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June 18, 2012

Ms. Gwendolyn Keyes Fleming
Regional Administrator
U.S. EPA, Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303

RE: Revision of Existing Motor Vehicle Emissions Budget for Kentucky Portion of Cincinnati-Hamilton, OH-KY-IN, Metropolitan Statistical Area 8-Hour Ozone Maintenance Area - Transition from MOBILE6.2 Model to MOVES Model

Dear Ms. Fleming:

The Kentucky Energy and Environment Cabinet (Cabinet), pursuant to Sections 107 and 175A(b) of the Clean Air Act, hereby submits to the U.S. Environmental Protection Agency (EPA) a proposed revision to the State Implementation Plan (SIP). Specifically, the Cabinet proposes a revision to Kentucky's SIP to update the existing motor vehicle emissions budget (MVEB) for the Kentucky portion of the Cincinnati-Hamilton, OH-KY-IN, Metropolitan Statistical Area maintenance area (Boone, Campbell, and Kenton Counties) for the 8-hour ozone National Ambient Air Quality Standard. The existing MVEB using the MOBILE6.2 model will be revised with the newer MOVES model.

To expedite the review and approval of this SIP revision, the Cabinet requests EPA parallel process this submittal. One paper copy of the proposed revision is enclosed, and an electronic copy on compact disc that is identical to the paper copy. A public hearing notice, which indicates the time and location of a public hearing to receive comments on this SIP revision, is enclosed. The Cabinet's response to information received during the public comment period will be provided in a subsequent submittal.

Your prompt consideration of this request is appreciated. If you have any questions or comments concerning this matter, please contact Andrea Smith at the Division for Air Quality at (502) 564-3999.

Sincerely Yours,

Leonard K. Peters
Secretary

Enclosures
c: Beverly Banister
R. Scott Davis

REVISION OF EXISTING MOTOR VEHICLE EMISSIONS BUDGET FOR KENTUCKY PORTION OF CINCINNATI-HAMILTON, OH-KY-IN, METROPOLITAN STATISTICAL AREA 8-HOUR OZONE MAINTENANCE AREA

TRANSITION FROM MOBILE6.2 MODEL TO MOVES MODEL

Boone, Campbell, and Kenton Counties, Kentucky

Prepared by:

Kentucky Division for Air Quality

June 25, 2012

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SIP Revision of Existing Motor Vehicle Emissions Budget

Introduction

The following documentation provides to the United States Environmental Protection Agency (U.S. EPA) Kentucky's State Implementation Plan (SIP) revision for the Kentucky portion of the Cincinnati-Hamilton, OH-KY-IN, Metropolitan Statistical Area (MSA) 8-hour ozone maintenance area. Specifically, the highway mobile vehicle emissions budget (MVEB) and therefore the overall emission levels for each county have been revised. This revision incorporates the MOtor Vehicle Emission Simulator (MOVES), the latest EPA-approved motor vehicle emissions factor model used for estimating highway mobile source emissions.

The Kentucky portion of the Cincinnati-Hamilton, OH-KY-IN, MSA 8-hour ozone maintenance area includes Boone, Campbell, and Kenton Counties. Currently, the area's 8-hour ozone MVEB is based on the MOBILE6.2 model, the predecessor to the MOVES model. The purpose of this SIP revision is to update the MVEB submitted with the original SIP dated January 29, 2010, using the latest EPA-approved model, the MOVES model.

Background

In December 2009, MOVES replaced MOBILE6.2 as EPA's official motor vehicle emission factor model. The Ohio-Kentucky-Indiana (OKI) Regional Council of Governments addresses the 8-county area's highway mobile source emissions for the Ohio Environmental Protection Agency, the Kentucky Division for Air Quality, and the Indiana Department of Environmental Management. The area includes Butler, Clermont, Hamilton, and Warren Counties in Ohio; Boone, Campbell, and Kenton Counties in Kentucky; and a portion of Dearborn County in Indiana.

The Clean Air Act requires SIP emission inventories and control measures to be based on the latest applicable models available when a SIP is developed. This, in turn, would result in SIP emission inventories represented with the latest data available. The MVEB may also be updated with the MOVES model based on anticipated transportation conformity determinations in the future.

In February 2012, the U.S. EPA approved the Kentucky Division for Air Quality's request to redesignate the Kentucky portion of the Cincinnati-Hamilton, OH-KY-IN 1997 Annual Fine Particulate Matter ($PM_{2.5}$) nonattainment area to attainment. This $PM_{2.5}$ redesignation request included a MVEB using the MOVES model. As stated above, the MOBILE6.2 model is used for the area's 8-hour ozone MVEB. Since two models are currently being used for the northern Kentucky area (MOBILE6.2 for ozone, MOVES for $PM_{2.5}$), OKI has requested to have the

ozone MVEB updated with the MOVES model. With this action, only one model will be used for both ozone and $PM_{2.5}$.

Emission Calculations

The Kentucky portion of the Cincinnati-Hamilton, OH-KY-IN, MSA 8-hour ozone maintenance area was designated to attainment in 2010. No changes were made in any emission calculations with the exception of the revision to the highway mobile source emissions. This revision has been made with the transition from a MVEB using MOBILE6.2 to a MVEB using MOVES.

