

# **Emissions from Idling Trucks for Extended Time Periods**

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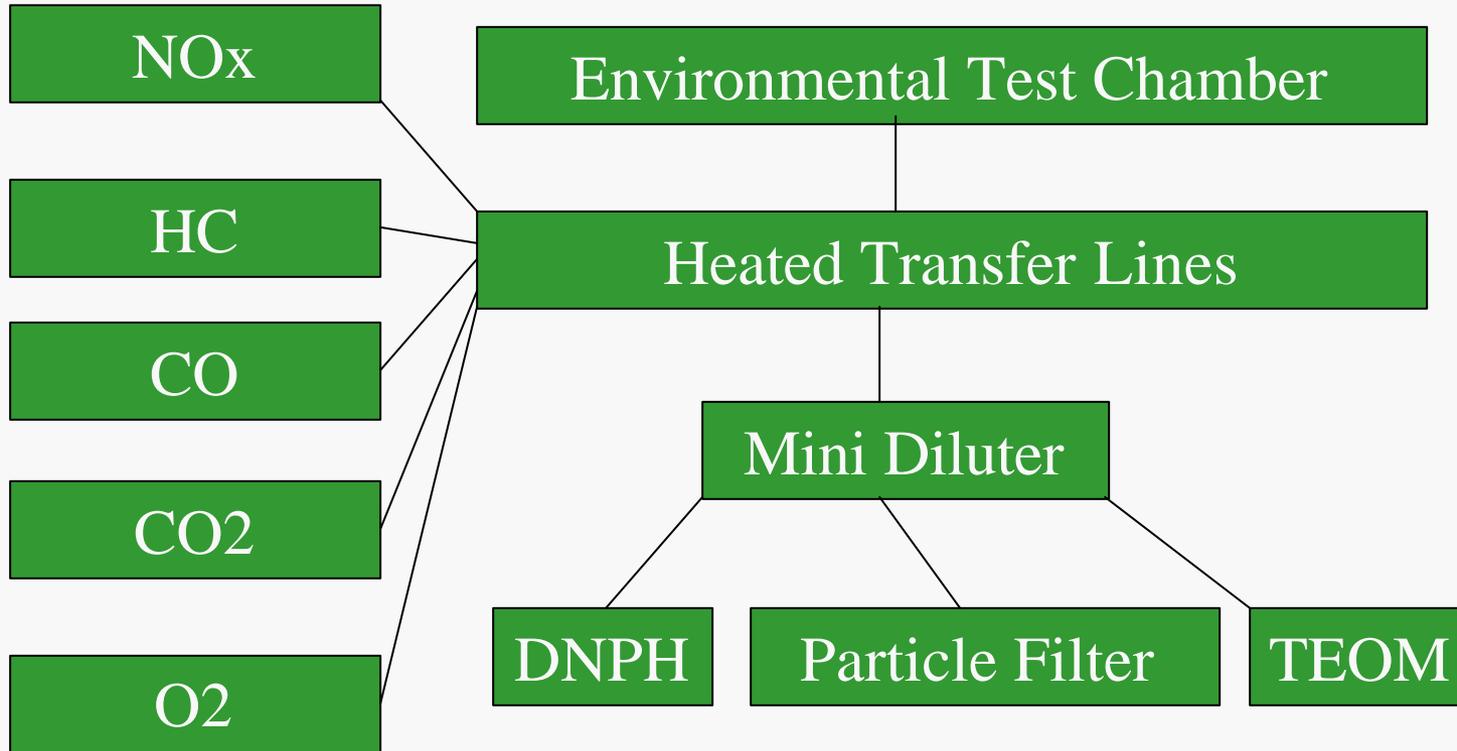
# Project Objective

- **Participants:** EPA, ATC, NJDOT, DOE-ORNL, ATA
- **Focus:** Measure truck idle emissions at a hot and a cold condition and for a high and low idle speed, using the large environmental chamber at the Aberdeen Test Center (ATC)
- **Objective:** Determine fuel use, emissions due to extended idle and compare to idle reducing technologies

