# ADDITIONAL INFORMATION FOR ON-ROAD MOBILE EMISSIONS FOR THE PROPOSED DALLAS-FORT WORTH NONATTAINMENT AREA REASONABLE FURTHER PROGRESS STATE IMPLEMENTATION PLAN REVISION FOR THE 1997 EIGHT-HOUR OZONE STANDARD

This document, along with the simultaneously submitted appendix: *Dallas-Fort Worth Nonattainment Area Reasonable Further Progress Demonstration Calculations Spreadsheet with MOVES2010a*, provides additional technical detail concerning final values for Motor Vehicle Emission Simulator (MOVES) model-based on-road mobile emissions estimates for ozone precursors (nitrogen oxides ($NO_X$) and volatile organic compounds (VOC)) that became available after the Dallas-Fort Worth (DFW) Nonattainment Area Reasonable Further Progress (RFP) State Implementation Plan (SIP) Revision for the 1997 Eight-Hour Ozone Standard was proposed by the commissioners of the Texas Commission on Environmental Quality (TCEQ) on June 8, 2011. The final, SIP-quality MOVES values were developed using methods consistent with the United States Environmental Protection Agency (EPA) SIP inventory development guidance and consistent with the requirements of transportation conformity. Draft MOVES values used in the proposed SIP were the best available estimates and were provided for comment purposes. The TCEQ is taking comment on using MOVES-based on-road mobile emissions inventories to demonstrate reasonable further progress in meeting the 1997 eight-hour ozone standard in the DFW nonattainment area.

## 1 Background

The EPA officially released the MOVES2010 version of the model on March 2, 2010, as a replacement to MOBILE6.2 for SIP applications. A revised version named MOVES2010a was provided by the EPA on September 23, 2010[1]. During the period of time that the DFW RFP SIP revision was developed for proposal, it was not feasible to include SIP-quality MOVES2010a-based on-road mobile emissions inventories; however, the TCEQ was able to provide an RFP analysis using the MOBILE6.2-based on-road mobile emissions inventories that were originally developed for this DFW RFP SIP revision as well as an RFP analysis using approximate MOVES2010-based on-road mobile emissions inventories developed by the TCEQ. The proposed DFW RFP SIP revision discusses the possible use of the MOVES model for the adopted DFW RFP SIP revision.

## 2 MOVES On-Road Mobile RFP Emissions Inventory Development

In June and July of 2011, the North Central Texas Council of Governments (NCTCOG) completed MOVES-based on-road mobile emissions inventories to be used for the current DFW RFP SIP and submitted them to the TCEQ. The methods used for the development of the final MOVES-based on-road mobile inventories are consistent with EPA inventory guidance and consistent with requirements of transportation conformity. Summaries of the inventory results are provided in Section 2.1: *MOVES-Based Emissions Inventory Summaries* of this document. The inventories developed for the DFW RFP SIP analysis include:

- 2002 RFP base year on-road mobile emission inventories for the DFW area based on vehicle miles traveled (VMT) estimates from the local travel demand model;

[1] Page 8 of the policy guidance (http://www.epa.gov/otaq/models/moves/420b09046.pdf) released with the MOVES2010 version of the model states that "as required by Clean Air Act section 172(c)(3) and EPA's regulation at 40 CFR 51.112(a), states must use the latest planning assumptions available at the time that the SIP is developed..."

- 2002, 2008, 2011, and 2012 RFP adjusted base year on-road mobile emission inventories for the DFW area based on VMT estimates from the local travel demand model;

- 2008, 2011, 2012, and 2013 RFP uncontrolled on-road mobile emission inventories for the DFW area based on VMT estimates from the local travel demand model; and

- 2008, 2011, 2012, and 2013 RFP post-control on-road mobile emission inventories for the DFW area based on VMT estimates from the local travel demand model.

The MOVES2010a-based on-road mobile emissions inventory projections submitted by NCTCOG were undertaken to allow the TCEQ to develop a final MOVES-based RFP analysis for the DFW nonattainment area. That analysis is presented in Tables 3-1: *Summary of the 2011 DFW RFP Demonstration with MOVES2010a (tons per day)* and 3-2: *Summary of the 2011 DFW RFP Demonstration with MOVES2010a (tons per day)* of this document.

## 2.1 MOVES-Based Emissions Inventory Summaries

The final MOVES-based on-road mobile emissions inventories were integrated into the existing total area inventories that include all major anthropogenic source categories. Tables 2-1: *Summary of the 2002 Base Year Ozone Season Weekday $NO_X$ and VOC Emissions for the DFW RFP with MOVES2010a (tons per day)*, 2-2: *Summary of the 2008 Ozone Season Weekday $NO_X$ and VOC Emissions for the DFW RFP with MOVES2010a (tons per day)* , 2-3: *Summary of the 2011 Ozone Season Weekday $NO_X$ and VOC Emissions for the DFW RFP with MOVES2010a (tons per day)*, and 2-4: *Summary of the 2012 Ozone Season Weekday $NO_X$ and VOC Emissions for the DFW RFP with MOVES2010a (tons per day)* present summaries of the base year, uncontrolled, and post-control emissions inventories used for the DFW RFP analysis. Emissions inventory estimates for point, area, and non-road mobile sources are the same as those presented to the commission on June 8, 2011. On-road mobile emissions inventory estimates, along with total uncontrolled and post-control emissions estimates, differ from those proposed on June 8, 2011, due to the completion of the final SIP-quality on-road mobile source inventory estimates based on the MOVES2010a model.

