BROOKE-HANCOCK-JEFFERSON TRANSPORTATION STUDY

TECHNICAL MEMORANDUM 2011-1

Transportation Air Quality Analysis and Technical Documentation

For the Weirton-Steubenville, WV-OH

State Implementation Plan Inventory Mobile Emission Estimates

For the U.S. EPA 1997 Annual $PM_{2.5}$ National Ambient Air Quality Standard

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SELECTED ABBREVIATIONS & ACRONYMS

BHJ – Brooke-Hancock-Jefferson Metropolitan Planning Commission

CFR – Code of Federal Regulations

FHWA – Federal Highway Administration;

FTA – Federal Transit Administration;

LRTP – Long Range Transportation Plan

MOBILE6 – Mobile Source Emission Factor Model

MOU – Memorandum of Understanding

MPO – Metropolitan Planning Organization

MVEB – Motor Vehicle Emissions Budget

NAAQS – National Ambient Air Quality Standard

NO_X – Nitrogen Oxides

ODOT – Ohio Department of Transportation

OEPA – Ohio Environmental Protection Agency

PM – Particulate Matter

$PM_{2.5}$ - Particulate Matter with an aerodynamic diameter less than 2.5 microns (often referred to as Fine Particulate Matter)

PM_{10} – Particulate Matter with an aerodynamic diameter less than 10 microns

SIP – State Implementation Plan

STIP – Statewide Transportation Improvement Program

TAZs – Traffic Analysis Zones

TCM – Transportation Control Measure

TDM – Travel Demand Model

TIP – Transportation Improvement Program in a Metropolitan Planning Area

USEPA – United States Environmental Protection Agency

VMT – Vehicle Miles of Travel

VOC – Volatile Organic Compounds

WVDEP – West Virginia Department of Environmental Protection

WVDOT – West Virginia Department of Transportation

REVISION HISTORY

February 24, 2012

Edit Page 1; Introduction; Paragraph #1 Revise paragraph into two sentences.

Edit Page 3; On Road Emission Summary Paragraph #1; Insert Maintenance Year 2022 with 2025

Revise; Table 1; BHJ Region on-Road Mobile Emissions by State; Add Maintenance Year 2025

Revise Page 4; Table 2; BHJ Region on-Road Mobile Emissions by County; Add Maintenance Year 2025

Revise Page 5; Travel Demand Modeling - Analysis Years; Add Analysis Year 2025 – Maintenance Year

Revise Page 9; Emission Factor Generation; Paragraph #1 Add 2025

Transportation Air Quality Analysis and Technical Documentation For the Weirton-Steubenville, WV-OH State Implementation Plan Inventory Mobile Emission Estimates For the U.S. EPA 1997 Annual $PM_{2.5}$ National Ambient Air Quality Standard

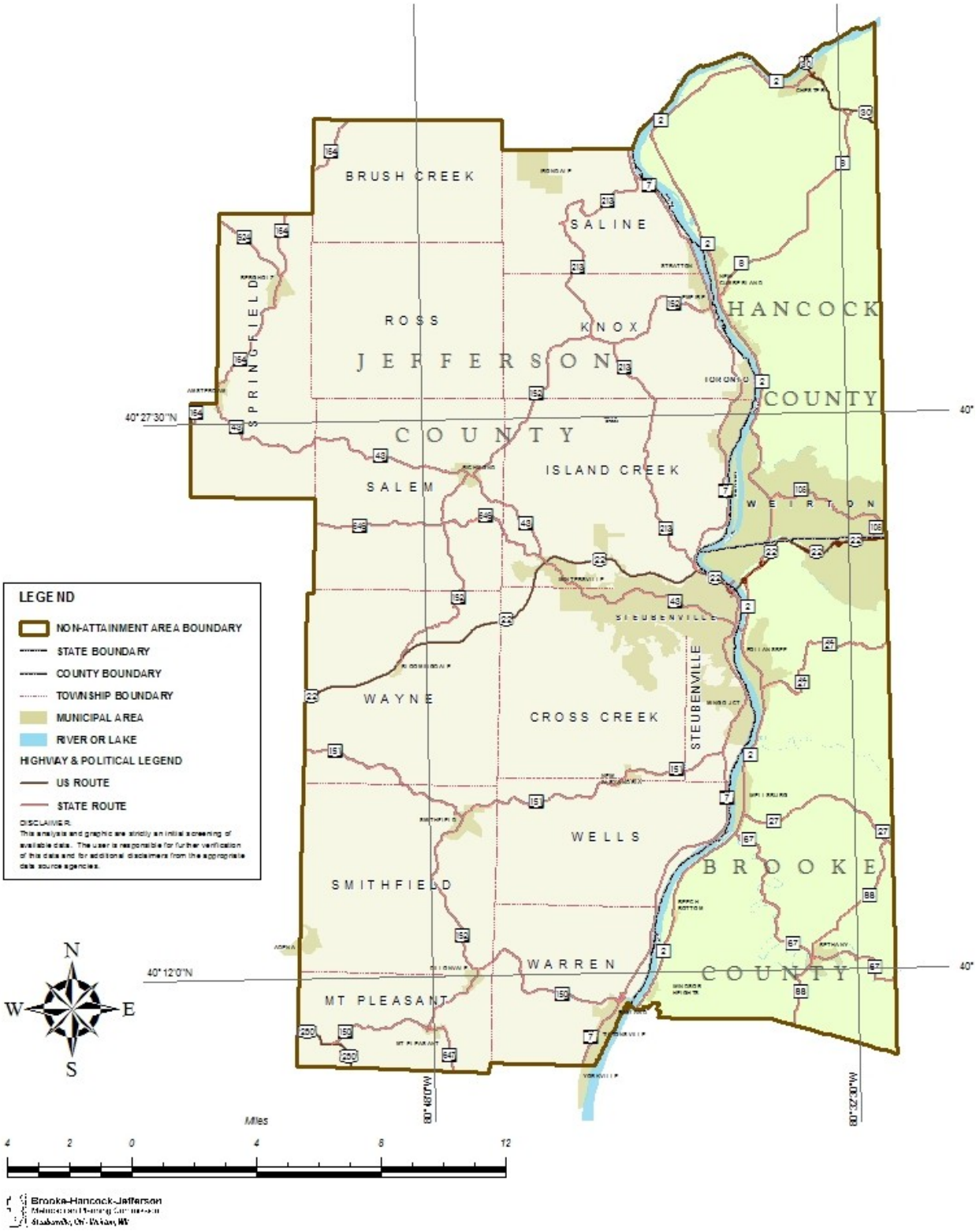
INTRODUCTION

This memorandum documents the air quality analyses and underlying planning assumptions performed for the Annual PM2.5 on-road mobile source emission inventories for the Weirton-Steubenville, WV-OH Metropolitan area State Implementation Plan (SIP). The Ohio Department of Transportation (ODOT), Division of Transportation System Development-Modeling and Forecasting Section and the Brooke-Hancock-Jefferson Planning Commission (BHJMPC) completed these analyses in coordination with the Ohio Environmental Protection Agency (OEPA) and West Virginia Department of Environmental Protection (WVDEP).

The BHJ Region is comprised of the counties of Brooke and Hancock in the north panhandle of West Virginia and Jefferson in east-central Ohio. On January 5, 2005, the USEPA designated all three counties within the BHJMPO Planning Area as non-attainment for the $PM_{2.5}$ air quality standard. The designation became effective on April 5, 2005; 90 days after USEPA published action in the *Federal Registry*. Figure 1 displays the geographic extent of the Steubenville-Weirton, OH-WV non-attainment area

The BHJMPC serves as the Metropolitan Planning Organization (MPO). The MPO submitted the necessary Travel Demand Model networks along with all land use and social-economic demographics. The ODOT Modeling and Forecasting section performed the MOVES runs to generate travel demand model based emission factors as well as the complete air quality analyses for the metropolitan area.

Figure 1
BHJ GEOGRAPHIC AREA
FINE PARTICULATE MATTER
NON-ATTAINMENT AREA BOUNDARY



ON ROAD MOBILE EMISSION SUMMARY

The Table 1 and 2 below present a summary of the pollutant emissions including Fine Particulate Matter ($PM_{2.5}$), Nitrogen Oxides (NO_x), Sulfur Dioxide (SO_2) modeled for each county that make up the BHJ Region. The Model Years for the demonstration includes the Base Year 2005, Attainment Year 2008 (a leap year), Interim Year 2015, and Maintenance Year 2025.

