



## INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

*We Protect Hoosiers and Our Environment.*

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Michael R. Pence  
Governor

Thomas W. Easterly  
Commissioner

July 2, 2013

Ms. Susan Hedman  
Regional Administrator  
U.S. Environmental Protection Agency  
Region 5  
77 West Jackson Boulevard  
Chicago, IL 60604-3950

Dear Ms. Hedman:

Re: MOBILE6.0 to MOVES MVEB  
Replacement Update to the Maintenance  
Plan for the 1997 Annual Fine Particles  
Standard for the Southwestern Indiana  
Area

The Indiana Department of Environmental Management (IDEM) submits the enclosed MOBILE6.0 to Motor Vehicle Emissions Simulator (MOVES) Motor Vehicle Emissions Budget (MVEB) replacement update to the maintenance plan for the annual fine particles standard for the Southwestern Indiana Area, which includes Dubois, Vanderburgh, and Warrick counties, Montgomery Township in Gibson County, Ohio Township in Spencer County, and Washington Township in Pike County. The United States Environmental Protection Agency (U.S. EPA) approved the *Request for Redesignation and Maintenance Plan Under the Annual National Ambient Air Quality Standard for Fine Particles*, for the Southwestern Indiana Area, submitted by IDEM on April 8, 2011, with an effective date of October 27, 2011. IDEM requests that U.S. EPA process this final submittal for approval into Indiana's State Implementation Plan.

IDEM provided an opportunity for a public hearing on the MVEB replacement update to the maintenance plan for the annual fine particles standard for the Southwestern Indiana Area, if a public hearing request was received by June 12, 2013. A hearing was scheduled for June 20, 2013. No request for a public hearing was received and the hearing was cancelled. IDEM received no comments during the public notice process. Documents related to the public participation process are included in Appendix C of this submittal

This MOBILE6.0 to MOVES MVEB replacement update incorporates onroad emission estimates and revised MVEBs using U.S. EPA's recently adopted MOVES model. The onroad emission estimates were calculated using the MOVES-based emission factors and data extracted from the Southwestern Indiana Area's travel-demand model.

MVEBs are being revised in anticipation of the mandatory use of the MOVES model in future transportation conformity determinations. Preliminary use of the new model indicates that emission estimates can be considerably different than similar calculations using MOBILE6.0, which was used to create the MVEBs in the original annual fine particles standard maintenance plan.

Onroad safety margins, established through the interagency consultation process, are included for nitrogen oxides (NO<sub>x</sub>) and fine particles (PM<sub>2.5</sub>). These onroad safety margins are allocated to onroad emission estimates in order to account for the wide array of assumptions that are factored into the calculation process. With the addition of onroad safety margins applied to mobile sources, the Southwestern Indiana Area annual fine particles standard maintenance area will continue to remain well below the overall safety margins for all sources. MVEBs are also constrained to ensure that total NO<sub>x</sub> and PM<sub>2.5</sub> emissions (i.e., all source categories) do not exceed attainment year emissions to ensure continued maintenance of the annual fine particles standard. Although there is an increase in direct PM<sub>2.5</sub> emissions in the Southwestern Indiana Area, this increase is outweighed by the significant regional reductions in NO<sub>x</sub> and SO<sub>2</sub> that have occurred and will continue to occur in the future.

This submittal consists of one (1) hard copy of the required documentation. An electronic version of the submittal in PDF format, that is identical to the hard copy, has been sent to Pamela Blakley, Chief of U.S. EPA Region 5's Control Strategies Section.

IDEM respectfully requests that U.S. EPA proceed with review of the MOBILE6.0 to MOVES MVEB replacement update and revised transportation conformity budgets and approval into Indiana's State Implementation Plan for the Southwestern Indiana maintenance area under the annual fine particles standard. If you have any questions or need additional information, please contact Scott Deloney, Chief, Air Programs Branch, at (317) 233-5694.

Sincerely,



Keith Baugues  
Assistant Commissioner  
Office of Air Quality

KB/sad/sms

Ms. Hedman

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Enclosures:

Onroad Emissions MOBILE6.0 to MOVES Replacement Submittal for the Southwestern Indiana Area under the 1997 Annual National Ambient Air Quality Standard for Fine Particles and Appendices

cc: John Mooney, U.S. EPA Region 5 (no enclosures)  
Doug Aburano, U.S. EPA Region 5 (w/ enclosures)  
Steve Rosenthal, U.S. EPA Region 5 (no enclosures)  
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# Onroad Emissions MOBILE6.0 to MOVES Replacement Submittal

For the Southwestern Indiana  
Maintenance Area under the 1997  
Annual National Ambient Air  
Quality Standard for Fine Particles

FINAL

July 2013

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## **Introduction**

On April 8, 2011, the Indiana Department of Environmental Management (IDEM) submitted a *Request for Redesignation and Maintenance Plan Under the Annual National Ambient Air Quality Standard for Fine Particles*, for Dubois, Vanderburgh, and Warrick counties, Montgomery Township in Gibson County, Ohio Township in Spencer County, and Washington Township in Pike County (herein referred to as “Southwestern Indiana” or the “Southwestern Indiana Area”). The United States Environmental Protection Agency (U.S. EPA) subsequently redesignated the Southwestern Indiana Area to attainment for the 1997 annual national ambient air quality standard for fine particles on September 27, 2011 (76 FR 59527) with an effective date of October 27, 2011. Onroad emissions for the April 8, 2011 submittal were calculated using MOBILE6.0. U.S. EPA has encouraged mobile source stakeholders to transition to the new Motor Vehicle Emissions Simulator (MOVES) model as expeditiously as possible. Therefore, IDEM is providing this MOBILE6.0 to MOVES replacement update to the previously submitted 1997 annual fine particles maintenance plan for the Southwestern Indiana maintenance area that incorporates MOVES-based onroad emissions.

## **Emission Inventory**

The tables titled, 2005 Base Year Emissions Inventory, 2008 Secondary Validation Year Emissions Inventory, 2015 Projected Emissions, 2020 Projected Emissions, and 2022 Projected Emissions were included in Appendix E of the original Redesignation Petition and Maintenance Plan. The consolidated table titled, *Table 4.1 – A, 2005, 2008, 2015, 2020, and 2022 Southwestern Indiana Maintenance Area, All Anthropogenic Sources*, (to be considered a replacement of the existing separate 2005, 2008, 2015, 2020, and 2022 tables for fine particles (PM<sub>2.5</sub>) and nitrogen oxides (NO<sub>x</sub>) included in Appendix E as detailed above) has been revised to incorporate updated onroad emission estimates for the years 2005, 2008, 2015, 2020, and 2022 and results in a different overall safety margin for the area.

**2005 Base Year Emissions Inventory  
(MOBILE6.0-based Onroad Emissions)**

**2005 Southwestern Indiana Area (Tons Per Year)**

		<b>ONROAD</b>	<b>NONROAD</b>	<b>AREA</b>	<b>EGU</b>	<b>POINT</b>	<b>TOTAL</b>
<b>Direct PM<sub>2.5</sub></b>	<b>DUBOIS COUNTY, IN</b>	21.06	49.60	8.50	30.46	93.63	<b>203.25</b>
	<b>GIBSON COUNTY, IN</b>	2.66	72.79	7.49	3,625.58	20.47	<b>3,728.99</b>
	<b>PIKE COUNTY, IN</b>	3.02	19.63	3.60	2,528.89	55.23	<b>2,610.37</b>
	<b>SPENCER COUNTY, IN</b>	3.10	39.17	3.71	33.36	50.84	<b>130.18</b>
	<b>VANDEBURGH COUNTY, IN</b>	57.30	116.66	8.14	0.33	60.72	<b>243.15</b>
	<b>WARRICK COUNTY, IN</b>	30.52	39.21	6.00	2,021.47	1,146.51	<b>3,243.71</b>
		<b>117.66</b>	<b>337.06</b>	<b>37.44</b>	<b>8,240.09</b>	<b>1,427.40</b>	<b>-</b>
					<b>GRAND TOTAL</b>		<b>10,159.65</b>

**2005 Southwestern Indiana Area (Tons Per Year)**

		<b>ONROAD</b>	<b>NONROAD</b>	<b>AREA</b>	<b>EGU</b>	<b>POINT</b>	<b>TOTAL</b>
<b>NO<sub>x</sub></b>	<b>DUBOIS COUNTY, IN</b>	1,203.96	848.55	360.71	87.51	216.54	<b>2,717.27</b>
	<b>GIBSON COUNTY, IN</b>	132.36	1,162.90	220.02	30,167.80	41.13	<b>31,724.21</b>
	<b>PIKE COUNTY, IN</b>	178.78	255.77	38.57	18,148.77	72.31	<b>18,694.20</b>
	<b>SPENCER COUNTY, IN</b>	177.98	727.76	88.24	21,501.05	145.17	<b>22,640.20</b>
	<b>VANDEBURGH COUNTY, IN</b>	3,150.98	2,140.34	746.06	25.41	83.94	<b>6,146.73</b>
	<b>WARRICK COUNTY, IN</b>	1,683.98	540.52	170.68	15,389.00	214.87	<b>17,999.05</b>
		<b>6,528.04</b>	<b>5,675.84</b>	<b>1,624.28</b>	<b>85,319.54</b>	<b>773.96</b>	<b>-</b>
					<b>GRAND TOTAL</b>		<b>99,921.66</b>

**2008 Secondary Validation Year Emissions Inventory  
(MOBILE6.0-based Onroad Emissions)**

**2008 Southwestern Indiana Area (Tons Per Year)**

		<b>ONROAD</b>	<b>NONROAD</b>	<b>AREA</b>	<b>EGU</b>	<b>POINT</b>	<b>TOTAL</b>
<b>Direct PM<sub>2.5</sub></b>	<b>DUBOIS COUNTY, IN</b>	15.84	40.28	8.49	30.52	79.48	<b>174.61</b>
	<b>GIBSON COUNTY, IN</b>	2.09	58.39	7.43	3,625.20	6.69	<b>3,699.80</b>
	<b>PIKE COUNTY, IN</b>	2.25	15.99	3.56	2,528.02	14.58	<b>2,564.40</b>
	<b>SPENCER COUNTY, IN</b>	2.43	31.73	3.68	3,157.90	47.58	<b>3,243.32</b>
	<b>VANDEBURGH COUNTY, IN</b>	45.42	95.93	8.13	0.08	65.95	<b>215.51</b>
	<b>WARRICK COUNTY, IN</b>	23.57	32.87	5.93	2,021.27	1,064.10	<b>3,147.74</b>
		<b>91.60</b>	<b>275.19</b>	<b>37.22</b>	<b>11,362.99</b>	<b>1,278.38</b>	<b>-</b>
<b>GRAND TOTAL</b>							<b>13,045.38</b>

**2008 Southwestern Indiana Area (Tons Per Year)**

		<b>ONROAD</b>	<b>NONROAD</b>	<b>AREA</b>	<b>EGU</b>	<b>POINT</b>	<b>TOTAL</b>
<b>NO<sub>x</sub></b>	<b>DUBOIS COUNTY, IN</b>	897.56	688.64	365.48	333.93	216.72	<b>2,502.33</b>
	<b>GIBSON COUNTY, IN</b>	104.41	931.59	2,223.11	12,674.10	42.77	<b>15,975.98</b>
	<b>PIKE COUNTY, IN</b>	131.32	217.29	40.61	14,908.12	72.25	<b>15,369.59</b>
	<b>SPENCER COUNTY, IN</b>	141.95	586.16	90.66	22,601.53	129.70	<b>23,550.00</b>
	<b>VANDEBURGH COUNTY, IN</b>	2,451.09	1,699.60	754.77	10.97	81.12	<b>4,997.55</b>
	<b>WARRICK COUNTY, IN</b>	1,291.73	457.58	173.96	9,750.15	218.01	<b>11,891.43</b>
		<b>5,018.06</b>	<b>4,580.86</b>	<b>3,648.59</b>	<b>60,278.80</b>	<b>760.57</b>	<b>-</b>
<b>GRAND TOTAL</b>							<b>74,286.88</b>

