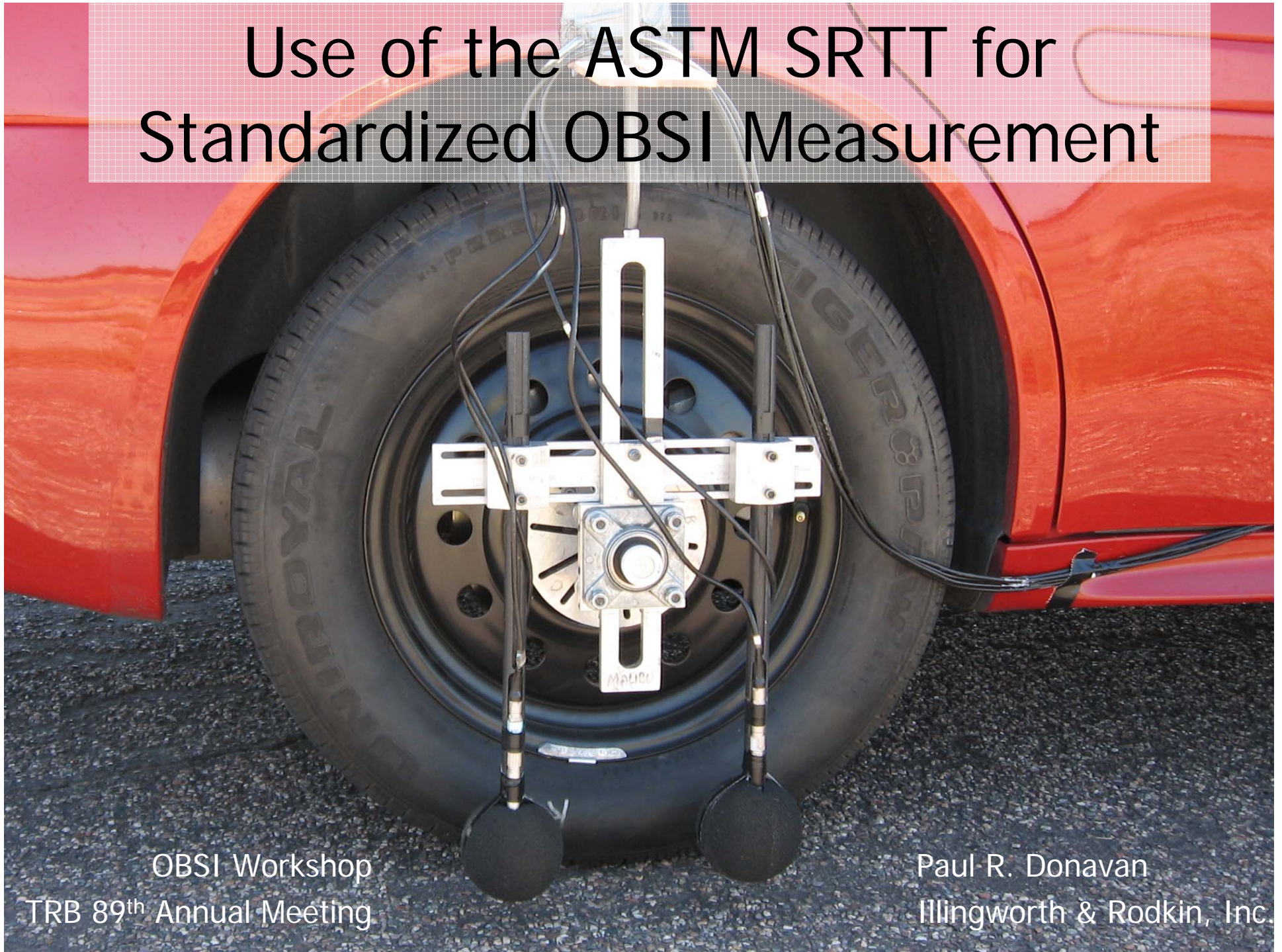


# Use of the ASTM SRTT for Standardized OBSI Measurement



OBSI Workshop  
TRB 89<sup>th</sup> Annual Meeting

Paul R. Donavan  
Illingworth & Rodkin, Inc.



# US Standard Test Tire Migration

**Goodyear Aquatred 3**  
**P205/70R15**



**UniRoyal SRTT**  
**P225/60R16**



# Issues for a Benchmark Tire

- Long term & international availability
- Variation between “identical” tires
- Change in noise generation over time
- Break-in & warm-up period
- Relationship to other, in-service tires



# ATSM Standard Reference Test Tire (SRTT)

- SRTT To be constructed for 10 years
- UniRoyal Tiger Paw brand, supplier is Michelin
- Use in the US & Europe
- Can be ordered internationally
- Relatively high cost tire

# SRTT Specification



Designation: F 2493 – 06

Standard Specification for  
P225/60R16 97S Radial Standard Reference Test Tire<sup>1</sup>

- Durometer hardness Type A –  $64 \pm 2$ 
  - Equilibrium temperature –  $73.4^{\circ}\text{F} \pm 3.6^{\circ}$
  - Average of 4 ribs – center rib excluded
- Storage
  - Not to exceed  $70^{\circ}\text{F}$
  - Limit ozone exposure
- Wheel rim width –  $6.5'' \pm 0.5''$
- Current cost ~ \$400

# Tire-to-Tire Variation

- Six tires of different age/mileage
  - Two used in testing previously (~700 & 125 mi)
  - Four new to be used for passby testing
- Pavements (7 total)
  - DGAC – one typical (two directions), one course
  - OGAC – two directions of travel
  - PCC – one longitudinally tined, one ground
- Average of three runs

