

APPENDIX C

DEMONSTRATION FOR MEETING THE MODELING REQUIREMENTS OF U.S. EPA'S ALTERNATE LOW ENHANCED I/M PERFORMANCE STANDARD

1.0 Introduction

This document demonstrates that Wisconsin's I/M program meets the modeling requirements for U.S. EPA's Alternate Low Enhanced I/M Performance Standard, specified in 40 CFR 51.351(g). This section of the CFR specifies a model program which is to be compared by emissions modeling with the I/M program under consideration. The modeling requirements are specified in 40 CFR 51.351(g)(13) as follows:

40 CFR 51.351(g)(13) *Evaluation date.* Enhanced I/M program areas subject to the provisions of this paragraph (g) shall be shown to obtain the same or lower emission levels as the model program described in this paragraph by January 1, 2002 to within ± 0.02 gpm [grams per mile]. Subject programs shall demonstrate through modeling the ability to maintain this level of emission reduction (or better) through their attainment deadline for the applicable NAAQS standard(s).

2.0 Description of the Modeling Demonstration

The demonstration involves a comparison of emission reductions from the U.S. EPA's model program with those from Wisconsin's actual program. The inputs to MOVES2010a for the model program and Wisconsin's actual program are provided in Tables B-1 and B-2 of Appendix B. Separate demonstrations are done for the two areas of: (a) the Six-County Milwaukee-Racine Nonattainment Area (Kenosha, Milwaukee, Ozaukee, Racine, Washington and Waukesha Counties) and (b) the Sheboygan County Nonattainment Area. Since ozone is the pollutant of concern, the pollutants modeled are the ozone precursors volatile organic compounds (VOC) and oxides of nitrogen (NOx).

VOC and NOx reductions from both the U.S. EPA's model program and Wisconsin's actual program were modeled for January¹ of 2002 and for July of 2009, 2012, 2015, 2018 and 2022. Wisconsin's I/M program meets the modeling requirements for a particular year if the VOC and NOx reductions from the I/M program for that year are greater than or equal to the reductions from the U.S. EPA's model program on January of 2002, with a tolerance of 0.02 grams per mile.

¹ To maintain consistent fleet, fuel and meteorological inputs throughout this modeling demonstration, January of 2002 was modeled by taking the average of the modeling results for July of 2001 and July of 2002. (Ozone levels tend to be highest on hot summer days.)

3.0 Modeling Results

Tables C-1 through C-4 summarize the modeling results. In all cases, Wisconsin's actual I/M program achieves the emission reduction percentages required to meet the U.S. EPA's Alternate Low Enhanced I/M Performance Standard.

Electronic copies of the MOVES2010a run specifications, input files and databases (input and output) for the modeling summarized below are available from Christopher Bovee, Bureau of Air Management, Wisconsin Department of Natural Resources, P.O. Box 7921, Madison, WI, 53707, phone: 608/266-5542, email: christopher.bovee@wisconsin.gov.

Table C-1
IM Performance Standard Modeling Results

Area: Six County Milwaukee-Racine Nonattainment Area (Kenosha, Milwaukee,
Ozaukee, Racine, Washington and Waukesha Counties)
Pollutant: VOC

		Emissions in Tons per Hot Summer Day			I/M Reductions per Hot Summer Day					
					U.S. EPA's ALEPS Model Program			Wisconsin's Actual I/M Program		
Time	Vehicle-Miles of Travel	No I/M Program	U.S. EPA's ALEPS Model Program	Wisc's Actual I/M Program	Tons	gpm	Pct.	Tons	gpm	Pct.
July 2001	44,904,463	67.31	63.45	60.69	3.86	0.078	5.7%	6.62	0.134	9.8%
July 2002	46,144,359	64.53	60.91	58.08	3.61	0.071	5.6%	6.45	0.127	10.0%
Jan. 2002	45,524,411	65.92	62.18	59.38	3.74	0.074	5.7%	6.54	0.130	9.9%
Target					2.73	0.054	4.1%			
July 2009	49,249,051	37.48	35.34	34.22	2.14	0.039	5.7%	3.26	0.060	8.7%
July 2012	52,471,643	29.83	28.38	27.71	1.46	0.025	4.9%	2.12	0.037	7.1%
July 2015	54,394,979	22.70	21.69	21.08	1.01	0.017	4.5%	1.62	0.027	7.1%
July 2018	56,318,303	18.95	18.24	17.61	0.71	0.011	3.7%	1.34	0.022	7.1%
July 2022	58,096,319	17.16	16.57	15.99	0.58	0.009	3.4%	1.17	0.018	6.8%

