



Puget Sound Regional Council

Appendix E

Air Quality Conformity Analysis

AIR QUALITY CONFORMITY ANALYSIS FOR THE 2017-2020 REGIONAL TRANSPORTATION IMPROVEMENT PROGRAM

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INTRODUCTION

This paper documents the positive air quality findings of the 2017-2020 Regional Transportation Improvement Program (TIP) for conformity with the State Implementation Plan for Air Quality (SIP). Required under the federal Clean Air Act, a SIP provides a blueprint of how current and former nonattainment areas will meet and maintain the National Ambient Air Quality Standards (NAAQS). Positive findings of conformity are required by the federal Clean Air Act (CAA), the Fixing America's Surface Transportation Act (FAST) and the Clean Air Washington Act. A positive conformity finding will allow the region to proceed with implementation of transportation projects in a timely manner.

As demonstrated in the sections below, PSRC has determined the 2017-2020 Regional TIP conforms to the Washington State Implementation Plan as required by the federal Clean Air Act and the state Clean Air Washington Act. This includes an emission analysis demonstrating that on-road transportation emissions are expected to be below the motor vehicle emissions budgets specified in the State Implementation Plan (SIP).

Transportation conformity is a mechanism for ensuring that transportation activities -- plans, programs and projects -- are reviewed and evaluated for their impacts on air quality prior to funding or approval. The intent of transportation conformity is to ensure that new projects, programs and plans do not impede an area from meeting and maintaining air quality standards. Specifically, regional transportation plans, improvement programs and projects may not cause or contribute to new violations, exacerbate existing violations, or interfere with the timely attainment of air quality standards or the required interim emissions reductions towards attainment. Meeting conformity requirements takes the collective participation of all jurisdictions and agencies that implement transportation projects and

programs within the central Puget Sound region.

AIR QUALITY STATUS

Air quality conformity must be addressed for areas designated by the U.S. Environmental Protection Agency (EPA) as nonattainment or maintenance for specific pollutants. This section outlines the status of the Puget Sound region for each of the six criteria air pollutants and the respective obligations related to transportation conformity. Figure 1 shows the location of current and past area boundaries

