



Technical Evaluation of Sensor Technology (TEST) Program

*Aeroqual Sensor
2019 – 3rd Quarter*



Introduction and Sensor Profile

This analysis report is focused on assessing the performance of the Aeroqual sensor as a part of the District's Technical Evaluation of Sensor Technology (TEST) Program. Using interchangeable sensor heads, the Aeroqual sensor is capable of measuring particulates or 17 different gases. Only ozone (O₃) is measured for this analysis using the Series 500 0-500 ppb range sensor head. The ozone sensor head uses an active flow and sample control system using Gas Sensitive Semiconductor (GSS) technology. The Aeroqual sensor also measures temperature and relative humidity.

Background and Approach of Evaluation Test

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 Series 500 sensor in the San Joaquin Valley and 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.

Overview of Analysis Findings from Current Period

The analysis for this report covers the time period of July 2019 through September 2019 (2019 – 3rd quarter). During this this period, hourly data was removed from the calculation of bias 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.

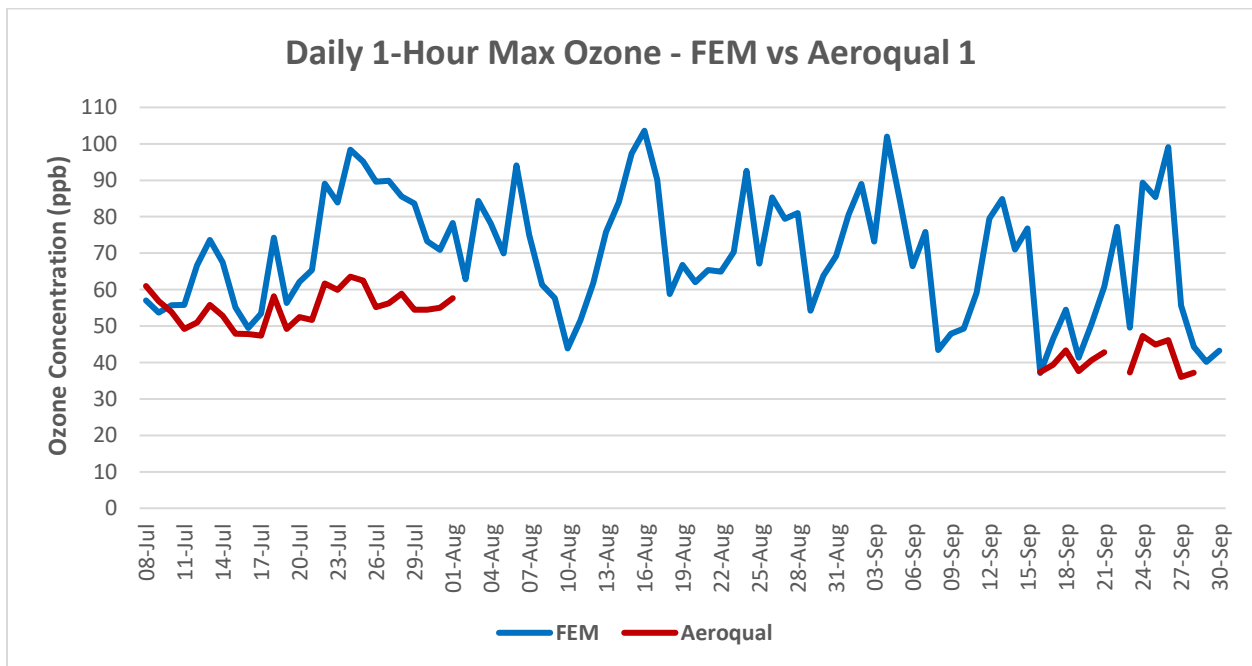
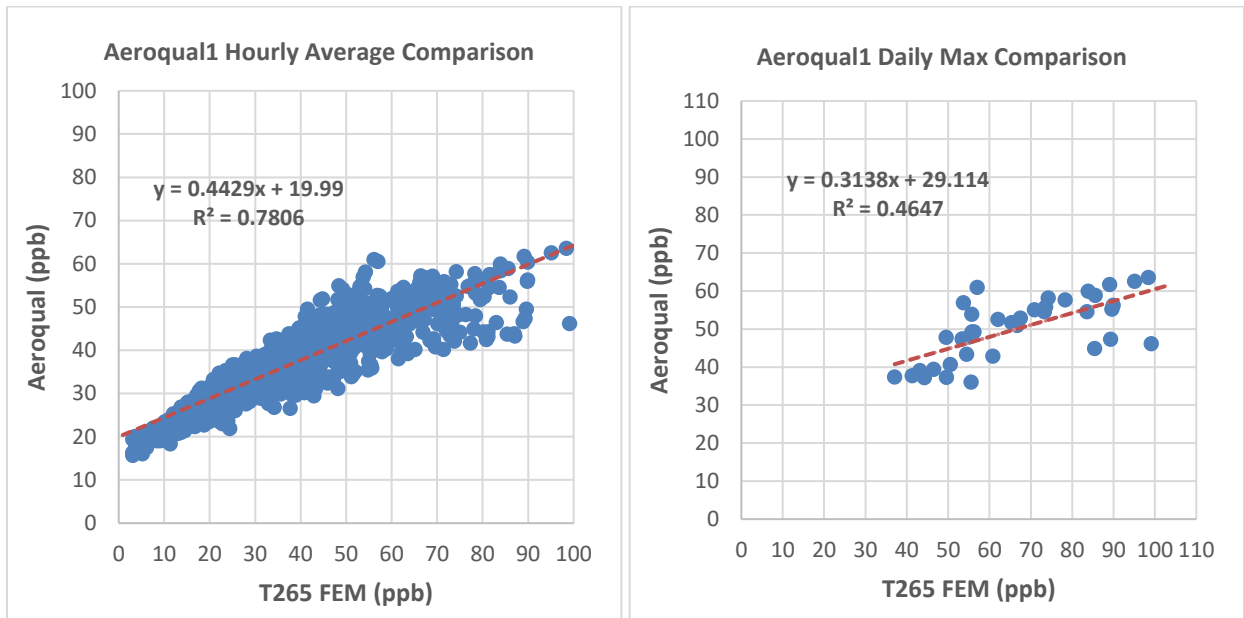
From July through September 2019, high and low pressure went back and forth to dominate the weather over the region. The low pressures that entered the region were dry, so little precipitation fell across the SJV; however, marine air was pushed into the Valley and allowed for cooler temperatures and reduced ozone concentrations.

