

## **TECHNICAL SUPPLEMENT TO THE DECEMBER 10, 2014 PROPOSAL OF THE DALLAS-FORT WORTH REASONABLE FURTHER PROGRESS STATE IMPLEMENTATION PLAN REVISION FOR THE 2008 EIGHT-HOUR OZONE STANDARD NONATTAINMENT AREA**

This supplement provides additional technical detail regarding Motor Vehicle Emission Simulator (MOVES) 2014 model-based on-road mobile emissions estimates. These estimates became available after the Dallas-Fort Worth (DFW) Reasonable Further Progress (RFP) State Implementation Plan (SIP) Revision for the 2008 Eight-Hour Ozone National Ambient Air Quality Standard (Non-Rule Project No. 2013-014-SIP-NR) was approved for proposal by the commission on December 10, 2014. The Texas Commission on Environmental Quality (TCEQ) is taking comment from December 26, 2014 through February 11, 2015 on using MOVES2014-based on-road emission inventories for this DFW RFP SIP revision.

### **Introduction**

The United States Environmental Protection Agency (EPA) made MOVES2014 available on July 31, 2014; officially released the MOVES2014 version of the model as a replacement to MOVES2010b for SIP applications on October 7, 2014 (70 FR 60343); and released an update to the model on October 27, 2014. The October 27, 2014 update fixed a significant error in the new non-road portion of MOVES2014; addressed a number of minor issues with the on-road portion of MOVES2014; improved the installation process; and included small performance improvements. The October 27, 2014 version of MOVES2014 was used for all on-road updates provided in this supplement. The MOVES2014 model was not available in time for MOVES2014-based emissions estimates to be included in the proposed DFW RFP SIP revision. The TCEQ may use MOVES2014 emissions inventories to replace the MOVES2010b emissions inventories in the adopted version of the DFW RFP SIP revision. This supplement to the proposed DFW RFP SIP revision provides an RFP analysis prepared using recently completed MOVES2014-based on-road emissions inventories for consideration during the public comment period. Since the MOVES2014 emissions estimates have very recently been developed, the TCEQ is still conducting a quality assurance review process. The emission estimates are subject to change if any errors are identified.

### **MOVES2014-Based On-Road Mobile Sources Emissions Inventories**

In December 2014, the North Central Texas Council of Governments (NCTCOG) completed MOVES2014-based on-road mobile emissions inventories for the current proposed DFW RFP SIP revision and submitted the work to the TCEQ. The NCTCOG developed these inventories for the 10-county DFW 2008 eight-hour ozone nonattainment area (hereafter referred to as the DFW area). The methods used for the development of the MOVES2014-based on-road mobile inventories are consistent with EPA inventory guidance and transportation conformity requirements. The planning assumptions, fleet characteristics, and vehicle miles traveled (VMT) estimates were also updated to incorporate the latest available information at the time the inventories were developed. A summary of the control strategies used for the MOVES2014 inventory development is provided in the *MOVES2014-Based On-Road Mobile Source Controls* section of this document. The inventories and control strategy reductions developed for the proposed DFW RFP SIP revision analysis include:

- 2011 RFP base year on-road mobile emission inventories for the DFW area based on VMT estimates from the local travel demand model;

- 2011, 2017, and 2018 RFP adjusted base year on-road mobile emission inventories for the DFW area based on VMT estimates from the local travel demand model;
- 2011, 2017, and 2018 RFP uncontrolled on-road mobile emission inventories for the DFW area based on VMT estimates from the local travel demand model;
- 2011, 2017, and 2018 RFP post-control on-road mobile emission inventories for the DFW area based on VMT estimates from the local travel demand model; and
- 2017, 2018, and 2019 control strategy reductions.

Summaries of the inventory results are provided in the *MOVES2014-Based Emissions Inventory Summary* section of this document. The TCEQ requested that NCTCOG develop MOVES2014-based on-road mobile emissions inventory projections to develop a final MOVES-based RFP analysis for the DFW area. This analysis is presented in the *MOVES2014-Based RFP Analysis* section of this document.

