Air Quality Report

NW Saltzman Road:
NW Cornell to NW Bauer Woods Drive Improvement Project

A MAJOR STREETS AND TRANSPORTATION IMPROVEMENT PROGRAM (MSTIP) PROJECT

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Acronyms

DEQ	Department of Environmental Quality
DLUT	Washington County Department of Land Use and Transportation
DOT	Department of Transportation
EPA	Environmental Protection Agency
ft	Foot/Feet
JPACT	Joint Policy Advisory Committee on Transportation
LOS	Level of Service
MSTIP	Major Streets and Transportation Improvement Program
MTIP	Metropolitan Transportation Improvement Program
NAAQS	National Ambient Air Quality Standards
RTP	Regional Transportation Plan
SAAQS	State Ambient Air Quality Standards
SIP	State Implementation Plans
TIP	Transportation Improvement Program
VOC	Volatile Organic Compound

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1 EXECUTIVE SUMMARY

The NW Saltzman Road: NW Cornell to NW Bauer Woods Drive Improvement Project is a minor arterial improvement which does not add new roadway capacity, and which is funded through the Washington County MSTIP program. The MSTIP program funds transportation projects through a permanent tax levy which is part of the Washington County property tax. The project is not a recipient of funds from US DOT, ODOT, or Metro (the local MPO), Title 23 U.S.C. or 49 U.S.C. Chapter 53. The project is therefore not required to demonstrate federal transportation conformity.

Regardless of the fact that the project is not required to demonstrate transportation conformity, the section of Saltzman Road included in the NW Saltzman Road: NW Cornell to NW Bauer Woods Drive Improvement Project is included in the most recently approved Metropolitan Transportation Improvement Program (MTIP) for financial years 2008 to 2011 (dated August 30, 2007). The 2007 Air Quality Conformity report for the 2008-2011 MTIP was adopted by the Metro Joint Policy Advisory Committee on Transportation (JPACT) and the Metro Council, and approved by the U.S. DOT on January 16, 2008.

Metro is currently updating the Regional Transportation Plan (RTP). The NW Saltzman Road project is included in the final draft Metro 2035 RTP (dated January 18, 2008); however, the description included in the RTP does not include approximately 900 feet on the north end of the alignment between NW Burton Street and NW Bauer Woods Drive. At present, the RTP includes the project as NW Saltzman Road from NW Cornell to NW Burton Street. The federal component of the new RTP was approved by the Metro Council and the JPACT on Transportation on December 13, 2007; the air quality analysis approved by the U.S. DOT on February 29, 2008.

A carbon monoxide hot spot analysis was conducted for the project-affected signalized intersection with the worst level of service. The results of the analysis showed that CO concentrations predicted for the existing year (2007), the first year of facility operation (2012), and for the planning horizon year (2030) are all well below the 1-hour and 8-hour CO National Ambient Air Quality Standards (NAAQS).

No long-term air quality impacts or exceedances of the NAAQS are expected as a result of the project. No mitigation is required.

2 INTRODUCTION

This report discusses the air quality analysis completed for the NW Saltzman Road: NW Cornell to NW Bauer Woods Drive Improvement Project in Washington County, Oregon.

2.1 PROJECT DESCRIPTION

The Washington County Department of Land Use and Transportation (DLUT) has proposed a roadway design and right-of-way acquisition project for future road improvements of NW Saltzman Road between NW Cornell Road and NW Bauer Woods Drive. This project is part of the Major Streets and Transportation Improvement Program (MSTIP). Proposed activities include the reconstruction of the two travel lanes, construction of an additional center turn lane, sidewalks, bike lanes, and illumination. Other improvements will include drainage and utility upgrades.

The project impacts will be contained within the NW Saltzman Road right-of-way corridor, which will be widened for the project. The County plans to extend the existing right-of-way to 90 feet wide based on the street arterials and proposed developments, such as three-lane sections with pedestrian facilities. The existing right-of-way is generally less than 90 feet.

