

Mobile Source Emission Factors

Donald H. Stedman and Gary A. Bishop

Chem. Dept. University of Denver

Denver CO 80208 ph 303 269 9839

dstedman@du.edu gbishop@du.edu

www.feat.biochem.du.edu

If you need a MOBILE SOURCE emission factor you have a choice of using a computer model (very unreliable), aircraft studies, a tunnel study or on-road remote sensing which is by an order of magnitude the least expensive technique.

Why the models are unreliable

Most of the on-road emissions come from a few gross emitters, some older MY, some “modified”.

Models are based upon dynamometer results.

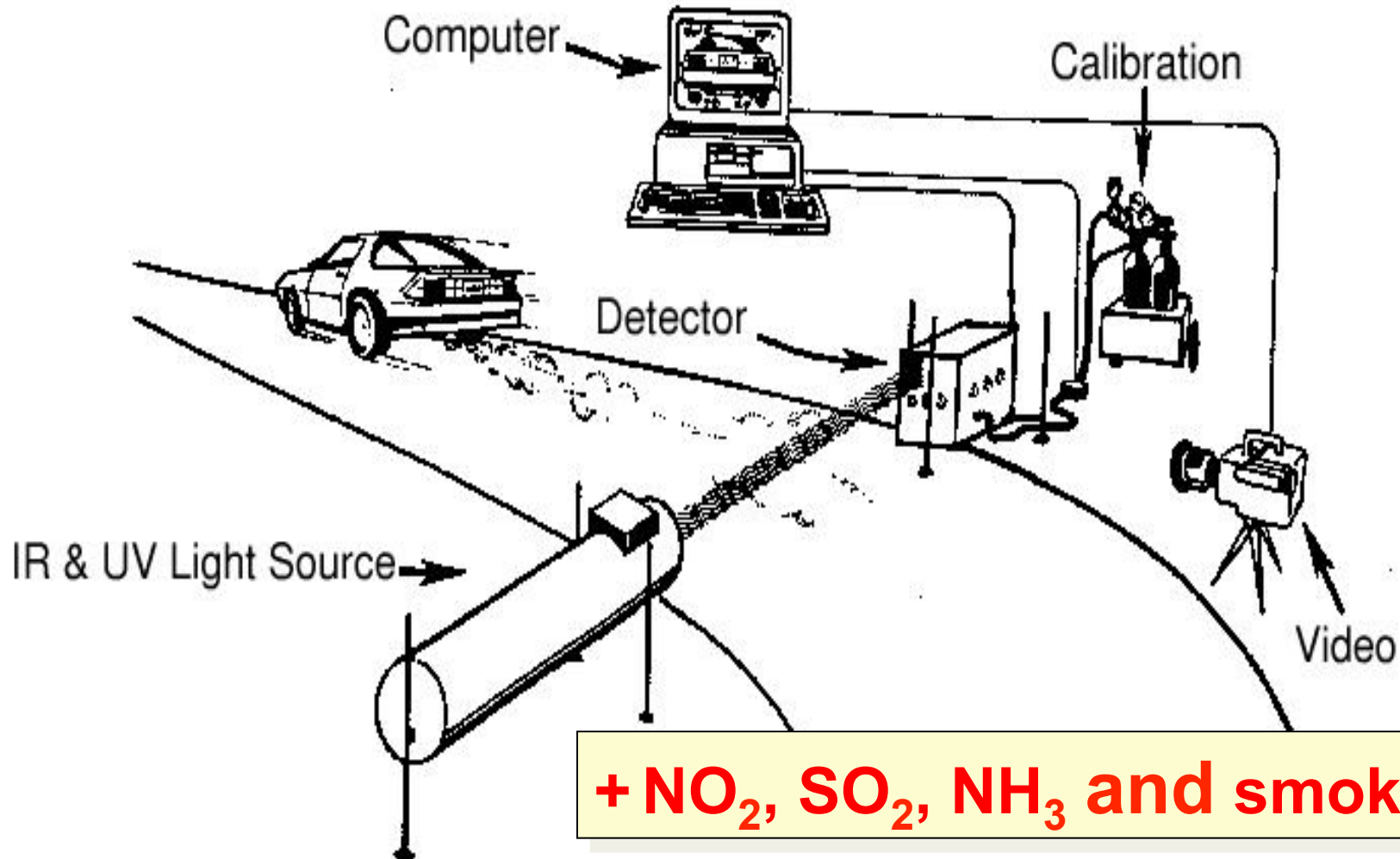
Dynamometer owners don't study gross emitters because their emissions are so variable and so gross that the apparatus needs to be rebuilt if they study one.

