Activity in MOVES2006

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Overview

- **Introduction**
- **VMT & SHO**
- **Starts & Evaporative Activity**
- **Future Steps**

Activity

- **<u>How much</u> of each emission process and operating mode are happening at a given place & time.**
- **Data typically obtained from secondary sources**
- **A major source of uncertainty in the model**

Definitions:

- **"Activity Basis"**
  - Express how much of an emission process happens in a given area and time.
  - Estimated based on the vehicle population and general characteristics of the vehicles' operation.
- **"Operating Mode"**
  - Distinguish emission-relevant types of operation.
  - Operating Mode Distributions allocate the total Activity Basis to the operating modes.

Emission Processes & Activity

Emission Process	Activity Basis	Operating Modes
Running Exhaust	Source Hours Operating (SHO)	VSP bins
Start Exhaust	Starts	Soak time bins
Extended Idle Exhaust	SH Extended Idle (SHEI)	Single mode
Well-to-Pump	na (chained calculator)	na
*Crankcase**	*na (chained calculator)*	*na*
Brakewear	SHO	VSP bins
Tirewear	SHO	Single mode

* Planned for MOVES2007

Emission Processes & Activity (cont.)

Emission Process	Activity Basis	Operating Modes
Evap Permeation	Source Hours (SH)	Running, Hot soak, Cold Soak
Evap Fuel Vapor Venting	SH	Running, Hot soak, Cold Soak
Evap Fuel Leaks	SH	Running, Hot soak, Cold Soak
Evap Non-Fuel Vapors*	*tbd*	*tbd*
Evap Refueling Losses*	*na (chained calculator)*	*na*

*Planned for MOVES2007

Activity for Running Emissions

- **Macroscale**
  1. VMT measured on roadways
  2. VMT converted to Source Hours Operating (SHO) using average speed
  3. SHO allocated to operating modes (VSP bins) using average speed distributions and associated driving cycles

- **Expect local inputs of average speed, and perhaps even driving cycle information for project-level analysis**
- **Microscale modelers may enter VSP distributions directly**

Start and evaporative activity

- **Important parameters**
  - Starts per vehicle by hour
  - Soak time distribution
  - Time operating & time parked.
- **Consistent treatment requires common source of activity data**
- **Instrumented vehicle data will be used directly in the model**
  - "SampleVehicleTrip" table will contain national default
  - Local instrumented vehicle results could be substituted

Sample vehicle trip data

SampleVehicleDay table

SampleVehicleTrip table

- Together provide a log of trips from a group of "sample vehicles".
- Allow model to compute starts/hour, operating time/hour, cold soaks/hour & hot soaks/hour with appropriate soak time.