**Table 2-1: Summary of the 2002 Base Year Ozone Season Weekday $NO_X$ and VOC Emissions for the DFW RFP with MOVES2010a (tons per day)**

| Emissions Inventory Source | Uncontrolled $NO_X$ | Post-Control $NO_X$ | Uncontrolled VOC | Post-Control VOC |
|---|---|---|---|---|
| Point Sources | 79.24 | 79.24 | 26.43 | 26.43 |
| Area Sources | 38.63 | 38.63 | 247.03 | 247.03 |
| Non-Road Mobile Sources | 167.62 | 153.41 | 114.48 | 82.05 |
| MOVES-Based On-Road Mobile Sources | 509.45 | 354.01 | 224.60 | 139.70 |
| Total of All Sources | 794.94 | 625.29 | 612.54 | 495.21 |

Note: 2002 and 2008 $NO_X$ and VOC emissions are given for the total nine-county DFW nonattainment area. See appendix submitted with this summary document for emissions separated between the four original and five additional counties of the DFW 1997 eight-hour ozone standard nonattainment area.

**Table 2-2: Summary of the 2008 Ozone Season Weekday $NO_X$ and VOC Emissions for the DFW RFP with MOVES2010a (tons per day)**

| Emissions Inventory Source | Uncontrolled $NO_X$ | Post-Control $NO_X$ | Uncontrolled VOC | Post-Control VOC |
|---|---|---|---|---|
| Point Sources | 85.14 | 49.21 | 31.34 | 31.19 |
| Area Sources | 150.39 | 150.39 | 323.59 | 320.44 |
| Non-Road Mobile Sources | 186.67 | 130.29 | 130.73 | 62.80 |
| MOVES-Based On-Road Mobile Sources | 632.28 | 235.30 | 262.06 | 104.67 |
| Total of All Sources | 1054.48 | 565.18 | 747.72 | 519.10 |

Note: 2002 and 2008 $NO_X$ and VOC emissions are given for the total nine-county DFW nonattainment area. See appendix submitted with this summary document for emissions separated between the four original and five additional counties of the DFW 1997 eight-hour ozone standard nonattainment area.

**Table 2-3: Summary of the 2011 Ozone Season Weekday $NO_X$ and VOC Emissions for the DFW RFP with MOVES2010a (tons per day)**

| Emissions Inventory Source | Uncontrolled $NO_X$ | Post-Control $NO_X$ | Uncontrolled VOC | Post-Control VOC |
|---|---|---|---|---|
| Point Sources | 105.86 | 62.79 | 39.89 | 39.73 |
| Area Sources | 168.66 | 40.56 | 351.90 | 346.64 |
| Non-Road Mobile Sources | 186.20 | 111.43 | 137.18 | 51.98 |
| MOVES-Based On-Road Mobile Sources | 707.87 | 197.05 | 293.76 | 89.54 |
| Total of All Sources | 1168.59 | 411.84 | 822.73 | 527.88 |

**Table 2-4: Summary of the 2012 Ozone Season Weekday $NO_X$ and VOC Emissions for the DFW RFP with MOVES2010a (tons per day)**

| Emissions Inventory Source | Uncontrolled $NO_X$ | Post-Control $NO_X$ | Uncontrolled VOC | Post-Control VOC |
|---|---|---|---|---|
| Point Sources | 102.10 | 58.87 | 40.74 | 40.58 |
| Area Sources | 175.61 | 41.34 | 362.95 | 341.78 |
| Non-Road Mobile Sources | 188.40 | 104.23 | 141.36 | 49.84 |
| MOVES-Based On-Road Mobile Sources | 728.83 | 177.63 | 301.33 | 82.20 |
| Total of All Sources | 1194.94 | 382.07 | 846.38 | 514.40 |

## 3 MOVES-Based RFP Analysis

The DFW RFP analyses were recalculated using the final MOVES-based on-road mobile emissions inventory values. Tables 3-1: *Summary of the 2011 DFW RFP Demonstration with MOVES2010a (tons per day)* and 3-2: *Summary of the 2012 DFW RFP Demonstration with MOVES2010a (tons per day)* illustrate a draft final MOVES2010a-based analysis of reasonable further progress for the DFW nonattainment area toward meeting the 1997 eight-hour ozone standard. According to this draft final analysis, the 2011 post-control inventory projection is short of meeting the milestone year target, but the 2012 milestone is met. The proposed DFW RFP SIP revision stated that the TCEQ would consider applying additional emissions reductions earned through the Texas Emission

Reduction Plan to address any milestone year shortfall. The TCEQ is considering using those reductions at adoption in order to successfully demonstrate RFP for 2011.