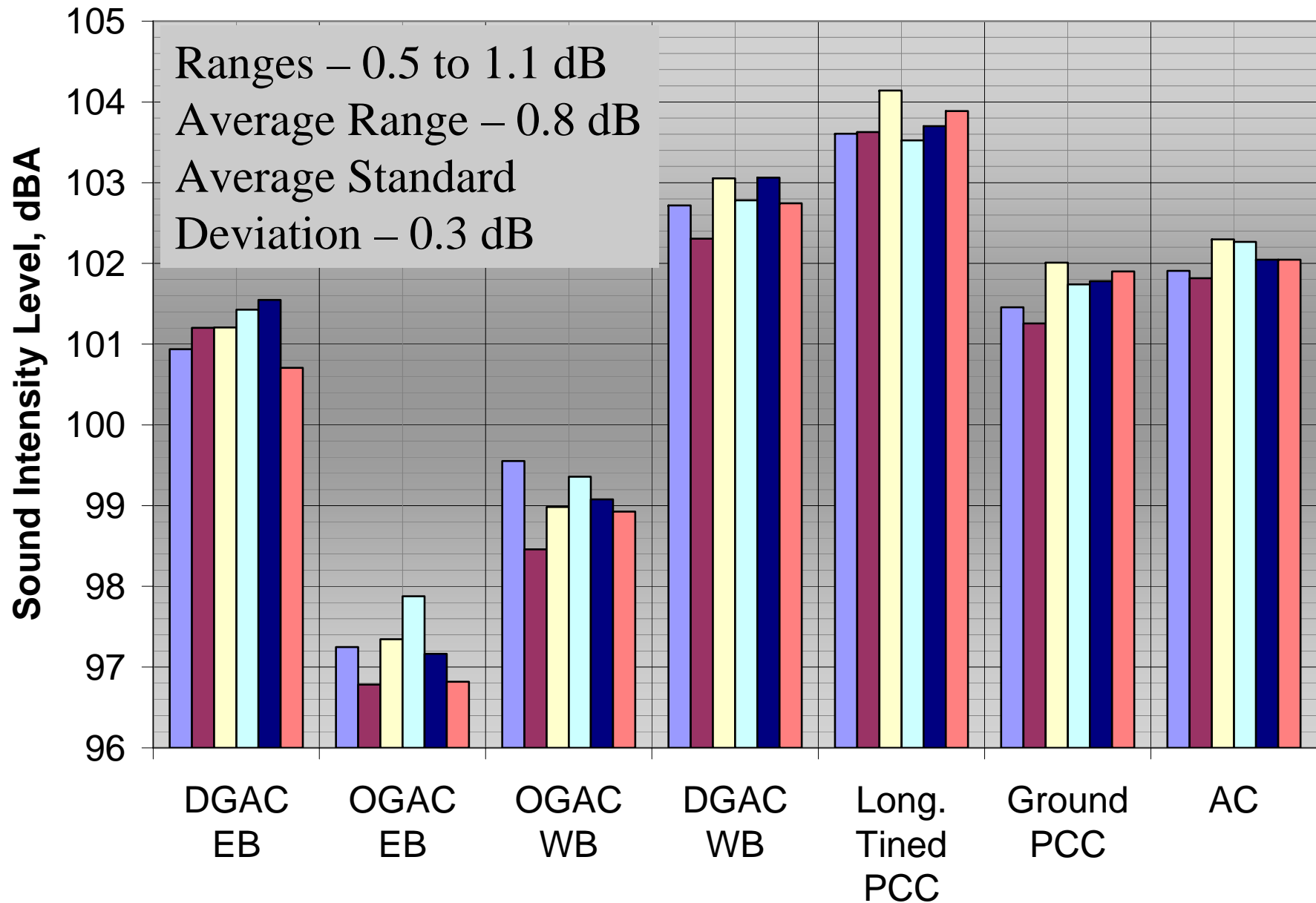


# SRTT Test Tires (2007)

Designation	Manufacturer Date	Purchase Date	Application	Km at Start	Average Hardness
SRTT #1	Oct-05	Mar-06	Secondary OBSI	~ 1000	63
SRTT #2	Oct-05	Mar-06	Primary OBSI	~ 200	64
LF Passby	Jul-06	Oct-06	Passby tire	0	64
LR Passby	Jul-06	Oct-06	Passby tire	0	65
RF Passby	Jul-06	Oct-06	Passby tire	0	64
RR Passby	Jul-06	Oct-06	Passby tire	0	64