ALEPS = Alternate Low Enhanced Performance Standard

NOTE: Results calculated on the numbers in this table may slightly differ from those shown because of rounding.

The U.S. EPA model program's reductions for January of 2002 are 0.074 grams per mile (gpm). Therefore, Wisconsin's actual program needs to show reductions of 0.074 gpm – 0.020 gpm = 0.054 gpm (4.1%) to meet the modeling requirements. Since all of the reductions from Wisconsin's actual program are greater than or equal to 4.1%, see rightmost column, Wisconsin's program does meet the modeling requirements for the ALEPS for VOC in the Six County Milwaukee-Racine Nonattainment Area.

Table C-2
IM Performance Standard Modeling Results

Area: Six County Milwaukee-Racine Nonattainment Area (Kenosha, Milwaukee,
Ozaukee, Racine, Washington and Waukesha Counties)
Pollutant: NOx

		Emissions in Tons per Hot Summer Day			I/M Reductions per Hot Summer Day					
					U.S. EPA's ALEPS Model Program			Wisconsin's Actual I/M Program		
Time	Vehicle-Miles of Travel	No I/M Program	U.S. EPA's ALEPS Model Program	Wisc's Actual I/M Program	Tons	gpm	Pct.	Tons	gpm	Pct.
July 2001	44,904,463	160.26	157.86	149.84	2.40	0.048	1.5%	10.42	0.211	6.5%
July 2002	46,144,359	156.27	154.24	146.44	2.04	0.040	1.3%	9.83	0.193	6.3%
Jan. 2002	45,524,411	158.27	156.05	148.14	2.22	0.044	1.4%	10.13	0.202	6.4%
Target					1.21	0.024	0.8%			
July 2009	49,249,051	92.81	92.33	87.54	0.49	0.009	0.5%	5.27	0.097	5.7%
July 2012	52,471,643	74.08	73.83	70.41	0.25	0.004	0.3%	3.67	0.063	4.9%
July 2015	54,394,979	53.80	53.66	51.34	0.13	0.002	0.2%	2.46	0.041	4.6%
July 2018	56,318,303	41.26	41.20	39.54	0.06	0.001	0.1%	1.72	0.028	4.2%
July 2022	58,096,319	33.24	33.20	31.99	0.04	0.001	0.1%	1.25	0.020	3.8%

ALEPS = Alternate Low Enhanced Performance Standard

NOTE: Results calculated on the numbers in this table may slightly differ from those shown because of rounding.

The U.S. EPA model program's reductions for January of 2002 are 0.044 grams per mile (gpm). Therefore, Wisconsin's actual program needs to show reductions of 0.044 gpm – 0.020 gpm = 0.024 gpm (0.8%) to meet the modeling requirements. Since all of the reductions from Wisconsin's actual program are greater than or equal to 0.8%, see rightmost column, Wisconsin's program does meet the modeling requirements for the ALEPS for NOx in the Six County Milwaukee-Racine Nonattainment Area.

