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## **Emission Trends in Heavy-duty Trucks in the South Coast Air Basin**

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23<sup>rd</sup> CRC On-Road Vehicle Emissions Workshop  
San Diego, California  
April 7 – April 10, 2013

# EMISSION TRENDS IN HEAVY-DUTY TRUCKS IN THE SOUTH COAST AIR BASIN

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# Multi-Year Study Objectives

- To obtain On-Road Heavy-Duty Diesel Truck (HDDT) emissions over a five-year period at two locations in the South Coast Air Basin
- To follow HDDT emission changes during this period as new vehicles enter the fleet with even lower emission certified engines
- To compare commercial RSD system with research RSD system

# Equipment and Measurements

DU FEAT with single  
measurement standard deviations

ESP 4600

NDIR – CO<sub>2</sub>  
CO ± 4 g/kg  
HC ± 4 g/kg  
%Opacity ± 0.8%

NDIR – CO, CO<sub>2</sub>,  
HC, Smoke

UV – NO ± 0.4 g/kg  
NO<sub>2</sub> ± 0.3 g/kg  
NH<sub>3</sub> ± 0.02 g/kg  
SO<sub>2</sub> ± 0.06 g/kg

UV – NO, Smoke

Speed and Acceleration  
License Plate Photo





Peralta Weigh Station  
EB SR-91/Weir Canyon Rd.

Sept. 24 – 28 2012

2,547 Measurements

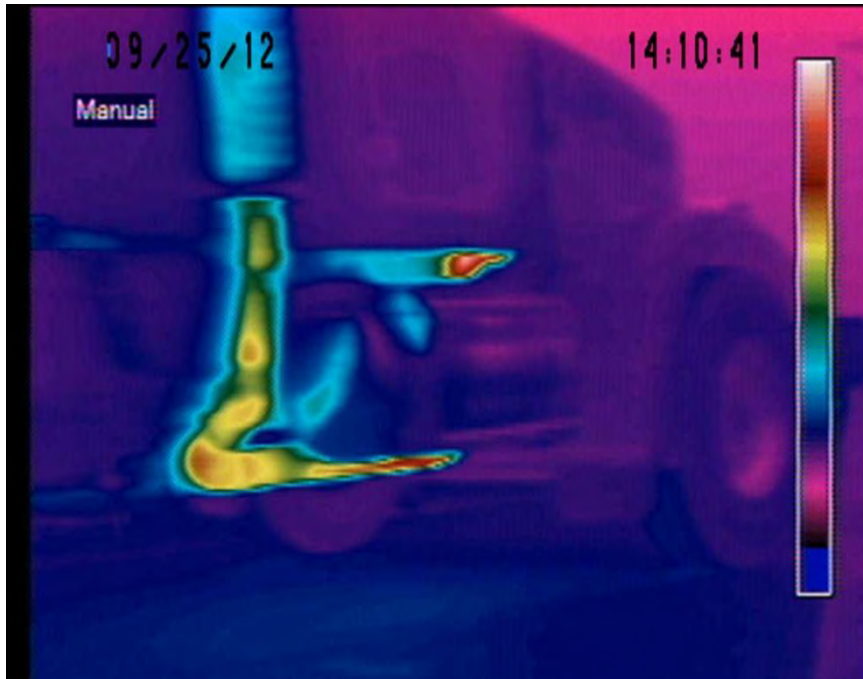
Mean MY 2004

5 – 15mph (Accel)

Port of Los Angeles  
Water Street Exit  
April 30 - May 4 2012  
1,746 Measurements  
Mean MY 2009.3  
0 – 5mph (Accel)



