOx emissions in Eastern Kern. As show below, beginning around 2015, stationary NOx surpassed mobile sources as the dominant source of NOx and has become a larger share of the District's NOx emissions as mobile sources continue to decline.

While San Joaquin Valley emissions continue to overwhelm the area, it is important to keep local emission sources and reductions in mind to ensure continued progress. Currently, the District is updating three RACT rules covering organic solvents, aerospace assembly and coating, and polyester resin. Emission reductions from these three updates are estimated to reduce ROG around 73 tons per year.

Table 2: Eastern Kern Emissions Totals in tons/day (2000-2030)

	2000	2005	2010	2015	2020	2025	2030
NOx							
Stationary	17.371	15.659	11.430	12.662	11.962	12.372	12.298
Areawide	0.121	0.155	0.136	0.111	0.124	0.125	0.128
Mobile	22.095	21.675	13.938	9.505	7.114	5.393	5.062
Total	**39.587**	**37.490**	**25.504**	**22.278**	**19.200**	**17.890**	**17.487**
ROG							
Stationary	1.090	1.126	1.279	1.078	1.392	1.472	1.520
Areawide	1.257	1.238	1.089	1.099	1.176	1.175	1.240
Mobile	9.398	8.651	7.026	5.747	4.842	4.386	4.048
Total	**11.745**	**11.015**	**9.395**	**7.924**	**7.410**	**7.034**	**6.807**

* Data from CEPAM: California 2019 Ozone SIP Baseline Emission Projections -
Version 1.04 Eastern Kern Nonattainment Area Tool

Wildfire Impacts

As with the rest of the State, Eastern Kern has been impacted by wildfires both near and far. Due to heavy fuel load throughout the State along with exceptionally dry conditions stemming from years of drought, the State has seen the numbers and severity of fires increasing. Modeling has utilized information submitted to them regarding fires in the vicinity of the monitor to remove those days which were impacted by smoke and thus were likely not representative of current anthropogenic ozone trends. The removal of those dates resulted in modified fourth high and thus modified design values as shown in the ozone portion of this document.

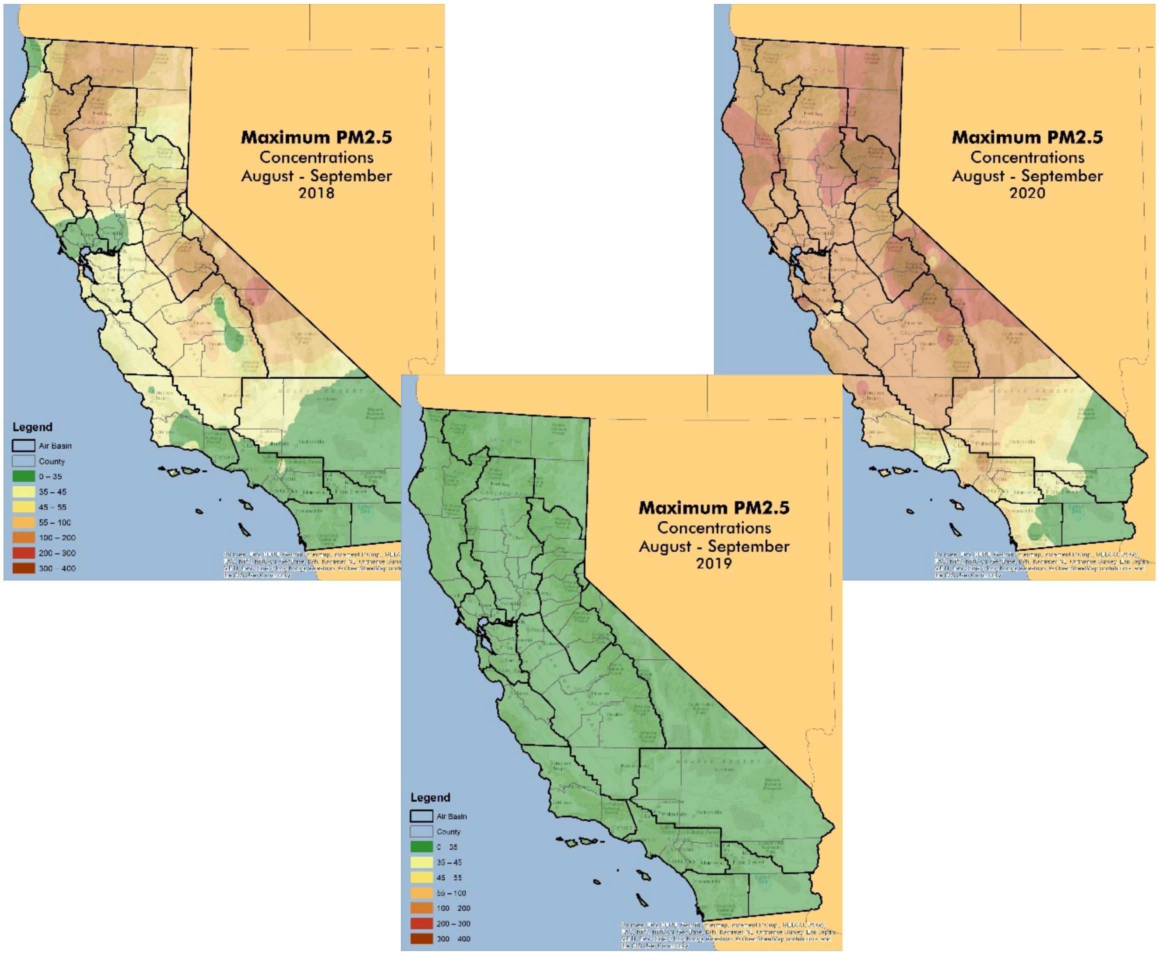
Table 3 contains a list of fires in the vicinity or upwind of the monitor during or preceding the impacted dates which were removed from modeling calculations.

