2014 Mobile Source Emissions Inventory

Shelley H. Lanham
Senior Air Quality Specialist
2014 Total Mobile Source Emissions
Mecklenburg County, NC

Purpose: Quantify exhaust emissions from mobile sources

- NO\textsubscript{x}: 13,168 tons
- VOC: 6,674 tons
- PM\textsubscript{2.5}: 698 tons
- CO: 91,773 tons
- SO\textsubscript{2}: 269 tons
- CO\textsubscript{2}: 5,613,475 tons
Mobile Sources of Air Pollution
A Categorical Approach

Goal: Identify high impact emission reduction strategies
Passenger Transport remains the largest mobile source of NO$_x$ in Mecklenburg County

- Passenger Transport: 34%
- Goods Movement: 22%
- Construction: 21%
- Aircraft and Ground Support Equipment: 13%

Total NOx: 13,168 tons
Construction Equipment remains the largest mobile source of PM$_{2.5}$ in Mecklenburg County.

Total PM$_{2.5}$: 698 tons
Passenger Transport emits vast majority of mobile source CO\textsubscript{2} emissions in Mecklenburg County.

Total CO\textsubscript{2} 5,613,475 tons
Drive Less!

Passenger transport is the largest mobile source of air pollution in Mecklenburg County.
\(\text{NO}_x\) Emissions from 1 piece of Construction Equipment

= \(\text{NO}_x\) Emissions from 104 Passenger Vehicles
Upgrade Construction Equipment with Grants to Replace Aging Diesel Engines (GRADE)

Construction equipment is the largest mobile source of particulate pollution in Mecklenburg County.

GRADE has reduced 489 tons of NO\textsubscript{x} since 2007.
\( \text{NO}_x \) Emissions from 1 Tractor Trailer

\( = \text{NO}_x \) Emissions from 80 Passenger Vehicles
Goods Movement is the second largest mobile source of NO$_x$ in Mecklenburg County.

GRADE for Freight expected to reduce 220 tons of NO$_x$. 
## Appendix A: On-Road Mobile Inventory

<table>
<thead>
<tr>
<th>On-road Vehicle Type</th>
<th>NOx</th>
<th>VOC</th>
<th>PM2.5</th>
<th>CO</th>
<th>SO2</th>
<th>Atmos CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TPY</td>
<td>%</td>
<td>TPY</td>
<td>%</td>
<td>TPY</td>
<td>%</td>
</tr>
<tr>
<td>Passenger Vehicle</td>
<td>3,786</td>
<td>56%</td>
<td>2,503</td>
<td>83%</td>
<td>73</td>
<td>35%</td>
</tr>
<tr>
<td>Combination Long-haul Truck</td>
<td>1,196</td>
<td>18%</td>
<td>62</td>
<td>2%</td>
<td>59</td>
<td>29%</td>
</tr>
<tr>
<td>Combination Short-haul Truck</td>
<td>611</td>
<td>9%</td>
<td>36</td>
<td>1%</td>
<td>29</td>
<td>14%</td>
</tr>
<tr>
<td>Light Commercial Truck</td>
<td>411</td>
<td>6%</td>
<td>233</td>
<td>8%</td>
<td>7</td>
<td>3%</td>
</tr>
<tr>
<td>Intercity Bus</td>
<td>345</td>
<td>5%</td>
<td>24</td>
<td>1%</td>
<td>18</td>
<td>9%</td>
</tr>
<tr>
<td>Single Unit Short-haul Truck</td>
<td>273</td>
<td>4%</td>
<td>49</td>
<td>2%</td>
<td>12</td>
<td>6%</td>
</tr>
<tr>
<td>Transit Bus</td>
<td>71</td>
<td>1%</td>
<td>6</td>
<td>0%</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>School Bus</td>
<td>42</td>
<td>1%</td>
<td>8</td>
<td>0%</td>
<td>3</td>
<td>1%</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>36</td>
<td>1%</td>
<td>103</td>
<td>3%</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Single Unit Long-haul Truck</td>
<td>26</td>
<td>0%</td>
<td>4</td>
<td>0%</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Refuse Truck</td>
<td>20</td>
<td>0%</td>
<td>1</td>
<td>0%</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>Motor Home</td>
<td>5</td>
<td>0%</td>
<td>2</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total On-road</td>
<td>6,822</td>
<td>3,030</td>
<td>207</td>
<td>39,974</td>
<td>77</td>
<td>4,298,027</td>
</tr>
</tbody>
</table>
## Appendix B: Nonroad Mobile Inventory