Date of Testing = May 2007

# SRTT Tire-to-Tire Variation (2007)

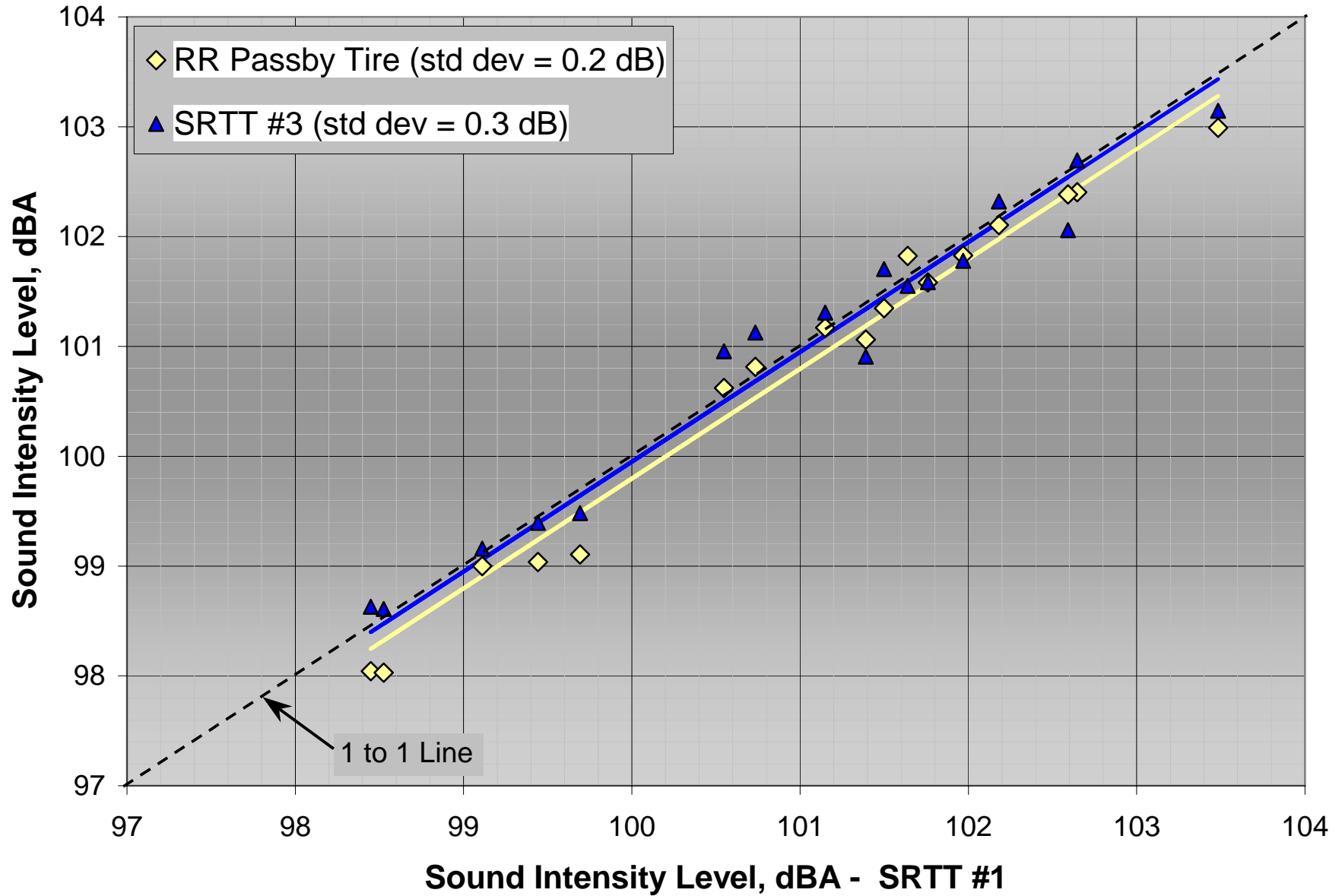




# SRTT Test Tires – 2007 & 2008

Designation	Manufacturer Date	Purchase Date	Application	Km at Start	Average Durometer
SRTT #1	Oct-05	Mar-06	Primary OBSI	~ 1000	63
SRTT #2	Oct-05	Mar-06	Secondary OBSI	~ 200	64
LF Passby	Jul-06	Oct-06	Passby tire	0	64
LR Passby	Jul-06	Oct-06	Passby tire	0	65
RF Passby	Jul-06	Oct-06	Passby tire	0	64
RR Passby	Jul-06	Oct-06	Passby tire	0	64
SRTT #1	Oct-05	Mar-06	Secondary OBSI	~ 2000	66
RR Passby	Jul-06	Oct-06	Passby tire	~ 300	63
SRTT #3	Oct-07	Oct-08	New Backup	0	62

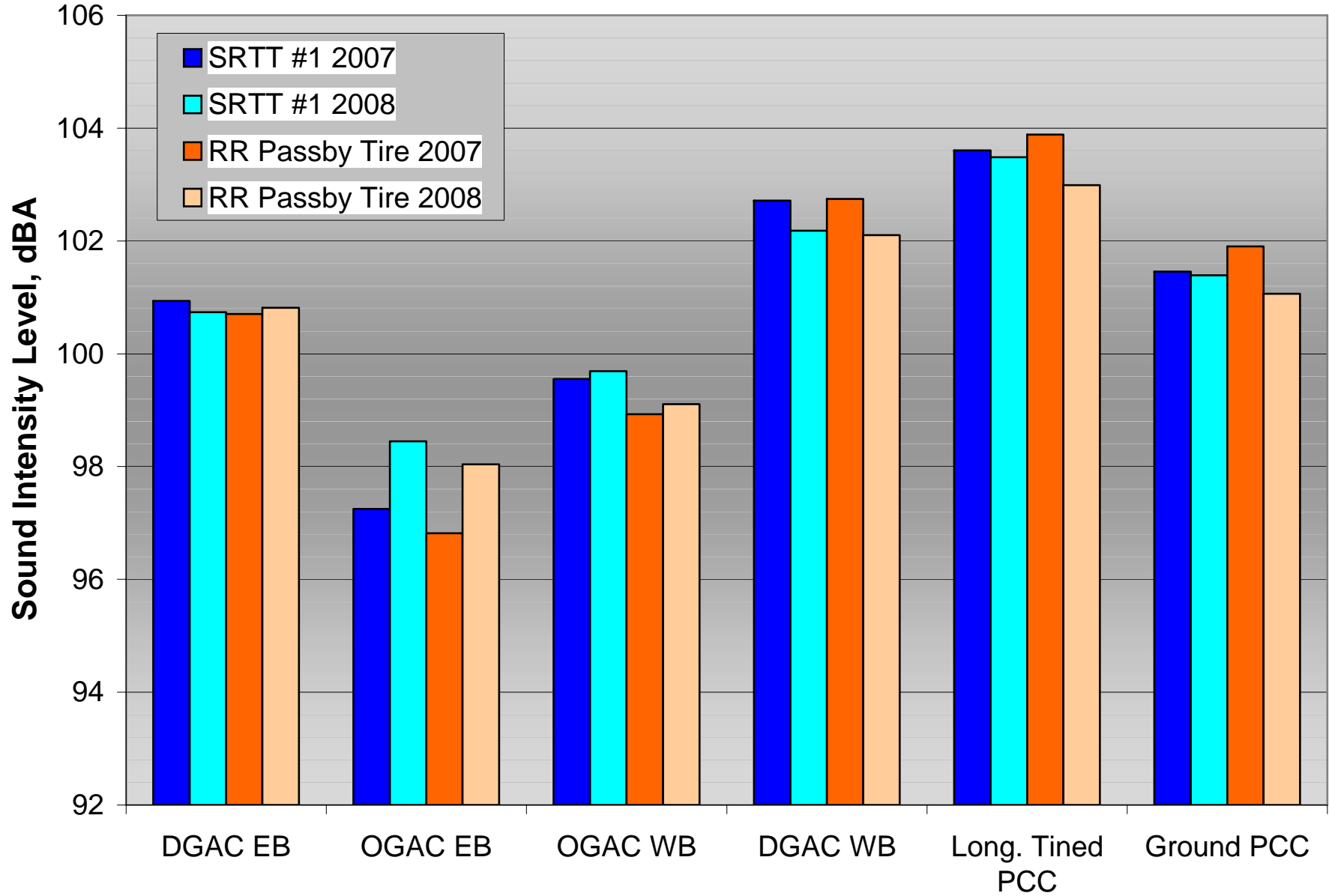
# SRTT Tire-to-Tire Variation (2008)