Table 3: List of Large Fires in Close Proximity and Upwind of Mojave Site on Affected Dates

Name	Acreage	Start Date	Distance (miles)	Direction*	Latitude	Longitude
Stone	1352	6/4/2018	36	SW	34.54860	-118.31138
Breckenridge	993	7/27/2018	44	NW	35.38741	-118.81793
Tarina	2950	8/3/2018	45	NW	35.37444	-118.83556
Stagecoach	7760	8/3/2020	34	NW	35.43044	-118.53361
Lake	31089	8/12/2020	31	SW	34.67900	-118.45200

In exceptional events demonstrations submitted to U.S. EPA, fires from hundreds of miles away have been shown to have impacts on transported ozone precursor emissions, and the resultant ozone formation, in downwind communities due to the airflow dynamics related to fires and their ability to send precursor emissions high into the atmosphere and transport them aloft for hundreds of miles. Below are three maps showing the wildfire impacted years of 2018 and 2020 as well as the relatively wildfire free intervening year of 2019. This juxtaposition makes it clear that despite how relatively small the actual wildfire acreage footprints can be, compared against the entirety of California, just how widespread their impacts can be felt.

Figure 8: PM2.5 Contour Maps of Maximum Concentrations August-September of 2018, 2019, and 2020

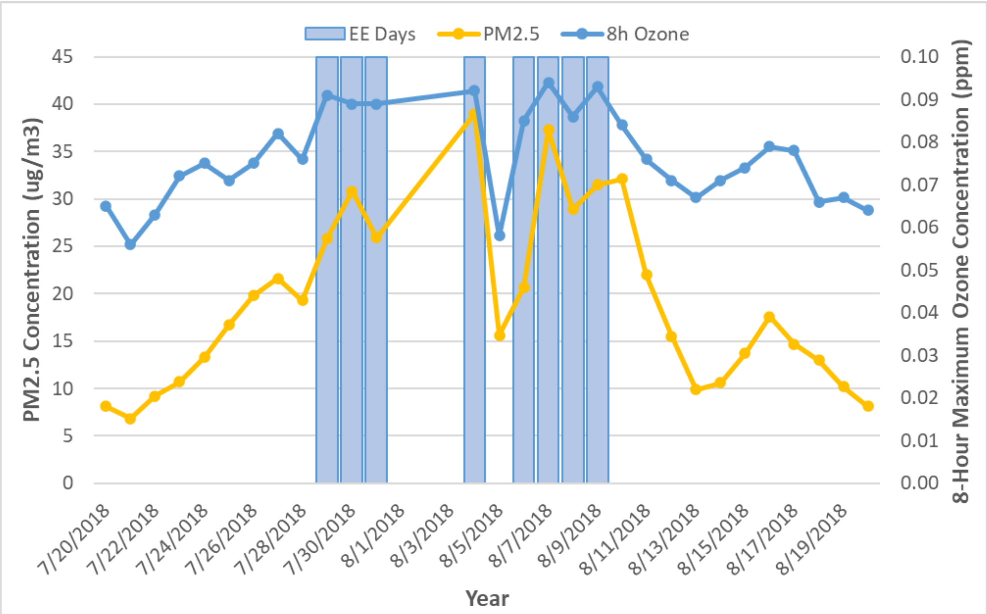


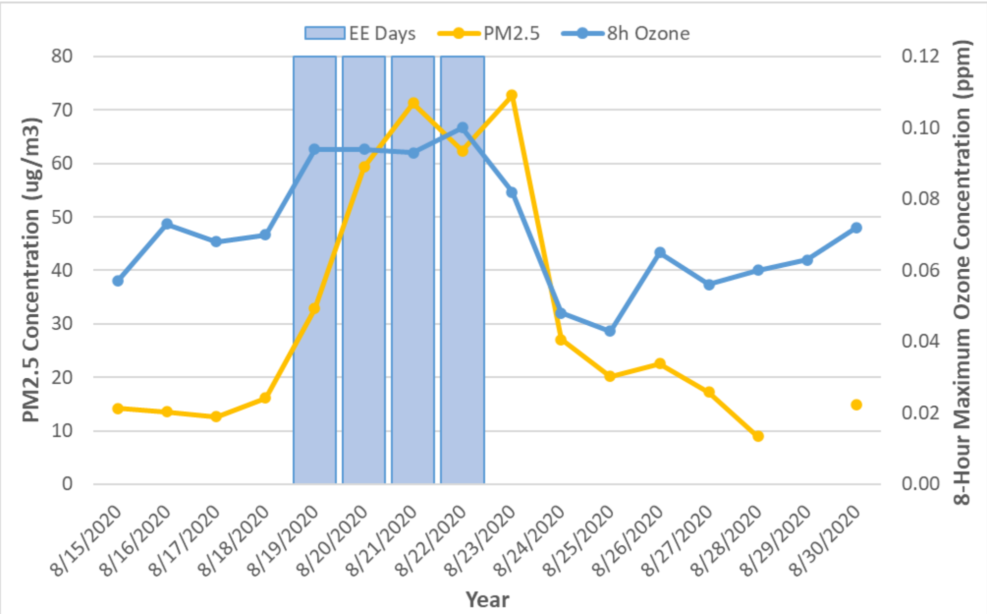
During a normal year with no wildfire impacts, such as in 2019, August and September are normally the cleanest months for PM2.5. Conversely, large wildfires occurring in both 2018 and 2020 resulted in significant impacts across the majority of California. As shown here, wildfire smoke contributed to higher concentrations and exceedances across much of California in 2018, while even worse in concentrations and coverage in 2020.

In the first few weeks of the firestorm in August 2020, about half of California's population — an estimated 19.6 million people — experienced levels of fine particulate matter exceeding national ambient air quality standards. By the end of September, the smoke had spread across Southern California and to nearly every corner of the state, with almost 95 percent of Californians exposed to unhealthy pollution levels.

Figure 9 contains plots of the ozone and PM2.5 trends for periods containing the days in question. These days include 7/29-7/31/2018, 8/4/2018, 8/6-8/9/2018, and 8/19-8/22/2020. As the time series plots indicate, the dates removed have exceptionally high PM2.5 values and correlating high ozone values that increase on the same days. These days have been found to have strong connections to the related ozone exceedances and occur during or after the wildfires listed above. The peak PM2.5 value at Mojave for 2018 outside of the related period was 22 ug/m3 and on the days removed for 2018, 138 of the hourly values were above that maximum. The peak PM2.5 value at Mojave for 2020 outside of the related period was 27.1 ug/m3 and on the days removed for 2020, 79 of the hourly values were above that maximum.

Figure 9: PM2.5 and 8-Hour Ozone Concentrations for the Time Periods Containing the Removed Ozone Values

