



**San Joaquin Valley**  
AIR POLLUTION CONTROL DISTRICT

## Technical Evaluation of Sensor Technology (TEST) Program

*Dylos Sensor  
2019 – 3<sup>rd</sup> Quarter*



### **Introduction and Sensor Profile**

This analysis report is focused on assessing the performance of the Dylos DC1100 sensor as a part of the District's Technical Evaluation of Sensor Technology (TEST) Program. The Dylos sensor uses optical laser-based particle counting methodology to estimate the concentration of PM<sub>2.5</sub> and PM<sub>10</sub>. The Dylos sensor counts and measures the size of the individual particles to calculate a mass concentration.

### **Background and Approach of Evaluation Test**

In May 2019, the District installed three Dylos sensors at the Clovis-Villa air monitoring station for the purpose of testing the Dylos sensors in the San Joaquin Valley and comparing the performance of the collocated Dylos sensors to the Federal Equivalent Method (FEM) PM<sub>2.5</sub> analyzer. The data sets analyzed for this report compare PM<sub>2.5</sub> data collected from the Dylos sensors and the MetOne BAM-1020 FEM monitor collocated at the regulatory air monitoring site. The scatter plots and time series graphs below show how the datasets compare for both hourly values and the 24-hour average.

### **Overview of Analysis Findings from Current Period**

The analysis for this report covers the time period of July 2019 through September 2019 (2019 – 3<sup>rd</sup> quarter). During this period, hourly data was removed from the calculation of bias when either the Dylos sensor or regulatory monitor did not have a valid hourly sample. For the 24-hour averages, only days with 18 or more valid hourly samples (75% or greater completeness) are included.