Table 1
BHJ REGION ON-ROAD MOBILE EMISSIONS BY STATE

OHIO

Jefferson County

Year	PM 2.5 (tons/yr)	NOX (tons/yr)	SO2 (tons/yr)	VMT (annual)
2005	73.17	2105.85	18.18	562,071,084
2008	60.97	1758.04	5.65	557,286,295
2015	31.88	870.17	3.93	544,597,475
2022	16.78	374.80	3.56	549,620,540
2025	16.49	322.71	3.56	572,657,778

WEST VIRGINIA

Brooke and Hancock Counties

Year	PM 2.5 (tons/yr)	NOX (tons/yr)	SO2 (tons/yr)	VMT (annual)
2005	38.04	1023.15	13.59	393,012,357
2008	27.93	772.27	4.03	389,998,556
2015	13.50	323.71	2.87	400,179,462
2022	8.82	158.47	2.50	390,998,315
2025	8.44	114.56	2.36	391,153,545

Table 2

BHJ REGION ON-ROAD MOBILE EMISSIONS BY COUNTY

Jefferson County

Year	PM 2.5 (tons/yr)	NOX (tons/yr)	SO2 (tons/yr)	VMT (annual)
2005	73.17	2105.85	18.18	562,071,084
2008	60.97	1758.04	5.65	557,286,295
2015	31.88	870.17	3.93	544,597,475
2022	16.78	374.80	3.56	549,620,540
2025	16.49	322.71	3.56	572,657,778

Brooke County

Year	PM 2.5 (tons/yr)	NOX (tons/yr)	SO2 (tons/yr)	VMT (annual)
2005	19.41	540.40	7.01	212,244,639
2008	14.42	412.02	2.11	212,778,859
2015	6.97	174.71	1.51	219,881,355
2022	4.55	86.23	1.33	215,917,336
2025	4.34	62.47	1.26	216,619,184

Hancock County

Year	PM 2.5 (tons/yr)	NOX (tons/yr)	SO2 (tons/yr)	VMT (annual)
2005	18.63	482.75	6.58	180,767,718
2008	13.51	360.25	1.92	177,219,697
2015	6.53	149.00	1.36	180,298,107
2022	4.28	72.24	1.17	175,080,979
2025	4.10	52.09	1.10	174,534,361

LATEST PLANNING ASSUMPTIONS

The annual PM2.5 inventory runs meet the latest planning assumption requirement. This report will present the latest population and land use data available that calibrated the modeling process used to calculate the vehicle emissions for the mobile emissions budgets as well as the input values for U.S. EPA's most recent emissions software MOVES for this attainment demonstration.

A series of conference calls held in November 2010 and February 2011 by the Interagency Consultancy Group established two parameters. First, that this re-designation effort will require the use of U.S. EPA's most recent emissions software MOVES for all mobile source emission analyses and second, the annual emission estimates will be based a single-season approach. The group also decided that since travel demand models produce average daily conditions, the daily emissions estimates are multiplied by 365 days to produce annual emissions estimates expressed in tons per year.

TRAVEL DEMAND MODELING - ANALYSIS YEARS

A Travel Demand Model (TDM) is the traditional forecasting tool used to examine potential changes in future travel patterns for a specific study area, in this case the Brooke-Hancock-Jefferson Metropolitan Area. The BHJ MPO, with the assistance of ODOT Modeling & Forecasting, maintains a validated region-wide TDM that employs a four-step modeling process consisting of trip generation, trip distribution, mode choice, and route assignment performed with the Cube Voyager software package. The model Outputs generated from the TDM are link-by-link directional 24-hour traffic volumes for simulating Base Year and Horizon Year travel patterns generated by the LRTP transportation network.

The current BHJ TDM Validation Year is 2000. The model uses comparable Average Daily Traffic count data, updated social-economic variables for each of the analysis years by either updating existing or known land use commitment for 2008, 2009, and 2014, or projected 2014 and 2020 variables based on a straight-line extrapolation between 2009 set of variables and the Horizon Year 2030 variables. These networks represent all planned federal-aid projects as well as any regionally significant projects found in the BHJ TIP and LRTP expected to be open for traffic by the end of each respective analysis year.

The interagency consultation process, as previously discussed, established the following model years for Brooke and Hancock counties, WV and Jefferson County, OH that reflected the most recent correspondence from the U.S. EPA:

- Analysis Year 2005 – Baseline Emissions
- Analysis Year 2008 – Attainment Year
- Analysis Year 2015 – Interim Year
- Analysis Year 2022 – Maintenance Year
- Analysis Year 2025 – Maintenance Year

SOCIAL-ECONOMIC DEMOGRAPHICS

Identifying projected growth centers and understanding urban and rural population changes are essential to determine future transportation needs in a given study area. Critical elements include an understanding of the past and anticipated future shifts in the region's economy, population, land use

patterns, and other environmental factors over time. In turn, these factors are useful for predicting future transportation patterns and justify transportation improvements over the next twenty years.

Travel forecasting procedures require the user delineate the TDM study area into geographic areas called Traffic Analysis Zones (TAZs). Typically, TAZs are based on factors such as land use, area types (urban, suburban or rural), or political government units such as cities, villages, or townships. TAZs represent centers of travel generators or attractors based on a set of demographic variables. The BHJMPO collects and reviews the TDM independent variables that characterize current and future estimates of the metropolitan area's social and economic activity that may influence land-use development patterns. In all, there are 376 TAZs in the BHJ model represented by 60 TAZs for Brooke County, 78 TAZs for Hancock County, and 237 TAZs for Jefferson County. Figure 2 displays the BHJ MPO geography covered by the Steubenville-Weirton Travel Demand Model (the entire three-county area) including the Traffic Analysis Zone structure. The computer-based TDM for the Steubenville-Weirton Metropolitan Area highway network employs the following land use variables:

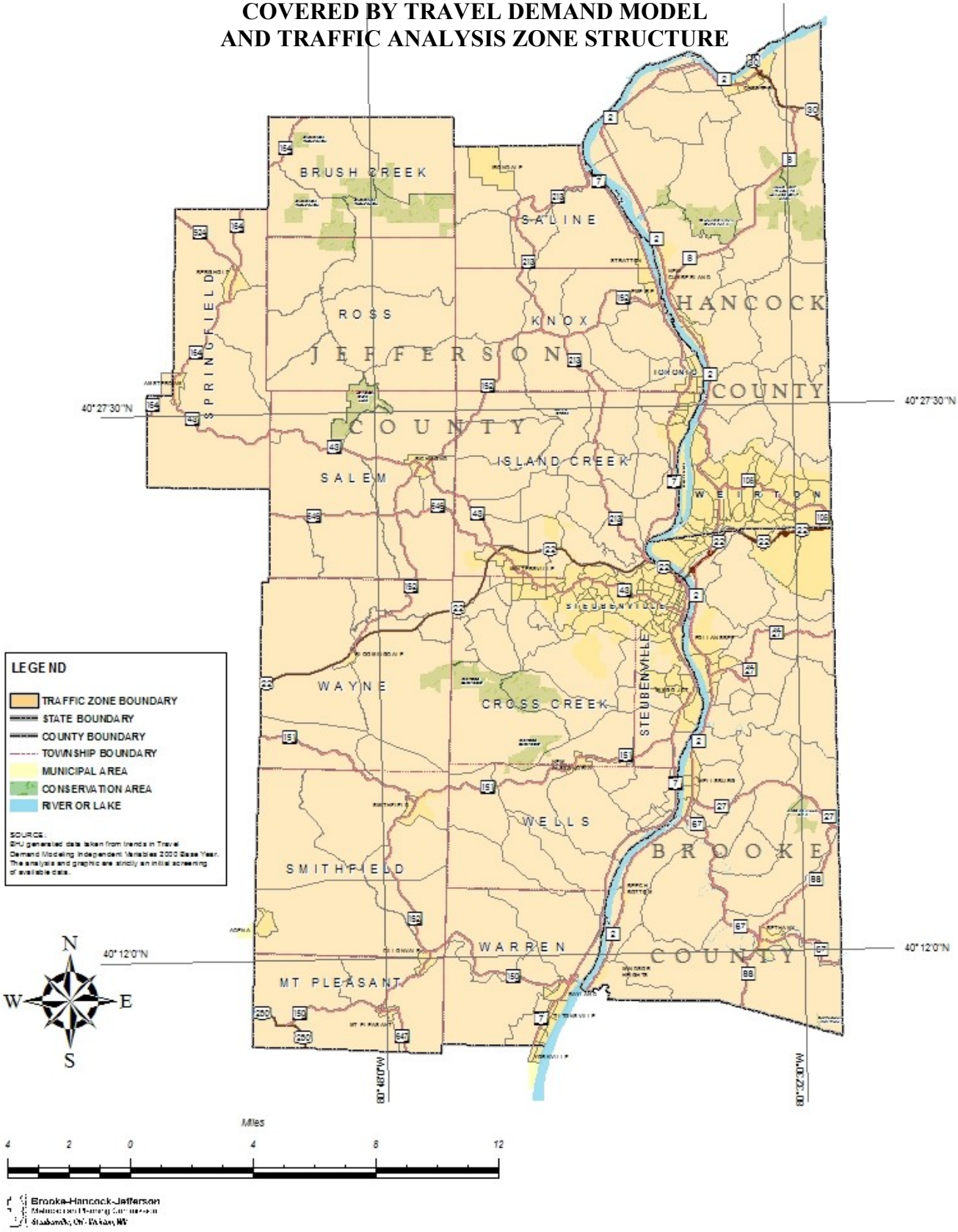
- [AREA_TYPE] ≡ Area Type
- [AVG_PARK] ≡ Average parking cost
- [ENROLL] ≡ School enrollment classified by Private [ENROLL_PRIV], Public [ENROLL_PUB] and Post-secondary [ENROLL_UNIV] schools
- [HOTEL_RM] ≡ Hotel Rooms
- [MED_HHINC] ≡ Median household income
- [POP] ≡ Population
- [POP_18] ≡ Population 18 years or less
- [POP_GRP] ≡ Population residing in Group Quarters
- [TOTEMP] ≡ Total Employment grouped by the North American Industrial Classification System (NAICS)
- [TOT_HH] ≡ Occupied housing
- [TOT_VEH] ≡ Vehicles available per household
- [WORKERS] ≡ Workers per household

Table 3 is a set of demographic variables developed for the most recent 2006 24-Hour PM2.5 National Ambient Air Quality Standard for the Weirton-Steubenville, WV-OH non-attainment area compiled September 2010.