Emission Sources: General

The emissions inventory is broken down into four (4) components: point, area, highway mobile, and non-highway mobile sources. This SIP revision involves the highway mobile source component and overall emission totals. A brief description follows.

Highway Mobile Sources

Highway mobile sources are defined as motorized vehicles normally operated on public roadways to provide transportation. They include standard automobiles, pickup trucks, trucks with two or more axles, multi-unit trucks, and motorcycles. Highway mobile emissions have been calculated using the MOVES model.

Description of Modeling Used

MOVES replaced MOBILE6.2 as EPA's official motor vehicle emission factor model in December 2009. The version of the MOVES model used is MOVES2010a. Predecessors of the model include MOVES2004, MOVESDemo, DraftMOVES2009, and MOVES2010. The MOVES model is the most-advanced motor vehicle emission factor model that provides a wide variety of applications for obtaining accurate motor vehicle emission estimates.

The release of the MOVES2010 model was announced in a Federal Register by EPA on March 2, 2010 (75 FR 9411). With this announcement came a two-year grace period of the requirement to use MOVES2010 for regional conformity analyses.

Following the official release of EPA's MOVES2010 model, a minor revision was made to enhance model performance. As a result, the MOVES2010a model was officially released by EPA on September 8, 2010.

A subsequent Federal Register by EPA announced a one-year extension to the two-year grace period of the requirement to use MOVES2010 for regional conformity analyses. The date of this

Federal Register is February 27, 2012 (77 FR 11394). Therefore, the MOVES model is required for any regional conformity analyses beginning after March 2, 2013.

Technical Information Supporting Proposed Revision

Technical information supporting this proposed SIP revision include the two Federal Registers mentioned above, 75 FR 9411 and 77 FR 11394. The U.S. EPA guidance document titled, "Policy Guidance on the Use of MOVES2010 for State Implementation Plan Development, Transportation Conformity, and Other Purposes" (EPA-420-B-09-046, December 2009), was also used for this SIP revision proposal.

Planning Assumptions

OKI calculated the emissions for Boone, Campbell, and Kenton Counties in Kentucky. Vehicle miles traveled and vehicle hours were estimated using the OKI Travel Demand Model Version 7.6. This model includes CUBE Voyager programs and a series of FORTRAN programs written by OKI. It uses the standard 4 phase sequential modeling approach of trip generation, distribution, modal choice, and assignment.

The travel demand model uses demographic and land use data and capacity and free-flow speed characteristics for each roadway segment in the network to produce a "loaded" highway network with forecasted traffic volumes with revised speeds based on specified speed/capacity relationships.

Travel analysis zones are the basic geographic unit for estimating travel in the OKI model. The OKI region consists of 1,608 traffic analysis zones, allowing for both detail and manageability. A variety of socioeconomic data items are used in the OKI transportation planning process. These data are used primarily to forecast future travel patterns by serving as independent variables in OKI trip generation equations. Planning data categories include population, households, household vehicles, employment (by employment category and zone of work), labor force participation by zone of residence, and area type.

OKI uses both base year and future year data in the planning process. The years are 2005, 2010, 2020, and 2030. Planning data, maintained at the Traffic Analysis Zone level, originate in the 2000 Census of Population and Housing. Base year 2005 and future year data for each variable are developed through various methods. All of the variables represent the latest OKI planning assumptions (See Appendix A).

Input Data

For the MOVES RunSpec file, the following settings were used as part of input data for the MOVES model.

MOVES RunSpec Settings: Input Data

MOVES RunSpec Parameter	Settings
MOVES 2010a, default database 20100829	
Scale	County, Emission Rates
Time Span	Time Aggregation = Hour July weekday, July meteorological data All hours of the day selected Weekdays only
Geographic Bounds	Two Custom Domains: 1) 4 Ohio counties and Lawrenceburg, IN 2) 3 Kentucky counties
Vehicles/Equipment	All source types, gasoline and diesel
Road Type	All road types including off-network
Pollutants and Processes	All ozone categories, Total Energy Consumption
Strategies	Modified AVFT strategy file to reflect 0% CNG buses in the transit fleet
General Output	Units = grams, joules, and miles
Output Emissions	Time = hour, Location = county, on-road emission rates by road type and source use type
Advanced Performance	None

For the MOVES County Data Manager, the following data source specifications were included as part of input data for the MOVES model.

MOVES County Data Manager: Input Data

MOVES County Data Manager	Data Source
Source Type Population	Local and default. Local data from KYTC (2011) and ODOT (2010) from motor vehicle registration data. Default data used for source types 41, 61, and 62.
Vehicle Type VMT	Local and default. HPMSVTypeYear VMT = daily VMT from OKI travel demand model with EPA's daily to annual VMT converter applied. monthVMTFraction = default, dayVMTFraction = default, hourVMTFraction = local
I/M Programs	Default modified to reflect discontinued I/M program in 2006
Fuel Formulation	Modified to reflect low RVP fuel program in Southwest Ohio
Fuel Supply	Default
Meteorology Data	Local. MOBILE6 converted values for Ohio and Kentucky values from Kentucky Division for Air Quality.
Ramp Fraction	Local. OKI travel demand model.
Road Type Distribution	Local. OKI travel demand model.
Age Distribution	Local and default. Local data from KYTC (2011) and ODOT (2010) from motor vehicle registration data. Default data used for source types 41, 61, and 62.
Average Speed Distribution	Local. OKI travel demand model.

