How to convert Dylos 1700 readings to AQI

By Jeffery K Smith (j.smith@ambiencedata.com)

I searched the Internet to see if anyone had already researched and published how to convert Dylos 1700 readings to AQI. I found that the hard part, that is to say, converting from the particle count concentration of .01 cubic feet (i.e., what the Dylos measures) into the mass concentration of micrograms per cubic meter or µg/m3 (i.e., what more expensive particulate matter monitoring devices measure) has already been done. The final step, namely converting from mass concentration to AQI requires the use of the United States government Environmental Protection Agency's "AQI Calculator: Concentration to AQI" web site (pasted below in Step 2)

Step 1-

The Clean Air & Healthy Homes Program (CAHHP) at the University of Montana's Center for Environmental Health Sciences created a spreadsheet and chart to "convert" Dylos readings to µg/m3. The spreadsheet uses an algorithm to "convert" Dylos Particulate Matter (PM) numbers from the particle count concentration of .01 cubic feet into the mass concentration of micrograms per cubic meter (µg/m3). They even have a Youtube video to explain to students how to use the spreadsheet with a Dylos 1700. https://www.youtube.com/watch?v=coHR_d4Gg7M

The Excel spreadsheet named <Dylos-Conversion-Sheet.xlsx> contains a Dylos conversion formula. Just click on one of the 'Column C' header " Dylos [µg/m3] " cells to reveal the formula. The spreadsheet can be downloaded from: https://www.fijnstofmeter.com/documentatie/Dylos-Conversion-Sheet.xlsx. I also wish to highlight the fact that these numbers are PM µg/m3 and still need to be converted to AQI.

****

Step 2-

Enter your mass concentration results into the US EPA AQI Calculator (http://aqicn.org/calculator) and choose for PM2.5. Note: you have to hope that you are not having a bad night or day like we see in New Delhi because the calculator does not convert PM2.5 mass concentration higher than 500.

****

Why I think this is good stuff

I want to close with writing why I think the algorithm/formula in Dylos-Conversion-Sheet.xlsx is accurate enough for our purposes -- I have not taken the time to contact and confirm from where the UMT program derived the algorithm. However, I recognized the number "3531.5" from a research paper I read some time ago from Drexel University that is still available as of today at https://www.fijnstofmeter.com/documentatie/Data-Validation.pdf.

I believe that the UMT formula is derived from this paper. However, it is possible that the inverse is true. I'm only going off of chronological dates on which that the information was published. After correcting for humidity, the Drexel paper reveals on page 7 that they have confirmed a very high level of data correlation of the Dylos 1700 results with much more expensive mass concentration particulate sensors. The accuracy of the algorithm is impressive in my opinion considering that the Dylos manufacturer and others consider (correctly I think) believe that it is impossible, given current technology, to accurately convert from the particulate concentration (measured by the Dylos) to the mass concentration µg/m3 (measured by the DustTrak and BAM units).