# Change in Noise over Time

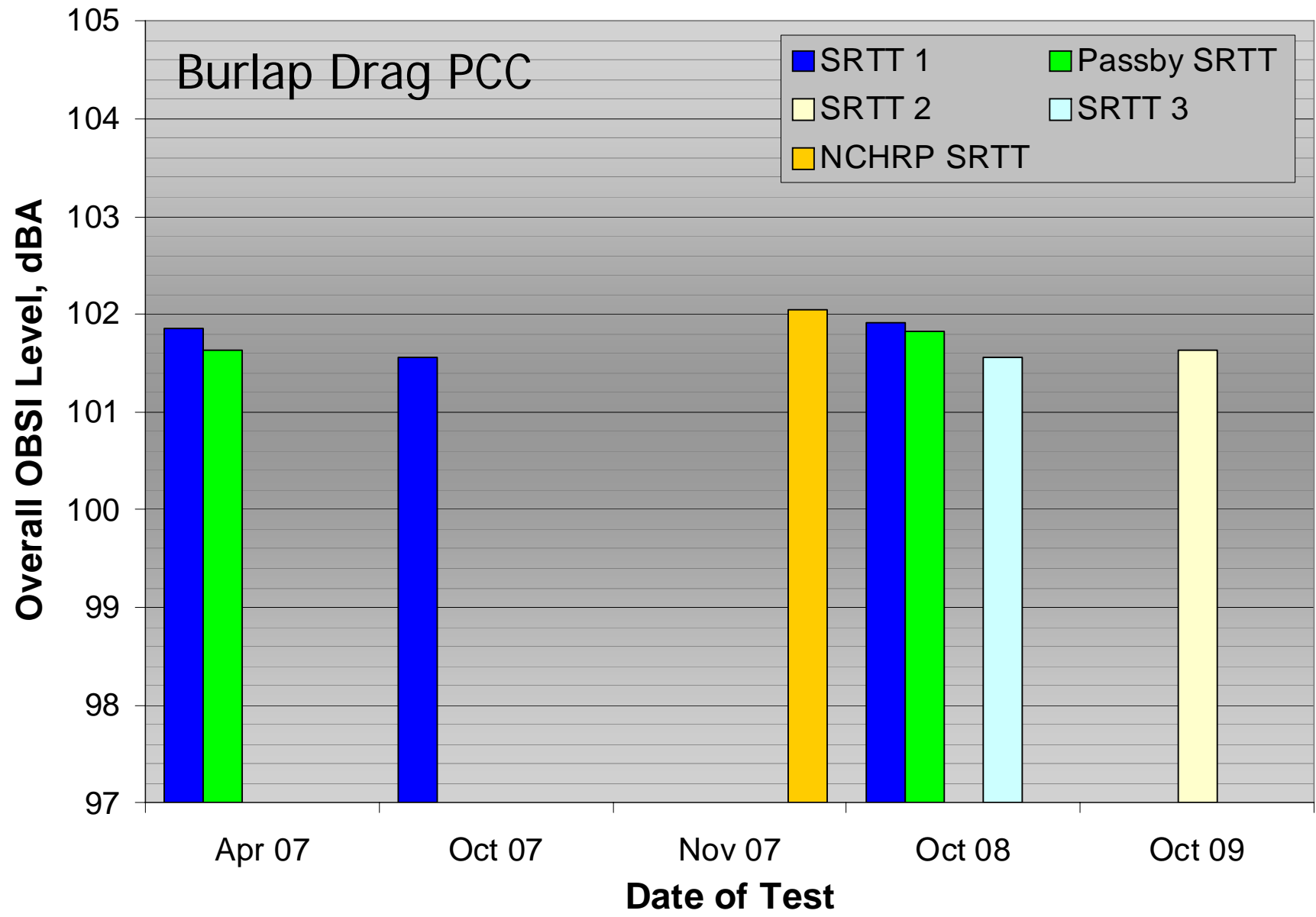
- Tire durometer hardness (tire aging)
  - Noise increases with hardness
  - Hardness increases with aging
  - Reported effect ~ 2 dB per 10 durometer numbers
  - Hardness increases at higher rate with exposure to higher temperature and ozone amounts
- Tread depth (tire wear)
  - Inconsistent trends
  - Results varying with test surface
- Very limited data specific to the SRTT