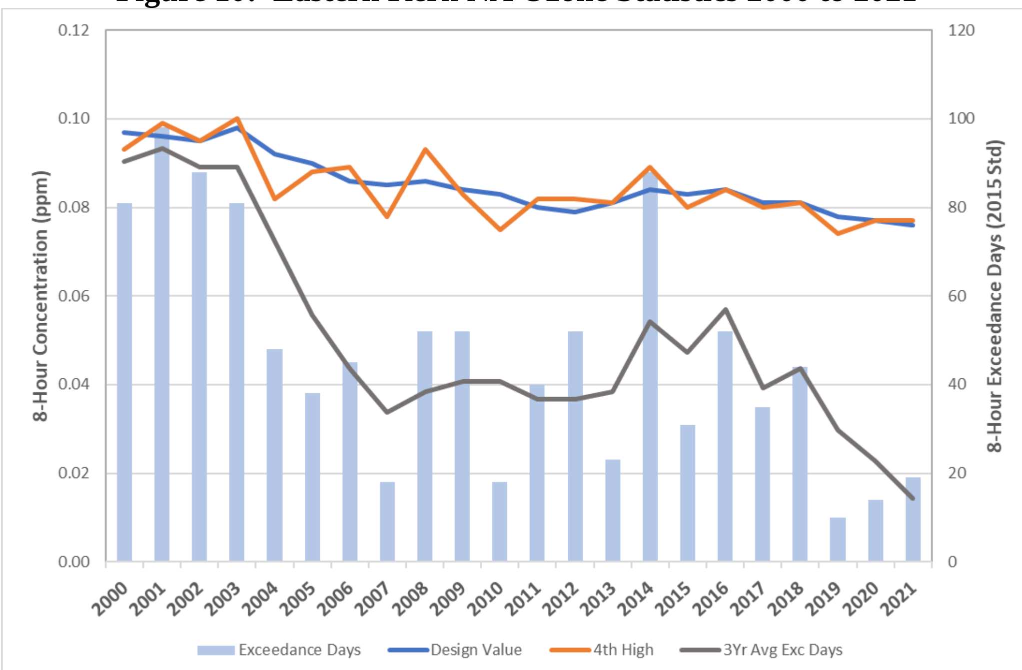




Ozone Air Quality

Long-term ozone trends from 2000 to 2020 indicate progress has been achieved in Eastern Kern. Preliminary design values and certain statistics for 2021 have been included where feasible. The adjusted 2021 design value of 0.076 ppm is about nine percent above the level of the 0.070 standard. By comparison, the 2000 design value (0.097 ppm) was nearly 39 percent above the 0.070 standard. As shown in Figure 10, adjusted design values have declined by nearly 22 percent from 0.097 ppm in 2000 to 0.076 ppm in 2021. During this same period, the adjusted 4th highest concentration has declined by 17 percent.

Figure 10: Eastern Kern NA Ozone Statistics 2000 to 2021



Identified Wildfire Impacted Days Removed.

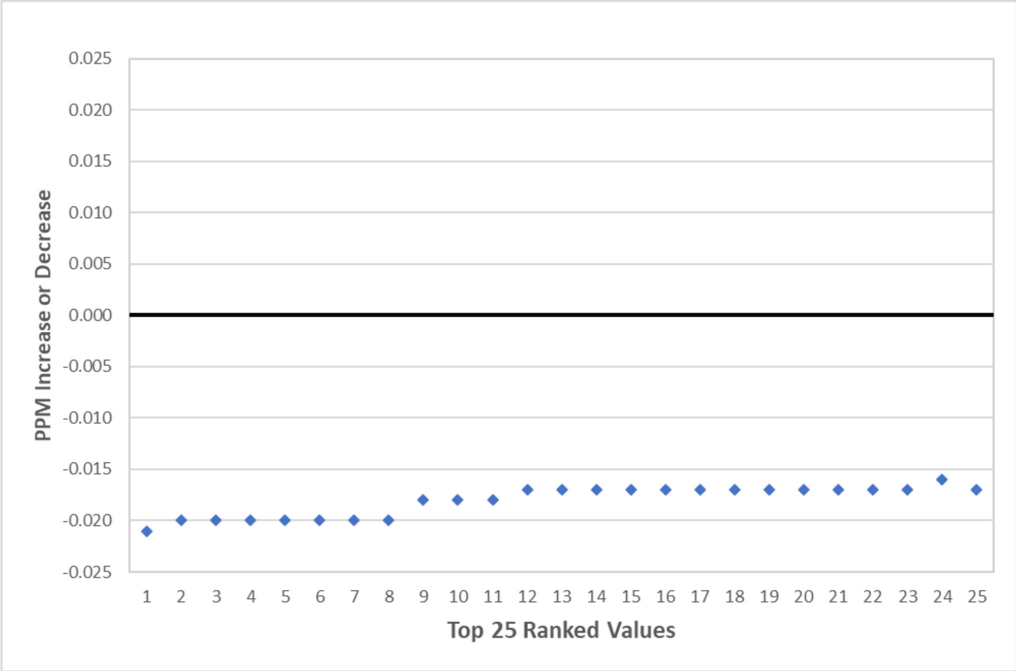
I. Top 25 Analysis

To complement the design value and exceedance day analyses which indicate an improvement in air quality from 2000 and 2020, the top 25 daily maximum 8 hour average ozone concentrations in 2018-2020 were ranked and compared to those measured in 2000-2002.