### **MOVES2014-Based On-Road Mobile Source Controls**

The on-road mobile emissions inventories for each DFW RFP analysis year were developed using emissions factors that reflect all control strategies for each analysis year. The controls that were modeled include: pre-1990 Federal Motor Vehicle Control Program (FMVCP), post-1990 FMVCP, summer reformulated gasoline (RFG), the East Texas Regional Low Reid Vapor Pressure (RVP) Gasoline Program, the DFW vehicle inspection and maintenance program (I/M) program, the DFW anti-tampering program (ATP), and Texas Low Emission Diesel (TxLED). The EPA finalized Tier 3 of the FMVCP in March 2014, required implementation to begin phase-in starting in 2017, and included Tier 3 in MOVES2014. The model used to develop the on-road emissions inventories for the DFW RFP SIP proposal, MOVES2010b, did not include Tier 3 of the FMVCP. A summary of the DFW on-road mobile source control strategies used for the MOVES2014 on-road emissions inventories are presented in Table 1: *Control Programs Modeled using MOVES2014 for RFP Control Scenarios*.

**Table 1: Control Programs Modeled using MOVES2014 for RFP Control Scenarios**

<b>Control Program Description</b>	<b>Additional Information</b>	<b>Year Control Program Started</b>	<b>Creditable for RFP</b>
Pre-1990 FMVCP	Pre-1990 control	Pre-1990	No
1992 Federal Controls on Gasoline Volatility	Pre-1990 control Collin, Dallas, Denton, and Tarrant Counties: Maximum Reid Vapor Pressure of 7.8 pounds per square inch Ellis, Johnson, Kaufman, Parker, Rockwall, and Wise: Maximum Reid Vapor Pressure of 9.0 pounds per square inch	1992	No
Anti-Tampering Program (ATP) (Dallas and Tarrant Counties only)	None	1986	Yes
I/M Program (Dallas and Tarrant Counties only)	None	1990	Yes
Tier 1, FMVCP	None	1994	Yes

Control Program Description	Additional Information	Year Control Program Started	Creditable for RFP
Reformulated Gasoline	Collin, Dallas, Denton, and Tarrant Counties only	1995 for phase one, 2000 for phase two	Yes
East Texas Regional Low RVP Gasoline Program	Ellis, Johnson, Kaufman, Parker, Rockwall, and Wise Counties	2000	Yes
National Low Emission Vehicle Program	None	2001	Yes
Expanded I/M and ATP	Expanded to Collin and Denton Counties	2002	Yes
Expanded I/M and ATP	Expanded to Ellis, Johnson, Kaufman, Parker, and Rockwall Counties	2003	Yes
Tier 2, FMVCP	Phase in from 2004 to 2009	2004	Yes
TxLED	15 parts per million maximum for sulfur. Low aromatic hydrocarbon and high cetane number to control NO <sub>x</sub>	2006	Yes
Federal Low-Sulfur Highway Diesel	15 parts per million maximum sulfur content	2006	Yes
2007 Heavy duty FMVCP	Phase in from 2007 to 2010	2007	Yes
Tier 3, FMVCP	Not final until March 2014, Phase in from 2017 until 2025 Effects are not included in MOVES2010b. Effects not included for any MOVES2010b-based DFW RFP SIP scenarios. MOVES2014 released July 2014 includes Tier 3 effects. Included in MOVES2014 DFW RFP SIP scenarios.	2017	Yes

### **MOVES2014-Based Emissions Summary**

The MOVES2014-based on-road mobile emissions inventories were integrated into the existing inventories that include all major anthropogenic source categories. For RFP calculation purposes, the inventories for the nine counties previously designated as nonattainment under the 1997 eight-hour ozone standard (Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties) are separated from the Wise County inventory.

