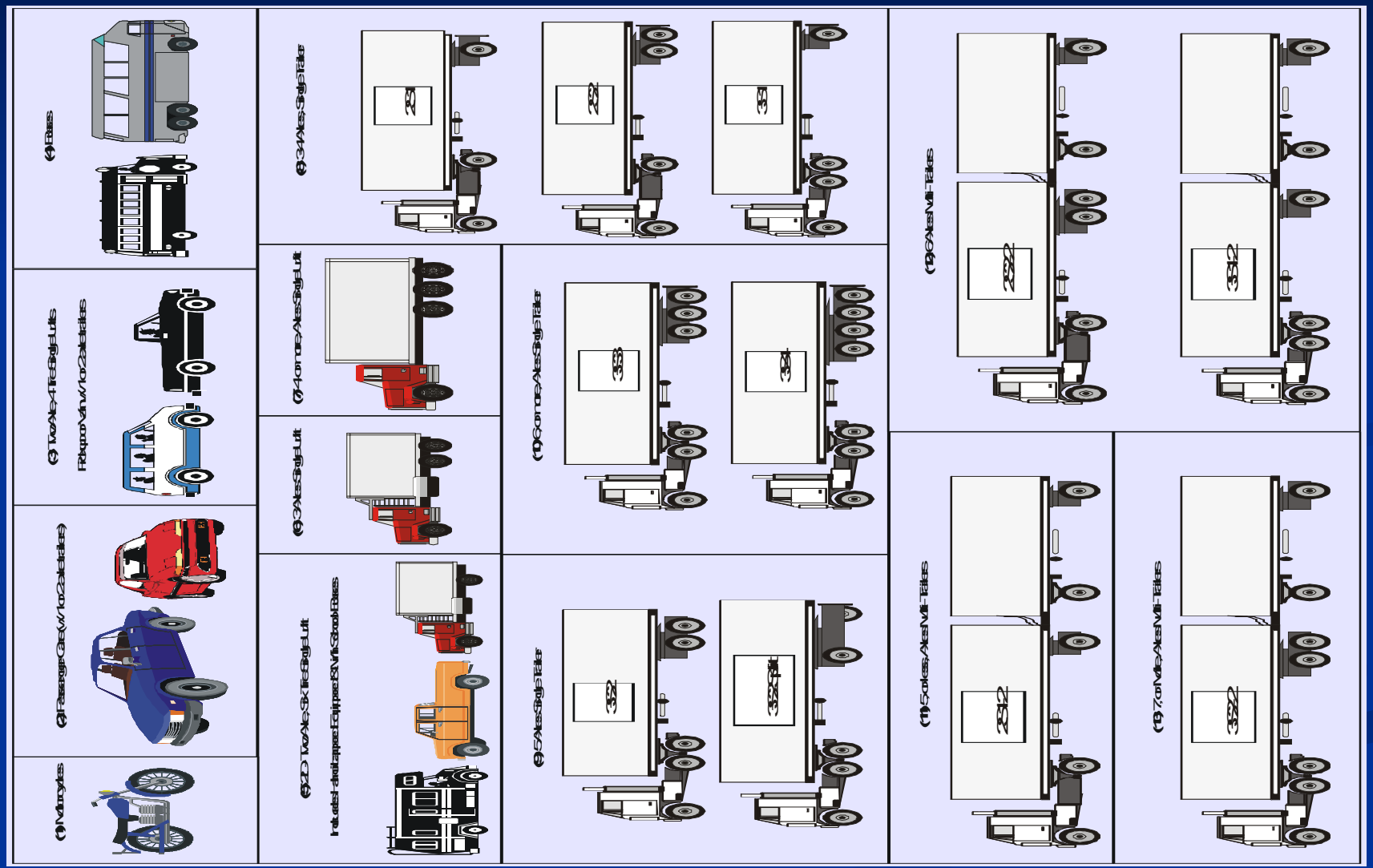
Estimating Idling Emissions of Heavy Duty Trucks

Joe Zietsman, Ph.D., P.E. and Dennis Perkinson, Ph.D.