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MOVES2006 Sample Vehicles

- **Analysis by Sierra Research**
- **Data sources**
  - Radian instrumented vehicles in Spokane, Baltimore & Atlanta, 1992
    - Adjusted per Texas Transportation Institute "Travel Time Index" showing growth in average trip length
  - GeoStats data from Minneapolis
    - OBD equipped cars only
- **Additional data not used:**
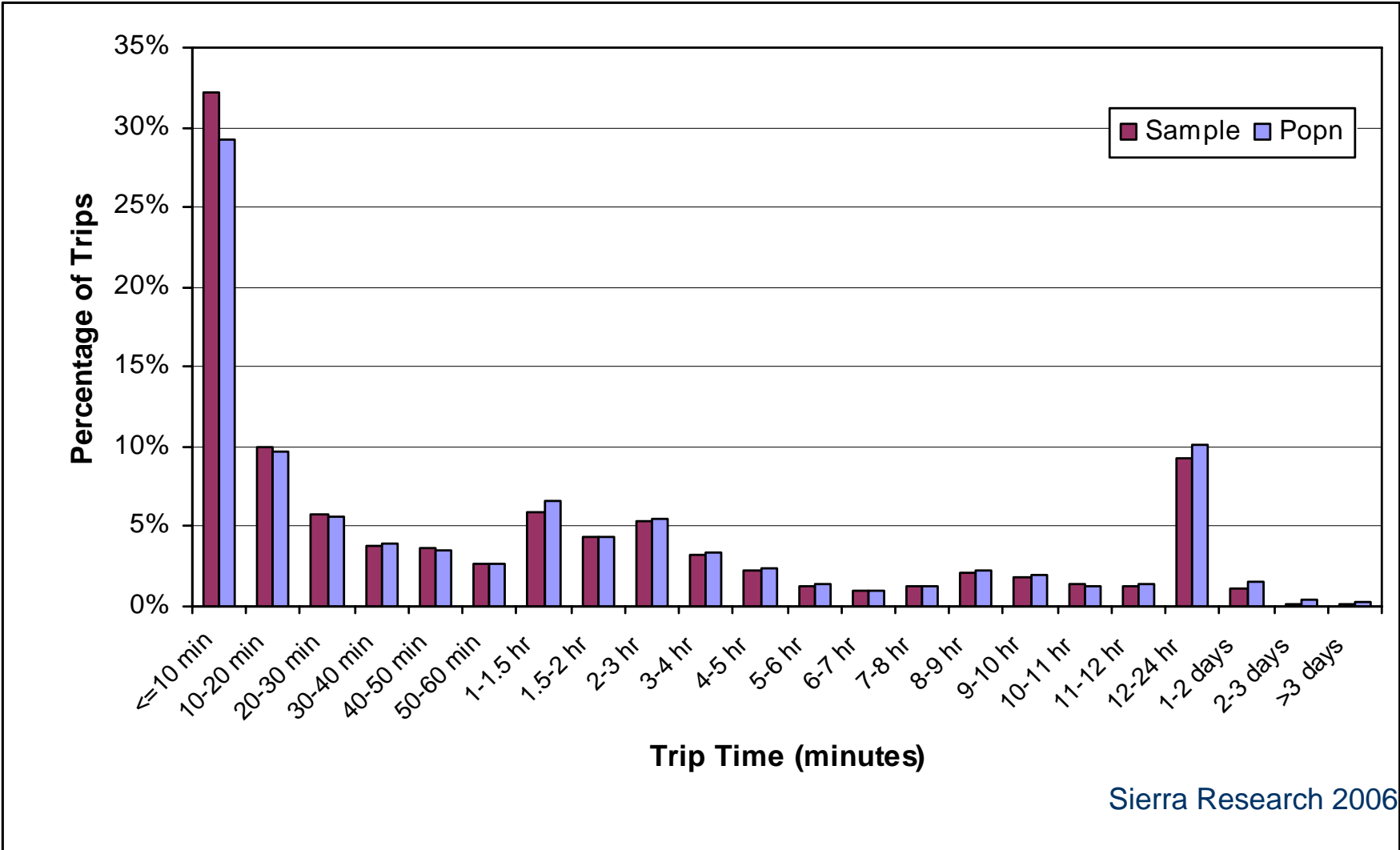 - GeoStats data from other cities – data collection time < 24 hours.

