



# NORTH CENTRAL TEXAS OIL & GAS VEHICLE INVENTORY STUDY



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# Introduction

2

Natural gas exploration and production activities have increased significantly in North Texas

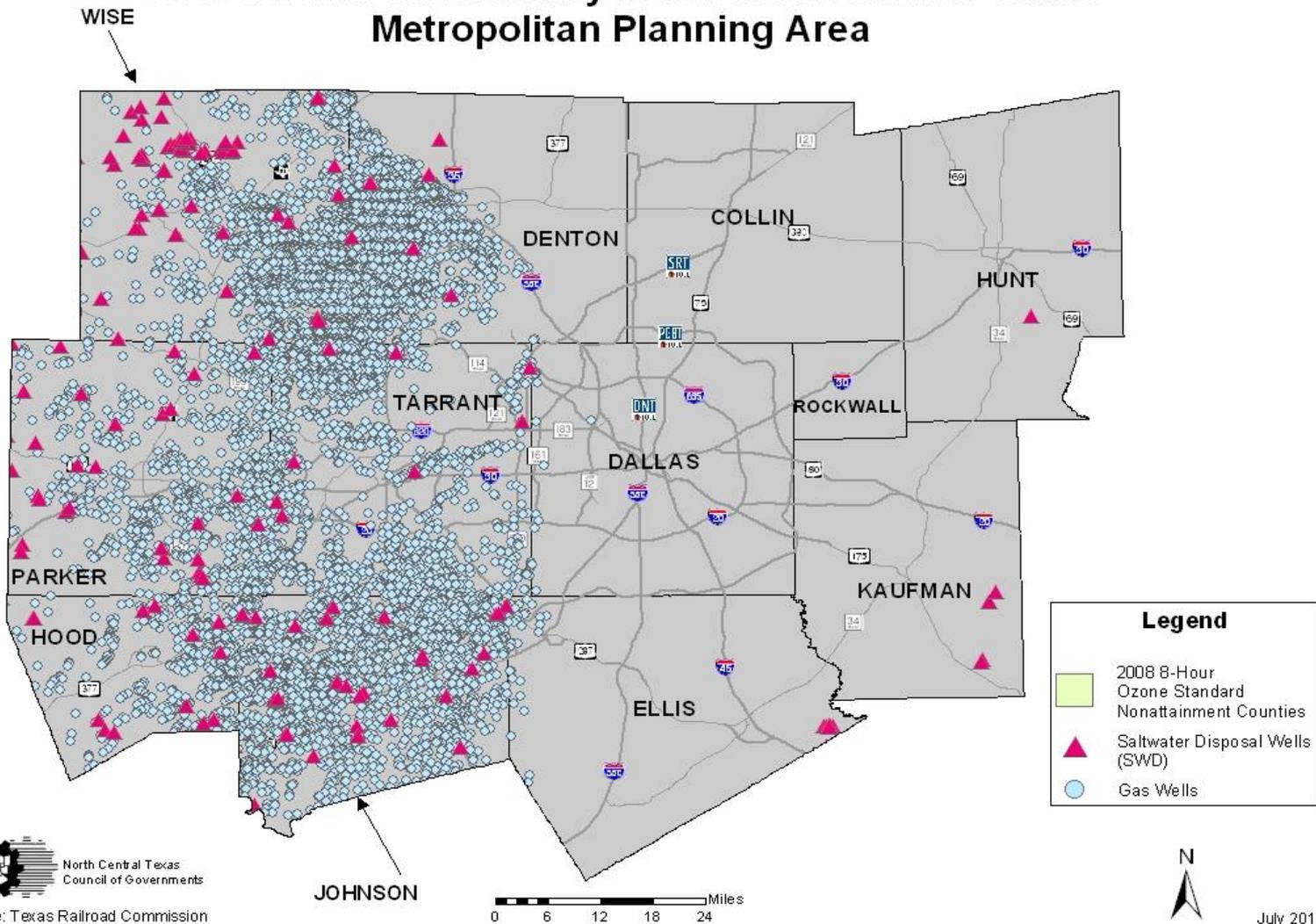
Concerns about air quality impact of trucks:

“Real world” impacts at air quality monitors

Implications for emissions inventories used for State Implementation Plan (SIP) development

# 2012 Oil and Gas Activity

## 2012 Oil and Gas Activity in the North Central Texas Metropolitan Planning Area



# Study Scope/Major Tasks

4

Estimate current and projected Barnett Shale truck activity

Verify truck activity with travel demand model estimates & TxDOT classification counts

Incorporate Barnett Shale truck trips in travel demand model to estimate vehicle miles traveled (VMT)

Estimate current and projected emissions from Barnett Shale truck activity

Carbon Dioxide (CO<sub>2</sub>)

Carbon Monoxide (CO)

Nitrogen Oxides (NO<sub>x</sub>)

Particulate Matter (PM)

Volatile Organic Compounds (VOC)

# Information Sources

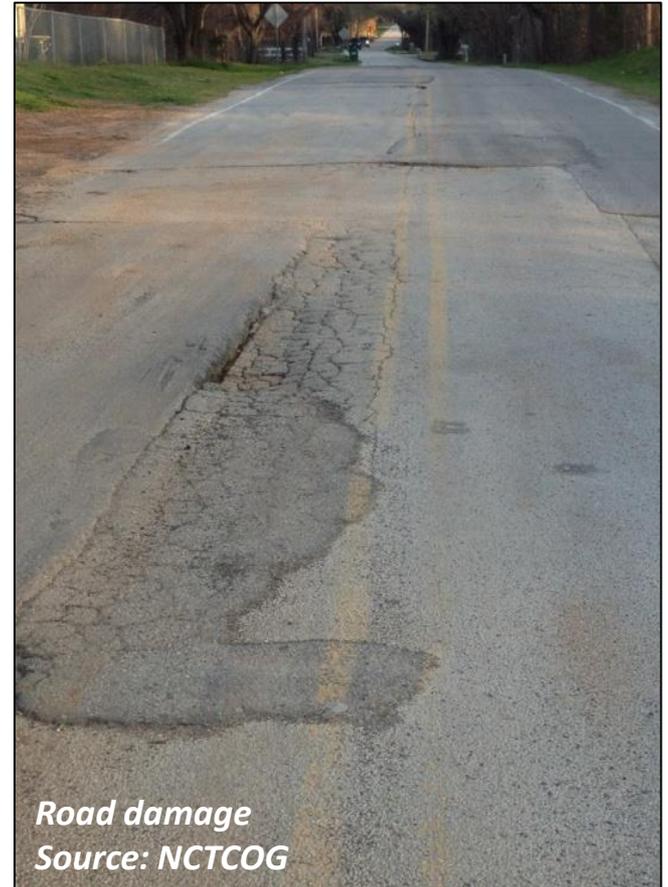
5

Existing reports/literature/presentations

Texas Department of Motor Vehicles  
permit/registration data

Texas Railroad Commission datasets

Conference calls, interviews, and  
surveys of industry members



# Phases

**Drilling**  
**~2-3 Weeks**



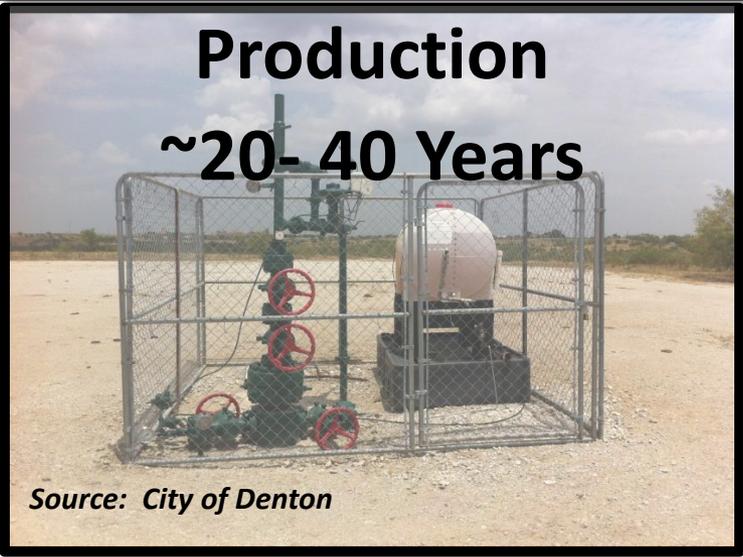
Source: NCTCOG

**Completion**  
**~16 Days**



Source: City of Fort Worth

**Production**  
**~20- 40 Years**



Source: City of Denton

All phases require trucks to transport equipment and supplies.

