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Heavy Duty Truck Emissions

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First Mexico City Remote Sensing Symposium
March 27-28, 2014

HEAVY DUTY TRUCK EMISSIONS

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Truck RSD acknowledgements

- Measurements of all pollutants in California supported by NREL, SCAQMD and CARB.
- Peralta weigh station (E-bound 91) and Port of LA roughly 2000 trucks at each location.
- Optical RSD Measurements 2008, 2009, 2010 and 2012.
- 2013 SHED/OHMS measurements Port and Cottonwood weigh station (N-bound I-5).
- Texas with NCTCOG and TAMU.
- Vancouver with DU and Envirotest Canada.

Two remote sensing methods to deal with high level exhaust

- Optical remote sensing (RSD) on a tower or scaffolding.
- SHED/OHMS which integrates about an eight second acceleration cycle of emissions.



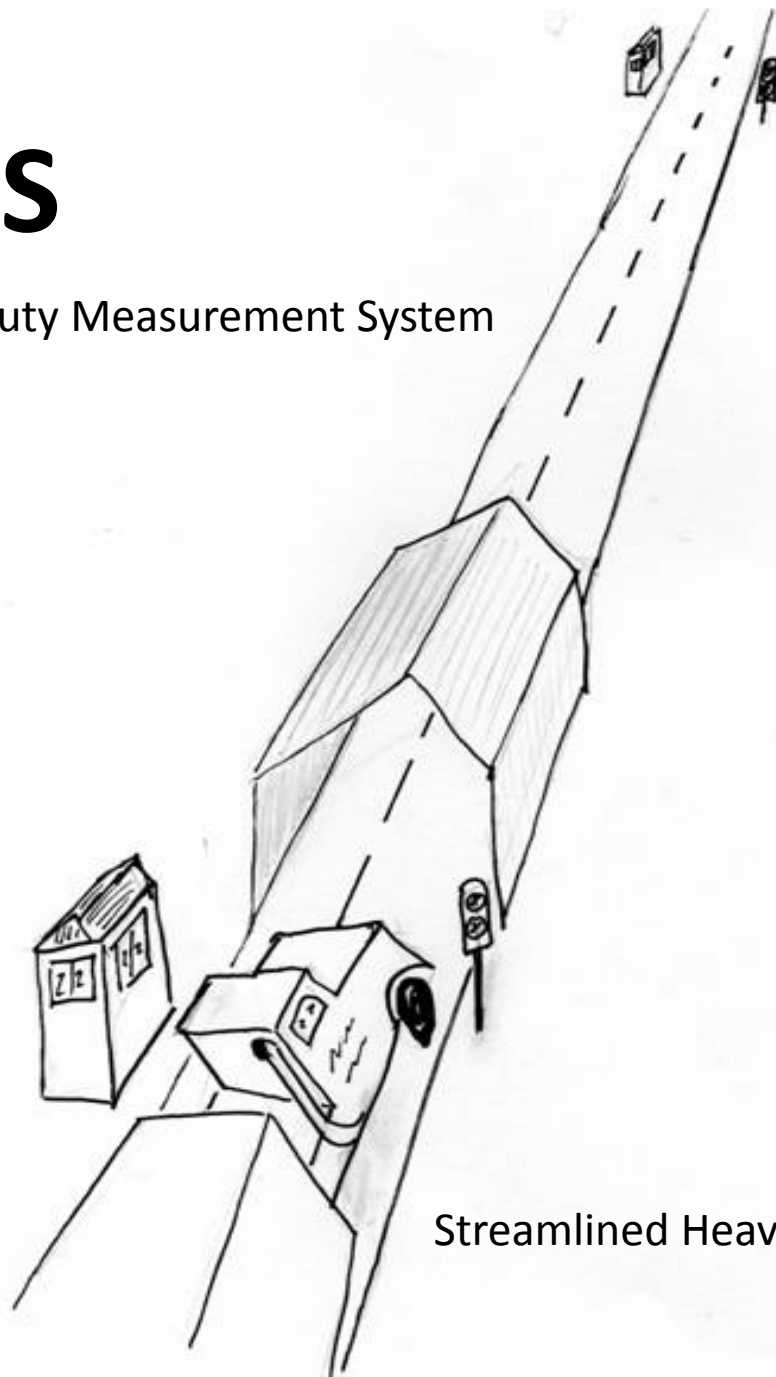
Vancouver OHMS





OHMS

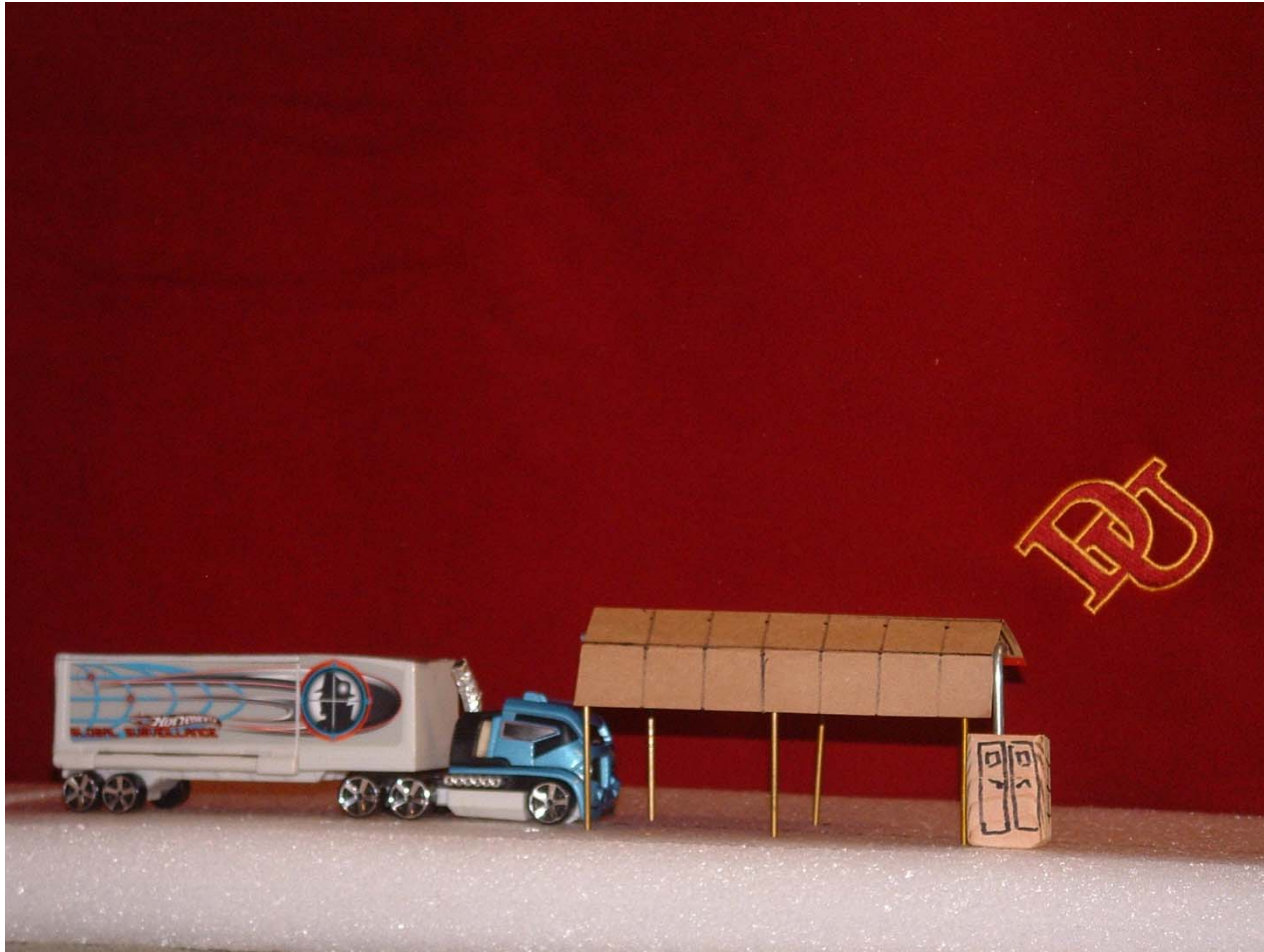
On-road Heavy-duty Measurement System



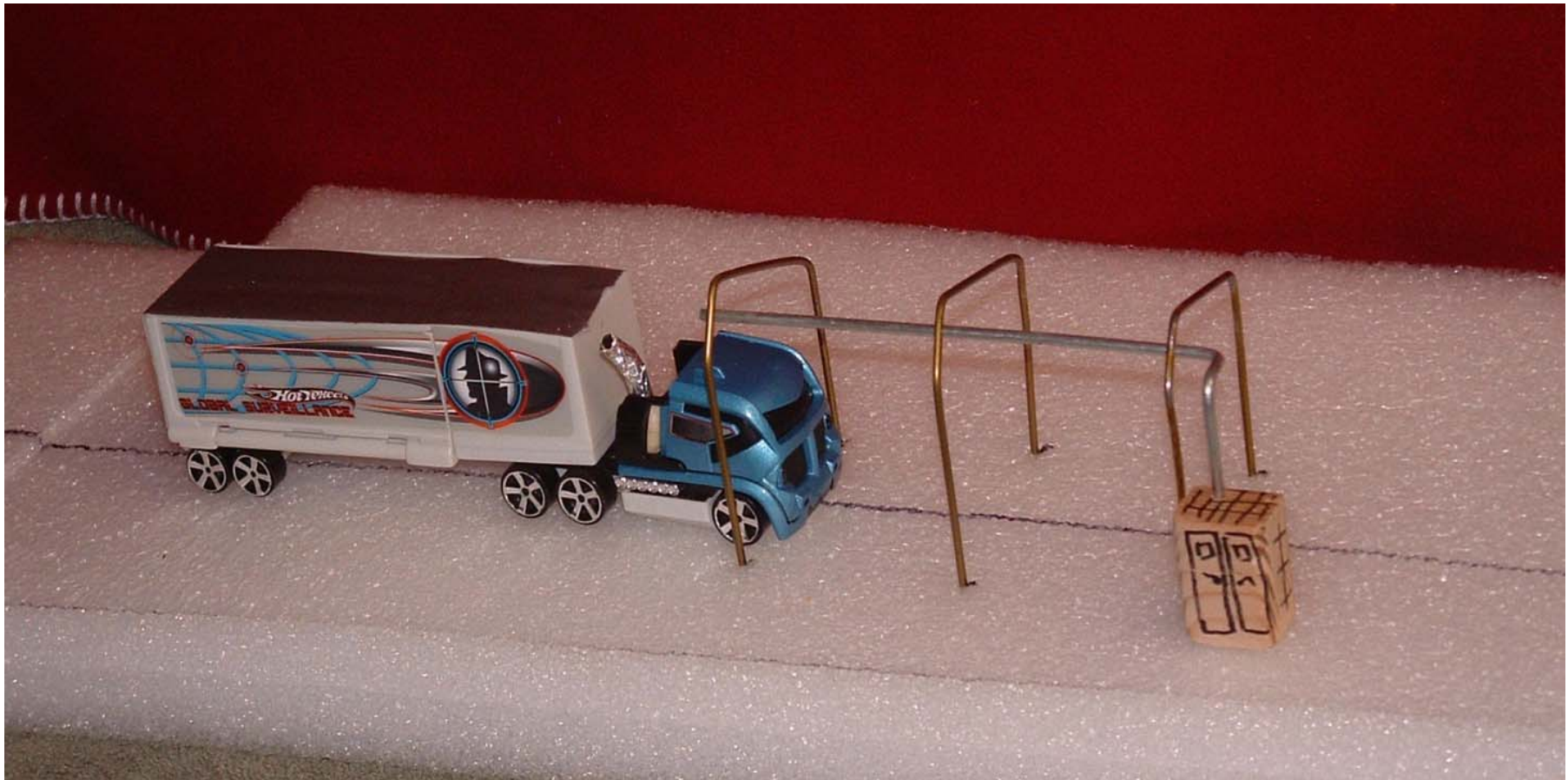
SHED

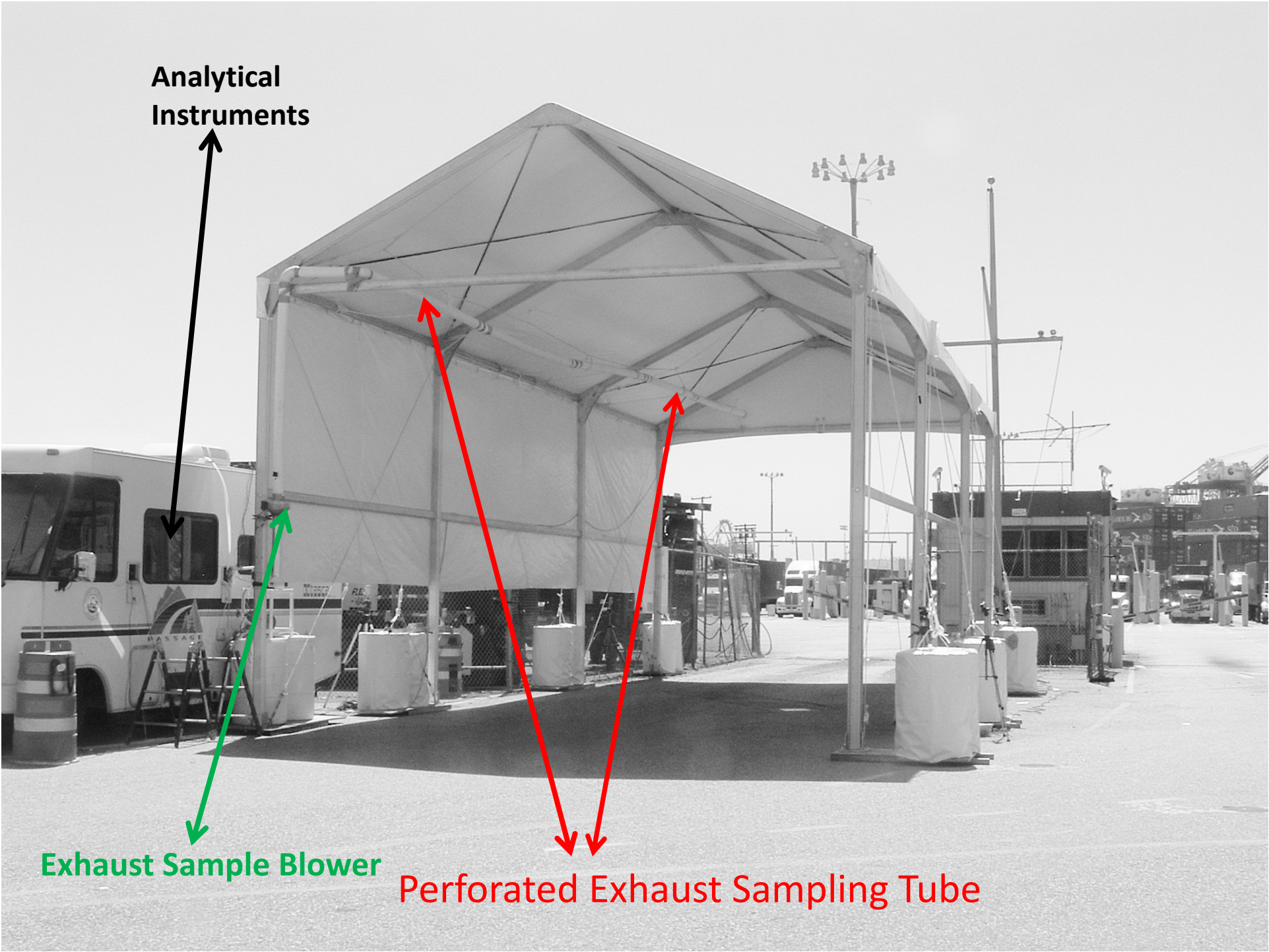
Streamlined Heavy-duty Emissions Determination