Overall Approach

- Select pilot area
- Define trucks
- Identify generators
- Perform pilot study
- Collect statewide data
- Order of magnitude estimate
- Develop comprehensive approach

FHWA Vehicle Categories



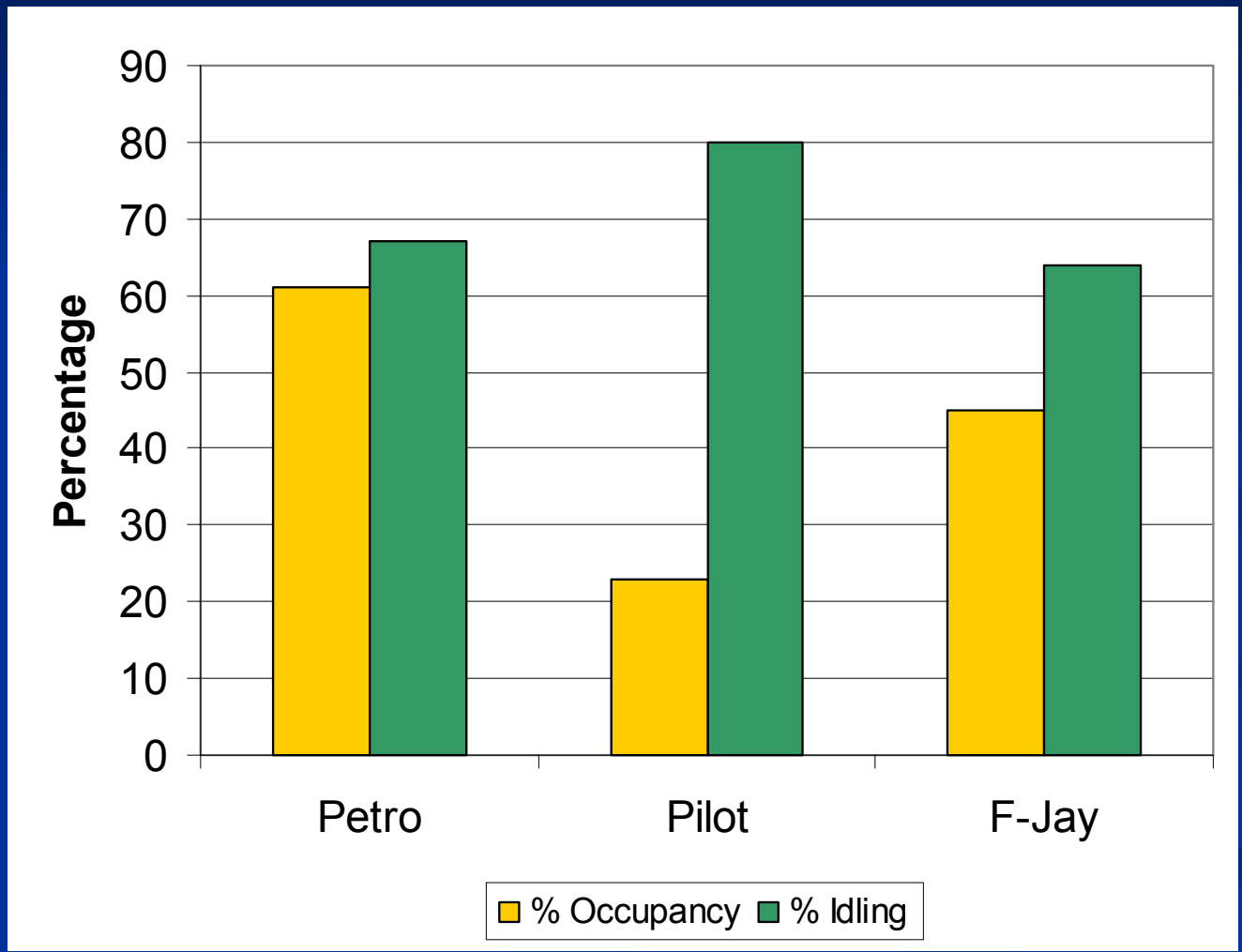
