



Technical Evaluation of Sensor Technology (TEST) Program

*Aeroqual Series 500 Sensor
2019 – 4th 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 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.

Overview of Analysis Findings from Current Period

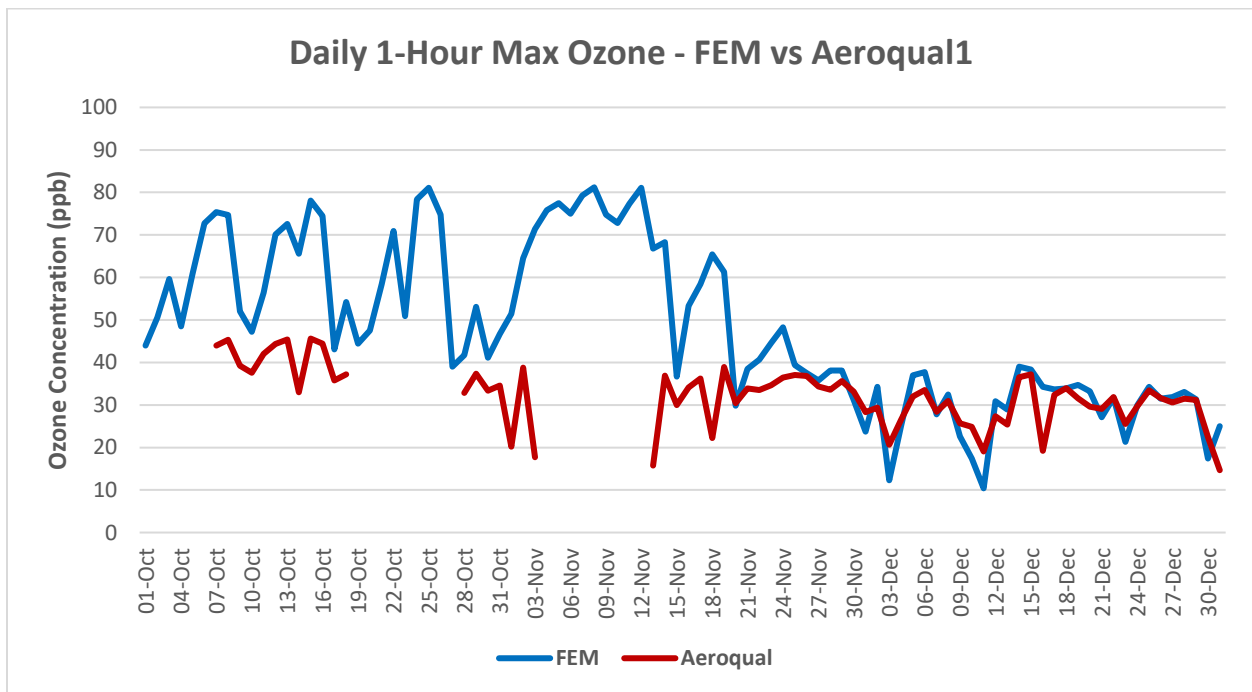
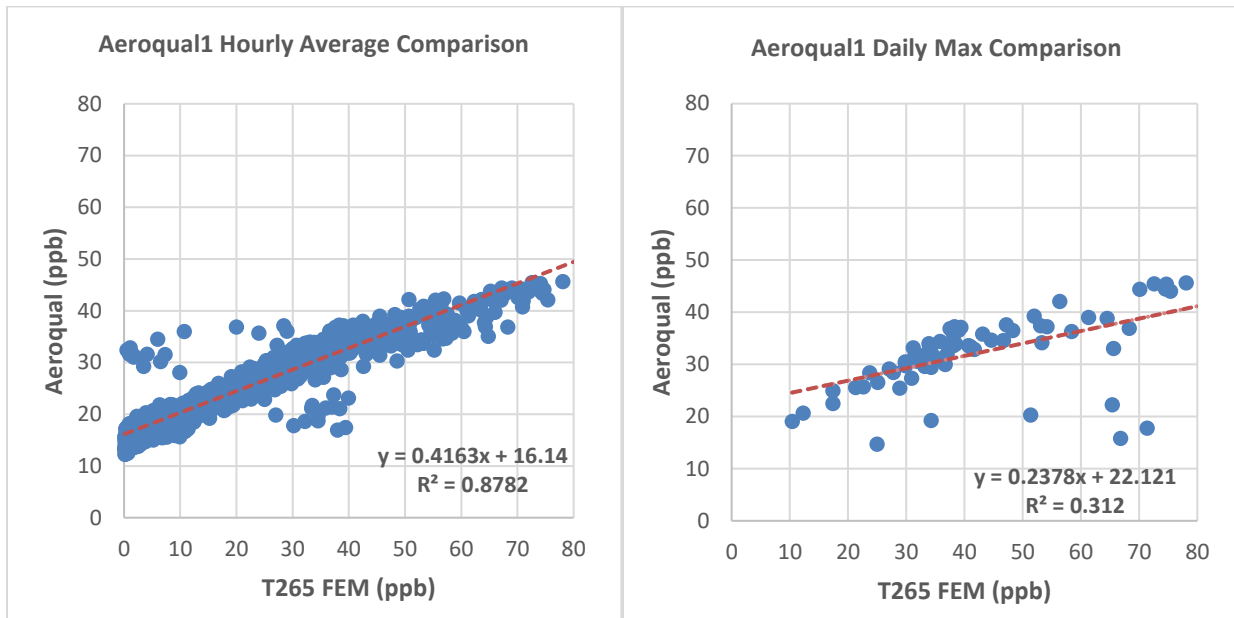
The analysis for this report covers the time period of October 2019 through December 2019 (2019 – 4th quarter). During this this period, hourly data was removed from the calculation of bias when either the Aeroqual sensor or regulatory analyzer did not have a valid hourly sample. For the scatter plots and line graph, all available data are shown.

