



Technical Evaluation of Sensor Technology (TEST) Program

*Aeroqual Series 500 Sensor
2021 – 3rd Quarter
Final Report*



Introduction and Sensor Profile

This analysis report is focused on assessing the performance of the Aeroqual sensor as part of the District's Technical Evaluation of Sensor Technology (TEST) Program. Between June and July 2019, the District installed three Aeroqual Series 500 sensors at the Clovis-Villa air monitoring site for the purpose of testing the Aeroqual sensor in the San Joaquin Valley by comparing the performance of the collocated Aeroqual sensor to the Federal Equivalent Method (FEM) ozone analyzer. The data sets analyzed for this report compare ozone data collected from the Aeroqual sensors and the Teledyne T265 FEM analyzer collocated at the regulatory air monitoring site. The scatter plots and time series graph below show how the hourly datasets compare for this period.

Background and Approach of Evaluation Test

In June 2019, one Aeroqual Series 500 sensor (Aeroqual1) began operating at the San Joaquin Valley Air Pollution Control District (District) Clovis air monitoring site to compare the sensor performance to the regulatory gaseous analyzer at the site. At the end of July, two more Aeroqual sensors (Aeroqual2 and Aeroqual3) began operating at the Clovis site. The data sets analyzed for this report compare O₃ data collected from all three Aeroqual Series 500 sensors with the Teledyne T265 Federal Equivalent Method (FEM) monitor at the Clovis air monitoring site. The scatter plots and time series graphs below show how the datasets compare for hourly values.

Overview of Analysis Findings from Current Period

The analysis for this report covers the time period of July 2021 through August 2021 (2021 - 3rd Quarter). The last valid data that Aeroqual recorded was on August 20, 2021 when the instrument was removed from the site. During this period, hourly data was removed from the calculation of bias and average concentrations when either the Aeroqual sensor or regulatory analyzer did not have a valid hourly sample. For the scatter plots and line graph, all available data are shown.