The comparison of ranked values provides insight as to the extent to which the highest ozone concentrations are responding to control measures over time without relying on any assumptions regarding the distribution of the data. In Figure 11, markers below the line indicate that 2018-20 ranked concentrations were lower than the corresponding 2000-02 ranked concentrations. Analyses indicate that concentrations across the range saw decreases in 2018-2020 as compared to 2000-2002.

It is important to keep in mind that while the data does indicate that the top 25 values in 2018-2020 were consistently lower than the 2000-2002 values, there were no days of those top 25 values in which concentrations fell below the 0.070 standard for the six years analyzed and only four days which concentrations were at or below the 0.075 standard.

Figure 11: Comparison of Top 25 days in 2000-02 and 2018-20 Eastern Kern NA



II. Spatial Distribution of Concentrations

To evaluate changes in distribution of ozone, spatial analysis tools were used to plot design values by year to determine trends in Eastern Kern and surrounding areas. These analyses (Figure 12) show that between 2000 and 2020, the concentrations within Eastern Kern and in the surrounding areas, which are the primary transport contributors (San Joaquin Valley and South Coast), decreased significantly. Eastern Kern has seen a reduction in their design value between 2000 and 2020 of nearly 21 percent, during this same time the San Joaquin Valley has seen a 16 percent reduction and the South Coast has seen a 22 percent reduction. The progress in these upwind areas continues to be integral to the continuing progress in areas downwind of their transport.

However, despite the clear improvements in ozone concentrations, the nonattainment area continues to exceed both the 0.075 and 0.070 ozone standards. These maps again highlight the challenge of transport from the San Joaquin Valley and South Coast.