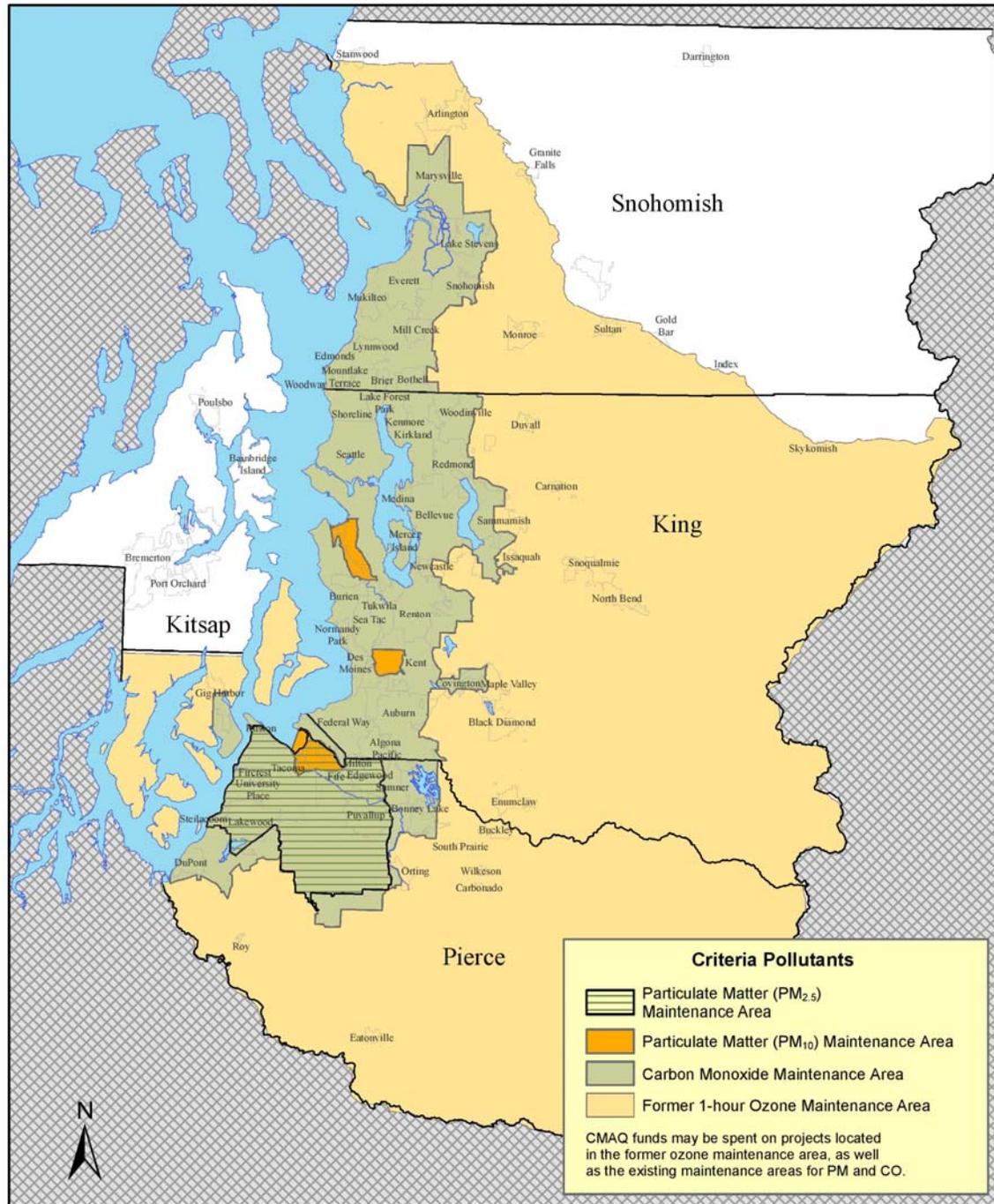
The federal Clean Air Act (CAA) requires EPA to set National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants: particulate matter (fine particulates, $PM_{2.5}$, and coarse particulates, PM_{10}), ground-level ozone, carbon monoxide (CO), sulfur oxides, nitrogen oxides (NO_x), and lead. Areas of the country where there have been exceedances of the NAAQS may be designated by the U.S. Environmental Protection Agency (EPA) as "nonattainment" for a particular pollutant. The CAA requires states to develop a general plan to attain and maintain the NAAQS in all areas of the country and a specific plan to attain the standards for each area designated nonattainment for any pollutant. These plans, known as State Implementation Plans or SIPs, are developed by state and local air quality management agencies and submitted to EPA for approval. A nonattainment area that has demonstrated pollutant concentration levels below the NAAQS may be redesignated to attainment. These areas are subject to an EPA-approved maintenance plan that is included as part of the SIP, and are commonly referred to as maintenance areas.

Within the Puget Sound region, there is a $PM_{2.5}$ nonattainment area, CO maintenance area, and three PM_{10} maintenance areas. Figure 1 shows the location of the area

Figure 1

Current Central Puget Sound Region Designated Maintenance Areas

February 2016



boundaries. The region is in attainment of all other criteria pollutants. More information on these areas is provided below.

In 2008, a portion of Pierce County was designated as nonattainment for PM_{2.5}. This area is located in Wapato Hills-Puyallup River Valley area near Tacoma. Effective March 12, 2015, the region was redesignated by the EPA as attainment with an approved maintenance plan for PM_{2.5}.

PM_{2.5} nonattainment and maintenance areas must consider sources of indirect PM_{2.5} emissions because they can result in formation of PM_{2.5} emissions. NO_x is considered a PM_{2.5} precursor; therefore NO_x emissions are addressed as part of the PM_{2.5} conformity demonstration. Other pollutants can be considered PM_{2.5} precursors but were not identified in the SIP as having a significant contribution to PM_{2.5} emissions in the maintenance area.