2.2 PROJECT SITE DESCRIPTION

2.2.1 Site Location and Current Conditions

The project area is within Washington County in Sections 21, 28, and 33, Township 1 North, Range 1 West, Willamette Meridian. The proposed project alignment is 1.7 miles long. The project area is within the unincorporated town of Cedar Mill. NW Saltzman Road is paved between NW Cornell Road and NW Bauer Woods Drive, with dense commercial and residential developments on both sides throughout the alignment. Sidewalks line most segments of the roadway.

2.2.2 Environmental Setting

The project area is located in the Tualatin Valley at the northern end of the Willamette Valley. The topography of the Tualatin Valley is characterized as: low undulating hills that rise towards the southern end of the Tualatin Mountains which drain into the Tualatin River at the south end of the valley. These low mountains separate this area from the Portland Basin, which includes the historically significant confluence of the Columbia and Willamette Rivers, approximately 7 miles north of the project area. The west side of the valley is bordered by the Coast Range with its eastern flanks and rolling foothills also draining into the Tualatin River. NW Saltzman Road is crossed by Willow

Creek, as it flows southeast into the Tualatin River, which is a major tributary of the Willamette River south of the project area.

3 AFFECTED ENVIRONMENT

The following section summarizes relevant air quality regulations and the existing air quality in the Portland metropolitan area.

3.1 AIR QUALITY REGULATIONS AND STANDARDS

The federal government has established National Ambient Air Quality Standards (NAAQS) to protect the public from air pollution. In addition, the Oregon Department of Environmental Quality (DEQ) has established State Ambient Air Quality Standards (SAAQS) that are at least as stringent as the NAAQS. State and federal ambient air quality standards are listed in Table 1. The U. S. Environmental Protection Agency (EPA) has delegated air quality program implementation to DEQ.

Table 1: National and State Ambient Air Quality Standards

Pollutant	Averaging Time	Federal	Oregon
Carbon Monoxide	8-hour[1]	9 ppm	9 ppm
	1-hour[1]	35 ppm	35 ppm
Lead	Calendar quarter	1.5 µg/m^3	1.5 µg/m^3
Ozone	8-hour[2]	0.075 ppm	0.08 ppm
Nitrogen Dioxide	Annual arithmetic mean	0.053 ppm	0.053 ppm
Sulfur Dioxide	Annual arithmetic mean	0.03 ppm	0.02 ppm
	24-hour	0.14 ppm	0.10 ppm
	3-hour	0.5 ppm	0.50 ppm
PM_{10}	Annual arithmetic mean	-	50 µg/m^3
	24-hour Average	150 µg/m^3	150 µg/m^3
$PM_{2.5}$	Annual arithmetic mean[3]	15 µg/m^3	-
	24-hour[4]	35 µg/m^3	-

Sources: EPA Office of Air Quality Planning and Standards (OAQPS) and the Oregon Department of Environmental Quality.

Note: ppm = parts per million; µg/m^3 = micrograms per cubic meter; PM_{10} = particulates with an aerodynamic diameter of less than or equal to 10 micrometers; $PM_{2.5}$ = particulate with an aerodynamic diameter of less than or equal to 2.5 micrometers.

[1]Not to be exceeded more than once per year

[2] To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

[3]To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m^3.

[4]To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m^3. This standard replaces the 24-hour $PM_{2.5}$ standard of 65 µg/m^3 as of December 17, 2006.

Geographic areas where concentrations of a pollutant exceed the NAAQS are classified as non-attainment (do not attain standards) areas. Areas previously designated as non-attainment that are now in compliance with air quality standards are classified as maintenance areas. Federal regulations require states to prepare State Implementation Plans (SIPs) that identify emission reduction strategies for non-attainment and maintenance areas.