**2015 Projected Emissions  
(MOBILE6.0-based Onroad Emissions)**

**2015 Southwestern Indiana Area (Tons Per Year)**

		<b>ONROAD</b>	<b>NONROAD</b>	<b>AREA</b>	<b>EGU</b>	<b>POINT</b>	<b>TOTAL</b>
<b>Direct PM<sub>2.5</sub></b>	<b>DUBOIS COUNTY, IN</b>	8.86	25.03	8.14	30.52	72.79	145.34
	<b>GIBSON COUNTY, IN</b>	1.22	37.25	7.06	3,625.08	2.07	3,672.68
	<b>PIKE COUNTY, IN</b>	2.14	10.66	3.38	2,527.73	1.03	2,544.94
	<b>SPENCER COUNTY, IN</b>	1.19	20.38	3.52	4,199.42	45.32	4,269.83
	<b>VANDEBURGH COUNTY, IN</b>	28.47	65.34	7.84	0.00	66.67	168.32
	<b>WARRICK COUNTY, IN</b>	12.45	21.25	5.60	2,021.20	1,030.55	3,091.05
		54.33	179.91	35.54	12,403.95	1,218.43	-
<b>GRAND TOTAL</b>							<b>13,892.16</b>

**2015 Southwestern Indiana Area (Tons Per Year)**

		<b>ONROAD</b>	<b>NONROAD</b>	<b>AREA</b>	<b>EGU</b>	<b>POINT</b>	<b>TOTAL</b>
<b>NO<sub>x</sub></b>	<b>DUBOIS COUNTY, IN</b>	420.57	442.76	358.45	415.83	216.69	1,854.30
	<b>GIBSON COUNTY, IN</b>	53.42	652.32	218.85	6,842.87	42.97	7,810.43
	<b>PIKE COUNTY, IN</b>	143.71	165.63	40.44	13,827.91	72.24	14,249.93
	<b>SPENCER COUNTY, IN</b>	62.41	413.45	89.56	22,968.36	122.00	23,655.78
	<b>VANDEBURGH COUNTY, IN</b>	1,238.85	1,125.61	741.07	6.16	80.17	3,191.86
	<b>WARRICK COUNTY, IN</b>	584.23	307.81	171.22	7,870.54	201.08	9,134.88
		2,503.19	3,107.58	1,619.59	51,931.67	735.15	-
<b>GRAND TOTAL</b>							<b>59,897.18</b>

**2020 Projected Emissions  
(MOBILE6.0-based Onroad Emissions)**

**2020 Southwestern Indiana Area (Tons Per Year)**

		ONROAD	NONROAD	AREA	EGU	POINT	TOTAL
	Direct PM <sub>2.5</sub>	DUBOIS COUNTY, IN	7.87	18.96	7.97	30.51	71.80
GIBSON COUNTY, IN		2.35	29.08	6.88	3,625.08	2.06	3,665.45
PIKE COUNTY, IN		2.07	8.60	3.29	2,527.73	1.02	2,542.71
SPENCER COUNTY, IN		1.05	15.95	3.44	4,199.42	44.74	4,264.60
VANDEBURGH COUNTY, IN		27.14	53.50	7.70	0.00	66.16	154.50
WARRICK COUNTY, IN		12.03	16.50	5.44	2,021.20	1,027.51	3,082.68
		<b>52.51</b>	<b>142.59</b>	<b>34.72</b>	<b>12,403.94</b>	<b>1,213.29</b>	<b>-</b>
	<b>GRAND TOTAL</b>						<b>13,847.05</b>

**2020 Southwestern Indiana Area (Tons Per Year)**

		ONROAD	NONROAD	AREA	EGU	POINT	TOTAL
	NO <sub>x</sub>	DUBOIS COUNTY, IN	411.58	346.48	354.14	415.71	216.65
GIBSON COUNTY, IN		55.23	551.23	216.21	6,842.87	42.79	7,708.33
PIKE COUNTY, IN		137.24	146.22	40.01	13,827.91	72.24	14,223.62
SPENCER COUNTY, IN		58.86	350.71	88.61	22,968.36	120.73	23,587.27
VANDEBURGH COUNTY, IN		1,237.00	912.07	732.77	6.16	80.17	2,968.17
WARRICK COUNTY, IN		565.90	246.75	169.31	7,870.54	192.10	9,044.60
		<b>2,465.81</b>	<b>2,553.46</b>	<b>1,601.05</b>	<b>51,931.55</b>	<b>724.68</b>	<b>-</b>
	<b>GRAND TOTAL</b>						<b>59,276.55</b>

**2022 Projected Emissions  
(MOBILE6.0-based Onroad Emissions)**

**2022 Southwestern Indiana Area (Tons Per Year)**

		<b>ONROAD</b>	<b>NONROAD</b>	<b>AREA</b>	<b>EGU</b>	<b>POINT</b>	<b>TOTAL</b>
<b>Direct PM<sub>2.5</sub></b>	<b>DUBOIS COUNTY, IN</b>	7.98	14.55	7.85	30.54	64.21	<b>125.13</b>
	<b>GIBSON COUNTY, IN</b>	4.22	22.36	6.73	3,624.85	0.69	<b>3,655.85</b>
	<b>PIKE COUNTY, IN</b>	2.04	6.75	3.21	2,527.21	0.15	<b>2,539.33</b>
	<b>SPENCER COUNTY, IN</b>	4.20	12.35	3.37	3,049.33	42.57	<b>3,108.82</b>
	<b>VANDEBURGH COUNTY, IN</b>	25.96	42.52	7.59	0.00	69.07	<b>145.14</b>
	<b>WARRICK COUNTY, IN</b>	40.56	13.04	5.30	2,021.08	979.81	<b>3,029.79</b>
			<b>48.93</b>	<b>111.57</b>	<b>34.05</b>	<b>11,253.01</b>	<b>1,156.50</b>
	<b>GRAND TOTAL</b>						<b>12,604.06</b>

**2022 Southwestern Indiana Area (Tons Per Year)**

		<b>ONROAD</b>	<b>NONROAD</b>	<b>AREA</b>	<b>EGU</b>	<b>POINT</b>	<b>TOTAL</b>
<b>NO<sub>x</sub></b>	<b>DUBOIS COUNTY, IN</b>	294.63	268.60	353.83	790.80	216.72	<b>1,924.58</b>
	<b>GIBSON COUNTY, IN</b>	40.88	436.09	216.11	3,406.37	43.67	<b>4,143.12</b>
	<b>PIKE COUNTY, IN</b>	98.25	122.63	40.93	12,223.57	72.21	<b>12,557.59</b>
	<b>SPENCER COUNTY, IN</b>	47.41	278.90	89.35	23,656.61	111.81	<b>24,184.08</b>
	<b>VANDEBURGH COUNTY, IN</b>	848.90	705.49	731.89	3.17	78.53	<b>2,367.98</b>
	<b>WARRICK COUNTY, IN</b>	369.79	198.31	169.86	5,781.61	187.84	<b>6,707.41</b>
			<b>1,699.86</b>	<b>2,010.02</b>	<b>1,601.97</b>	<b>45,862.13</b>	<b>710.78</b>
	<b>GRAND TOTAL</b>						<b>51,884.76</b>

**Table 4.1 – A**  
**2005, 2008, 2015, 2020, and 2022 Southwestern Indiana Maintenance Area,**  
**All Anthropogenic Sources**  
**(MOVES-based Onroad Emissions)**

<b>(Tons per Day)</b>					
<b>Sector</b>	<b>2005 PM<sub>2.5</sub></b>	<b>2008 PM<sub>2.5</sub></b>	<b>2015 PM<sub>2.5</sub></b>	<b>2020 PM<sub>2.5</sub></b>	<b>2022 PM<sub>2.5</sub></b>
Area	37.44	37.22	35.54	34.72	34.05
Nonroad	337.06	275.19	179.91	142.59	111.57
EGU	8,240.09	11,362.99	12,403.95	12,403.94	11,253.01
Onroad	<b>440.28</b>	<b>360.35</b>	<b>173.85</b>	<b>112.07</b>	<b>87.35</b>
Point	1,427.40	1,278.38	1,218.43	1,213.29	1,156.50
<b>Total</b>	<b>10,482.27</b>	<b>13,314.13</b>	<b>14,011.68</b>	<b>13,906.61</b>	<b>12,642.48</b>
Overall Safety Margin	NA	NA	<b>(3,529.42)</b>	NA	<b>(2,160.21)</b>
<b>Sector</b>	<b>2005 NO<sub>x</sub></b>	<b>2008 NO<sub>x</sub></b>	<b>2015 NO<sub>x</sub></b>	<b>2020 NO<sub>x</sub></b>	<b>2022 NO<sub>x</sub></b>
Area	1,624.28	3,648.59	1,619.59	1,601.05	1,601.97
Nonroad	5,675.84	4,580.86	3,107.58	2,553.46	2,010.02
EGU	85,319.54	60,278.80	51,931.67	51,931.55	45,862.13
Onroad	<b>12,336.71</b>	<b>10,107.77</b>	<b>4,906.91</b>	<b>3,372.83</b>	<b>2,759.20</b>
Point	773.96	760.57	735.15	724.68	710.78
<b>Total</b>	<b>105,730.33</b>	<b>79,376.59</b>	<b>62,300.90</b>	<b>60,183.57</b>	<b>52,944.10</b>
Overall Safety Margin	NA	NA	<b>43,429.43</b>	NA	<b>52,786.23</b>

Onroad emission estimates in Table 4.1 – A were calculated using U.S. EPA’s MOVES model-produced emission factors and data extracted from the area’s travel-demand model. The MOVES model implements a significantly different approach to emissions estimation than the previous model (MOBILE6.0). Preliminary use of the MOVES model indicates that emission estimates can be considerably different than similar calculations using MOBILE6.0, which was used to create the original MVEBs for the Southwestern Indiana 1997 annual fine particles nonattainment area. A general summary of the MOVES methodology used in this area can be found in Appendix A. In addition, MOVES input and output files are being provided electronically with this submittal. Growth and control strategy assumptions for non-mobile sources (i.e. area, nonroad, electric generating units, and point) from the original submittal for the years 2005, 2008, 2015, 2020, and 2022 were developed before the economic challenges of the last several years. Because of this, the factors included in the original submittal may project more growth than will actually occur in the future. As a result, the growth and control strategy assumptions for the non-mobile sources for the years 2005, 2008, 2015, 2020, and 2022 continue to be valid and do not affect the overall conclusions of the plan.

Onroad safety margins have been included for onroad emission estimates to accommodate the wide array of assumptions that are factored into the calculation process. Since assumptions change over time, it is necessary to have an onroad safety margin that will accommodate the impact of refined assumptions in the process. The plan continues to meet all applicable Clean Air Act (CAA) requirements as the revised emission inventories clearly illustrate that total PM<sub>2.5</sub>

and NO<sub>x</sub> emissions in the Southwestern Indiana 1997 annual fine particles maintenance area will continue to decline leading to local reductions between 2005 (base year) and 2015 (maintenance plan interim budget year) and 2005 (base year) and 2022 (maintenance plan horizon budget year). Although there is an increase in direct PM<sub>2.5</sub> emissions in the Southwestern Indiana Area, this increase is outweighed by the significant regional reductions in NO<sub>x</sub> and SO<sub>2</sub> that have occurred and will continue to occur in the future.

**Transportation Conformity Budgets**

Table 5.1 was included on Page 28 of the original Redesignation Petition and Maintenance Plan for the Southwestern Indiana, 1997 annual fine particles maintenance area. Table 5.1 – A (to be considered a replacement of Table 5.1) has been revised to incorporate U.S. EPA’s MOVES model-produced emission factors and data extracted from the region’s travel-demand model.

**Table 5.1  
Emission Estimations for Onroad Mobile Sources for the  
Southwestern Indiana Area  
(MOBILE6.0-based Onroad Emissions)**

	2005	2008	2015	2020	2022
Direct PM <sub>2.5</sub> (tons/year)	117.67	91.59	54.33	50.48	48.93
NO <sub>x</sub> (tons/year)	6,528.04	5,018.06	2,503.19	1,929.38	1,699.86

**Table 5.1 - A  
Emission Estimations for Onroad Mobile Sources for the  
Southwestern Indiana Area  
(MOVES-based Onroad Emissions)**

	2005	2008	2015	2020	2022
PM <sub>2.5</sub> (tons/year)	440.28	360.35	173.85	112.07	87.35
NO <sub>x</sub> (tons/year)	12,336.71	10,107.77	4,906.91	3,372.83	2,759.20

Table 5.2 was also included on Page 28 of the original Redesignation Petition and Maintenance Plan for the Southwestern Indiana Area. Table 5.2 – A (to be considered a replacement of Table 5.2) has been revised to incorporate MVEBs calculated using U.S. EPA’s MOVES model-produced emission factors and data extracted from the region’s travel-demand model as detailed in Table 5.1 - A.