October and November 2019 were dry and stagnant with significant wind events towards the end of both months. By Thanksgiving, precipitation entered the region and good dispersion followed through December. Due to shorter days, less sunlight was available and ozone remained low through the later part of the quarter. Data from each of the Aeroqual sensors was intermittent during this period due to the analyzers resetting automatically and other unknown factors. As the plots below show, Aeroqual data was overall biased lower than the District's regulatory data during this period with the exception of the Aeroqual1 sensor which had a high hourly bias for this period.

Site Specific Analysis of Aeroqual Sensor Performance

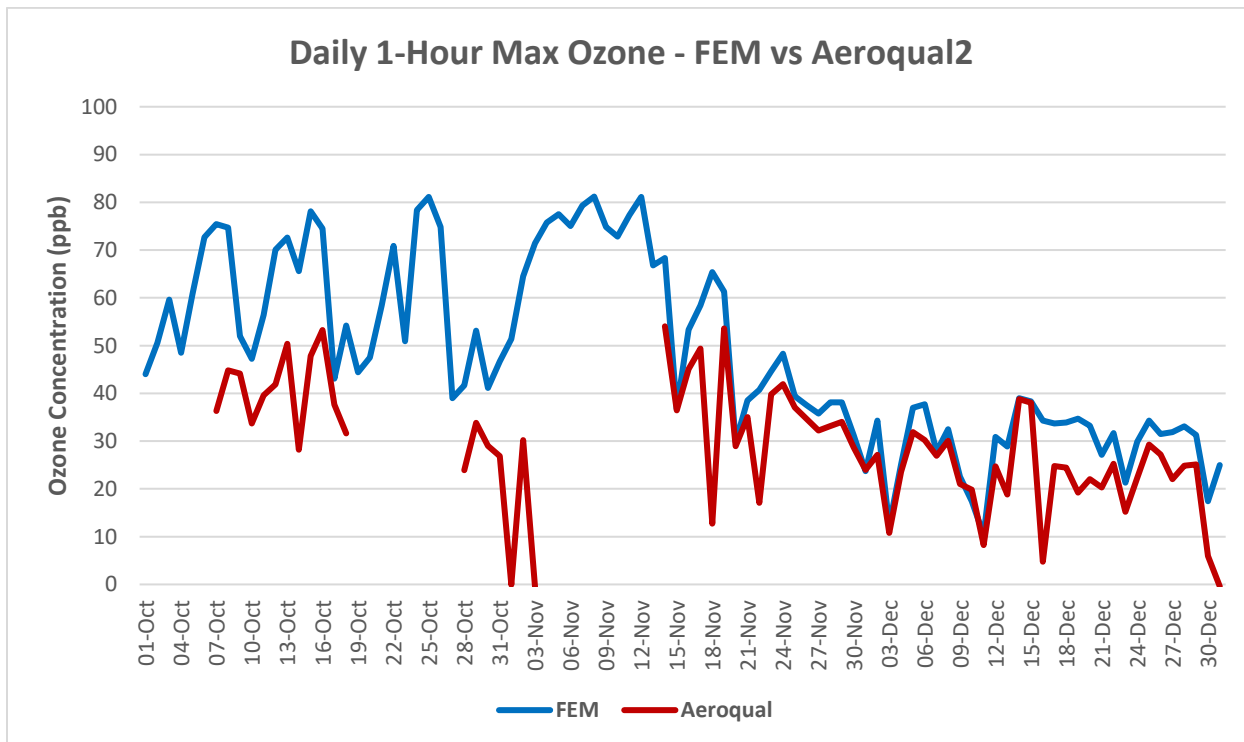
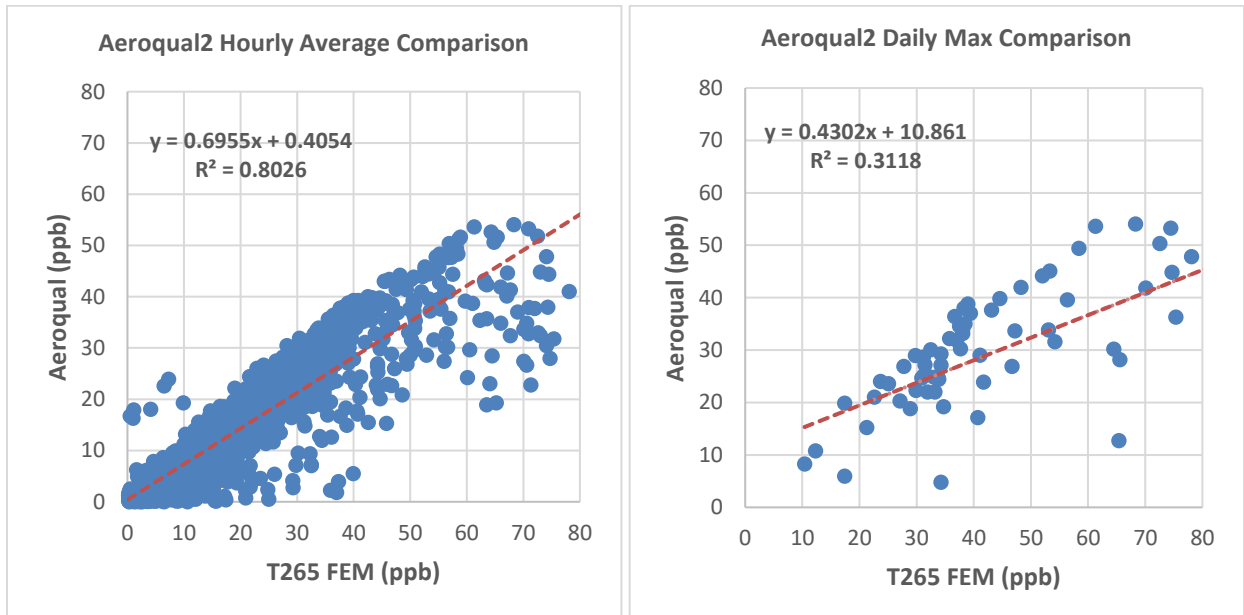
Aeroqual 1