# Variation in Level 5/2007 to 10/2008

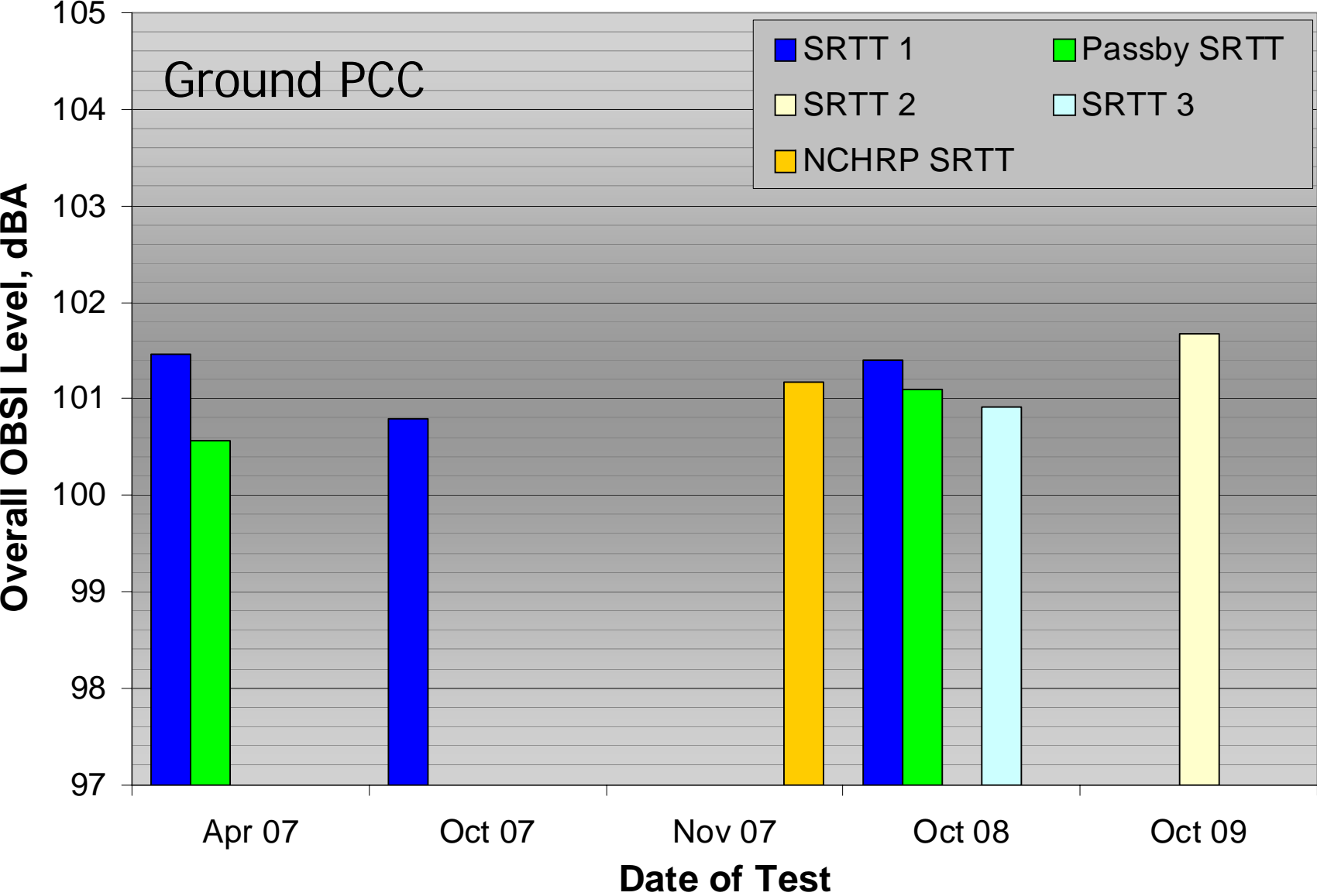




# Variation by Tire & Age



# Variation by Tire & Age



# Tire Comparisons

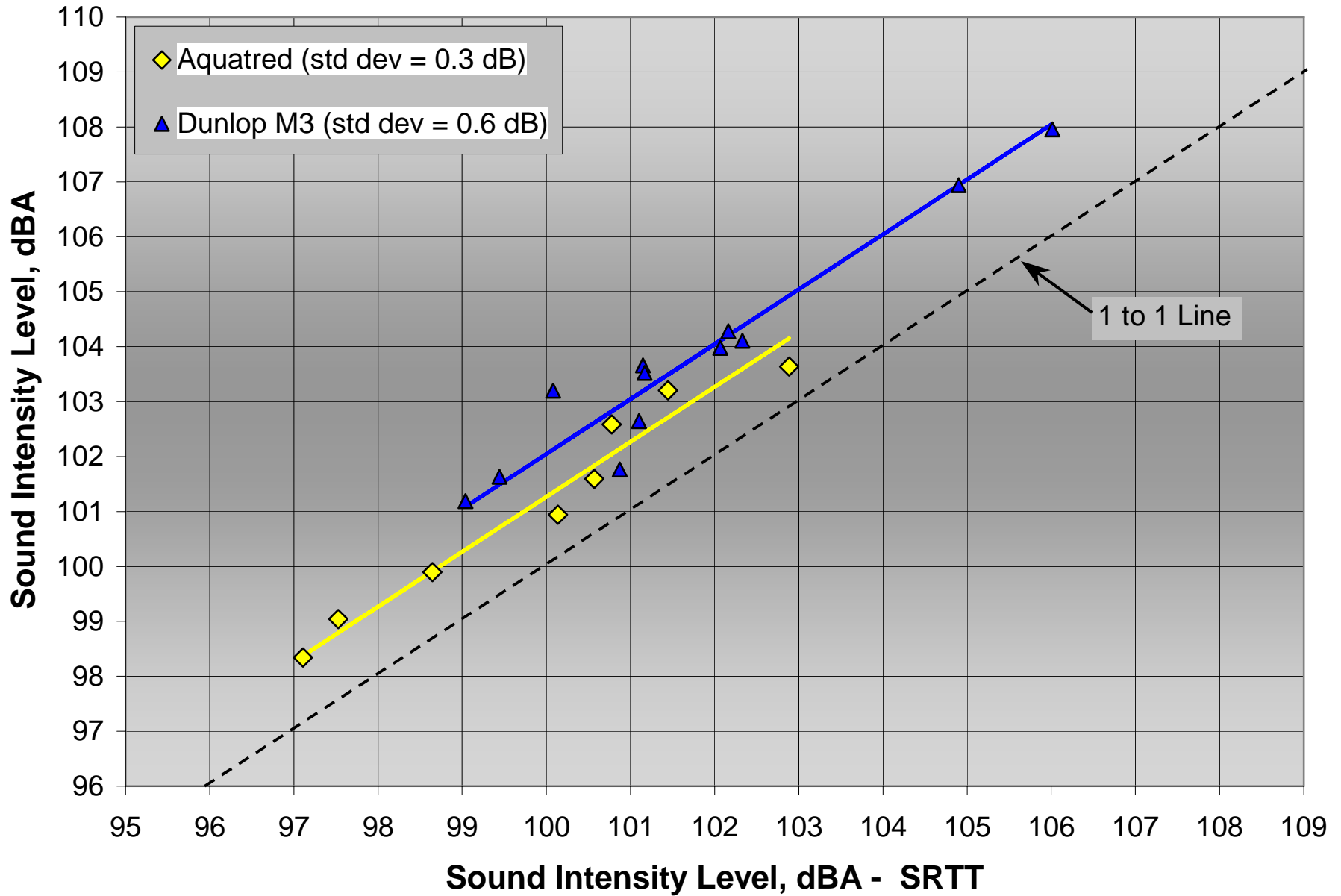
**Goodyear Aquatred 3  
P205/70R15**

**Dunlop SP Winter  
Sport 3 P225/60R16**

**UniRoyal SRTT  
P225/60R16**



# Comparison of Tire OBSI Levels

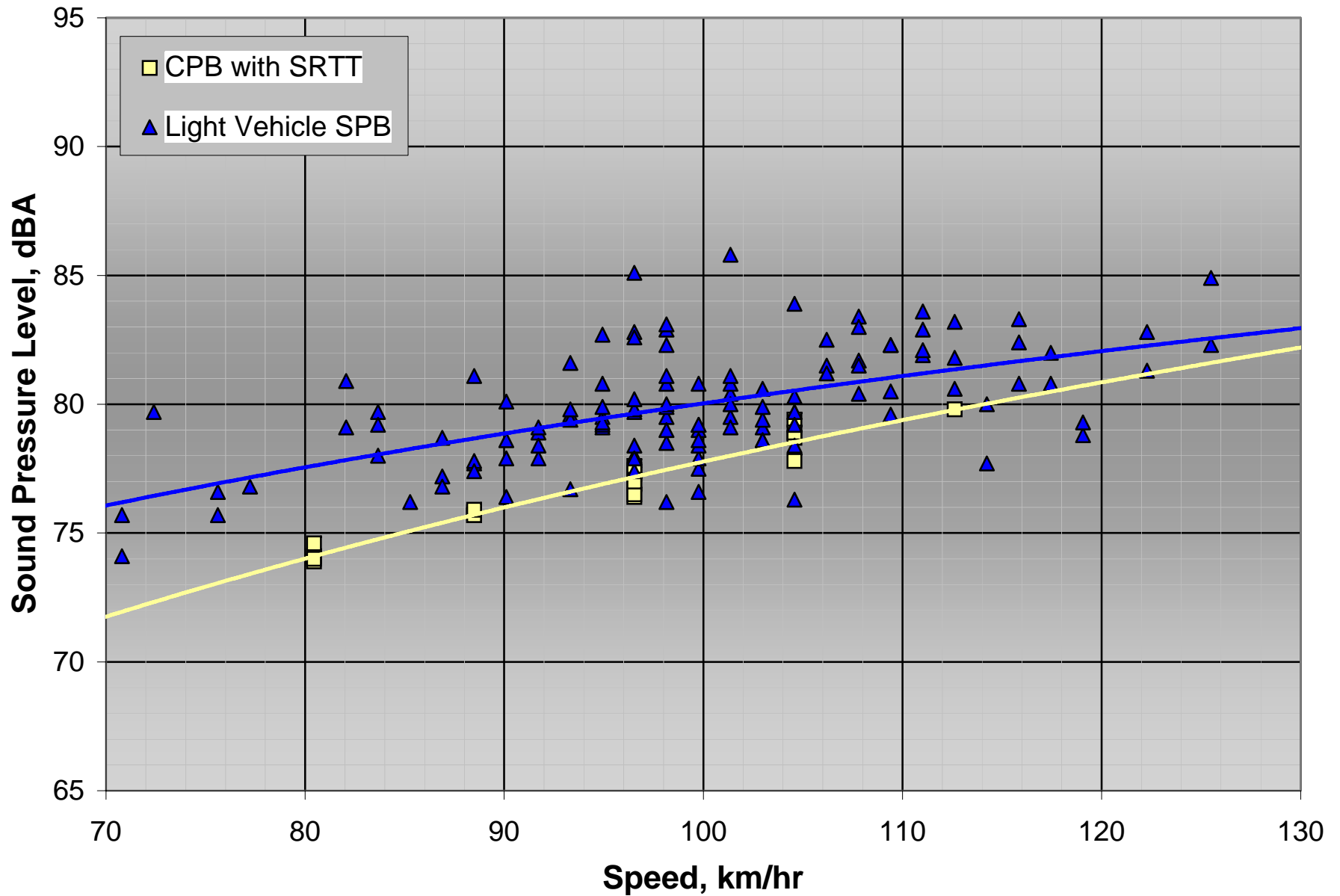