In 1987, the industrial areas of the Seattle Duwamish River, Kent Valley and Tacoma Tideflats were classified as nonattainment areas for PM₁₀. The three PM₁₀ areas were redesignated as attainment with an approved maintenance plan effective May 14, 2001, after years of meeting the NAAQS. In December 2013, EPA proposed the approval of a limited maintenance plan for the three PM₁₀ areas. A limited maintenance plan is used to meet Clean Air Act requirements for formerly designated nonattainment areas with little risk of violating the PM₁₀ NAAQS again. All three areas currently have monitored PM₁₀ levels that are roughly one-third of the PM₁₀ NAAQS, with steady declines in PM₁₀ levels since the areas were first identified as potentially violating the PM₁₀ NAAQS in 1987. EPA approved the limited

maintenance plan for conformity purposes on May 30, 2014, resulting in a regional emissions analysis no longer being required to demonstrate conformity for the three PM₁₀ areas.¹ EPA released the final approval of the limited maintenance plan on August 20, 2014.

In 1978, the central Puget Sound region was classified as a nonattainment area by EPA for carbon monoxide (CO). In 1996, having met the federal standards for several years, the region was redesignated by the EPA as attainment with an approved maintenance plan for CO. On October 11, 2016, the area will reach the end of the 20-year maintenance period for CO; transportation conformity will no longer be required for CO in the region after this date.

The region was previously a maintenance area for the original 1-hour ground-level ozone standard. The 1-hour standard was revoked in 1997, and conformity no longer applies. The region is currently designated as Unclassifiable/Attainment for the 8-hour ground-level ozone standard. The former ozone maintenance area is included on the map in Figure 1 because the area is still eligible for funds from the Congestion Mitigation Air Quality (CMAQ) Program.

CONFORMITY ANALYSIS REQUIREMENTS

Transportation conformity is required by the Clean Air Act section 176(c) (42 U.S.C. 7506(c)) to ensure that federal funding and approval are given to highway and transit projects that are consistent with ("conform to") the air quality goals established by a SIP. 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 NAAQS.

implementation of any outstanding TCMs, and project level analyses.

¹ Additional requirements still apply under a Limited Maintenance Plan, including consultation, the

Section 93.109 of the federal conformity rule identifies the applicable criteria and procedures for determining conformity of transportation plans, TIPs and projects, which are further detailed in sections 110-119. The sections applicable to TIPs are summarized below.

- Section 93.110: The conformity determination must be based on the latest planning assumptions.²*
- Section 93.111: The conformity determination must be based on the latest emissions estimation model available.*
- Section 93.112: The MPO must make the conformity determination according to consultation procedures identified in the conformity rule.*
- Section 93.113: Plans and TIPs must provide for the timely implementation of transportation control measures (TCMs) from the applicable SIP.*
- Section 93.118: Regional emissions must be less than or equal to the motor vehicle emissions budgets established in the applicable SIP or submitted SIP revision.*

The TIP implements PSRC's long range plan, Transportation 2040, and all projects submitted for inclusion in the TIP undergo a rigorous review for consistency with the plan. All regionally significant projects³ must be individually listed as projects in the plan; all other projects are reviewed for consistency with the policies contained in the plan. All applications for TIP

² This requirement is further clarified in the joint FHWA/EPA Memorandum, "Guidance for the Use of Latest Planning Assumptions in Conformity Determinations," dated December 2008.

amendments are reviewed to verify that the project changes do not affect the conformity finding; any change in scope to a regionally significant project must be captured in the plan before the revised project is allowed into the TIP.

All projects in the 2017-2020 Regional TIP have been previously included in the most recent regional conformity finding, which occurred earlier this year as part of the update to Transportation 2040, adopted in June 2015. There were no new regionally significant projects submitted to the TIP that were not already included in the plan, nor were there any modelable changes to regionally significant projects. Therefore, the analysis conducted as part of the June 2015 Transportation 2040 Update accurately reflects the conformity analysis for the 2017-2020 Regional TIP. Additional information on the conformity analysis requirements listed above is provided in the next section.

