ON-ROAD EMISSIONS INVENTORY SUPPLEMENT TO THE PROPOSED HOUSTON-GALVESTON-BRAZORIA AREA REDESIGNATION SUBSTITUTE FOR THE ONE-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARD STATE IMPLEMENTATION PLAN REVISION

1. BACKGROUND

This supplement provides additional technical detail regarding Motor Vehicle Emission Simulator (MOVES) 2014 model-based on-road mobile emissions estimates that became available after the Houston-Galveston-Brazoria (HGB) Redesignation Substitute (RS) State Implementation Plan (SIP) Revision for the One-Hour Ozone National Ambient Air Quality Standard (Non-Rule Project No. 2014-011-SIP-NR) was approved for proposal by the commission on November 19, 2014. The proposed SIP revision was developed using the MOVES201ob on-road model. The Texas Commission on Environmental Quality (TCEQ) is taking comment from December 5, 2014 through January 9, 2015 on the proposed HGB RS SIP revision, including using MOVES2014-based on-road emissions inventories in lieu of the MOVES2010b inventories for the adopted version of the HGB RS SIP revision.

The United States Environmental Protection Agency (EPA) officially released the MOVES2014 version of the model as a replacement to MOVES2010b for SIP applications in the October 7, 2014 issue of the *Federal Register* (70 FR 60343). The TCEQ is working with the Texas Transportation Institute (TTI) to develop 2011, 2014, 2017, 2020, 2023, and 2026 on-road emissions inventories using MOVES2014 for the HGB area, which may replace the current inventories and control reductions referenced in the proposal version of this SIP revision. The planning assumptions, fleet characteristics, and vehicle miles traveled (VMT) estimates may also be updated to incorporate the latest available information.

If MOVES2014 inventories are used, it is expected that the final emissions figures and maintenance results would be different than those reported in the proposed HGB RS SIP revision. Instead of relying solely on the use of MOVES2010b inventories for the proposed SIP revision, the TCEQ performed a preliminary analysis based on approximate MOVES2014-based on-road emissions inventories in this supplement to the proposed HGB RS SIP revision for consideration during the public comment period.

2. PRELIMINARY MOVES2014-BASED ON-ROAD MOBILE SOURCE EMISSIONS INVENTORIES, CONTROL STRATEGIES, AND CONTROL STRATEGY REDUCTIONS

An expedited method was used to obtain preliminary MOVES2014 emissions estimates in order to assess the degree of changes expected in the on-road inventories. The method and results are discussed section-by-section below.

2.1 Preliminary MOVES2014-Based On-Road Mobile Sources Emissions Inventory Development

The MOVES2010b and preliminary MOVES2014 inventories were developed using the latest available data, the most current planning assumptions, and the same total VMT. For the MOVES2010b SIP-quality emissions estimates, an hourly-link method was used in conjunction with emissions rates to develop inventories. Instead of using an hourly-link method, the

preliminary MOVES2014 emissions estimates were calculated by running MOVES2014 in inventory mode without post-processing. The inventory-mode method will produce information valid for planning purposes; however, the resulting values may not be used to set motor vehicle emissions budgets because the emissions differences due to subtle changes in the transportation network assessed with a link-based method will not be captured with the inventory-mode method.

A summary of the on-road mobile source VMT used to develop both the MOVES2010b and the preliminary MOVES2014 nitrogen oxides (NO_X) and volatile organic compounds (VOC) emissions is presented in Table 2-1: *HGB VMT (miles per average summer day).* The preliminary MOVES2014-based HGB 2011, 2014, 2017, 2020, 2023, and 2026 on-road mobile source emissions inventories (EIs) for NO_X and VOC are summarized in Table 2-2: *Preliminary MOVES2014-Based HGB Average Summer Weekday NO_X and VOC Emissions for On-Road Mobile Sources (tons per day).*

Documentation of the development of the preliminary MOVES2014-based on-road mobile source emissions is provided in Attachment A: *Preliminary MOVES2014-Based On-Road Inventories in Support of the Area Redesignation Substitute for the One-Hour Ozone National Ambient Air Quality Standard State Implementation Plan Revision.*

Table 2-1: HGB VMT (miles per average summer day)

Description	2011	2014	2017	2020	2023	2026
Vehicle Miles Traveled	150,968,794	144,916,411	151,890,390	159,509,450	167,539,317	176,004,008

Table 2-2: Preliminary MOVES2014-Based HGB Average Summer Weekday NO_X and VOC Emissions for On-Road Mobile Sources (tons per day)

Pollutant	2011	2014	2017	2020	2023	2026
NO_X	217.88	154.87	97.86	72.40	57.81	47.86
VOC	88.17	65.82	48.84	40.61	35.78	30.89

2.2 Preliminary MOVES2014-Based On-Road Mobile Source Control Strategies

The preliminary MOVES2014 on-road mobile EIs were developed using emissions factors that incorporate the same control strategies as the proposed HGB RS SIP revision except Tier 3 of the Federal Motor Vehicle Control Program (FMVCP) is included and the Texas Low Emissions Diesel (TxLED) program is not included. The Tier 3 FMVCP rule, which was finalized in March 2014, will begin implementation in 2017 and is included in the MOVES2014 model but not in the MOVES2010b model. Since the expedited methodology used for the preliminary analyses does not include post-processing assessments, the effects due to TxLED are not included in the preliminary emissions estimates.