Output Data

OKI's post-processing program, IMPACT, was used as part of the MOVES post-processing procedures to obtain the MOVES emission results. The IMPACT program calculated the appropriate totals by area and roadway type. Summertime traffic volumes were also determined through seasonal conversion factors, as developed by OKI.

Discussion of Results

With the transition from a MOBILE6.2 MVEB to a MOVES MVEB, below are emission comparison summary tables for both VOC (page 7) and NOx (page 8). These summary tables show the difference between the MVEBs and show the difference between the overall emissions.

VOC Emissions Inventory: MOBILE6.2 Budget Versus MOVES Budget

Northern Kentucky (all emissions reported in tons per day)

BOONE COUNTY

VOC	USING MOBILE6.2 MODEL				USING MOVES MODEL			
Sector	2005	2008	2015	2020	2005	2008	2015	2020
Point	2.57	2.81	3.04	3.20	2.57	2.81	3.04	3.20
Area	8.13	8.41	8.50	8.50	8.13	8.41	8.50	8.50
Non-Hwy	5.43	5.07	4.55	4.36	5.43	5.07	4.55	4.36
Mobile	4.33	4.00	3.17	2.96	9.71	6.37	3.50	2.27
TOTAL	**20.46**	**20.29**	**19.26**	**19.02**	**25.84**	**22.66**	**19.59**	**18.33**

CAMPBELL COUNTY

VOC	USING MOBILE6.2 MODEL				USING MOVES MODEL			
Sector	2005	2008	2015	2020	2005	2008	2015	2020
Point	0.25	0.28	0.30	0.31	0.25	0.28	0.30	0.31
Area	4.77	4.34	4.20	4.20	4.77	4.34	4.20	4.20
Non-Hwy	1.76	1.51	1.29	1.22	1.76	1.51	1.29	1.22
Mobile	2.52	2.29	1.74	1.55	5.62	3.69	2.03	1.31
TOTAL	**9.30**	**8.42**	**7.53**	**7.28**	**12.40**	**9.82**	**7.82**	**7.04**

KENTON COUNTY

VOC	USING MOBILE6.2 MODEL				USING MOVES MODEL			
Sector	2005	2008	2015	2020	2005	2008	2015	2020
Point	1.20	1.17	1.31	1.42	1.20	1.17	1.31	1.42
Area	8.53	7.88	7.66	7.66	8.53	7.88	7.66	7.66
Non-Hwy	2.33	1.95	1.76	1.73	2.33	1.95	1.76	1.73
Mobile	4.32	3.85	2.85	2.56	9.87	6.47	3.56	2.31
TOTAL	**16.38**	**14.85**	**13.58**	**13.37**	**21.93**	**17.47**	**14.29**	**13.12**

NORTHERN KENTUCKY

VOC	USING MOBILE6.2 MODEL				USING MOVES MODEL			
Sector	2005	2008	2015	2020	2005	2008	2015	2020
Point	4.02	4.26	4.65	4.93	4.02	4.26	4.65	4.93
Area	21.43	20.63	20.36	20.36	21.43	20.63	20.36	20.36
Non-Hwy	9.52	8.53	7.60	7.31	9.52	8.53	7.60	7.31
Mobile	11.17	10.14	7.76	7.07	25.20	16.53	9.09	5.89
TOTAL	**46.14**	**43.56**	**40.37**	**39.67**	**60.17**	**49.95**	**41.70**	**38.49**

VOC EMISSIONS INVENTORY DIFFERENCE FROM MOBILE6.2

Year	Boone	Campbell	Kenton	TOTAL
2005	5.38	3.10	5.55	**14.03**
2008	2.37	1.40	2.62	**6.39**
2015	0.33	0.29	0.71	**1.33**
2020	-0.69	-0.24	-0.25	**-1.18**

NOx Emissions Inventory: MOBILE6.2 Budget Versus MOVES Budget

Northern Kentucky (all emissions reported in tons per day)

BOONE COUNTY

NOx	USING MOBILE6.2 MODEL				USING MOVES MODEL			
Sector	2005	2008	2015	2020	2005	2008	2015	2020
Point	23.94	23.27	25.08	26.47	23.94	23.27	25.08	26.47
Area	4.99	5.02	5.03	5.03	4.99	5.02	5.03	5.03
Non-Hwy	12.96	11.02	9.77	9.48	12.96	11.02	9.77	9.48
Mobile	10.27	8.53	4.63	3.45	30.88	21.32	12.16	7.22
TOTAL	**52.16**	**47.84**	**44.51**	**44.43**	**72.77**	**60.63**	**52.04**	**48.20**

CAMPBELL COUNTY

NOx	USING MOBILE6.2 MODEL				USING MOVES MODEL			
Sector	2005	2008	2015	2020	2005	2008	2015	2020
Point	0.00	0.02	0.02	0.03	0.00	0.02	0.02	0.03
Area	1.41	1.32	1.30	1.30	1.41	1.32	1.30	1.30
Non-Hwy	6.33	5.34	4.57	4.34	6.33	5.34	4.57	4.34
Mobile	5.98	4.88	2.54	1.81	17.87	12.34	7.04	4.18
TOTAL	**13.72**	**11.56**	**8.43**	**7.48**	**25.61**	**19.02**	**12.93**	**9.85**