Generators for Pilot Study

- Truck stops
- Rest areas
- Industries
- Ports

Methodology

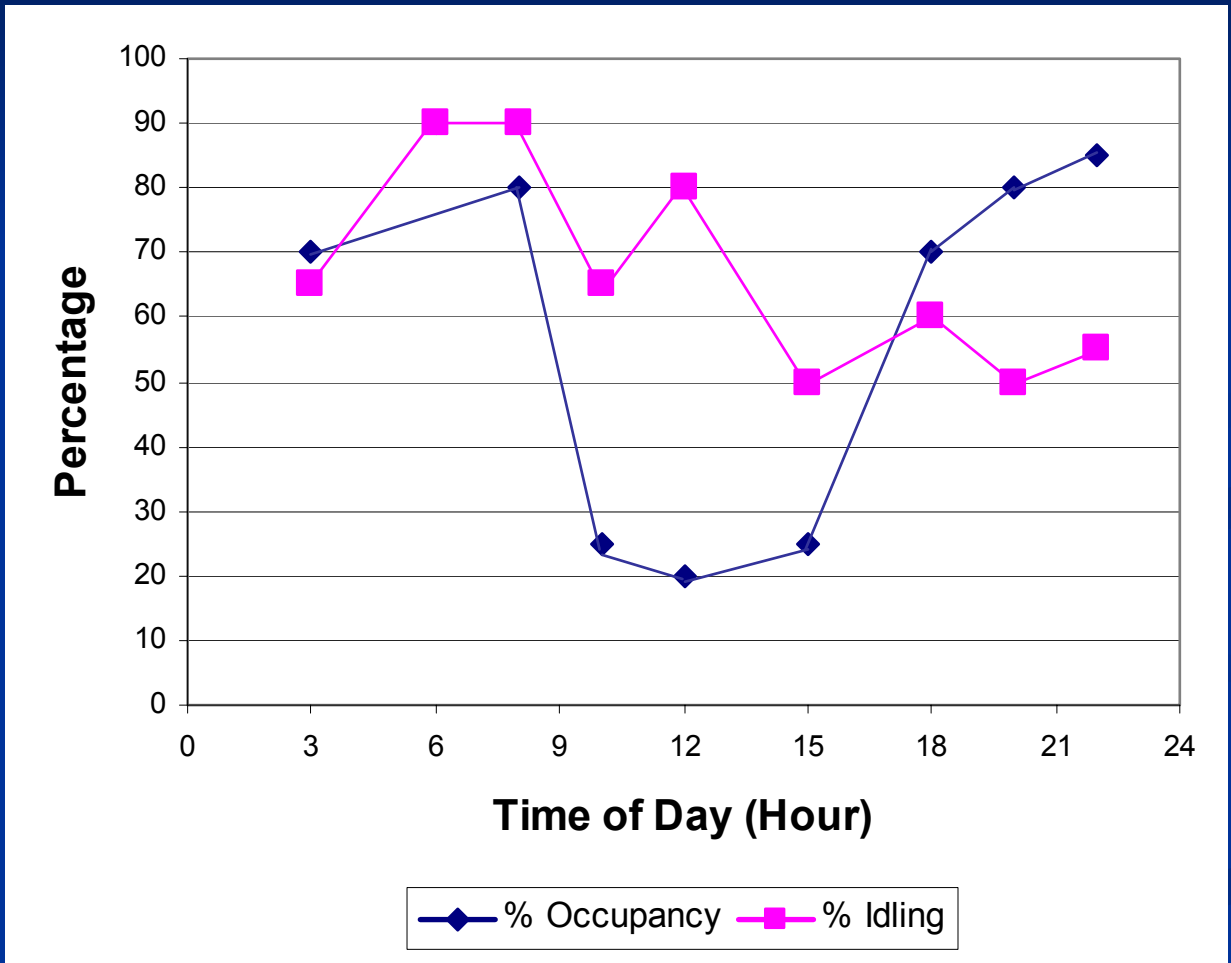
- Data collection
  - Literature
  - Interviews
  - Observations
- Model building
- Activity estimation
- Emissions estimation