Trip Start Hour Distributions
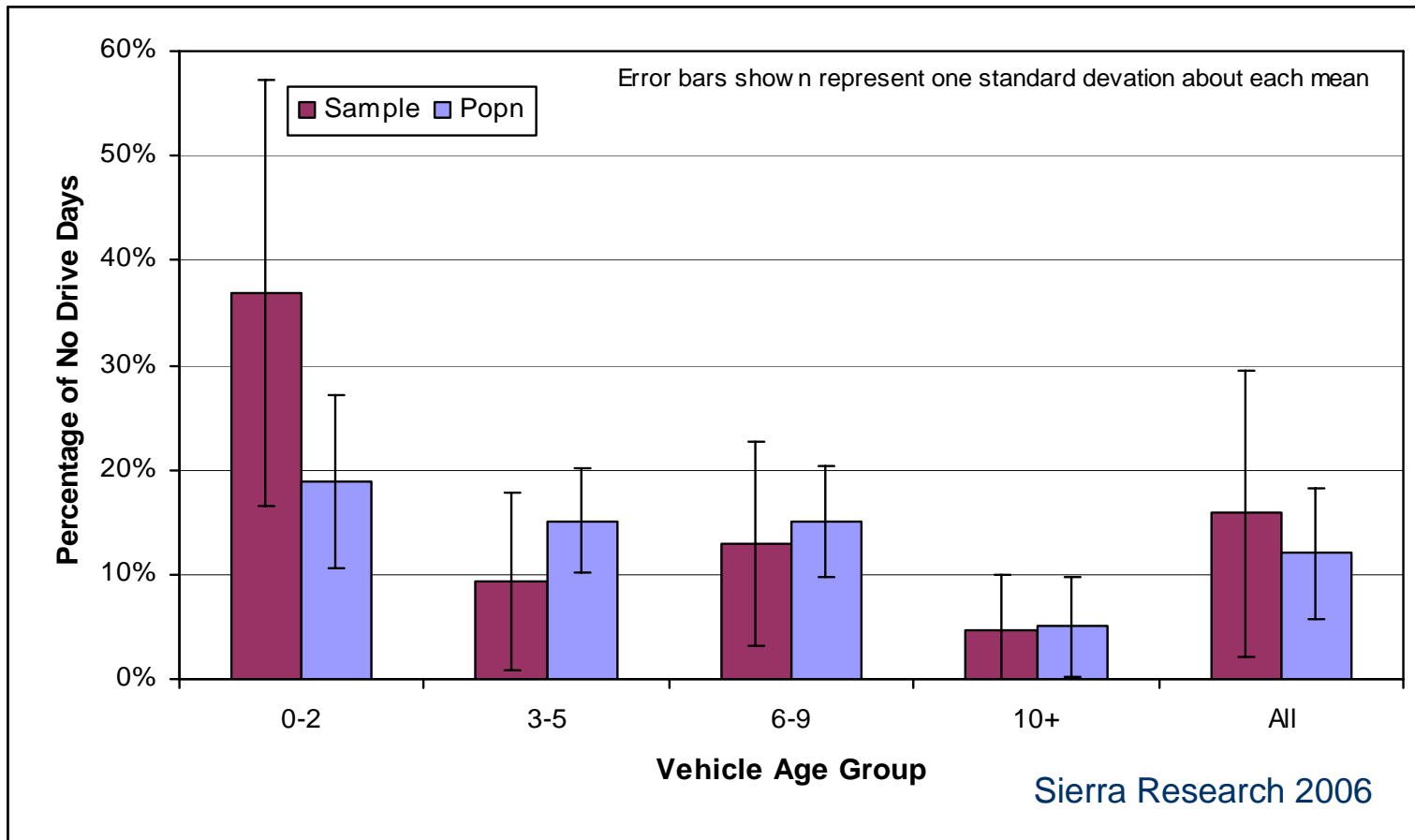# Passenger Car Sample vs. Population

