AIR QUALITY ANALYSIS

AND

CONFORMITY DETERMINATION

FOR

BELMONT, OHIO AND MARSHALL COUNTIES

June, 2018

Prepared by:

Bel-O-Mar Regional Council
105 Bridge Street Plaza
Wheeling, WV 26003
www.belomar.org

INTRODUCTION

As per the EPA's final rule published in the Federal Register Vol. 69, No. 126 on July 1, 2004, "Transportation Conformity is required under the Clean Air Act section 176(c) (42 U.S.C. 7506(c) to ensure that federally supported highway and transit project activities are consistent with ("Conform to") the purpose of the state air quality implementation plan (SIP). Conformity currently applies under EPA's rules to areas that are designated nonattainment or maintenance." Areas are designated "nonattainment" for violating the National Ambient Air Quality Standards (NAAQs). Final Rules published in the Federal Register Vol. 69, No. 84 on April 30, 2004 state "CAA definition of the nonattainment area that is defined in Section 107(d)(1)(A)(I) as an area that is violating the standard. If an area meets this definition, EPA is obligated to designate the area as nonattainment." The nonattainment areas can be redesignated as attainment/maintenance as per section 107(d)(3) of the Clean Air Act.

Nonattainment designations are based on violating the NAAQs for any one or more criteria pollutants. Six (6) common air pollutants that are harmful for our health and for which specific standards are established by the EPA, are Nitrogen Dioxide, Ozone, Carbon Monoxide, Sulfur Dioxide, Particulate Matter and Lead. The area is designated nonattainment for particulate matter ($PM_{2.5}$) and was designated nonattainment for Ozone. Effective June, 2007 all three counties have been redesignated as attainment for Ozone.

As per 1997 NAAQs, the Ozone standard was exceeded if the three year average of the 4th highest Ozone reading was greater than 0.08 ppm. This value is also referred to as "design value." Bel-O-Mar was designated as non-attainment under this 1997 8-hour standard. In 2008, the standard was lowered to 0.075 ppm. EPA further revised this to 0.070 ppm in October, 2015.

As part of the redesignation process, OEPA and WVDEP were required to submit a SIP revision including maintenance plan for their respective area. Both agencies were able to demonstrate that the area will continue to be in attainment of the 8-hour Ozone NAAQs. In doing so, emission budgets were established in the maintenance plan and were found to be adequate by USEPA. Emissions budget was developed using MOBILE 6.2. As a maintenance area, it is Bel-O-Mar's responsibility to make a conformity determination based on established budgets for ozone precursors NOx and VOC.

West Virginia revised the Motor Vehicle Emissions budgets for Ozone precursors in 2011. The final (corrected) USEPA approved budgets were published on December 22, 2011 in the Federal Register Vol. 76, No. 246. These budgets are used for the ozone conformity for the Ohio and Marshall Counties. Belmont County budgets were first developed using MOBILE 6.2. The VOC and NOx budgets were published in Federal Register Vol. 72, No. 94 on May 17, 2007. These budgets were replaced by the MOVES based budget published in Federal Register Vol. 78, No. 112 on June 11, 2013. These budgets are used for the Belmont County Ozone Conformity.

In April, 2015, the 1997 Ozone NAAQs were revoked and as per EPA guidance, conformity determination for 1997 Ozone NAAQs was not needed for the Wheeling Metropolitan Planning area. Thus, following the interagency consultation process, a qualitative conformity determination was made for the Long Range Plan for 2040 and the FY2018 - FY2021 TIP. However, the United States Court of Appeals for Washington, D.C. in the ruling issued on February 16, 2018, reversed EPA's decision, and emission analysis based conformity

determination is required again. As per an interagency conference call on May 30, 2018, it was decided that the emissions analysis based conformity of the 1997 Ozone NAAQs is needed for the previously adopted Long Range Plan and TIP. Thus, an emissions analysis based Ozone conformity determination for Belmont County, Ohio and Ohio and Marshall Counties in West Virginia is done. MOVES based emissions developed by ODOT for the Ohio and West Virginia portions are used for this conformity.

As per EPA's final rule 40 CFR Part 93 conformity to the purpose of the SIP means that transportation activities will not cause new air quality violations, worsen existing violations, or delay timely attainment of the relevant national ambient air quality standards. The metropolitan planning organization (MPO) is charged with the responsibility to demonstrate conformity. Thus as per Court of Appeals ruling and guidance from FHWA and EPA, the MPO is adding the emissions based transportation conformity to the existing conforming plan.

For the $PM_{2.5}$, the area was re-designated to attainment of the 1997 annual NAAQS in September, 2013. As a part of the attainment ruling, EPA also determined that for the purpose of transportation conformity, emissions from on road mobile sources are insignificant. This finding relieved both states of the obligation to comply with nonattainment-related planning requirements for $PM_{2.5}$ pursuant to Part D of the Clean Air Act. As a result, emissions analysis is not required for $PM_{2.5}$ transportation conformity. However, the conformity process, including interagency consultation and other conformity requirements are still to be satisfied. In addition, a project level hot-spot analysis is also potentially required.

It was determined that the $PM_{2.5}$ conformity can be established based on qualitative regional conformity determination pursuant to 40 CFR §93.109(f). The qualitative regional conformity is to include other requirements of the rule such as interagency consultation process, fiscal constraints, latest planning assumptions and public involvement.

As per interagency consultation process, a qualitative conformity determination was done for the $PM_{2.5}$. The $PM_{2.5}$ conformity is not affected by the court ruling. The emissions analysis based conformity is being done for Ozone precursors only.

Transportation Conformity Process

The regulatory requirements that govern this process, require that a locally relevant conformity process be developed through interagency consultation. An initial interagency meeting was held on August 31, 2004 in Marietta, Ohio to establish a process for addressing Ozone conformity. Another interagency meeting was held on August 31, 2005 in Parkersburg, West Virginia to address $PM_{2.5}$ conformity issues. Since then, several meetings have been held via conference calls. The most recent interagency consultation was via a conference call on May 30, 2018.

The purpose of this interagency conference call was to establish an appropriate conformity process for the previously adopted Long Range Plan and TIP. A conformity process summary was prepared and sent for the interagency review. The process summary and associated emails are included in Appendix A. A qualitative conformity analysis was done for the Long Range Transportation Plan for 2040 and the FY2018 - FY2021 TIP. In the light of

Washington, D.C. Court of Appeals ruling on February 16, 2018, it is necessary to do a quantitative analysis including emissions analysis and approved budgets for Ozone precursors VOC and NOx. It was decided that USEPA published VOC and NOx budgets for the three counties will be used for the budget test. On-road emissions will be generated using the current Travel Demand Model and MOVES emissions. Emissions are to be generated for the following analysis years:

> 2018 - 1st year [1]
> 2020 - Interim year
> 2030 - Interim year
> 2040 - Long Range Plan horizon year

The conformity determination is done separately for Belmont County, Ohio and Ohio and Marshall Counties in West Virginia. The Ozone conformity is based on estimated plan emissions being less than the established budgets.