Truck about to pass under test shed



Shows perforated extraction tube leading to instrument enclosure





Analytical
Instruments

Exhaust Sample Blower

Perforated Exhaust Sampling Tube

OHMS

- Speed & Acceleration
- License Plate
- IR Exhaust Temperature



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

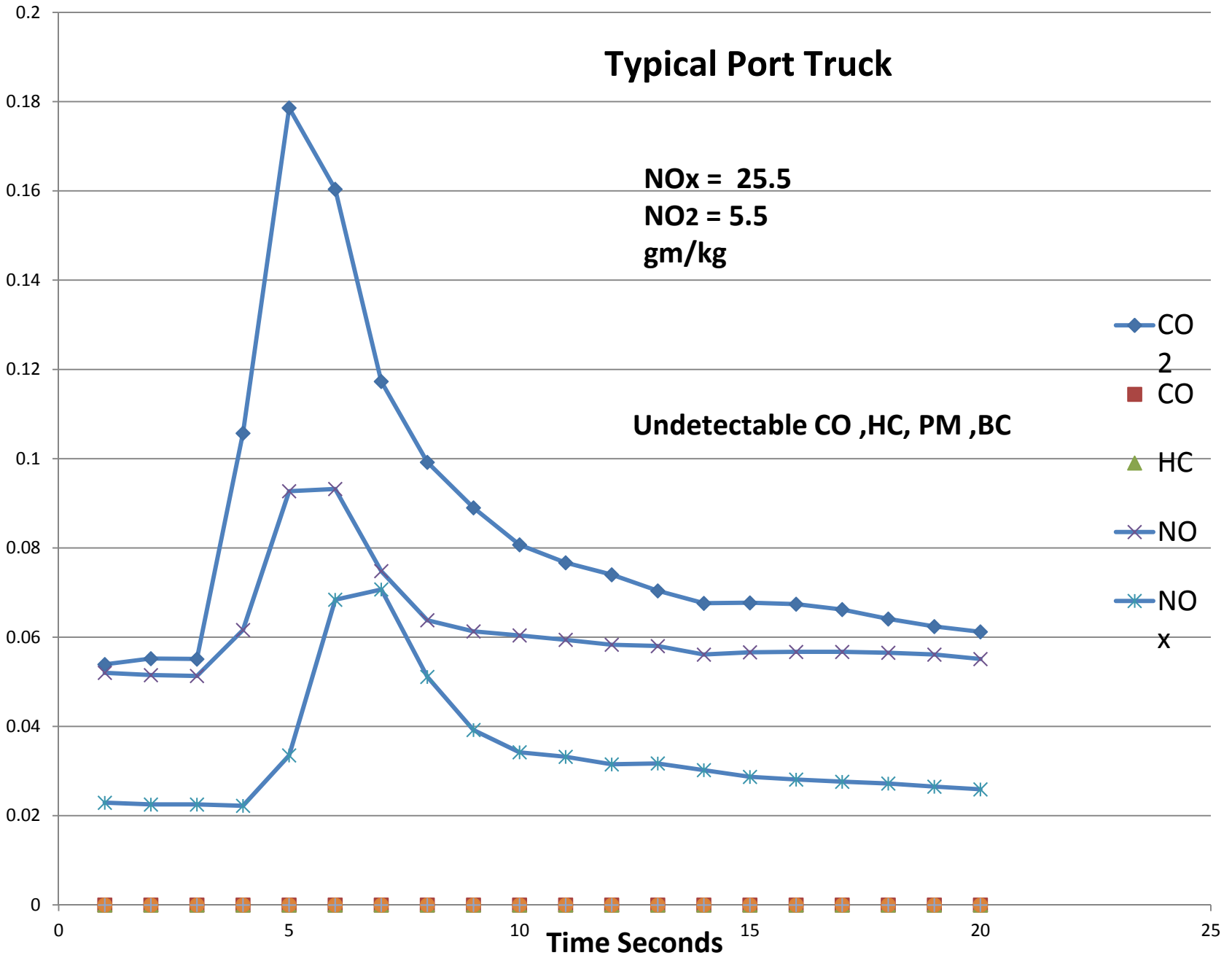