Variation Between Truck Stops



Truck Stop Amenities

Time of Day Variation



Equations to Estimate Emissions

Truck stops and rest areas

$$TS = R\sum_{i=1}^{n} 24 \times C_i \times \overline{O} \times \overline{I}$$

Industries

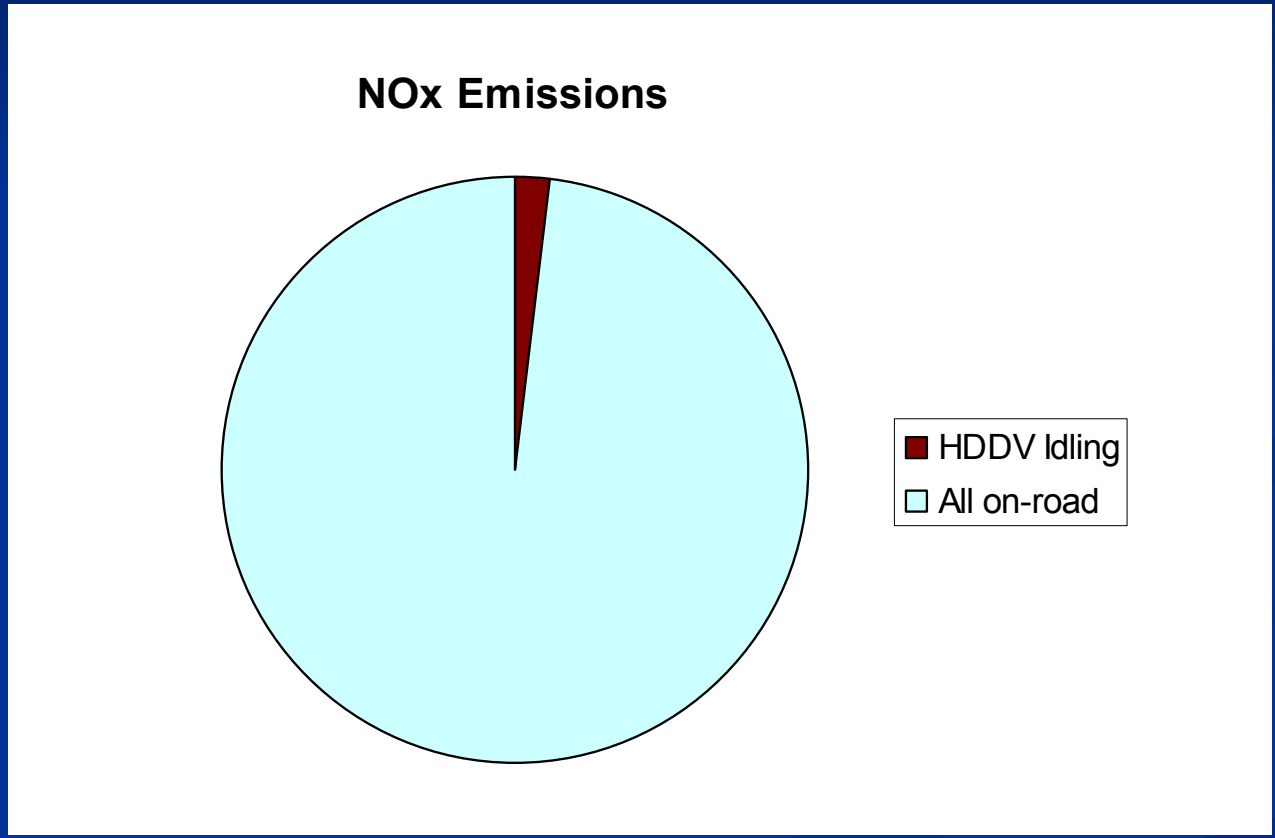
$$TI = R\sum_{i=1}^{n} 0.50 \times (0.0875 e_i)$$