Table 3
BHJ REGION
REPRESENTATIVE SOCIAL-ECONOMIC DEMOGRAPHIC VARIABLES BY COUNTY 2005-2020

Variable by Year	County			Total
	Brooke, WV	Hancock, WV	Jefferson, OH	
2005 Population	24,696	32,572	69,457	126,725
2005 Households	9,976	13,714	28,472	52,162
2005 Employment	8,351	12,958	23,263	44,572
2008 Population	24,602	31,971	67,643	124,216
2008 Households	9,912	13,441	27,592	50,945
2008 Employment	8,234	10,736	23,676	42,646
2014 Population	24,431	30,965	64,381	119,777
2014 Households	9,813	13,007	26,134	48,954
2014 Employment	8,145	13,047	21,819	43,011
2020 Population	24,253	29,790	60,934	114,977
2020 Households	9,694	12,488	24,532	46,714
2020 Employment	7,770	12,252	21,551	41,573

Figure 2
BHJ GEOGRAPHIC AREA
COVERED BY TRAVEL DEMAND MODEL
AND TRAFFIC ANALYSIS ZONE STRUCTURE



EMISSION FACTOR GENERATION

The MOVES model generated the emission factor files were for base year-2005 and attainment year-2008 representing the transportation improvement programs implemented in the BHJ Region. The model also generated emission factors for two future year scenarios 2015, 2022, and 2025.

Table 4 summarizes the settings used in the MOVES run specification file and the MOVES County-Data Manager. The subsequent tables provide the specific inputs that are not using the MOVES default values.

Table 4
MOVES INPUTS

RunSpec Parameter Settings	
MOVES Version	8/26/2010
Scale	Custom Domain
MOVES Modeling Technique	Emission Factor Method Rates per Distance Rates per Vehicle
Time Span	Time Aggregation: Hour 1 Month representing average annual temperatures All hours of day selected 16 speed bins Weekdays only
Geographic Bounds	Brooke, Hancock, and Jefferson counties
Vehicles/Equipment	All source types, gasoline and diesel
Road Type	All road types including off-network
Pollutants and Processes	NO_X, All $PM_{2.5}$ categories, SO_2, Total Energy Consumption
Strategies	None
General Output	Units = grams, joules and miles
Output Emissions	Time = hour, Location = custom area, on-road emission rates by road type and source use type
Advance Performance	None

Table 4 (continued)
MOVES INPUTS

County Data Manager Sources	
Source Type Population	Combination of local and default data Local data (Ohio and West Virginia) from motor vehicle registration Default data used for source types 51, 52, 53, 61, and 62 Future year growth rate based on MPO model Household growth rate
Vehicle Type VMT	Combination of local and default data
	HPMSVTypeYear VMT = daily VMT from travel demand model monthVMTFraction = default dayVMTFraction=default hourVMTFraction=local
I/M Program	None
Fuel Formulation	Default
Fuel Supply	Default
Metereology Data	Local data obtained from NOAA National Climatic Data Center. Data will consist of monthly high and low temperatures and daily relative humidity for 2002.
Ramp Fraction	Using the base year travel demand model for VHT fractions.
	Future fractions will be assumed constant
Road Type Distribution	Use ODOT and WV Division of Highways county summary VMT categorized by federal functional classes
Age Distribution	Combination of local and default data. Local data (Ohio and West Virginia) from motor vehicle registration Default data used for source types 41, 42, 43, 51, 52, 53, 61, and 62 The same age distribution will be used for all analysis years
Average Speed Distribution	Default
Alternative Fuel Type	Default

TEMPERATURE AND RELATIVE HUMIDITY

The single season approach for temperature and relative humidity uses weather data collected by the National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC). The data used in this report, taken from the Pittsburgh International Airport collection center, is representative of 12 months in 2009. Data entered into a spreadsheet provided by U.S. EPA converted the Mobile6 to get the correct data for the MOVES model. Listed in the table below are the average annual hourly temperatures and relative humidity distribution profiles for the Weirton-Steubenville, WV-OH metropolitan area.

Table 5
AVERAGE TEMPERATURE AND RELATIVE HUMIDITY DATA

TIME OF DAY	AVG HOURLY TEMPERATURE	AVG HOURLY RELATIVE HUMIDITY
Midnight	47.20	79.7%
1:00 AM	46.10	67.1%
2:00 AM	45.20	80.7%
3:00 AM	44.60	82.9%
4:00 AM	44.10	83.8%
5:00 AM	43.60	84.1%
6:00 AM	43.10	82.6%
7:00 AM	43.50	79.6%
8:00 AM	45.90	74.8%
9:00 AM	49.60	70.1%
10:00 AM	53.50	65.7%
11:00 AM	56.80	62.0%
NOON	59.70	59.8%
1:00 PM	61.30	58.2%
2:00 PM	61.90	57.4%
3:00 PM	62.00	57.3%
4:00 PM	61.60	58.3%
5:00 PM	60.50	61.2%
6:00 PM	58.60	65.3%
7:00 PM	56.20	69.2%
8:00 PM	53.70	66.1%
9:00 PM	51.60	74.3%
10:00 PM	50.10	75.7%
11:00 PM	48.60	78.1%

RAMP FRACTION

The Base Year Travel Demand Model used the Vehicles Hour of Travel (VHT) fractions to derive the Ramp Fractions shown in Table 6. The future year networks also used the base year fractions.

Table 6
RAMP FRACTIONS

roadTypeID	roadDesc	rampFraction
2	Rural Restricted Access	0.02
4	Urban Restricted Access	0.09

SOURCE TYPE POPULATION

A combination of local and MOVES default data is the Source Type Population for vehicle classifications. The MOVES default values provided the data for Source Type Population 51, 52, 53, 61, and 62 while local data from Ohio and West Virginia motor vehicle registrations accounted for all other Source Type Population needed to run the MOVES model. Table 7 shows the Source Type Population identifications, the corresponding Source Type Name, and the number of vehicles analyzed for Jefferson County, OH and Brooke/Hancock County, WV combined.

Table 7
SOURCE TYPE POPULATION FOR YEAR 2005

sourceTypeID	sourceTypeName	sourceTypePopulation	
		Jefferson County, OH	Brooke/Hancock County, WV
11	MotorCycle	6,072	1,673
21	Passenger Car	74,051	21,369
31	Passenger Truck	39,994	17,415
32	Light Commercial Truck	3,033	2,573
41	Intercity Bus	38	15
42	Transit Bus	68	8
43	School Bus	144	99
51	Refuse truck	23	12
52	Single Unit Short-haul Truck	958	739
53	Single Unit Long-haul Truck	299	84
54	Motor Home	1,953	63
61	Combination Short-haul Truc	283	130
62	Combination Long-haul Truc	326	145

VEHICLE AGE DISTRIBUTION

A grouping of data from Ohio and West Virginia sources along with the MOVES model defaults make up the Vehicle Age Distribution. MOVES default values included Vehicle Type ID 41, 42, 51, 52, 53, 61, and 62. Local data from Ohio and West Virginia motor vehicle registrations accounted for all other Vehicle Type ID. Table 8 and Table 9 show the Vehicle Age Distribution for Jefferson County, OH and Brooke/Hancock County, WV respectively.

Table 8

VEHICLE AGE DISTRIBUTION FOR JEFFERSON COUNTY, OH

yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction
2005	11	0	0.0019	2005	21	9	0.0527	2005	31	18	0.0209
2005	11	1	0.0200	2005	21	10	0.0572	2005	31	19	0.0179
2005	11	2	0.0516	2005	21	11	0.0613	2005	31	20	0.0125
2005	11	3	0.0785	2005	21	12	0.0537	2005	31	21	0.0116
2005	11	4	0.0850	2005	21	13	0.0542	2005	31	22	0.0091
2005	11	5	0.0871	2005	21	14	0.0532	2005	31	23	0.0075
2005	11	6	0.0622	2005	21	15	0.0540	2005	31	24	0.0052
2005	11	7	0.0655	2005	21	16	0.0450	2005	31	25	0.0040
2005	11	8	0.0597	2005	21	17	0.0414	2005	31	26	0.0026
2005	11	9	0.0464	2005	21	18	0.0343	2005	31	27	0.0009
2005	11	10	0.0392	2005	21	19	0.0324	2005	31	28	0.0011
2005	11	11	0.0309	2005	21	20	0.0236	2005	31	29	0.0006
2005	11	12	0.0207	2005	21	21	0.0211	2005	31	30	0.0062
2005	11	13	0.0186	2005	21	22	0.0144	2005	32	0	0.0100
2005	11	14	0.0186	2005	21	23	0.0102	2005	32	1	0.0275
2005	11	15	0.0156	2005	21	24	0.0086	2005	32	2	0.0925
2005	11	16	0.0137	2005	21	25	0.0065	2005	32	3	0.0975
2005	11	17	0.0109	2005	21	26	0.0050	2005	32	4	0.0450
2005	11	18	0.0116	2005	21	27	0.0025	2005	32	5	0.0450
2005	11	19	0.0100	2005	21	28	0.0017	2005	32	6	0.0375
2005	11	20	0.0088	2005	21	29	0.0015	2005	32	7	0.0350
2005	11	21	0.0107	2005	21	30	0.0408	2005	32	8	0.0575
2005	11	22	0.0093	2005	31	0	0.0053	2005	32	9	0.0375
2005	11	23	0.0139	2005	31	1	0.0218	2005	32	10	0.0475
2005	11	24	0.0244	2005	31	2	0.0454	2005	32	11	0.0425
2005	11	25	0.0179	2005	31	3	0.0526	2005	32	12	0.0375
2005	11	26	0.0139	2005	31	4	0.0664	2005	32	13	0.0425
2005	11	27	0.0165	2005	31	5	0.0729	2005	32	14	0.0300
2005	11	28	0.0183	2005	31	6	0.0645	2005	32	15	0.0725
2005	11	29	0.0142	2005	31	7	0.0606	2005	32	16	0.0375
2005	11	30	0.1044	2005	31	8	0.0688	2005	32	17	0.0250
2005	21	0	0.0044	2005	31	9	0.0523	2005	32	18	0.0150
2005	21	1	0.0193	2005	31	10	0.0641	2005	32	19	0.0300
2005	21	2	0.0305	2005	31	11	0.0542	2005	32	20	0.0175
2005	21	3	0.0407	2005	31	12	0.0548	2005	32	21	0.0175
2005	21	4	0.0393	2005	31	13	0.0477	2005	32	22	0.0250
2005	21	5	0.0468	2005	31	14	0.0462	2005	32	23	0.0200
2005	21	6	0.0437	2005	31	15	0.0503	2005	32	24	0.0025
2005	21	7	0.0464	2005	31	16	0.0418	2005	32	25	0.0175
2005	21	8	0.0536	2005	31	17	0.0302	2005	32	26	0.0075