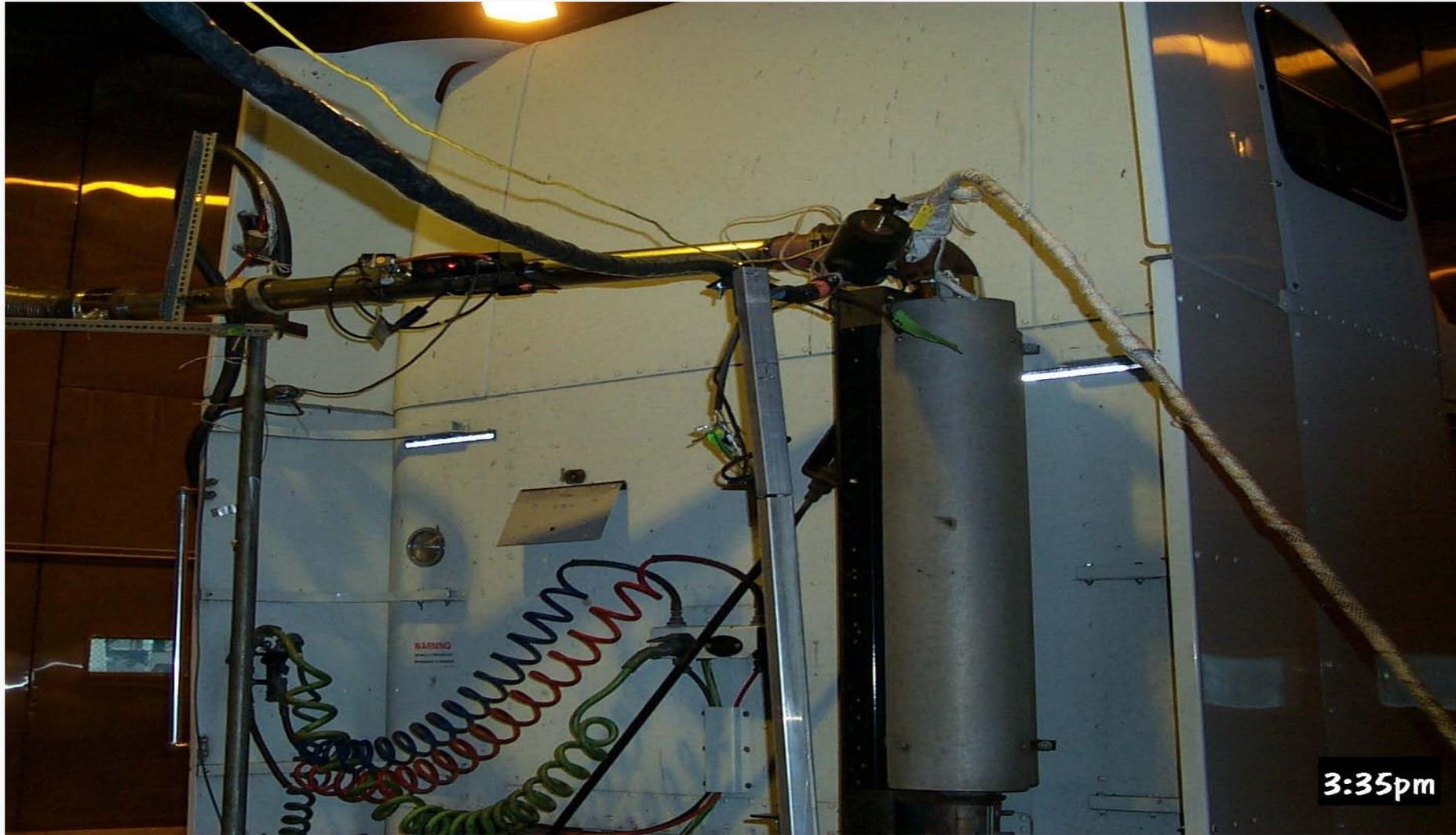
# Experimental Methods

- Five Class 8 Trucks, 1992-2001 All turbo, DI, Electronic controls; also included an APU and direct-fire heater
- Three Temperatures 0°F, 65°F, 90°F
- Cab Temperature 70°F
- Two engine speeds: 600 and 1200 rpm
- Idle truck for 3 hrs to achieve steady state
- EPA ROVER and Conventional Gas Analyzers
- PM Measured by TEOM and Filter, using mini-diluter
- Aldehydes by DNPH Cartridges

