Comparison of MOBILE6.2 and MOVES Emissions
Annual Emissions in Tons/Year

Key Assumptions:

Travel Demand Modeling: Based on Peninsula Model as of July, 2011.

Network & TAZ Data: WILMAPCO: July, 2010
Dover/Kent MPO: Summer, 2009

CUBE Voyager: Version 5.1.3 (March 2011).

Emissions Modeling:
MOBILE 6.2: Based on Input Files for Above Conformity Determinations.
MOVES: Based on DNREC Input Files & Excel Spreadsheet Process.

October 13, 2011
Comparison of MOBILE 6.2 & MOVES for Delaware ("Where Are We Today?"):  

Mobile Source Emissions Model Development Process:

**December, 2010 – March, 2011:**

**April – August, 2011:**
1) Input **DNREC “MOVES Process”** into DelDOT/MPO Peninsula Travel Model (CUBE Voyager 5.1.3).
2) Generate Annual Emissions.
3) QA/QC Among WRA/DelDOT/DNREC as to Process Inputs & Outputs.

**August – September, 2011:**
2) Generate Daily Emissions.
3) QA/QC Among WRA/DelDOT/DNREC as to Process Inputs & Outputs.

**October, 2011:**
1) Refine Process, Continue QA/QC.
2) Review Sussex County Emissions Results.
Comparison of MOBILE 6.2 & MOVES for Delaware:

Quick Review of Emissions Software:

<table>
<thead>
<tr>
<th>MOBILE 6.2</th>
<th>MOVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author: EPA</td>
<td>EPA</td>
</tr>
<tr>
<td>Release Date: July, 2001</td>
<td>March 12, 2010</td>
</tr>
<tr>
<td>Previous Version: MOBILE 5a/5b</td>
<td>MOBILE 6.2</td>
</tr>
<tr>
<td>Main Output: Emission Factors (Specific &amp; Composite) for 1 mph Increment Speeds.</td>
<td>Emission Factors for 16 Speed Bins. (VHT Based on VMT Allocation to Bins).</td>
</tr>
<tr>
<td>Output Form: Only Emission Rates</td>
<td>Emission Rate &amp; Inventory Possible.</td>
</tr>
<tr>
<td>User Data: Limited User-Provided Data</td>
<td>Able to Accommodate State Data</td>
</tr>
<tr>
<td>GUI: No: User-Specified ASCII File</td>
<td>Yes: Has GUI</td>
</tr>
<tr>
<td>Geographic Scale: County &amp; Nation</td>
<td>Project, County, Multi-County, Nation</td>
</tr>
<tr>
<td>Data Analysis: Pre-1994 Vehicle Fleet</td>
<td>Larger data set (Pre-1999 Fleet?)</td>
</tr>
<tr>
<td>Travel Model Input: VMT Based Speed Distribution</td>
<td>VHT Based Speed Distribution</td>
</tr>
<tr>
<td>Particulates: PM data with No Temperature Effects</td>
<td>PM data with LDV &amp; Temp. Effects</td>
</tr>
<tr>
<td>Heavy Vehicles: HDV without Speed Effects, No Crankcase, Start or Extended Idle Emissions.</td>
<td>HDV with Speed Effects and Other Processes.</td>
</tr>
</tbody>
</table>

Source: EPA Website.
Comparison of MOBILE6.2 and MOVES Emissions
New Castle County – Annual NOx Tons/Year

2002 Annual NOx Budget = 11799.1 TPY

2009 Annual NOx Budget = 4904 TPY

MOVES Emissions Estimates are Generally Higher than MOBILE6.2.
Comparison of MOBILE6.2 and MOVES Emissions
New Castle County – Annual VOC Tons/Year

MOVES Emissions Estimates are Generally Lower than MOBILE6.2.
Comparison of MOBILE6.2 and MOVES Emissions
New Castle County – Annual PM2.5 Tons/Year

MOBILE6.2
MOVES Emissions Estimates are Generally Higher than MOBILE6.2.

2002 Annual PM2.5 Budget = 208.6 TPY
2008 Annual PM2.5 Budget = 86.9 TPY
Comparison of MOBILE6.2 and MOVES Emissions
Kent County – Annual NOx Tons/Year

MOVES Emissions Estimates are Generally Higher than MOBILE6.2.

MOVES

MOBILE6.2

105% Increase

96% Increase

119% Increase

128% Increase

128% Increase

127% Increase

1148

1084

1062

505

474

465

1030

1148

1197

1280

1354

1845

2402

3787

3849

MOVES Emissions Estimates are Generally Higher than MOBILE6.2.

Prepared by DelDOT Planning / WRA 7-28-11
Comparison of MOBILE6.2 and MOVES Emissions
Kent County – Annual VOC Tons/Year

MOVES Emissions Estimates are Higher and Lower than MOBILE6.2.
Comparison of MOBILE6.2 and MOVES Emissions
Sussex County – Annual NOx Tons/Year

MOVES Emissions Estimates are Generally Higher than MOBILE6.2.