Table 8 (continued)

VEHICLE AGE DISTRIBUTION FOR JEFFERSON COUNTY, OH

yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction
2005	32	27	0.0075	2005	42	5	0.1429	2005	43	14	0.0000
2005	32	28	0.0050	2005	42	6	0.1429	2005	43	15	0.0074
2005	32	29	0.0000	2005	42	7	0.0000	2005	43	16	0.0000
2005	32	30	0.0150	2005	42	8	0.0000	2005	43	17	0.0074
2005	41	0	0.0000	2005	42	9	0.0000	2005	43	18	0.0074
2005	41	1	0.0000	2005	42	10	0.0000	2005	43	19	0.0148
2005	41	2	0.0333	2005	42	11	0.0000	2005	43	20	0.0296
2005	41	3	0.1000	2005	42	12	0.0000	2005	43	21	0.0000
2005	41	4	0.0333	2005	42	13	0.0000	2005	43	22	0.0074
2005	41	5	0.0333	2005	42	14	0.0000	2005	43	23	0.0222
2005	41	6	0.1667	2005	42	15	0.0000	2005	43	24	0.0000
2005	41	7	0.0333	2005	42	16	0.0000	2005	43	25	0.0000
2005	41	8	0.0333	2005	42	17	0.0000	2005	43	26	0.0000
2005	41	9	0.0333	2005	42	18	0.0000	2005	43	27	0.0000
2005	41	10	0.1333	2005	42	19	0.1427	2005	43	28	0.0000
2005	41	11	0.1000	2005	42	20	0.0000	2005	43	29	0.0000
2005	41	12	0.0667	2005	42	21	0.0000	2005	43	30	0.0074
2005	41	13	0.0000	2005	42	22	0.0000	2005	51	0	0.0000
2005	41	14	0.1000	2005	42	23	0.0000	2005	51	1	0.0000
2005	41	15	0.0333	2005	42	24	0.0000	2005	51	2	0.0455
2005	41	16	0.0000	2005	42	25	0.0000	2005	51	3	0.0455
2005	41	17	0.0000	2005	42	26	0.0000	2005	51	4	0.2727
2005	41	18	0.0333	2005	42	27	0.0000	2005	51	5	0.0000
2005	41	19	0.0000	2005	42	28	0.0000	2005	51	6	0.0455
2005	41	20	0.0333	2005	42	29	0.0000	2005	51	7	0.0909
2005	41	21	0.0000	2005	42	30	0.0000	2005	51	8	0.1818
2005	41	22	0.0000	2005	43	0	0.0444	2005	51	9	0.0909
2005	41	23	0.0000	2005	43	1	0.1185	2005	51	10	0.0000
2005	41	24	0.0000	2005	43	2	0.0667	2005	51	11	0.0455
2005	41	25	0.0000	2005	43	3	0.0593	2005	51	12	0.0909
2005	41	26	0.0000	2005	43	4	0.0222	2005	51	13	0.0455
2005	41	27	0.0000	2005	43	5	0.0593	2005	51	14	0.0000
2005	41	28	0.0000	2005	43	6	0.0370	2005	51	15	0.0000
2005	41	29	0.0000	2005	43	7	0.0444	2005	51	16	0.0000
2005	41	30	0.0336	2005	43	8	0.0519	2005	51	17	0.0000
2005	42	0	0.0000	2005	43	9	0.0667	2005	51	18	0.0000
2005	42	1	0.1429	2005	43	10	0.0741	2005	51	19	0.0000
2005	42	2	0.2857	2005	43	11	0.0667	2005	51	20	0.0000
2005	42	3	0.0000	2005	43	12	0.0815	2005	51	21	0.0000
2005	42	4	0.1429	2005	43	13	0.1037	2005	51	22	0.0453

Table 8 (continued)

VEHICLE AGE DISTRIBUTION FOR JEFFERSON COUNTY, OH

yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction
2005	51	23	0.0000	2005	53	1	0.0000	2005	54	10	0.0287
2005	51	24	0.0000	2005	53	2	0.0455	2005	54	11	0.0417
2005	51	25	0.0000	2005	53	3	0.0455	2005	54	12	0.0355
2005	51	26	0.0000	2005	53	4	0.2727	2005	54	13	0.0307
2005	51	27	0.0000	2005	53	5	0.0000	2005	54	14	0.0294
2005	51	28	0.0000	2005	53	6	0.0455	2005	54	15	0.0219
2005	51	29	0.0000	2005	53	7	0.0909	2005	54	16	0.0301
2005	51	30	0.0000	2005	53	8	0.1818	2005	54	17	0.0225
2005	52	0	0.0000	2005	53	9	0.0909	2005	54	18	0.0219
2005	52	1	0.0000	2005	53	10	0.0000	2005	54	19	0.0178
2005	52	2	0.0455	2005	53	11	0.0455	2005	54	20	0.0273
2005	52	3	0.0455	2005	53	12	0.0909	2005	54	21	0.0225
2005	52	4	0.2727	2005	53	13	0.0455	2005	54	22	0.0355
2005	52	5	0.0000	2005	53	14	0.0000	2005	54	23	0.0314
2005	52	6	0.0455	2005	53	15	0.0000	2005	54	24	0.0225
2005	52	7	0.0909	2005	53	16	0.0000	2005	54	25	0.0191
2005	52	8	0.1818	2005	53	17	0.0000	2005	54	26	0.0362
2005	52	9	0.0909	2005	53	18	0.0000	2005	54	27	0.0150
2005	52	10	0.0000	2005	53	19	0.0000	2005	54	28	0.0130
2005	52	11	0.0455	2005	53	20	0.0000	2005	54	29	0.0109
2005	52	12	0.0909	2005	53	21	0.0000	2005	54	30	0.2309
2005	52	13	0.0455	2005	53	22	0.0453	2005	61	0	0.0023
2005	52	14	0.0000	2005	53	23	0.0000	2005	61	1	0.0102
2005	52	15	0.0000	2005	53	24	0.0000	2005	61	2	0.0228
2005	52	16	0.0000	2005	53	25	0.0000	2005	61	3	0.0255
2005	52	17	0.0000	2005	53	26	0.0000	2005	61	4	0.0383
2005	52	18	0.0000	2005	53	27	0.0000	2005	61	5	0.0409
2005	52	19	0.0000	2005	53	28	0.0000	2005	61	6	0.0427
2005	52	20	0.0000	2005	53	29	0.0000	2005	61	7	0.0412
2005	52	21	0.0000	2005	53	30	0.0000	2005	61	8	0.0401
2005	52	22	0.0453	2005	54	0	0.0034	2005	61	9	0.0418
2005	52	23	0.0000	2005	54	1	0.0096	2005	61	10	0.0557
2005	52	24	0.0000	2005	54	2	0.0239	2005	61	11	0.0529
2005	52	25	0.0000	2005	54	3	0.0280	2005	61	12	0.0454
2005	52	26	0.0000	2005	54	4	0.0335	2005	61	13	0.0488
2005	52	27	0.0000	2005	54	5	0.0260	2005	61	14	0.0379
2005	52	28	0.0000	2005	54	6	0.0485	2005	61	15	0.0458
2005	52	29	0.0000	2005	54	7	0.0362	2005	61	16	0.0527
2005	52	30	0.0000	2005	54	8	0.0225	2005	61	17	0.0396
2005	53	0	0.0000	2005	54	9	0.0239	2005	61	18	0.0353

Table 8 (continued)

VEHICLE AGE DISTRIBUTION FOR JEFFERSON COUNTY, OH

yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction
2005	61	19	0.0352	2005	62	3	0.0470	2005	62	18	0.0221
2005	61	20	0.0283	2005	62	4	0.0359	2005	62	19	0.0221
2005	61	21	0.0340	2005	62	5	0.0331	2005	62	20	0.0083
2005	61	22	0.0314	2005	62	6	0.0249	2005	62	21	0.0166
2005	61	23	0.0224	2005	62	7	0.0276	2005	62	22	0.0166
2005	61	24	0.0242	2005	62	8	0.0331	2005	62	23	0.0166
2005	61	25	0.0157	2005	62	9	0.0663	2005	62	24	0.0083
2005	61	26	0.0147	2005	62	10	0.0884	2005	62	25	0.0083
2005	61	27	0.0077	2005	62	11	0.1050	2005	62	26	0.0110
2005	61	28	0.0068	2005	62	12	0.1243	2005	62	27	0.0028
2005	61	29	0.0059	2005	62	13	0.0746	2005	62	28	0.0028
2005	61	30	0.0538	2005	62	14	0.0635	2005	62	29	0.0000
2005	62	0	0.0028	2005	62	15	0.0414	2005	62	30	0.0109
2005	62	1	0.0028	2005	62	16	0.0442				
2005	62	2	0.0028	2005	62	17	0.0359				