For the hourly ozone averages, the Aeroqual sensor had a 4.3 ppb high bias during the July 1 through September 30, 2019 period. For the daily 1-hour ozone max, Aeroqual had a 10.0 ppb low bias during the July 1 through September 30, 2019 period.



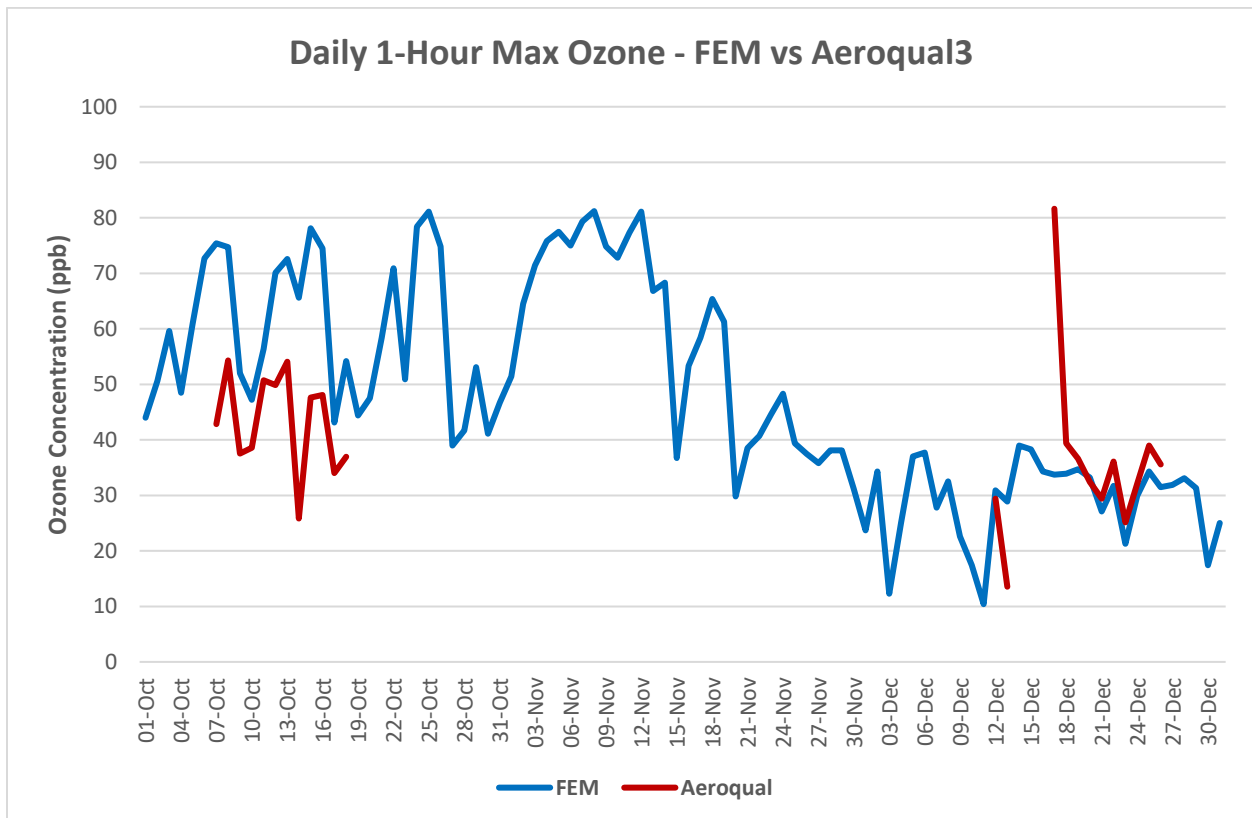
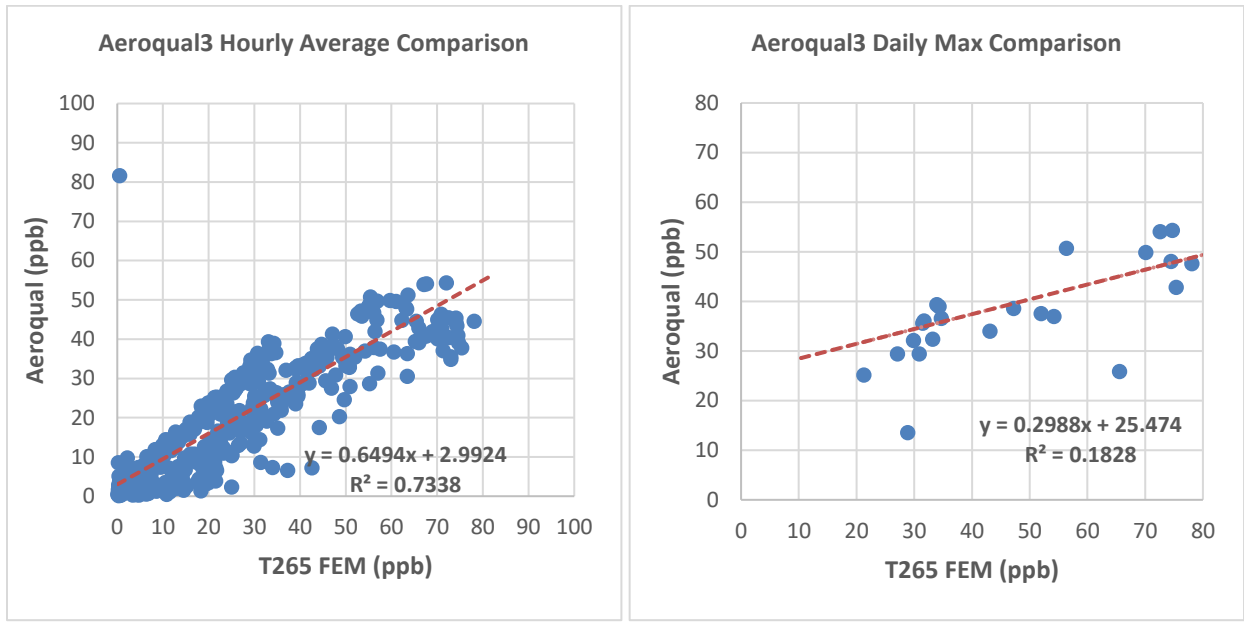
Aeroqual 2

For the hourly ozone averages, the Aeroqual sensor had a 5.8 ppb low bias during the July 1 through September 30, 2019 period. For the daily 1-hour ozone max, Aeroqual had a 13.0 ppb low bias during the July 1 through September 30, 2019 period.



Aeroqual 3

For the hourly ozone averages, the Aeroqual sensor had a 5.8 ppb low bias during the July 1 through September 30, 2019 period. For the daily 1-hour ozone max, Aeroqual had a 7.7 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	24.4	45.6	0.87	0.42	16.14	0.31	0.24	22.12
Aeroqual2	14.3	54.0	0.80	0.70	0.41	0.31	0.43	10.86
Aeroqual3	18.9	81.6	0.73	0.65	2.99	0.18	0.30	25.47
FEM	23.4	81.2						