The controls that were modeled using MOVES2014 include: pre-1990 FMVCP, fleet turnover to Tier 1 of the FMVCP, fleet turnover to Tier 2 of the FMVCP, the 2007 heavy duty diesel FMVCP, summer reformulated gasoline (RFG), the HGB vehicle inspection and maintenance (I/M) program, and the HGB anti-tampering program. A summary of the on-road mobile source control strategies for the HGB area are presented in Table 2-3: *HGB On-Road Mobile Control Strategies Summary*.

Table 2-3: HGB On-Road Mobile Control Strategies Summary

Control Program Description	Year Control Program Started	Control Scenario Notes
Pre-1990 FMVCP	Pre-1990	Included for 2011, 2014, 2017, 2020, 2023, and 2026
Anti-Tampering Program	1986	Included for 2011, 2014, 2017, 2020, 2023, and 2026
1992 Federal Controls on Gasoline Volatility	1992	Maximum Reid Vapor Pressure of 7.8 pounds per square inch Included for 2011, 2014, 2017, 2020, 2023, and 2026
Tier 1 FMVCP	1994	Included for 2011, 2014, 2017, 2020, 2023, and 2026
RFG Phase 1	1995 for Phase One	Superseded by RFG Phase 2
I/M Program	1997	Included for 2011, 2014, 2017, 2020, 2023, and 2026
RFG Phase 2	2000 for Phase Two	Included for 2011, 2014, 2017, 2020, 2023, and 2026
National Low Emission Vehicle Program	2001	Included for 2011, 2014, 2017, 2020, 2023, and 2026
Tier 2 FMVCP	2004	Phase in 2004 to 2009 Included for 2011, 2014, 2017, 2020, 2023, and 2026
TxLED	2006	Low aromatic hydrocarbon and high cetane number to control NO_X Included in the MOVES2010b proposal estimates Not included in preliminary MOVES 2014 estimates Included in the final MOVES2014 estimates
Federal Low-Sulfur Highway Diesel	2006	15 parts per million maximum sulfur content Included for 2011, 2014, 2017, 2020, 2023, and 2026
2007 Heavy Duty FMVCP	2007	Phase in 2007 to 2010 Included for 2011, 2014, 2017, 2020, 2023, and 2026
Tier 3 FMVCP	2017	Tier 3 rule not final until March 2014 Not included in MOVES2010b SIP EIs Included in the MOVES2014 EIs

2.3 Preliminary MOVES2014-Based On-Road Mobile Source Control Strategy Reductions

Due in part to including the effects of Tier 3 FMVCP, preliminary MOVES2014 emissions estimates indicate an even greater decrease in on-road emissions for the HGB future milestone years when compared with MOVES2010b. Using the same increase in VMT as the MOVES2010b assessments, the preliminary MOVES2014 emissions estimates show a 169.87 tons per day (tpd) decrease in NO_X and a 57.31 tpd decrease in VOC between the base year of 2011 and the 2026 horizon year.

A summary of the preliminary MOVES2014 emissions change from the 2011 base year to each milestone year and the horizon year are summarized in Table 2-4: *Preliminary MOVES2014 Estimated Reductions from 2011 Baseline Due to FMVCP, I/M, and RFG (tons per day)*. A summary of the preliminary MOVES2014-based percent change in NO_X and VOC from the 2011

base year to each milestone year and the horizon year are summarized in Table 2-5: *Preliminary MOVES2014-Estimated Percent Reductions from 2011 Baseline Due to FMVCP, I/M, and RFG.*

Table 2-4: Preliminary MOVES2014-Estimated Reductions from 2011 Baseline Due to FMVCP, I/M, and RFG (tons per day)

Inventory Year	NO_X	VOC
2011	0	0
2014	-63.03	-22.36
2017	-119.76	-39.31
2020	-145.27	-47.56
2023	-159.89	-52.41
2026	-169.87	-57.31

Table 2-5: Preliminary MOVES2014-Estimated Percent Reductions from 2011 Baseline Due to FMVCP, I/M, and RFG

Inventory Year	NO_X	VOC
2011	0.0	0.0
2014	-29.00	-25.40
2017	-55.11	-44.65
2020	-66.84	-54.03
2023	-73.57	-59.53
2026	-78.16	-65.10

3. EMISSIONS SUMMARY UPDATED WITH PRELIMINARY MOVES2014-BASED ON-ROAD EMISSIONS INVENTORIES

The preliminary MOVES2014-based on-road emissions estimates for the 2011 baseline year, the 2026 horizon year, and the intervening milestone years (2014, 2017, 2020, and 2023) are presented in the table below, along with the summary emissions for the other source categories for the HGB area. Except for updates to the mobile source category, no other source category updates have been made to the values presented in the proposed HGB RS SIP revision.

