



Technical Evaluation of Sensor Technology (TEST) Program

*Aeroqual Series 500 Sensor
2020 – 1st Quarter*



Introduction and Sensor Profile

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 (Aeroqual 1) 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 (Aeroqual 2 and Aeroqual 3) 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

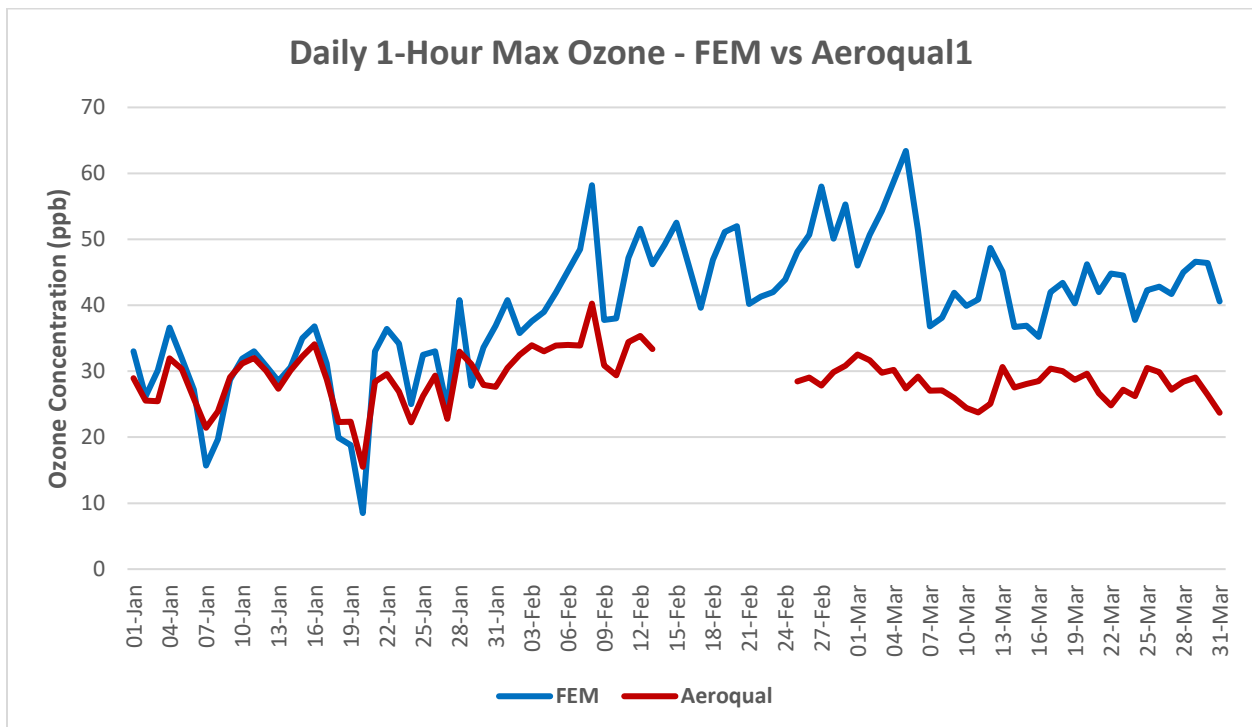
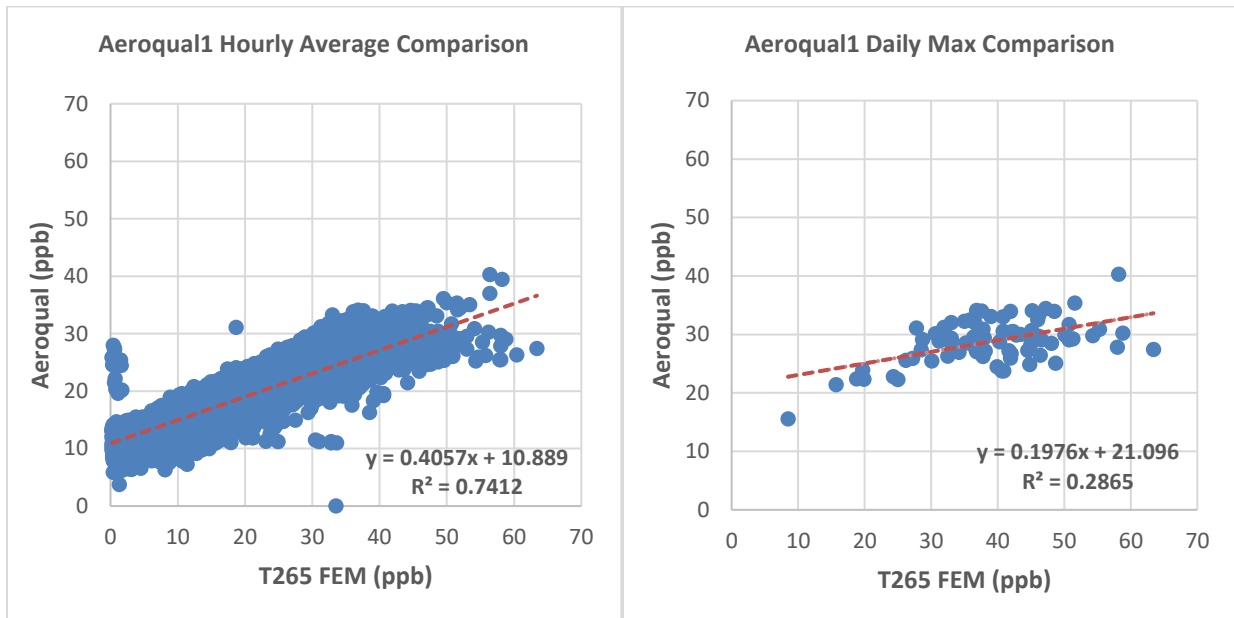
The analysis for this report covers the time period of January 2020 through March 2020 (2020 – 1st quarter). During this this period, hourly data was removed from the calculation of bias when either the Aeroqual sensor or regulatory analyzer did not have a valid hourly sample. For the scatter plots and line graph, all available data are shown.

