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.
• 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
Show: perforated extraction tube leading to instrument enclosure
OHMS

- Speed & Acceleration
- License Plate
- IR Exhaust Temperature

- Horiba AIA 240; NDIR – CO$_2$ & 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**

$\text{NO}_x = 25.5$

$\text{NO}_2 = 5.5$

$\text{gm/kg}$

**Undetectable CO, HC, PM, BC**
HDDV NOx Emissions by OHMS/SHED and by RSD optical method "O"
N= about 10,000

- Cottonwood
- Peralta
- POLA 2013
- POLA 2012
- Vancouver
- Texas

<table>
<thead>
<tr>
<th>Model Year</th>
<th>HDDV NOx Emissions by OHMS/SHED</th>
<th>HDDV NOx Emissions by RSD optical method</th>
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NO2/NOx OHMS Vancouver 2013
HDDV NOx results

- Optical one second snapshot and SHED/OHMS results provide reasonable agreement on HDDV NOx 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 NO$_2$/NOx 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

Approx. Std.

PM g/kg
BC g/kg
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
Cottonwood OHMS
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