The resulting emissions summaries by ozone precursor are shown in Table 3-1: *HGB NO_X Emissions by Source Category with Preliminary MOVES2014 On-road Emissions (tons per day) and* Table 3-2: *HGB VOC Emissions by Source Category with Preliminary MOVES2014 On-road Emissions (tons per day).*

Table 3-1: HGB NO_X Emissions by Source Category with Preliminary MOVES2014 On-Road Emissions (tons per day)

Category	2011	2014	2017	2020	2023	2026
Point Sources	108.48	126.31	126.82	127.01	127.20	127.39
Area Sources	21.15	22.19	22.90	23.28	23.17	23.23
Preliminary MOVES2014 On-Road Mobile Sources	217.88	154.87	97.86	72.4	57.81	47.86

Category	2011	2014	2017	2020	2023	2026
Non-Road Mobile Sources	121.11	106.99	94.99	83.70	75.54	68.98
Total	468.62	410.36	342.57	306.39	283.72	267.46

Table 3-2: HGB VOC Emissions by Source Category with Preliminary MOVES2014 On-Road Emissions (tons per day)

Category	2011	2014	2017	2020	2023	2026
Point Sources	96.11	100.81	102.86	103.29	103.71	104.12
Area Sources	308.74	321.92	332.43	339.67	342.58	346.13
Preliminary MOVES2014 On-Road Mobile Sources	88.17	65.82	48.84	40.61	35.78	30.89
Non-Road Mobile Sources	49.92	38.33	33.34	30.86	30.11	30.02
Total	542.94	526.88	517.47	514.43	512.18	511.16

4. MAINTENANCE DEMONSTRATION CONCLUSION UPDATED WITH PRELIMINARY MOVES2014-BASED RESULTS

The proposed HGB RS SIP revision narrative indicates a decrease of 176.40 tpd in combined NO_X and VOC emissions between 2011 and 2026 for the HGB area based upon EI summaries that include MOVES2010b on-road EIs. This net change includes a projected 18.49 tpd decrease in VOC and a 157.91 tpd decrease in NO_X.

Using preliminary MOVES2014-based on-road emissions inventory estimates, trend analysis indicates an overall decrease of 232.94 tpd in combined NO_X and VOC emissions for the HGB area between the maintenance base and horizon years of 2011 and 2026. This net change includes a projected 31.78 tpd decrease in VOC and a 201.16 tpd decrease in NO_X. Therefore, using MOVES2014 in the adopted version of the HGB RS SIP revision would not be anticipated to negatively affect the maintenance demonstration.

Based on this trend analysis, the HGB area is projected to show continued attainment of the one-hour ozone standard through 2026.

5. SUMMARY

The TCEQ is taking comment on using the MOVES2014 on-road emission inventories in the adopted version of the HGB Redesignation Substitute State Implementation Plan Revision for the One-Hour Ozone National Ambient Air Quality Standard (Non-Rule Project No. 2014-011-SIP-NR). The MOVES2014 model includes the effects of Tier 3 and other updates that make it the most robust tool to assess future year on-road mobile source emissions estimates. Based on the analysis provided in this supplement, the TCEQ anticipates that the use of on-road mobile emissions inventories developed using the EPA's MOVES2014 would not change the conclusion included in the proposed HGB RS that the area demonstrates maintenance from the 2011 base year to the 2026 horizon year. In fact, the TCEQ anticipates that the use of MOVES2014 in the adopted SIP revision would yield even greater reductions in both NO_X and VOC.

6. REFERENCES

EPA, 2005. *Emissions Inventory Guidance for Implementation of Ozone and Particulate Matter National Ambient Air Quality Standards (NAAQS) and Regional Haze Regulations*, EPA-454/R-05-001, Issued By: Emissions Inventory Group, Emissions, Monitoring and Analysis Division, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, Research Triangle Park, NC 27711. August 2005.

EPA, 2014. *Policy Guidance on the Use of MOVES2014 and Subsequent Minor Revisions for State Implementation Plan Development, Transportation Conformity, and Other Purposes*, EPA-420-B-14-008, Issued by: Transportation and Regional Programs Division, Office of Transportation and Air Quality, U.S. Environmental Protection Agency, July 2014.

EPA, 2014. *Motor Vehicle Emission Simulator (MOVES), User Guide for MOVES2014*, EPA420-B-14-055, Assessment and Standards Division, Office of Transportation and Air Quality. July 2014.

7. ATTACHMENTS

Attachment A: *Preliminary MOVES2014-Based On-Road Inventories in Support of the Area Redesignation Substitute for the One-Hour Ozone National Ambient Air Quality Standard State Implementation Plan Revision*.