Owners of “modified” vehicles do not volunteer for government programs.

The computer models are built by the same agency that is responsible for the regulations governing motor vehicle emissions. They are bound to be a bit optimistic regarding the success of their regulations.

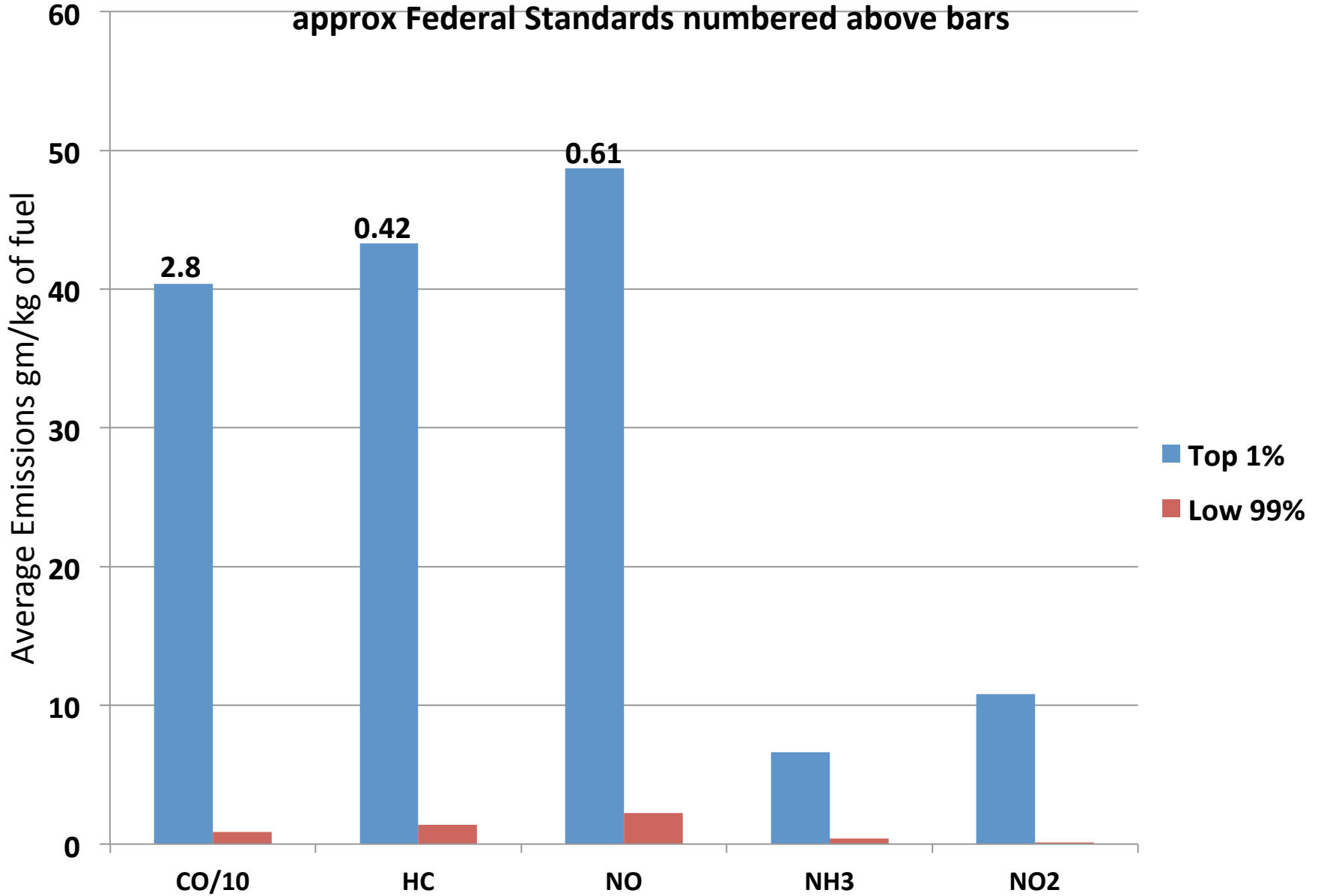
- Fujita et al JAWMA **62**, 1134-1139, 2012 showed that the VOC/NO_x model emission factors were wrong by factors of 1.4-3.1.
- On-road remote sensing results in Van Nuys a few weeks before the Fujita Van Nuys tunnel study showed good agreement.
- A typical week of on-road remote sensing obtains about 25,000 representative readings of CO, HC, NO, NO₂, SO₂ and NH₃ fuel-based emissions for a few \$\$ per vehicle measured.