KENTON COUNTY

NOx	USING MOBILE6.2 MODEL				USING MOVES MODEL			
Sector	2005	2008	2015	2020	2005	2008	2015	2020
Point	0.04	0.03	0.03	0.03	0.04	0.03	0.03	0.03
Area	4.17	4.06	4.02	4.02	4.17	4.06	4.02	4.02
Non-Hwy	8.43	7.33	6.15	5.75	8.43	7.33	6.15	5.75
Mobile	10.39	8.37	4.23	3.01	31.40	21.68	12.36	7.34
TOTAL	**23.03**	**19.79**	**14.43**	**12.81**	**44.04**	**33.10**	**22.56**	**17.14**

NORTHERN KENTUCKY

NOx	USING MOBILE6.2 MODEL				USING MOVES MODEL			
Sector	2005	2008	2015	2020	2005	2008	2015	2020
Point	23.98	23.32	25.13	26.53	23.98	23.32	25.13	26.53
Area	10.57	10.40	10.35	10.35	10.57	10.40	10.35	10.35
Non-Hwy	27.72	23.69	20.49	19.57	27.72	23.69	20.49	19.57
Mobile	26.64	21.78	11.40	8.27	80.15	55.34	31.56	18.74
TOTAL	**88.91**	**79.19**	**67.37**	**64.72**	**142.42**	**112.75**	**87.53**	**75.19**

NOx EMISSIONS INVENTORY DIFFERENCE FROM MOBILE6.2

Year	Boone	Campbell	Kenton	TOTAL
2005	20.61	11.89	21.01	**53.51**
2008	12.79	7.46	13.31	**33.56**
2015	7.53	4.50	8.13	**20.16**
2020	3.77	2.37	4.33	**10.47**

Budgets and Safety Margins

Although the highway mobile source emissions increased from the original MOBILE6.2 MVEB, the revised data should not influence the ozone attainment status for Boone, Campbell, and Kenton Counties. The point, area, and non-highway sectors of the SIP emissions inventory are not affected. The only affected portions are the highway mobile source sector and the overall totals. The change in the data only concerns the transition from the MOBILE6.2 MVEB to the MOVES MVEB.

The following table summarizes the new MVEBs for VOC and NOx, using the MOVES model. Safety margins for 2015 and 2020 are also included.

TABLE 1
KENTUCKY PORTION OF THE CINCINNATI-HAMILTON, OH-KY-IN, MSA
8-HOUR OZONE MAINTENANCE AREA
MOBILE BUDGETS AND SAFETY MARGINS
(TONS PER DAY)

Mobile	**2005**	**2008**	**2015**	**2020**
VOC	25.20	16.53	9.09	5.89
NOx	80.15	55.34	31.56	18.74
Safety Margin				
VOC	N/A	N/A	2.06	2.87
NOx	N/A	N/A	6.31	9.39
Budgets with Margins				
VOC	N/A	N/A	11.15	8.76
NOx	N/A	N/A	37.87	28.13

There is a 25% safety margin for 2015 and 2020, for both VOC and NOx. This amount is based on a request by the Kentucky Transportation Cabinet. The safety margin is due to the variability of data sources and the potential inconsistency of the values, from a variety of parameters. The first parameter involves VIN data, the second parameter involves the Transportation Travel Model. Due to continuous updates of the model, emission outcome percentages can vary. Data includes speeds, employment, population, and household data. And the third parameter involves local road vehicle miles traveled (VMT), which are based on estimates.

Safety margins were calculated in two steps using the following formulas. For the 2015 safety margin,

Step #1 (2015 VOC Total – 2008 VOC Total) x 25% = 2015 Safety Margin

Step #2 2015 VOC Mobile + 2015 Safety Margin = **2015 VOC Budget with Margin**

The same approach was taken for calculating the 2015 "NOx Budget with Margin."

For the 2020 safety margin, the formula in Step #1 was slightly modified. This time, the formula was associated with the 2020 VOC Total.

Step #1 (2020 VOC Total – 2008 VOC Total) x 25% = 2020 Safety Margin

Step #2 2020 VOC Mobile + 2020 Safety Margin = **2020 VOC Budget with Margin**

The same approach was taken for calculating the 2020 "NOx Budget with Margin."

Summary

The addition of the safety margin to the 2015 and 2020 mobile emissions must ensure that the total emissions from all sectors do not exceed the emissions in the attainment year 2008. The safety margin amounts added will not cause the projected emissions in 2015 and 2020 to exceed the emissions for the year 2008.

The mobile budgets included in Table 1 above will apply to future transportation conformity determinations.

Public Hearing

A public hearing to receive comments on this SIP revision will be scheduled should a request for a public hearing be received. If no request is received, then the hearing shall be cancelled. Comments and their responses from the 30-day public hearing comment period will be included as part of the statement of consideration in a subsequent submittal to EPA. See Appendix B.