Trucks idle in all phases waiting to load/unload or while performing work.

# Methodology

7

Two major tasks

Quantify Activity

Calculate Emissions

Three analysis years

2006, 2012, 2018

	Activity Rates	Emissions Estimates
Drilling Phase	Literature Review	MOVES Emission Factors
Completion Phase	Literature Review	MOVES Emission Factors
Production Phase	Synthetic Module of Travel Demand Model	MOVES Emission Factors
Extended Idling	Survey Responses	MOVES Emission Factors EPA Idling Emission Factors

MOVES=Motor Vehicle Emissions Simulator

EPA=Environmental Protection Agency

# The Drilling Phase

8

Major steps:

Preparation of well site

Delivery/assembly of rig equipment

Drilling of the well

Disassembly/removal of rig equipment

## Estimated Activity Characteristics

**Duration: 2-3 weeks**

**Truck Trips: 187**

**Truck Idling to Load/Unload Cargo**



# The Completion Phase

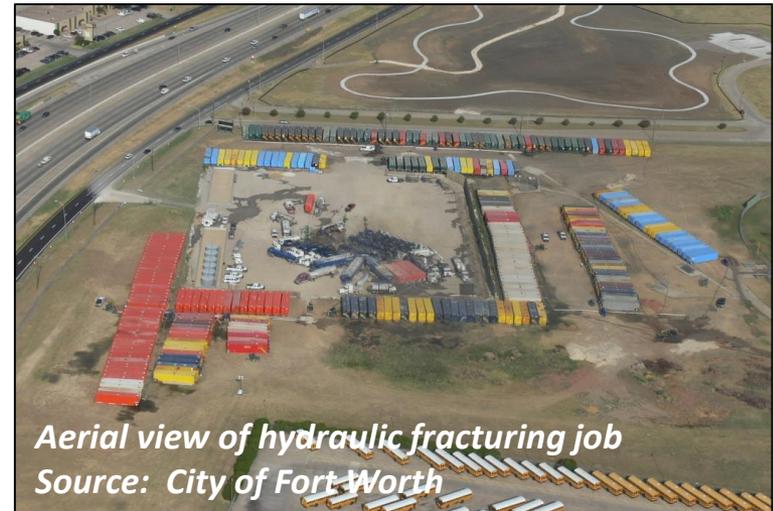
9

Major Steps:

Hydraulic fracturing

Well put into production

Installation of wellhead, meters  
and pumps



*Aerial view of hydraulic fracturing job  
Source: City of Fort Worth*

## Estimated Activity Characteristics

**Duration: Approximately 16 days**

**Truck Trips: 420**

**Truck Idling to Load/Unload Cargo**



*Sand Trucks  
Source: Anchor Trucking*

# The Production Phase

10

**Major Steps:**

**Removal of produced water**

**Frequency declines over time**

*Water Hauler Truck  
Source: City of Denton*



## Estimated Activity Characteristics

**Duration: Approximately 20-40 years**

**Truck Trips: Approximately 0.33 trips/well/day**

**Truck Idling to Load/Unload Cargo**

# Activity Rate Results

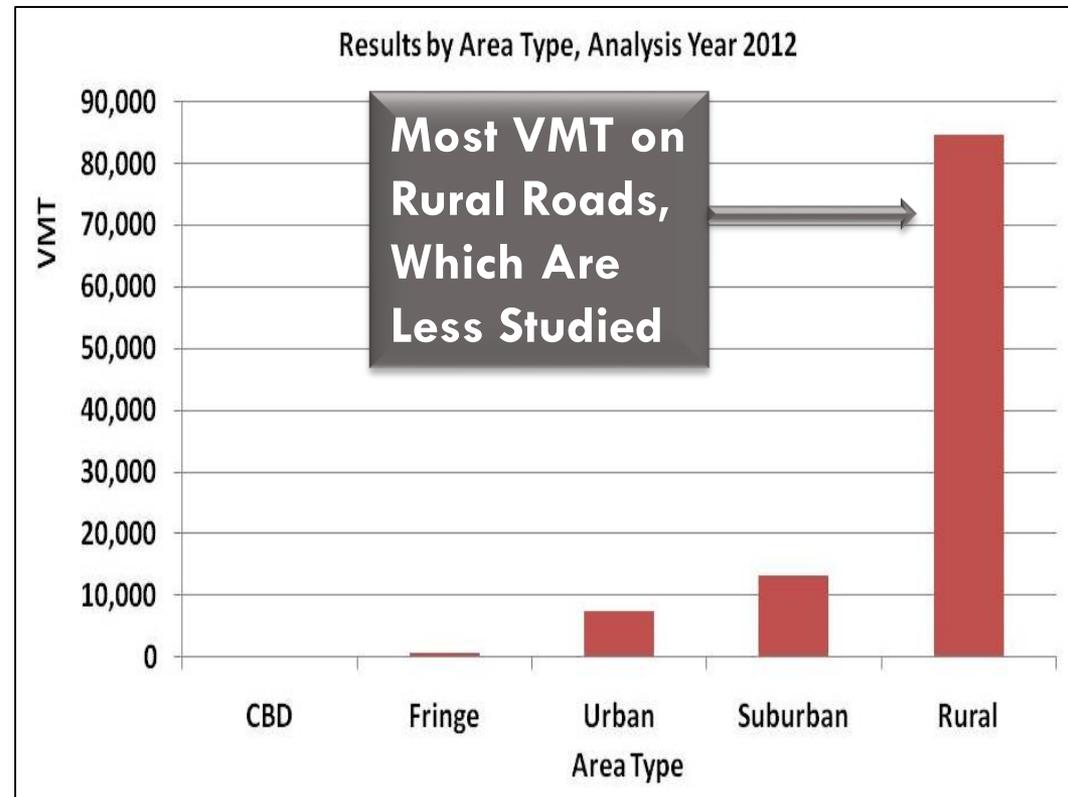
11