CO, HC and NO Remote Sensing



Average Emissions from top 1% and lower 99%, N=19242, Denver 2014

approx Federal Standards numbered above bars



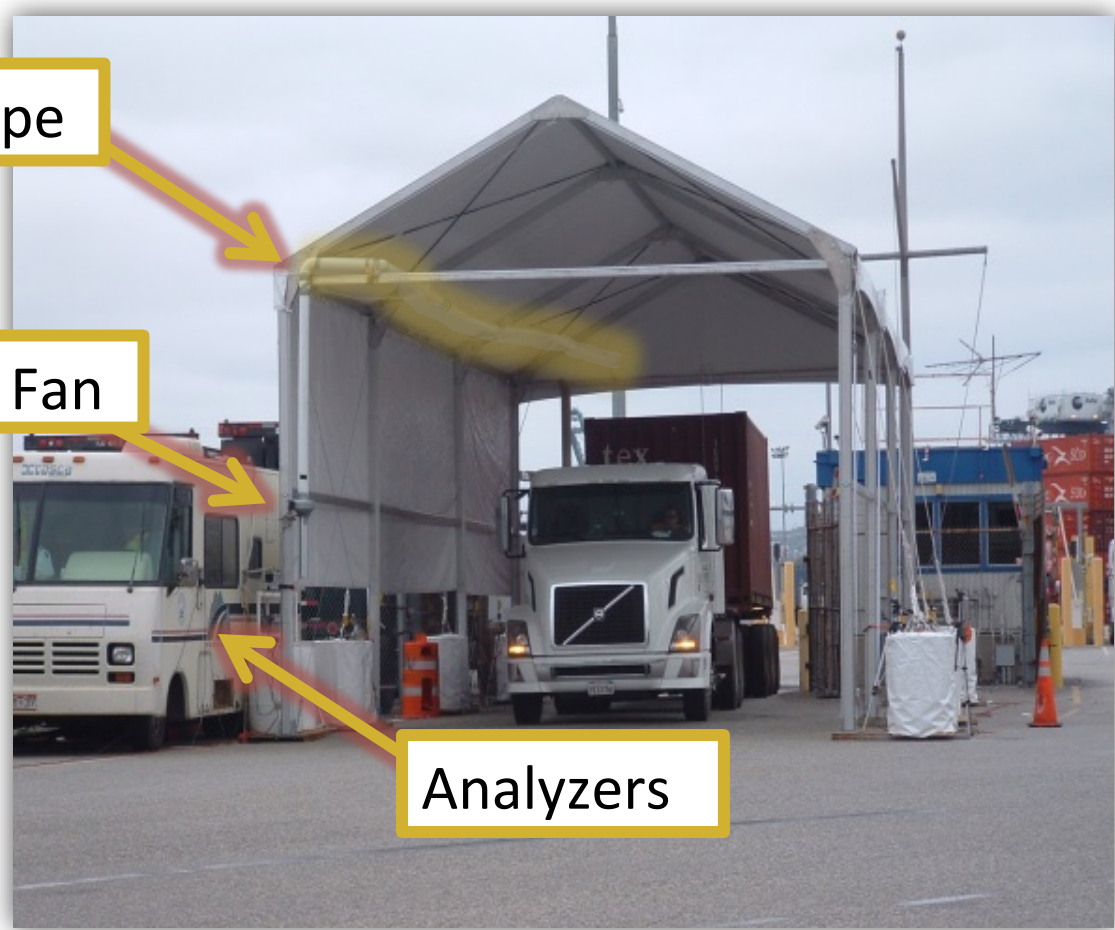
OHMS

- ◆ Pipe 50ft long
- ◆ Measurements of 15-20 sec
- ◆ Speed & Acceleration
- ◆ License Plate
- ◆ IR Exhaust Pipe Temperature

Pipe

Inline Fan

Analyzers



- ◆ Horiba AIA 240; NDIR – CO₂ & CO
- ◆ Horiba FCA 240; FID/Chemi – HC & NO
- ◆ Horiba FCA 240; Chemi – Total NO_x
- ◆ Droplet Measurement Tech PAX – Black Carbon
- ◆ Dekati Mass Monitor (DMM 230A) – PM mass & number