Typical Port Truck

NO_x = 25.5
NO₂ = 5.5
gm/kg

**V
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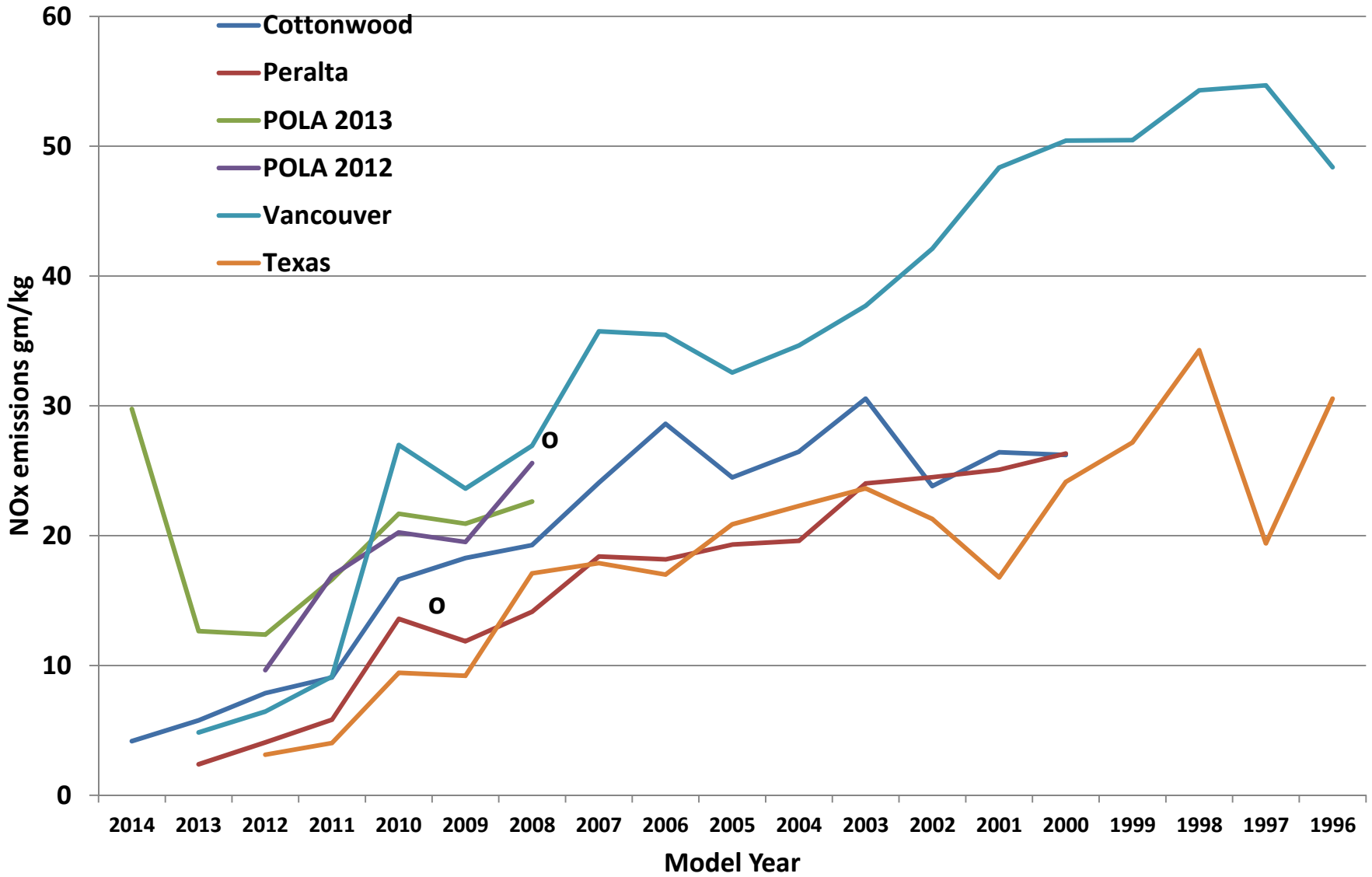
Undetectable CO ,HC, PM ,BC

- ◆ CO
- 2
- CO
- ▲ HC
- × NO
- × NO



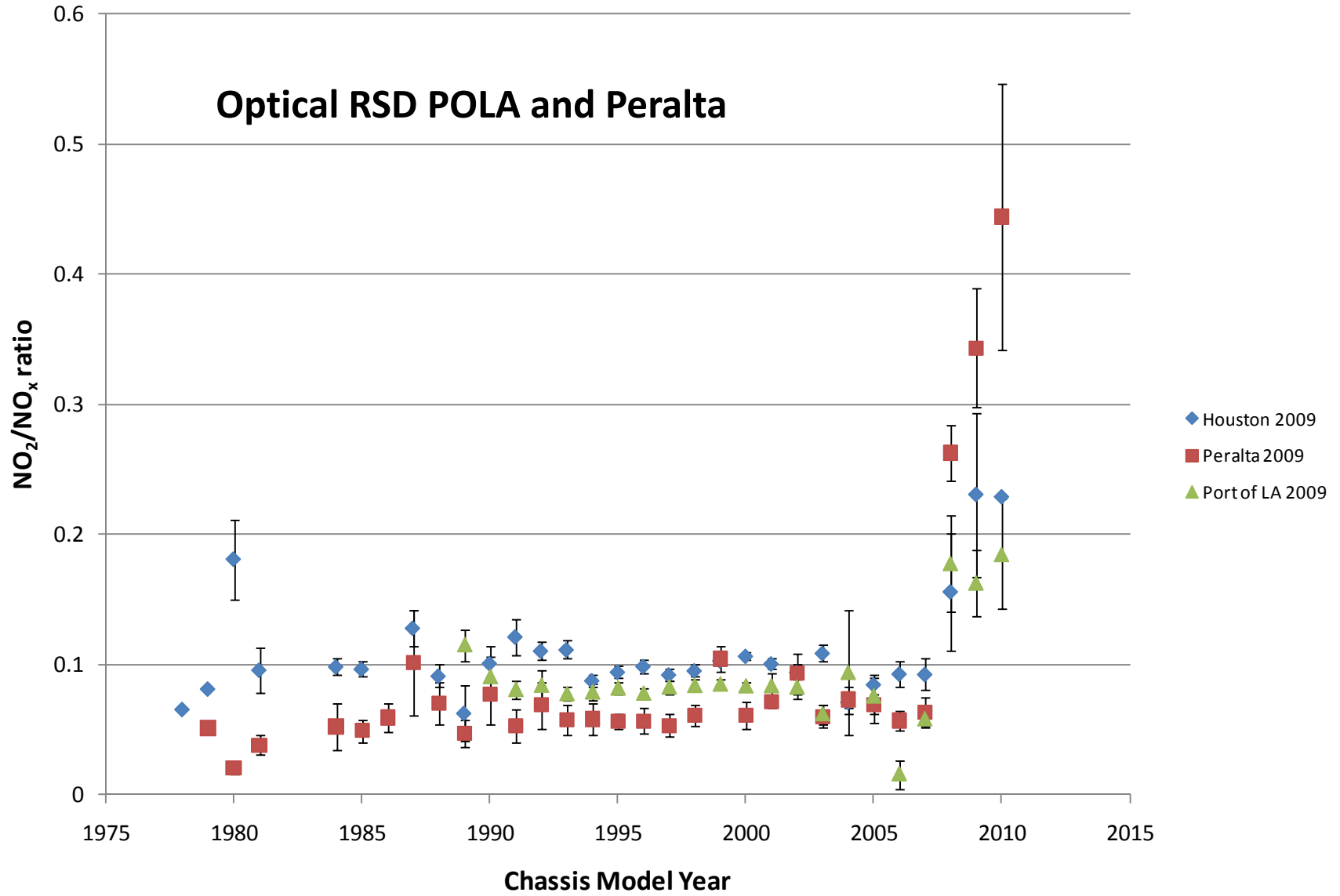
HDDV NOx Emissions by OHMS/SHED and by RSD optical method "O"