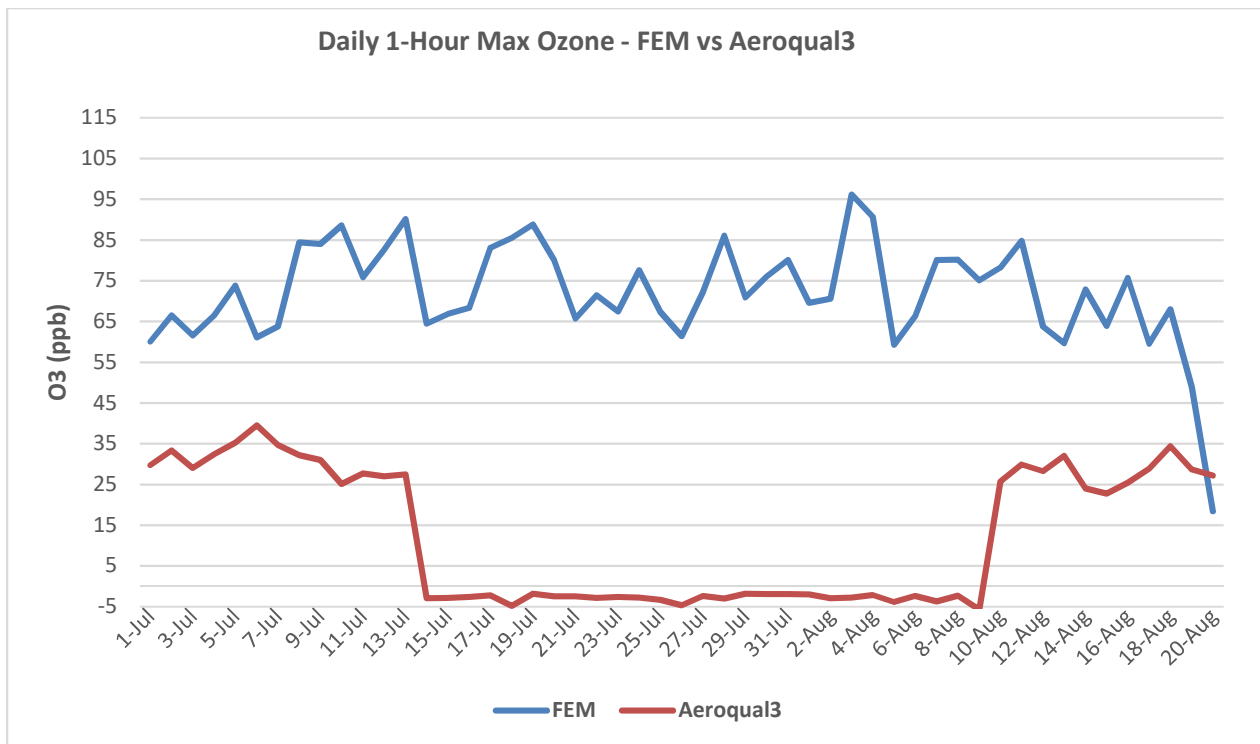
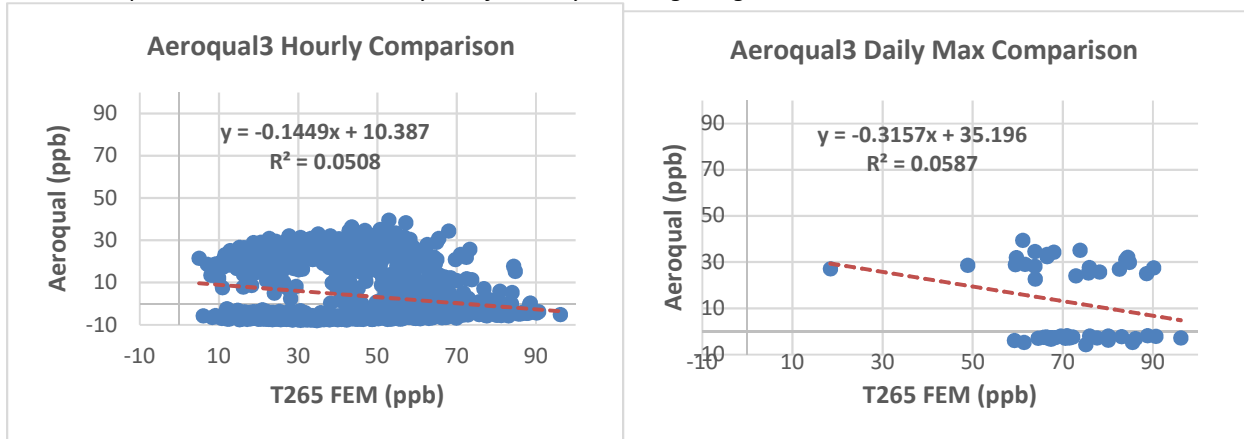
The 3rd quarter of 2021 was essentially dominated by high pressure systems that produced numerous days of triple digit temperatures, and poor dispersion across the Valley. Monsoonal moisture also streamed into California and produced thunderstorms that caused wildfires to erupt in the northern California and Sierra Nevada mountains. Wind flow patterns and strong temperature inversions associated with the high pressure systems exacerbated smoke impacts in the Valley. There were brief periods of cooling and improved dispersion conditions that infiltrated the Valley when low pressure systems moved through the Pacific Northwest during August.

Sensor Specific Analysis of Aeroqual Sensor Performance

Aeroqual3

For the hourly ozone value, the Aeroqual sensor had a 43.1 ppb low bias and the max daily ozone had a 59.6 ppb low bias during the 3rd quarter 2021 period. Due to the instrument beginning to malfunction, the Aeroqual3 had intermittent data throughout the quarter, until it finally stopped working on August 20, 2021. Data used in this analysis is from July 1 through August 20, 2021.

Note: Aeroqual3 data used in this analysis is from July 1 through August 20, 2021.



Non-Reporting Analyzers

Aeroqual1 and Aeroqual2

Data from these sensors was not available for the July 1, 2021, through September 30, 2021, period. The Aeroqual2 sensor experienced a device failure and was removed from the site on December 8, 2020. The Aeroqual1 sensor experienced a device failure and was removed from the site on April 8, 2021.

Statistical Summary

The following table provides a statistical summary of the ozone data collected during the analysis period of this report.

Clovis-Villa	Average 1-hr	Max 1-hr	1-hr R2	1-hr Slope	1-hr Intercept	Max R2	Max Slope	Max Intercept
Aeroqual3	3.6	39.5	0.0508	-0.1449	10.387	0.0587	-0.3157	35.196
FEM	46.7	96.2						