APPENDIX A

Mobile Source Emissions Inventory

for Cincinnati Ozone Maintenance

Area – MOVES Emissions Model

April 2012

OKI Regional Council of Governments

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Mobile Source Emissions Inventory for Cincinnati Ozone Maintenance Area – MOVES emissions model

Includes a portion of Dearborn County, Indiana, the counties of Boone, Campbell, Kenton in Kentucky, and the counties of Butler, Clermont, Clinton, Hamilton, and Warren in Ohio. Emission estimates for the Year 2005, 2008, 2015, 2020, and 2030 developed in support of revision to Ozone State Implementation Plan

April 2012

Prepared for the Indiana Department of Environmental Management, the Kentucky Division for Air Quality and the Ohio Environmental Protection Agency by

OKI Regional Council of Governments

Ohio · Kentucky · Indiana
Regional Council of Governments

Acknowledgments

Title	Mobile Source Emissions Inventory for Cincinnati Ozone Maintenance Area
Abstract	This report was prepared for the Indiana Department of Environmental Management, the Kentucky Division for Air Quality and the Ohio Environmental Protection Agency. The Cincinnati Ozone Maintenance area includes a portion of Dearborn County Indiana, the counties of Boone, Campbell, Kenton in Kentucky, and the counties of Butler, Clermont, Clinton, Hamilton, and Warren in Ohio. Clinton County is outside of OKI's MPO area with emission estimates prepared by the Ohio Department of Transportation. This report includes emission estimates for the years 2005, 2008, 2015, 2020 and 2030 was generated to support a revision to the SIPs for the 8-hour Ozone standard. EPA's Motor Vehicle Emission Simulation (MOVES) 2010 was used to generate the emission rates.
Date	April 2012
Agency	Ohio-Kentucky-Indiana Regional Council of Governments Mark Policinski, Executive Director Robert Koehler, P.E., Deputy Director
Project Manager	Andrew J. Reser, AICP
Project Staff	Harikishan Perugu, PTP Larry Buckler

The preparation of this document was financed cooperatively by the Federal Highway Administration, the Federal Transit Administration, the Commonwealth of Kentucky Transportation Cabinet, the Ohio Department of Transportation, and the units of local and county government in the OKI region. The opinions, findings, and conclusions expressed in this document are those of the OKI Regional Council of Governments and are not necessarily those of the U.S. Department of Transportation. This report does not constitute a standard, specification, or regulation.

MOBILE Source Emissions Inventory for the Cincinnati Ozone Maintenance area

This report was prepared for the Indiana Department of Environmental Management, the Kentucky Division for Air Quality and the Ohio Environmental Protection Agency. The Cincinnati Ozone Maintenance area includes a portion of Dearborn County Indiana, the counties of Boone, Campbell, Kenton in Kentucky, and the counties of Butler, Clermont, Clinton, Hamilton, and Warren in Ohio. Clinton County Ohio is outside OKI's MPO boundaries. The Ohio Department of Transportation prepares emission estimates for Clinton County. This report includes emission estimates for the years 2005, 2008, 2015, 2020 and 2030 generated to support the SIPs for the 8-hour ozone standard. EPA's Motor Vehicle Emissions Simulator (MOVES) 2010 model was used to generate the vehicle emission rates. In December 2009, MOVES replaced MOBILE6.2 as the EPA's official emission factor model. The OKI travel demand model version 7.6 was used to generate VMT and speed estimates. MOVES emission rates were generated for VOC's, and NO_x.

OKI, as the MPO, is responsible for transportation planning and air quality/transportation conformity. Transportation conformity is a mechanism to ensure that federal funding and approval are given to those transportation activities that are consistent with the air quality goals of the State Implementation Plans (SIPs) for Indiana, Kentucky and Ohio. The SIPs include an inventory of projected emissions from vehicles. One or more of the analysis years in the projected inventory may be designated as the motor vehicle emissions budget (MVEB). This budget establishes a maximum allowable limit on future emissions from vehicles (mobile sources). OKI's transportation plans and programs must be shown to be in conformity with all SIP provisions. The conformity process is a quantitative analysis, using U.S.EPA's vehicle emissions software (currently MOVES), demonstrating that forecasted regional vehicle emissions do not exceed the established budget.

Table 1 shows daily mobile source emissions for the combined Indiana and Ohio portions of the Maintenance area, including Clinton County. Table 2 shows daily mobile source emissions for the Kentucky portion of the Maintenance area. Separate MVEB's are typically designated for these two areas. An additional safety margin should be added to the MVEB's due uncertainty with growth assumptions utilized in the OKI travel demand model and MOVES. Daily mobile source emissions for each county are shown in Table 3.

Table 1

Mobile Source Emissions Inventory for the Indiana and Ohio Portions of the Cincinnati Ozone Maintenance Area (tons per day)

	2005	2008	2015	2020	2030
VOC	93.68	95.54	48.75	37.24	31.81
NOx	157.38	131.28	81.95	63.59	56.48

Table 2

Mobile Source Emissions Inventory for the Kentucky Portion of the Cincinnati Ozone Maintenance Area (tons per day)

	2005	2008	2015	2020	2030
VOC	25.20	16.53	9.08	5.89	4.53
NOx	80.14	55.34	31.55	18.75	14.37

Table 3

Mobile Source Emissions by State/County for the Cincinnati Ozone Maintenance Area (tpd)