# New Cameras This Year



Exhaust Pipe

IR Thermograph

Green ~ 200°C

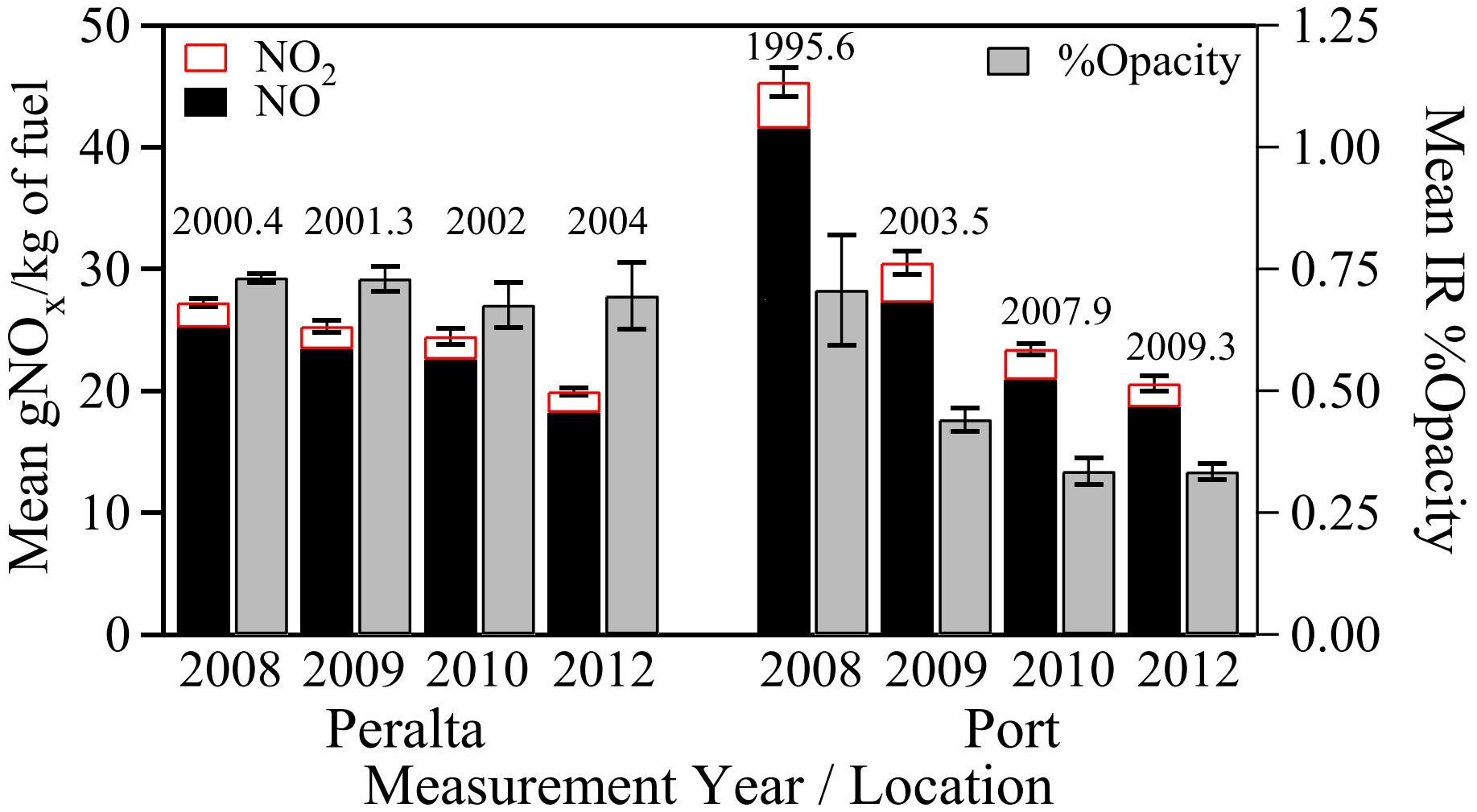