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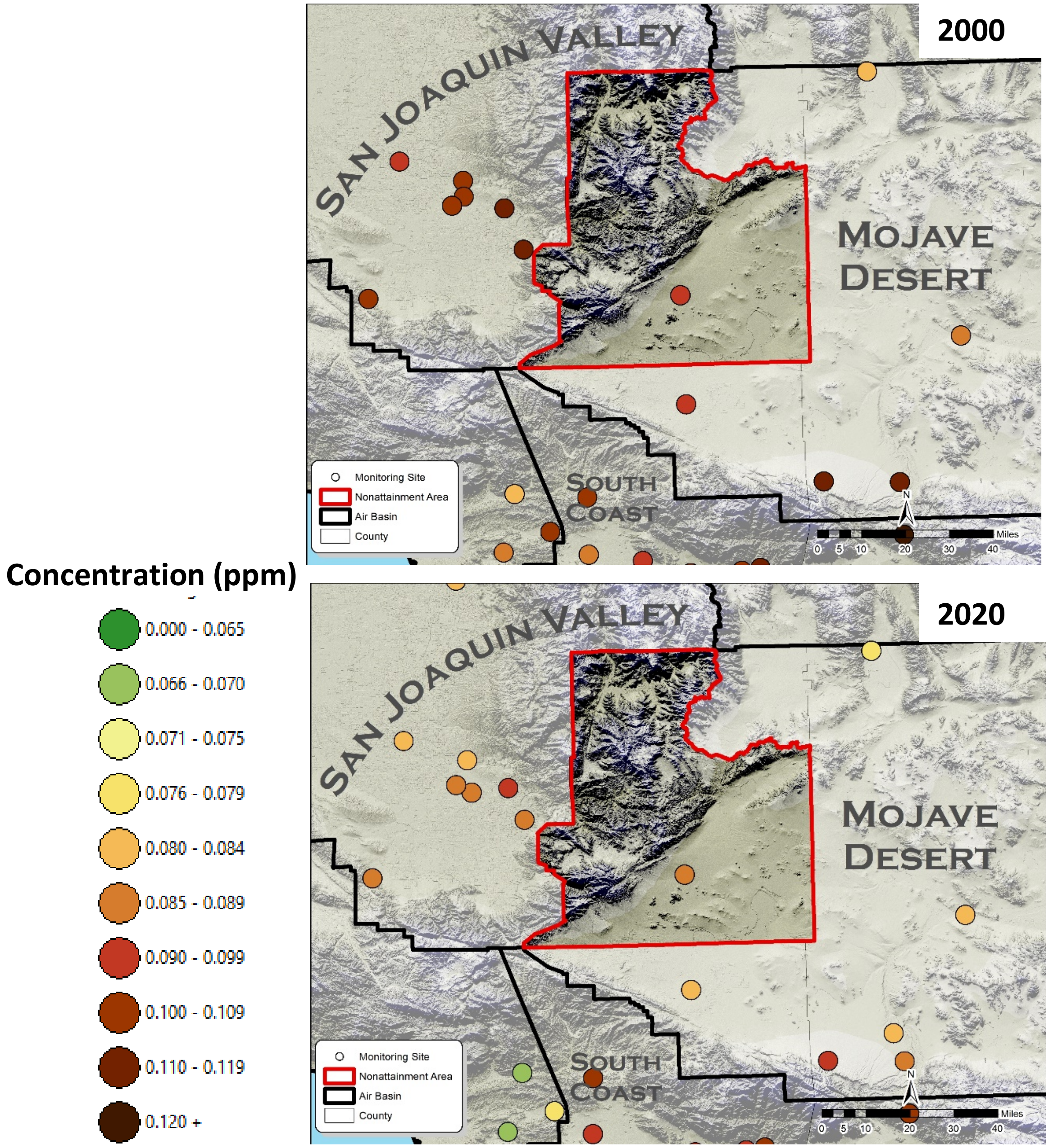
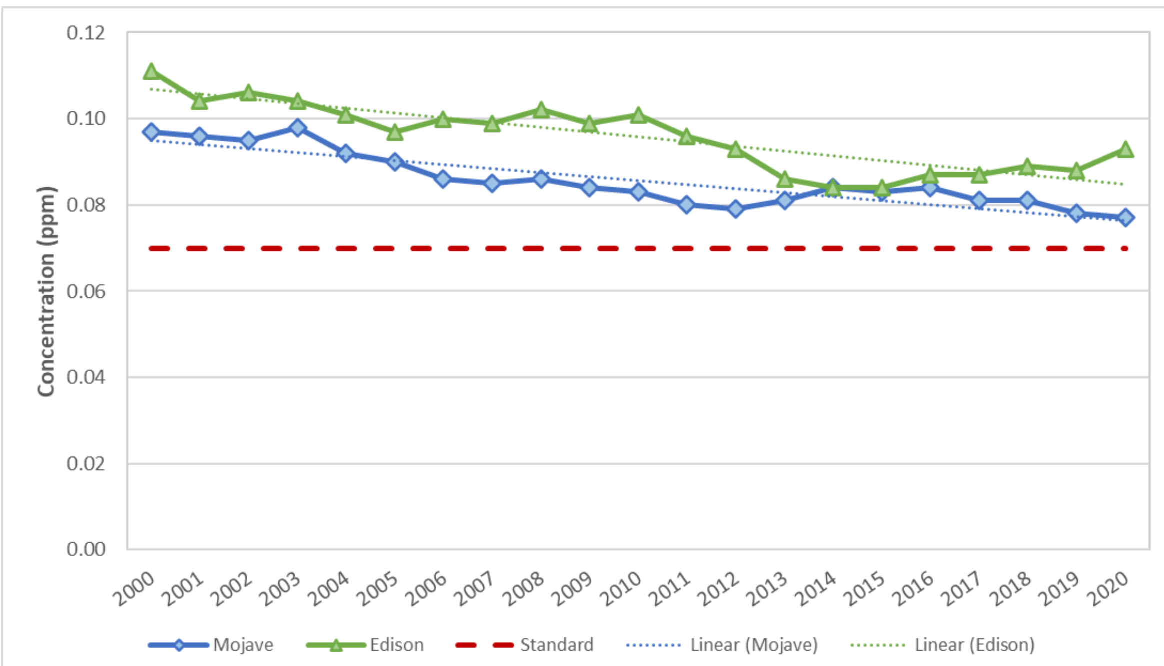
Figure 12: Concentration Dot Maps Representing the Spatial Distribution of Ozone Air Quality in Eastern Kern and Surrounding Areas (2000 & 2020)



III. Upwind and Downwind Trends

Design values were compared between upwind and downwind sites to confirm that progress in the San Joaquin Valley was translating to similar progress in Eastern Kern. Figure 13 shows the design value trends and linear trend lines for Edison in the San Joaquin Valley and Mojave-Poole in Eastern Kern. As shown, overall the linear trend for both sites shows a similar path towards the 0.070 standard. Design values at the two sites generally track each other over time given the complex nature of the ozone problem and potential for transport contributions from the South Coast. Only in the past four or so years can a divergence be seen as Mojave continues a downward trend and Edison starts trending upwards. Some of this divergence might be due to wildfire days not being removed from the Edison site, but likely not all of it due to the divergence starting in 2016.