In developing emissions a Travel Demand Model[2] (TDM) and MOVES software is used. The TDM inputs the roadway network and land use data for the relevant year. All roadways classified collectors and up are included in this network. The TDM outputs vehicle miles of travel (VMT). The VMT and MOVES emission factors for Ozone, are used to generate emissions. The latest available data or extrapolation from the most recent available data for the base year (2010) is used. A typical summer day is used. The horizon year of the transportation plan is 2040. The Ozone budget year is 2018. Emissions are generated for the years 2018, 2020, 2030, and 2040. The Ohio portion emissions for 2018 are not generated by ODOT for the Ohio MPOs in EPA Region 5. The year 2040 is the plan horizon. For the West Virginia portion, 2018 is the first analysis year, while 2020 and 2030 are the interim years. On the Ohio side, 2020 is the first analysis year and 2030 is the interim year. In forecasting demographics and land use variables for the analysis years and LRP horizon year, the latest planning assumptions and available data are used.

Latest Planning Assumptions

The base year for the Travel Demand Model (TDM) was updated from the year 2002 to 2010. The 2010 decennial census block level data was aggregated for subareas known as Traffic Analysis Zones (TAZs). Population and households were used for benchmarking other variables used for the TDM. The variables used are households, school enrollment, number of vehicles and employment. Most recent available employment data from the Bureau of Labor Statistics was used for the employment. School enrollment was obtained from the Department of Education of each State. Number of vehicles was obtained using the rate for number of vehicles available for household.

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[1] 2018 Emissions are generated for the West Virginia portion only, as for Ohio portion, they are not required.

[2] The TDM is developed, validated and maintained by ODOT with MPO input and assistance.

Latest available employment projections, acquired from the Woods and Poole Economic, Inc., were used for the future employment. Employment at TAZ Level was generated by disaggregating the countywide employment projection.

Transit trips in the area are significantly low in relation to the auto trips. On an average, there are less than 2,500 transit trips per day. Thus, as agreed upon by the participating agencies, model split was not used.

The area has experienced population loss in the past. As per the 2010 Census, the region lost 3% of the population. However, the percentage population lost has continually decreased since 1990, and this is projected to continue with the estimated regional population decreasing by just 1.5% by the year 2040. Due to this relatively small change, the number of households, vehicle registration and school enrollment are expected to remain nearly the same as 2010 values. With many new businesses and developments expected in the area, and the continued growth of the natural gas industry, the employment growth between 2010 and 2040 is expected to be significant. Even with the slight loss in population, the number of people employed is expected to increase by 27% by the year 2040.

Land Use Data

Travel analysis zones (551 in the 3-county area) and external roadway "stations" (32) are the basic geographic units for estimating travel patterns. Socioeconomic data used to forecast future travel patterns include population, households, school enrollment, vehicle registrations, and employment by category and location. Sources for the 2010 data include the 2010 Census (primarily SF1 block data) and ES202 employment data. All data sources were geocoded and aggregated to the zone level. Future year data for each variable was projected through various methods. A table showing base and horizon year variables is included as Table 3 in Appendix B.

The area is experiencing significant activity related to the extraction of natural gas from the shale formations. The employment outlook for the future is very good.

A survey of local elected and appointed officials and economic development agencies in the region was conducted to determine areas of future growth and known gain/loss of jobs and housing. Survey results were incorporated in developing the 2040 zonal statistics. The zonal assignment was based on the developmental potential of each TAZ, planned and committed developments and local knowledge. In assigning growth to TAZs, it was assumed that new sites with developed infrastructure or in close proximity to one, will have a larger share of future growth. Given the topography of the region, it is assumed generally that new economic development will mostly occur in one east-west corridor (I-70/US40) and one north-south corridor (Ohio Route 7 and US250/WV Route 2 along the Ohio River). In Belmont County, however, additional development is expected along SR331 and in areas surrounding the urban core. Due to a scarcity of developable land in Ohio County, development will occur on sites that are generally flat and can be adequately serviced. In addition, over time, generally flat land in the valley will selectively go through planned land use changes to optimize economic development. The population and employment projections prepared by the Woods and Poole Economics, Inc. are used. Countywide employment projection was disaggregated to traffic analysis zone level.

Travel Demand Model

The TDM covers all three MPO counties and is maintained by ODOT. It was validated based on 2010 variables and traffic counts. Since emissions analysis was not required, forecasted volumes and VMT were generated for the horizon year (2040) only. Digital roadway network for each of the four analysis years, used for emissions analysis, are prepared and used now. Trip generation figures, with some exceptions, are assumed to change linearly between 2010 and 2040. All plan projects are included based on the assigned analysis year. The list of these projects is included below. Additional TDM details are provided in the Technical Memorandum prepared by ODOT and included as Appendix B.

<center>**Highway Project Recommendations**</center>

Belmont County

Upgrade I-70 to six lanes from the SR9 Interchange to Mall Road Interchange.   Analysis Year 2030

Construct a new Commons Mall Road from US40 South to Mall Rd. and Banfield Rd. Intersections.   Analysis Year 2018

Ohio County

Upgrade I-70 to six lanes from Elm Grove/Triadelphia Interchange to Cabela Drive.   Analysis Year 2040

Marshall County

Upgrade WV2 to add a fifth lane (TWLTL) from 6th Street in Moundsville (M.P. 19.50) to US250 Intersection (M.P. 20.35)   Analysis Year 2020

Upgrade WV2 from Kent (M.P. 4.5) to Franklin (M.P. 6.5).   Analysis Year 2030

Upgrade WV2 from Wetzel County Line (M.P. 00) to Kent (M.P. 4.5)   Analysis Year 2030

Emissions Factor Model

ODOT utilizes USEPA's MOVES2014a emissions modeling software. Emissions generated for this conformity analysis are generated through MOVES2014a. Emissions are generated at county level. The Technical Memorandum prepared by ODOT and included as Appendix B, includes settings and inputs used to run this model. The MOVES emissions used for the conformity are shown in Table 1.

Public Involvement

To be added in the final document after the public comment period.

