HEAVY-DUTY VEHICLE EMISSIONS IMPACT STUDY

NCTCOG Public Meeting
September 8, 2020

Jason Brown, Principal Air Quality Planner
HEAVY-DUTY VEHICLE EMISSIONS IMPACT STUDY

Region Fails Federal Ozone Standards
Nitrogen Oxides (NOₓ) Emissions Limited Area
Diesel Engine Higher NOₓ Rates

Air Quality Planning Purposes
Improve Accuracy of Measurements
Strategy and Policy Opportunities

Emissions Factors vs. Speeds

Total Nitrogen Oxides (NOₓ) = 234.75 tons per day (tpd)

- Point (Oil & Gas) 6.04 tpd
- Area 34.47 tpd
- Off-Road Mobile 30.95 tpd
- Non-Road Mobile 38.18 tpd
- On-Road Mobile 88.27 tpd
- Oil & Gas (Production & Drill Rigs) 6.79 tpd

Light-Duty Vehicles 36.18 tpd
Medium-Duty Vehicles 9.81 tpd
Heavy-Duty Vehicles 42.28 tpd

Source: NCTCOG
Recent Public Updates

I45 Zero-Emission Corridor Plan

Natural Gas Vehicle U.P.-T.I.M.E.

Funding Opportunities – www.nctcog.org/aqfunding
STUDY OBJECTIVES

• Understand Oversize/Overweight (OS/OW) Heavy-Duty Vehicle (HDV) Activities
  – Vehicle Types
  – OS/OW Permit Types
  – Vehicle Activity

• OS/OW Emissions Characteristics

• Regional Impact of OS/OW Operations
### NCTCOG Region Single and Multi-Trips Permits by Year

<table>
<thead>
<tr>
<th>Year</th>
<th>Single Trip Routed Permits</th>
<th>Percent Total (%)</th>
<th>Multi-Trip Non-Routed County Permits</th>
<th>Percent Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2016</td>
<td>125,917</td>
<td>86</td>
<td>20,539</td>
<td>14</td>
</tr>
<tr>
<td>FY2017</td>
<td>142,213</td>
<td>82</td>
<td>30,923</td>
<td>18</td>
</tr>
<tr>
<td>FY2018</td>
<td>145,546</td>
<td>81</td>
<td>33,828</td>
<td>19</td>
</tr>
</tbody>
</table>

**DATA ANALYSIS – VEHICLE CHARACTERISTICS**

Source: Texas A&M Transportation Institute

Photos: Texas Department of Motor Vehicles

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**General Construction**

Oil and Gas Industry 25.8%

Agricultural Products 7.7%

Manufacturing 6.5%

Road Construction 3.9%

Ready-Mixed Concrete 0.8%

Marine Transportation 0.8%

Wastewater and Pipeline Industry 0.7%

**Percent of Multi-Trip County Permits**

0% 10% 20% 30% 40% 50%
Phasing In By Vehicle Model Year

2001 and Older
No Emissions Control Technology Required

2002 and Newer
Exhaust Gas Recirculation System (EGR)

2010 and Newer
Diesel Particulate Filter (DPF),
Selective Catalytic Reduction (SCR) and
Diesel Emissions Fluid (DEF)
EMISSIONS ANALYSIS – KEY RESULTS

Pre-SCR Equipped Vehicle (MY2005 and MY2009)

- Increase in load weight/size equate to higher \( \text{NO}_x \) emissions.
- Older vehicles have higher emissions (deterioration)

<table>
<thead>
<tr>
<th>Model Year</th>
<th>NOx Emissions Rates (g/mile)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Restricted Access (Freeways)</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
</tr>
<tr>
<td>2005</td>
<td>15.63</td>
</tr>
<tr>
<td>2009</td>
<td>4.67</td>
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</table>

Source: Texas A&M Transportation Institute

Photo: Texas Department of Motor Vehicles
EMISSIONS ANALYSIS – KEY RESULTS

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<tr>
<td></td>
<td>Restricted Access (Freeways)</td>
<td>Unrestricted Access (Arterials)</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>Normal</td>
</tr>
<tr>
<td>2014</td>
<td>1.50</td>
<td>2.93</td>
</tr>
</tbody>
</table>

Source: Texas A&M Transportation Institute

SCR Equipped Vehicle

- Arterials: For lower speed/acceleration combinations \( \text{NO}_x \) emissions increase as weight increases.
- Freeways: For higher speed/acceleration combinations \( \text{NO}_x \) emissions decrease as weight increases.

• Generally, for lower weight loads the exhaust temperature is below SCR effective temperature range, therefore increased \( \text{NO}_x \) emissions.
REGIONAL IMPACT OF OS/OW OPERATIONS

Ideas:

• Permit Fee Structure or Requirements

• Enforcement

• Incentives – [www.nctcog.org/aqfunding](http://www.nctcog.org/aqfunding)

• Coordinate with Federal and State Regulators, Local Stakeholders