SCR Urea Tank Detection

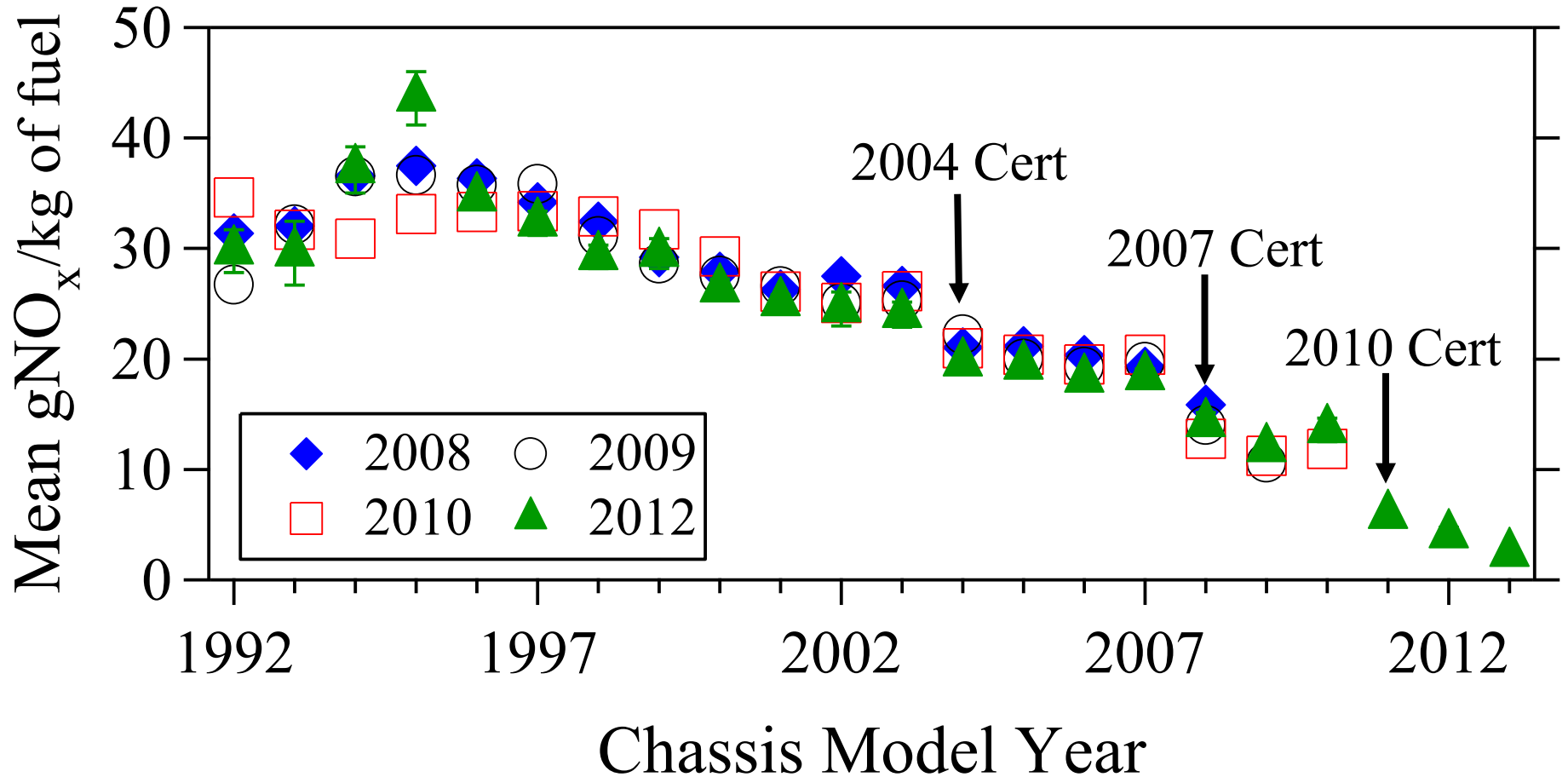
Blue Cap = Urea tank