**Table 5.2**  
**Mobile Vehicle Emission Budgets**  
**(MOBILE6.0-based Onroad Emissions)**

	2015	2022
PM <sub>2.5</sub> (tons/year)	57.05	53.83
NO <sub>x</sub> (tons/year)	2,628.35	1,869.84

**Table 5.2 - A**  
**Motor Vehicle Emission Budgets for the**  
**Southwestern Indiana Area**  
**(MOVES-based Onroad Emissions)**

	2015	2022
PM <sub>2.5</sub> (tons/year)	199.93	100.45
NO <sub>x</sub> (tons/year)	5,642.95	3,173.08

Through the interagency consultation process, it was determined that a maintenance plan interim budget year of 2015, and a horizon budget year of 2022, would be appropriate. The interagency consultation group approved onroad margins of safety of fifteen percent (15%) for both PM<sub>2.5</sub> and NO<sub>x</sub> onroad emission estimates for the years 2015 and 2022. A summary of this interagency consultation discussion can be found in Appendix B. These revised emission inventories clearly illustrate that onroad PM<sub>2.5</sub> and NO<sub>x</sub> emissions in the Southwestern Indiana 1997 annual fine particles maintenance area will continue to decline leading to local reductions between 2005 (base year) and 2015 (maintenance plan interim budget year), as well as between 2005 (base year) and 2022 (maintenance plan horizon budget year).

Furthermore, when compared to the overall safety margin as defined in the Code of Federal Regulations (CFR) at 40 CFR 93.101, it is evident the onroad safety margin allocation is reasonable and appropriate. More specifically, even with the allocation of an onroad safety margin to mobile sources, emissions will continue to remain well below the overall safety margin for all sources as detailed in Table 4.1 - A. MVEBs are constrained to ensure that the total emissions (i.e., all source categories) do not exceed the 2005 attainment year emissions of either PM<sub>2.5</sub> or NO<sub>x</sub>, thereby ensuring continued maintenance of the 1997 annual fine particles standard. As stated previously, although there is an increase in direct PM<sub>2.5</sub> emissions in the Southwestern Indiana Area, this increase is outweighed by the significant regional reductions in NO<sub>x</sub> and SO<sub>2</sub> that have occurred and will continue to occur in the future.

**Conclusion**

This MOBILE6.0 to MOVES replacement update to the previously submitted *Request for Redesignation and Maintenance Plan Under the Annual National Ambient Air Quality Standard for Fine Particles for the Southwestern Indiana Area* incorporates onroad emission estimates and a revised MVEB using U.S. EPA's recently adopted MOVES model. MVEBs have been revised in

anticipation of the mandatory use of the MOVES model in future transportation conformity determinations. The onroad emission estimates were calculated using the MOVES-based emission factors and data extracted from the area's travel-demand model. Onroad safety margins for PM<sub>2.5</sub> and NO<sub>x</sub>, established through the interagency consultation process, are included in order to account for the wide array of assumptions that are factored into the calculation process. MVEBs are also constrained to ensure that total PM<sub>2.5</sub> and NO<sub>x</sub> emissions (i.e., all source categories) do not exceed attainment year (2005) emissions to ensure continued maintenance of the 1997 annual fine particles standard, even considering the increase in direct PM<sub>2.5</sub> emissions that will be offset by current and future regional and national reductions. With the addition of MOVES-based onroad safety margins applied to mobile sources, the Southwestern Indiana annual fine particles maintenance area will continue to remain well below the overall safety margins for all sources into the future. As such, the 1997 annual fine particles maintenance plan for the Southwestern Indiana Area continues to meet all applicable CAA requirements.

# Appendix A

## Southwestern Indiana Area MOVES Methodology

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Vanderburgh and Warrick Counties  
MOVES2010a Input Data and  
Parameters

INDOT Planning Contract

**Final Report**  
**October 4, 2012**



**CDM**  
**Smith**

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**Overview:**

This report is being written to document the input parameters for a set of MOVES2010a runs for the Vanderburgh and Warrick Counties 8-hour Ozone Maintenance Area and the Vanderburgh and Warrick Counties PM 2.5 non-attainment area. This report contains a discussion on the intended input settings used in MOVES2010a and the development of the input datasets. These MOVES2010a runs are intended to develop a default set of emission rates that can be used for conformity determination and is part of a statewide effort being conducted by the Indiana Department of Transportation (INDOT).

Throughout this report references are made to MOVES 2010a codes for two types of data. The values for the source type codes are shown in Table 1. The values for the road type codes are shown in Table 2. MOVES2010a input settings and assumptions for this effort are shown in Appendix A.

**Table 1: MOVES2010a Source Type Codes**

sourcetypeid	Description
11	Motorcycles
21	Passenger Car
31	Passenger Truck
32	Light Commercial Truck
41	Intercity Bus
42	Transit Bus
43	School Bus
51	Refuse Truck
52	Single Unit Short-haul Truck
53	Single Unit Long-haul Truck
54	Motor Home
61	Combination Short-haul Truck
62	Combination Long-haul Truck

**Table 2: MOVES2010a Road Type Codes**

roadtypeid	Description
1	Off Network
2	Rural Restricted Access
3	Rural Unrestricted Access
4	Urban Restricted Access
5	Urban Unrestricted Access

**Vehicle Age Distribution:**

The vehicle age distributions for MOVES source types 21, 31, and 32 (cars, passenger trucks, and light commercial vehicles respectively) were developed through an analysis of Indiana's 2009 vehicle registration data. The analysis was performed by Eastern Research Group (ERG) under contract to the Lake Michigan Air Directors Consortium (LADCO). ERG was provided with vehicle identification numbers (VIN) for vehicles in Indiana.

There were approximately 6.37 million VINs in the statewide data set. Out of these, approximately 1.3 million returned errors. Of these, approximately 200,000 errors were deemed non-critical. This means that the model year and vehicle type assigned to the records were most likely correct despite there being an error in the VIN decoding. These records were included in ERG's analysis. The remaining errors were considered critical enough to call into question the accuracy of the model year and vehicle types. These critical errors were excluded from ERG's analysis.

In all, approximately 5.2 million VINs from around the state were used in the analysis. Each VIN was associated to a specific county. ERG then developed age distributions for each county in the state along with seven combination areas comprised of two or more counties each. Additional information on the methodology used to develop the vehicle age distributions can be found in a May 28, 2010 report written by ERG for LADCO titled MOBILE6 and MOVES Registration Distribution Calculations for Indiana Registration Data. Each set of age distributions was provided in both MOBILE6 and MOVES formats. The MOVES formatted data will be used for these MOVES2010a runs.

Due to limitations in ERG's VIN decoder, it was not possible to develop vehicle age distributions for any source types other than 21, 31, and 32 from the vehicle registration data. For all other source types, MOVES2010a default vehicle age distributions specific to each source types were used. This includes motorcycles and all heavy vehicles. Vehicle age distributions for all source types were kept constant for all future years. The vehicle age distributions for Vanderburgh and Warrick Counties as a combined area are shown in Appendix B of this report.

#### **Vehicle Population:**

The vehicle populations for source types 21, 31, and 32 were developed directly from the vehicle registration data. All valid records that were identified from the vehicle registration data set were used to determine the number of vehicles for each of these three source types. The VIN decoded data provided to INDOT contained vehicle types according to MOBILE6.2 vehicle categories. There is a direct correlation between MOVES source type 21 (cars) and the MOBILE6.2 vehicle type LDV. All valid LDV records (those records not excluded from the vehicle age distribution analysis due to errors as was described in the section on Vehicle Age Distribution in this report) were counted in the vehicle population.

There is not a direct correlation between MOVES source types 31 (passenger trucks) and 32 (light commercial vehicles) and the MOBILE6.2 light truck vehicle types (LDT1, LDT2, LDT3, and LDT4). All valid records from the vehicle registration data set for MOBILE6.2 light duty trucks were counted in the vehicle populations. The light duty trucks were distributed between MOVES source types 31 and 32 as per the Environmental Protection Agency's (EPA) guidance documented in Table A.1 of the appendix of the Technical Guidance on the Use of MOVES2010 for Emission Inventory Preparation in State Implementation Plans and Transportation Conformity. The guidance provides two sets of factors for distributing MOBILE6.2 light trucks between MOVES source types 31 and 32. These are based on fuel type and are shown in Table 3.

**Table 3: Distribution of MOBILE6.2 Light Duty Trucks into MOVES Source Types**

Fuel	Source Types	
	31	32
Gas	78%	22%
Diesel	42%	58%

As per ERG's assumption documented in MOBILE6 and MOVES Registration Distribution Calculations for Indiana Registration Data, all light duty trucks that did not have a fuel type identified were counted as diesel trucks. This was to prevent an underestimation of diesel trucks and their related emissions.

Since only valid records from the vehicle registration data were used to calculate vehicle populations for source types 21, 31, and 32, it is reasonable to assume that some of the erroneous records that were discarded from the analysis actually belonged to these source types. The nature of these errors is not that the vehicle does not exist. Rather, it is that the vehicle could not be properly identified with any sense of certainty. It was therefore necessary to adjust the vehicle populations calculated from vehicle registration data to compensate for these discarded records. Based on an analysis of the error rate reported by ERG, vehicle populations for source types 21, 31, and 32 were increased by 5.8 percent.

Vehicle populations were not able to be developed directly from the vehicle registration data for some source types. This was due to the limitations in the VIN decoder used by ERG to process the vehicle registration data. Vehicle populations for all other source types (motorcycles and heavy vehicles) were derived by applying the Mileage Accumulation Rate (MAR) method documented in EPA's Technical Guidance on the Use of MOVES2010 for Emission Inventory Preparation in State Implementation Plans and Transportation Conformity, Section 3.3 Source Type Population.

The default MARs were extracted from MOVES by running MOVES for a single pollutant and a single year for all vehicles, fuels, months, days, and hours. The activity output was set to report both distance and population. A ratio of population to vehicle-miles-traveled (VMT) was calculated from these outputs. The ratios were calculated for each source type.

The Evansville MPO, which is the metropolitan planning organization (MPO) for Vanderburgh and Warrick Counties, provided VMT by MOVES road types extracted from their travel demand model's base year. Since the default MARs in MOVES vary by year (but not by location), the MOVES run that was executed to extract the MARs was run for a year consistent with the travel demand model's base year. This resulted in MARs that could be applied directly to the validated VMTs reported by the travel demand model. The travel demand model VMTs were converted into annual VMT and distributed by vehicle types using statewide default VMT distribution factors documented in this report in the section on Default VMT Distributions. The MARs were then applied to the annual vehicle type VMTs. The result was an estimated vehicle population for each source type for the travel demand model's base year. Since the vehicle populations for source types 21, 31, and 32 were developed directly from the vehicle registration data, the population

estimates derived for those source types using the MAR method were discarded and the observed data were used instead.

Future year vehicle populations were developed base on socioeconomic growth rates for the maintenance area. The MPO provided base year and horizon year population and employment data for the area. Annual growth rates were calculated for population growth and employment growth individually. Population growth rates were then used to grow the light vehicle populations (source types 11, 21, 31, and 32). Employment growth rates were used to grow the heavy vehicle populations (source types 41, 42, 43, 51, 52, 53, 54, 61, and 62). Vehicle populations were calculated for every year from 2008 to 2040. These vehicle populations for Vanderburgh and Warrick Counties as a combined area are shown in Appendix C.

