



**San Joaquin Valley**  
AIR POLLUTION CONTROL DISTRICT

## Technical Evaluation of Sensor Technology (TEST) Program

*Aeroqual Series 500 Sensor  
2020 – 3<sup>rd</sup> 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 O<sub>3</sub> 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**

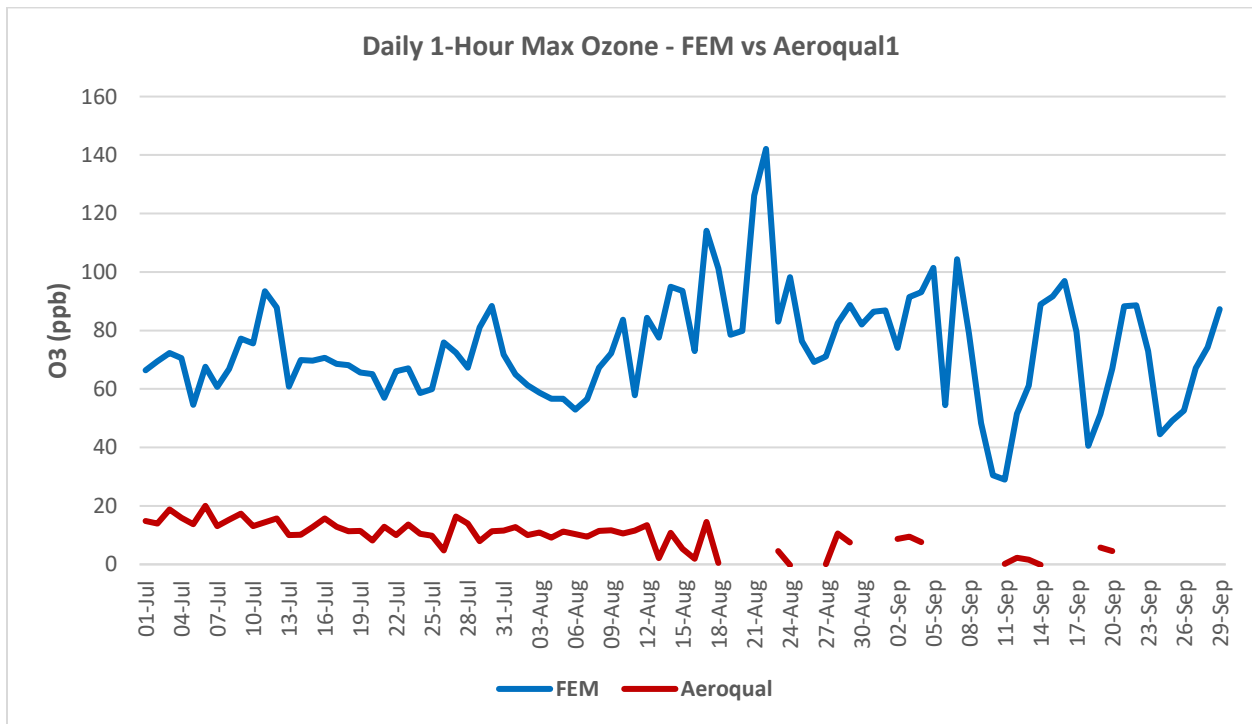
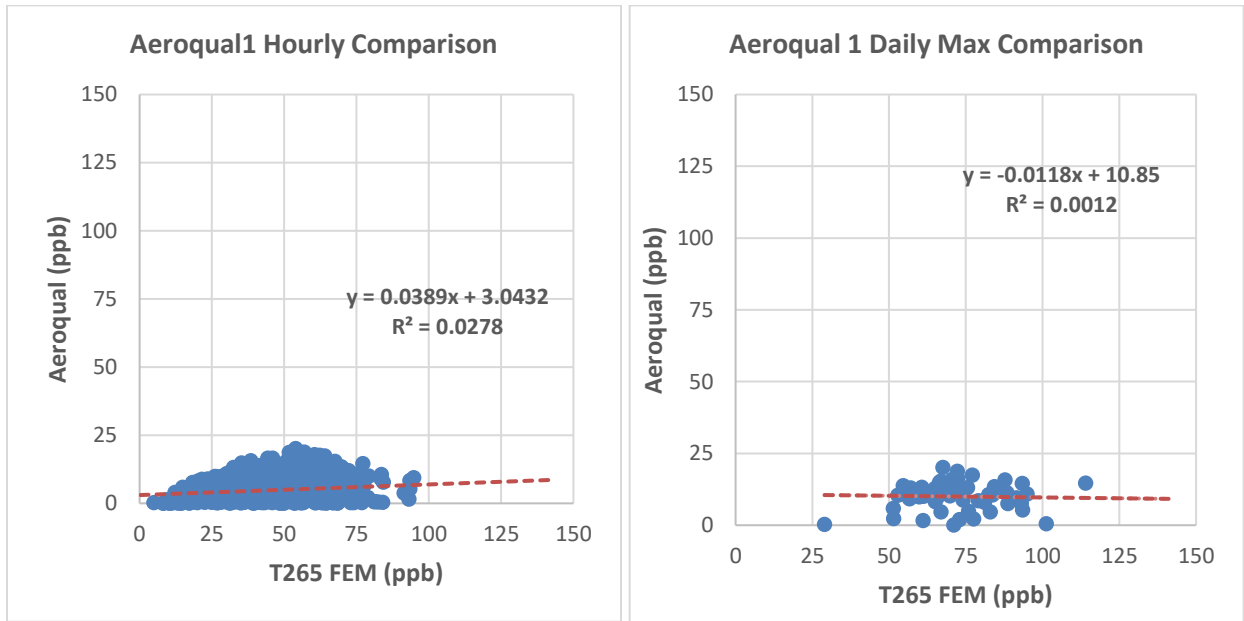
The analysis for this report covers the time period of July 2020 through September 2020 (2020 – 3<sup>rd</sup> quarter). During this this period, hourly data was removed from the calculation of bias when either the Aeroqual sensor or regulatory analyzer did not have a valid hourly sample. For the scatter plots and line graph, all available data are shown.