Summaries of the base year, uncontrolled, and post- control emissions inventories used for the MOVES2014-Based DFW RFP analysis are presented in the following tables:

- Table 2: *MOVES2014-Based Summary of the 2011 Base Year Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Nine Previously Designated Counties (tons per day);*
- Table 3: *MOVES2014-Based Summary of the 2017 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for the Nine Previously Designated Counties (tons per day);*
- Table 4: *MOVES2014-Based Summary of the 2018 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Nine Previously Designated Counties (tons per day); and*

- Table 5: MOVES2014-Based Summary of the 2011 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Wise County (tons per day);
- Table 6: MOVES2014-Based Summary of the 2017 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Wise County;
- Table 7: MOVES2014-Based Summary of the 2018 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Wise County.

Emissions inventory estimates for point, area, and non-road mobile sources presented below are the same as those in the proposed DFW RFP SIP revision approved by the commission on December 10, 2014. On-road mobile emissions inventory estimates, along with total uncontrolled and post-control emissions estimates, differ from those in the proposed DFW SIP revision approved by the commission on December 10, 2014, due to the availability of the on-road mobile source inventory estimates based on the MOVES2014 model.

**Table 2: MOVES2014-Based Summary of the 2011 Base Year Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Nine Previously Designated Counties (tons per day)**

Emissions Inventory Source	Uncontrolled NO <sub>x</sub>	Controlled NO <sub>x</sub>	Uncontrolled VOC	Controlled VOC
Non-Road Mobile Sources	188.80	112.98	130.51	53.74
On-Road Mobile Sources (MOVES2014)	736.68	230.75	355.31	99.39
Emission Inventory Source	Existing Controlled NO <sub>x</sub> (as of 2011)	Post-2011 Controlled NO <sub>x</sub>	Existing Controlled VOC	Post-2011 Controlled VOC
Area Sources	30.48	30.48	263.30	263.30
Point Sources	31.34	31.34	27.66	27.66
Total of All Sources	987.30	405.55	776.78	444.09

**Table 3: MOVES2014-Based Summary of the 2017 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Nine Previously Designated Counties (tons per day)**

Emissions Inventory Source	Uncontrolled NO <sub>x</sub>	Controlled NO <sub>x</sub>	Uncontrolled VOC	Controlled VOC
Non-Road Mobile Sources	206.27	81.54	150.44	37.01
On-Road Mobile Sources (MOVES2014)	860.90	144.08	416.88	70.41
Emission Inventory Source	Existing Controlled NO <sub>x</sub> (as of 2011)	Post-2011 Controlled NO <sub>x</sub>	Existing Controlled VOC	Post-2011 Controlled VOC
Area Sources	30.91	30.91	266.15	266.15
Point Sources	46.71	46.71	30.84	30.84
Total of All Sources	1144.79	303.24	864.31	404.41

**Table 4: MOVES2014-Based Summary of the 2018 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Nine Previously Designated Counties (tons per day)**

Emissions Inventory Source	Uncontrolled NO <sub>x</sub>	Controlled NO <sub>x</sub>	Uncontrolled VOC	Controlled VOC
Non-Road Mobile Sources	206.03	76.38	152.56	36.15
On-Road Mobile Sources (MOVES2014)	881.68	129.61	427.12	66.43
Emission Inventory Source	Existing Controlled NO <sub>x</sub> (as of 2011)	Post-2011 Controlled NO <sub>x</sub>	Existing Controlled VOC	Post-2011 Controlled VOC
Area Sources	29.93	29.93	258.70	258.70
Point Sources	45.90	45.90	29.83	29.83
Total of All Sources	1163.54	281.82	868.21	391.11

**Table 5: MOVES2014-Based Summary of the 2011 Base Year Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Wise County (tons per day)**