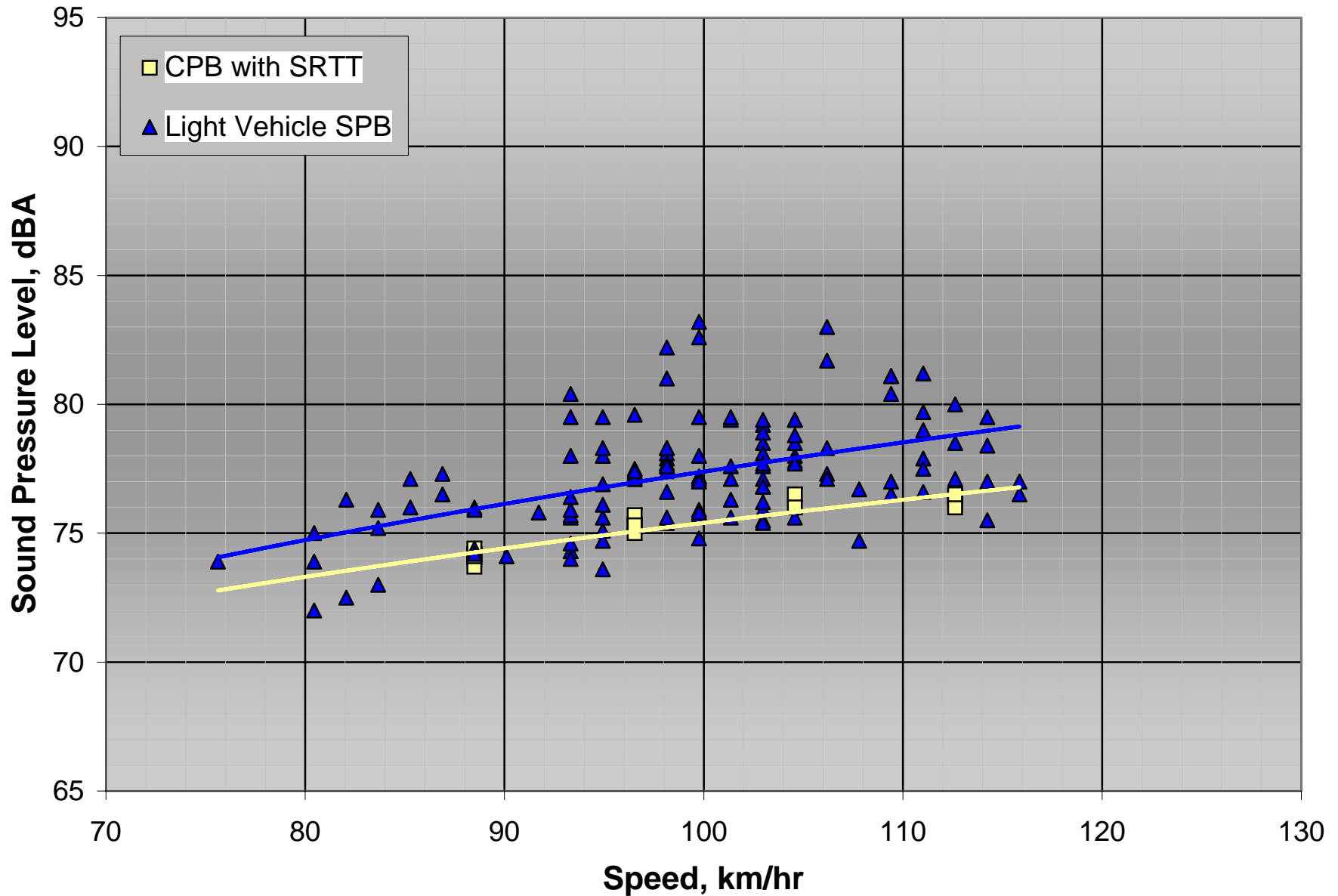
# Comparison to SPB Results

- 12 sites measured
- Mix of AC and PCC
- Measured
  - Statistical passbys for light vehicles
  - Controlled passbys for test vehicle with SRTT tires
- Examples for 7.5m microphone
  - PCC – longitudinally tines
  - DGAC – 5 years old
  - Porous AC – 1 year old