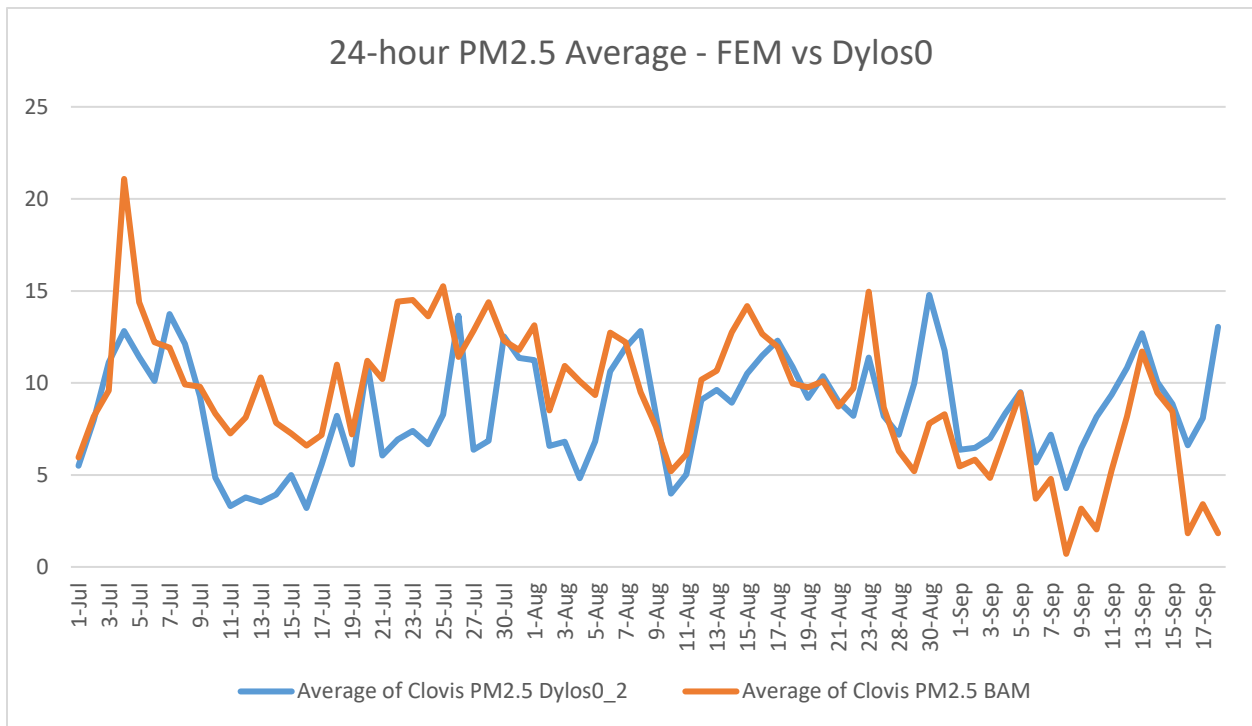
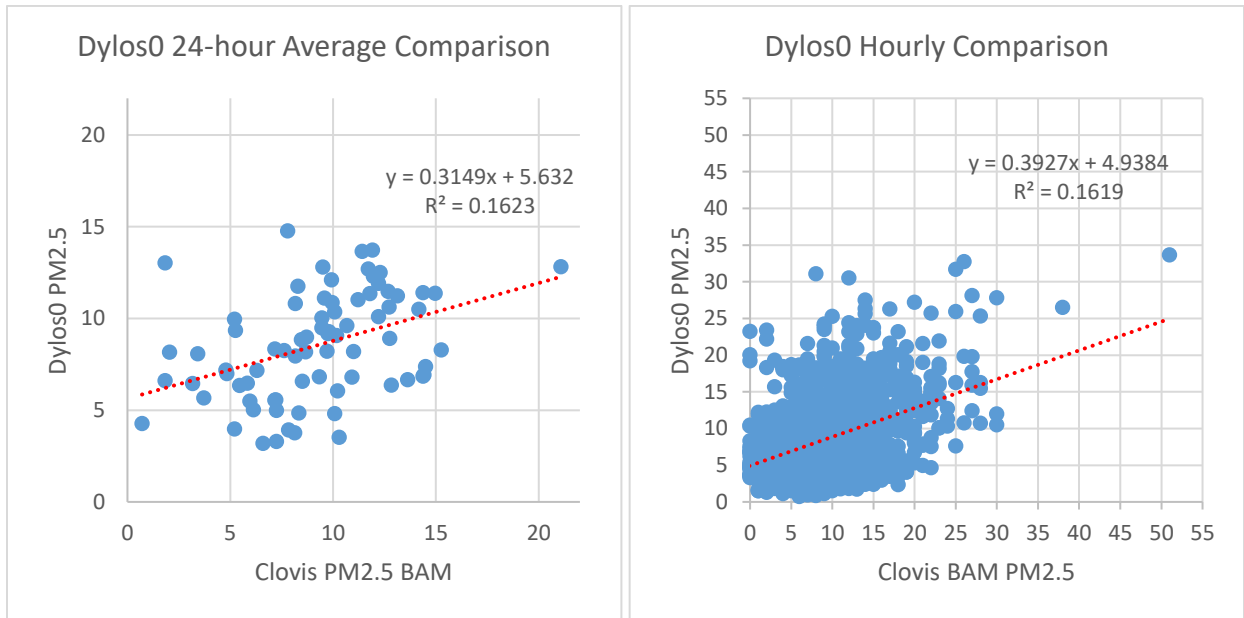
The 3<sup>rd</sup> quarter of 2019 had good to moderate dispersion conditions throughout the Valley. Data from the 3<sup>rd</sup> quarter of 2019 were impacted by a mixture of both troughs and ridges traversing the region. Overall, PM<sub>2.5</sub> concentrations during this period remained low except increased concentrations were recorded on July 4<sup>th</sup> for both the regulatory monitor and Dylos sensors due to fireworks.

The three Dylos sensors operating during this period show variable results, both high and low, compared to the regulatory monitor. The Dylos2 had the lowest 24-hour bias, at 0.53 µg/m<sup>3</sup>, while Dylos0 and 1 had bias of -0.69 µg/m<sup>3</sup> and -1.98 µg/m<sup>3</sup> respectively.