Emissions Inventory Source	Uncontrolled NO <sub>x</sub>	Controlled NO <sub>x</sub>	Uncontrolled VOC	Controlled VOC
Non-Road Mobile Sources	12.19	6.85	2.73	1.25
On-Road Mobile Sources (MOVES2014)	16.34	5.99	4.34	1.81
Emission Inventory Source	Existing Controlled NO <sub>x</sub> (as of 2011)	Post-2011 Controlled NO <sub>x</sub>	Existing Controlled VOC	Post-2011 Controlled VOC
Area Sources	12.14	12.14	29.18	29.18
Point Sources	8.61	8.61	2.14	2.14
Total of All Sources	49.28	33.59	38.39	34.38

**Table 6: MOVES2014-Based Summary of the 2017 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Wise County (tons per day)**

Emissions Inventory Source	Uncontrolled NO <sub>x</sub>	Controlled NO <sub>x</sub>	Uncontrolled VOC	Controlled VOC
Non-Road Mobile Sources	11.17	4.71	2.75	0.82
On-Road Mobile Sources (MOVES2014)	18.28	3.57	4.89	1.24
Emission Inventory Source	Existing Controlled NO <sub>x</sub> (as of 2011)	Post-2011 Controlled NO <sub>x</sub>	Existing Controlled VOC	Post-2011 Controlled VOC
Area Sources	9.72	9.72	23.74	23.74
Point Sources	10.21	10.21	3.41	3.41
Total of All Sources	49.38	28.21	34.79	29.21

**Table 7: MOVES2014-Based Summary of the 2018 Ozone Season Weekday NO<sub>x</sub> and VOC Emissions for Wise County (tons per day)**

Emissions Inventory Source	Uncontrolled NO <sub>x</sub>	Controlled NO <sub>x</sub>	Uncontrolled VOC	Controlled VOC
Non-Road Mobile Sources	10.61	4.18	2.71	0.77
On-Road Mobile Sources (MOVES2014)	18.74	3.21	5.01	1.16
Emission Inventory Source	Existing Controlled NO <sub>x</sub> (as of 2011)	Post-2011 Controlled NO <sub>x</sub>	Existing Controlled VOC	Post-2011 Controlled VOC
Area Sources	7.44	7.44	19.17	19.17
Point Sources	9.71	9.71	2.88	2.88
Total of All Sources	46.50	24.54	29.77	23.98

**MOVES2014-BASED RFP ANALYSIS**

The DFW RFP analyses were recalculated using the MOVES2014-based on-road mobile emissions inventory values. Summaries of the MOVES2014-based demonstrations for 2017 and 2018 for the two DFW RFP county groups are provided in the following tables:

- Table 8: *MOVES2014-Based Summary of the 2017 DFW RFP Demonstration for the Nine Previously Designated Counties (tons per day)*,
- Table 9: *MOVES2014-Based Summary of the 2017 DFW RFP Demonstration for Wise County (tons per day)*,
- Table 10: *MOVES2014-Based Summary of the 2018 DFW RFP Demonstration for the Nine Previously Designated Counties (tons per day)*; and
- Table 11: *MOVES2014-Based Summary of the 2018 DFW RFP Demonstration for Wise County (tons per day)*.

As concluded in the final row of each of these tables, if MOVES2014-based calculations are used in the adopted DFW RFP SIP revision, the DFW area demonstrates the required RFP emission reductions for each milestone year, for both the nine previously designated counties and Wise County. All RFP calculations are documented in Attachment A: *Reasonable Further Progress Demonstration Spreadsheet with MOVES2014*.