Latest Planning Assumptions

The federal conformity rule includes procedures for estimating regional emissions for transportation conformity analyses (§93.122). The process for estimating regional emissions for conformity analyses involves the integration of PSRC's land use and travel demand modeling with EPA's emissions factor model. The land use and travel demand modeling must be based on the latest planning assumptions. The following sections describe the technical analysis used for the Transportation 2040 conformity analysis, which also serves as the conformity analysis for the 2017-2020 Regional TIP.

Land Use Modeling

For the Transportation 2040 Update technical analysis, PSRC utilized a

³ Defined as Transportation 2040 Regional Capacity Projects; more details may be found on PSRC's website at <http://www.psrc.org/transportation/t2040/projects-and-approval/>.

spreadsheet allocation model to develop a tailored land use forecast product called the Transportation 2040 Update Land Use (or TULU) dataset. The TULU dataset was purposefully crafted to meet the following technical specifications and policy requirements:

- The TULU dataset is consistent with the region's most current long-range regional forecast of households, population and employment from the 2012 Regional Macroeconomic Forecast;
- The TULU dataset reflects the regional long-range strategic growth assumptions as detailed by the VISION 2040 regional growth strategy; and
- The TULU dataset is reflective of locally adopted growth targets developed to begin implementing the VISION 2040 regional growth strategy.

Travel Demand Modeling

PSRC has developed a customized set of computer programs and mathematical procedures to simulate current and future travel patterns and conditions within the four counties (King, Kitsap, Pierce, and Snohomish) of the central Puget Sound region. These programs and procedures are collectively referred to as the "regional travel demand forecasting model" or simply as the "travel model." The travel model produces detailed spatial and network data that are used to analyze how the region's transportation infrastructure and environment are likely to be impacted by future population growth and development.

For the travel demand analysis used to support the Transportation 2040 Update, the previously mentioned TULU dataset comprises the key land use assumptions, while the set of transportation projects and policies enumerated within Transportation 2040 form the basis for the key transportation network assumptions for analysis. Additional information on PSRC's travel demand modeling procedures is

available through PSRC's web site (www.psrc.org) or by calling the Information Center ((206) 464-7532).

The conformity analysis must include modeling of all regionally significant projects. As defined by the conformity rule, a regionally significant project is:

"a transportation project (other than an exempt project) that is on a facility which serves regional transportation needs (such as access to and from the area outside of the region, major activity centers in the region, major planned developments such as new retail malls, sports complexes, etc., or transportation terminals as well as most terminals themselves) and would normally be included in the modeling of a metropolitan area's transportation network, including at a minimum all principal arterial highways and all fixed guideway transit facilities that offer an alternative to regional highway travel."

The conformity analysis includes all modelable projects and programs contained in Transportation 2040. As described earlier, all projects in the 2017-2020 Regional TIP were reviewed for consistency with the Transportation 2040 Regional Capacity Projects list and the current conformity analysis.

Projects are coded into PSRC's travel demand model networks for their respective years of implementation. The travel demand model analyses performed for the Transportation 2040 Update include 2006, 2010, 2025, and 2040.

Latest Emissions Model

EPA released the latest version of the Motor Vehicle Emission Simulator (MOVES2014) on July 31, 2014, and a subsequent minor revision (MOVES2014a) in November 2015. EPA published a federal register notice on October 7th, 2014, approving the use of MOVES2014 for official purposes, with a 2-year grace period established before it is

required to be used for transportation conformity analyses,⁴ per 40 CFR 93.111(b).

The conformity analysis from the Transportation 2040 Update was performed using version MOVES2010b. No update to the analysis is required at this time, per the information on MOVES2014 and the 2-year grace period identified above.

MOVES2010b does not account for Tier 3 emission standards that phase in beginning in 2017, heavy-duty engine and vehicle greenhouse gas regulations that phase in during model years 2014-2018, or the second phase of light-duty vehicle greenhouse gas regulations that phase in for model years 2017-2025 cars and light trucks. Therefore, the emissions presented as part of the regional analysis may be an overestimate.