**Analysis of Clarity-Node Sensor Performance**

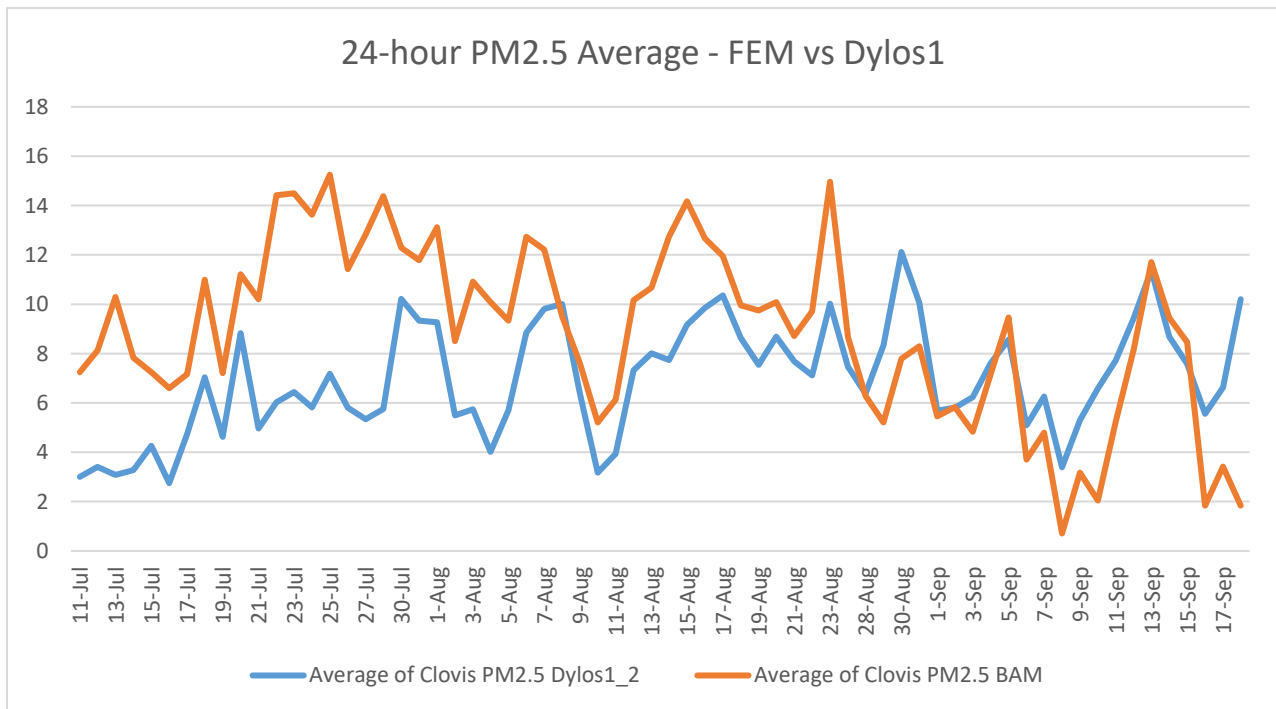
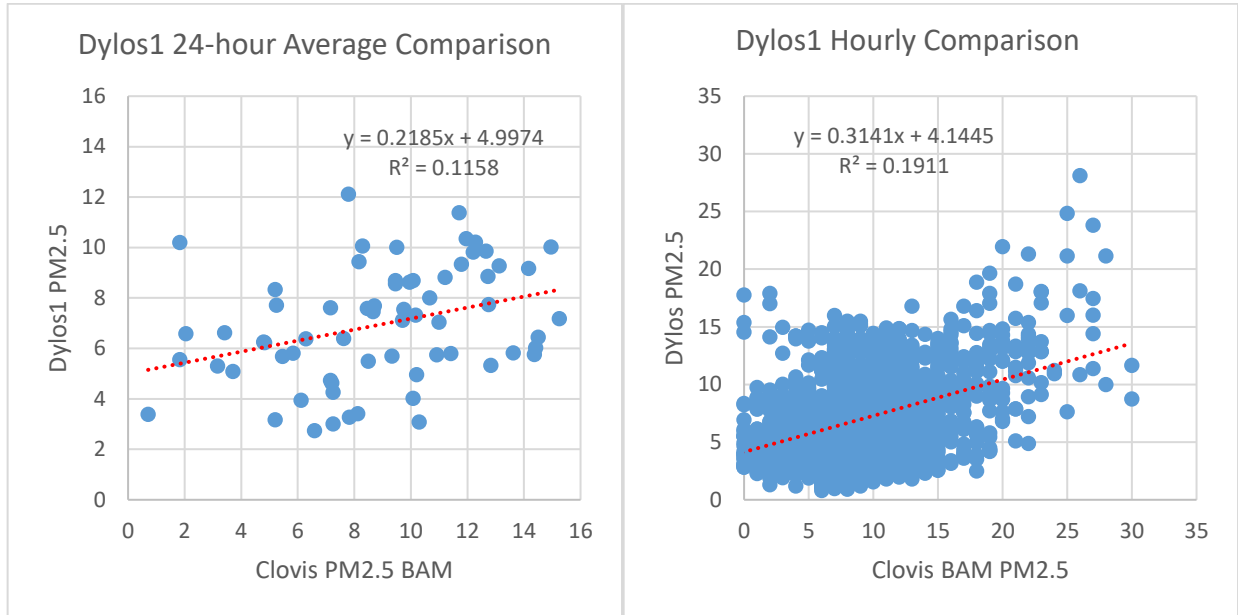
**Dylos0**