Transportation Conformity Test

The ozone conformity tests are based on the data in Table 1. In this table, the 2018 budgets are USEPA approved budgets and emissions are estimated using a Travel Demand Model, maintained and run by ODOT and MOVES2014a emissions modeling software was also run by ODOT. The table is reproduced here from the report "Bel-O-Mar Region Air Quality Conformity Analysis - Technical Memo" prepared by ODOT in June 2018. This report is included as Appendix B. West Virginia Department of Environmental Protection submitted revised budget for Ozone. The revised (corrected) Ozone budgets for Ohio and Marshall counties were published by USEPA in the Federal Register on December 22, 2011 (Federal Register Vol. 76, No. 246). Revised budgets are used. West Virginia budgets are MOBILE based. ODOT prepared MOVES based budget in the year 2013. These were approved by USEPA on June 11, 2013 (Federal Register Vol. 78, No. 112). For Belmont County, these budgets are used. The USEPA approved budgets and MOVES based emissions are shown in Table 1.

Table 1
Ozone Budgets and Emissions
(Tons/Day)

Belmont Co. (OH)	2018 Budget	2018 Emissions	2020 Emissions	2030 Emissions	2040 Emissions
VOC	2.15	n/a	0.93	.54	.40
NOx	5.18	n/a	1.82	.83	.57
Marshall & Ohio Co. (WV)	2018 Budget	2018 Emissions	2020 Emissions	2030 Emissions	2040 Emissions
VOC	7.7 *	.63	.53	.44	.24
NOx	3.1	1.25	1.03	1.07	.43

Conformity Determination

A fiscally constrained 2040 Transportation Plan was prepared by the Bel-O-Mar Regional Council in accordance with the provisions of MAP-21 and FAST ACT. The financial constraint determination is made by Bel-O-Mar based on the project cost estimates and future revenue stream estimates provided by ODOT and WVDOT. All plan projects by anticipated year of completion were included in the emissions analysis.

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* On July 11, 2018, USEPA published the revised budget for Ohio and Marshall Counties in the Federal Register, Vol. 83, No. 133. The revised VOC budget is 9.1 tons per day (tpd). This is significantly higher than the 7.7 tpd used for the conformity determination. Therefore, the budget test is also met with the revised (9.1 tpd) budget for Ohio and Marshall Counties.

Since the area has been redesignated as attainment/maintenance for ozone by USEPA and separate ozone budgets for the Ohio and West Virginia side have been established, the ozone conformity test is based on approved budgets. Conformity determination is made separately for Belmont County, Ohio and Ohio and Marshall Counties, West Virginia.

As per Table 1 for ozone in Belmont County, the VOC and NOx emissions for the analysis year 2020 are less than budgets for 2018. Also the emissions for interim year 2030 and the horizon year 2040 are less than the budget for 2018. Therefore, the conformity test for ozone is met for Belmont County, Ohio.

For the Ohio and Marshall Counties in West Virginia, the emissions for the year 2018, interim years 2020 and 2030 and the plan horizon year 2040 are less than the budgets for 2018. Since the emissions for both Ozone precursors VOC and Nox are less than the 2018 approved budgets, the conformity test is met.

Since the budget test for both Ozone precursors is met, the 2040 Transportation Plan is in conformity with the requirements of the CAAA, Ohio SIP and West Virginia SIP.

Transportation Improvement Program (TIP) for FY2018-FY2021 includes projects derived from the conforming plan. Only the analyzed plan projects and plan consistent exempt projects are included in this TIP. Therefore, the TIP for FY2018-FY2021 is in conformity with the requirement of the CAAA, Ohio SIP and West Virginia SIP.

The TIP and the long range transportation plan are financially constrained and this determination is made by Bel-O-Mar in cooperation with the WVDOT and ODOT.

APPENDIX A

Interagency Consultation

EXHIBIT A

Interagency Consultation

After a conference call on May 30, 2018 as per interagency consultation a "Wheeling/Bridgeport 2040 Transportation Plan Conformity Analysis Summary" was prepared based on the template provided by ODOT. This summary outlined the process and timeline for the conformity. This summary document is included here.   The conformity summary was emailed for consensus on the process and timeline. The consensus emails received are presented below.

From: Fewell, David R
<David.R.Fewell@wv.gov>
Sent: Wednesday, June 06, 2018 3:53 PM
To: Rakesh Sharma
Subject: FW: Bel-O-Mar 1997 Ozone Conformity
- Interagency Consultation
Attachments: Wheeling conformity sum_May 2018.doc

Rakesh,

The WVDEP concurs.

Thanks,

David Fewell
 304-926-0499 ext.1255

From: Toole, Laura (FHWA)
<laura.toole@dot.gov>
Sent: Wednesday, June 06, 2018 1:05 PM

To: Maietta, Anthony;
Michael.Maleski@epa.ohio.gov; Rakesh Sharma; Dave.Moore1@dot.ohio.gov; Keller,
Perry J; Oesterling, Leigh (FHWA); Inglis-Smith, Chandra (FHWA); McKenzie,
Stewart (FTA); David Fewell; Becoat, gregory; DeAngelis, Michele (FTA)
Cc: Sam.Granato@dot.ohio.gov;
Nino.Brunello@dot.ohio.gov
Subject: RE: Bel-O-Mar 1997 Ozone Conformity
- Interagency Consultation

The FHWA Ohio Division concurs with the Wheeling/Bridgeport 2040 Transportation
Plan Conformity Analysis Summary.

Sincerely,
Laura

From: Maietta, Anthony [mailto:maietta.anthony@epa.gov]
Sent: Wednesday, June 6, 2018 11:59 AM
To: Michael.Maleski@epa.ohio.gov; Rakesh Sharma <rsharma@belomar.org>; Toole,
Laura (FHWA) <laura.toole@dot.gov>; Dave.Moore1@dot.ohio.gov; Keller, Perry J
<Perry.J.Keller@wv.gov>; Oesterling, Leigh (FHWA) <Leigh.Oesterling@dot.gov>;
Inglis-Smith, Chandra (FHWA) <chandra.inglis-smith@dot.gov>; McKenzie, Stewart
(FTA) <Stewart.Mckenzie@dot.gov>; David Fewell <david.r.fewell@wv.gov>; Becoat,
gregory <becoat.gregory@epa.gov>; DeAngelis, Michele (FTA)
<Michele.DeAngelis@dot.gov>
Cc: Sam.Granato@dot.ohio.gov; Nino.Brunello@dot.ohio.gov
Subject: RE: Bel-O-Mar 1997 Ozone Conformity - Interagency Consultation

EPA Region 5 concurs as well.

Thanks,

-Tony

Anthony Maietta

EPA Region 5

(312) 353-8777

maietta.anthony@epa.gov

All,

Ohio EPA concurs with the Wheeling/Bridgeport 2040 Transportation Plan
Conformity Analysis Summary.