N= about 10,000

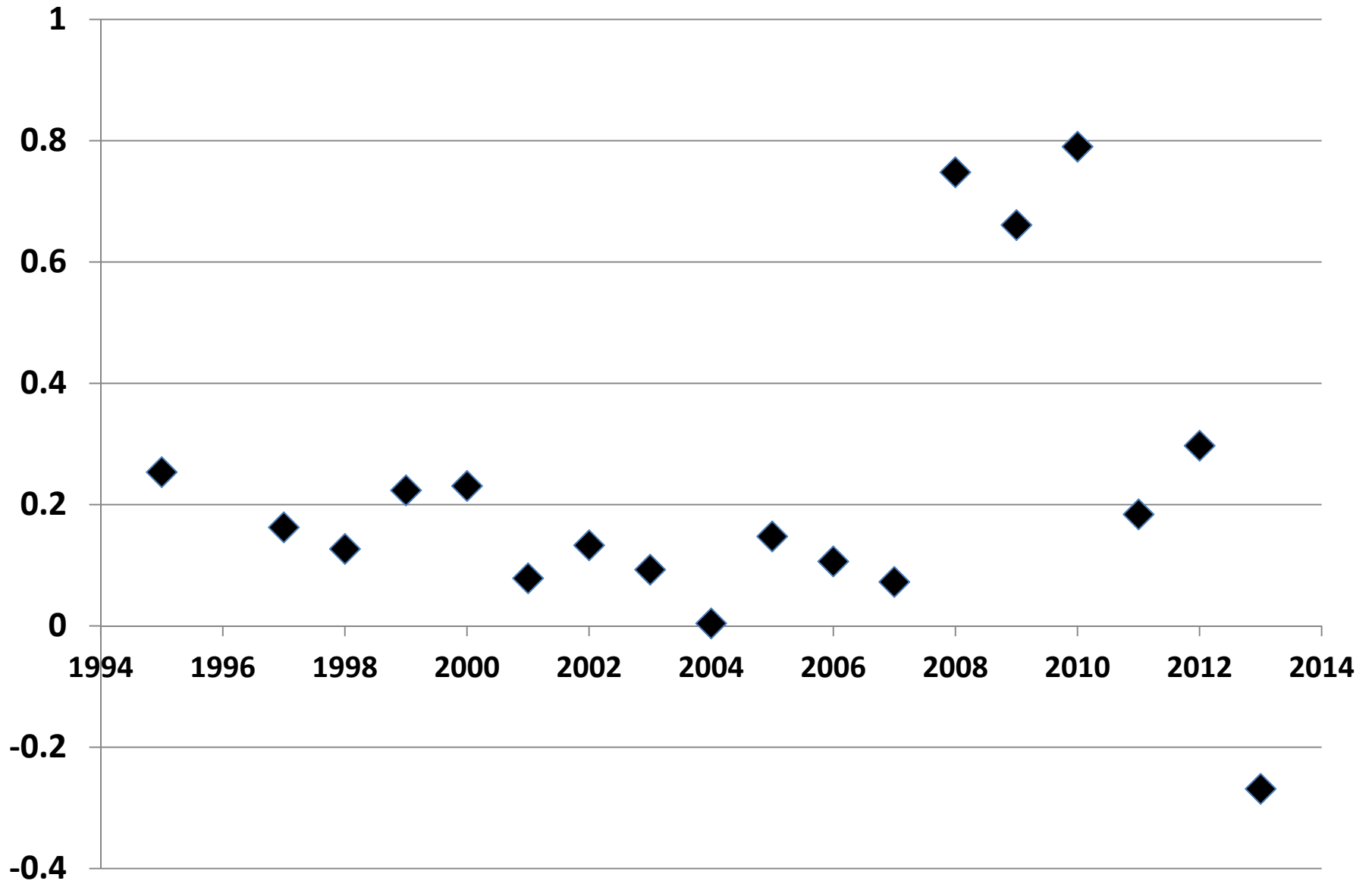


NO₂/NO_x Ratio

Optical RSD POLA and Peralta



NO2/NOx OHMS Vancouver 2013



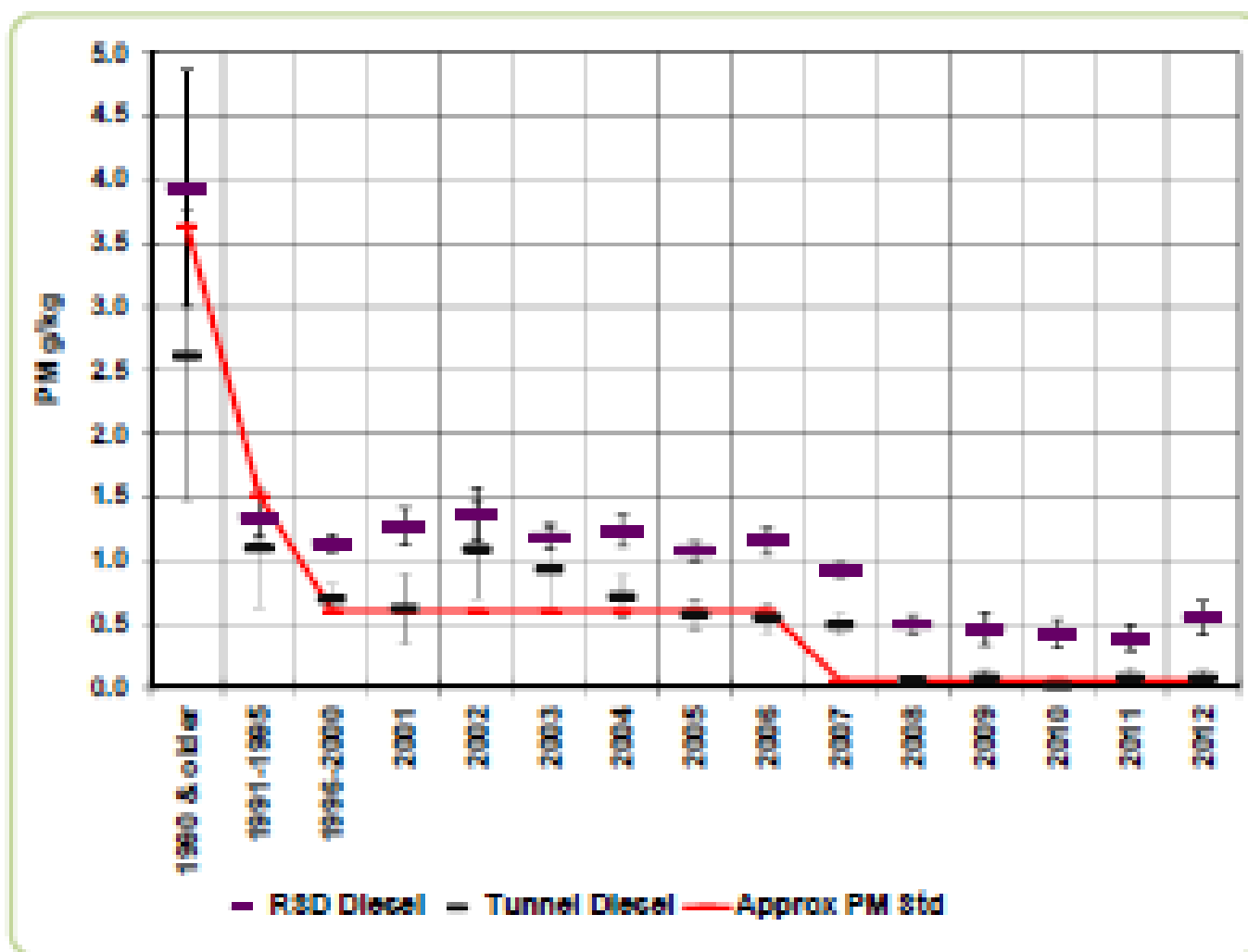
HDDV NO_x results

- Optical one second snapshot and SHED/OHMS results provide reasonable agreement on HDDV NO_x emissions by model year.
- OHMS results do not (yet?) meet the USEPA 2010 standard of about 1.33 gm/kg of fuel. This may arise from averaging.
- Interesting things happen with the NO₂/NO_x ratio by MY.