Sierra Research 2006
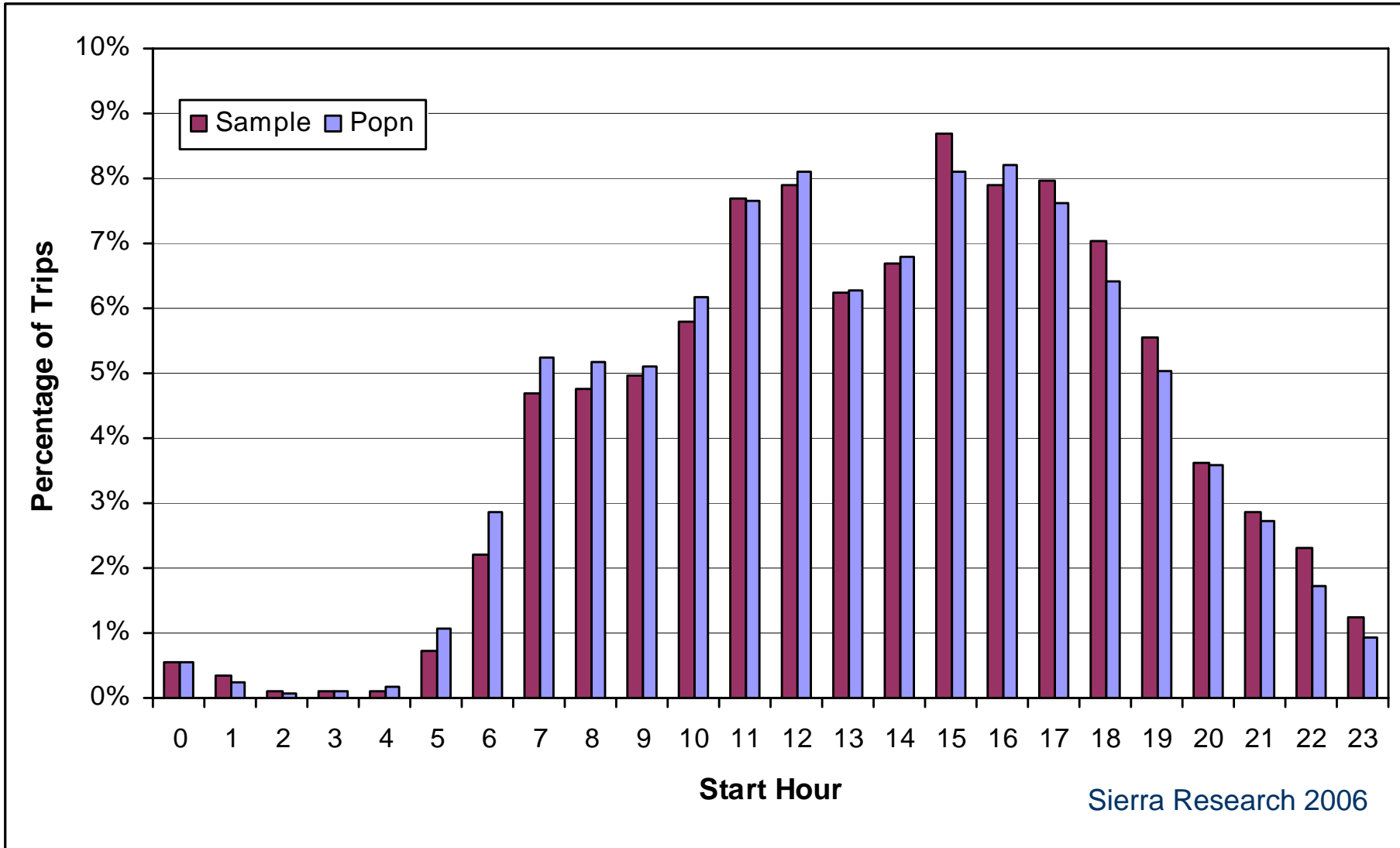
Soak Time Distributions
Passenger Car Sample vs. Population

Sierra Research 2006

No Drive Day Percentages by Age Group Passenger Car Sample vs. Population

Sierra Research 2006

Sample Trip data concerns

- **Instrumentation difficulties**
- **Lack of full-day data**
- **Limited geographical coverage**
- **Bias to measure frequently-driven vehicles**
  - Undercount "no-drive days"
- **Older vehicles undersampled**
- **Limited data for commercial & freight vehicles**

Future steps for MOVES activity

- **Add data on HD trip activity**

- **Additional data on LD trip activity**

- **Methods & guidance for inputs at regional and microscale**

  – Continue working with DOT to understand interface with transportation models