Prepared by DelDOT Planning / WRA 7-28-11
Comparison of MOBILE6.2 and MOVES Emissions
Sussex County – Annual VOC Tons/Year

MOVES Emissions Estimates are Generally Lower than MOBILE6.2.

MOBILE6.2
MOVES

2% Increase
3% Decrease
17% Decrease
34% Decrease
36% Decrease
36% Decrease
Comparison of MOBILE6.2 and MOVES Emissions
Daily Emissions in Tons/Day

Key Assumptions:

Travel Demand Modeling: Based on Peninsula Model as of July, 2011.

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CUBE Voyager: Version 5.1.3 (March 2011).

Emissions Modeling:
MOBILE 6.2: Based on Input Files for Above Conformity Determinations.
MOVES: Based on DNREC Input Files & Excel Spreadsheet Process.

September 27, 2011
Comparison of MOBILE6.2 and MOVES Emissions
New Castle County – Weekday NOx Tons/Day
Average of 3 Summer and 3 Winter Months

MOBILE6.2
- Current Budget
- Pending Budget
MOVES (Summer)
MOVES (Winter)

2008 Daily NOx Budget = 21.35 TPD
2009 Daily NOx Budget = 19.23 TPD

Prepared by DelDOT Planning / WRA  9-27-11
Comparison of MOBILE6.2 and MOVES Emissions
New Castle County – Weekday VOC Tons/Day
Average of 3 Summer and 3 Winter Months

MOBILE6.2
- Current Budget
- Pending Budget
MOVES (Summer)
MOVES (Winter)

2008 Daily VOC Budget = 10.61 TPD
2009 Daily VOC Budget = 9.89 TPD

Prepared by DelDOT Planning / WRA 9-27-11
Comparison of MOBILE6.2 and MOVES Emissions
Kent County – Weekday NOx Tons/Day
Average of 3 Summer and 3 Winter Months

MOBILE6.2
Current Budget
Pending Budget
MOVES (Summer)
MOVES (Winter)

2008 Daily NOx Budget = 9.68 TPD
2009 Daily NOx Budget = 9.04 TPD

Prepared by DelDOT Planning / WRA 9-27-11
Comparison of MOBILE6.2 and MOVES Emissions
Kent County – Weekday VOC Tons/Day
Average of 3 Summer and 3 Winter Months

2008 Daily VOC Budget = 4.14 TPD
2009 Daily VOC Budget = 3.95 TPD
Comparison of MOBILE6.2 and MOVES Emissions
Sussex County – Weekday NOx Tons/Day
Average of 3 Summer and 3 Winter Months

MOBILE6.2
Current Budget
Pending Budget
MOVES (Summer)
MOVES (Winter)

2008 Daily NOx Budget = 12.86 TPD
2009 Daily NOx Budget = 11.93 TPD

Prepared by DelDOT Planning / WRA 9-27-11
### Comparison of MOBILE6.2 and MOVES Emissions

**Sussex County – Weekday VOC Tons/Day**

**Average of 3 Summer and 3 Winter Months**

<table>
<thead>
<tr>
<th>Year</th>
<th>MOBILE6.2 Current Budget</th>
<th>MOBILE6.2 Pending Budget</th>
<th>MOVES (Summer)</th>
<th>MOVES (Winter)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>6.11</td>
<td>5.96</td>
<td>3.77</td>
<td>2.82</td>
</tr>
<tr>
<td>2009</td>
<td>5.96</td>
<td>5.74</td>
<td>4.34</td>
<td>2.69</td>
</tr>
<tr>
<td>2010</td>
<td>5.74</td>
<td>5.50</td>
<td>4.05</td>
<td>2.33</td>
</tr>
<tr>
<td>2011</td>
<td>5.50</td>
<td>5.96</td>
<td>4.29</td>
<td>2.47</td>
</tr>
<tr>
<td>2012</td>
<td>5.96</td>
<td>6.11</td>
<td>4.62</td>
<td>2.27</td>
</tr>
<tr>
<td>2013</td>
<td>6.11</td>
<td>5.74</td>
<td>4.34</td>
<td>2.16</td>
</tr>
<tr>
<td>2014</td>
<td>5.74</td>
<td>5.50</td>
<td>4.05</td>
<td>2.47</td>
</tr>
<tr>
<td>2015</td>
<td>5.50</td>
<td>5.96</td>
<td>4.29</td>
<td>2.33</td>
</tr>
</tbody>
</table>

**2008 Daily VOC Budget = 7.09 TPD**

**2009 Daily VOC Budget = 7.05 TPD**

*Prepared by DelDOT Planning / WRA  9-27-11*