# Experimental Schematic

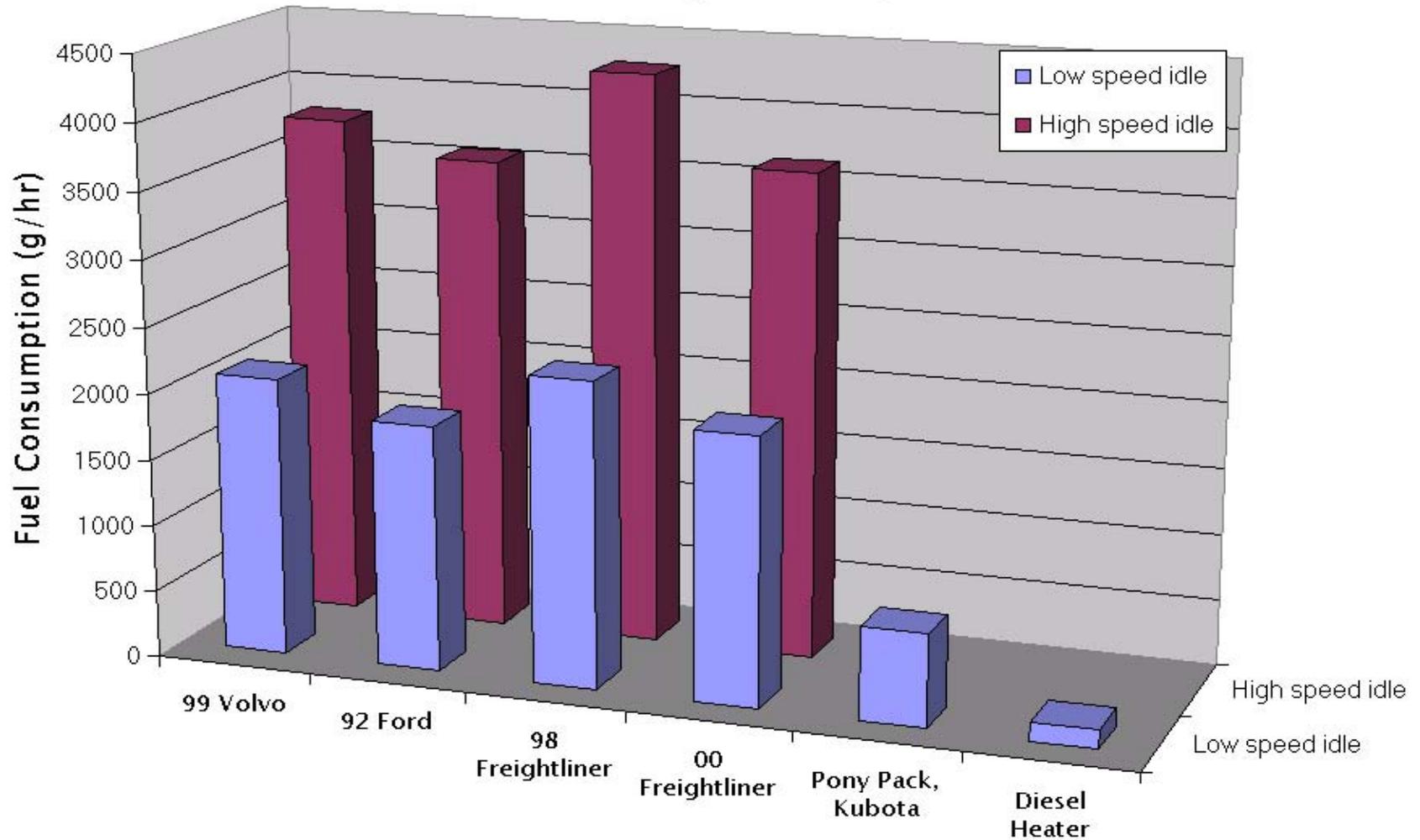


# Typical exhaust sampling for truck in Aberdeen environmental chamber



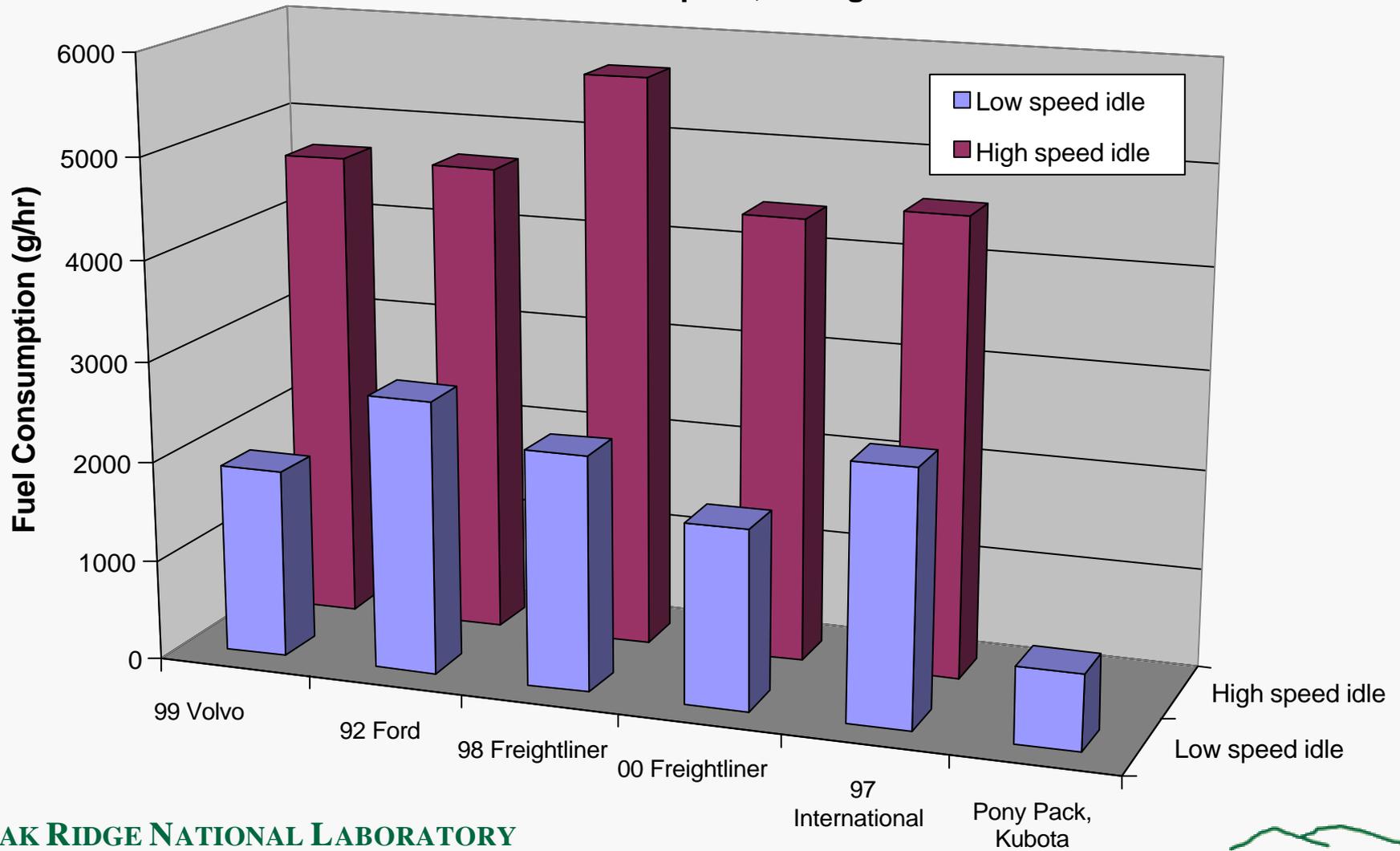
# Fuel Use, Cold Condition

Fuel Consumption, 0 deg. F



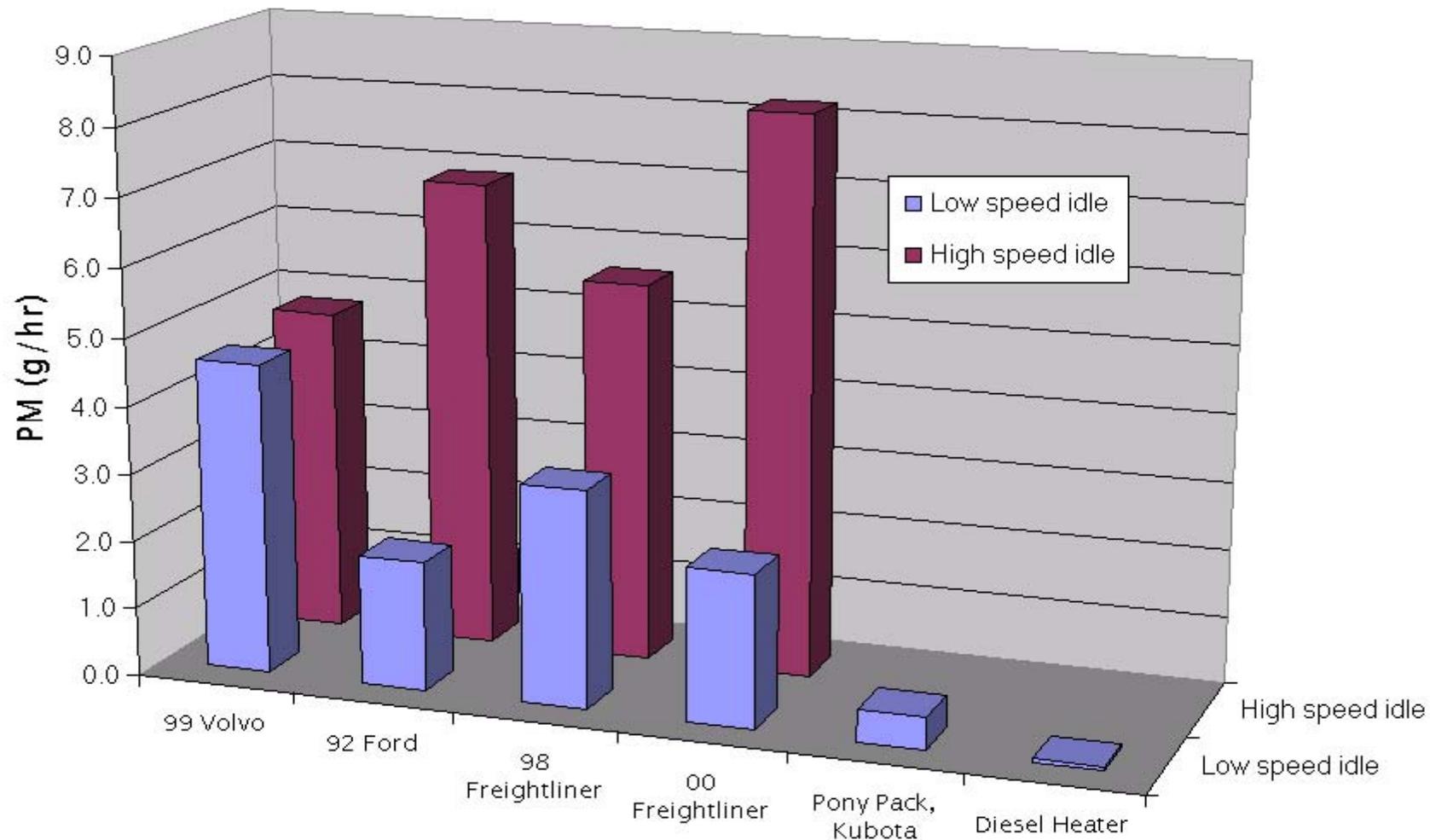