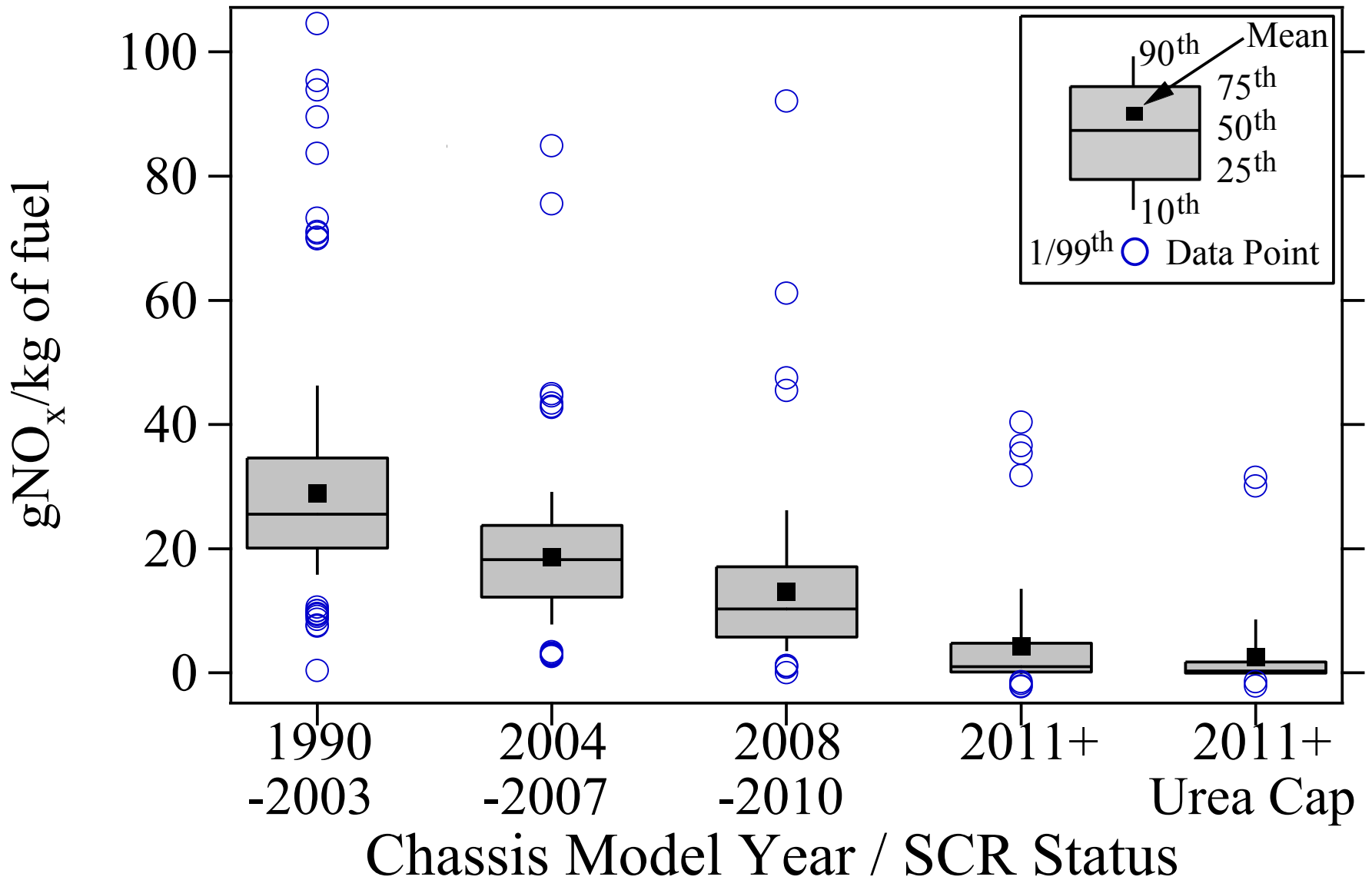
# 5 Year NO<sub>x</sub> and IR %Opacity Trends