Nominal impact on daily regional VMT

Potential for extensive localized impact

Numerous assumptions made

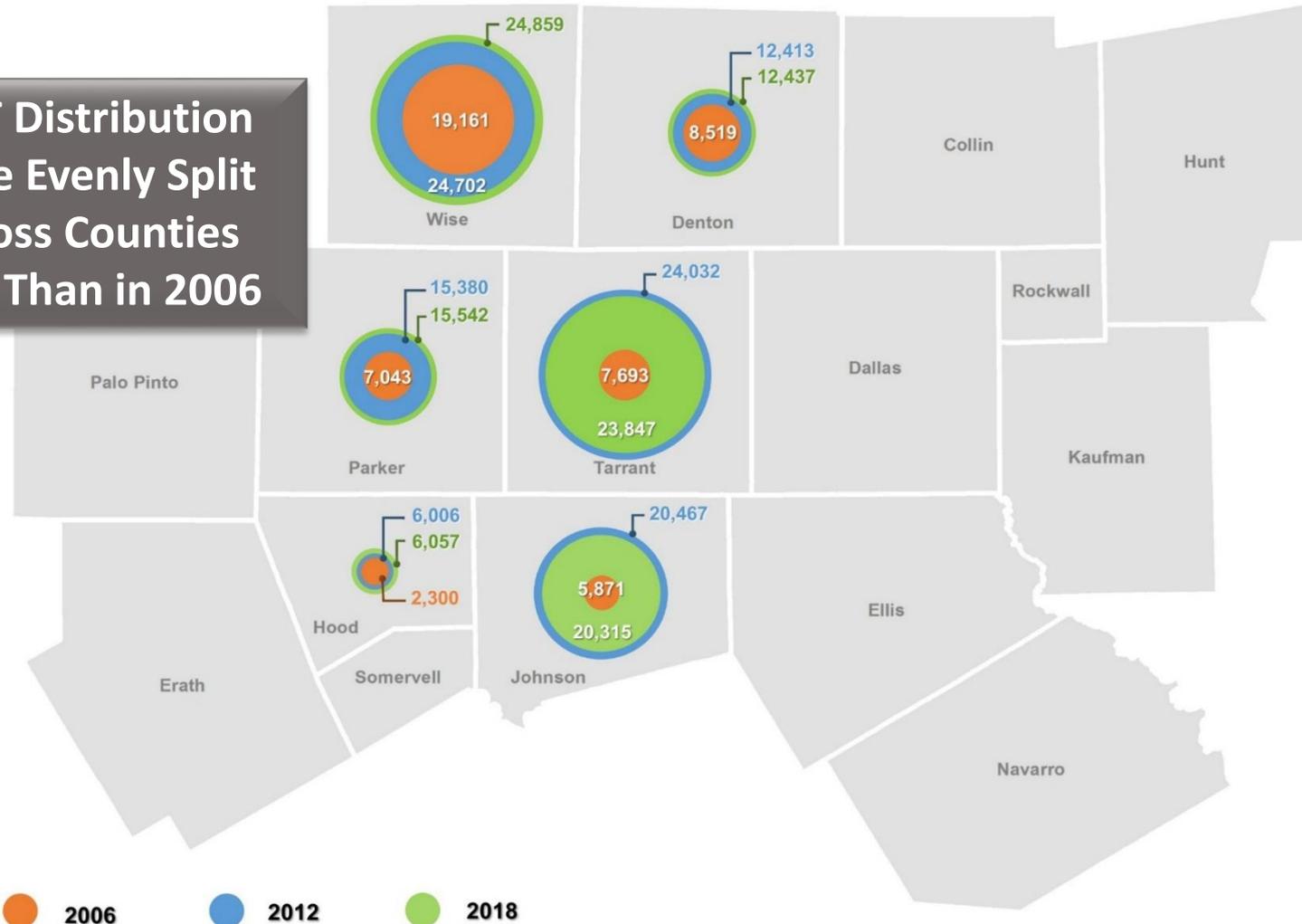
Conservative results



# VMT By County, By Year

12

VMT Distribution  
More Evenly Split  
Across Counties  
Now Than in 2006

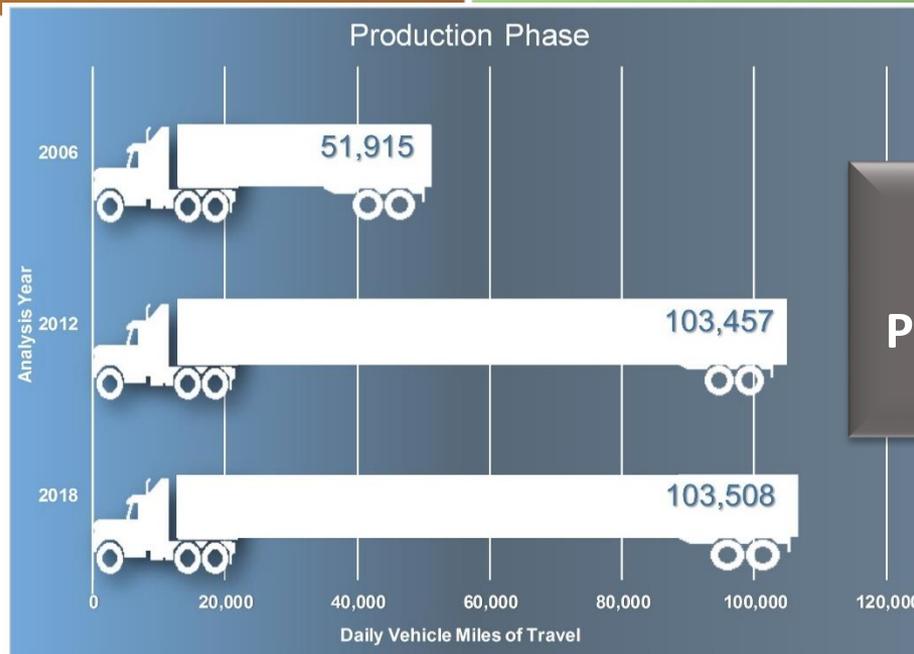
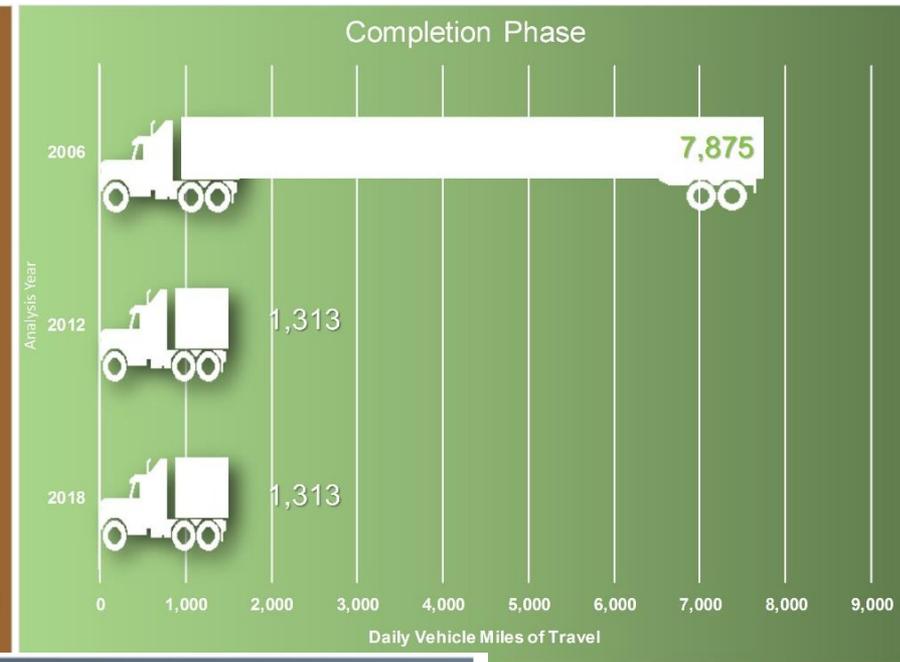
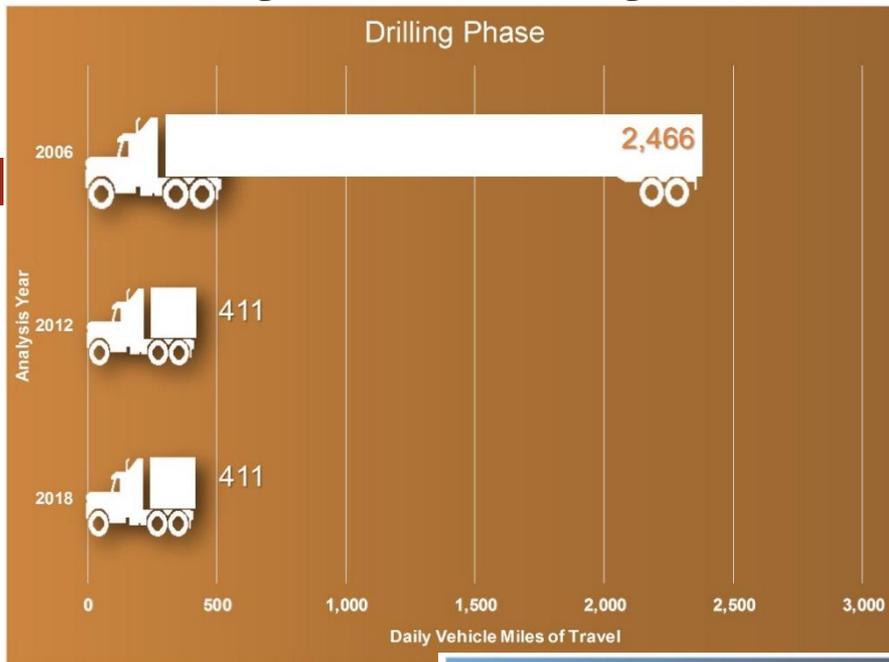