# Fuel Use, Hot Condition

## Fuel Consumption, 90 deg. F



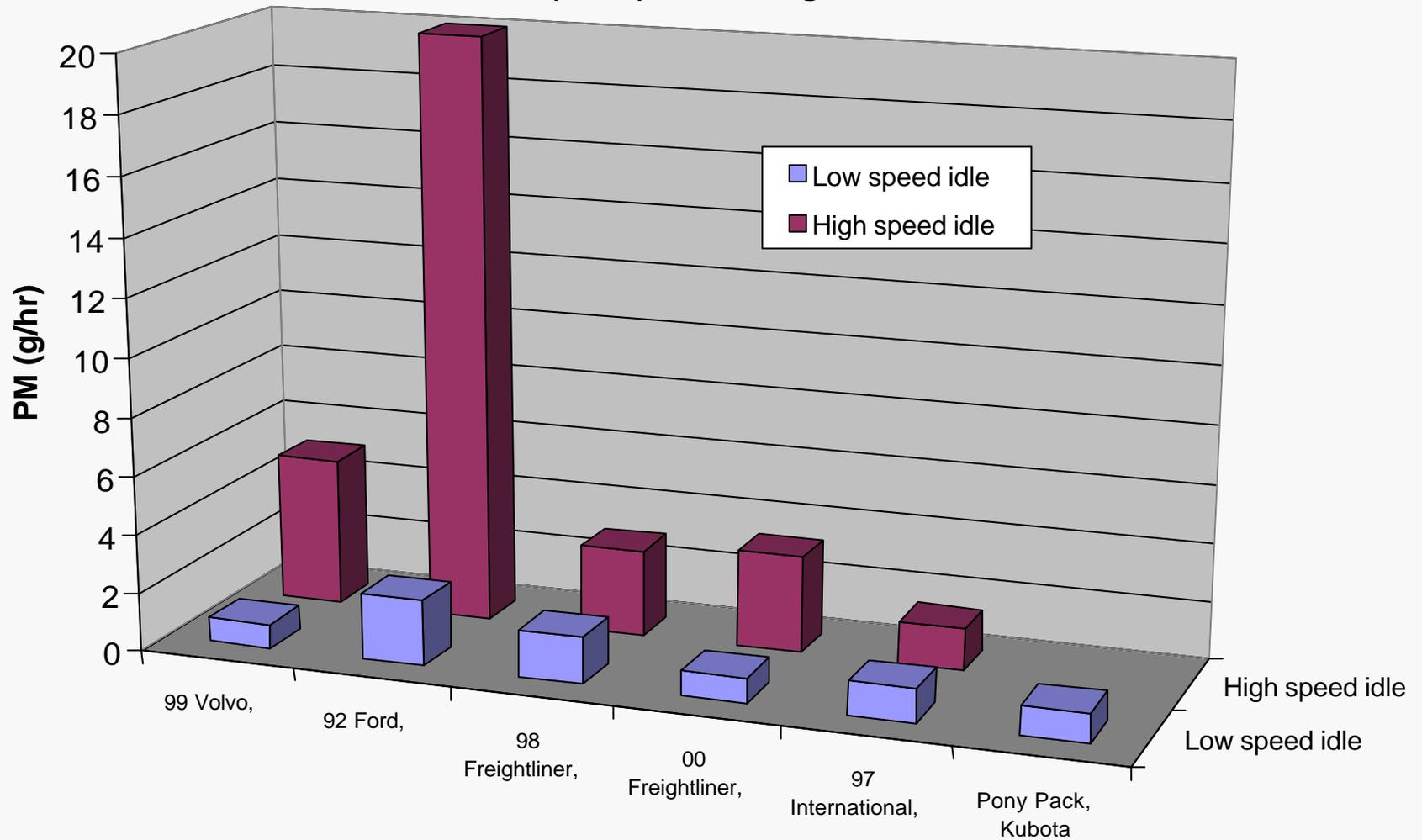
# PM, Cold Condition

(Filter) PM, 0 deg. F

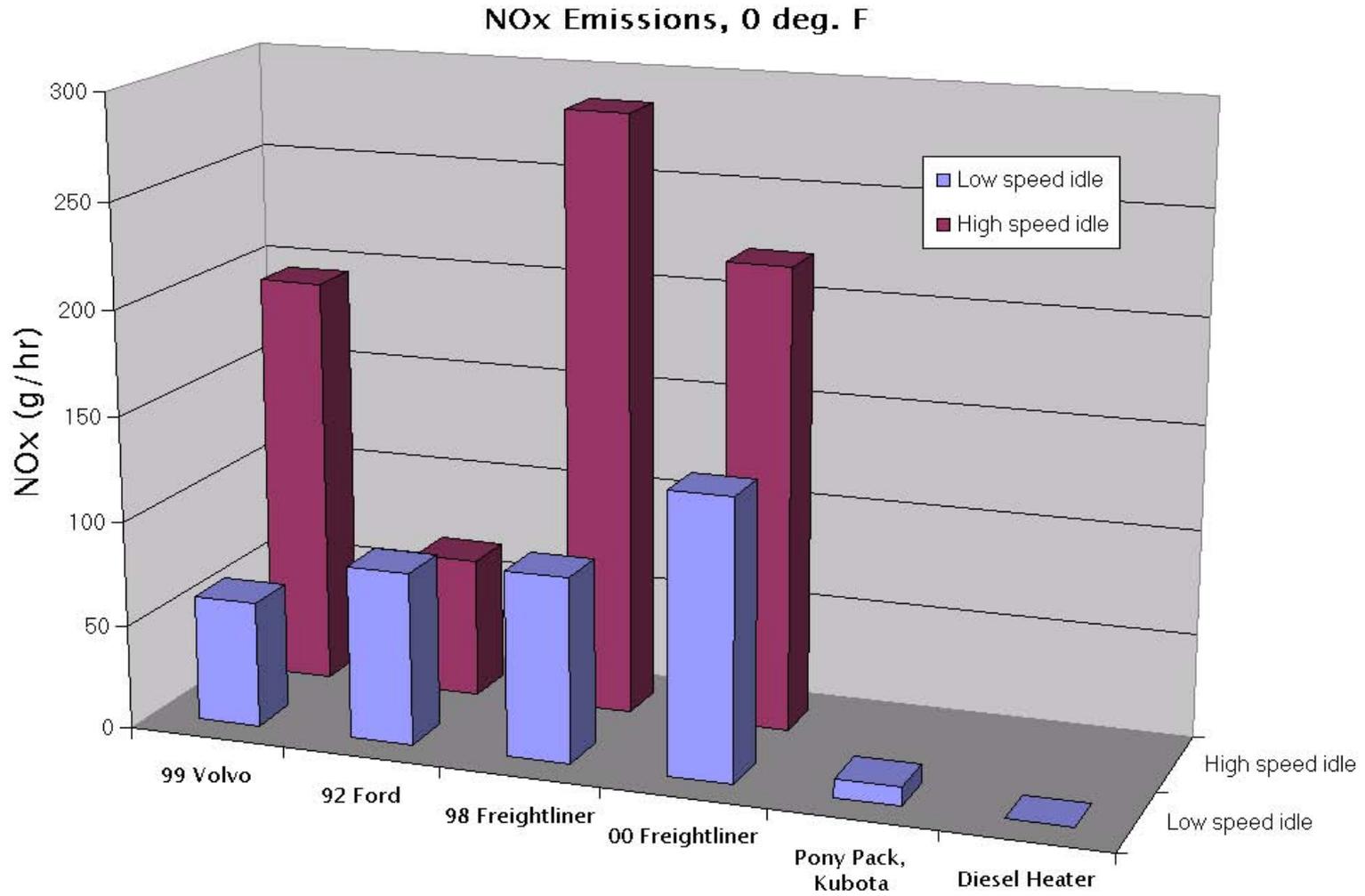


# PM, Hot Condition

(Filter) PM, 90 deg. F

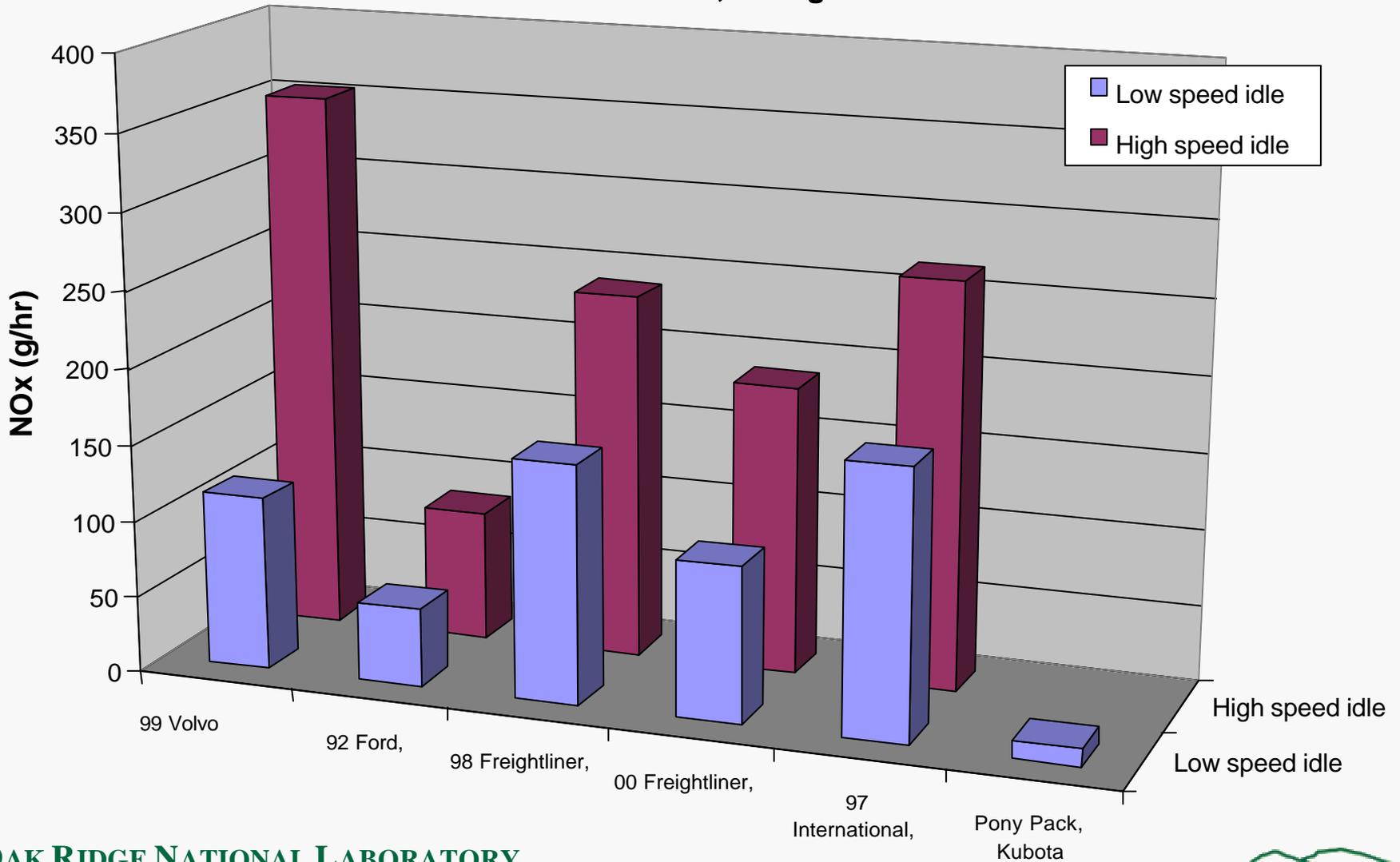


# NOx, Cold Condition



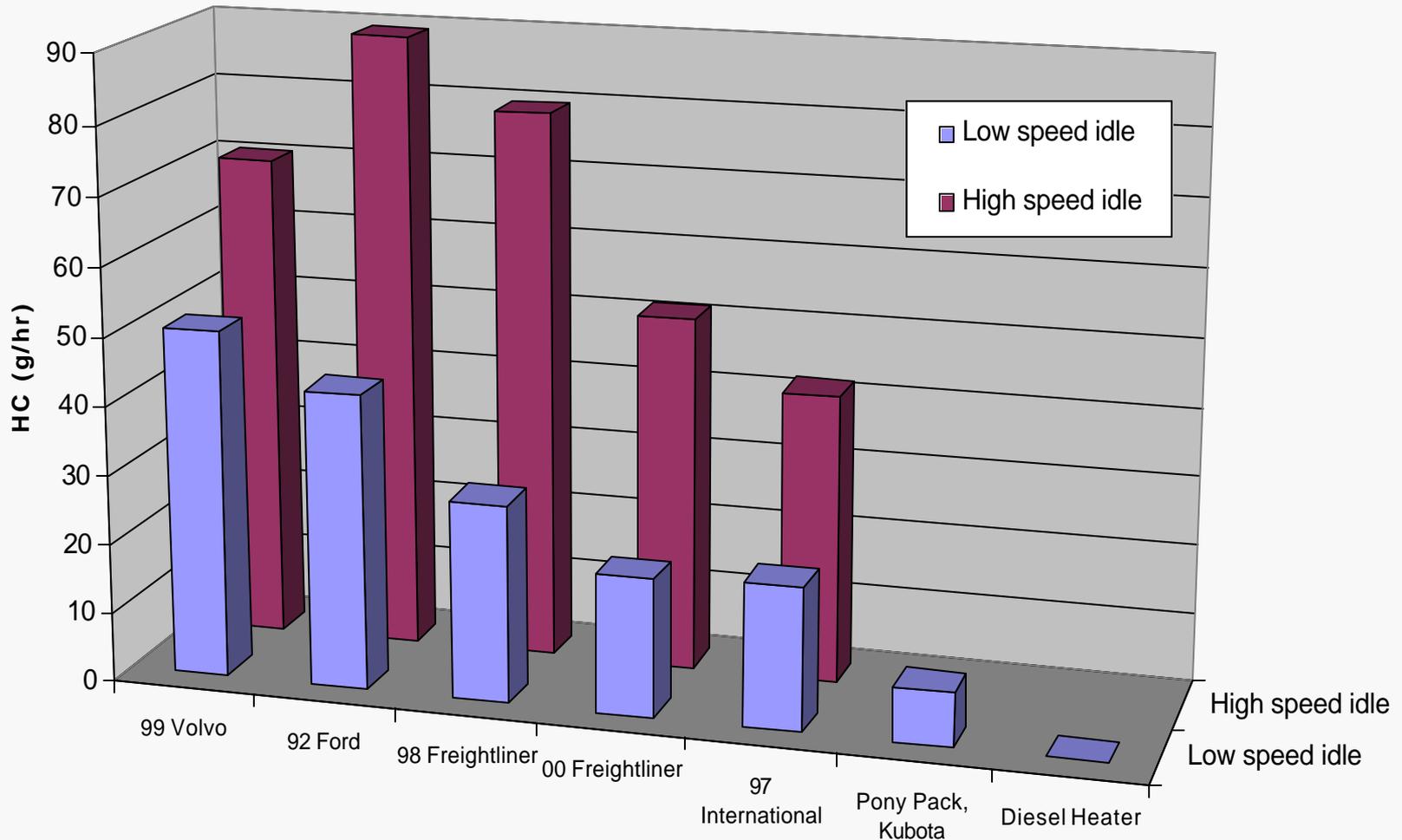