Ports

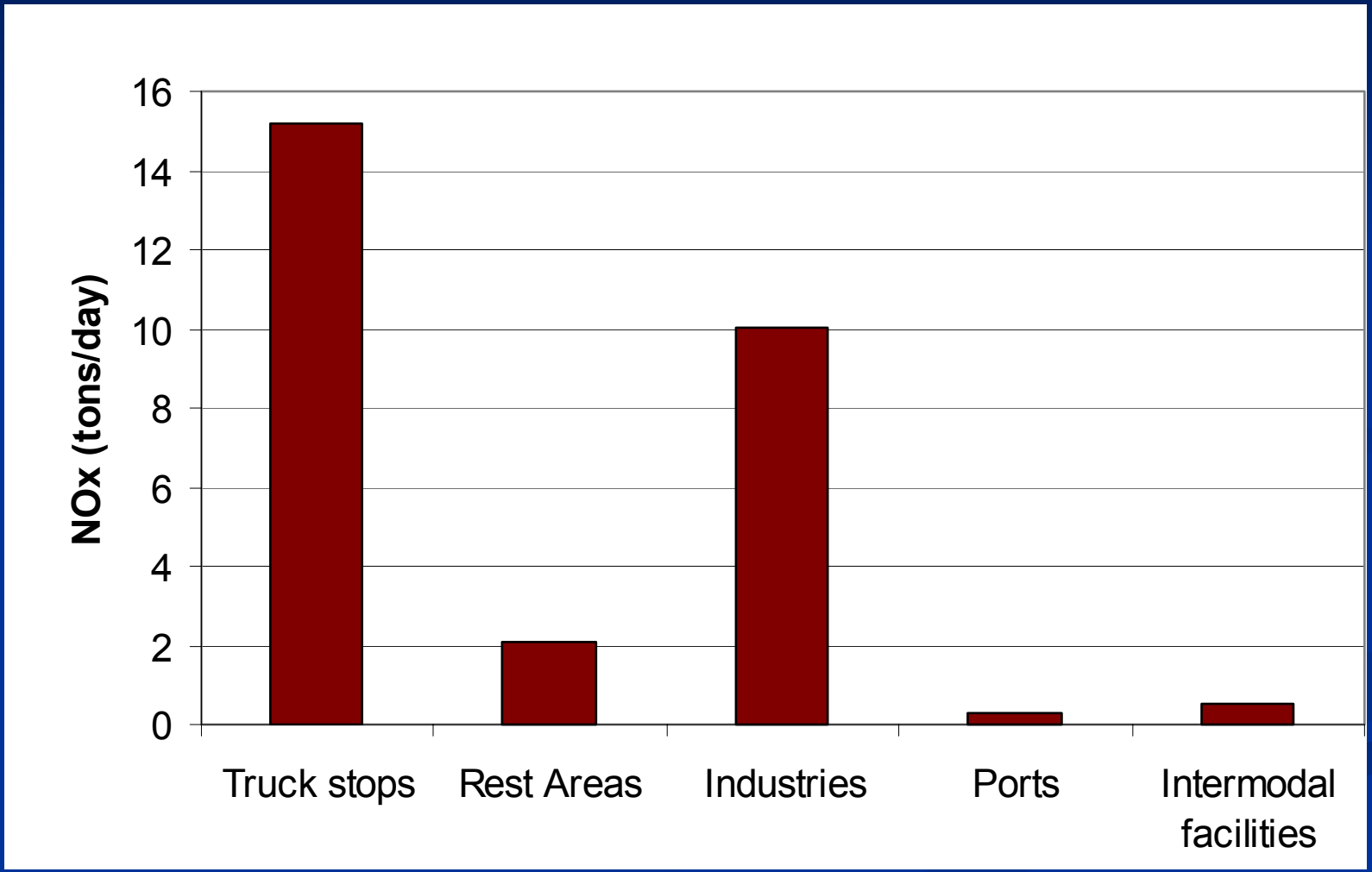
$$TP = R\sum_{i=1}^{n} 1.25 \times t_i$$

R	=	NOx emissions rate (tons per hour)
C_i	=	capacity of truck stop i
$\overline{O}$	=	average occupancy rate (percentage)
$\overline{I}$	=	average idling rate (percentage)
e_i	=	number of employees for industry i
t_i	=	number of truck visits per day at port