Thanks,

Mike Maleski

Ohio EPA - Division of Air Pollution Control

<Dave.Moore1@dot.ohio.gov>; Keller, Perry J <Perry.J.Keller@wv.gov>; Oesterling, Leigh <leigh.oesterling@dot.gov>; Maleski, Michael <Michael.Maleski@epa.ohio.gov>; Maietta.Anthony@epa.gov; Inglis-Smith, Chandra (FHWA) <chandra.inglis-smith@dot.gov>; McKenzie, Stewart (FTA) <Stewart.Mckenzie@dot.gov>; Fewell, David R <David.R.Fewell@wv.gov>; becoat.gregory@epa.gov; DeAngelis, Michele (FTA) <Michele.DeAngelis@dot.gov>

Cc: Granato, Samuel <Sam.Granato@dot.ohio.gov>; Brunello, Antonino <Nino.Brunello@dot.ohio.gov>

Subject: RE: Bel-O-Mar 1997 Ozone Conformity - Interagency Consultation

All,

I have included David Fewell (WVDEP) and Gregory Becoat (EPA) and Michele DeAngelis (FTA).

Rakesh Sharma

From: Toole, Laura (FHWA) <laura.toole@dot.gov>

Sent: Monday, June 04, 2018 2:49 PM

To: Dave.Moore1@dot.ohio.gov; Keller, Perry J <Perry.J.Keller@wv.gov>; Oesterling, Leigh (FHWA) <Leigh.Oesterling@dot.gov>; Michael.Maleski@epa.ohio.gov; Maietta.Anthony@epa.gov; Inglis-Smith, Chandra (FHWA) <chandra.inglis-smith@dot.gov>; McKenzie, Stewart (FTA) <Stewart.Mckenzie@dot.gov>

Cc: Rakesh Sharma <rsharma@belomar.org>; Sam.Granato@dot.ohio.gov; Nino.Brunello@dot.ohio.gov

Subject: RE: Bel-O-Mar 1997 Ozone Conformity - Interagency Consultation

All,

I am including Steward McKenzie, FTA Region V, in this email.

Sincerely,

Laura

From: Dave.Moore1@dot.ohio.gov [mailto:Dave.Moore1@dot.ohio.gov]

Sent: Monday, June 4, 2018 2:29 PM

To: Keller, Perry J <Perry.J.Keller@wv.gov>; Oesterling, Leigh (FHWA)
<Leigh.Oesterling@dot.gov>; Toole, Laura (FHWA) <laura.toole@dot.gov>;
Michael.Maleski@epa.ohio.gov; Maietta.Anthony@epa.gov; Inglis-Smith, Chandra
(FHWA) <chandra.inglis-smith@dot.gov>

Cc: rsharma@belomar.org; Sam.Granato@dot.ohio.gov; Nino.Brunello@dot.ohio.gov

Subject: Bel-O-Mar 1997 Ozone Conformity - Interagency Consultation

All,

See attached Bel-O-Mar Conformity Summary – Interagency Consultation
documentation. Bel-O-Mar is initiating a new 1997 Ozone Standard 2040
Transportation Plan and 2018-2021 TIP transportation conformity determination.
This documentation summarizes the conformity criteria, procedures, and schedules
and SIP mobile budget tests by which Bel-O-Mar proposed to advance its
conformity demonstration.

Please forward this documentation to WV interagency planning partner agencies.

Please review this document and respond with interagency consultation comments
and/or concurrence with the procedures TMACOG is proposing.

Thanks
DM

   Did You Know: Children of parents who talk to their teens about drugs are

   up to 50% less likely to use. Start the conversation:
StartTalking.Ohio.Gov
   This email is intended for the sole use of the intended recipient and may
   contain privileged, sensitive or protected information. If you are not the

EXHIBIT B

Wheeling/Bridgeport
2040 Transportation Plan Conformity Analysis Summary

The Wheeling MPO (Wheeling WV, – Bridgeport, OH urbanized area) is initiating a new conformity analysis/determination for its existing 2040 Transportation Plan and 2018 – 2021 Transportation Improvement Program. This new conformity process is in response to FHWA's April 23, 2018 guidance requiring conformity analyses for "orphaned" US EPA 1997 Ozone standard areas.

Interagency consultation topics
- **Latest planning assumptions** – The base year for the Travel Demand Model (TDM) was updated from the year 2002 to 2010. The 2010 decennial census block level data was aggregated for subareas known as Traffic Analysis Zones (TAZs). Population and households were used for benchmarking other variables used for the TDM. The variables used are households, school enrollment, number of vehicles and employment. Most recent available employment data from the Bureau of Labor Statistics was used for the employment. School enrollment was obtained from the Department of Education of each State. Number of vehicles was obtained by using the rate for number of vehicles available per household.

Latest available employment projections, acquired from the Woods and Poole Economic, Inc., were used for the future employment. Employment at TAZ Level was generated by disaggregating the countywide projected employment.

Transit trips in the area are significantly low in relation to the auto trips. On an average, there are less than 2,500 transit trips per day. Thus, as agreed upon by the participating agencies, model split was not used.

The area has experienced population loss in the past. As per the 2010 Census, the region lost 3% of the population. However, the percentage loss has continually decreased since 1990, and is projected to continue with the estimated regional population decreasing by just 1.5% by the year 2040. Due to this relatively small change, the number of households, vehicle registration and school enrollment are expected to remain nearly the same as 2010 values. With many new businesses and developments expected in the area, and the continued growth of the natural gas industry, the employment growth between 2010 and 2040 is expected to be significant. Even with the slight loss in population, the number of people employed is expected to increase by 27% by 2040.

- **Latest emission modeling**
  - Conformity analyses will utilize MOVES2014a
- Conformity tests – 1997 Ozone SIP budgets tests
- **Analyzed, regionally significant projects list –**

Ohio County:
Upgrade I-70 to six lanes from Elm Grove/Triadelphia Interchange to Cabela Drive
    Analysis Year 2040

Marshall County:
Upgrade WV2 to add a fifth lane (TWLTL) from 6th Street in Moundsville (M.P. 19.50) to US250 intersection (M.P. 20.35)
     Analysis Year 2020
Upgrade WV2 from Kent (M.P. 4.5) to Franklin (M.P. 6.5)
     Analysis Year 2030
Upgrade WV2 from Wetzel County Line (M.P. 00) to Kent (M.P. 4.5)
     Analysis Year 2030

Belmont County:
Upgrade I-70 to six lanes from the SR9 Interchange to Mall Road Interchange.
     Analysis Year 2030
Construct a new Commons Mall Crossing Road from US40 South to Mall Rd and Banfield Rd Intersections.
     Analysis Year 2018

- **Conformity Analysis/Determination schedule**
  - AQ conformity runs – Received by June 27, 2018 (ODOT/Belomar)
  - Final Bel-O-Mar Conformity documentation recording emissions analysis methodology and results. – By July 3, 2018 (Belomar)
  - Public Involvement effort to review conformity results – Commences on July 10th and ends on July 25, 2018 (Public Notice, Webpage and Facebook postings and email comments received via email, on webpage 24/7, thru Facebook 24/7, onsite and thru regular mail)
  - Bel-O-Mar Transportation Plan/2018 – 2021 TIP Conformity determination – July 26, 2018 presented for board action.