Figure 13: Ozone Design Value Trends in Edison and Mojave Sites
8-hour Ozone Design Values 2000 – 2020



A notable difference between sites is that the Edison site saw a reduction in the design value of 16 percent over 20 years, as compared to nearly 21 percent for Mojave. The Edison site's smaller decrease might reflect the aforementioned recent uptick in design values, potentially driven by increasingly serious wildfire seasons and the related impacted days. The Mojave design values which include the years 2018 or 2020 reflect the removal of dates in those years identified as smoke impacted and adjustment of the 4th high value used to calculate the design value.

WOE

IV. Ozone Air Quality Summary

Based on ozone air quality trends, there has been measurable progress towards meeting both the 0.075 and 0.070 8-hour ozone standards. Eastern Kern's future progress towards these standards is linked to the upwind areas surrounding it and their progress in making significant reductions and ensuring Eastern Kern has a path towards attaining the standards. Recent design values for 2019 and 2020 are more than 10 percent above the 0.070 standard (0.078 in 2019 and 0.077 in 2020) and the magnitude of exceedance days (18) represents a challenge that cannot be addressed in the four year time period given the current classification (0.070 standard).

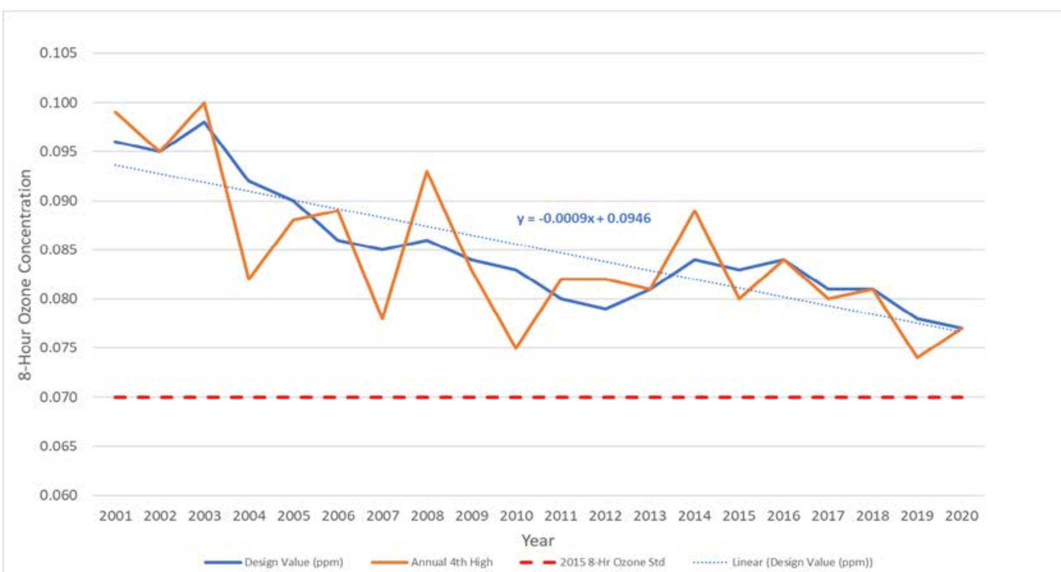
Attainment Projections

Currently, Eastern Kern has an attainment deadline of 2026 for both the 0.075 and 0.070 standards. After reviewing air quality trends, given recent measurements, a 2026 attainment (0.070 standard) would be very unlikely and that a 2032 attainment date would be much more feasible for the 0.070 standard.

The District is requesting as a part of the SIP that U.S EPA classify Eastern Kern from serious to a severe classification with a 2032 attainment deadline for the 0.070 ozone standard. An analysis of photochemical modeling, discussed later in this document, combined with ozone air quality data demonstrates that attainment by 2026 for the 0.075 standard and 2032 for the 0.070 standard is feasible.

Figure 14 includes a 20-year trend in 8-hour design values and includes the adjusted 2018 and 2020 fourth high values and the related effects on the design values calculated using them. These values and the resulting trend, lead to a formula predicting a design value of 0.075 ppm by 2023 and a design value of 0.070 ppm by 2029. This contrasts with a similar trend which did not account for fire days and which resulted in a predicted design value of 0.075 ppm by 2026 and a design value of 0.070 ppm by 2033. Indicating how important it is to quantify the impacts of the increasing severity and number of wildfires in and around California.