Emissions were calculated for CO, PM_{2.5} and NO_x. The emissions for each of the analyses were generated by output from PSRC's travel demand model and MOVES version 2010b. Emission estimates for PM_{2.5} and NO_x were created using model settings consistent with the procedures used by Ecology to develop the motor vehicle emissions budgets provided in conjunction with the PM_{2.5} Maintenance Plan and Redesignation Request. The model settings for the CO analysis were based on the inputs and procedures used in the emissions inventories in the CO maintenance plan. All model options and assumptions were coordinated with PSRC's air quality partner agencies.

MOVES inputs include the most current vehicle registrations, vehicle inspection and maintenance (I/M) settings, fuel supply data, and local meteorology at the county level. Ecology provided county-specific input files that were used in the most recent statewide

emissions inventory. These files were used to create input files for future analysis years, assuming the fleet mix and age distribution remains constant. MOVES utilizes a database-centered design that does not create an input file that could be provided as part of this documentation, however Attachment A contains more details about MOVES methodology and assumptions.

INTERAGENCY CONSULTATION AND PUBLIC INVOLVEMENT

Federal Clean Air Act regulations, as identified in the federal conformity rule (40 CFR Part 93), and Clean Air Washington Act regulations defined in the state conformity rule (WAC 173-420-070), require formal consultation procedures for conducting conformity analyses. The consultation procedures for the conformity analysis of the 2017-2020 Regional TIP are consistent with PSRC's Public Participation Plan, which is in compliance with the federal Statewide and Metropolitan Planning regulations (23 CFR Part 450) as well as the above conformity regulations. The Public Participation Plan may be obtained by contacting PSRC's Information Center ((206) 464-7532), or through PSRC's web site (www.psrc.org).

A major task identified under the consultation procedures requirements is the review of key assumptions for conducting the conformity analysis. PSRC held a scoping meeting with the region's air quality consultation partners to present the methodology and procedures for the conformity analysis conducted for the Transportation 2040 plan adopted in 2014. These partner agencies include the Federal Highway Administration (FHWA), the Federal Transit Administration (FTA), the Environmental Protection Agency (EPA), the Washington State Departments of

⁴ Policy Guidance on the use of MOVES2014 for State Implementation Plan Development, Transportation

Conformity, and Other Purposes. US EPA, July 2014.

Transportation (WSDOT) and Ecology, and the Puget Sound Clean Air Agency (PSCAA). This scoping meeting, held on November 18, 2013, met the formal consultation requirements of the federal and state Clean Air Acts.

As part of the Transportation 2040 update in 2015, the region's consultation partners were contacted via email to confirm the methodology to update the emissions analysis.

As described earlier in this document, the analysis conducted as part of the June 2015 Transportation 2040 Update accurately reflects the conformity analysis for the 2017-2020 Regional TIP, and no changes were necessary. The region's consultation partners met again on August 29, 2016, to review the process and confirm that the previous analysis is sufficient.

In addition to interagency consultation, opportunity for public comment is also provided. The 2017-2020 Regional TIP is being released for a formal public comment period between September 8 and October 27, 2016, including this air quality conformity documentation. In addition, opportunity for public comment is provided at the beginning of each PSRC Board meeting. The adoption of the TIP and the approval of the conformity determination are expected to occur at PSRC's October 27, 2016 Executive Board meeting. Additional information on public involvement throughout the preparation of the TIP is included in the TIP document, found on PSRC's website at <http://www.psrc.org/transportation/tip>.

STATUS OF TRANSPORTATION CONTROL MEASURES

According to the federal conformity rule, transportation plans must provide for the timely implementation of Transportation Control Measures (TCMs) from an

applicable maintenance plan (§93.113). TCMs are projects, programs or actions that will aid in the elimination or reduction of the severity or number of violations of the NAAQS, and help expeditiously attain and maintain those standards. TCMs can be strategies to increase the efficiency of existing transportation facilities, reduce travel demand, or lower the amount of emissions in vehicles leading to measurable vehicle emissions reductions. Expected emissions reductions, or credits, from these TCMs are included in maintenance plan inventories and attainment/maintenance demonstrations.