For the 24-hour average, Dylos data had a  $-0.68 \mu\text{g}/\text{m}^3$  low bias during the July 2019 through September 2019 period. For the hourly average, Dylos data had a  $-0.68 \mu\text{g}/\text{m}^3$  low bias over the same period.



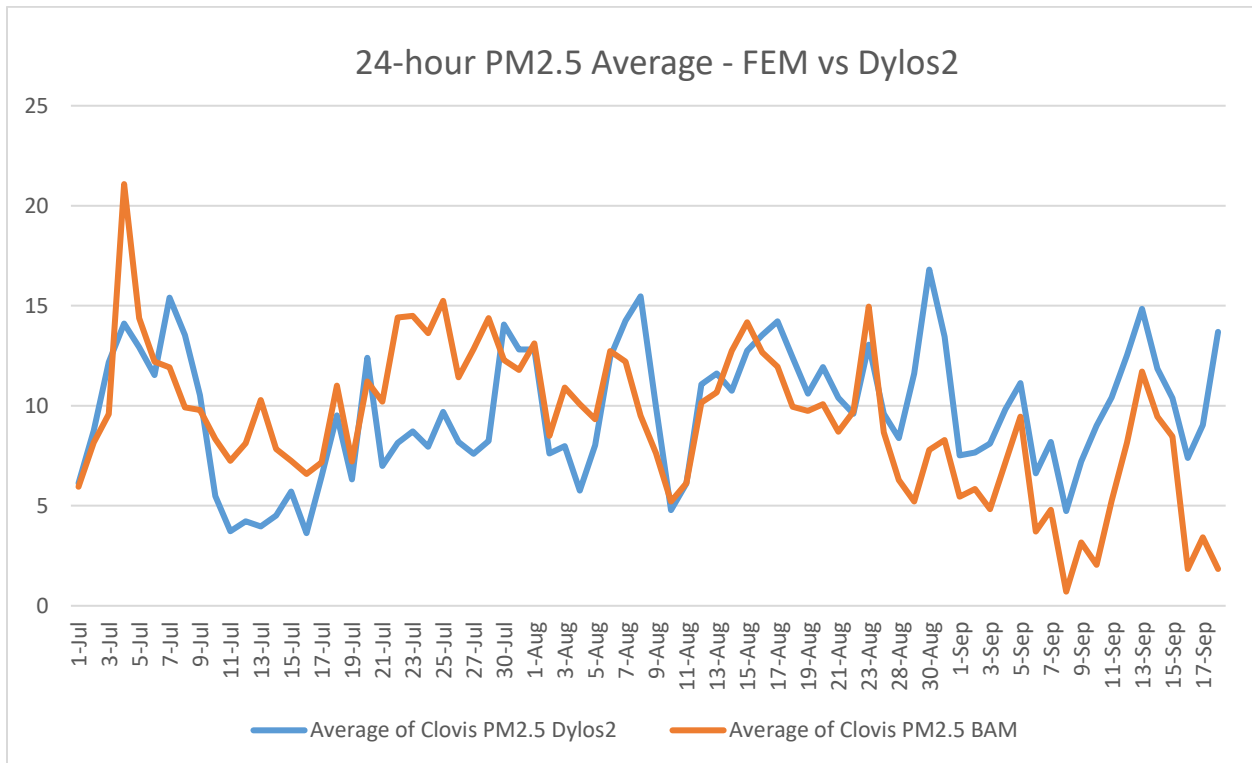
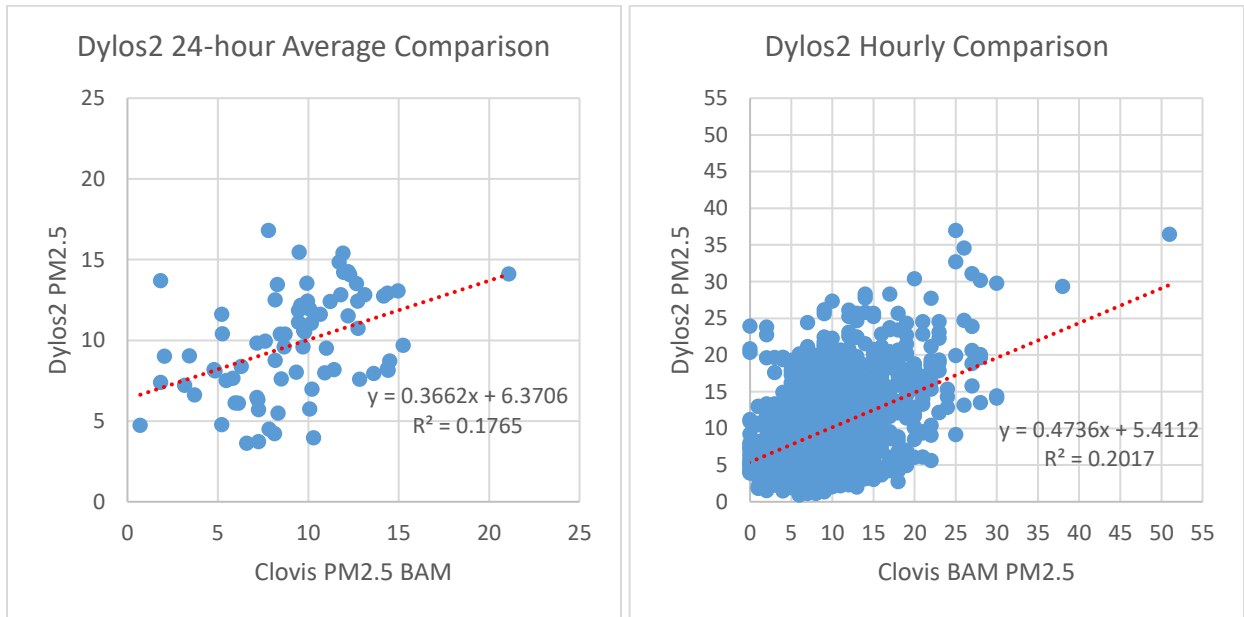
### Dylos1

For the 24-hour average, Dylos data had a  $-1.98 \mu\text{g}/\text{m}^3$  low bias during the July 2019 through September 2019 period. For the hourly average, Dylos data had a  $-1.98 \mu\text{g}/\text{m}^3$  low bias over the same period.



### 7Dylos2

For the 24-hour average, Dylos data had a 0.53 µg/m<sup>3</sup> high bias during the September 2019 through July 2019 period. For the hourly average, Dylos data had a 0.61 µg/m<sup>3</sup> high bias over the same period.



### Statistical Summary

The following table provides a statistical summary of the PM2.5 data collected during the analysis period of this report.

Clovis-Villa	Average 24-hr	Max 1-hr	Max 24-hr	1-hr R2	1-hr Slope	1-hr Intercept	24-hr R2	24-hr Slope	24-hr Intercept
Dylos 0	8.53	36.73	14.78	0.16	0.39	4.94	0.16	0.31	5.63
Dylos 1	6.95	28.12	12.11	0.19	0.31	4.14	0.12	0.22	5.00
Dylos 2	9.75	36.97	16.81	0.20	0.47	5.41	0.18	0.37	6.37
FEM	8.98	122.00	122.00						