Table C-3
IM Performance Standard Modeling Results

Area: Sheboygan County Nonattainment Area
Pollutant: VOC

		Emissions in Tons per Hot Summer Day			I/M Reductions per Hot Summer Day					
					U.S. EPA's ALEPS Model Program			Wisconsin's Actual I/M Program		
Time	Vehicle-Miles of Travel	No I/M Program	U.S. EPA's ALEPS Model Program	Wisc's Actual I/M Program	Tons	gpm	Pct.	Tons	gpm	Pct.
July 2001	3,100,569	4.86	4.56	4.45	0.30	0.087	6.1%	0.41	0.120	8.4%
July 2002	3,146,207	4.59	4.31	4.20	0.28	0.080	6.0%	0.39	0.113	8.6%
Jan. 2002	3,123,388	4.72	4.44	4.32	0.29	0.084	6.1%	0.40	0.117	8.5%
Target					0.22	0.064	4.6%			
July 2009	3,025,045	2.60	2.45	2.38	0.15	0.044	5.6%	0.22	0.065	8.3%
July 2012	3,949,496	2.83	2.70	2.64	0.13	0.030	4.6%	0.19	0.044	6.8%
July 2015	4,060,788	2.17	2.08	2.02	0.09	0.020	4.1%	0.14	0.032	6.7%
July 2018	4,172,095	1.84	1.78	1.72	0.06	0.013	3.3%	0.12	0.025	6.3%
July 2022	4,320,678	1.71	1.67	1.62	0.05	0.010	2.8%	0.10	0.021	5.8%

ALEPS = Alternate Low Enhanced Performance Standard

NOTE: Results calculated on the numbers in this table may slightly differ from those shown because of rounding.

The U.S. EPA model program's reductions for January of 2002 are 0.084 grams per mile (gpm). Therefore, Wisconsin's actual program needs to show reductions of 0.084 gpm – 0.020 gpm = 0.064 gpm (4.6%) to meet the modeling requirements. Since all of the reductions from Wisconsin's actual program are greater than or equal to 4.6%, see rightmost column, Wisconsin's program does meet the modeling requirements for the ALEPS for VOC in the Sheboygan County Nonattainment Area.

Table C-4
IM Performance Standard Modeling Results

Area: Sheboygan County Nonattainment Area
Pollutant: NOx

		Emissions in Tons per Hot Summer Day			I/M Reductions per Hot Summer Day					
					U.S. EPA's ALEPS Model Program			Wisconsin's Actual I/M Program		
Time	Vehicle-Miles of Travel	No I/M Program	U.S. EPA's ALEPS Model Program	Wisc's Actual I/M Program	Tons	gpm	Pct.	Tons	gpm	Pct.
July 2001	3,100,569	12.36	12.17	11.73	0.18	0.054	1.5%	0.62	0.182	5.0%
July 2002	3,146,207	11.82	11.66	11.24	0.15	0.044	1.3%	0.57	0.165	4.8%
Jan. 2002	3,123,388	12.09	11.92	11.49	0.17	0.049	1.4%	0.60	0.174	4.9%
Target					0.10	0.029	0.8%			
July 2009	3,025,045	5.94	5.91	5.63	0.03	0.009	0.5%	0.32	0.095	5.3%
July 2012	3,949,496	6.29	6.27	5.99	0.02	0.005	0.3%	0.30	0.069	4.8%
July 2015	4,060,788	4.52	4.51	4.32	0.01	0.002	0.2%	0.20	0.045	4.4%
July 2018	4,172,095	3.49	3.49	3.36	0.00	0.001	0.1%	0.14	0.030	4.0%
July 2022	4,320,678	2.88	2.88	2.78	0.00	0.001	0.1%	0.10	0.021	3.5%

ALEPS = Alternate Low Enhanced Performance Standard

NOTE: Results calculated on the numbers in this table may slightly differ from those shown because of rounding.

The U.S. EPA model program's reductions for January of 2002 are 0.049 grams per mile (gpm). Therefore, Wisconsin's actual program needs to show reductions of 0.049 gpm – 0.020 gpm = 0.029 gpm (0.8%) to meet the modeling requirements. Since all of the reductions from Wisconsin's actual program are greater than or equal to 0.8%, see rightmost column, Wisconsin's program does meet the modeling requirements for the ALEPS for NOx in the Sheboygan County Nonattainment Area.