Control measures identified in the CO maintenance plan relating to on-road mobile sources include the continuation of the existing Inspection and Maintenance program administered by Ecology, and the development and implementation of a program sponsored by PSCAA to prevent exceedances of the NAAQS for CO through congestion management activities in locations with high measured CO values. Both of these programs have been implemented and are still in place. There are no control measures in the PM₁₀ or PM_{2.5} maintenance plans relating to on-road mobile sources.

MOTOR VEHICLE EMISSIONS BUDGET

The conformity analysis must show that the total regional emissions produced by projects in the plan or TIP, plus activity on the existing travel network, do not exceed the motor vehicle emissions budget identified in the maintenance plan for each respective criteria pollutant. The emissions budget is a ceiling of total emissions that cannot be exceeded. Emissions are calculated on an individual link basis, based on the vehicle miles traveled (VMT) and speed of each link. This calculation is performed separately for each of five time periods (a.m. peak, midday, p.m. peak,

evening and nighttime). Emissions are calculated for both intrazonal and interzonal trips. The calculated emissions of individual links are then summed for each of the five time periods, which in turn are summed for the total daily emissions in each maintenance area.

Table 1 and Table 2 identify the motor vehicle emissions budget for the required criteria pollutants and present the analysis results. The emissions from the projects and programs in Transportation 2040 - and correspondingly the 2017-2020 Regional TIP - for each of the analysis years are below the established daily motor vehicle emissions budgets for the criteria pollutants CO, PM_{2.5} and NO_x.

Table 1 – CO Emissions Analysis Results

Year	CO Emissions
2017 Motor Vehicle Emissions Budget*	2,512
2016	1,304
2020	1,145
2030	949
2040	962

* estimated emissions must be less than MVEB

Table 2 – PM_{2.5} and NO_x Emissions Analysis Results

Year	PM _{2.5}	NO _x
2017 Motor Vehicle Emissions Budget*	1,888	41,790
2017	1,674	36,887
2020	1,518	31,059
2026 Motor Vehicle Emissions Budget**	1,321	22,880
2026	1,247	20,876
2030	1,204	18,996
2040	1,095	14,296

* estimated emissions for years 2017 through 2025 must be less than the 2017 MVEB

** estimated emissions for years 2026 and beyond must be less than the 2026 MVEB

Emissions of CO, PM_{2.5}, and NO_x were calculated for 2010, 2025, and 2040, corresponding to the available travel modeling analysis years. The emissions for 2016, 2017, 2020, 2026, and 2030 were therefore interpolated, per consultation with PSRC’s air quality partner agencies and consistent with Section 93.118(d)(2) of the federal conformity rule. Pursuant to Section 93.118(b) of the federal conformity rule, analyses were conducted for each year for

which a motor vehicle emissions budget has been established, the horizon year of Transportation 2040, and intermediary years such that the analyses are no more than 10 years apart. Under consultation with PSRC’s air quality partner agencies and consistent with standard practices (Section 93.118(b)(2)(ii) of the federal conformity rule), these budgets were carried forward in this analysis as the budgets for 2020, 2030 and 2040, which is the horizon year of

Transportation 2040. In addition, CO was analyzed for 2016 because the CO maintenance plan identifies a motor vehicle emissions budget for the horizon year of 2016.

Fiscal Constraint

Every project in the 2017-2020 Regional TIP has been reviewed for fiscal constraint. Per 23 CFR 450.324(i), it has been determined that full funding can reasonably be anticipated to be available for all projects in the 2017-2020 Regional TIP within the time period contemplated for completion of the projects. The TIP document describes

this procedure in greater detail, and Appendix D provides additional information on the financial plan for the TIP and the plan. This documentation can be found on PSRC's website at

<http://www.psrc.org/transportation/tip>.

CONCLUSIONS

This analysis provides sufficient basis for PSRC to determine that the 2017-2020 Regional TIP conforms to the Washington State Implementation Plan as required by the federal Clean Air Act and the state Clean Air Washington Act.