# NOx, Hot Condition

## NOx Emissions, 90 deg. F



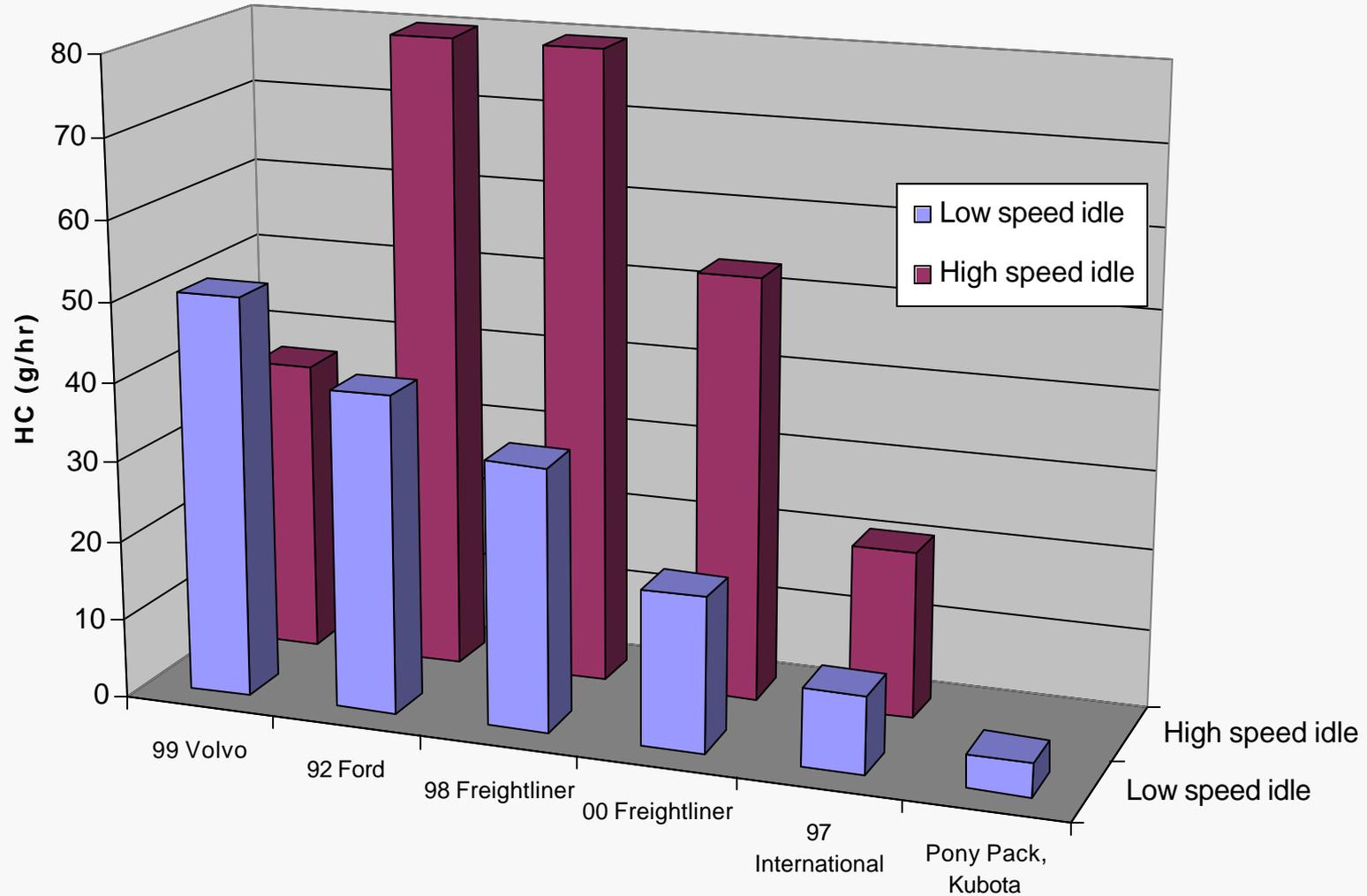
# Hydrocarbon, Cold Condition

Hydrocarbon Emission, 0 deg. F



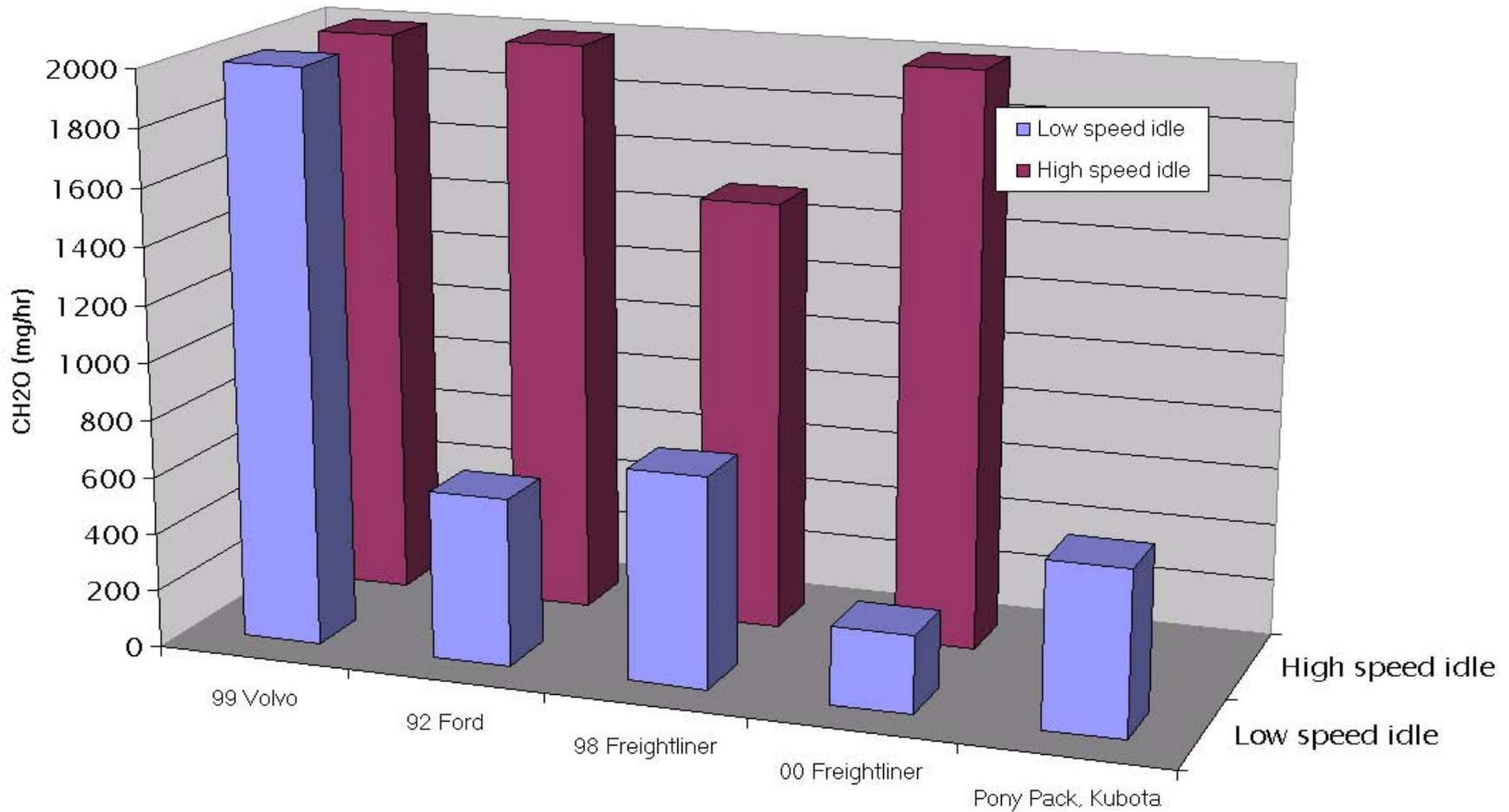
# Hydrocarbon, Hot Condition

Hydrocarbon Emissions, 90F



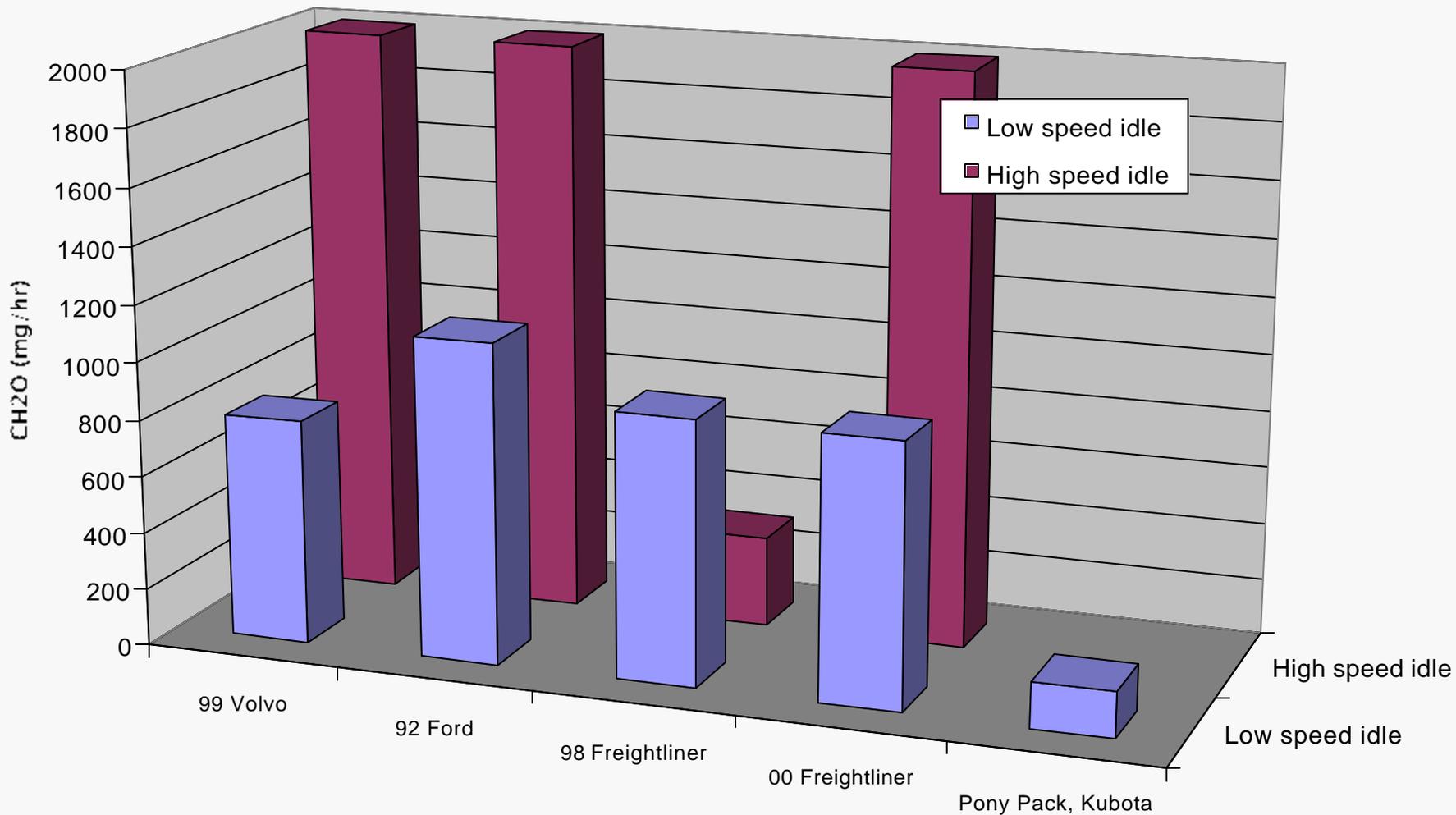
# Formaldehyde, Cold Condition

Formaldehyde Emissions, 0 deg. F