Figure 14: Ozone Design Value and Fourth High Trends at Mojave Site, Including Design Value Trendline and Formula



CARB modeling used an observation and relative response approach to determine future design values at the Mojave site for both 2026 and 2032. Table 4 shows that attainment by 2026 (0.075 standard) and 2032 (0.070 standard) are achievable. CARB modeling used a weighted 2018 base year design value which accounted for the effects of the pandemic by using the average of the fourth high for 2018 and 2019 to fill in for the 2020 value. This modeling projected a 0.074 ppm 2026 design value and a 0.069 ppm 2032 design value.

Table 4: ARB Modeling Design Value Projections

Site Name	ARB Modeling 2026 (ppm)	ARB Modeling 2032 (ppm)
Mojave-923 Poole Street	0.074	0.069

Summary

This Weight of Evidence evaluation comprises a set of analyses that provide support for attainment. The District has requested to be classified by the U.S. EPA as a severe nonattainment area for the 0.075 and 0.070 federal 8 hour ozone standards, with attainment deadlines of 2026 and 2032 respectively.

Ozone concentrations in Eastern Kern are overwhelmed by the transport of pollutants and precursor emissions, primarily from the San Joaquin Valley. Therefore, attainment in Eastern Kern relies primarily on emission reductions occurring from statewide measures, as well as local measures in the upwind areas. It also cannot be understated the impact more severe wildfire events, as well as their associated emissions, will have and have already had in districts across this State.

Based on the supporting analyses completed as part of this WOE evaluation, attainment of the 0.075 and 0.070 8-hour ozone standards by 2026 and 2032 respectively, can be supported due to the following factors:

- Eastern Kern is bordered by two extreme nonattainment areas: the San Joaquin Valley and the South Coast. Complex terrain, the regional distribution of emissions, and persistent summertime winds blowing from the San Joaquin Valley into Eastern Kern, via the Tehachapi Pass, result in transport playing a fundamental role both in Eastern Kern's ozone problem and its attainment strategy. Transport from the South Coast, through the Soledad Pass, can also contribute to the ozone problem in Eastern Kern. However, only a limited quantity of the overall emissions produced in the South Coast Air Basin flow through this pass. Past and current analyses show that transport from the San Joaquin Valley is dominant on many more days than that from the South Coast.

- Local emissions of ozone precursors declined significantly between 2000 and 2021. Total NOx emissions declined by 50 percent and ROG emissions by 38 percent. Local emissions, however, are much lower than emissions in the upwind San Joaquin Valley and South Coast. ROG and NOx emissions in comparison with Eastern Kern are eight percent of San Joaquin Valley emissions and five percent of South Coast emissions.

- Long-term trends demonstrate that ozone air quality has improved in Eastern Kern. Between 2000 and 2020, the adjusted design value decreased by nearly 20 percent, the adjusted fourth high concentration by 17 percent, and averaged exceedance days were cut by over three quarters, declining from 81 to 14. Average peak concentrations are lower in 2020 when compared to the year 2000.

- Air quality progress to date is not sufficient to attain the 0.070 standard by 2026. The 2020 design value was 10 percent above the 0.070 standard and both the design value trend and modeling point to attainment by 2026 as not achievable. In addition, although peak concentrations have declined since 2000, the majority of these concentrations are still greater than 0.070 ppm.

- The San Joaquin Valley is the primary transport contributor to Eastern Kern. An analysis of design value trends in the upwind San Joaquin Valley and Eastern Kern indicates that progress in Eastern Kern has tracked with progress in the San Joaquin Valley for the most part.

- Significant further emission reductions in the San Joaquin Valley are projected to provide for attainment in the San Joaquin Valley by 2037. These emissions reductions will also help with attainment in downwind areas including Eastern Kern. Ozone levels in Eastern Kern are not as high as those in the San Joaquin Valley, thus the quantity of emissions reductions needed for attainment in the Eastern Kern is not as great.

Taken together, the results from all of these analyses indicate that the Eastern Kern ozone nonattainment area can expect to show attainment of the 0.075 standard by 2026, the required attainment date for severe nonattainment areas for the 2008 8-hour ozone Standard. Additionally, the Eastern Kern Nonattainment Area can expect to show attainment of the 0.070 standard by 2032, the required attainment date for severe nonattainment areas for the 2015 8-hour ozone Standard.

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