ATTACHMENT A: EMISSIONS METHODOLOGY

As part of the regional conformity analysis, on-road mobile emissions of CO, PM_{2.5}, and NO_x were estimated for required years within the respective maintenance and nonattainment areas. The PM_{2.5} and NO_x conformity analyses are consistent with the methodology Ecology used to develop the PM_{2.5} and NO_x motor vehicle emissions budgets (MVEB). The CO MVEB was developed using the MOBILE6 model, which has been replaced by MOVES. The PM_{2.5} MOVES methodology was applied to the CO emission analysis, and inputs specific to the CO SIP were considered as appropriate.

The budget calculation method developed by Ecology was designed to be as simple as possible, yet without sacrificing the accuracy of the emissions estimates. The basic calculation equation is shown below, followed by a more detailed description of the method and data sources. These examples are from the 2011 Clean Data Determination. Actual emissions analyses were performed using updated data years.

Basic Calculation

$$E = (M \times F_{gmi}) + (V \times F_{gpveh})$$

where E = emissions in g

M = VMT

V = vehicle population

F_{gmi} = emission factor in g/mi

F_{gpveh} = emission factor in g/vehicle

Vehicle Miles Traveled

As part of the Transportation 2040 update, average daily weekday VMT for the Puget Sound region for the years 2006, 2010, 2025 and 2040 was modeled.

The travel demand model VMT is estimated for individual roadway links for 5 periods during the day: Morning = 6a - 9a, Midday = 9a - 3p, Afternoon = 3p - 6p, Evening = 6p - 10p, Nighttime = 10p - 6a.

Data for each link and time period includes:

- Length
- Facility type
- Functional class (for most links)
- County
- NAA flag (Yes/No flag for in the nonattainment area)
- Congested speed
- VMT

The VMT link data was combined with the MOVES emission factors. First, each link was assigned to its closest MOVES speed bin and classified as to its MOVES road type: Rural Restricted, Rural Unrestricted, Urban Restricted, or Urban Unrestricted. For PM_{2.5} and NO_x calculations, the NAA link VMT data was summed by time period, MOVES speed bin and MOVES road type to estimate emissions for an average winter day. For CO, the same procedure was followed for the links within the maintenance area by each county and then summed to estimate emissions for an average winter day.

Vehicle Population

WA Dept. of Licensing (DOL, 2011), Federal Transit Administration (FTA, 2010), and WA Office of the Superintendent of Public Instruction (OSPI, 2011) vehicle registration data was used to calculate the vehicle population in Pierce, King, and Snohomish Counties. The ratio of county VMT to nonattainment or maintenance area VMT was used to allocate the vehicle population to the appropriate area.

2040 and 2025 vehicle populations were estimated for each county using a

combination of vehicle trips and households. The future vehicle population was then allocated to the nonattainment or maintenance area using the VMT ratio as described above.

Emission Factors

Ecology provided a series of MOVES input files that were used to create the 2011 statewide PM_{2.5} emissions inventory. A set of files was created for each county and represented the current vehicle registration data, fuel supply data, and I/M programs specific to each county. These files were used to create MOVES input files for 2006, 2010, 2025, and 2040, assuming that the vehicle mix and age distributions remain constant in the future.

The PM_{2.5} and NO_x budgets were developed with MOVES using a meteorological input file that represented the temperature profile for peak PM_{2.5} conditions. MOVES was run with this same

meteorological file for this conformity analysis. The CO emissions were estimated using MOVES county default values for a January weekday. The temperature profiles in the MOVES county defaults were determined by the consultation partners to adequately represent the winter day minimum and maximum temperatures used in MOBILE for the CO emissions budget.

EPA's MOVES model was used to generate PM_{2.5}, NO_x, and CO emission factors in g/mi and g/vehicle. The g/mi factors were output by hour, road type, and speed bin. The g/vehicle factors were output by hour.

The emission factors were prepared for combination with the VMT and vehicle population data. The g/mi factors were averaged over each of the 5 VMT time periods resulting in one factor per road type, time period, and speed bin. The g/vehicle factors were summed over each hour of the day resulting in one factor per day.