<table>
<thead>
<tr>
<th>Nonroad Vehicle Type</th>
<th>NOx</th>
<th>VOC</th>
<th>PM2.5</th>
<th>CO</th>
<th>SO2</th>
<th>Atmos CO2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>TPY</td>
<td>%</td>
<td>TPY</td>
<td>%</td>
<td>TPY</td>
<td>%</td>
</tr>
<tr>
<td>Construction</td>
<td>2,779</td>
<td>44%</td>
<td>427</td>
<td>12%</td>
<td>239</td>
<td>49%</td>
</tr>
<tr>
<td>Aircraft</td>
<td>1,623</td>
<td>26%</td>
<td>279</td>
<td>8%</td>
<td>25</td>
<td>5%</td>
</tr>
<tr>
<td>Commercial</td>
<td>628</td>
<td>10%</td>
<td>606</td>
<td>17%</td>
<td>51</td>
<td>10%</td>
</tr>
<tr>
<td>Lawn/Garden</td>
<td>483</td>
<td>8%</td>
<td>1,848</td>
<td>51%</td>
<td>139</td>
<td>28%</td>
</tr>
<tr>
<td>Railroad Locomotives</td>
<td>341</td>
<td>5%</td>
<td>16</td>
<td>0%</td>
<td>-</td>
<td>0%</td>
</tr>
<tr>
<td>Industrial</td>
<td>325</td>
<td>5%</td>
<td>49</td>
<td>1%</td>
<td>18</td>
<td>4%</td>
</tr>
<tr>
<td>Airport Support</td>
<td>122</td>
<td>2%</td>
<td>11</td>
<td>0%</td>
<td>8</td>
<td>2%</td>
</tr>
<tr>
<td>Pleasure Craft</td>
<td>18</td>
<td>0%</td>
<td>71</td>
<td>2%</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>Recreational</td>
<td>17</td>
<td>0%</td>
<td>335</td>
<td>9%</td>
<td>10</td>
<td>2%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>8</td>
<td>0%</td>
<td>1</td>
<td>0%</td>
<td>1</td>
<td>0%</td>
</tr>
<tr>
<td>Logging</td>
<td>1</td>
<td>0%</td>
<td>1</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Railroad Equipment</td>
<td>1</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Oil Field</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Total Nonroad</td>
<td>6,347</td>
<td>0%</td>
<td>3,644</td>
<td>0%</td>
<td>492</td>
<td>0%</td>
</tr>
</tbody>
</table>
Appendix C: On-road Mobile Inventory Procedure

Model Used:
- MOVES2014a, version 20141021

Source of Input Data:
- North Carolina Division of Air Quality
  - MOVES2014a input files
- Charlotte Department of Transportation
  - Average speed
  - Vehicle miles traveled

MOVES2014a was run in inventory mode with results (outputs) broken down vehicle type, hour, day of the week, and month for post processing.
Appendix D: Nonroad Mobile Inventory Procedure

Models used:
- MOVES2014a (incorporated NONROAD2008)
- EDMS5.1.4.1

Source of Input Data:
- Bureau of Transportation Statistics
  - Flight data
  - Aircraft counts

Nonroad emissions are calculated by MOVES2014a. Those totals are added to pollution generated from aircraft take-offs and landings, as calculated by EDMS5.1.4.1. Locomotive emissions are provided by NCDEQ based on National Emission Inventory.
On-road vs. Nonroad Mobile Sources

- NOx: ONROAD 50%, NONROAD 50%
- VOC: ONROAD 50%, NONROAD 50%
- PM2.5: ONROAD 33%, NONROAD 67%
- CO: ONROAD 50%, NONROAD 50%
- SO2: ONROAD 33%, NONROAD 67%
- CO2: ONROAD 75%, NONROAD 25%
2014 NOx Emissions by Category
Mecklenburg County, NC

- Land/Resource Management: 4%
- Facility Support: 7%
- Air Craft: 13%
- Construction: 21%
- Goods Movement: 22%
- Passenger Transport: 33%

Total: 13,168 tons
2014 Top Sources of NOx
Mecklenburg County, NC

- Passenger Vehicles
- Construction
- Aircraft
- Combination Long-haul Truck
- Commercial
- Combination Short-haul Truck

Tons

0  500  1000  1500  2000  2500  3000  3500  4000
2014 Top Sources of PM2.5
Mecklenburg County, NC

- Construction: 250 Tons
- Lawn/Garden: 150 Tons
- Passenger Vehicles: 80 Tons
- Combination Long-haul Truck: 60 Tons
- Commercial: 50 Tons
- Combination Short-haul Truck: 30 Tons
2014 Top Sources of CO2
Mecklenburg County, NC

- Passenger Vehicles: 3,000,000 Tons
- Construction: 1,000,000 Tons
- Aircraft: 2,000,000 Tons
- Goods Movement: 3,000,000 Tons
- Combination Short-haul Truck: 1,000,000 Tons
- Light Commercial Truck: 4,000,000 Tons

Tons