The Aeroqual2 and 3 sensors were placed into sampling mode starting at the end of July. Data from all three Aeroqual sensors were intermittent during this time period due to unidentifiable issues with the analyzers. Multiple days of no data from the Aeroqual sensors are shown in each graph below. The Aeroqual data was biased lower than the District's regulatory data during this period.

Site Specific Analysis of Aeroqual Sensor Performance

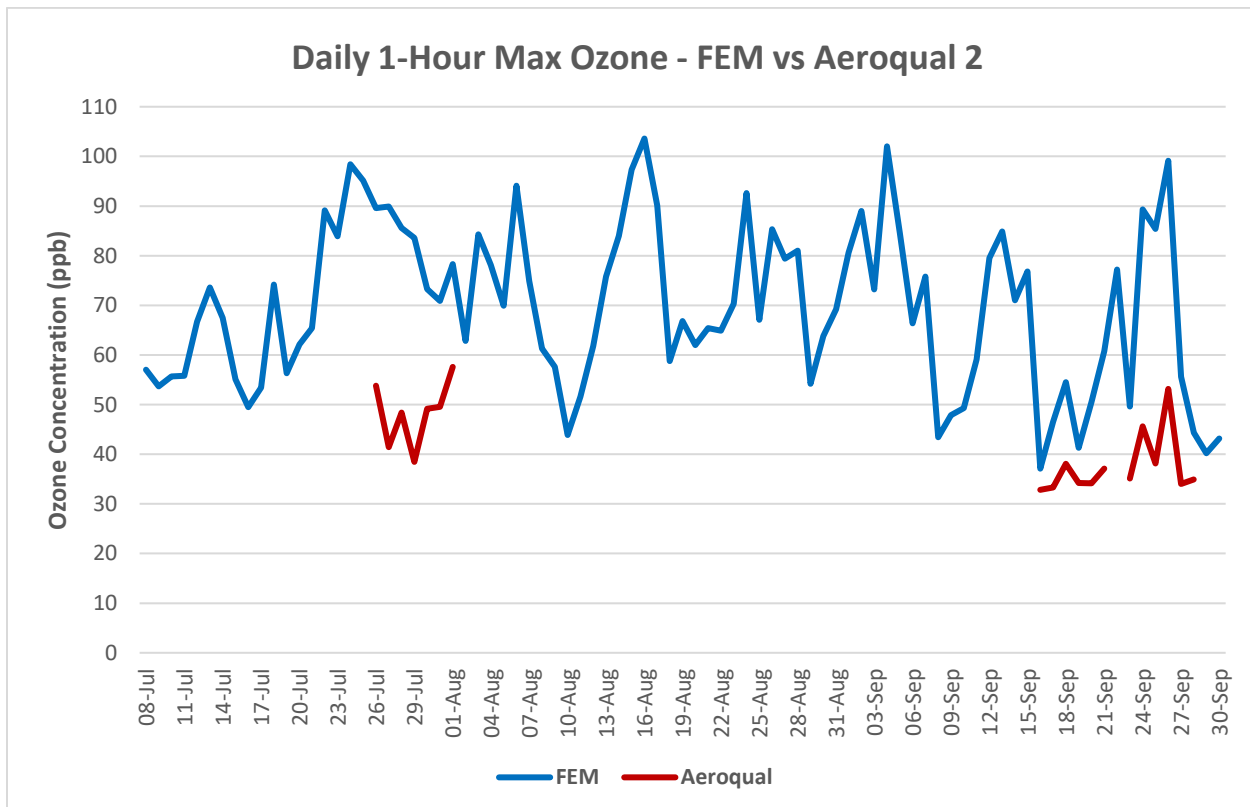
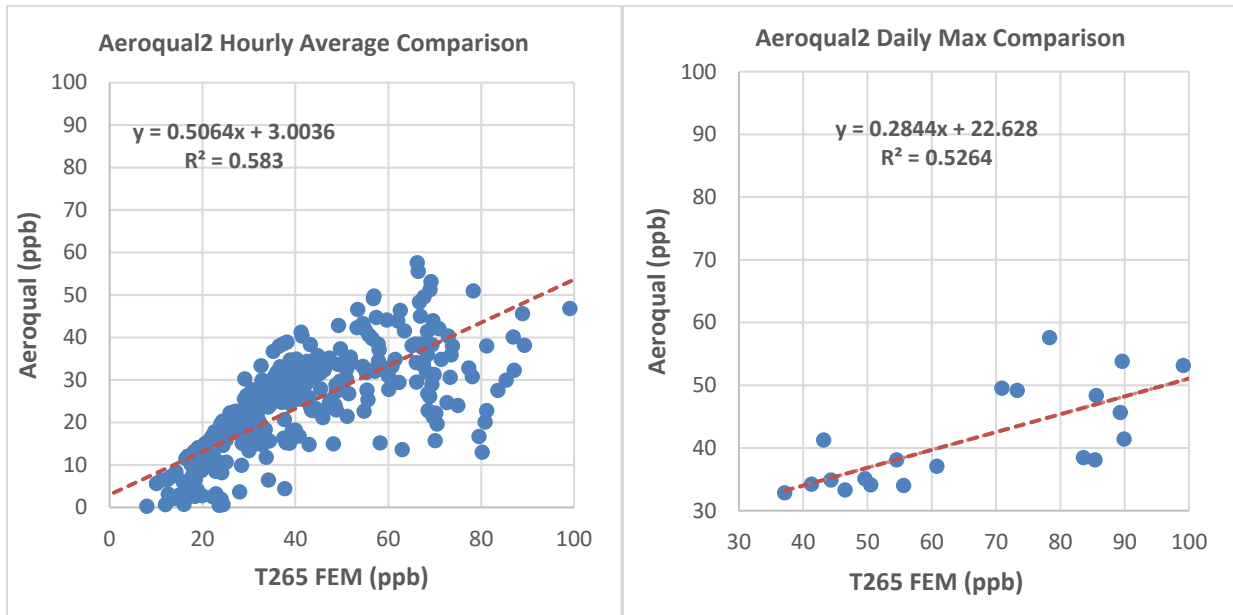
Aeroqual 1