**Table 8: MOVES2014-Based Summary of the 2017 DFW RFP Demonstration for the Nine Previously Designated Counties (tons per day)**

Line	Description	NO <sub>x</sub>	VOC
Line 1	Uncontrolled or Existing Controlled 2017 emissions forecast with growth for nine previously designated counties	1144.79	864.31
Line 2	Creditable RFP control reductions, for nine previously designated counties, between 2011 and 2017	823.81	453.39
Line 3	Controlled 2017 RFP emissions forecast for nine previously designated counties ( <b>Line 1 minus Line 2</b> )	320.98	410.92
Line 4	Amount of NO <sub>x</sub> and VOC reduction to transfer to Wise County RFP demonstration	0.00	1.00

Line	Description	NO <sub>x</sub>	VOC
Line 5	Amount of NO <sub>x</sub> reduction substitution (see Sheet 3, Attachment A)	0.00	0.00
Line 6	Controlled 2017 RFP forecast for nine previously designated counties accounting for transfer and NO <sub>x</sub> substitution <b>(Line 3 plus Line 4 plus Line 5)</b>	320.98	411.92
Line 7	2017 RFP target level of emissions for nine previously designated counties	363.11	426.67
Line 8	Excess (+) / Shortfall (-), (Line 7 minus Line 6)	+42.13	+14.75
Line 9	<b>Is controlled RFP EI less than target level of emissions?</b>	<b>Yes</b>	<b>Yes</b>

**Table 9: MOVES2014-Based Summary of the 2017 DFW RFP Demonstration for Wise County (tons per day)**

Line	Description	NO <sub>x</sub>	VOC
Line 1	Uncontrolled or existing controlled 2017 emissions forecast with growth for Wise County	49.38	34.79
Line 2	Creditable RFP control reductions for Wise County between 2011 and 2017	18.96	5.30
Line 3	Controlled 2017 Wise County RFP emissions forecast <b>(Line 1 minus Line 2)</b>	30.42	29.49
Line 4	Amount of NO <sub>x</sub> and VOC reduction to transfer from RFP demonstration for nine previously designated counties	0.00	-1.00
Line 5	Controlled 2017 Wise County RFP forecast accounting for transfer and NO <sub>x</sub> substitution <b>(Line 3 plus Line 4)</b>	30.42	28.49
Line 6	2017 Wise County RFP target level of emissions	33.36	29.27
Line 7	Excess (+) / Shortfall (-), (Line 6 minus Line 5)	+2.94	+0.78
Line 8	<b>Is controlled RFP EI less than target level of emissions?</b>	<b>Yes</b>	<b>Yes</b>

**Table 10: MOVES2014-Based Summary of the 2018 DFW RFP Demonstration for the Nine Previously Designated Counties (tons per day)**

Line	Description	NO <sub>x</sub>	VOC
Line 1	Uncontrolled or existing controlled 2018 emissions forecast with growth for nine previously designated counties	1163.54	868.21
Line 2	Creditable RFP control reductions between 2011 and 2017 for nine previously designated counties	823.81	453.39
Line 3	Creditable RFP control reductions between 2017 and 2018 for nine previously designated counties	22.72	19.03
Line 4	Controlled 2018 RFP emissions forecast for nine previously designated counties <b>(Line 1 minus Line 2 minus Line 3)</b>	317.01	395.79
Line 5	Amount of creditable reductions reserved for RFP milestone contingency for nine previously designated counties	12.07	0.00
Line 6	Controlled 2018 RFP emission forecast with milestone contingency for nine previously designated counties <b>(Line 4 plus Line 5)</b>	329.08	395.79

Line	Description	NO <sub>x</sub>	VOC
Line 7	Amount of NO <sub>x</sub> and VOC reduction to transfer to Wise County RFP demonstration	0.00	0.00
Line 8	Amount of NO <sub>x</sub> reduction substitution (see Sheet 9, Attachment A)	0.00	0.00
Line 9	Controlled 2018 RFP forecast for nine previously designated counties, without reductions reserved for contingency, accounting for reduction transfer to Wise County, and accounting for NO <sub>x</sub> substitution <b>(Line 6 plus Line 7 plus Line 8)</b>	329.08	395.79
Line 10	2018 RFP target level of emissions for nine previously designated counties	353.96	421.83
Line 11	Excess (+) / Shortfall (-), (Line 10 minus Line 9)	+24.88	+26.04
<b>Line 12</b>	<b>Is controlled RFP EI less than target level of emissions?</b>	<b>Yes</b>	<b>Yes</b>