● 2006 ● 2012 ● 2018

VMT data represented by diameter of circles

# Daily VMT by Phase

13



**VMT Associated with Production Phase Continues to Grow**

# Emissions Results

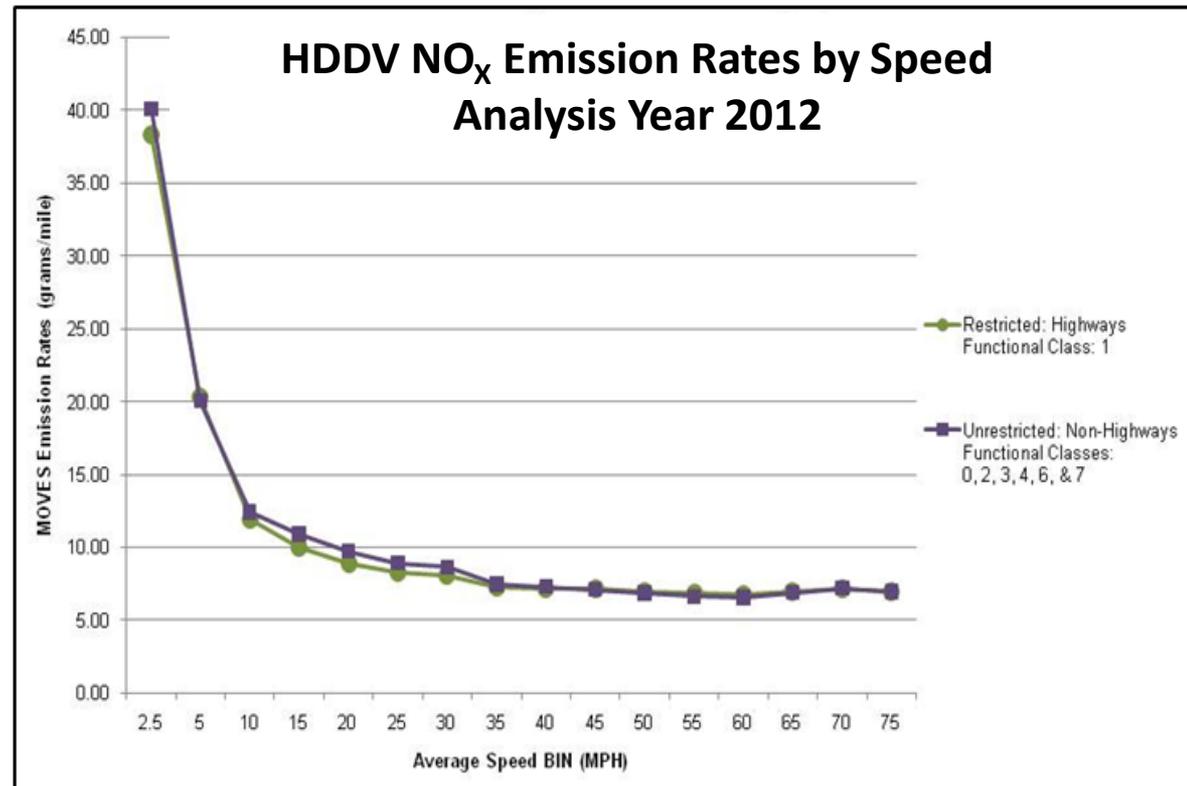
14

VMT-based emissions  
proportionally impacted  
by activity rates

Approximately 78%  
of estimated  
emissions in 2012  
attributed to  
extended idling

## Emissions Impact, Tons per Day\*

Pollutant	2006	2012	2018
NO <sub>x</sub>	2.54	4.07	2.17
VOC	0.30	0.43	0.08



# Conclusions

15

Process established

Numerous incomplete or  
unavailable datasets

Several assumptions were made  
to generate findings

Lack of reliable data

Results may be significantly  
underestimated



# Next Steps

16

## “Phase 2” Study

**Refine activity estimates**

**Trip length**

**Truck route patterns (origin/destination data)**

**Daily saltwater disposal well capacity**

Adjust modeling process

Re-evaluate vehicle classification counts

Promotion of idle reduction strategies

Submittal of TxDOT research project ideas

Coordination with Eagle Ford Shale stakeholders

Improvement of agency communication

# For More Information

17

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