#### **Meteorological Data:**

The default set of hourly temperatures and hourly relative humidity was developed using EPA's data converters for changing MOBILE6.2 minimum / maximum temperatures and absolute humidity to the MOVES equivalent formats. The values for the MOBILE6.2 inputs were taken from the Request for Redesignation and Maintenance Plan for Ozone Attainment in the 8-hour Ozone Basic Nonattainment Area, Appendix D, developed by Indiana Department of Environmental Management in June 2, 2005 and the draft Request for Redesignation and Maintenance Plan under the Annual National Ambient Air Quality Standard for Fine Particles, Appendix F, developed by the Indiana Department of Environmental Management in January, 2011.

Meteorological data reflect average annual conditions for the PM 2.5 runs. The MOBILE6.2 meteorological input data for each of the twelve months of the years were averaged together to create average annual temperatures and humidity. These were then passed through the data converters. The data reflect summer conditions for ozone using MOBILE6.2 inputs for July. The MOVES formatted meteorological data for Vanderburgh and Warrick Counties as a combined area are presented in Appendix D of this report.

#### **Default VMT Distributions:**

As part of this effort, INDOT developed a default set of VMT distribution factors by Highway Performance Monitoring System (HPMS) vehicle type and by MOVES road type. These distribution factors were developed by analyzing four consecutive years of continuous traffic count data ending in 2010 for twenty permanent traffic count stations throughout Indiana. The stations were selected to provide a spread of locations corresponding to each of the four MOVES road types. Furthermore, these stations were selected from among sites that were concentrated in nonattainment and maintenance areas. In some cases, data from the requested site were either partially or completely unavailable. An inventory of the sites used to develop the distributions is shown in Table 4.

The vehicle counts reported at each station were provided by vehicle class. These were aggregated into the six basic HPMS vehicle types: motorcycle, passenger car, light truck, bus, single-unit heavy truck, and combination heavy truck. The distribution of VMT by vehicle type was calculated for each road type by taking each vehicle type's percentage of total traffic. These default statewide factors are shown in Appendix E.

**Table 4: Inventory of Permanent Count Stations**

SiteID	City	County	Location	Road Type	Data Quality
3000	MUNCIE	DELAWARE	SR 332 RM 0.5	3	Closed since 9/26/2006. No data.
3200	CARMEL	HAMILTON	US 31 RM 125.7	5	Good
3300	INDY WEST	MARION	I 465 MM 10.0	4	Closed since 9/1/10
4000	GARY	LAKE	I 80 / I 94 MM 6.0	4	Only 2010 data passed QC
4500	LAPORTE	LAPORTE	SR 2 RM 65.2	3	Good
5600	SELLERSBURG	CLARK	I 65 MM 8.0	4	Bad sensors. Not usable.
6100	EVANSVILLE	GIBSON	I 64 MM 27.9	2	Good
0105	TERRE HAUTE	VIGO	US 41 RM 104.2	3	Good-closed 11/13/08-5/13/09
0201	MIDDLEBURY	ELKHART	SR 120 RM 13.9	3	Good- closed 8/3/10-12/6/10
0210	FORT WAYNE	ALLEN	I-69 0.53 mi N of SR 3	4	Good
0303	MUNCIE	DELAWARE	US 35 RM 44.5	5	Good
0327	DALEVILLE	DELAWARE	I 69 MM 31.4	2	Good-built in 12/10/2007
0403	SOUTH BEND	ST. JOSEPH	US 20 RM 77.1	4	Good
0501	INDY SOUTH	MARION	SR 37 RM 143.5	5	Good-closed 5/22/09-6/1/09
0502	MARTINSVILLE	MORGAN	SR 67 RM 80.6	3	Good
0507	SEYMOUR	JACKSON	I 65 MM 47.0	2	Good
0602	HAZLETON	GIBSON	SR 56 RM 0.6	3	Good
0603	DUBOIS	DUBOIS	SR 56 RM 53.3	3	Good- closed 10/16/08-3/20/09
0608	EVANSVILLE	VANDERBURGH	SR 66 RM 23.5	5	Good
1315	I 70	MARION	I 70 MM 83.5	4	Closed 5/17/06-3/24/08

**Default Hourly Distributions:**

The same set of twenty permanent traffic count locations discussed in the section on Default VMT Distributions was analyzed to develop a set of hourly distribution factors. These factors were calculated by road type, by HPMS vehicle type. Hourly factors were only calculated for the average weekday. The hourly distribution pattern for each traffic count location was reviewed. Any data that appeared to reflect either an error in the data or an outlier of behavior were removed to prevent bias in the data. The following data were excluded from the analysis:

- Bus data from count stations 0105 and 0603 were excluded due to abnormal midnight peaks in the data;
- An abnormal relationship between passenger cars and light duty trucks at count station 4500 prompted the exclusion of all data from this location due to questions of reliability;
- Peak spreading behavior observed at count station 4000 from traffic related to Chicago was considered to be too unique to be included in a default statewide data set; and,
- Combination truck traffic from station 3200 was excluded due to too much overnight traffic when compared to other vehicles and other stations.

Furthermore, traffic patterns reported by those count stations corresponding to road type 3 (3000, 4500, 0105, 0201, 0502, 0602, and 0603) had a tendency to over represent long distance travel. This was most likely the result of statewide permanent count stations focusing primarily on higher order facilities. Rural collectors and local streets are less likely to reflect long distance travel. The hourly distributions for road type 3 (rural unrestricted access) were adjusted to better account for traffic behavior on lower order facilities in rural areas. A sample of traffic count data from Morgan County, IN was used to introduce more local traffic behavior in the road type 3 hourly distributions. An analysis of the Morgan County data showed a pattern more consistent with AM and PM peaking characteristics reflecting local commuting traffic on collectors and local streets for passenger cars and light duty trucks. The Morgan County data for passenger cars and light duty trucks on collectors and local streets were weighted and added to the road type 3 data set. This analysis assumed that rural collectors and local streets accounted for 20 percent of all VMT for road type 3.

The statewide default hourly distribution factors are presented in Appendix F.

**Default Daily and Monthly Distributions:**

Default daily and monthly distribution factors were calculated from INDOT's official count adjustment factors which are more commonly used to develop AADT from raw traffic counts. These factors are based on the set of daily traffic counts collected from all permanent count stations throughout the state. The daily distribution factors determine what percentage of VMT is occurring on weekdays and what percentage is occurring on weekends. The monthly distribution factors determine what percentage of annual VMT is occurring in each month of the year. The statewide default daily distribution factors are shown in Appendix G. The statewide default monthly distribution factors are shown in Appendix H.

**Ramp Fractions:**

The ramp fractions represent the percentage of vehicle-hours-traveled (VHT) for road types 2 (rural restricted access) and 4 (urban restricted access) occurring on the ramps associated with those road types. These fractions were calculated based on the percentage of VHT occurring on ramps reported by the base year travel demand model. These ramp fractions are reported in Appendix I.

## Appendix A

### Number of Runs:

Input Item	Ozone	PM 2.5
Years	2002, 2010, 2015, 2020, 2025, 2030, 2035, 2040	2008, 2010, 2015, 2020, 2022, 2030, 2035, 2040
Pollutants/ Processes	Volatile Organic Compound (VOC), NOx, and supporting	PM 2.5 with all subspecies; NOx
Meteorology	Summer	Average Annual
# of MOVES runs	8	8

General Parameters:

MOVES Screen	Input Item	Ozone	PM 2.5
<b>Description</b>	Description	User Choice	
<b>Scale</b>	Domain/Scale	County	
	Calculation Type	Emission Rate	
<b>Time Spans</b>	Time Aggregation Level	Hour	Hour
	Year	2002, 2010, 2015, 2020, 2025, 2030, 2035, 2040	2008, 2010, 2016, 2020, 2022, 2030, 2035, 2040
	Months	July	April
	Days	Weekday	Weekday
	Hours	Select All	Select All
<b>Geographic Bounds</b>	Geographic Bounds	Vanderburgh County*	Vanderburgh County*
<b>Vehicles</b>	Vehicles	All Gas and Diesel Combinations	
<b>Road Type</b>	Road Type	Select All	
<b>Pollutants/ Processes</b>	Pollutants/ Processes	VOC, NOx, and supporting	PM 2.5 with all subspecies; NOx
<b>General Output</b>	Database Name	Evansville Ozone	Evansville PM
	Units	Select "Grams" and "Miles" and "Million BTU"	
	Activity	Distance, Population	
<b>Output Emissions Detail</b>	On Road	Select "Source Use Type" and "Road Type"	

\*Represents both Vanderburgh and Warrick Counties.

County Data Manager

County Data Manager Input	Excel Sheet Tab Name		
		Ozone	PM 2.5
<b>Source (Vehicle) Type Population</b>	sourceTypeYear	Local Registration for Source Types 21, 31, and 32; Estimated population using default MOVES mileage accumulation rates and local VMT for all other source types. Future year vehicle populations based on population growth rates for source types 11, 21, 31, and 32. Employment growth used for all other source types.	
<b>Vehicle Type VMT (by 13 MOVES Vehicle Types)</b>	HPMSVTypeYear	Statewide default vehicle distributions across road types developed by INDOT using an analysis of permanent count station data from a statewide data set.	
	MonthVMTFraction	Statewide default monthly fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.	
	DayVMTFraction	Statewide default daily fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.	
	HourVMTFraction	Statewide default hourly fractions developed by INDOT using an analysis of permanent count station data from a statewide data set.	
<b>Average Speed Distribution (% of VHT in each 5 mph speed bin)</b>	avgSpeed Distribution	National defaults.	
<b>Road Type Distribution (VMT by 5 MOVES Road Types)</b>	roadType Distribution	Calculated from local VMT data. Use travel demand model base year distributions for all years.	
<b>Age Distribution (Vehicle Population by Age of Vehicle)</b>	sourceTypeAge Distribution	Local age distributions developed from vehicle registration data for source types 21, 31, and 32. Default MOVES age distributions for all other source types.	
<b>Ramp Fraction</b>	RoadType	Based on local travel demand model.	
<b>Meteorology Data</b>	ZoneMonthHour	MOBILE6 Summer Met Data Converted to MOVES format	MOBILE6 12 month Met Data Converted to MOVES format and averaged to annual meteorology
<b>Fuel (% of Market Share by Fuel Type)</b>	FuelFormulation	MOVES Defaults	
	FuelSupply	Vanderburgh County MOVES Defaults for Summer (check if varies among counties)	Vanderburgh County MOVES Defaults for annual (check if varies among counties)
<b>I/M Program</b>	IMCoverage	No Program	

Appendix B

Vehicle Age Distributions for Vanderburgh and Warrick Counties:

ageid	Source Types												
	11	21	31	32	41	42	43	51	52	53	54	61	62
0	0.2109690540	0.0254913494	0.0108613399	0.0283536975	0.0643023355	0.0545743076	0.0622220643	0.0494240790	0.0588526168	0.0787544027	0.0615095870	0.0535634660	0.0670845256
1	0.1921154969	0.0471761977	0.0455523407	0.0691813189	0.0626728412	0.0531913309	0.0606452875	0.0481716155	0.0573612230	0.0767586735	0.0599508636	0.0535634660	0.0670845256
2	0.1573471585	0.0580075242	0.0532532087	0.0714378942	0.0624853859	0.0530322328	0.0604638952	0.0480275345	0.0571896519	0.0765290827	0.0597715492	0.0541045093	0.0677621447
3	0.1359771581	0.0527361307	0.0471399955	0.0603686832	0.0624229593	0.0529792497	0.0604034894	0.0479795509	0.0571325186	0.0764526251	0.0597118340	0.0575579884	0.0720873878
4	0.1058454735	0.0539901675	0.0713109281	0.0783771127	0.0617369906	0.0523970560	0.0597397140	0.0474523026	0.0565046834	0.0756124785	0.0590556596	0.0564182312	0.0708599203
5	0.0750909142	0.0553551809	0.0640255212	0.0718634254	0.0559170498	0.0474575929	0.0541080614	0.0429789769	0.0511779950	0.0684845018	0.0534884926	0.0489290859	0.0612802835
6	0.0476805323	0.0577522778	0.0726611766	0.0639022521	0.0468365056	0.0397508123	0.0453212873	0.0359994879	0.0428670388	0.0573630896	0.0448023279	0.0366034411	0.0458432683
7	0.0331026886	0.062597645	0.0709548186	0.0653071651	0.0425786431	0.0361370941	0.0412011709	0.0327268079	0.0389700355	0.0521482660	0.0407293873	0.0340742206	0.0426755959
8	0.0197278356	0.0632456247	0.0616514578	0.0567925412	0.0468268516	0.0397426124	0.0453119367	0.0359920640	0.0428582007	0.0573512681	0.0447930981	0.0358093100	0.0448486759
9	0.0118473747	0.0721570542	0.0623636768	0.0628379241	0.0534377006	0.0453533365	0.0517089150	0.0410733035	0.0489087688	0.0654479137	0.0511168252	0.0526288382	0.0659139597
10	0.0053251777	0.0654096705	0.0604644261	0.0567073950	0.0532712252	0.0452120443	0.0515478328	0.0409453420	0.0487564067	0.0652440247	0.0509575859	0.0624520143	0.0782168041
11	0.0025378610	0.0559211621	0.0512946064	0.0461492614	0.0407951886	0.0536203440	0.0411075833	0.0313580350	0.0391491717	0.0523881239	0.0302729398	0.0478258601	0.0598985955
12	0.0013011470	0.050893174	0.0480747830	0.0399335859	0.0331924560	0.0489936472	0.0382933197	0.0255124310	0.0394065607	0.0466101866	0.0389128550	0.0487354179	
13	0.0006124019	0.0430811573	0.0375695526	0.0292051599	0.0277347637	0.0458089741	0.0333751020	0.0545980574	0.0316399801	0.0194774783	0.0291673253	0.0325145854	0.0462990441
14	0.0002476898	0.0433142083	0.0361154388	0.0285665631	0.0364294706	0.0377746681	0.0430663640	0.0632656498	0.0364439725	0.0194691525	0.0347804437	0.0427077419	0.0462072388
15	0.0001527705	0.0346136346	0.0357444914	0.0309932309	0.0283511969	0.0332950401	0.0210164622	0.0395649332	0.0357887614	0.0311848083	0.0335202065	0.0332372597	0.0300444032
16	0.0000668536	0.0300081013	0.0257882632	0.0210311210	0.0235884296	0.0279132162	0.0253671498	0.0341566540	0.0259987277	0.0230196849	0.0233151075	0.0276536739	0.0230524492
17	0.0000299603	0.0235936477	0.0221233029	0.0179658564	0.0175637044	0.0244970846	0.0206833627	0.0146346390	0.0197956396	0.0052258132	0.0206748599	0.0205906442	0.0138452217
18	0.0000127409	0.0196650723	0.0184731805	0.0145600068	0.0201192241	0.0250480695	0.0266888558	0.0401958334	0.0193740288	0.0037212159	0.0155464816	0.0235865809	0.0100066460
19	0.0000055369	0.0160361340	0.0154017360	0.0115798885	0.0225790392	0.0366610768	0.0301447753	0.0342277190	0.0227335396	0.0175775477	0.0203628520	0.0264703224	0.0098603738
20	0.0000022027	0.0141717254	0.0150307886	0.0129848014	0.0226407923	0.0281971934	0.0173882093	0.0270081845	0.0289395833	0.0183874556	0.0265944575	0.0265427135	0.0095755112
21	0.0000010015	0.0106315684	0.0149120855	0.0124739240	0.0212965445	0.0224413685	0.0209032932	0.0367430589	0.0255089927	0.0121624816	0.0238465850	0.0249667984	0.0083402541
22	0.0000005320	0.0082566669	0.0097633356	0.0079611733	0.0221366577	0.0207614938	0.0211741003	0.0294241579	0.0211707159	0.0029207200	0.0232916886	0.0259516972	0.0021970287
23	0.0000002372	0.0061814025	0.0097781735	0.0078334540	0.0187753208	0.0176845935	0.0186862600	0.0367365508	0.0255742899	0.0006595597	0.0173635700	0.0220110680	0.0022815392
24	0.0000001072	0.0051493192	0.0086653313	0.0079611733	0.0165801584	0.0153441343	0.0162223474	0.0195371739	0.0181341022	0.0013228019	0.0186391363	0.0194375881	0.0028947085
25	0.0000000515	0.0038065010	0.0056235626	0.0052364937	0.0130464803	0.0119613578	0.0125269842	0.0202862884	0.0101534224	0.0013255722	0.0189070434	0.0152949162	0.0014963357
26	0.0000000201	0.0022417295	0.0038430151	0.0030226915	0.0052066606	0.0114707358	0.0046276161	0.0058785937	0.0158244798	0.0000000000	0.0123858355	0.0061039775	0.0003051544
27	0.0000000084	0.0014426972	0.0025817939	0.0022989484	0.0044375500	0.0062552616	0.0034269422	0.0066192300	0.0082431519	0.0005853113	0.0073123264	0.0052023202	0.0002365920
28	0.0000000046	0.0013983065	0.0019586023	0.0012771936	0.0038534093	0.0027153367	0.0040227141	0.0058648852	0.0078447522	0.0004224309	0.0040199156	0.0045175071	0.0007539156
29	0.0000000027	0.0016979436	0.0006825432	0.0005108774	0.0050202650	0.0073813428	0.0039557847	0.0014702211	0.0082910352	0.0000000000	0.0005297244	0.0058854602	0.0002483418
30	0.0000000006	0.0139941626	0.0163365235	0.0133253864	0.0041641999	0.0025473919	0.0046291194	0.0021486392	0.0093642209	0.0005969550	0.0069720059	0.0048818583	0.0002641374

Source: Quality assured vehicle registration data for the combined Vanderburgh County and Warrick County area for source types 21, 32, and 32, MOVES2010a default distributions for all other source types.

Appendix C

Vanderburgh and Warrick Counties Vehicle Populations:

Vehicle Populations	Source Types												
	11	21	31	32	41	42	43	51	52	53	54	61	62
<i>Annual Populations</i>													
2008	4,425	94,893	73,275	22,434	83	43	560	22	1,503	193	348	2,210	2,644
2009	4,446	95,335	73,616	22,539	83	43	564	22	1,513	194	350	2,225	2,662
2010	4,466	95,780	73,960	22,644	84	44	568	22	1,524	196	352	2,241	2,681
2011	4,487	96,227	74,305	22,750	84	44	572	22	1,535	197	355	2,257	2,700
2012	4,508	96,676	74,652	22,856	85	44	576	23	1,545	199	357	2,272	2,719
2013	4,529	97,127	75,000	22,962	85	45	580	23	1,556	200	360	2,288	2,738
2014	4,550	97,580	75,350	23,069	86	45	584	23	1,567	201	362	2,304	2,757
2015	4,572	98,035	75,701	23,177	87	45	588	23	1,578	203	365	2,321	2,776
2016	4,593	98,493	76,055	23,285	87	46	592	23	1,589	204	368	2,337	2,796
2017	4,614	98,952	76,409	23,394	88	46	597	23	1,600	206	370	2,353	2,815
2018	4,636	99,414	76,766	23,503	88	46	601	24	1,612	207	373	2,370	2,835
2019	4,657	99,878	77,124	23,613	89	47	605	24	1,623	209	375	2,386	2,855
2020	4,679	100,344	77,484	23,723	90	47	609	24	1,634	210	378	2,403	2,875
2021	4,701	100,812	77,845	23,834	90	47	613	24	1,646	212	381	2,420	2,895
2022	4,723	101,282	78,209	23,945	91	48	618	24	1,657	213	383	2,437	2,915
2023	4,745	101,755	78,573	24,056	92	48	622	24	1,669	215	386	2,454	2,936
2024	4,767	102,229	78,940	24,169	92	48	626	25	1,681	216	389	2,471	2,957
2025	4,789	102,706	79,308	24,281	93	49	631	25	1,692	218	391	2,489	2,977
2026	4,812	103,186	79,678	24,395	94	49	635	25	1,704	219	394	2,506	2,998
2027	4,834	103,667	80,050	24,509	94	49	640	25	1,716	221	397	2,524	3,019
2028	4,857	104,151	80,424	24,623	95	50	644	25	1,728	222	400	2,541	3,040
2029	4,879	104,637	80,799	24,738	96	50	649	25	1,741	224	402	2,559	3,062
2030	4,902	105,125	81,176	24,853	96	50	653	26	1,753	225	405	2,577	3,083
2031	4,925	105,615	81,554	24,969	97	51	658	26	1,765	227	408	2,595	3,105
2032	4,948	106,108	81,935	25,086	98	51	662	26	1,777	228	411	2,614	3,127
2033	4,971	106,603	82,317	25,203	98	51	667	26	1,790	230	414	2,632	3,149
2034	4,994	107,100	82,701	25,320	99	52	672	26	1,802	232	417	2,650	3,171
2035	5,018	107,600	83,087	25,438	100	52	677	27	1,815	233	420	2,669	3,193
2036	5,041	108,102	83,475	25,557	100	53	681	27	1,828	235	423	2,688	3,215
2037	5,065	108,606	83,864	25,676	101	53	686	27	1,841	237	426	2,707	3,238
2038	5,088	109,113	84,255	25,796	102	53	691	27	1,854	238	429	2,726	3,261
2039	5,112	109,622	84,649	25,916	102	54	696	27	1,867	240	432	2,745	3,284
2040	5,136	110,134	85,043	26,037	103	54	701	27	1,880	242	435	2,764	3,307

Source: Quality assured vehicle registration data for the combined Vanderburgh County and Warrick County area for source types 21, 32, and 32, MOVES2010a default mileage accumulation rates for all other source types. Population growth factors are taken from local socioeconomic data forecasts.

**Appendix D**

*Vanderburgh and Warrick Counties Meteorological Data:*

Ozone					PM 2.5				
monthID	zoneID	HourID	temperature	relHumidity	monthID	zoneID	HourID	temperature	relHumidity
7	181730	1	72.6	63.9	4	181730	1	49.9	100.0
7	181730	2	71.3	66.6	4	181730	2	48.7	100.0
7	181730	3	70.4	68.8	4	181730	3	47.7	100.0
7	181730	4	69.7	70.5	4	181730	4	47.0	100.0
7	181730	5	69.1	71.8	4	181730	5	46.5	100.0
7	181730	6	68.5	73.3	4	181730	6	45.8	100.0
7	181730	7	68.0	74.6	4	181730	7	45.3	100.0
7	181730	8	68.4	73.5	4	181730	8	45.7	100.0
7	181730	9	71.1	67.2	4	181730	9	48.4	100.0
7	181730	10	75.3	58.3	4	181730	10	52.7	97.4
7	181730	11	79.6	50.6	4	181730	11	57.1	83.1
7	181730	12	83.2	44.9	4	181730	12	60.8	72.7
7	181730	13	86.5	40.5	4	181730	13	64.1	64.7
7	181730	14	88.2	38.3	4	181730	14	65.9	60.8
7	181730	15	88.8	37.6	4	181730	15	66.5	59.5
7	181730	16	89.0	37.4	4	181730	16	66.7	59.1
7	181730	17	88.6	37.9	4	181730	17	66.3	60.0
7	181730	18	87.3	39.4	4	181730	18	65.0	62.7
7	181730	19	85.2	42.1	4	181730	19	62.9	67.6
7	181730	20	82.5	45.9	4	181730	20	60.1	74.5
7	181730	21	79.8	50.2	4	181730	21	57.3	82.3
7	181730	22	77.5	54.2	4	181730	22	54.9	89.8
7	181730	23	75.8	57.3	4	181730	23	53.2	95.5
7	181730	24	74.1	60.6	4	181730	24	51.5	100.0

Source: Mobile 6.2 reported meteorological data from *Request for Redesignation and Maintenance Plan for Ozone Attainment in the 8-hour Ozone Basic Nonattainment Area*, Appendix D, developed by Indiana Department of Environmental Management in June 2, 2005 and the draft *Request for Redesignation and Maintenance Plan under the Annual National Ambient Air Quality Standard for Fine Particles*, Appendix F, developed by the Indiana Department of Environmental Management in January, 2011 converted using EPA data converter.