State	2005	2008	2015	2020	2030
Indiana					
Dearborn NA					
VMT	599,761	613,027	686,339	730,126	800,277
VOC	1.36	1.38	0.71	0.54	0.46
NOx	2.28	1.90	1.19	0.92	0.82
Ohio					
Butler					
VMT	7,804,476	8,133,554	8,721,511	9,277,916	10,169,344
VOC	17.24	17.58	8.97	6.85	5.85
NOx	28.96	24.16	15.08	11.70	10.39
Clermont					
VMT	5,391,578	5,599,530	5,810,859	6,181,573	6,775,503
VOC	11.49	11.72	5.98	4.57	3.90
NOx	19.30	16.10	10.05	7.80	6.93
Hamilton					
VMT	23,170,766	23,481,421	25,598,858	27,231,982	29,848,450
VOC	50.60	51.61	26.33	20.12	17.18
NOx	85.01	70.92	44.27	34.35	30.51
Warren					
VMT	6,263,010	6,464,217	6,571,210	6,990,432	7,662,077
VOC	12.99	13.25	6.76	5.16	4.41
NOx	21.82	18.20	11.36	8.82	7.83
OKI OH/IN Total					
VMT	43,229,591	44,291,749	47,388,777	50,412,029	55,255,652
VOC	93.68	95.54	48.75	37.24	31.81
NOx	157.38	131.28	81.95	63.59	56.48
Clinton, OH					
VMT	1,956,501	1,939,190	2,215,886	2,349,923	2,736,782
VOC	2.92	2.51	1.37	0.93	0.71
NOx	6.53	5.50	3.01	1.86	1.28
OH/IN VOC Total	96.60	98.05	50.12	38.17	32.52
OH/IN NOx Total	163.90	136.78	84.96	65.45	57.76
Kentucky	**2005**	**2008**	**2015**	**2020**	**2030**
Boone					
VMT	4,186,006	4,355,527	4,712,497	5,129,347	5,802,955
VOC	9.71	6.37	3.50	2.27	1.75
NOx	30.88	21.32	12.16	7.22	5.54
Campbell					
VMT	2,437,698	2,495,174	2,727,746	2,969,033	3,358,939
VOC	5.62	3.69	2.03	1.31	1.01
NOx	17.87	12.34	7.04	4.18	3.20

Kenton					
VMT	4,182,042	4,197,027	4,791,791	5,215,655	5,900,597
VOC	9.87	6.47	3.56	2.31	1.77
NOx	31.40	21.68	12.36	7.34	5.63
OKI KY Total					
VMT	10,805,746	11,047,728	12,232,034	13,314,036	15,062,492
VOC	25.20	16.53	9.08	5.89	4.53
NOx	80.14	55.34	31.55	18.75	14.37
NA Area Total					
VOC	121.80	114.58	59.21	44.06	37.05
NOx	244.05	192.12	116.51	84.20	72.13

Mobile Source Emission Forecast Process

Emission Factor Model

OKI's conformity assessment utilized U.S.EPA's emissions model MOVES 2010 to develop emission factors for VOC and NO_X. Table 4 summarizes the settings used in the MOVES run specification file. Table 5 lists the data used in the MOVES County-Data Manager. Further technical details on the use of MOVES are found in the appendix to the OKI report *"Mobile Source Emissions Inventory for Cincinnati PM2.5 Nonattainment Area"*, revised December 2010.

Table 4

MOVES RunSpec Parameter	Settings
MOVES 2010a, default database 20100829	
Scale	County, Emission Rates
Time Span	Time aggregation = Hour July weekday, July meteorological data All hours of day selected Weekdays only
Geographic Bounds	Two Custom Domains 1) 4 Ohio counties and Lawrenceburg IN, 2) 3 Kentucky counties
Vehicles/Equipment	All source types, gasoline and diesel
Road Type	All road types including off-network
Pollutants and Processes	All Ozone categories, Total Energy Consumption
Strategies	Modified AVFT strategy file to reflect 0% CNG buses in the transit fleet
General Output	Units= grams, joules and miles
Output Emissions	Time = hour, Location =county, on-road emission rates by road type and source use type.
Advanced Performance	none

Table 5

County Data Manager	Data Source
Source Type Population	Local and default. Local data from KYTC (2011) and ODOT (2010) from motor vehicle registration data. Default data used for source types 41, 61 and 62.
Vehicle Type VMT	Local and default. HPMSVTypeYear VMT=daily VMT from OKI travel demand model with EPA's daily to annual VMT converter applied. monthVMTFraction = default. dayVMTFraction=default, hourVMTFraction=local.
I/M Programs	Default modified to reflect discontinued I/M program in 2006
Fuel Formulation	Modified to reflect low RVP fuel program in Southwest Ohio
Fuel Supply	Default
Meteorology Data	Local. MOBILE6 converted values for Ohio and Kentucky values from Kentucky Division for Air Quality.
Ramp Fraction	Local. OKI travel demand model.
Road Type Distribution	Local. OKI travel demand model.
Age Distribution	Local and default. Local data from KYTC (2011) and ODOT (2010) from motor vehicle registration data. Default data used for source types 41, 61 and 62.
Average Speed Distribution	Local. OKI travel demand model.

OKI Travel Demand Model

Vehicle miles traveled and vehicle hours were estimated using the OKI Travel Demand Model Version 7.6. The OKI Travel Demand Model is composed of CUBE Voyager programs and a series of FORTRAN programs written by OKI. It is a state of the practice model that uses the standard 4 phase sequential modeling approach of trip generation, distribution, modal choice and assignment. The model uses demographic and land use data and capacity and free-flow speed characteristics for each roadway segment in the network to produce a "loaded" highway network with forecasted traffic volumes with revised speeds based on specified speed/capacity relationships.