Table 9

VEHICLE AGE DISTRIBUTION FOR BROOKE/HANCOCK COUNTY, WV

yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction
2005	11	0	0.0291	2005	21	9	0.0639	2005	31	18	0.0136
2005	11	1	0.0472	2005	21	10	0.0654	2005	31	19	0.0112
2005	11	2	0.0678	2005	21	11	0.0596	2005	31	20	0.0101
2005	11	3	0.0872	2005	21	12	0.0515	2005	31	21	0.0103
2005	11	4	0.0993	2005	21	13	0.0437	2005	31	22	0.0087
2005	11	5	0.0690	2005	21	14	0.0352	2005	31	23	0.0064
2005	11	6	0.0460	2005	21	15	0.0315	2005	31	24	0.0063
2005	11	7	0.0617	2005	21	16	0.0255	2005	31	25	0.0035
2005	11	8	0.0654	2005	21	17	0.0208	2005	31	26	0.0033
2005	11	9	0.0575	2005	21	18	0.0165	2005	31	27	0.0017
2005	11	10	0.0412	2005	21	19	0.0121	2005	31	28	0.0013
2005	11	11	0.0339	2005	21	20	0.0101	2005	31	29	0.0013
2005	11	12	0.0212	2005	21	21	0.0100	2005	31	30	0.0207
2005	11	13	0.0194	2005	21	22	0.0055	2005	32	0	0.0346
2005	11	14	0.0224	2005	21	23	0.0044	2005	32	1	0.0287
2005	11	15	0.0163	2005	21	24	0.0037	2005	32	2	0.0606
2005	11	16	0.0121	2005	21	25	0.0039	2005	32	3	0.0740
2005	11	17	0.0121	2005	21	26	0.0034	2005	32	4	0.0807
2005	11	18	0.0139	2005	21	27	0.0010	2005	32	5	0.0843
2005	11	19	0.0042	2005	21	28	0.0011	2005	32	6	0.0909
2005	11	20	0.0073	2005	21	29	0.0009	2005	32	7	0.0701
2005	11	21	0.0079	2005	21	30	0.0401	2005	32	8	0.0524
2005	11	22	0.0163	2005	31	0	0.0318	2005	32	9	0.0528
2005	11	23	0.0091	2005	31	1	0.0322	2005	32	10	0.0555
2005	11	24	0.0115	2005	31	2	0.0523	2005	32	11	0.0488
2005	11	25	0.0085	2005	31	3	0.0590	2005	32	12	0.0232
2005	11	26	0.0067	2005	31	4	0.0650	2005	32	13	0.0319
2005	11	27	0.0109	2005	31	5	0.0751	2005	32	14	0.0303
2005	11	28	0.0103	2005	31	6	0.0719	2005	32	15	0.0382
2005	11	29	0.0103	2005	31	7	0.0644	2005	32	16	0.0335
2005	11	30	0.0743	2005	31	8	0.0639	2005	32	17	0.0205
2005	21	0	0.0247	2005	31	9	0.0576	2005	32	18	0.0083
2005	21	1	0.0387	2005	31	10	0.0620	2005	32	19	0.0114
2005	21	2	0.0534	2005	31	11	0.0545	2005	32	20	0.0134
2005	21	3	0.0668	2005	31	12	0.0494	2005	32	21	0.0110
2005	21	4	0.0592	2005	31	13	0.0437	2005	32	22	0.0130
2005	21	5	0.0619	2005	31	14	0.0366	2005	32	23	0.0091
2005	21	6	0.0563	2005	31	15	0.0334	2005	32	24	0.0079
2005	21	7	0.0639	2005	31	16	0.0308	2005	32	25	0.0020
2005	21	8	0.0653	2005	31	17	0.0180	2005	32	26	0.0039

Table 9 (continued)

VEHICLE AGE DISTRIBUTION FOR BROOKE/HANCOCK COUNTY, WV

yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction
2005	32	27	0.0024	2005	42	5	0.0576	2005	43	14	0.0464
2005	32	28	0.0031	2005	42	6	0.0504	2005	43	15	0.0374
2005	32	29	0.0028	2005	42	7	0.0461	2005	43	16	0.0144
2005	32	30	0.0007	2005	42	8	0.0492	2005	43	17	0.0111
2005	41	0	0.0843	2005	42	9	0.0759	2005	43	18	0.0136
2005	41	1	0.0672	2005	42	10	0.0609	2005	43	19	0.0138
2005	41	2	0.0576	2005	42	11	0.0506	2005	43	20	0.0118
2005	41	3	0.0506	2005	42	12	0.0489	2005	43	21	0.0104
2005	41	4	0.0693	2005	42	13	0.0434	2005	43	22	0.0107
2005	41	5	0.0562	2005	42	14	0.0394	2005	43	23	0.0073
2005	41	6	0.0488	2005	42	15	0.0320	2005	43	24	0.0092
2005	41	7	0.0379	2005	42	16	0.0321	2005	43	25	0.0000
2005	41	8	0.0453	2005	42	17	0.0181	2005	43	26	0.0000
2005	41	9	0.0535	2005	42	18	0.0082	2005	43	27	0.0000
2005	41	10	0.0560	2005	42	19	0.0231	2005	43	28	0.0000
2005	41	11	0.0550	2005	42	20	0.0071	2005	43	29	0.0000
2005	41	12	0.0597	2005	42	21	0.0032	2005	43	30	0.0000
2005	41	13	0.0528	2005	42	22	0.0007	2005	51	0	0.0498
2005	41	14	0.0487	2005	42	23	0.0013	2005	51	1	0.0398
2005	41	15	0.0400	2005	42	24	0.0009	2005	51	2	0.0340
2005	41	16	0.0167	2005	42	25	0.0006	2005	51	3	0.0767
2005	41	17	0.0147	2005	42	26	0.0002	2005	51	4	0.0926
2005	41	18	0.0133	2005	42	27	0.0004	2005	51	5	0.0604
2005	41	19	0.0180	2005	42	28	0.0003	2005	51	6	0.0544
2005	41	20	0.0112	2005	42	29	0.0001	2005	51	7	0.0243
2005	41	21	0.0090	2005	42	30	0.0002	2005	51	8	0.0696
2005	41	22	0.0099	2005	43	0	0.0794	2005	51	9	0.0625
2005	41	23	0.0038	2005	43	1	0.0660	2005	51	10	0.0514
2005	41	24	0.0048	2005	43	2	0.0647	2005	51	11	0.0730
2005	41	25	0.0048	2005	43	3	0.0594	2005	51	12	0.0610
2005	41	26	0.0040	2005	43	4	0.0798	2005	51	13	0.0796
2005	41	27	0.0036	2005	43	5	0.0406	2005	51	14	0.0442
2005	41	28	0.0026	2005	43	6	0.0511	2005	51	15	0.0479
2005	41	29	0.0007	2005	43	7	0.0435	2005	51	16	0.0145
2005	41	30	0.0000	2005	43	8	0.0585	2005	51	17	0.0169
2005	42	0	0.0624	2005	43	9	0.0696	2005	51	18	0.0156
2005	42	1	0.0771	2005	43	10	0.0419	2005	51	19	0.0040
2005	42	2	0.0742	2005	43	11	0.0526	2005	51	20	0.0043
2005	42	3	0.0727	2005	43	12	0.0556	2005	51	21	0.0043
2005	42	4	0.0627	2005	43	13	0.0512	2005	51	22	0.0000

Table 9 (continued)

VEHICLE AGE DISTRIBUTION FOR BROOKE/HANCOCK COUNTY, WV

yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction
2005	51	23	0.0092	2005	53	1	0.1419	2005	54	10	0.0323
2005	51	24	0.0027	2005	53	2	0.1124	2005	54	11	0.0161
2005	51	25	0.0070	2005	53	3	0.0585	2005	54	12	0.0161
2005	51	26	0.0003	2005	53	4	0.0609	2005	54	13	0.0161
2005	51	27	0.0000	2005	53	5	0.1017	2005	54	14	0.0000
2005	51	28	0.0000	2005	53	6	0.0783	2005	54	15	0.0323
2005	51	29	0.0000	2005	53	7	0.0185	2005	54	16	0.0161
2005	51	30	0.0000	2005	53	8	0.0138	2005	54	17	0.0645
2005	52	0	0.0622	2005	53	9	0.0686	2005	54	18	0.0161
2005	52	1	0.0520	2005	53	10	0.0748	2005	54	19	0.0161
2005	52	2	0.0412	2005	53	11	0.0517	2005	54	20	0.0484
2005	52	3	0.0466	2005	53	12	0.0129	2005	54	21	0.0645
2005	52	4	0.0559	2005	53	13	0.0031	2005	54	22	0.0806
2005	52	5	0.0572	2005	53	14	0.0064	2005	54	23	0.0323
2005	52	6	0.0434	2005	53	15	0.0067	2005	54	24	0.0968
2005	52	7	0.0344	2005	53	16	0.0000	2005	54	25	0.0323
2005	52	8	0.0351	2005	53	17	0.0032	2005	54	26	0.0161
2005	52	9	0.0435	2005	53	18	0.0024	2005	54	27	0.0000
2005	52	10	0.0578	2005	53	19	0.0000	2005	54	28	0.0000
2005	52	11	0.0531	2005	53	20	0.0002	2005	54	29	0.0000
2005	52	12	0.0460	2005	53	21	0.0101	2005	54	30	0.1452
2005	52	13	0.0580	2005	53	22	0.0006	2005	61	0	0.0843
2005	52	14	0.0430	2005	53	23	0.0011	2005	61	1	0.0672
2005	52	15	0.0251	2005	53	24	0.0005	2005	61	2	0.0576
2005	52	16	0.0409	2005	53	25	0.0000	2005	61	3	0.0506
2005	52	17	0.0220	2005	53	26	0.0020	2005	61	4	0.0693
2005	52	18	0.0219	2005	53	27	0.0000	2005	61	5	0.0562
2005	52	19	0.0239	2005	53	28	0.0000	2005	61	6	0.0488
2005	52	20	0.0190	2005	53	29	0.0000	2005	61	7	0.0379
2005	52	21	0.0225	2005	53	30	0.0000	2005	61	8	0.0453
2005	52	22	0.0088	2005	54	0	0.0161	2005	61	9	0.0535
2005	52	23	0.0112	2005	54	1	0.0000	2005	61	10	0.0560
2005	52	24	0.0115	2005	54	2	0.0484	2005	61	11	0.0550
2005	52	25	0.0125	2005	54	3	0.0000	2005	61	12	0.0597
2005	52	26	0.0130	2005	54	4	0.0000	2005	61	13	0.0528
2005	52	27	0.0265	2005	54	5	0.0323	2005	61	14	0.0487
2005	52	28	0.0059	2005	54	6	0.0645	2005	61	15	0.0400
2005	52	29	0.0032	2005	54	7	0.0323	2005	61	16	0.0167
2005	52	30	0.0027	2005	54	8	0.0484	2005	61	17	0.0147
2005	53	0	0.1697	2005	54	9	0.0161	2005	61	18	0.0133