8-Hour Ozone

Attainment/SIP status:
- 1997 8-Hour Ozone Standard Maintenance Area –
- MOVES Based Ohio SIP budgets - June 11, 2013 - 78 FR 34903
- Revised West Virginia MOBILE budgets December 22, 2011 - 76 FR 79540
Geography:
- Belmont County, Ohio
- Marshall and Ohio Counties, WV
Conformity Tests:
- 8-Hour SIP budget tests of Bel-O-Mar 2040 T-Plan and 2018 – 2021 TIP analysis year networks
Analysis Years:
- 2018 - 1st analysis year
- 2020 - Interim year
- 2030 - Interim year
- 2040 - Transportation Plan horizon year

	1997 8-Hour Ozone -Tons/Day				
OH	2018 Budget	2018 Emissions	2020 Emissions	2030 Emissions	2040 Emissions
VOC	2.15				
NOx	5.18				
WV	2018 Budget	2018 Emissions	2020 Emissions	2030 Emissions	2040 Emissions
VOC	7.7				
NOx	3.1				

APPENDIX B

Air Quality Conformity Analysis - Technical Memo

Ohio DOT, Modeling & Forecasting Section

June 2018

APPENDIX B

Belomar Regional Council
Air Quality Conformity Analysis - Technical Memo
Ohio DOT, Modeling & Forecasting Section   June 2018

Wheeling Area Air Quality Analysis   States of Ohio and West Virginia

The Wheeling MPO (Wheeling WV, – Bridgeport, OH urbanized area) is initiating a new conformity analysis/determination for its existing 2040 Transportation Plan and 2018 – 2021 Transportation Improvement Program. This new conformity process is in response to FHWA's April 23, 2018 guidance requiring conformity analyses for "orphaned" US EPA 1997 Ozone standard areas.

Table 2.1 summarizes the summertime daily HC and NOX emissions estimates for all three counties for years 2018, 2020, 2030, and 2040. Table 2.2 shows the regional total emissions. The comparison to regionwide budget figures is shown below in Table 1.

Figure 1 –Area Analyzed
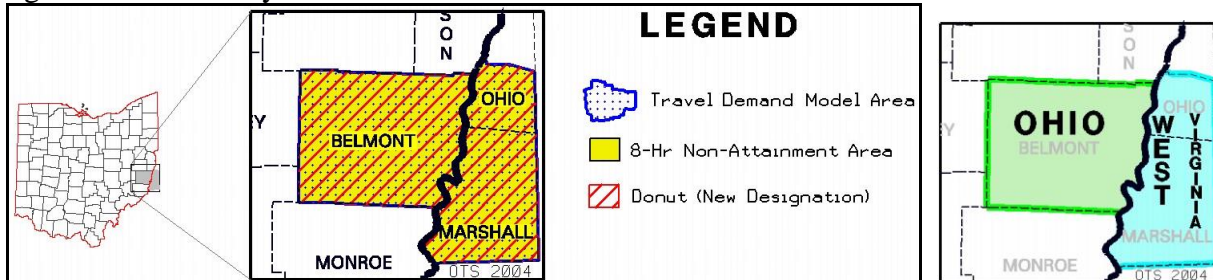
Table 1						
Belmont Co. (OH)	**2010 Baseline**	**2018 Budget**	**2018 Emissions**	**2020 Emissions**	**2030 Emissions**	**2040 Emissions**
VOC		2.15	n/a	0.93	.54	.40
NOx		5.18	n/a	1.82	.83	.57
Marshall &Ohio Co. (WV)	**2010 Baseline**	**2018 Budget**	**2018 Emissions**	**2020 Emissions**	**2030 Emissions**	**2040 Emissions**
VOC		7.7	.63	.53	.44	.24
NOx		3.1	1.25	1.03	1.07	.43

Table 2.1 – HC and NOX Summer Emissions by County

	Belmont County OH		Marshall County WV		Ohio County WV		WV Total	
Year	HC	NOX	HC	NOX	HC	NOX	HC	NOX
2018	n/a	n/a	0.22	0.43	0.41	0.82	0.63	1.25
2020	0.93	1.82	0.19	0.35	0.34	0.68	0.53	1.03
2030	0.54	0.83	0.15	0.36	0.29	0.70	0.44	1.07
2040	0.40	0.57	0.08	0.15	0.16	0.28	0.24	0.43

Note: Emissions are expressed in tons per day

1

Table 2.2 Three-County Region Total Emissions

Year	HC	NOX
2018	n/a	n/a
2020	1.46	2.85
2030	0.98	1.90
2040	0.64	1.00

Note: Emissions are expressed in tons per day

Travel Demand Model

A travel demand model (TDM) is the traditional forecasting tool used to examine potential changes in future travel patterns. The digital road networks within them include all planned federal-aid projects as well as any regionally significant projects found in the TIP and LRTP expected to be open for traffic by the end of each respective analysis year. All projects identified in the LRTP having an impact on travel time and/or vehicle carrying capacity regardless of funding source were included in the air quality analysis. Trip generation figures by zone, with some exceptions, are assumed to change linearly with time between 2010 and the Plan Horizon year of 2040.

The Wheeling area travel demand model network covers about 1500 miles of streets and highways in the 3-county metro area and has recently been reconstructed from digital e-911 roadway centerline files from Belmont County and the state of West Virginia's SAMB program, and most recently validated to observed traffic volumes for the year of 2010. The Long Range Plan project listings were used to create digital networks for the Years 2018, 2020, 2030 and 2040. Land use data comes from the Census, ES202 employment reporting, and local vehicle registrations. A trip generation model was borrowed from another urban area and adjusted as needed for local land use data. The hourly distribution of trips by trip purpose and direction are constrained to match the hourly distribution of traffic counts. Trip distribution also begins with a trip-length distribution by purpose borrowed from another urban area and adjusted to ensure modeled VMT matched HPMS estimates of VMT within 1% in the model base year of 2010.