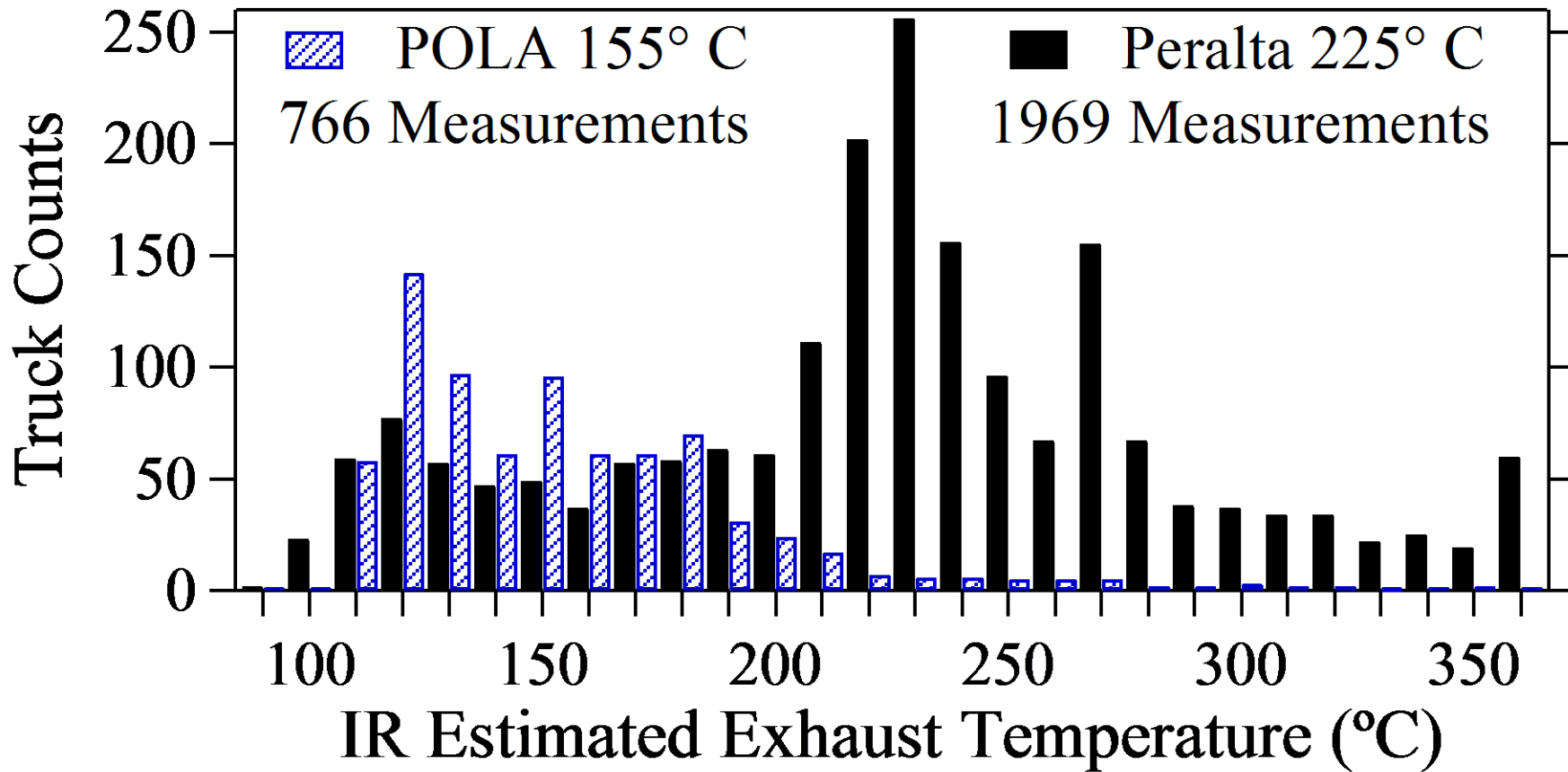
# Peralta NO<sub>x</sub> Emissions by Model Year