## Appendix E

*Indiana Default VMT Distributions by Vehicle Type and Road Type:*

<b>Road Type</b>	<b>Motorcycle</b>	<b>Passenger Car</b>	<b>Light Duty Truck</b>	<b>Bus</b>	<b>Single Unit Truck</b>	<b>Combination Truck</b>
<b>2</b>	0.007033832	0.506408086	0.163786651	0.004174166	0.007773053	0.310824213
<b>3</b>	0.001733929	0.659751199	0.225767175	0.000793168	0.010963315	0.100991214
<b>4</b>	0.003973041	0.569953374	0.254198647	0.002831718	0.009082816	0.159960404
<b>5</b>	0.002785022	0.702754695	0.245240087	0.001402085	0.009764356	0.038053756

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Appendix F

Indiana Default Hourly Distribution Factors for Road Type 2 – Rural Restricted Access:

Hour	Source Types													
	11	21	31	32	41	42	43	51	52	53	54	61	62	
1	0.0125903247	0.0101219844	0.0084967341	0.0084967341	0.0254913340	0.0254913340	0.0254913340	0.0126607789	0.0126607789	0.0126607789	0.0126607789	0.0197906895	0.0197906895	
2	0.0104070951	0.0069241973	0.0066421955	0.0066421955	0.0269500431	0.0269500431	0.0269500431	0.0114617645	0.0114617645	0.0114617645	0.0114617645	0.0212124099	0.0212124099	
3	0.0098043179	0.0058567534	0.0061275627	0.0061275627	0.0231103443	0.0231103443	0.0231103443	0.0107741941	0.0107741941	0.0107741941	0.0107741941	0.0201622890	0.0201622890	
4	0.0140329469	0.0069658232	0.0084286563	0.0084286563	0.0234460042	0.0234460042	0.0234460042	0.0128724692	0.0128724692	0.0128724692	0.0128724692	0.0213065902	0.0213065902	
5	0.0165212405	0.0100841552	0.0134026652	0.0134026652	0.0244090660	0.0244090660	0.0244090660	0.0174195788	0.0174195788	0.0174195788	0.0174195788	0.0250478552	0.0250478552	
6	0.0312047458	0.0241732202	0.0316551315	0.0316551315	0.0322923692	0.0322923692	0.0322923692	0.0261005783	0.0261005783	0.0261005783	0.0261005783	0.0304976568	0.0304976568	
7	0.0399082603	0.0390974746	0.0481531313	0.0481531313	0.0302344914	0.0302344914	0.0302344914	0.0420450985	0.0420450985	0.0420450985	0.0420450985	0.0339947725	0.0339947725	
8	0.0482864956	0.0528758381	0.0535145983	0.0535145983	0.0386071681	0.0386071681	0.0386071681	0.0556119122	0.0556119122	0.0556119122	0.0556119122	0.0383435322	0.0383435322	
9	0.0472316355	0.0493101459	0.0541442978	0.0541442978	0.0454144773	0.0454144773	0.0454144773	0.0647383083	0.0647383083	0.0647383083	0.0647383083	0.0447350945	0.0447350945	
10	0.0521292001	0.0488627065	0.0570682751	0.0570682751	0.0533197396	0.0533197396	0.0533197396	0.0711110358	0.0711110358	0.0711110358	0.0711110358	0.0517738130	0.0517738130	
11	0.0559204481	0.0513700269	0.0575854739	0.0575854739	0.0576707709	0.0576707709	0.0576707709	0.0730230234	0.0730230234	0.0730230234	0.0730230234	0.0557712484	0.0557712484	
12	0.0572822100	0.0533048469	0.0582753930	0.0582753930	0.0549541212	0.0549541212	0.0549541212	0.0731872952	0.0731872952	0.0731872952	0.0731872952	0.0571435296	0.0571435296	
13	0.0592008057	0.0551586141	0.0599414146	0.0599414146	0.0541541840	0.0541541840	0.0541541840	0.0739324454	0.0739324454	0.0739324454	0.0739324454	0.0567014536	0.0567014536	
14	0.0615145144	0.0595500442	0.0635019874	0.0635019874	0.0570747392	0.0570747392	0.0570747392	0.0746488056	0.0746488056	0.0746488056	0.0746488056	0.0567500887	0.0567500887	
15	0.0647783324	0.0662712693	0.0683897966	0.0683897966	0.0551925339	0.0551925339	0.0551925339	0.0704234655	0.0704234655	0.0704234655	0.0704234655	0.0578234055	0.0578234055	
16	0.0713500739	0.0764876319	0.0772110428	0.0772110428	0.0551956709	0.0551956709	0.0551956709	0.0628601912	0.0628601912	0.0628601912	0.0628601912	0.0577540296	0.0577540296	
17	0.0754978425	0.0847160034	0.0792545794	0.0792545794	0.0557979766	0.0557979766	0.0557979766	0.0534712990	0.0534712990	0.0534712990	0.0534712990	0.0562910814	0.0562910814	
18	0.0693763461	0.0821220539	0.0693254052	0.0693254052	0.0501011685	0.0501011685	0.0501011685	0.0436895095	0.0436895095	0.0436895095	0.0436895095	0.0527021980	0.0527021980	
19	0.0542187052	0.0620082513	0.0521045300	0.0521045300	0.0459665909	0.0459665909	0.0459665909	0.0363413126	0.0363413126	0.0363413126	0.0363413126	0.0502215100	0.0502215100	
20	0.0432143461	0.0459015588	0.0390794599	0.0390794599	0.0462959768	0.0462959768	0.0462959768	0.0312048570	0.0312048570	0.0312048570	0.0312048570	0.0467116534	0.0467116534	
21	0.0358137860	0.0372595462	0.0311015284	0.0311015284	0.0418602463	0.0418602463	0.0418602463	0.0261242877	0.0261242877	0.0261242877	0.0261242877	0.0421311043	0.0421311043	
22	0.0294294934	0.0312744978	0.0249803003	0.0249803003	0.0366496745	0.0366496745	0.0366496745	0.0215822587	0.0215822587	0.0215822587	0.0215822587	0.0381387483	0.0381387483	
23	0.0223450238	0.0235734666	0.0182964081	0.0182964081	0.0347517842	0.0347517842	0.0347517842	0.0189759266	0.0189759266	0.0189759266	0.0189759266	0.0342326572	0.0342326572	
24	0.0179418099	0.0169198902	0.0133194323	0.0133194323	0.0310595247	0.0310595247	0.0310595247	0.0157396039	0.0157396039	0.0157396039	0.0157396039	0.0307625891	0.0307625891	

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Indiana Default Hourly Distribution Factors for Road Type 3 – Rural Unrestricted Access:

Hour	Source Types													
	11	21	31	32	41	42	43	51	52	53	54	61	62	
1	0.0040299464	0.0073183989	0.0054636028	0.0054636028	0.0036998387	0.0036998387	0.0036998387	0.0043988387	0.0043988387	0.0043988387	0.0043988387	0.0043988387	0.0164160879	0.0164160879
2	0.0040299464	0.0041131835	0.0034619242	0.0034619242	0.0045536477	0.0045536477	0.0045536477	0.0041872686	0.0041872686	0.0041872686	0.0041872686	0.0041872686	0.0167510731	0.0167510731
3	0.0041817017	0.0032797517	0.0030691885	0.0030691885	0.0046485153	0.0046485153	0.0046485153	0.0073497934	0.0073497934	0.0073497934	0.0073497934	0.0073497934	0.0165479051	0.0165479051
4	0.0053114356	0.0057247729	0.0048082254	0.0048082254	0.0039844417	0.0039844417	0.0039844417	0.0084039684	0.0084039684	0.0084039684	0.0084039684	0.0084039684	0.0195836328	0.0195836328
5	0.0140963815	0.0151258840	0.0143177758	0.0143177758	0.0082534864	0.0082534864	0.0082534864	0.0153176438	0.0153176438	0.0153176438	0.0153176438	0.0153176438	0.0258467673	0.0258467673
6	0.0292719118	0.0316782840	0.0354335195	0.0354335195	0.0293141068	0.0293141068	0.0293141068	0.0299744215	0.0299744215	0.0299744215	0.0299744215	0.0299744215	0.0344245647	0.0344245647
7	0.0397598694	0.0468485516	0.0516314034	0.0516314034	0.0496157860	0.0496157860	0.0496157860	0.0557776279	0.0557776279	0.0557776279	0.0557776279	0.0557776279	0.0440469233	0.0440469233
8	0.0448183995	0.0633910409	0.0636260878	0.0636260878	0.0768428043	0.0768428043	0.0768428043	0.0778885464	0.0778885464	0.0778885464	0.0778885464	0.0778885464	0.0512793380	0.0512793380
9	0.0370114322	0.0460357746	0.0558633273	0.0558633273	0.1049236315	0.1049236315	0.1049236315	0.0853025536	0.0853025536	0.0853025536	0.0853025536	0.0853025536	0.0568238265	0.0568238265
10	0.0418989849	0.0427840868	0.0547852386	0.0547852386	0.1065363817	0.1065363817	0.1065363817	0.0879727734	0.0879727734	0.0879727734	0.0879727734	0.0879727734	0.0599756501	0.0599756501
11	0.0509391967	0.0444183487	0.0568454275	0.0568454275	0.1186794422	0.1186794422	0.1186794422	0.0886336394	0.0886336394	0.0886336394	0.0886336394	0.0886336394	0.0633505956	0.0633505956
12	0.0563855259	0.0512966366	0.0618918527	0.0618918527	0.1154539418	0.1154539418	0.1154539418	0.0859045570	0.0859045570	0.0859045570	0.0859045570	0.0859045570	0.0635864154	0.0635864154
13	0.0638721209	0.0537246907	0.0610818211	0.0610818211	0.0999905132	0.0999905132	0.0999905132	0.0858537212	0.0858537212	0.0858537212	0.0858537212	0.0858537212	0.0644099711	0.0644099711
14	0.0708697265	0.0545001954	0.0632013074	0.0632013074	0.0864244379	0.0864244379	0.0864244379	0.0852196109	0.0852196109	0.0852196109	0.0852196109	0.0852196109	0.0637040231	0.0637040231
15	0.0774626513	0.0656899700	0.0681384267	0.0681384267	0.0592922873	0.0592922873	0.0592922873	0.0774551039	0.0774551039	0.0774551039	0.0774551039	0.0774551039	0.0609657913	0.0609657913
16	0.0849155229	0.0775959037	0.0765115831	0.0765115831	0.0295038421	0.0295038421	0.0295038421	0.0663381066	0.0663381066	0.0663381066	0.0663381066	0.0663381066	0.0570058311	0.0570058311
17	0.0916096179	0.0871890696	0.0796014405	0.0796014405	0.0317806660	0.0317806660	0.0317806660	0.0433522764	0.0433522764	0.0433522764	0.0433522764	0.0433522764	0.0517440242	0.0517440242
18	0.0855899909	0.0856725476	0.0737419189	0.0737419189	0.0184043260	0.0184043260	0.0184043260	0.0290727541	0.0290727541	0.0290727541	0.0290727541	0.0290727541	0.0467760851	0.0467760851
19	0.0685259502	0.0656330958	0.0545272751	0.0545272751	0.0120481928	0.0120481928	0.0120481928	0.0187744815	0.0187744815	0.0187744815	0.0187744815	0.0187744815	0.0413186686	0.0413186686
20	0.0503659899	0.0457301992	0.0390975413	0.0390975413	0.0118584575	0.0118584575	0.0118584575	0.0129711680	0.0129711680	0.0129711680	0.0129711680	0.0129711680	0.0364127078	0.0364127078
21	0.0353421239	0.0400621944	0.0294058171	0.0294058171	0.0096765013	0.0096765013	0.0096765013	0.0106166656	0.0106166656	0.0106166656	0.0106166656	0.0106166656	0.0318882915	0.0318882915
22	0.0217853168	0.0289018238	0.0218457686	0.0218457686	0.0061663979	0.0061663979	0.0061663979	0.0079972816	0.0079972816	0.0079972816	0.0079972816	0.0079972816	0.0290264055	0.0290264055
23	0.0119380838	0.0205028665	0.0136731866	0.0136731866	0.0048382506	0.0048382506	0.0048382506	0.0061564888	0.0061564888	0.0061564888	0.0061564888	0.0061564888	0.0255574344	0.0255574344
24	0.0061882440	0.0127827290	0.0079763402	0.0079763402	0.0035101034	0.0035101034	0.0035101034	0.0050809093	0.0050809093	0.0050809093	0.0050809093	0.0050809093	0.0225579868	0.0225579868