Travel analysis zones are the basic geographic unit for estimating travel in the OKI model. The OKI region is subdivided into 1608 traffic analysis zones to permit detail as well as manageability. A variety of socioeconomic data items are used in the OKI transportation planning process. These data are used primarily to forecast future travel patterns by serving as independent variables in OKI trip generation equations. The following categories of planning data are utilized:

- Population (household and group quarter)
- Households
- Household vehicles
- Employment (by employment category and zone of work)
- Labor force participation (by zone of residence)
- Area type

The principal data requirements of the OKI travel demand forecasting model are population and employment. From these variables, other characteristics including households, labor force, and personal vehicles may be derived. Chapter 5 of *OKI 2030 Regional Transportation Plan 2008 Update* provides a complete demographic overview of the region.

OKI utilizes both base year (2005) and future year data (2010, 2020 and 2030) in the planning process. Planning data are maintained at the Traffic Analysis Zone (TAZ) level, and originate in the 2000 Census of Population and Housing. Base year 2005 and future year data for each variable are developed through various methods. More detailed explanation of base year and future year data generation for each of the above-mentioned categories of planning data follows. All of the variables represent the latest OKI planning assumptions.

Population

Base and Future Year Data: Population data for base year 2005 and future years 2010, 2020 and 2030 originate with the 2000 Census of Population and Housing. Utilizing ArcView GIS, population data at the zonal level for 2000 was derived from the area proportion allocation of block level population.

As a tri-state regional planning agency, OKI uses county level projections as prepared by the respective state data centers (Ohio Department of Development Office of Strategic Research, Kentucky State Data Center and Indiana Business Research Center) as control totals. The most current projections (years 2005 to 2030) were released by the Ohio and Indiana state data centers in 2003 and the Kentucky State Data Center in 2004. Population projections at the zonal level are calculated by multiplying household size by the projected zonal households. Household size is factored so that, in each county, the sum of the zonal populations equals the control total.

Households

Base Year Data: Household data for base year 2005 originates with the 2000 Census of Population and Housing. Utilizing the geographic information system ArcMap, household data at the zonal level for 2000 was derived from the area proportion allocation of block level households. Year 2000 household data was updated to 2005 with residential building permits issued between January 2000 and December 2004. The residential building locations were geo-coded in ArcMap, then aggregated to the TAZs. The housing unit totals for each TAZ were converted to households by applying a vacancy rate, an adjustment for permitted but unbuilt units, and subtracting demolitions (where data was available). These households were then added to the year Census 2000 zonal household total to arrive at 2005 households for each TAZ.

Future Year Data: The preparation of household projections was accomplished by calculating the number of households for a projected county population using ratios of householders to total population by age specific cohorts derived from the 2000 Census for each analysis year. Disaggregation to TAZs was determined by historical trends, existing and future land use, topography, flood plain information, availability of land, local knowledge and other factors.

Household Vehicles

Base and Future Year Data: Base and future year household vehicle data were obtained from the 2000 Census of Population and Housing. The 2000 Census is the only source of household vehicle data available at the block group level. Average vehicles per household were calculated for block groups then applied to the TAZs associated with each block group. The 2005, 2010, 2020 and 2030 vehicles per household level was held at the 2000 level based on the fact that, since 2002, the number of vehicles per household has exceeded the number of drivers per household.

Labor Force

Base and Future Year Data: The OKI labor force is a function of the population as determined by a labor force participation ratio (the number of employed persons in the labor force per persons 16 and over). Household data for base year 2005 originates with the 2000 Census of Population and Housing. Utilizing the geographic information system ArcMap, household data at the zonal level for 2000 was derived from the area proportion allocation of block group level employed labor force. The labor force projections for 2005, 2010, 2020 and 2030 were based on the most recent projections of national labor force participation rates by age and sex cohorts from the U.S. Department of Labor, Bureau of Labor Statistics for each of those years. These rates were then applied to the projected county age/sex cohorts and adjusted to eliminate the unemployed to arrive at a county employed labor force control total. Employed labor force at the zonal level is calculated by multiplying the labor force participation rate by the zonal population. The labor force participation rate is adjusted so that, in each county, the sum of the zonal labor force counts equals the control total.

Employment

Base Year Data: Quarterly Census of Employment and Wages (QCEW or ES202) data for 2005 was utilized as the primary tool to calculate employment at the zonal level. Individual business records containing physical location, number of employees and SIC code were geocoded through ArcMap and aggregated to the TAZ level. This data set was supplemented by other sources of data to complete the commuting employment picture in the OKI region. Each zone's employment was divided according to the SIC code into three classes (retail, office, industrial) based upon the potential for generating trips.

Future Year Data: For future year employment projection, calculation was first made of the employment at the regional level. At the regional level, employment is a calculation of the region's employed labor force minus workers who live in the region but commute out to work, plus workers who live outside the region but commute in to work. The regional total was disaggregated first to the county level based on historic trends and expected changes in the county's share of the region's employment and then to the TAZ level. Disaggregation to TAZs was determined by historical trends, existing and future land use, topography, flood plain information, availability of land, local knowledge and other factors.