**Table 3-1: Summary of the 2011 DFW RFP Demonstration with MOVES2010a (tons per day)**

| Line # | Description | $NO_X$ | VOC |
|---|---|---|---|
| Line 1 | Uncontrolled emissions forecast with growth | 1168.59 | 822.73 |
| Line 2 | Creditable RFP control reductions for NDC* 2008 | 80.59 | 25.90 |
| Line 3 | Creditable RFP control reductions for EC* 2008 | 408.21 | 202.98 |
| Line 4 | Creditable RFP control reductions 2008 to 2011 | 270.99 | 53.94 |
| Line 5 | Controlled RFP emissions forecast (Line 1 minus Line 2 minus Line 3 minus Line 4) | 408.81 | 539.92 |
| Line 6 | Amount of creditable reductions reserved for milestone year 2011 contingency | 18.91 | 0.00 |
| Line 7 | Amount of $NO_X$ reduction substitution | 68.34 | -68.34 |
| Line 8 | Controlled RFP forecast without reductions reserved for contingency and accounting for $NO_X$ substitution (Line 5 plus Line 6 plus Line 7) | 496.06 | 471.58 |
| Line 9 | 2011 RFP target level of emissions | 496.07 | 467.65 |
| Line 10 | Excess (+) / Shortfall (-) (Line 9 minus Line 8) | 0.01 | -3.93 |
| **Line 11** | **Is controlled RFP emissions inventory less than target level of emissions?** | Yes | No |

* The five new counties (NDC) are the counties added to the DFW nonattainment area under the 1997 eight-hour ozone standard (Ellis, Johnson, Kaufman, Parker, and Rockwall Counties). The four existing counties (EC) are those designated nonattainment under the one-hour and eight-hour ozone standards (Collin, Dallas, Denton, and Tarrant Counties).

**Table 3-2: Summary of the 2012 DFW RFP Demonstration with MOVES2010a (tons per day)**

| Line # | Description | $NO_X$ | VOC |
|---|---|---|---|
| Line 1 | Uncontrolled emissions forecast with growth | 1194.94 | 846.38 |
| Line 2 | Creditable RFP control reductions for 2008 to 2011 | 759.79 | 282.81 |
| Line 3 | Creditable RFP control reductions 2011 to 2012 | 56.07 | 45.42 |
| Line 4 | Controlled RFP emissions forecast (Line 1 minus Line 2 minus Line 3) | 379.09 | 518.14 |
| Line 5 | Amount of creditable reductions reserved for milestone year 2011 contingency | 18.91 | 0.00 |
| Line 6 | Amount of $NO_X$ reduction substitution | 46.21 | -46.21 |
| Line 7 | Controlled RFP forecast without reductions reserved for contingency and accounting for $NO_X$ substitution (Line 4 plus Line 5 plus Line 6) | 444.21 | 471.93 |
| Line 8 | 2012 RFP target level of emissions | 481.78 | 471.95 |
| Line 9 | Excess (+) / Shortfall (-) (Line 8 minus Line 7) | 37.57 | 0.01 |
| **Line 10** | **Is Controlled RFP emissions inventory Less Than Target Level of Emissions?** | Yes | Yes |

## 4 MOVES-Based Motor Vehicle Emissions Budgets

Since the MOVES2010a emissions estimates have very recently been developed, they are still undergoing a quality assurance review process and are subject to change if any errors are detected. If the TCEQ elects to use the MOVES2010a figures for the DFW RFP SIP revision, the 2011 RFP motor vehicle emissions budget (MVEB) for adoption would be 197.05 $NO_X$ tons per day (tpd) and 89.54 VOC tpd. The 2012 RFP MVEB for adoption would be 177.63 $NO_X$ tpd and 82.20 VOC tpd.

## 5 Summary

The TCEQ is taking comment on using on-road mobile emissions inventories based on the MOVES2010a model for the current DFW RFP SIP revision for the 1997 eight-hour ozone standard. MOVES2010a is the latest available version of the MOVES model. The use of MOVES2010a increases $NO_X$ and VOC emissions in the base and milestone year emissions inventories compared to the MOBILE6.2 on-road estimates. While the final MOVES-based emissions inventories are different from the preliminary MOVES-based emissions inventories presented at proposal, the percent change between uncontrolled and post-control inventories is similar. With the MOVES2010a model, the current DFW RFP SIP revision successfully demonstrates reasonable further progress toward meeting the 1997 eight-hour ozone standard for milestone year 2012.

For detailed calculations of the MOVES2010a-based RFP analysis, please refer to the appendix submitted with this summary document: *Dallas-Fort Worth Nonattainment Area Reasonable Further Progress Demonstration Calculations Spreadsheet with MOVES2010a*.