The modeling software program utilizes hourly saturation flow rates that are calculated based on road inventory data, roadway type, and the Highway Capacity Manual (HCM). Coded speeds by street segment are a function of road type and posted speed limits and are based on the Ohio statewide travel time study conducted in 2000 (available on the web at http://www.dot.state.oh.us/urban/data/statewid/report.doc) using the "run time" version of speeds without intersection delays. The modeling software program internally estimates additional travel times for vehicles that stop for traffic control (stop signs and red lights) based on HCM methods and modeled traffic patterns. A more complete description of the modeling procedures is available at http://ajhassoc.com/ . (This is also the first working travel model in the country to make use of travel time reliability to estimate travel routes, as described in the Transportation Research Record at https://trrjournalonline.trb.org/doi/pdf/10.3141/2302-20 .)

Land Use / Socio-Economic Data

Data used to forecast future travel patterns include households, population, school enrollment, vehicle ownership, labor force participation, and employment by industry category and location. Sources for year 2010 data include the 2000 Census (primarily block-level data, aggregated to 551 zones), QCEW (U.S. BLS) employment data from state-based employment agencies, and school enrollment information from the US Department of Education. Table 3 below provides a summary of forecasted growth in metro area population and employment. The land use forecasts for the three-county area (including sources and rate of change over time) are documented in the latest update to the Long-Range Transportation Plan prepared by Bel-O-Mar staff (Table 5-1 at http://www.belomar.org/trans/lrp/ , which is copied as Table 3 below.

Table 3 – Summary of Key Metro Area Land Use and Forecasted Growth Assumptions

	2010	2040 Projected
Population	147,950	145,665
Households	61,462	61,590
Vehicle registrations	104,317	104,789
Employment	79,608	101,047
K-8 School Enrollment	15,105	15,012
High School Enrollment	7,617	7,206
Post Secondary/College	10,406	9,762

Table 4 – Forecasted daily vehicle-miles of travel (VMT)

County	Travel Model VMT by County			
	Yr 2018	Yr 2020	Yr 2030	Yr 2040
Ohio	1,463,000	1,501,000	1,668,000	1,951,000
Marshall	812,000	829,000	910,000	1,057,000
Belmont	2,582,000	2,844,000	3,154,000	3,648,000
Total	**4,857,000**	**5,174,000**	**5,732,000**	**6,656,000**

Emission Factors

The U.S. EPA's emissions model MOVES2014a was used to develop emission factors for applicable years for both VOCs and NOX. The input files contains local parameters, developed through consultation with OEPA, for temperature, humidity, vehicle inspection and maintenance programs, and fuel characteristics. Total emissions were computed as described in the CMAQ report prepared by ODOT staff and available on the World Wide Web at http://www.dot.state.oh.us/Divisions/Planning/SPR/ModelForecastingUnit/Documents/cmaqr6_revised_jan_2012.pdf . (The network format used is as described in Appendix B of the report.) Unless cited otherwise in this report, U.S. EPA default values are utilized. For the three-county Wheeling metro area, this includes the distribution of vehicles by age and type by functional class.

Table 3 summarizes the settings used in the MOVES run specification file and the MOVES County-Data Manager. The subsequent tables provide the specific inputs not using the MOVES default values.

<div align="center">

Table 3 – MOVES Inputs

</div>

RunSpec Parameter Settings	
MOVES Version	MOVES2010A
Scale	Custom Domain

MOVES Modeling Technique	Emission Factor Method
	    Rates per Profile (grams/vehicle)
	    Rates per Distance (grams/mile)
	    Rates per Vehicle (grams/vehicle)

Time Span	Time Aggregation: Hour 1 Month representing average summer temperatures All hours of day selected, 16 speed bins, Weekdays only
Geographic Bounds	Belmont county OH, Ohio and Marshall counties WV
Vehicles/Equipment	All source types, gasoline and diesel
Road Type	All road types including off-network
Pollutants and Processes	Total Gaseous Hydrocarbons, Non-Methane Hydrocarbons, Volatile Organic Compounds, NO_x, NO, NO_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
County Data Manager Sources	

Source Type Population	Combination of local and default data
	    Local data (OH&WV) from motor vehicle registration
	    Default data used for source types 41, 51, 54, 61, and 62
	    Future year growth rate 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 2009.
Ramp Fraction	Using the base year travel demand model for VHT fractions.
Road Type Distribution	Use ODOT and WVDOH county summary VMT categorized by federal functional classes

Age Distribution	Combination of local and default data.
	    Local data (2010) ODOT from motor vehicle registration
	    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	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 Wheeling 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. Table 4 below contains the average annual hourly temperatures and relative humidity distribution profiles used for the Belomar region.

Table 4
AVERAGE TEMPERATURE AND RELATIVE HUMIDITY DATA

Time of Day	Average Temperature	Average Relative Humidity (%)
Midnight	47.2	79.7
1 AM	46.1	67.1
2 AM	45.2	80.7
3 AM	44.6	82.9
4 AM	44.1	83.8
5 AM	43.6	84.1
6 AM	43.1	82.6
7 AM	43.5	79.6
8 AM	45.9	74.8
9 AM	49.6	70.1

10 AM	53.5	65.7
11 AM	56.8	62.0
12 PM	59.7	59.8
1 PM	61.3	58.2
2 PM	61.9	57.4
3 PM	62.0	57.3
4 PM	61.6	58.3
5 PM	60.5	61.2
6 PM	58.6	65.3
7 PM	56.2	69.2
8 PM	53.7	66.1
9 PM	51.6	74.3
10 PM	50.1	75.7
11 PM	48.6	78.1

RAMP FRACTION

The Vehicles Hour of Travel (VHT) fractions from the travel demand model were used to derive the Ramp Fraction values needed for the MOVES model procedures (approximately 4% in Belmont county Ohio, 8% in Ohio county West Virginia, and 4% in Marshall county West Virginia).

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 vehicle Source Types 51, 52, 53, 61, and 62 while local data from Ohio and West Virginia motor vehicle registrations accounted for all other Source Type Populations needed to run the MOVES model. Table 5 shows the Source Type Population identifications, the corresponding Source Type Name, and the number of vehicles analyzed for Belmont County, OH and Ohio/Marshall County, WV combined.