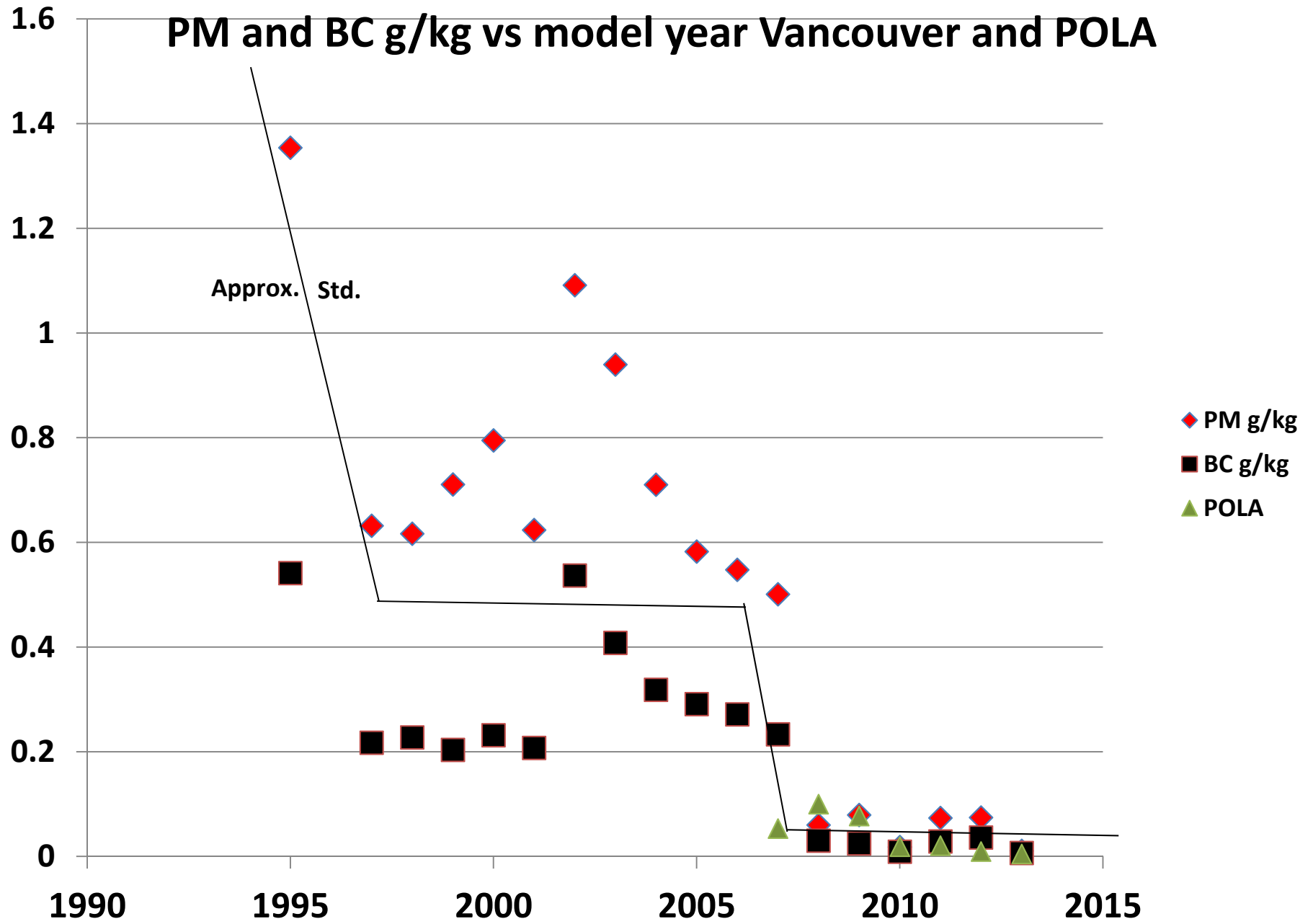
OHMS Smoke Results

- Attend CRC next week for most up to date OHMS smoke results.
- Next slide shows Vancouver smoke results in which the newest HDDV mostly meet the USEPA and CARB standards of about 0.07 gm/kg.
- The one second optical snap shot RSD does appear to have a small offset of about 0.5 gm/kg.
- From older HDDV smoke is throttle dependent.
- Note that Port 2007 chassis HDDV were required to meet 2007 motor smoke emission standards.