Table 9 (continued)

VEHICLE AGE DISTRIBUTION FOR BROOKE/HANCOCK COUNTY, WV

yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction	yearid	sourcetypeid	ageid	ageFraction
2005	61	19	0.0180	2005	62	3	0.1140	2005	62	18	0.0035
2005	61	20	0.0112	2005	62	4	0.1186	2005	62	19	0.0012
2005	61	21	0.0090	2005	62	5	0.0804	2005	62	20	0.0010
2005	61	22	0.0099	2005	62	6	0.0643	2005	62	21	0.0006
2005	61	23	0.0038	2005	62	7	0.0403	2005	62	22	0.0010
2005	61	24	0.0048	2005	62	8	0.0304	2005	62	23	0.0000
2005	61	25	0.0048	2005	62	9	0.0315	2005	62	24	0.0009
2005	61	26	0.0040	2005	62	10	0.0320	2005	62	25	0.0003
2005	61	27	0.0036	2005	62	11	0.0290	2005	62	26	0.0003
2005	61	28	0.0026	2005	62	12	0.0080	2005	62	27	0.0000
2005	61	29	0.0006	2005	62	13	0.0087	2005	62	28	0.0000
2005	61	30	0.0001	2005	62	14	0.0115	2005	62	29	0.0000
2005	62	0	0.1668	2005	62	15	0.0062	2005	62	30	0.0000
2005	62	1	0.1331	2005	62	16	0.0013				
2005	62	2	0.1140	2005	62	17	0.0011				

ROAD TYPE DISTRIBUTION

The ODOT and WV Division of Highway county summary Vehicle Miles Traveled (VMT) data categorized by federal functional class for the three county non-attainment areas is the basis for Road Type Distribution Fraction. Table 10 illustrates Road Type Distribution.

Table 10
ROAD TYPE DISTRIBUTION FOR BROOKE-HANCOCK-JEFFERSON NON-ATTAINMENT AREA

source TypeID	road TypeID	roadDesc	roadType VMTFraction		source TypeID	road TypeID	roadDesc	roadType VMTFraction
11	1	Off-Network	0		43	4	Urban Restricted Access	0.25
11	2	Rural Restricted Access	0.11		43	5	Urban Unrestricted Access	0.26
11	3	Rural Unrestricted Access	0.38		51	1	Off-Network	0
11	4	Urban Restricted Access	0.25		51	2	Rural Restricted Access	0.11
11	5	Urban Unrestricted Access	0.26		51	3	Rural Unrestricted Access	0.38
21	1	Off-Network	0		51	4	Urban Restricted Access	0.25
21	2	Rural Restricted Access	0.11		51	5	Urban Unrestricted Access	0.26
21	3	Rural Unrestricted Access	0.38		52	1	Off-Network	0
21	4	Urban Restricted Access	0.25		52	2	Rural Restricted Access	0.11
21	5	Urban Unrestricted Access	0.26		52	3	Rural Unrestricted Access	0.38
31	1	Off-Network	0		52	4	Urban Restricted Access	0.25
31	2	Rural Restricted Access	0.11		52	5	Urban Unrestricted Access	0.26
31	3	Rural Unrestricted Access	0.38		53	1	Off-Network	0
31	4	Urban Restricted Access	0.25		53	2	Rural Restricted Access	0.11
31	5	Urban Unrestricted Access	0.26		53	3	Rural Unrestricted Access	0.38
32	1	Off-Network	0		53	4	Urban Restricted Access	0.25
32	2	Rural Restricted Access	0.11		53	5	Urban Unrestricted Access	0.26
32	3	Rural Unrestricted Access	0.38		54	1	Off-Network	0
32	4	Urban Restricted Access	0.25		54	2	Rural Restricted Access	0.11
32	5	Urban Unrestricted Access	0.26		54	3	Rural Unrestricted Access	0.38
41	1	Off-Network	0		54	4	Urban Restricted Access	0.25
41	2	Rural Restricted Access	0.11		54	5	Urban Unrestricted Access	0.26
41	3	Rural Unrestricted Access	0.38		61	1	Off-Network	0
41	4	Urban Restricted Access	0.25		61	2	Rural Restricted Access	0.11
41	5	Urban Unrestricted Access	0.26		61	3	Rural Unrestricted Access	0.38
42	1	Off-Network	0		61	4	Urban Restricted Access	0.25
42	2	Rural Restricted Access	0.11		61	5	Urban Unrestricted Access	0.26
42	3	Rural Unrestricted Access	0.38		62	1	Off-Network	0
42	4	Urban Restricted Access	0.25		62	2	Rural Restricted Access	0.11
42	5	Urban Unrestricted Access	0.26		62	3	Rural Unrestricted Access	0.38
43	1	Off-Network	0		62	4	Urban Restricted Access	0.25
43	2	Rural Restricted Access	0.11		62	5	Urban Unrestricted Access	0.26
43	3	Rural Unrestricted Access	0.38					

POST PROCESSING

Several custom programs created by ODOT were computed the total emissions. The process uses data on daily and directional traffic distributions as well as more up to date volume/delay functions from the 2000 Highway Capacity Manual (HCM). This process, described below and illustrated in Figure 4, also uses rewritten code able to handle the newer model network formats and MOVES generated emission factors.

The first step in the process involves running postcms.exe to calculate hourly link volumes based on the percentage of the daily volume (travel demand model output) determined by a link's facility and area type. The analysis does not use the link speeds from the travel demand model. Using a link's volume-to-capacity ratio and link group code, a post-process to the model based on HCM methods estimates the link speeds.

The second step (mmoves.exe) uses a combination of the MOVES emission factors and the hourly link volumes that are output of the postcms.exe program. The hourly volumes multiplied by the MOVES emission factor for the corresponding hour of day, speed bin, and road type; calculate emissions for every network link for each hour. The final link on road vehicle emissions for the area is the sum of all individual link-hour emissions.

The third step, (vehcalm.exe), calculates vehicle-based emissions for each source type for each hour of the day. A combination of local and default data is the source for the vehicle source type. The final vehicle emissions for each county are the sum of all individual hourly emissions for all vehicle types.

Since the intrazonal trips are not loaded onto the network, the fourth step in the process requires a separate method to account for those trips that use local roads to travel within a zone. The intracalm.exe program uses intrazonal trips to estimate VMT using the area in square miles and intrazonal trips of each zone. The computer program assumes that the zone is circular and uses the radius of the circle as the average trip length for these intrazonal trips. By combining MOVES generated emissions with estimated intrazonal VMT, the intrazonal emissions are then calculated. The emission rates are the same as those used to calculated link based emissions.

The final step is to summarize link, vehicle, and intrazonal emissions for each county, pollutant, and analyzed year, and to multiply annual average daily emissions by 365 to produce an annual estimate.

APPENDIX A

INTERAGENCY CONSULTATION DOCUMENTATION

Mike Paprocki

From: Jennifer Hunter [Jennifer.Hunter@epa.state.oh.us]
Sent: Friday, March 05, 2010 11:37 AM
To: rsharma@belomar.org; mikepap@bhjmpc.org; ldaniel@clarkcountyohio.gov; twalsh@clarkcountyohio.gov; jrdutton@co.stark.oh.us; leigh.oesterling@dot.gov; Dave.Moore1@dot.state.oh.us; jeffrey.blanton@fhwa.dot.gov; Larry.Heil@fhwa.dot.gov; terri@fivco.org; LBrown@indot.in.gov; Jesse.Mayes@ky.gov; SMapel@lcounty.com; cparasa@morpc.org; NGILL@morpc.org; fred.rader@movrc.org; randy.durst@movrc.org; tracy.higgins@movrc.org; bdavis@mpo.noaca.org; aramirez@mvrpc.org; ssalameh@ntelos.net; areser@oki.org; Perry.J.McCutcheon@wv.gov; Richard.L.Warner@wv.gov
Cc: Carolina Prado; SRAYMOND@idem.IN.gov; SHAWN SEALS; john.gowins@ky.gov; Craig.Butler@louisville.gov; Cynthia.Lee@louisvilleky.gov; William.F.Durham@wv.gov
Subject: Multi-State PM2.5 Redesignation Effort

Hello All:

OH, KY, IN and WV are working together to explore potential redesignation efforts for the 1997 annual PM2.5 standard as we are all clean based on 2007-2009 air quality data. You are being contacted because you (or your organization) have been involved historically with such efforts for redesignating OH, OH-IN-KY, OH-IN-WV and/or OH-WV nonattainment areas.