Concentrations during January and February 2020, were influenced by alternating high pressure systems and low pressure systems. As such, January and February saw ozone concentrations fluctuate; increasing when high pressure and poor dispersion were present, and decreasing when dispersion improved. Ozone concentrations were lower in through March and into April 2020 due to longer periods of improved dispersion conditions resulting from low pressure systems passing through the region more regularly. As the plots below show, Aeroqual data was overall biased lower than the District's regulatory data during this period.

Sensor Specific Analysis of Aeroqual Sensor Performance

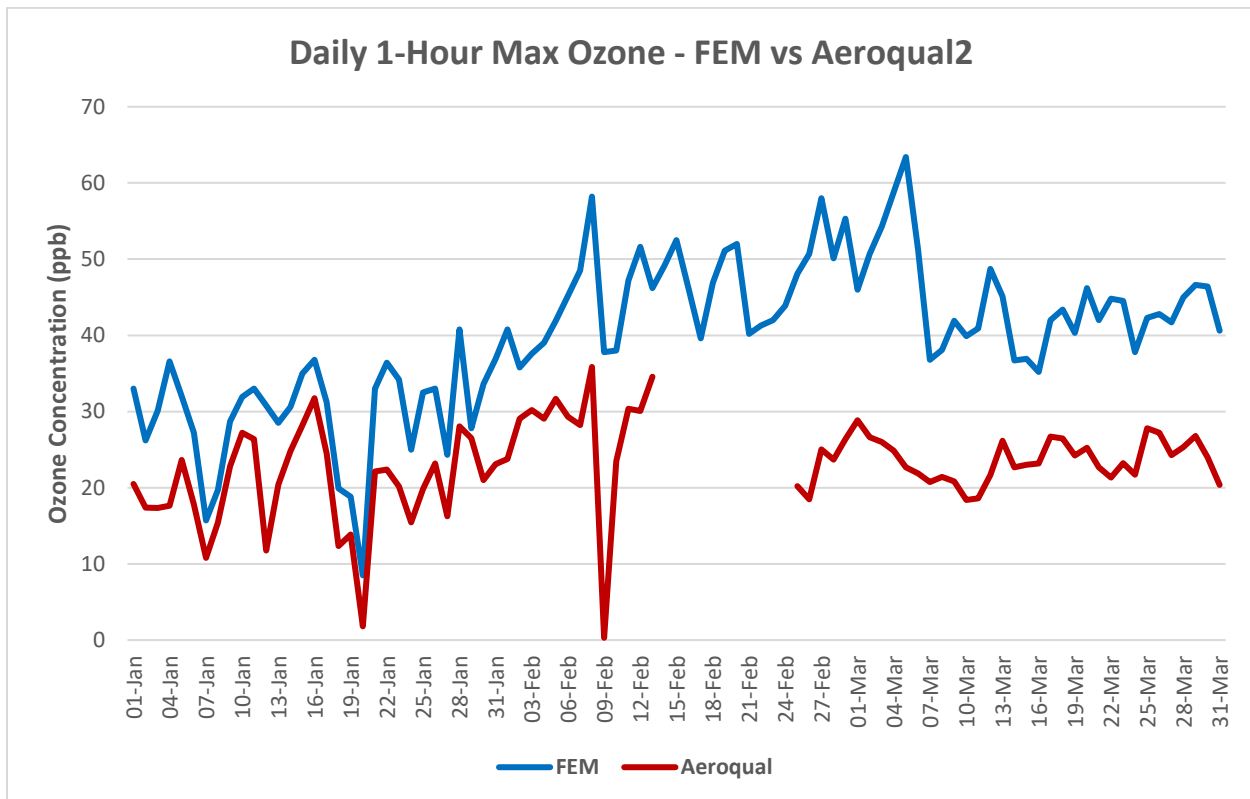
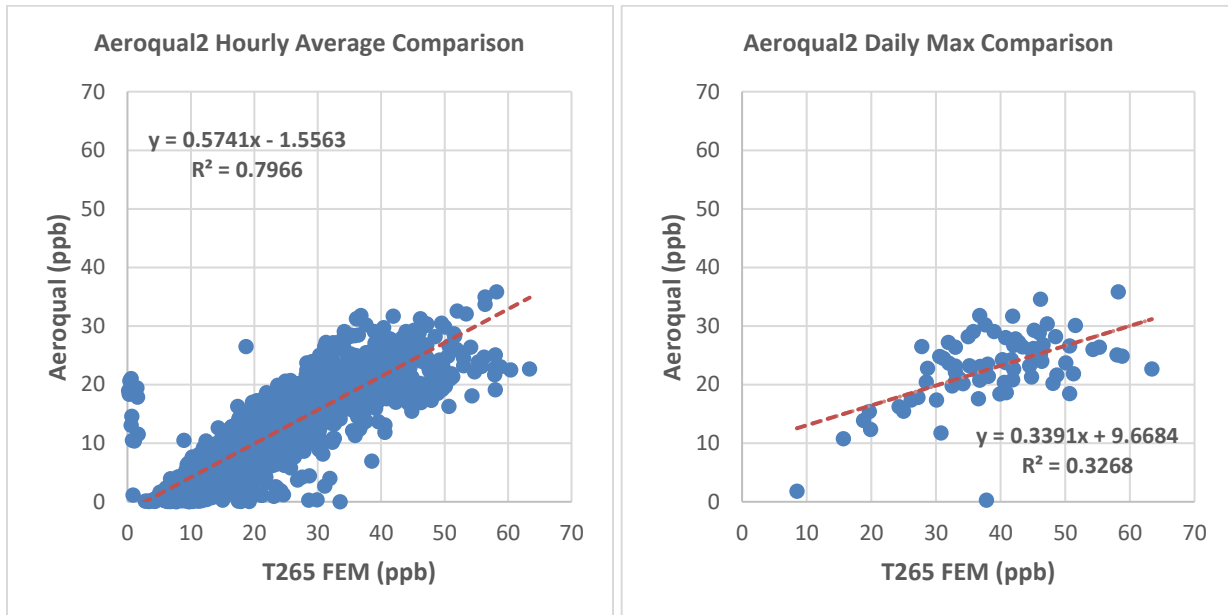
Aeroqual 1