Area Type

Base and Future Year Data: For each analysis year, each TAZ is assigned an area type designation as CBD, Urban, Suburban or Rural based on population and employment densities.

Model Calibration

OKI's Travel Demand Model has been validated to observed traffic volumes for the model base year 2005. The modeling network encompasses the entire ozone Maintenance area with the exception of Clinton County, Ohio. The modeling network also includes Greene, Miami and Montgomery counties in Ohio and the remainder of Dearborn County Indiana. The difference between estimated vehicle miles traveled (VMT) and 2005 observed VMT is less than 1%. A highway screenline analysis compares the screenline observed and simulated traffic volume discrepancies with the ODOT standard of maximum desirable deviation. The comparison shows that the model performs at a satisfactory level and all the errors were under the ODOT curve. Further information can be found in OKI's 2007 report, "*OKI/MVRPC Travel Demand Model Methodology/ Validation Report*". For the calibration, OKI used over 3000 traffic counts collected through 2006 by the Ohio Department of Transportation (ODOT), the Kentucky Transportation Cabinet, many county and local governments, transportation engineering consultants, and OKI. These traffic counts cover nearly 50% percent of the links in the OKI portion of the modeling network. The methodology provides consistency with past emission inventory and conformity analysis work performed by OKI.

Local Inputs and Post-Model Processing

OKI incorporates a variety of sources of local data to both improve and confirm the accuracy of VMT, as well as other travel-related parameters. Free flow speeds used on the highway and transit networks are based on travel time studies performed locally. The OKI post-processing program, IMPACT, uses the loaded highway network to generate VMT by hour, VMT by speed distribution and VMT by facility type. These tables are then included as input into MOVES. Two separate sets of VMT tables are generated: one for the four Ohio counties plus Dearborn County Indiana, and a second for the three Kentucky counties. The VMT by hour tables utilize hourly traffic distribution and directional split factors for different roadway types as developed by OKI. The main source of the data was the permanent traffic counting stations located throughout the OKI region for the years of 2004-2006. This data was supplemented with data collected at coverage count stations (locations with counts taken on only one-two days). The stations were classified by area type: urban and rural, and functional classification: freeway, arterial and collector. Speeds representing various "loaded" conditions (with traffic volumes) are estimated using techniques from the 1997 Highway Capacity Manual. This permits the estimation of speeds as conditions vary from hour to hour on the different facility types throughout the region. The IMPACT program performs the appropriate summation by area and roadway type as well as regional totals. OKI has also developed seasonal conversion factors to adjust traffic volumes to summer conditions. The factors were derived from local data collected at permanent traffic counting stations during 1994-1997 utilizing the average daily traffic monthly conversion factors for June, July and August. Further information on OKI's IMPACT program is documented in the report, *"Travel Demand Model*

Summary Reporting and Impact Summary Reporting: OKI/MVRPC Travel Demand Model User's Guide", OKI 2003.

APPENDIX B

Public Hearing Notice

and Documentation

KENTUCKY DIVISION FOR AIR QUALITY
NOTICE OF PUBLIC HEARING
TO REVISE KENTUCKY'S STATE IMPLEMENTATION PLAN

The Kentucky Energy and Environment Cabinet will conduct a public hearing on July 30, 2012, at 6:00 p.m. (local time) in the Conference Room of the Northern Kentucky Area Development District (NKADD), 22 Spiral Drive, Florence, Kentucky. This hearing is being held to receive comments on a proposed State Implementation Plan (SIP) revision to update the 8-hour ozone motor vehicle emissions budget for the Kentucky portion of the Cincinnati-Hamilton, Ohio-Kentucky-Indiana ozone maintenance area from the MOBILE6.2 model to the MOVES model. This revision, when approved by U.S. EPA, will meet the requirement of using a MOVES-generated budget for SIP development, transportation conformity determinations, and other purposes for the area.

This hearing is open to the public and all interested persons will be given the opportunity to present testimony. The hearing will be held, if requested, at the date, time and place given above. It is not necessary that the hearing be held or attended in order for persons to comment on the proposed submittal to EPA. To assure that all comments are accurately recorded, the Division requests that oral comments presented at the hearing also be provided in written form, if possible. To be considered part of the hearing record, comments must be received by the close of the hearing. Comments should be sent to the contact person. If no request for a public hearing is received, the hearing will be cancelled, and notice of the cancellation will be posted at the website listed below. Request for a public hearing must be received no later than July 23, 2012 while all comments must be submitted no later than July 30, 2012.

The full text of the proposed SIP revision is available for public inspection and copying during regular business hours (8:00 a.m. to 4:30 p.m.) at the locations listed below. Any individual requiring copies may submit a request to the Division for Air Quality in writing, by telephone, or by fax. Requests for copies should be directed to the contact person. In addition, an electronic version of the proposed SIP revision document and relevant attachments can be downloaded from the Division for Air Quality's website at:
http://air.ky.gov/Pages/PublicNoticesandHearings.aspx.

The hearing facility is accessible to people with disabilities. An interpreter or other auxiliary aid or service will be provided upon request. Please direct these requests to the contact person.

CONTACT PERSON: Joe Forgacs, Environmental Technologist III, Division for Air Quality, 200 Fair Oaks Lane, Frankfort, Kentucky 40601. Phone (502) 564-3999; Fax (502) 564-4666; E-mail joe.forgacs@ky.gov.

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