Please review the following map for those areas we are interested in obtaining your assistance with:
http://www.epa.ohio.gov/portals/27/SIP/Nonattain/pm2_5.pdf

Preliminary discussions have resulted in the following:
1-We would like to request USEPA redesignate each of these areas to attainment
2-We require assistance with mobile source modeling
3- The following years will need mobile inventories- 2005 base nonattainment year, 2008 attainment year, 2015 interim (BUDGET) year and 2021 maintenance (BUDGET) year. 2021 is still under discussion but it is our belief 2020 will not buy us enough time (it must be 10 years from USEPA's APPROVAL) and 2025 has proven to be too far out for establishing other budgets (e.g., non-mobile). So we apologize for the odd year!
4-There is significant discussion regarding whether Mobile 6.2 or MOVES is the appropriate, or best, model to use.
5-We are shooting for a by no later than end of "summer time" to submit. This would necessitate mobile runs be complete by the June time frame so we have time to synthesize the data and provide an opportunity for public comment.

In relation to #4 - each of you know better your capabilities given the time frame we are looking at. Here are some of the things we are hearing in questioning the appropriateness of using either model from our USEPA regions and also some of the concerns we have raised as a group.

1. Since we already had these projects in the works R4 and R5 (R3 silent thus far) thought we could defend the use of MOBILE6.2 for SIPs provided we submit before the summer time frame of 2010 but the closer we get to December 2010 for a state submission, the harder it will be to defend EPA approval of a SIP that relies on anything other than MOVES.

2. R5 also expressed the following: please note that the MOVES model produces higher emission estimates than MOBILE6.2 for both PM2.5 and NOx. So, at some point in time, within the 2 year MOVES grace period, the motor vehicle emission budgets will need to be updated using MOVES. From preliminary estimates, it appears that MOBILE6.2 based motor vehicle budgets will be too tight for MPOs to conform the transportation plans after the 2 year grace period. So, submitting the redesignation requests with MOBILE6.2 based motor vehicle budgets is consistent with our guidance. However, you will likely need to update the budgets in the redesignation requests using MOVES prior to the end of the grace period (prior to the MPOs being required to use MOVES for conformity purposes). The 2 year grace period will end in 2012.

3. Concern was raised about duplicating work (i.e., as a result of 2 above)

4. There is concern there may not be detailed enough county level information for the MOVES inputs.

5. It was suggested that some areas could use MOVES and others Mobile 6.2. However, there is concern that if we aren't consistent across the state then one or the other may be more scrutinized.

So at this time for each of your organizations we'd appreciate the following information by March 16, 2009:

1-For the areas on the above map - which counties can you commit to modeling?
2-Can you commit to the time frame of spring/early summer for modeling results?
3-Would you prefer to use MOVES or Mobile 6.2?
4-Even if you would prefer Mobile 6.2, are you able to use MOVES if necessary - within the time frame?
5-Will you have enough county level detail for the MOVES inputs?
6-Do you have any other comments/questions/concerns?

We thank you for your assistance,

Jennifer L. Hunter
Environmental Manager
State Implementation Plan (SIP) Development
Ohio EPA, Division of Air Pollution Control
614-644-3696

Ohio Environmental Protection Agency This communication and any response to it may constitute a public record and thus may be publicly available to anyone who requests it.

Mike Paprocki

From: Dave.Moore1@dot.state.oh.us
Sent: Thursday, July 15, 2010 8:22 AM
To: Mike Paprocki
Cc: Nino.Brunello@dot.state.oh.us
Subject: RE: AQ Networks

Mike,

Need networks for the SIP redesignation analysis as follows:

- 2005 base non-attainment year
- 2008 attainment year
- 2015 interim (Budget) year
- 2021 maintenance (Budget) year

Thanks
DM

"Mike Paprocki" <mikepap@bhjmpc.org>

07/15/2010 07:57 AM

To <Dave.Moore1@dot.state.oh.us>
cc <Nino.Brunello@dot.state.oh.us>
Subject RE: AQ Networks

I plan to start putting together a Memorandum outlining the process for the 2006 24-hour conformity exercise starting next week. What is needed from me for the 1997 SIP Redesignation package other than what Nino has accomplished to date?

Michael Paprocki
Transportation Study Director
BHJ Metropolitan Planning Commission
124 North Fourth Street, Second Floor
Steubenville, OH 43952

Phone: 740.282.3685
Fax: 740.282.1821

mailto:mikepap@bhjmpc.org

From: Dave.Moore1@dot.state.oh.us [mailto:Dave.Moore1@dot.state.oh.us]
Sent: Wednesday, July 14, 2010 12:40 PM
To: mikepap@bhjmpc.org
Cc: Nino.Brunello@dot.state.oh.us
Subject: AQ Networks

Mike,

Status of BHJ's networks for both 2006 $PM_{2.5}$ standard T-Plan conformity determination and 1997 $PM_{2.5}$ SIP

Mike Paprocki

From: Jennifer Hunter [Jennifer.Hunter@epa.state.oh.us]
Sent: Tuesday, September 07, 2010 12:38 PM
To: mikepap@bhjmpc.org; Nino.Brunello@dot.state.oh.us; Sam Granato
Cc: Leigh.Oesterling@dot.gov; Dave Moore; Carolina Prado; jeffrey.blanton@fhwa.dot.gov; Perry.J.McCutcheon@wv.gov; Richard.L.Warner@wv.gov; william.f.durham@wv.gov
Subject: Re: Multi-State PM2.5 Redesignation Effort

Sam, Nino and Mike,
We are about to wrap up our Cincinnati area redesignation effort and move onto other areas. I've been told to have them all done this year -> ouch. I'm touching base back with all the MPOs and DOTs to see where we are in MOVES modeling and how quickly we could get redesignation modeling accomplished??? I know we talked about this a while back regarding the Steub/Weirton area (Jefferson, Hancock and Brooke Counties).

As a reminder we were looking for the following MOVES modeling for SO2, NOx and PM2.5

2005
2008
2015
2021

Thanks, Jen

ps....cc'd out of courtesy all the others to keep them in the loop.

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Mike Paprocki

From: Carolina Prado [Carolina.Prado@epa.state.oh.us]
Sent: Monday, December 06, 2010 9:44 AM
To: mikepap@bhjmpc.org; Leigh.Oesterling@dot.gov; Dave Moore; Nino.Brunello@dot.state.oh.us; Sam Granato; Koch.Martin@epa.gov; Patricia Morris; Jeffrey.Blanton@fhwa.dot.gov; fred.rader@movrc.org; randy.durst@movrc.org; tracy.higgins@movrc.org; Laura.M.Crowder@wv.gov; Perry.J.McCutcheon@wv.gov; Richard.L.Warner@wv.gov; Fred Durham
Subject: Steubenville-Weirton, Wheeling, and Parkersburg-Marietta areas PM2.5 redesignation effort

Interagency Consultancy Group,

We would like to start discussion on the PM2.5 redesignations for Steubenville-Weirton, Wheeling, and Parkersburg-Marietta nonattainment areas. We would like to have an Interagency Consultation Group call to agree on parameters and timing for all three redesignations. The Steubenville-Weirton area includes the counties of Jefferson (OH) and Hancock and Brooke (WV), the Wheeling area includes the counties of Belmont (OH) and Ohio and Marshall (WV), and the Parkersburg-Marietta area includes the counties of Washington (OH) and Wood and Pleasants (WV). For the purpose of redesignations and maintenance plans we have to include emissions/projections for all these areas and counties.

As you all know we have to use MOVES to model our mobile emission for PM2.5, NOx, and SO2, and to fulfill our redesignation/maintenance plan, the following years will need mobile inventories - 2005 base nonattainment year, 2008 attainment year, 2015 interim (BUDGET) year and 2022 maintenance (BUDGET) year. During this call we would like to agree and be consistent among what's modeled and the assumptions used, as well as to have a sense of timing and other inputs needed.

Please let me know ASAP your availability on the following dates:

Friday, December 10th - anytime
Monday, December 13th - anytime
Tuesday, December 14th - after 12:00pm
Friday, December 17th - anytime

Also if I missed somebody on this email you think should be part of this IAC call, please forward the email accordingly.

Thanks,

Carolina M. Prado
State Implementation Plan (SIP) Development Ohio EPA, Division of Air Pollution Control 614-644-2310 Carolina.Prado@epa.state.oh.us

---
Ohio Environmental Protection Agency
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Mike Paprocki

From: Nino.Brunello@dot.state.oh.us
Sent: Tuesday, December 14, 2010 12:43 PM
To: Leigh.Oesterling@dot.gov
Cc: ARamirez@mvrpc.org; Carolina.Prado@epa.state.oh.us; cparasa@morpc.org; Dave.Moore1@dot.state.oh.us; William.F.Durham@wv.gov; fred.rader@movrc.org; Jeffrey.Blanton@dot.gov; Jennifer.Hunter@epa.state.oh.us; Kotsch.Martin@epamail.epa.gov; Laura.M.Crowder@wv.gov; ldaniel@clarkcountyohio.gov; mikepap@bhjmpc.org; Morris.Patricia@epa.gov; ngill@morpc.org; Perry.J.McCutcheon@wv.gov; randy.durst@movrc.org; Richard.L.Warner@wv.gov; rothaj@rapca.org; rsharma@belomar.org; Sam.Granato@dot.state.oh.us; SMapel@lcounty.com; Smith.Dianna@epamail.epa.gov; tracy.higgins@movrc.org
Subject: RE: MOVES protocols - PM2.5 redesignation
Attachments: ATT00110.jpg

I mistakenly typed the new data source in the wrong place in the parameter listing. Fuel Formulation is the one using the MOVES default values. Fuel Supply in not using defaults.