From July through September, dry and hot weather prevailed across the region. Periods of gusty winds entered the District throughout the 3<sup>rd</sup> quarter as troughs moved through the area. Starting in mid-August, several wildfires across California caused dense smoke to settle over the San Joaquin Valley. With longer days in this quarter, ozone concentrations were expected to increase due to more sunlight being available. August and September saw ozone concentrations fluctuate as the smoke blocked sunlight on some days and decreased temperatures resulting in lower than expected ozone concentrations. Other days, ozone increased more than expected as wildfire smoke brought precursor emissions which led to greater than expected ozone concentrations. Data from each of the Aeroqual sensors was intermittent during this time period due to sensor data loggers resetting automatically, heat caused the sensors to malfunction, and other unknown factors. As the plots below show, Aeroqual data was biased lower than the District's regulatory data during this period.

**Sensor Specific Analysis of Aeroqual Sensor Performance**

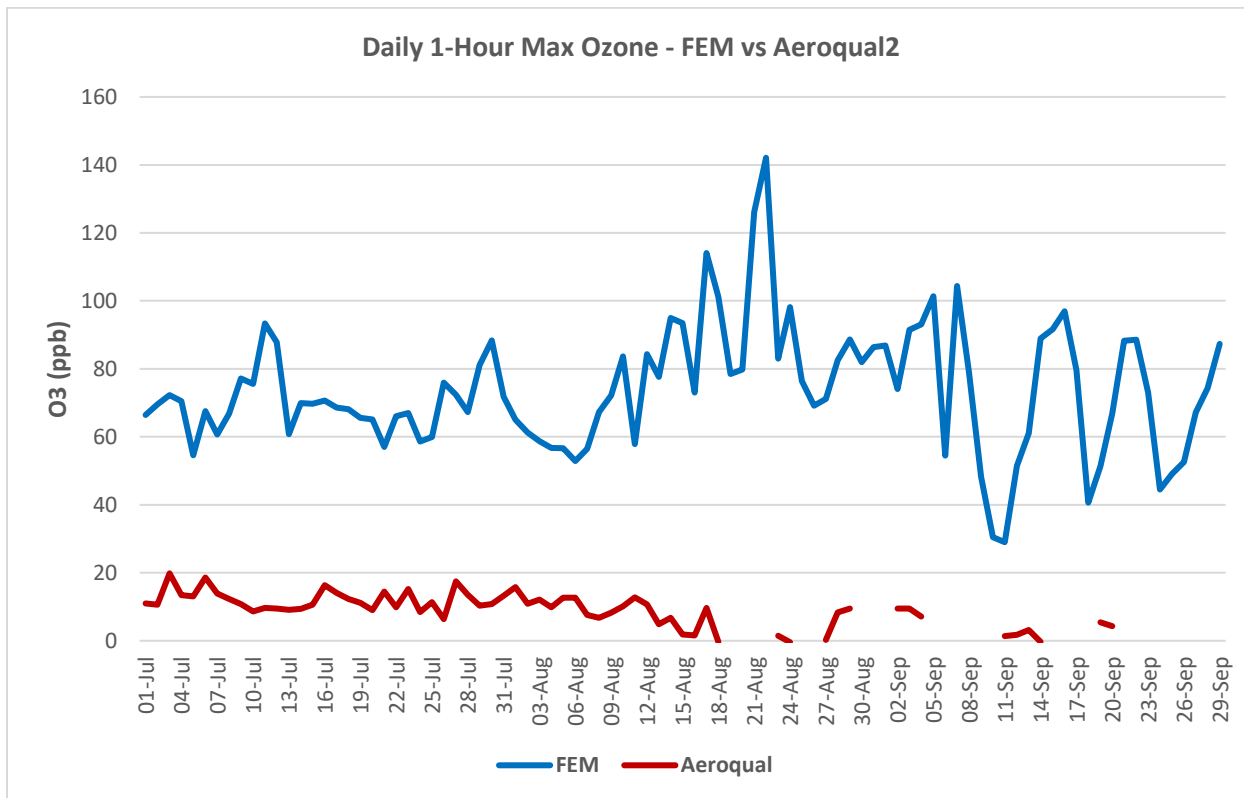
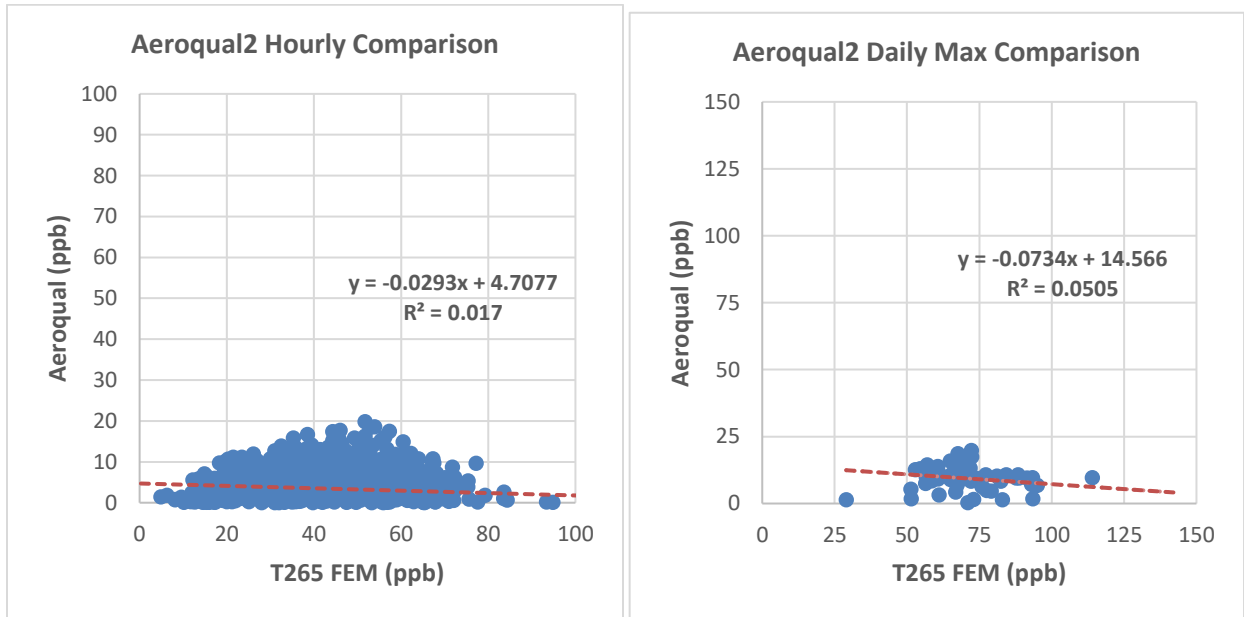
**Aeroqual 1**