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Indiana Default Hourly Distribution Factors for Road Type 4 –Urban Restricted Access:

Hour	Source Types													
	11	21	31	32	41	42	43	51	52	53	54	61	62	
1	0.0114838630	0.0104500369	0.0090397680	0.0090397680	0.0186488577	0.0186488577	0.0186488577	0.0090968023	0.0090968023	0.0090968023	0.0090968023	0.0194173119	0.0194173119	
2	0.0071800855	0.0062500477	0.0056304309	0.0056304309	0.0163411464	0.0163411464	0.0163411464	0.0080102618	0.0080102618	0.0080102618	0.0080102618	0.0198708197	0.0198708197	
3	0.0063691205	0.0049689741	0.0046493622	0.0046493622	0.0157775876	0.0157775876	0.0157775876	0.0078361983	0.0078361983	0.0078361983	0.0078361983	0.0186489893	0.0186489893	
4	0.0073777516	0.0058427101	0.0058801326	0.0058801326	0.0161766037	0.0161766037	0.0161766037	0.0086827231	0.0086827231	0.0086827231	0.0086827231	0.0198231326	0.0198231326	
5	0.0108139353	0.0098545059	0.0108999000	0.0108999000	0.0221330492	0.0221330492	0.0221330492	0.0117453229	0.0117453229	0.0117453229	0.0117453229	0.0232515449	0.0232515449	
6	0.0235457656	0.0231603609	0.0263517526	0.0263517526	0.0299755654	0.0299755654	0.0299755654	0.0204013312	0.0204013312	0.0204013312	0.0204013312	0.0294638153	0.0294638153	
7	0.0461747881	0.0495085217	0.0542414568	0.0542414568	0.0393812372	0.0393812372	0.0393812372	0.0435263184	0.0435263184	0.0435263184	0.0435263184	0.0375553768	0.0375553768	
8	0.0567226756	0.0788353145	0.0674512195	0.0674512195	0.0503870867	0.0503870867	0.0503870867	0.0659533819	0.0659533819	0.0659533819	0.0659533819	0.0446175773	0.0446175773	
9	0.0493171440	0.0638279223	0.0614111771	0.0614111771	0.0589556475	0.0589556475	0.0589556475	0.0756333178	0.0756333178	0.0756333178	0.0756333178	0.0515843704	0.0515843704	
10	0.0406144957	0.0466481655	0.0536303211	0.0536303211	0.0581555587	0.0581555587	0.0581555587	0.0790728466	0.0790728466	0.0790728466	0.0790728466	0.0553194565	0.0553194565	
11	0.0415130748	0.0428102606	0.0512594850	0.0512594850	0.0616027281	0.0616027281	0.0616027281	0.0824723032	0.0824723032	0.0824723032	0.0824723032	0.0583081277	0.0583081277	
12	0.0465166969	0.0452333632	0.0529793024	0.0529793024	0.0644246353	0.0644246353	0.0644246353	0.0820640679	0.0820640679	0.0820640679	0.0820640679	0.0589378233	0.0589378233	
13	0.0517959830	0.0478487216	0.0547982766	0.0547982766	0.0637644078	0.0637644078	0.0637644078	0.0808088903	0.0808088903	0.0808088903	0.0808088903	0.0575925555	0.0575925555	
14	0.0566713893	0.0502151226	0.0576880799	0.0576880799	0.0625591325	0.0625591325	0.0625591325	0.0811795580	0.0811795580	0.0811795580	0.0811795580	0.0571667797	0.0571667797	
15	0.0671882913	0.0580384620	0.0656779676	0.0656779676	0.0619482678	0.0619482678	0.0619482678	0.0795090490	0.0795090490	0.0795090490	0.0795090490	0.0573429674	0.0573429674	
16	0.0810035452	0.0715596945	0.0786905659	0.0786905659	0.0609466141	0.0609466141	0.0609466141	0.0727723312	0.0727723312	0.0727723312	0.0727723312	0.0567213465	0.0567213465	
17	0.0863864724	0.0838541123	0.0821371575	0.0821371575	0.0577256909	0.0577256909	0.0577256909	0.0563364761	0.0563364761	0.0563364761	0.0563364761	0.0551911545	0.0551911545	
18	0.0843264717	0.0874512168	0.0756929494	0.0756929494	0.0510164625	0.0510164625	0.0510164625	0.0371719560	0.0371719560	0.0371719560	0.0371719560	0.0531125437	0.0531125437	
19	0.0645951265	0.0604364374	0.0543673700	0.0543673700	0.0450990958	0.0450990958	0.0450990958	0.0249336618	0.0249336618	0.0249336618	0.0249336618	0.0487199307	0.0487199307	
20	0.0469536991	0.0424749554	0.0373951308	0.0373951308	0.0384927066	0.0384927066	0.0384927066	0.0188134711	0.0188134711	0.0188134711	0.0188134711	0.0432101938	0.0432101938	
21	0.0373781148	0.0353280630	0.0293181427	0.0293181427	0.0322318571	0.0322318571	0.0322318571	0.0162446774	0.0162446774	0.0162446774	0.0162446774	0.0390319248	0.0390319248	
22	0.0316564842	0.0313403787	0.0249971308	0.0249971308	0.0282046747	0.0282046747	0.0282046747	0.0142456600	0.0142456600	0.0142456600	0.0142456600	0.0355118446	0.0355118446	
23	0.0245992722	0.0251562568	0.0203505544	0.0203505544	0.0242700475	0.0242700475	0.0242700475	0.0124474209	0.0124474209	0.0124474209	0.0124474209	0.0317711657	0.0317711657	
24	0.0198157539	0.0189063955	0.0154623663	0.0154623663	0.0217813392	0.0217813392	0.0217813392	0.0110419727	0.0110419727	0.0110419727	0.0110419727	0.0278292477	0.0278292477	

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

Indiana Default Hourly Distribution Factors for Road Type 5 –Urban Unrestricted Access:

Hour	Source Types													
	11	21	31	32	41	42	43	51	52	53	54	61	62	
1	0.0092279794	0.0085268711	0.0060669694	0.0060669694	0.0126828270	0.0126828270	0.0126828270	0.0037158531	0.0037158531	0.0037158531	0.0037158531	0.0106396358	0.0106396358	
2	0.0055316691	0.0048527626	0.0037675180	0.0037675180	0.0099485186	0.0099485186	0.0099485186	0.0038117041	0.0038117041	0.0038117041	0.0038117041	0.0124309233	0.0124309233	
3	0.0047273286	0.0037895145	0.0033129405	0.0033129405	0.0069482800	0.0069482800	0.0069482800	0.0044165887	0.0044165887	0.0044165887	0.0044165887	0.0121505035	0.0121505035	
4	0.0047017359	0.0044201159	0.0042394230	0.0042394230	0.0113599945	0.0113599945	0.0113599945	0.0056282193	0.0056282193	0.0056282193	0.0056282193	0.0144699998	0.0144699998	
5	0.0081858928	0.0079416389	0.0087215410	0.0087215410	0.0153898606	0.0153898606	0.0153898606	0.0086545038	0.0086545038	0.0086545038	0.0086545038	0.0210508569	0.0210508569	
6	0.0225361588	0.0203863353	0.0238668712	0.0238668712	0.0256929528	0.0256929528	0.0256929528	0.0191822890	0.0191822890	0.0191822890	0.0191822890	0.0299165403	0.0299165403	
7	0.0435184779	0.0478282898	0.0541952158	0.0541952158	0.0448331117	0.0448331117	0.0448331117	0.0418068371	0.0418068371	0.0418068371	0.0418068371	0.0436775030	0.0436775030	
8	0.0602121997	0.0721456866	0.0675347974	0.0675347974	0.0691895946	0.0691895946	0.0691895946	0.0731482386	0.0731482386	0.0731482386	0.0731482386	0.0588646976	0.0588646976	
9	0.0558311148	0.0567013867	0.0643660182	0.0643660182	0.0747059425	0.0747059425	0.0747059425	0.0880926125	0.0880926125	0.0880926125	0.0880926125	0.0640862836	0.0640862836	
10	0.0485821670	0.0466493163	0.0603283916	0.0603283916	0.0803995772	0.0803995772	0.0803995772	0.0921313810	0.0921313810	0.0921313810	0.0921313810	0.0680944168	0.0680944168	
11	0.0495985610	0.0468148434	0.0590657789	0.0590657789	0.0774061573	0.0774061573	0.0774061573	0.0943973720	0.0943973720	0.0943973720	0.0943973720	0.0703404942	0.0703404942	
12	0.0573056055	0.0516032787	0.0615645883	0.0615645883	0.0753332651	0.0753332651	0.0753332651	0.0911430924	0.0911430924	0.0911430924	0.0911430924	0.0698309800	0.0698309800	
13	0.0607752380	0.0555323143	0.0626732860	0.0626732860	0.0739763390	0.0739763390	0.0739763390	0.0895629476	0.0895629476	0.0895629476	0.0895629476	0.0685413889	0.0685413889	
14	0.0609214817	0.0562211160	0.0629887267	0.0629887267	0.0779993863	0.0779993863	0.0779993863	0.0912650000	0.0912650000	0.0912650000	0.0912650000	0.0671175363	0.0671175363	
15	0.0649907135	0.0607579027	0.0667909366	0.0667909366	0.0761037810	0.0761037810	0.0761037810	0.0905726397	0.0905726397	0.0905726397	0.0905726397	0.0651260461	0.0651260461	
16	0.0724418316	0.0715477952	0.0751900074	0.0751900074	0.0728035185	0.0728035185	0.0728035185	0.0775387708	0.0775387708	0.0775387708	0.0775387708	0.0605241028	0.0605241028	
17	0.0773519648	0.0803647101	0.0757034489	0.0757034489	0.0526405510	0.0526405510	0.0526405510	0.0464337395	0.0464337395	0.0464337395	0.0464337395	0.0557685235	0.0557685235	
18	0.0770777578	0.0832250581	0.0684911688	0.0684911688	0.0347686748	0.0347686748	0.0347686748	0.0260342365	0.0260342365	0.0260342365	0.0260342365	0.0506461891	0.0506461891	
19	0.0635977420	0.0637849687	0.0526386278	0.0526386278	0.0285090860	0.0285090860	0.0285090860	0.0173341336	0.0173341336	0.0173341336	0.0173341336	0.0402747366	0.0402747366	
20	0.0483079600	0.0462284324	0.0372839274	0.0372839274	0.0220585728	0.0220585728	0.0220585728	0.0112536468	0.0112536468	0.0112536468	0.0112536468	0.0310667712	0.0310667712	
21	0.0383158572	0.0386568197	0.0292289942	0.0292289942	0.0174082029	0.0174082029	0.0174082029	0.0076615624	0.0076615624	0.0076615624	0.0076615624	0.0268533367	0.0268533367	
22	0.0305027859	0.0325107627	0.0236169348	0.0236169348	0.0137124544	0.0137124544	0.0137124544	0.0062358957	0.0062358957	0.0062358957	0.0062358957	0.0231915644	0.0231915644	
23	0.0214502991	0.0236017051	0.0170601049	0.0170601049	0.0139442910	0.0139442910	0.0139442910	0.0053276381	0.0053276381	0.0053276381	0.0053276381	0.0193751364	0.0193751364	
24	0.0145073780	0.0159083752	0.0113147831	0.0113147831	0.0121850602	0.0121850602	0.0121850602	0.0046510979	0.0046510979	0.0046510979	0.0046510979	0.0159618330	0.0159618330	

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

## Appendix G

### *Indiana Default Daily Distribution Factors:*

monthID	dayID	
	2	5
1	0.2325411725	0.7674588275
2	0.2380547378	0.7619452622
3	0.2393402049	0.7606597951
4	0.2396052454	0.7603947546
5	0.2484757701	0.7515242299
6	0.2489743665	0.7510256335
7	0.2481153021	0.7518846979
8	0.2527028648	0.7472971352
9	0.2496078420	0.7503921580
10	0.2462808693	0.7537191307
11	0.2439742406	0.7560257594
12	0.2258784720	0.7741215280

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

## Appendix H

### *Indiana Default Monthly Distribution Factors:*

monthID	monthVMTFraction
1	0.0733424010
2	0.0693661929
3	0.0827036024
4	0.0831789580
5	0.0891346903
6	0.0888150873
7	0.0907968617
8	0.0918542094
9	0.0854175366
10	0.0875162272
11	0.0812354405
12	0.0766387926

Source: Statewide averages developed from Indiana Department of Transportation traffic count data.