Figure I-3: Heavy-duty Vehicle PM Emissions: Tunnel and RSD



PM and BC g/kg vs model year Vancouver and POLA



Applications

- Entry to Ports? Weigh stations?
- Border crossing (including weight power and braking capability)
- HDV I/M “My car gets tested what are you doing about all those trucks”? Essentially an ASM or IM240 test using the road as the dynamometer
- DPF (and SCR) deterioration; random testing

Texas



Texas



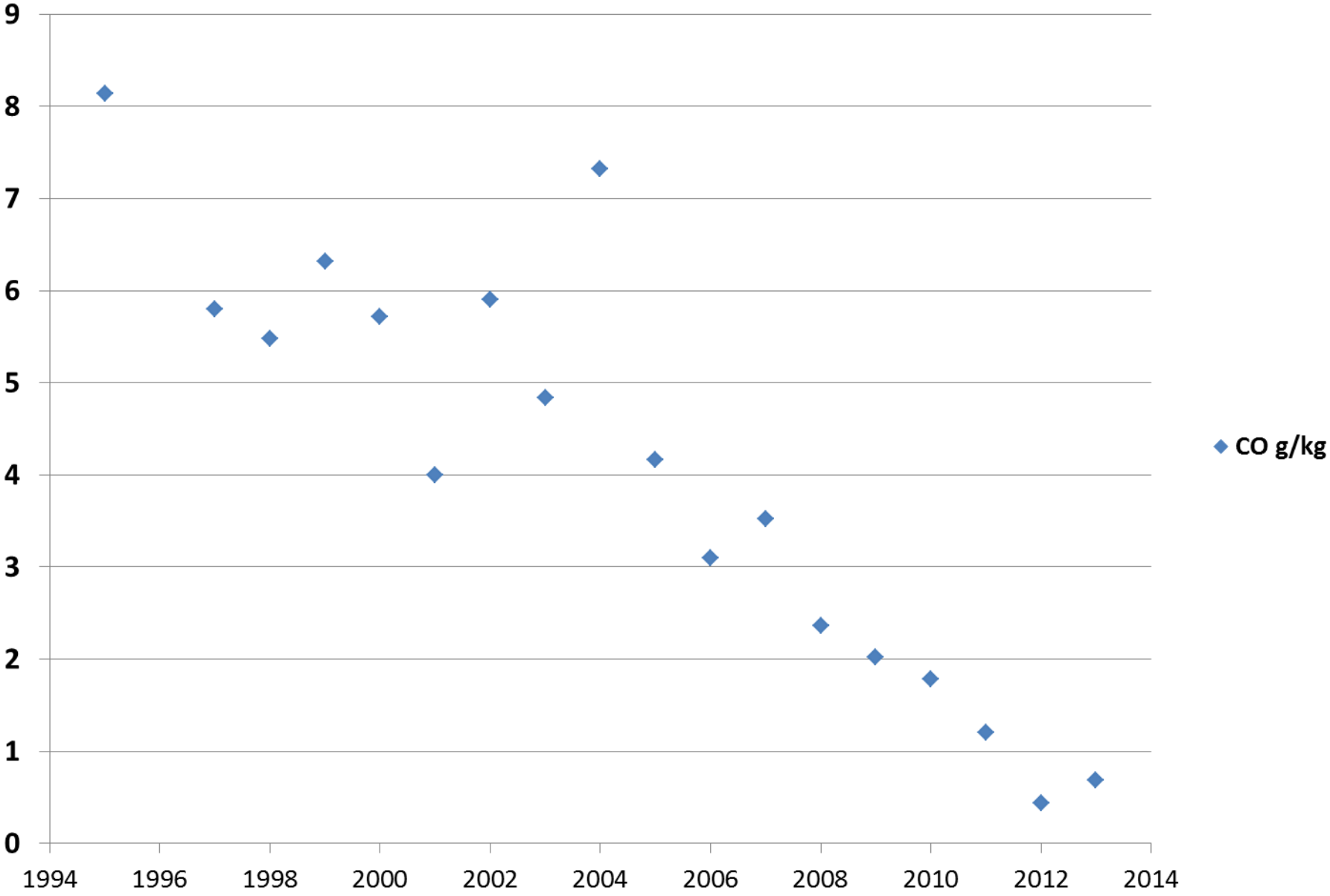
Port of LA OHMS

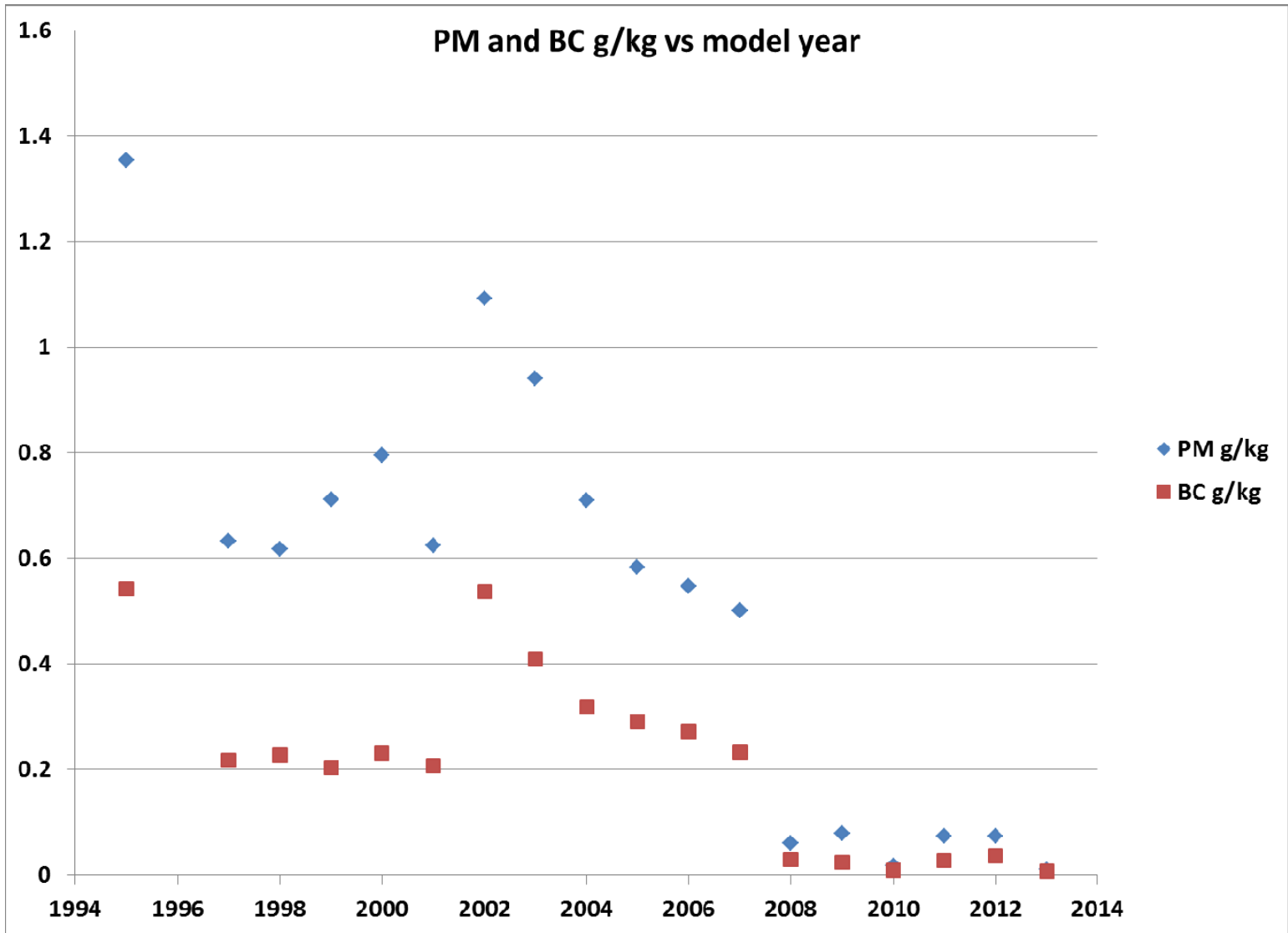


Cottonwood OHMS

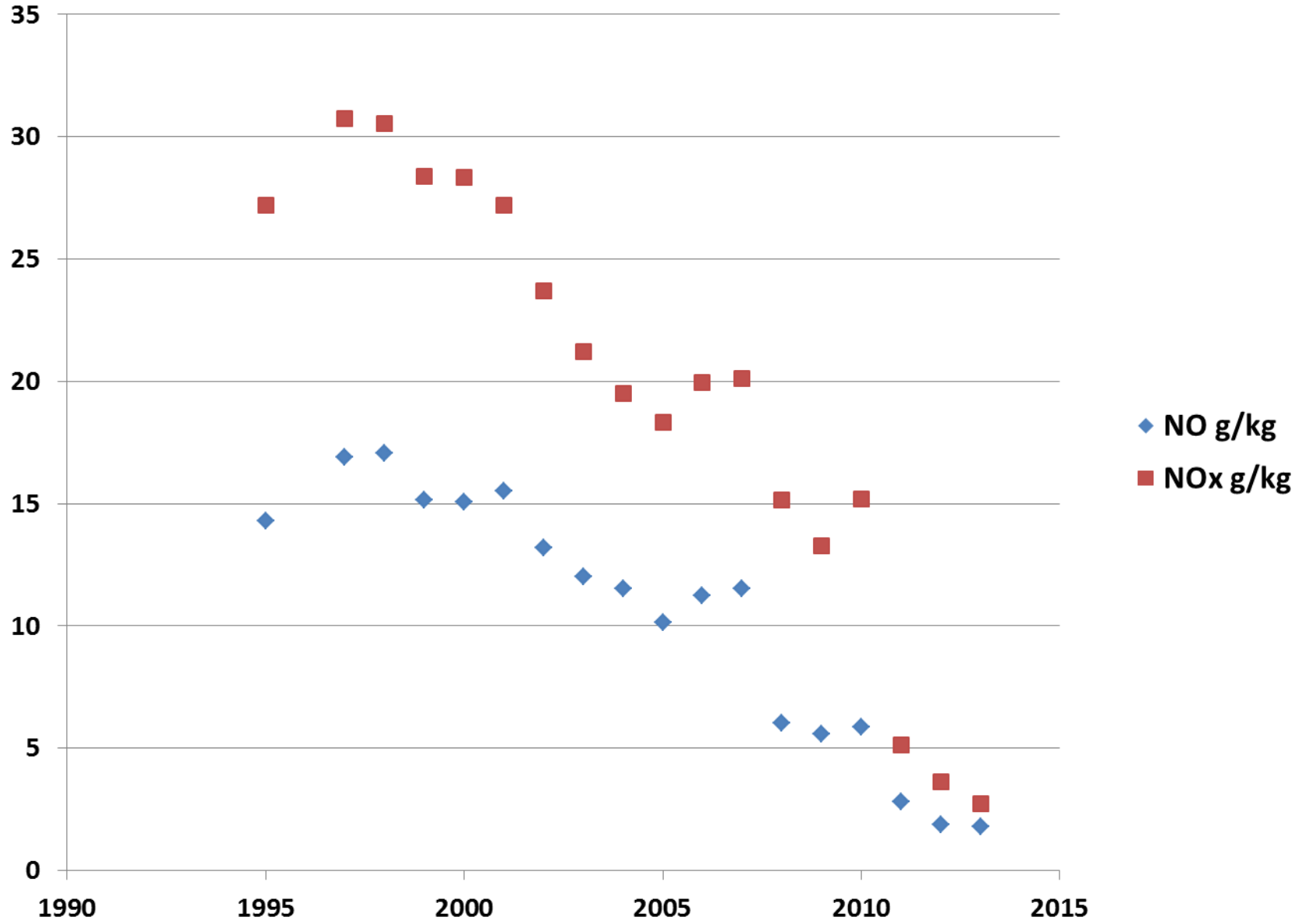


CO g/kg vs model year





NO and NOx g/kg vs Model Year



Conclusions

- OHMS works!
- It works in narrow low tents and taller wider tents (except tall and wide loses some lower exhaust trucks in a strong headwind).
- Texas had problems with CO and HC early and BC all the time.
- Vancouver and more recent data look very good.
- Emissions results of new regulations are apparent especially smoke.
- OHMS test takes 15 seconds.
- PEMS >2 hrs, HDDyno ~12 hrs!



What is a DPF Delete? Which kit do I need?

Breath easy. We have everything you need to know below.

Thank You

- Questions