Testimony to CARB on SJVAB PM2.5 SIP report dated June 2024 (on 25-July-2024) by Ian Faloona, Professor of Atmospheric Science, UC Davis

> I am concerned about the lack of referencing to any modern studies that are not specific ones supported by CARB (e.g. Chen et al., Atm. Env., 2014). My written submission points to over a dozen studies in the past decade that contain results that are extremely relevant to efforts to reach PM2.5 attainment in the SJVAB.

> None of the design values (for O_3 MDA8, PM2.5 24-hr, or annual PM2.5) have shown any signs of declining over the past decade or more. See Fig. 5 in the WOE appendix of the report, for example. Note also, as seen in Fig. 23 of WOE, there is a corresponding lack of trends in measured ambient NO_2 across the SJV, despite continued diminution in the NO_x inventory. A recent study of satellite NO_2 trends by my group (Wang et al., ERL, 2023) shows this to be true broadly across croplands and shrublands all across California (NO_2 has not decreased over the past 12 years, despite it still decreasing in urban areas at a rate of ~ -3.7%/yr.)

> Table 14 of the report (and Table 2a of the WOE) shows the proposed decreases in air basin NO_x emissions from 2017 to 2031. First it shows a total emission of NO_x in 2025 of **121** tons/day, whereas the current version of the (California Emissions Projection Analysis Model) CEPAM2019v1.03 - Standard Emission Tool reports **165** tpd in 2025, 36% larger than this plan. According to this inventory, 6% (8.8 tpd) of this total is from cropland soils, and 2% (3.3 tpd) are from wildfires.

> But more troubling than not being on target at this stage is that the ultimate projection of **95.2** tpd NO_x in 2031 is *extremely* unrealistic. One of the overlooked studies I mentioned at the outset is Luo et al., ES&T, 2022, which used a state-of-the-art model of fertilized soils emissions of reactive N gases (the Fertilizer Emission Scenario Tool for the CMAQ (FEST- C) in agroecosystem model), which predicted the soil emissions in the SJVAB to be **103** tpd in 2011. California fertilizer sales have increased at about 1%/yr over the past 30 years (according to the CDFA), and temperatures in the SJV are rising nearly 1K/decade, which means that this soil source is likely only going to be significantly larger in 2031. These estimates don't even consider soil emissions of nitrous acid (HONO) which are believed to be quite significant (similar in magnitude to NO) in agricultural soils, this represents another branch of the literature that is completely overlooked in this report.

> Finally, another study from my research group, Pan & Faloona, ACP, 2022, has carefully inspected AQ data from 10 sites across the Central Valley from 2016-2020 (June-Sept) and found that wildfires impacted 1 in 5 days of the study, and that on average the 24-hr PM2.5 in the SJV was elevated by 8.2 μg m^{-3} during these days. One in five days is already likely to tax the ability of the regulatory system to allocate exemption days due to wildfires, and this problem is only going to get worse. Therefore, forecasting PM2.5 air quality into the next decade is going to require much more realistic considerations of the rapidly increasing wildfire impacts (CA burned area is rising exponentially with a doubling rate of 10-20 years), in addition to the agricultural

soil sources mentioned above, which are also rising due to increasing fertilizer use and a warming climate.