## Appendix I

### *Vanderburgh and Warrick Counties Ramp Fractions:*

<b>Road Type</b>	<b>Ramp Fraction</b>
2	2%
4	13%

Source: Analysis of VHT from the Evansville MPO travel demand model.

## Appendix B

Combined Meeting Minutes for the  
1997 8-Hour Ozone Standard for  
Vanderburgh and Warrick Counties,  
Indiana, and the 1997 Annual Fine  
Particles Standard for the  
Southwestern Indiana Area  
Interagency Consultation Group  
Meeting Minutes/Summary

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## **Interagency Consultation Group (ICG) Conference Call Minutes**

### **For the MOBILE6.0 to MOVES MVEB Replacement Update Related to the 1997 8-Hour Ozone Standard for Vanderburgh and Warrick Counties, Indiana, and the 1997 Annual Fine Particles Standard for the Southwestern Indiana Area**

#### **ICG Conference Call Date and Time**

- February 13, 2013 at 1pm Eastern Standard Time

#### **ICG Attendees**

- Shawn Seals (IDEM), Anthony Maietta (EPA), Greg Katter (INDOT), Larry Heil (FHWA), Ron Hinsenkamp (WCIEDD), Dan White (WCIEDD), Seyed Shokouhzadeh (EMPO), and Vishu Lingala (EMPO)

#### **ICG Discussion Topics and Conclusions**

1. For the Ozone MVEB Replacement submittal, various mobile source margins of safety were discussed.
  - A. After discussion, the consensus of the ICG was that as long as the a 15% mobile source margin of safety for VOC and NO<sub>x</sub> emissions does not result in an exceedance of the all sources margins of safety, it was reasonable and appropriate for inclusion in the MVEB replacement submittal.
2. For the PM<sub>2.5</sub> MVEB Replacement submittal, various mobile source margins of safety were discussed.
  - A. After discussion, the consensus of the ICG was that as long as the a 15% mobile source margin of safety for NO<sub>x</sub> and PM<sub>2.5</sub> emissions does not result in an exceedance of the all sources margins of safety, it was reasonable and appropriate for inclusion in the MVEB replacement submittal.



# Appendix C

## Southwestern Indiana Maintenance Area Public Participation Documentation

- **Legal Notice of Public Hearing**
  - **IDEM Webmaster Certification of Legal Notice Publication**
  - **Screenshot Verification of Legal Notice Posting on IDEM Website**
- **Summary of Comments and Responses Thereto**
  - **No Comments Received**

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## LEGAL NOTICE OF PUBLIC HEARING

### **Motor Vehicle Emission Budgets Replacement Update to the Maintenance Plans for the 1997 Annual Fine Particles Standard for the Southwestern Indiana Area**

Notice is hereby given under 40 CFR 51.102 that the Indiana Department of Environmental Management (IDEM) is accepting written comment and providing an opportunity for public hearing regarding the Motor Vehicle Emission Budget (MVEB) replacement update to the maintenance plan for the 1997 annual fine particles standard for Dubois, Vanderburgh, and Warrick counties, Montgomery Township in Gibson County, Ohio Township in Spencer County, and Washington Township in Pike County (herein referred to as the "Southwestern Indiana Area"). Onroad emissions for the original submittal were calculated using the United States Environmental Protection Agency's (U.S. EPA's) MOBILE6.2 mobile model and are now being replaced with U.S. EPA's recently adopted Motor Vehicle Emissions Simulator (MOVES) mobile model. All interested persons are invited and will be given reasonable opportunity to express their views concerning the submittal of the proposed MVEB replacement update to the maintenance plan for the 1997 annual fine particles standard for the Southwestern Indiana Area.

The purpose of this notice is to solicit public comment on Indiana's proposed MVEB replacement update. The Southwestern Indiana Area was designated as nonattainment for the 1997 annual fine particles standard and is subject to the requirements of Section 172 of the Clean Air Act (CAA). One of the compliance requirements mandated by Section 175A(b) of the CAA, is the development of a plan demonstrating that maintenance areas will continue to meet the 1997 annual fine particles standard for the next ten years, which includes MVEBs for onroad sources, beyond the current maintenance period. This submittal of the proposed MVEB replacement update to the *Request for Redesignation and Maintenance Plan Under the Annual National Ambient Air Quality Standard for Fine Particles* for the Southwestern Indiana Area was originally submitted on April 8, 2011 is being drafted and submitted consistent with U.S. EPA guidance. Upon completion of this public notice process, the MOBILE6.2-based to MOVES-based MVEB replacement update will be submitted to U.S. EPA for approval into the State Implementation Plan.

Copies of the draft documents will be available on or before May 22, 2013, to any person upon request and at the following locations:

- Indiana Department of Environmental Management, Office of Air Quality, Indiana Government Center North, 100 North Senate Avenue, Room N1003, Indianapolis, Indiana.
- Indiana Department of Environmental Management, Southwest Regional Office, 1120 North Vincennes Avenue, Petersburg, Indiana.

- Evansville Vanderburgh Public Library, Central Branch, 200 SE Martin Luther King Jr. Boulevard, Evansville, Indiana.
- Boonville-Warrick County Public Library, 611 West Main Street, Boonville, Indiana.
- Jasper Public Library, 1116 Main Street, Jasper, Indiana.
- Pike County Public Library, 1104 Main Street, Petersburg, Indiana.
- Spencer County Public Library, 210 Walnut Street, Rockport, Indiana.

The draft documents will also be available on the following web page:

<http://www.in.gov/idem/5474.htm>

An electronic version of all MOVES mobile model input and output files will be available at the public hearing, if held, or upon request.

Any person may submit written comments on the MVEB replacement update to the maintenance plan for the 1997 annual fine particles standard for the Southwestern Indiana Area on or before June 21, 2013. Written comments should be directed to Mr. Shawn Seals, Mail Code 61-50, Office of Air Quality, Indiana Department of Environmental Management, 100 North Senate Avenue, Indianapolis, Indiana 46204; or fax (317) 233-5967; or email at [SSeals@idem.in.gov](mailto:SSeals@idem.in.gov). Interested parties may also present oral or written comments at the public hearing, if held. Oral statements will be heard, but for the accuracy of the record, statements should be submitted in writing. Written statements may be submitted to the attendant designated to receive written comments at the public hearing.

A public hearing on the MVEB replacement update to the maintenance plan for the 1997 annual fine particles standard for the Southwestern Indiana Area will be held if a public hearing request is received by June 12, 2013. A hearing has been scheduled for June 20, 2013. The meeting will convene at 6:00 p.m. (local time) at the Evansville Vanderburgh Public Library, Central Branch, 200 SE Martin Luther King Jr. Boulevard, Evansville, Indiana, 47713. If a request for a public hearing is not received by June 12, 2013, the hearing will be cancelled. Interested parties can check the online IDEM calendar at <http://www.in.gov/idem/5390.htm> or contact Mr. Shawn Seals at (317) 233-0425, after June 12, 2013, to see if the hearing has been cancelled or will convene.

A transcript of the hearing and all written submissions provided at the public hearing shall be open to public inspection at IDEM and copies may be made available to any person upon payment of reproduction costs. Any person heard or represented at the hearing or requesting notice shall be given written notice of actions resulting from the hearing.

For additional information contact Mr. Shawn Seals, at the Indiana Department of Environmental Management, Office of Air Quality, Room N1001, Indiana Government Center North, 100 North Senate Avenue, Indianapolis, IN 46204 or call (317) 233-0425 or (800) 451-6027 ext. 3-0425 (in Indiana).

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*Individuals requiring reasonable accommodations for participation in this hearing, if held, should contact the IDEM Americans with Disabilities Act (ADA) coordinator at:*

Attn: ADA Coordinator  
Indiana Department of Environmental Management – Mail Code 50-10  
100 North Senate Avenue  
Indianapolis, IN 46204-2251

*Or call (317) 233-1785 (voice) or (317) 232-6565 (TDD). Please provide a minimum of 72 hours notification.*

**IDEM WEBMASTER CERTIFICATION OF LEGAL NOTICE PUBLICATION**

May 23, 2013

**CERTIFICATE OF PUBLICATION**

This is to certify that the Indiana Department of Environmental Management (IDEM) Notice of the opportunity for a Public Hearing regarding the following:

- Motor Vehicle Emission Budgets (MVEB) Replacement Update to the Maintenance Plans for the 1997 Annual Fine Particles Standard for the Southwestern Indiana Area.

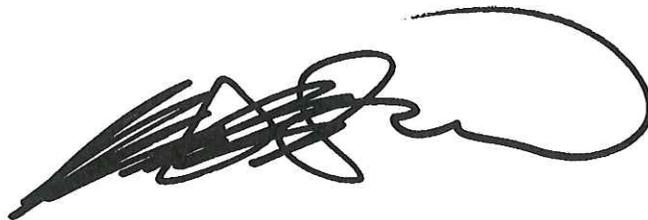
was published on IDEM's web site on May 16, 2013. It is expected that it will remain posted on the site until at least June 21, 2013.

The notice in full was available online at the following web address, under "Southwestern".

<http://www.in.gov/idem/5474.htm>

Web publication of the notice was at the request of Scott Deloney, Branch Chief, Programs Branch, Office of Air Quality, IDEM.

By:

A handwritten signature in black ink, appearing to read "Mike Finklestein", with a large, sweeping flourish extending to the right.

Mike Finklestein  
IDEM Webmaster

Attachments:

Copy of web page as published.

# SCREENSHOT VERIFICATION OF LEGAL NOTICE POSTING ON IDEM WEBSITE

The screenshot shows a Windows desktop environment. In the foreground, a 'Date and Time Properties' dialog box is open, displaying the date as May 16, 2013, and the time as 2:53:31 PM. The current time zone is Eastern Daylight Time. In the background, a Windows Internet Explorer browser window is open to the IDEM website, displaying a table of public notices. The table lists various locations and projects, including Washington (city) WWTP, Patoka Lake RWSD WWTP, Holland (town) WWTP, City of Jasper, Motor Vehicle Emission Budget Replacement Update, Princeton (city) WWTP, Gibson County Coal Mine, and Eastern Heights Utilities Water. Each entry includes details such as the project name, location, document type (e.g., NPDES Final Renewal, Solid Waste Land Application Permit), dates, and project managers.

Location	Project Name	Document Type	Start Date	End Date	Status	Project Manager
Washington (city) WWTP	Daviess	<a href="#">NPDES Final Renewal (PDF)</a>	04/18/2013	05/07/2013	Yes	Project Manager: Bill Stenner
Patoka Lake RWSD WWTP	Dubois	<a href="#">NPDES Final Renewal (PDF)</a>	04/30/2013	05/20/2013	Yes	Project Manager: John Donnellan
Holland (town) WWTP	Dubois	<a href="#">NPDES Final Renewal (PDF)</a>	04/28/2013	05/14/2013	Yes	Project Manager: Matt Cook
City of Jasper	Dubois and Pike	<a href="#">Solid Waste Land Application Permit (DOC)</a>	05/08/2013	05/07/2013	Yes	Project Manager: Brenda Stechanoff
Motor Vehicle Emission Budget Replacement Update to the Maintenance Plans for the 1997 Annual Fine Particles Standard for the Southwestern Indiana Area	Dubois, Gibson, Pike, Spencer, Vanderburgh and Warrick	<a href="#">Legal Notice and Opportunity for Public Hearing (PDF)</a>	05/22/2013	05/21/2013	Yes	Address on Notice
Princeton (city) WWTP	Gibson	<a href="#">NPDES Draft Renewal (PDF)</a>	04/18/2013	05/20/2013	Yes	Project Manager: Bill Stenner
Gibson County Coal Mine	Gibson	<a href="#">NPDES Completeness &amp; Availability of an Anticipatory Demonstration (PDF)</a>	04/05/2013	05/05/2013	Yes	Project Manager: Steve Roush
Eastern Heights Utilities Water	Greene	<a href="#">Water Well Construction</a>	04/09/2013		Yes	Address on Notice