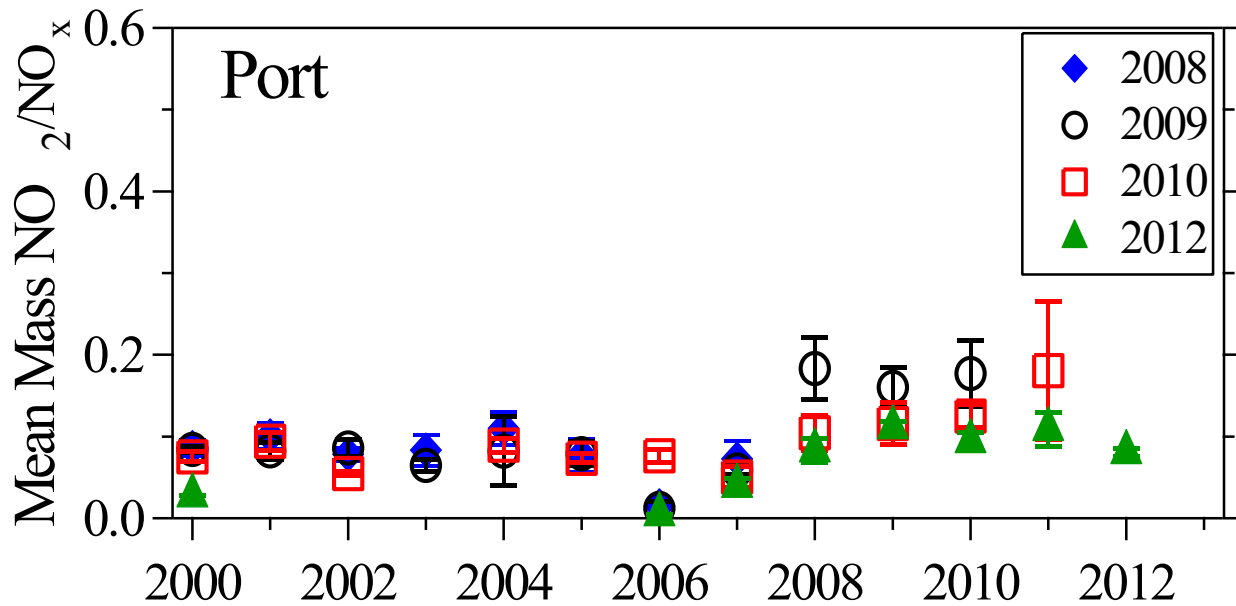
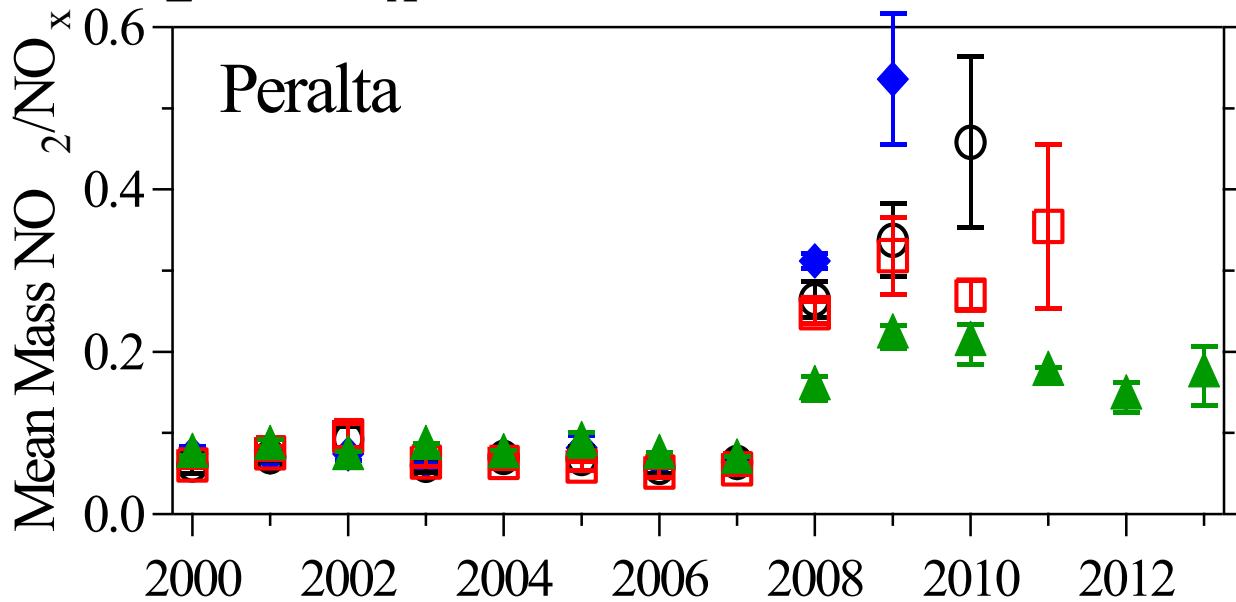
# 2012 Peralta NO<sub>x</sub> Emissions