For the hourly ozone averages, the Aeroqual sensor had a 3.4 ppb low bias during the July 1 through September 30, 2019 period. For the daily 1-hour ozone max, Aeroqual had a 16.8 ppb low bias during the July 1 through September 30, 2019 period.



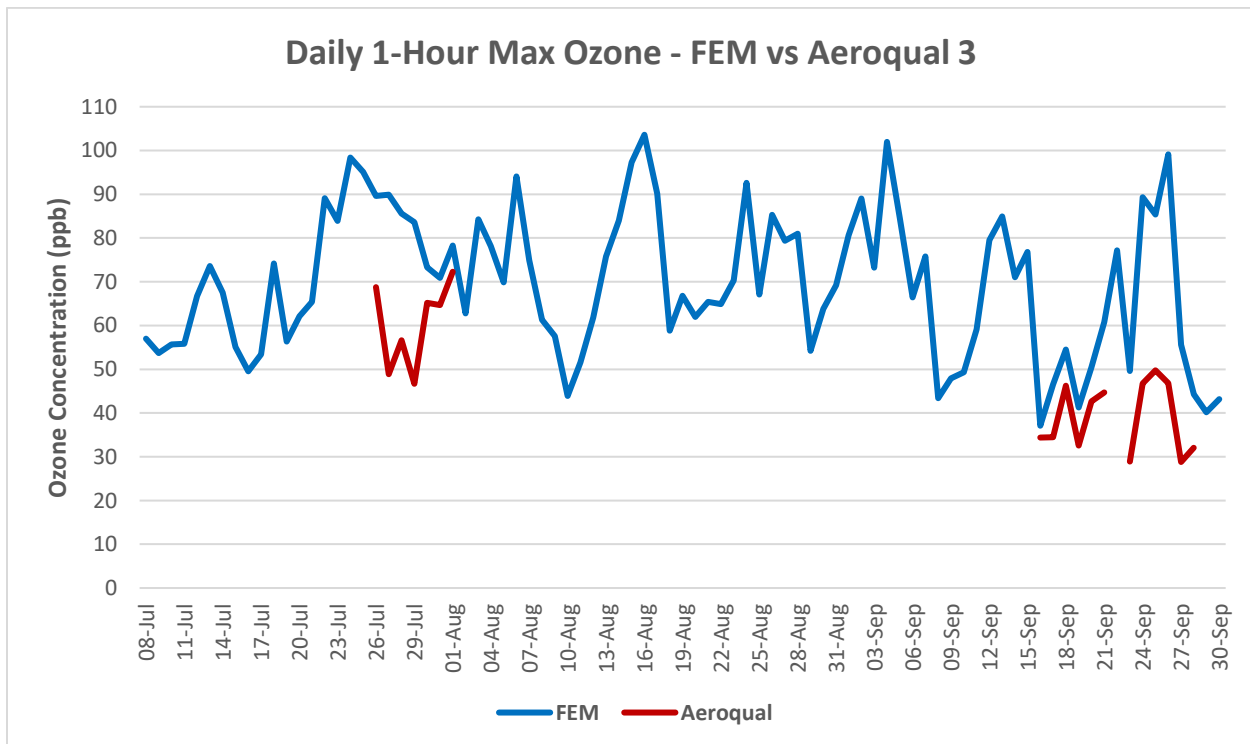
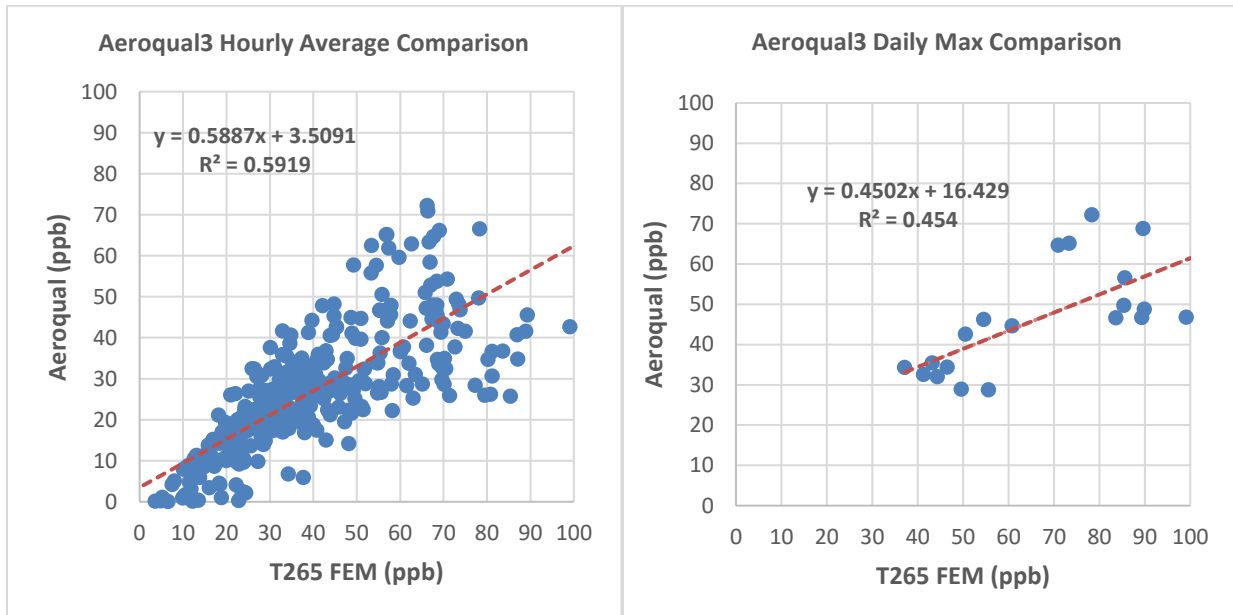
Aeroqual 2

For the hourly ozone averages, the Aeroqual sensor had a 16.3 ppb low bias during the July 1 through September 30, 2019 period. For the daily 1-hour ozone max, Aeroqual had a 24.9 ppb low bias during the July 1 through September 30, 2019 period.



Aeroqual 3

For the hourly ozone averages, the Aeroqual sensor had a 12.6 ppb low bias during the July 1 through September 30, 2019 period. For the daily 1-hour ozone max, Aeroqual had a 20.1 ppb low bias during the July 1 through September 30, 2019 period.



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
Aeroqual1	37.9	63.5	0.78	0.44	19.99	0.46	0.31	29.11
Aeroqual2	22.1	57.6	0.58	0.51	3.00	0.53	0.28	22.63
Aeroqual3	26.0	72.3	0.59	0.59	3.51	0.45	0.45	16.42
FEM	42.6	103.6						