-Nino

<Leigh.Oesterling@dot.gov>

12/14/2010 11:18 AM

To <Nino.Brunello@dot.state.oh.us>, <Carolina.Prado@epa.state.oh.us>, <ldaniel@clarkcountyohio.gov>, <Morris.Patricia@epa.gov>, <aramirez@mvprc.org>, <rothaj@rapca.org>, <rsharma@belomar.org>, <mikepap@bhjmpc.org>, <Dave.Moore1@dot.state.oh.us>, <Sam.Granato@dot.state.oh.us>, <Kotsch.Martin@epamail.epa.gov>, <Smith.Dianna@epamail.epa.gov>, <Jeffrey.Blanton@dot.gov>, <fred.rader@movrc.org>, <randy.durst@movrc.org>, <tracy.higgins@movrc.org>, <Laura.M.Crowder@wv.gov>, <Perry.J.McCutcheon@wv.gov>, <Richard.L.Warner@wv.gov>, <fdurham@wvdep.org>, <SMapel@lcounty.com>, <cparasa@morpc.org>, <ngill@morpc.org>, <Jennifer.Hunter@epa.state.oh.us>

cc

Subject RE: MOVES protocols - PM2.5 redesignation

Just one question on the protocol – is Fuel Supply using MOVES Default value, as indicated on the attached protocol?

Thanks.
Leigh

Leigh A. Oesterling, Planning & Environmental Team Leader
Federal Highway Administration - Ohio Division
200 N. High Street, Room 328
Columbus, OH 43215
(614) 280-6837
leigh.oesterling@dot.gov

Please consider the environment before printing this email

From: Nino.Brunello@dot.state.oh.us [mailto:Nino.Brunello@dot.state.oh.us]
Sent: Tuesday, December 14, 2010 9:00 AM
To: Carolina Prado; ldaniel@clarkcountyohio.gov; Oesterling, Leigh (FHWA); Patricia Morris; aramirez@mvprc.org; Andy

Roth; rsharma@belomar.org; mikepap@bhjmpc.org; Dave Moore; Sam Granato; Kotsch.Martin@epamail.epa.gov; Smith.Dianna@epamail.epa.gov; Blanton, Jeffrey (FHWA); fred.rader@movrc.org; randy.durst@movrc.org; tracy.higgins@movrc.org; Laura.M.Crowder@wv.gov; Perry.J.McCutcheon@wv.gov; Richard.L.Warner@wv.gov; Fred Durham; SMapel@lcounty.com; Chandra Parasa; ngill@morpc.org; Jennifer Hunter
Subject: MOVES protocols - PM2.5 redesignation

All,

My apologies for the delay. Attached is the updated MOVES inputs protocols for today's and tomorrow's PM2.5 redesignation conference calls.

Nino

~~~~~~

Nino Brunello, P.E.
Modeling & Forecasting Section
Office of Multi-Modal Planning
Ohio Department of Transportation
(614) 752-5742[attachment "MOVES model protocals for standard MPOs.docx" deleted by Nino Brunello/MultiModalPlanning/CEN/ODOT]
~~~~~~

Fine Particulate Matter ($PM_{2.5}$), Annual Standard

Several parameters have been identified for use in the preparation of this analysis. The parameters listed below will be applied in the base MOVES setup:

- Pollutants to be monitored: SO_2, NO_x, and $PM_{2.5}$
- Model years: 2005, 2008 (leap year), 2015, and 2022 (reflecting the most recent correspondence from EPA)
- MOVES modeling technique: Emission Factor method
    - Rates per Distance
    - Rates per Vehicle
    - (Rates per Profile are used only for VOCs)
- Scale: Custom domain
- Time Span:
    - Time aggregation: Hour
    - 1 month representing average annual temperatures
    - All hours of day selected
    - 16 speed bins
    - Weekdays only
- Geographic Bounds: Custom Domain – all counties in the MORPC area
- Vehicles/Equipment: All source types, gasoline and diesel
- Road Type: All road types including off-network
- Pollutants and Processes: NO_x, All $PM_{2.5}$ categories, SO_2, Total Energy Consumption
- Strategies: none
- General Output: Units = grams, joules and miles
- Output Emissions: Time = hour, Location = custom area, on-road emission rates by road type and source use type.
- Advanced Performance: none

The following assumptions will be applied within the County Data Manager portion of the MOVES software package. Each parameter is identified, along with the source data that will be applied (if applicable).

- Source Type Population: Combination of local and default data. Local data (2010) ODOT from motor vehicle registration data. Default data used for source types 41, 61, and 62. Future year growth rate based on MPO model variable Household growth rate
- Vehicle Type VMT: Combination of local and default data. HPMSVTypeYear VMT = daily VMT from travel demand model with EPA's daily to annual VMT converter applied. monthVMTFraction = default. dayVMTFraction=default. hourVMTFraction=local.
- I/M Programs: I/M program information will be applied for 2005 where applicable.
- Fuel Formulation: Modify diesel sulfur fraction to match previous MOBILE inputs. Future runs will also be modified for reformulated gas, RVP, etc. for summer analyses.
- Fuel Supply: Using MOVES default data.
- Meteorology Data: Local data obtained from NOAA National Climatic Data Center. Data will consist of monthly high and low temperatures and daily relative humidity.
- Ramp Fraction: Using the base year travel demand model for VHT fractions. Future fractions will be assumed constant.
- Road Type Distribution: Use ODOT (and some WVDOT) county summary VMT categorized by federal functional classes

- Age Distribution: Combination of local and default data. Local data (2010) ODOT from motor vehicle registration data (also some WVDO data). Default data used for source types 41, 51, 54, 61, and 62. The same age distribution will be used for all analysis years.
- Average Speed Distribution: Using MOVES default data. Data source does not matter because it is ignored when calculating emission rates.
- Alternative Fuel Vehicle Types: Default file will be modified to reflect any CNG buses.

CONF. CALL 2/23/2011 1:30 – 1:48 P.M.

PM2.5 Redesignation OH-WV MPO AREAS

NINO B. STU MODEL 2005 2008 2015 & 2022

ASSIGNMENTS COMPLETED

NEXT STEP MOVES MODEL EMISSION RATES

POPULATION & AGE DISTRIBUTION FOR INPUT

STATE by STATE BUDGETS INDIVIDUAL

PROCESS WILL REPLACE EXISTING MVBE FOR PM2.5

including SAFETY MARGINS

18 MOS. TO ACT UPON the SIP BUDGETS

SHOULD HAVE BUDGET ADEQUACY MARCH 2012

FOR USEPA Region 5 – PAT MORRIS

Mike Paprocki

From: Carolina Prado [Carolina.Prado@epa.state.oh.us]
Sent: Wednesday, February 23, 2011 8:29 AM
To: rsharma@belomar.org; mikepap@bhjmpc.org; jeffrey.blanton@dot.gov; Leigh.Oesterling@dot.gov; Dave Moore; Mark Byram; Nino.Brunello@dot.state.oh.us; Sam Granato; Martin Kotsck; Patricia Morris; Smith.Dianna@epamail.epa.gov; fred.rader@movrc.org; randy.durst@movrc.org; tracy.higgins@movrc.org; Laura M Crowder; Perry.J.McCutcheon@wv.gov; Richard.L.Warner@wv.gov; Fred Durham
Cc: Jennifer Hunter
Subject: TODAY CALL: Steubenville-Weirton, Wheeling, and Parkersburg-Marietta areas PM2.5 redesignation

This is a friendly reminder of our call today.
February 23, 2011 (Wednesday) at 1:30 PM EST.
call in number is 614-644-4743, no access code required

Based our 12/14/2010 IAC call we agreed that Nino Brunello (ODOT) with BHJ was going to produce network for 2015 & 2022 and produce final protocol document for the Steubenville and Sam Granato (ODOT) was going to tackle the Wheeling and Parkersburg areas in coordination with the respective MPOs.

During the call it was agreed we would receive mobile numbers and protocols for all these three areas (Steubenville-Weirton, Wheeling, and Parkersburg-Marietta) by March 24, 2011. During this call we would like to have an update on these efforts and know if we are still on target for the 3/24 deadline.

Thanks,
Carolina

Ohio Environmental Protection Agency
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Mike Paprocki

From: Carolina Prado [Carolina.Prado@epa.state.oh.us]
Sent: Tuesday, December 14, 2010 2:29 PM
To: rsharma@belomar.org; mikepap@bhjmpc.org; jeffrey.blanton@dot.gov; Leigh.Oesterling@dot.gov; Dave Moore; Nino.Brunello@dot.state.oh.us; Sam Granato; Martin Kotsck; Patricia Morris; Smith.Dianna@epamail.epa.gov; fred.rader@movrc.org; randy.durst@movrc.org; tracy.higgins@movrc.org; Laura M Crowder; Perry.J.McCutcheon@wv.gov; Richard.L.Warner@wv.gov; Fred Durham
Cc: Jennifer Hunter
Subject: NEXT CALL: Steubenville-Weirton, Wheeling, and Parkersburg-Marietta areas PM2.5 redesignation

Follow Up Flag: Follow up
Due By: Tuesday, February 22, 2011 9:00 AM
Flag Status: Flagged

Thanks for your participation in today's call.

We will have a follow-up call on February 23, 2011 (Wednesday) at 1:30 PM EST.
The call in number is 614-644-4743, no access code required.

Thanks,
Carolina

Ohio Environmental Protection Agency
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