# Maximum Observed IR Estimated Exhaust Temperature

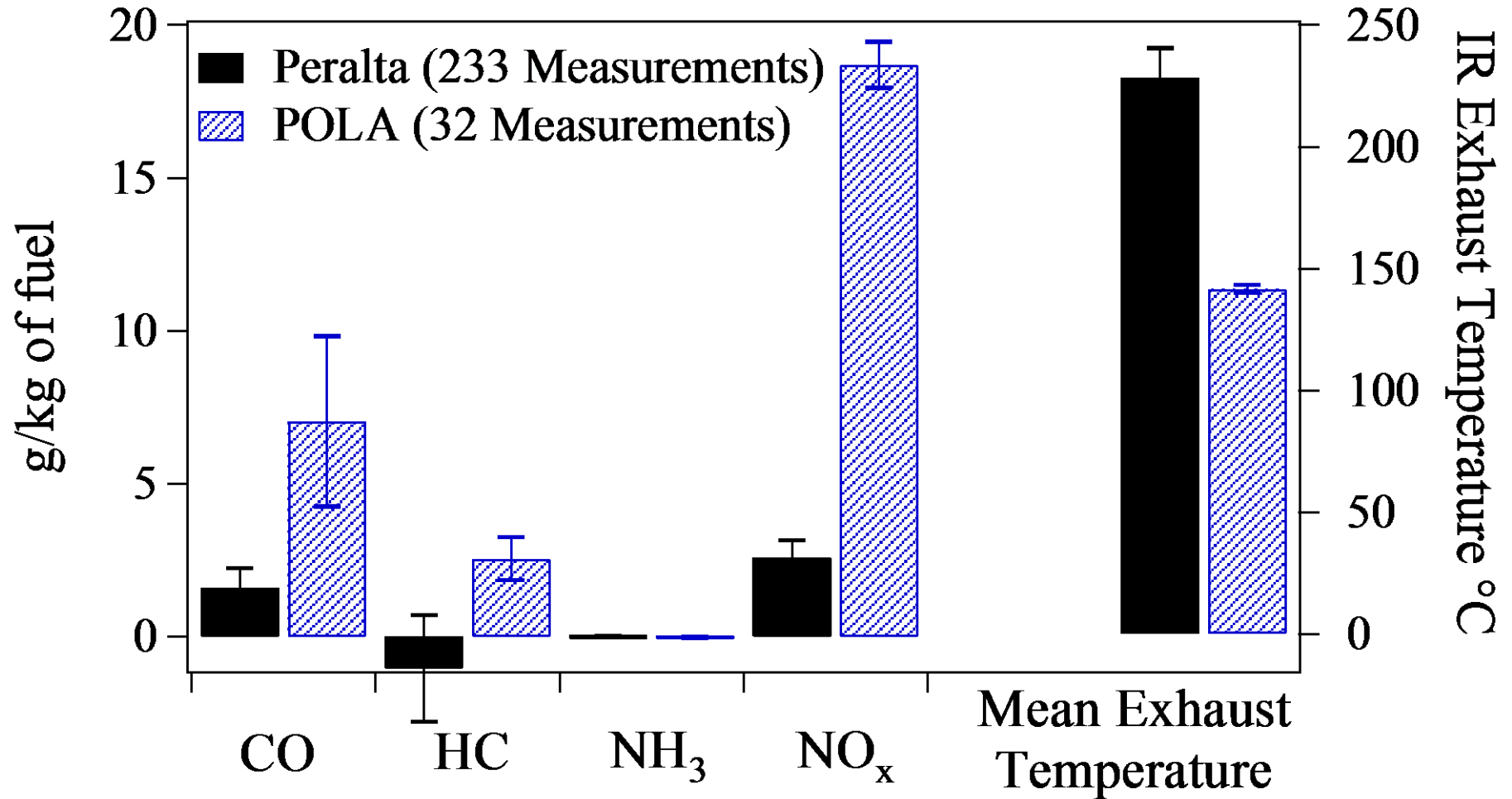


# NO<sub>2</sub>/NO<sub>x</sub> Ratio by Model Year



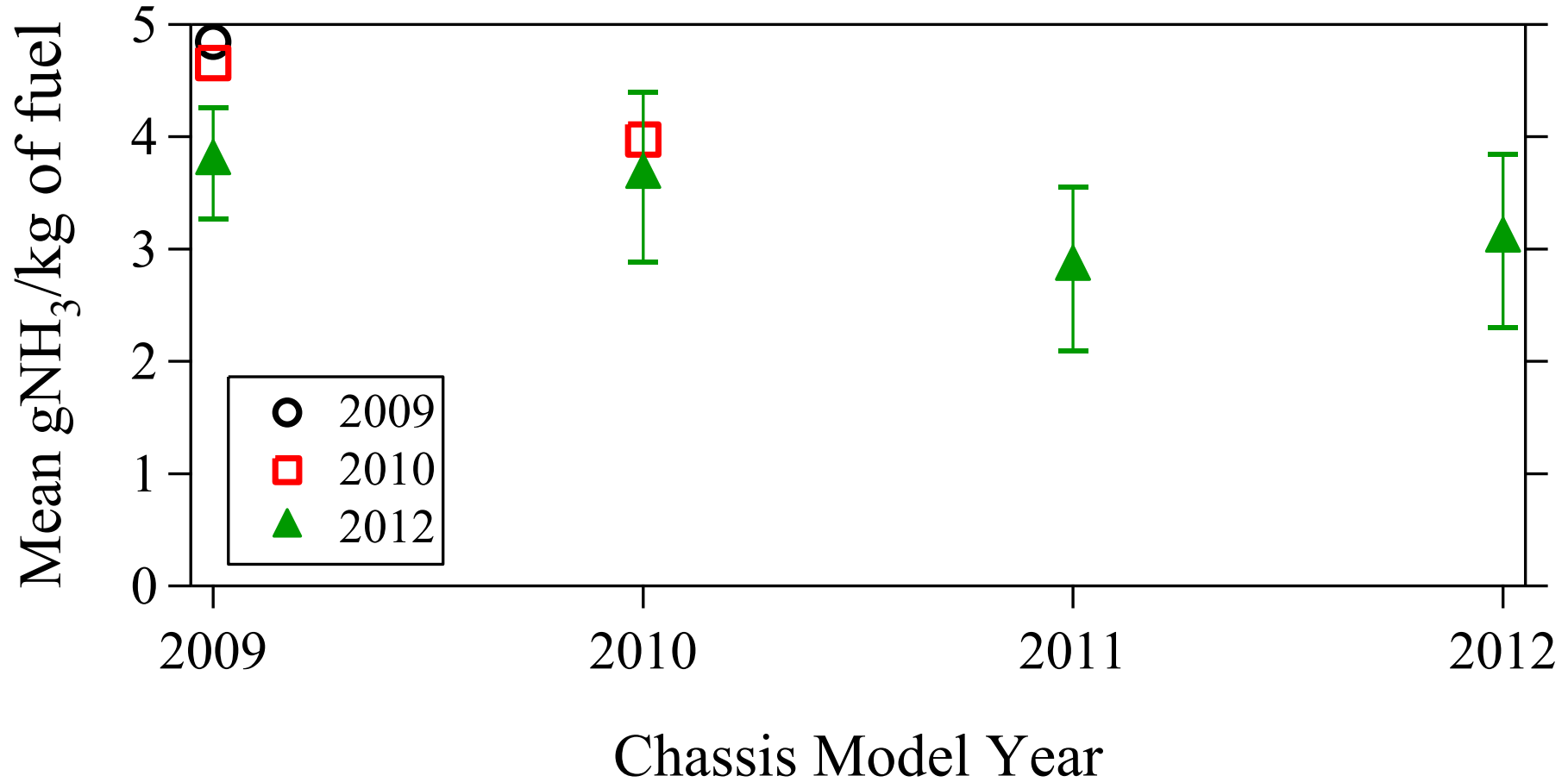
Chassis Model Year

# SCR Equipped Truck Emissions Comparison



# Stoichiometric LNG Fueled Truck

## Ammonia Emissions



# Conclusions

- Mean  $\text{gNO}_x/\text{kg}$  emissions decreased 18.5% at Peralta and 12% at the Port and smoke emissions at the Port have remained low since 2010.
- Exhaust temperatures are 65 to 70° C higher at Peralta contributing to successful SCR operations and rapidly decreasing  $\text{NO}_x$  emissions.
- SCR equipped trucks can have high  $\text{NO}_x$  emissions when the equipment is inoperative as observed at the Port.
- $\text{NO}_2/\text{NO}_x$  ratios continue to decrease and the ratios are lower in the newer MY trucks.