For the hourly ozone averages, the Aeroqual sensor had a 1.1 ppb low 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.



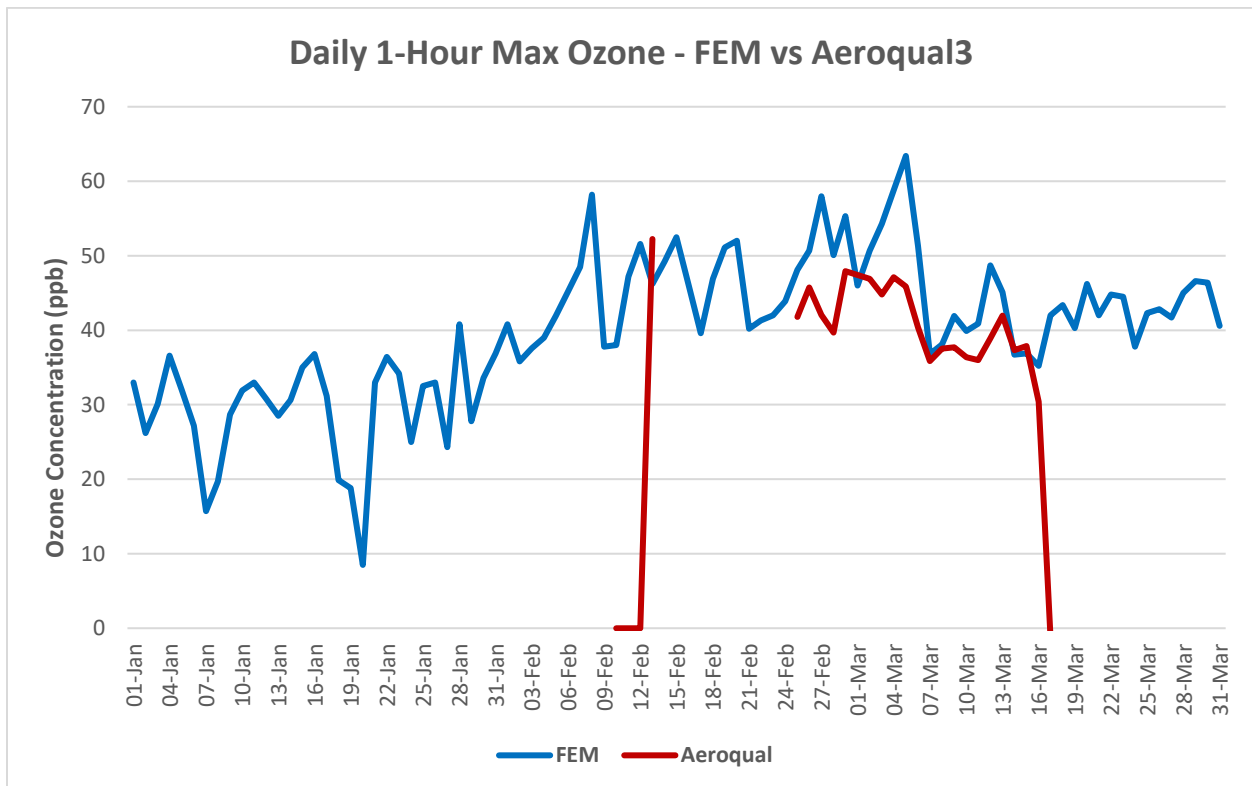
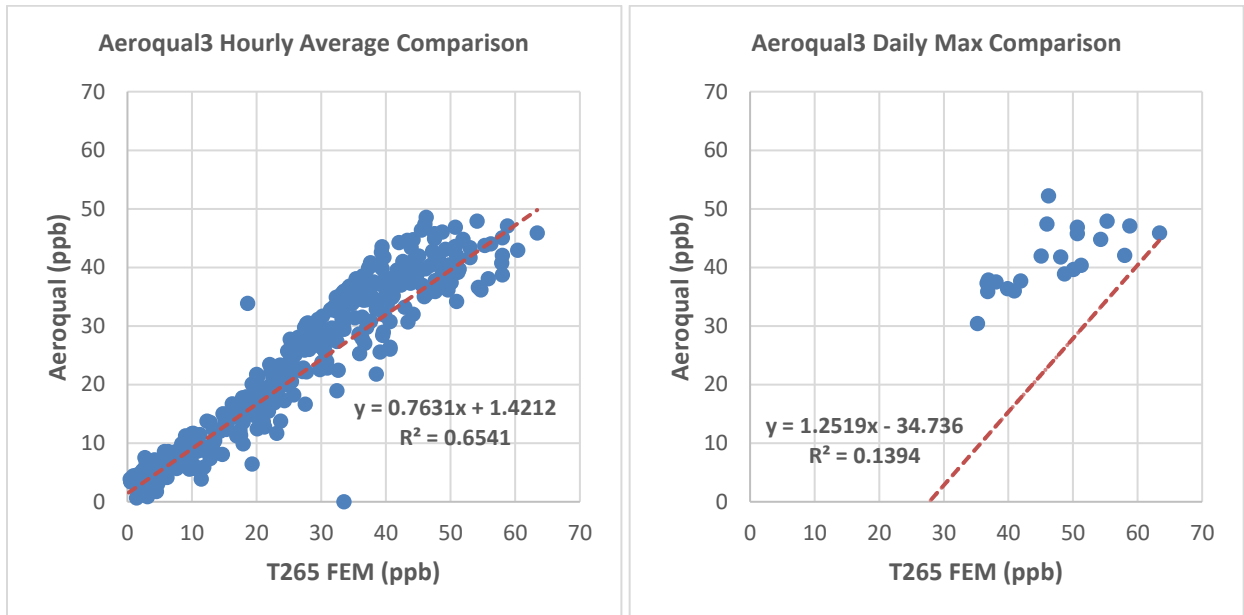
Aeroqual 2

For the hourly ozone averages, the Aeroqual sensor had a 10.2 ppb low bias during the July 1 through September 30, 2019 period. For the daily 1-hour ozone max, Aeroqual had a 16.0 ppb low bias during the July 1 through September 30, 2019 period.



Aeroqual 3

For the hourly ozone averages, the Aeroqual sensor had a 6.6 ppb low bias during the July 1 through September 30, 2019 period. For the daily 1-hour ozone max, Aeroqual had a 23.3 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	18.9	40.3	0.74	0.41	10.89	0.29	0.20	21.10
Aeroqual2	9.8	35.9	0.80	0.57	-1.56	0.33	0.34	9.67
Aeroqual3	20.8	52.2	0.65	0.76	1.42	0.14	1.25	-34.74
FEM	20.6	63.4						