Table 5
SOURCE TYPE POPULATION FOR YEAR 2018

year	Source Type	Belmont #	Marshall co #	Ohio co #
2005	11 MotorCycle	4877	965	1184
2005	21 Passenger Car	50280	9942	18392
2005	31 Passenger Truck	23322	10247	14487
2005	32 Light Commercial Truck	622	1808	2354
2005	41 Intercity Bus	59	6	17
2005	42 Transit Bus	2	3	9
2005	43 School Bus	131	102	52
2005	51 Refuse truck	36	8	14

2005	52 Single Unit Short-haul Truck	14	475	843
2005	53 Single Unit Long-haul Truck	56	54	96
2005	54 Motor Home	170	22	49
2005	61 Combination Short-haul Truck	811	80	252
2005	62 Combination Long-haul Truck	1015	89	280

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 6 shows a sample Vehicle Age Distribution By Source Type for Belmont County, OH in 2005.

Table 6
VEHICLE AGE DISTRIBUTION BY SOURCE TYPE FOR BELMONT COUNTY, OHIO IN 2005

yearid	ageid	11	21	31	32	41	42	43	51	52	53	54	61	62
2005	0	0.003	0.004	0.006	0.010	0.000	0.000	0.023	0.000	0.000	0.000	0.003	0.003	0.011
2005	1	0.025	0.020	0.022	0.028	0.053	0.000	0.031	0.000	0.000	0.000	0.018	0.012	0.033
2005	2	0.052	0.033	0.047	0.069	0.026	0.000	0.047	0.000	0.000	0.000	0.033	0.024	0.018
2005	3	0.068	0.039	0.051	0.066	0.026	0.000	0.055	0.286	0.286	0.286	0.039	0.028	0.096
2005	4	0.085	0.042	0.061	0.068	0.316	0.000	0.047	0.000	0.000	0.000	0.030	0.037	0.079
2005	5	0.083	0.048	0.076	0.025	0.079	0.000	0.016	0.000	0.000	0.000	0.037	0.049	0.064
2005	6	0.068	0.047	0.066	0.015	0.053	0.000	0.063	0.000	0.000	0.000	0.041	0.047	0.030
2005	7	0.079	0.048	0.065	0.045	0.000	0.000	0.070	0.214	0.214	0.214	0.028	0.047	0.038
2005	8	0.064	0.057	0.068	0.048	0.079	0.000	0.070	0.000	0.000	0.000	0.033	0.043	0.033
2005	9	0.051	0.054	0.056	0.035	0.053	0.000	0.070	0.000	0.000	0.000	0.034	0.043	0.052
2005	10	0.042	0.062	0.063	0.069	0.026	0.000	0.063	0.000	0.000	0.000	0.043	0.057	0.085
2005	11	0.032	0.060	0.056	0.041	0.105	0.000	0.086	0.000	0.000	0.000	0.043	0.051	0.083
2005	12	0.027	0.056	0.054	0.055	0.053	0.000	0.141	0.000	0.000	0.000	0.035	0.045	0.080
2005	13	0.020	0.055	0.045	0.030	0.000	0.000	0.078	0.000	0.000	0.000	0.024	0.045	0.041
2005	14	0.020	0.050	0.041	0.031	0.000	0.000	0.008	0.071	0.071	0.071	0.020	0.038	0.053
2005	15	0.014	0.051	0.048	0.055	0.026	0.000	0.047	0.071	0.071	0.071	0.032	0.048	0.053
2005	16	0.015	0.043	0.043	0.040	0.000	0.500	0.000	0.071	0.071	0.071	0.027	0.051	0.027
2005	17	0.012	0.038	0.031	0.028	0.000	0.000	0.008	0.071	0.071	0.071	0.025	0.035	0.011
2005	18	0.012	0.034	0.020	0.036	0.026	0.000	0.000	0.000	0.000	0.000	0.028	0.030	0.029
2005	19	0.009	0.031	0.017	0.031	0.000	0.500	0.031	0.000	0.000	0.000	0.020	0.033	0.005
2005	20	0.007	0.022	0.013	0.028	0.026	0.000	0.000	0.071	0.071	0.071	0.014	0.028	0.006
2005	21	0.008	0.019	0.012	0.025	0.000	0.000	0.023	0.000	0.000	0.000	0.029	0.029	0.017
2005	22	0.006	0.015	0.009	0.033	0.000	0.000	0.000	0.071	0.071	0.071	0.024	0.032	0.015

2005	23	0.010	0.010	0.008	0.018	0.000	0.000	0.016	0.000	0.000	0.000	0.025	0.021	0.015
2005	24	0.018	0.007	0.006	0.018	0.027	0.000	0.008	0.072	0.072	0.072	0.024	0.023	0.005
2005	25	0.019	0.006	0.005	0.008	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.016	0.006
2005	26	0.014	0.006	0.004	0.010	0.000	0.000	0.000	0.000	0.000	0.000	0.022	0.014	0.008
2005	27	0.016	0.002	0.002	0.013	0.000	0.000	0.000	0.000	0.000	0.000	0.017	0.008	0.003
2005	28	0.017	0.001	0.001	0.002	0.026	0.000	0.000	0.000	0.000	0.000	0.013	0.007	0.000
2005	29	0.018	0.002	0.001	0.007	0.000	0.000	0.000	0.000	0.000	0.000	0.014	0.007	0.000
2005	30	0.088	0.038	0.006	0.014	0.000	0.000	0.000	0.000	0.000	0.000	0.201	0.054	0.006

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 7 illustrates Road Type Distribution.

Table 7
ROAD TYPE DISTRIBUTION FOR THE BELOMAR REGION

sourceTypeID	roadTypeID	roadTypeVMTFraction	sourceTypeID	roadTypeID	roadTypeVMTFraction
11	1	0	51	1	0
11	2	0.25	51	2	0.25
11	3	0.24	51	3	0.24
11	4	0.18	51	4	0.18
11	5	0.33	51	5	0.33
21	1	0	52	1	0
21	2	0.25	52	2	0.25
21	3	0.24	52	3	0.24
21	4	0.18	52	4	0.18
21	5	0.33	52	5	0.33
31	1	0	53	1	0
31	2	0.25	53	2	0.25
31	3	0.24	53	3	0.24
31	4	0.18	53	4	0.18
31	5	0.33	53	5	0.33
32	1	0	54	1	0
32	2	0.25	54	2	0.25
32	3	0.24	54	3	0.24
32	4	0.18	54	4	0.18
32	5	0.33	54	5	0.33
41	1	0	61	1	0
41	2	0.25	61	2	0.25
41	3	0.24	61	3	0.24
41	4	0.18	61	4	0.18
41	5	0.33	61	5	0.33
42	1	0	62	1	0
42	2	0.25	62	2	0.25
42	3	0.24	62	3	0.24

42	4	0.18	62	4	0.18
42	5	0.33	62	5	0.33
43	1	0	roadTypeID	roadDesc	
43	2	0.25	2	Rural Restricted Access	
43	3	0.24	3	Rural Unrestricted Access	
43	4	0.18	4	Urban Restricted Access	
43	5	0.33	5	Urban Unrestricted Access	

OUTPUT EMISSION FACTORS

Table 8 shows the first record in a MOVES sample output (rate per distance) emission file for year 2020 with I/M programs. For any given month, day of week, hour of the day, pollutant, and source type; the rate per distance varies by road type and speed bin. Rates per distance emissions are applied to link and intrazonal VMT.