For the hourly ozone value, the Aeroqual1 sensor had a 39.3 ppb low bias and the max daily ozone had a 61.9 ppb low bias during the 3<sup>rd</sup> quarter 2020 period.



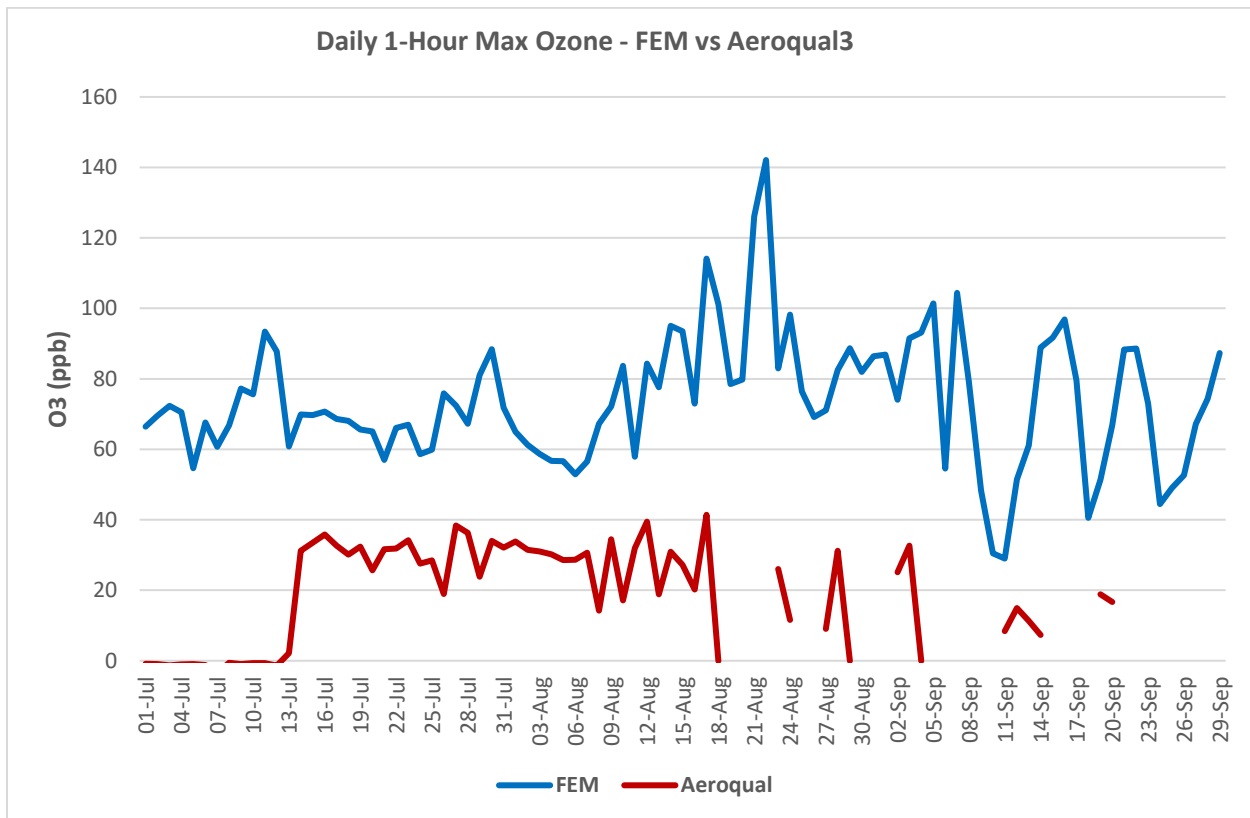
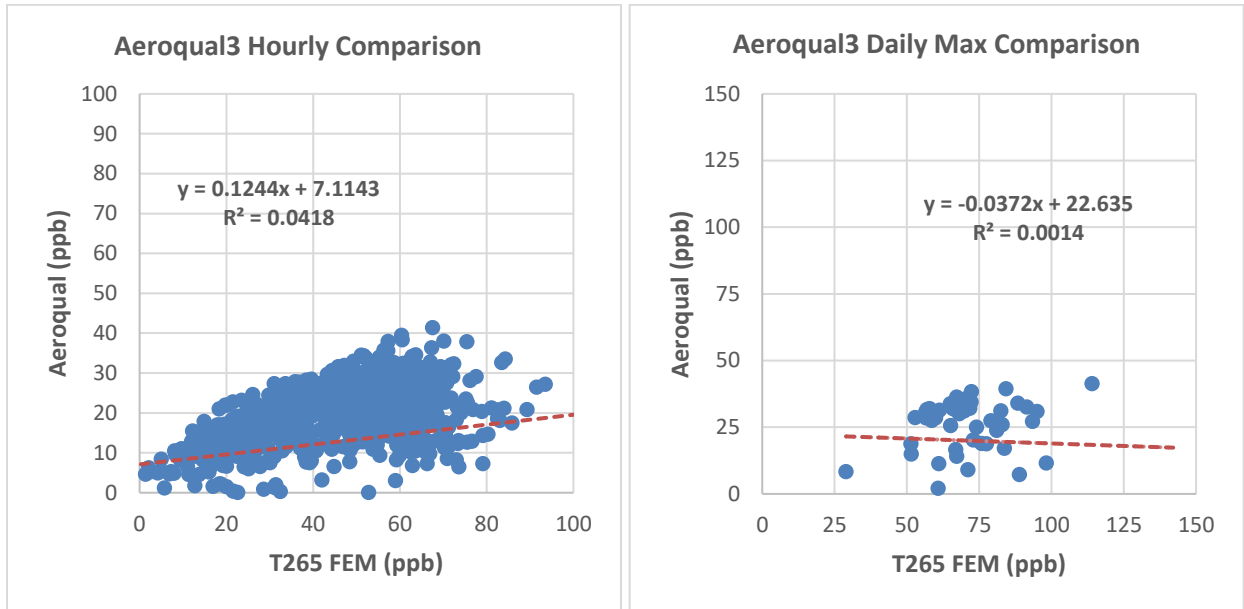
## Aeroqual 2

For the hourly ozone value, the Aeroqual 2 sensor had a 40.5 ppb low bias and the max daily ozone had a 62.7 ppb low bias during the 3<sup>rd</sup> quarter 2020 period.



### Aeroqual 3

For the hourly ozone value, the Aeroqual sensor had a 31.7 ppb low bias and the max daily ozone had a 52.0 ppb low bias during the 3<sup>rd</sup> quarter 2020 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	4.6	20.0	0.0278	0.0389	3.0432	0.0012	-0.0118	10.85
Aeroqual2	3.4	19.8	0.017	-0.0293	4.7077	0.0505	-0.0734	14.566
Aeroqual3	12.3	41.4	0.0418	0.1244	7.1143	0.0014	-0.0372	22.635
FEM	43.0	142.1						