**Table 11: MOVES2014-Based Summary of the 2018 DFW RFP Demonstration for Wise County (tons per day)**

Line	Description	NO <sub>x</sub>	VOC
Line 1	Uncontrolled or existing controlled Wise County 2018 emissions forecast with growth	46.50	29.77
Line 2	Creditable Wise County RFP control reductions between 2011 and 2017	18.96	5.30
Line 3	Creditable Wise County RFP control reductions between 2017 and 2018	0.97	0.30
Line 4	Controlled 2018 Wise County RFP emissions forecast <b>(Line 1 minus Line 2 minus Line 3)</b>	26.57	24.17
Line 5	Amount of creditable reductions reserved for Wise County RFP milestone contingency	1.00	0.00
Line 6	Controlled Wise County RFP emission forecast with milestone contingency <b>(Line 4 plus Line 5)</b>	27.57	24.17
Line 7	Amount of NO <sub>x</sub> and VOC reduction to transfer from RFP demonstration for nine previously designated counties	0.00	0.00
Line 8	Controlled 2018 Wise County RFP forecast without reductions reserved for contingency and accounting for NO <sub>x</sub> substitution <b>(Line 6 plus Line 7)</b>	27.57	24.17
Line 9	2018 Wise County RFP target level of emissions	33.36	28.23
Line 10	Excess (+) / Shortfall (-), (Line 8 minus Line 7)	+5.79	+4.06
<b>Line 11</b>	<b>Is controlled RFP EI less than target level of emissions?</b>	<b>Yes</b>	<b>Yes</b>

### **MOVES2014-Based Contingency Analysis**

RFP contingency was calculated for the RFP milestone year, 2017 to 2018; and the RFP post-attainment contingency year, 2018 to 2019. A contingency demonstration was done for the nine previously designated counties as a county group and for the newly designated Wise County. The required 3% contingency for both years and for both county groups was achieved using a 3% NO<sub>x</sub> reduction. A summary of the contingency demonstrations is provided in Table 12: *MOVES2014-Based DFW RFP Contingency Summary*. If the TCEQ elects to use the

MOVES2014 figures for the DFW RFP SIP revision, all RFP contingency requirements will be exceeded without additional emissions controls. Details of the contingency calculations may be viewed in Attachment A: *Reasonable Further Progress Demonstration Spreadsheet with MOVES2014*.

**Table 12: MOVES2014-Based DFW RFP Contingency Summary**

Contingency Demonstration Description	NO <sub>x</sub> Reduction Requirement (tpd)	Available NOX Reductions (tpd)	Demonstration Status
Nine Previously Designated Counties Milestone	12.07	12.07	Requirement Met
Nine Previously Designated Counties Attainment Year	12.07	50.64	Requirement Exceeded
Wise County Milestone	1.00	1.00	Requirement Met
Wise County Attainment Year	1.00	6.69	Requirement Exceeded

Note 1: The nine previously designated counties include: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant.

**MOVES2014-Based Motor Vehicle Emissions Budgets**

Since the MOVES2014 emissions estimates have been recently developed, these estimates are still undergoing a quality assurance review process and are subject to change if any errors are identified. If the TCEQ elects to use the MOVES2014 estimates presented in this supplement for the adopted DFW RFP SIP revision, the 2017 RFP motor vehicle emissions budget (MVEB) for adoption would be 162.42 NO<sub>x</sub> tons per day (tpd) and 78.82 VOC tpd. The 2018 RFP MVEB for adoption would be 146.10 NO<sub>x</sub> tpd and 74.35 VOC tpd.

**Attachments**

Attachment A Reasonable Further Progress Demonstration Spreadsheet with MOVES2014

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