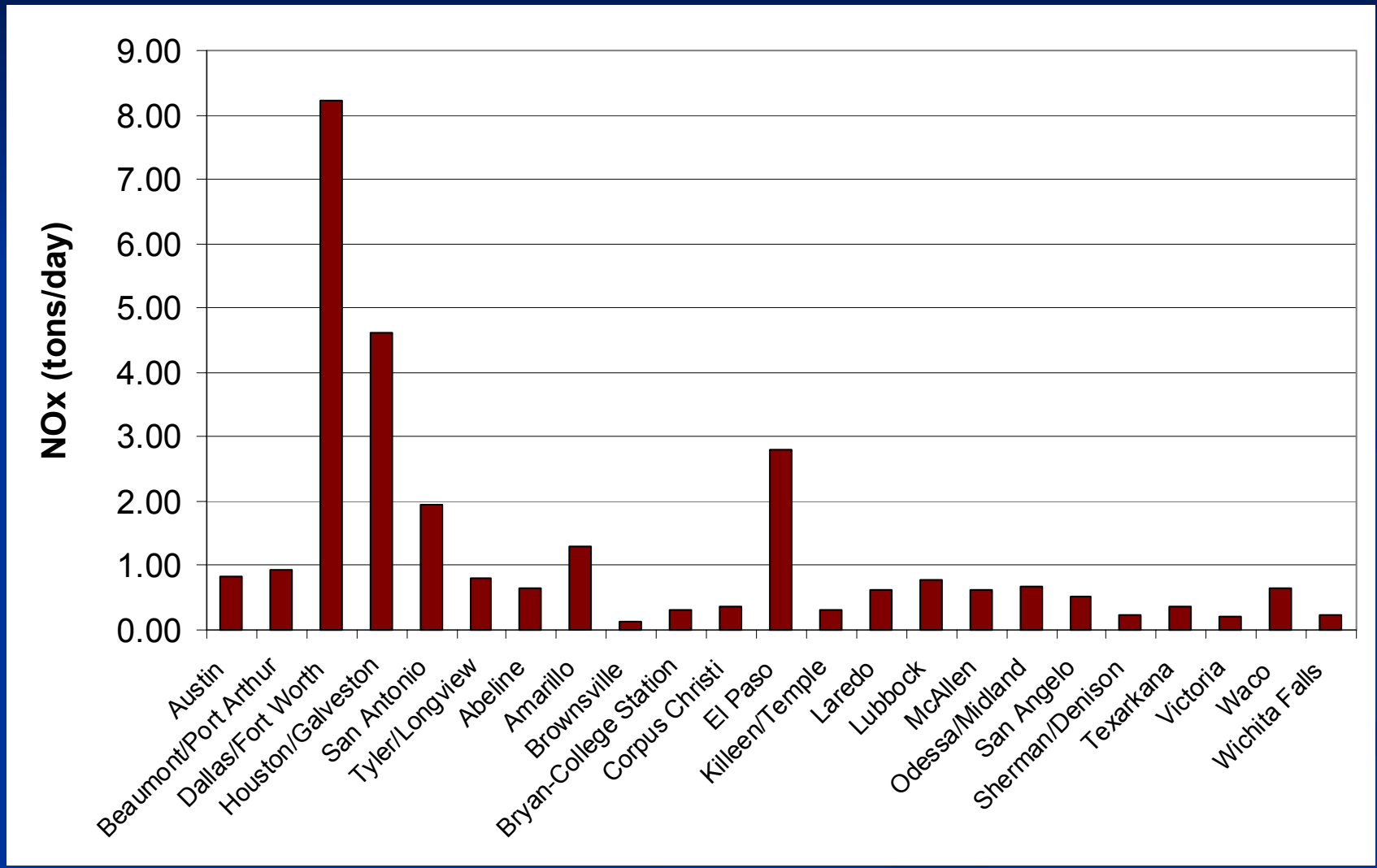
NOx Emissions of HDDV Idling Versus All On-Road



HDDV Idling Per Category



HDDV Idling Per Metro Area



Comprehensive Approach

Idling Sources

- Truck stops
- Rest areas
- Warehouses
- Retail
- **Manufacturing**
- Ports
- Airports
- Railway yards
- Construction sites
- Package distribution

Manufacturing variables

- Categories of industries
- Idling per category
- Truck visits per employees and category
- Industries per county and category
- Employment per county and category
- Truck mix
- Time of day and day of week variations

Idling Emissions Rates (PEMS)

Conclusions

- HDDV Idling can be significant
- Overall methodology:
  - Data collection
  - Model building
  - Activity estimation
  - Emissions estimation
- Comprehensive effort:
  - Range of vehicles
  - Range of generator
  - Range of factors
  - Range of emissions rates
  - Range of time periods
  - Range of locations
- **zietsman@tamu.edu**