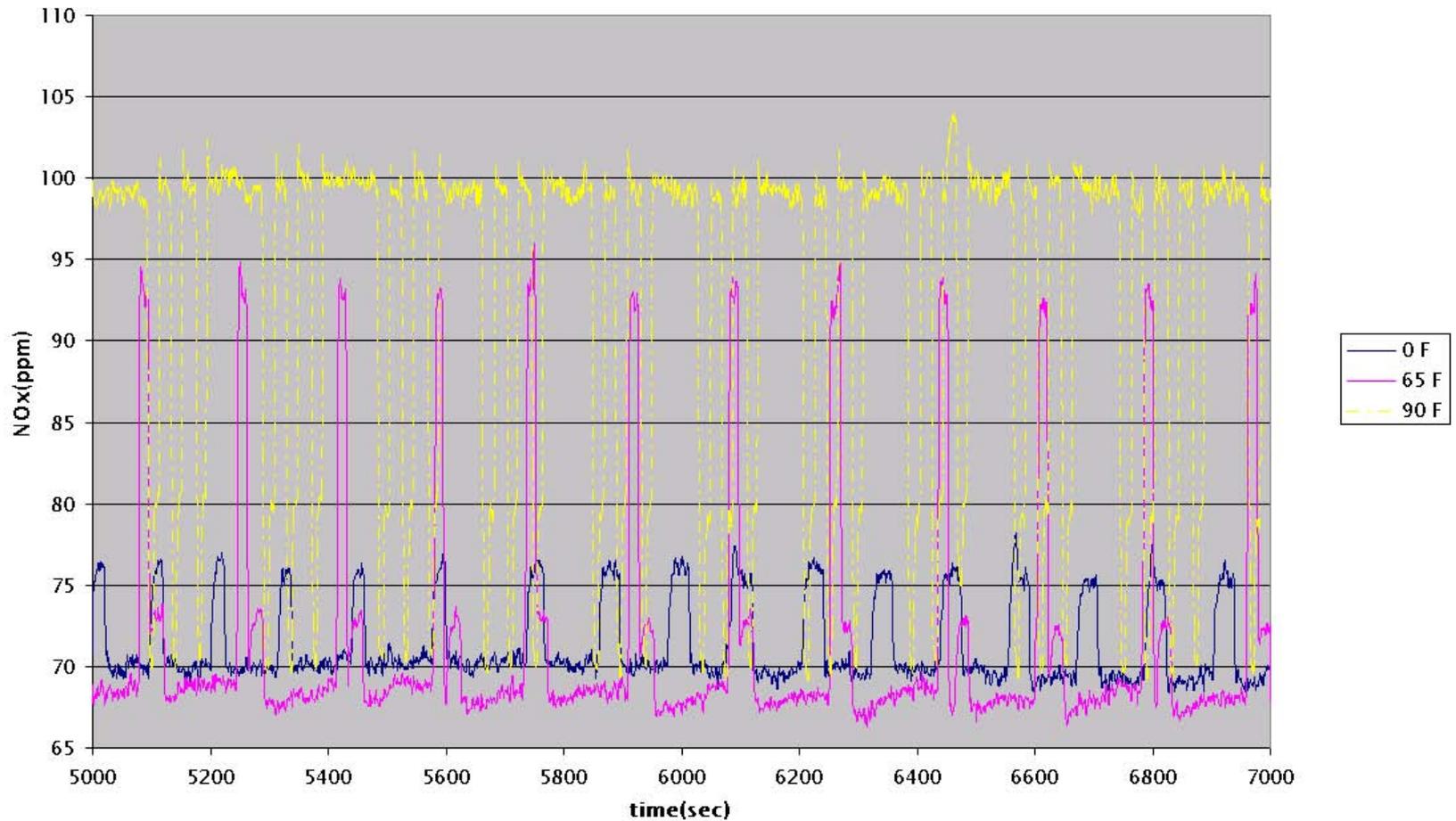


# Formaldehyde, Hot Condition

## Formaldehyde Emissions, 90 deg. F



# Accessories Load Effects



# Potential Net Savings from APU Idling Reduction Technology

- Average of all trucks at 1200 rpm minus APU results

Number of trucks	1	
Hours of avoided idling per day	10	
Days of avoided idling/yr	150	
NOx reduction	225	kg/yr
PM reduction	3.75	kg/yr
Fuel use reduction	1171	gallons/yr

# Conclusions

- High rpm (1200) idle uses significantly more fuel and produces more emissions
- Fuel cost savings alone likely won't offset cost of APU
- Cooling fan and compressor loads cause large swings in all emissions

# Future Work

- Study aftertreatment devices under different environmental conditions
- Engine controls for reduction of idle emissions
- System integration of APU

# Acknowledgements

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- NJ DOT – Henry Schweber supported ATC
- ATA – helped arrange truck participation