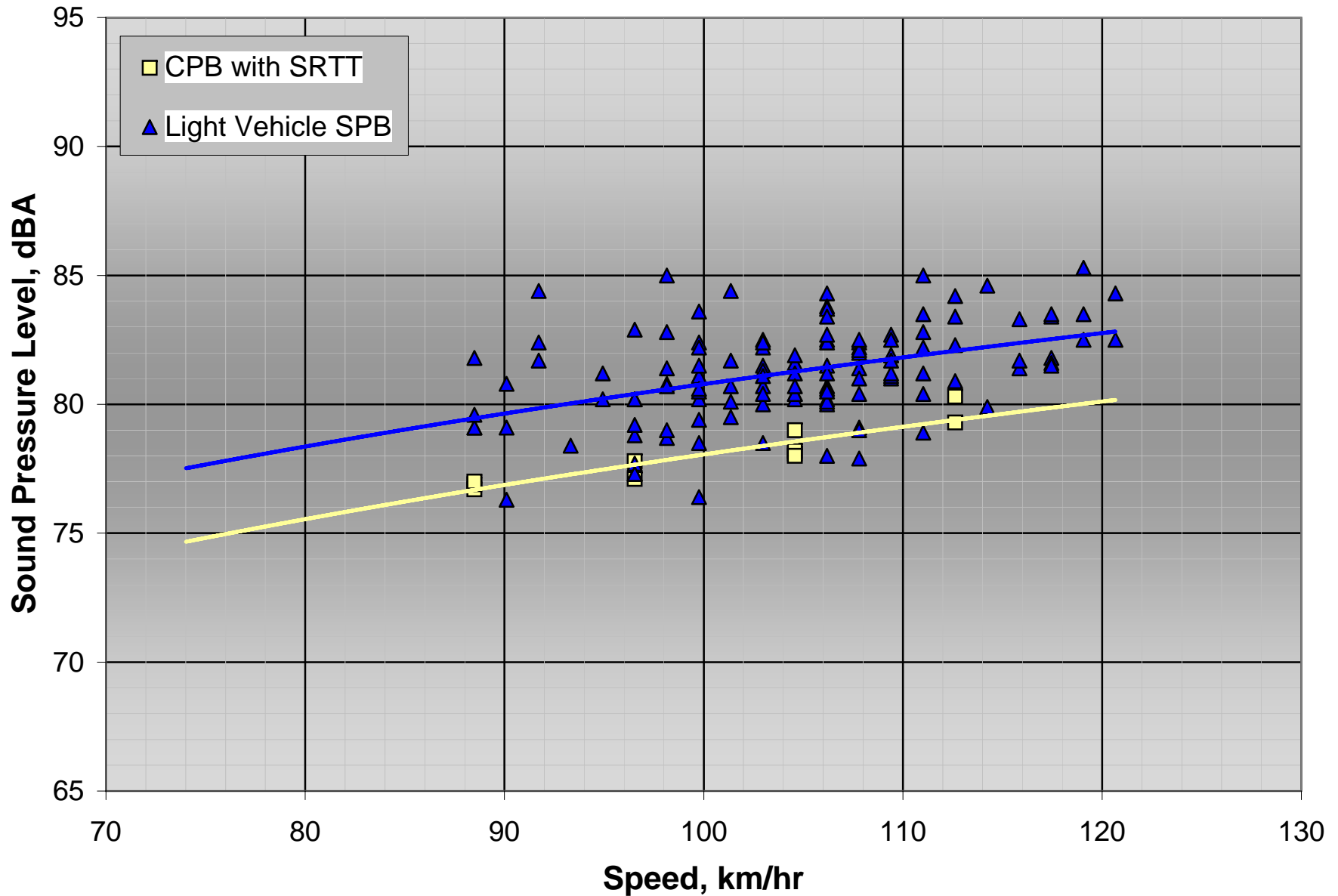
# SRTT CPB & SPB Results - DGAC



# SRTT CPB & SPB Results – Porous AC

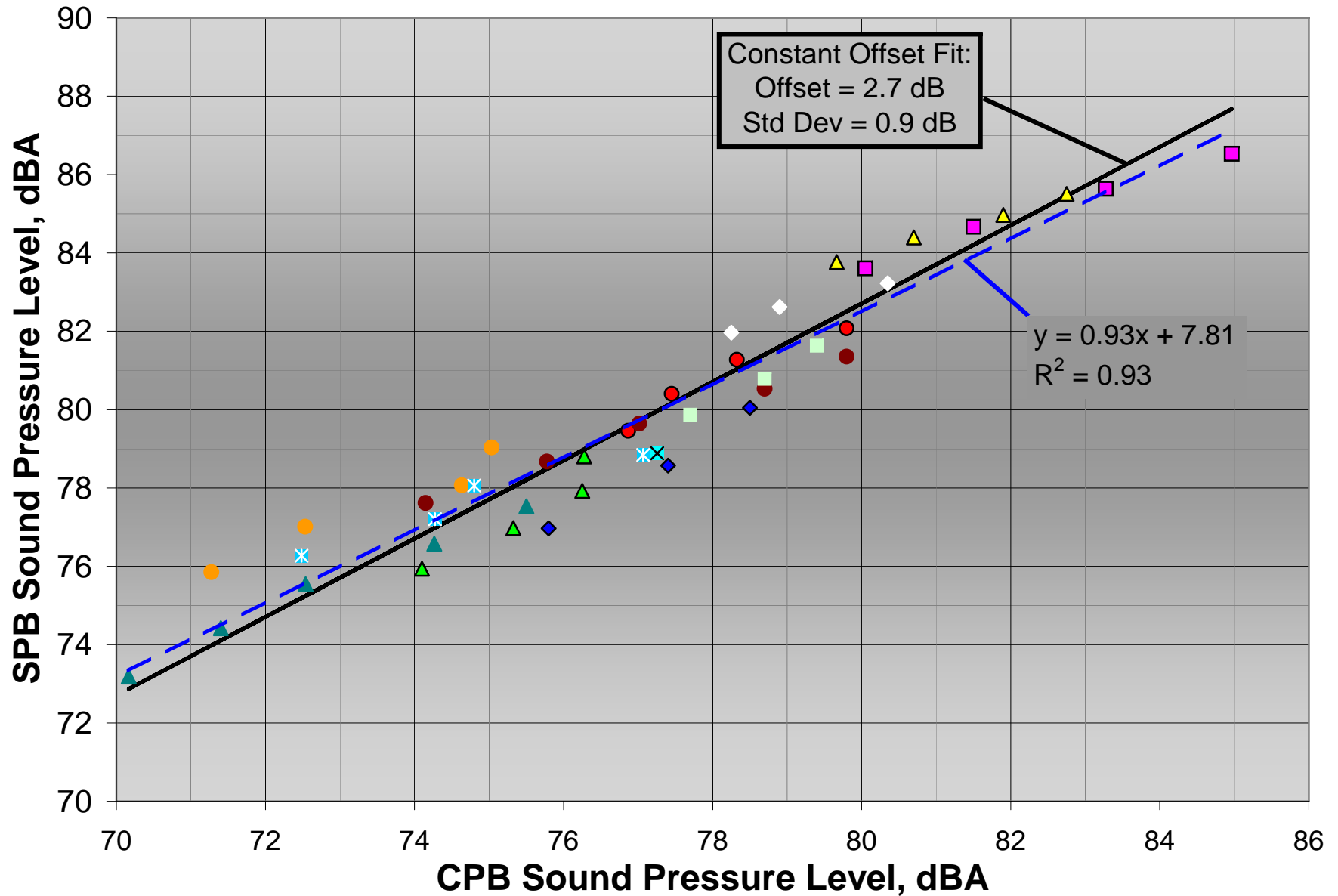


# SRTT CPB & SPB Results – PCC

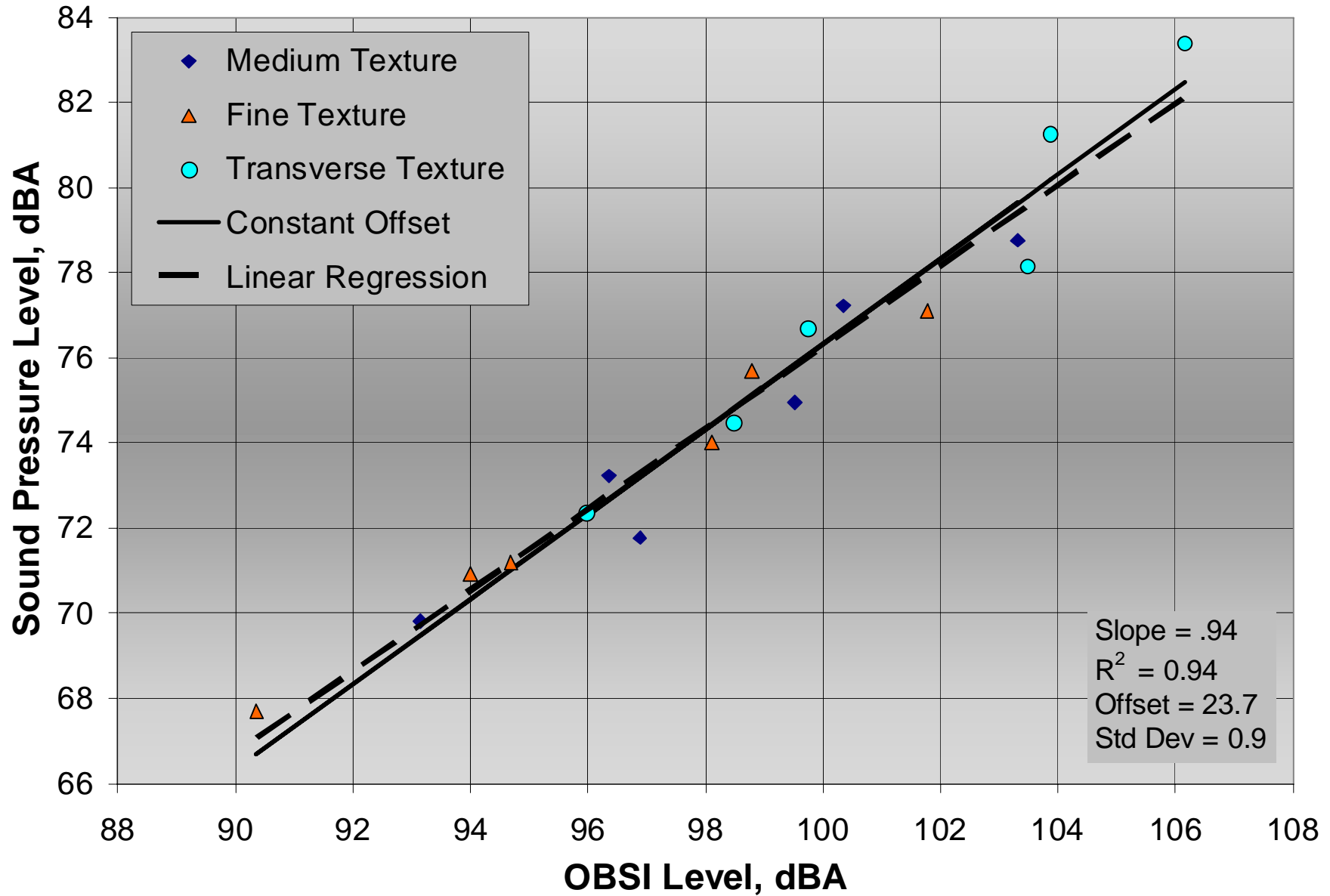




# SRTT CPB & SPB Results – 12 Sites



# OBSI & CPB for "Hard" Sites – 25 ft



# Summary:

## SRTT as a benchmark tire

- Long term availability
- Rank orders pavements similar to other tires (lower absolute levels)
- Low tire-to-tire variation
  - Varies with pavement
  - Average range of 6 tires = 0.8 dB
- Performance maintained under moderate usage up to at least 1½ years