Table 8 – Sample Emission File (Rate per Distance) for year 2020

Heading:	MOVESScenarioID	MOVESRunID	yearID	monthID	dayID	hourID
Record:			2020	7	5	1
Heading:	linkID	pollutantID	processID	sourceTypeID	SCC	fuelTypeID
Record:		87	0	1		0
Heading:	modelYearID	roadTypeID	avgSpeedBinID	temperature	relHumidity	ratePerDistance
Record:	0	2	1			1.388011

Table 9 shows the first record in a MOVES sample output (rate per vehicle) emission file for year 2020 with I/M programs. The rate per vehicle varies for any combinations of month, day of week, hour of the day, pollutant, and process. Rates per vehicle emissions are applied to the vehicle source type population.

Table 9 – Sample Emission File (Rate per Vehicle) for year 2020

Heading:	MOVESScenarioID	MOVESRunID	yearID	monthID	dayID
Record:			20 20	7	5
Heading:	hourID	zoneID	pollutantID	processID	sourceTypeID
Record:	1		87		1
Heading:	SCC	fuelTypeID	modelYearID	temperature	ratePerVehicle
Record:		0	0		0.14004

Table 10 shows the first record in a MOVES sample output (rate per profile) emission file for year 2020 with I/M programs. The rate per vehicle varies for any combinations of month, day of week, hour of the day, pollutant, and process. Rates per profile emissions are applied to the vehicle souce type population.

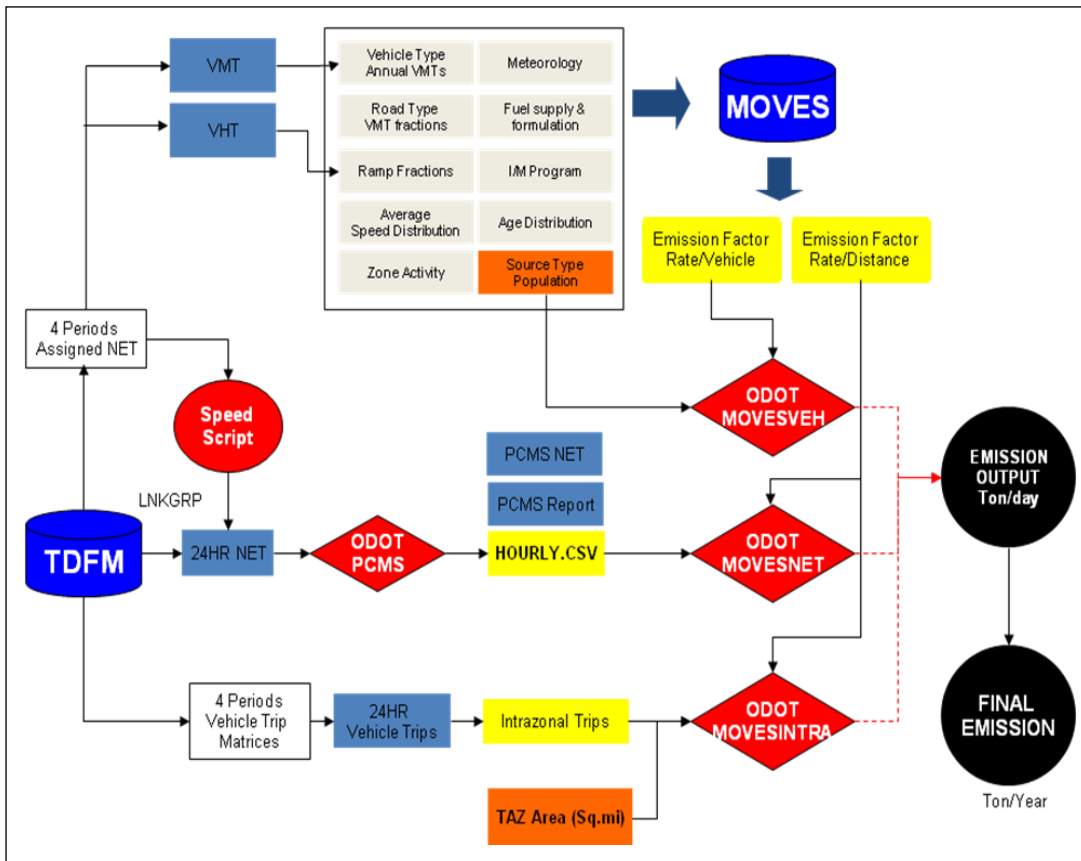**Table 10 – Sample Emission File (Rate per Profile) for year 2020**

Heading:	MOVESScenarioID	MOVESRunID	yearID	monthID	dayID
Record:			2020	0	5
Heading:	hourID	zoneID	pollutantID	processID	sourceTypeID

Record:		24			87	12	54
Heading:		SCC	fuelTypeID	modelYearID	temperature	ratePerVehicle	
Record:			0	0	71.5	0.027222	

POST PROCESSING

Several custom programs created by ODOT staff were used to compute total emissions. See Figure 2 below for the general schematic of the process. Details are provided at
http://www.dot.state.oh.us/Divisions/Planning/SPR/ModelForecastingUnit/Documents/cmaqr3.pdf

Figure 2 – Emission Calculation Process

PROJECTS IN THE 2040 MPO LONG-RANGE PLAN

Ohio County, WV:

Upgrade I-70 to six lanes from Elm Grove/Triadelphia Interchange to Cabela Drive
    Analysis Year 2040

Marshall County, WV:

Upgrade WV2 to add a fifth lane (TWLTL) from 6th Street in Moundsville (M.P. 19.50) to US250 intersection (M.P. 20.35)
    Analysis Year 2020

Upgrade WV2 from Kent (M.P. 4.5) to Franklin (M.P. 6.5)
    Analysis Year 2030

Upgrade WV2 from Wetzel County Line (M.P. 00) to Kent (M.P. 4.5)
    Analysis Year 2030

Belmont County, OH:

Upgrade I-70 to six lanes from the SR9 Interchange to Mall Road Interchange.
    Analysis Year 2030

Construct a new Commons Mall Crossing Road from US40 South to Mall Rd and Banfield Rd Intersections.
    Analysis Year 2018