The Portland metropolitan region has not exceeded the standards for five of these NAAQS air pollutants – lead, nitrogen dioxide, PM_{10}, $PM_{2.5}$, and sulfur dioxide. In the past, the region has exceeded carbon monoxide and ozone standards. The current status, as determined by the US Environmental Protection Agency (EPA) as of April 9, 2007, is that the Portland metropolitan area, including the NW Saltzman Road: NW Cornell to NW Bauer Woods Drive Improvement Project area, is a maintenance area for carbon monoxide and is in attainment for the 8-hour ozone standard.

It should be noted that when the EPA phase 1 final rule to implement the 8-hour ozone standard was published on April 30, 2004, antibacksliding provisions were made. The rule set forth specific requirements for areas that were designated "attainment" for the 8-hour ozone standard, and that were, at the time of the 8-hour designations (generally June 15, 2004), either attainment areas with maintenance plans for the 1-hour ozone standard, or non-attainment areas for the 1-hour ozone standard. These areas include the Portland metropolitan area and the NW Saltzman Road Improvement Project area.

Specifically, 40 CFR 51 requires these areas submit a maintenance plan under section 110(a)(1) of the Clean Air Act (CAA). That maintenance plan must demonstrate maintenance out to 10 years after designation. This maintenance plan does not, however, carry with it any conformity obligations, unlike maintenance plans required under section 175(a) of the CAA. Therefore, the Portland metropolitan area maintains an updated 1-hour ozone maintenance plan, adopted by the Oregon Environmental Quality Commission in February, 2007. This 1-hour ozone maintenance plan has been submitted to the EPA for their approval, which is pending.

3.2 EXISTING AIR QUALITY

The Oregon DEQ has responsibility for maintaining compliance with the NAAQS standards. Because they can potentially contribute to non-compliance with these standards, the air pollutants of concern for highway projects in the Portland metropolitan area have historically been CO, nitrogen oxides (NO_x), and volatile organic compounds (VOCs).

VOCs and NO_x react with sunlight to produce ozone. Vehicle emissions are the primary source of VOCs and NO_x. Other sources include lawn mowers, gas-powered tools, and household products and paints, the use of which increases with population growth. Ozone problems tend to be regional in nature because the chemical reactions that produce ozone occur over a period of time. DEQ does not measure ozone in the vicinity of the project area; however DEQ does monitor ozone in Canby, Oregon, where high ozone levels typically occur because of its location downwind of Portland. Data collected in Canby between 1997 through 2006 are summarized in Table 2. Because ozone is a regional issue, the analysis methods used to determine the impact of transportation projects on ozone formation are also regional in nature.

Table 2: Canby Ambient Ozone Concentrations

Year	Highest 8-hour Average (ppm)	4th Highest 8-hour Average (ppm)	3-Year Average of the 4th Highest 8-hour Average (ppm)
1997	0.074	0.062	0.078
1998	0.116	0.081	0.080
1999	0.080	0.072	0.071
2000	0.071	0.065	0.072
2001	0.080	0.069	0.068
2002	0.085	0.063	0.065
2003	0.084	0.075	0.069
2004	0.084	0.067	0.068
2005	0.079	0.064	0.068
2006	0.106	0.072	0.067

Source: DEQ 2006 Oregon Air Quality Data Summaries.
Note: ppm = parts per million.

Prior to May 27, 2008 (when the federal ozone standard changed to 0.075 ppm), to be in compliance with the 8-hour ozone standard, the 3 year average of the fourth-highest daily maximum 8-hour average ozone concentrations could not exceed 0.085 ppm. The data from the Canby monitoring station for 1997 through 2006 show that the 0.085 ppm standard was not exceeded during this period.

Unlike ozone, air pollution associated with CO tends to be localized. Maximum CO concentrations usually occur near congested intersections during winter weather conditions when temperature inversions trap vehicle emissions near the ground. Local concentrations of CO near intersections may be affected by improvements or degradation in traffic congestion resulting from a project. Dispersion models are used to predict the CO concentrations near intersections to

determine if the concentrations will cause a violation of the NAAQS. This type of analysis is called a "hot spot" analysis. An adverse air quality impact occurs if the hot spot analysis indicates a violation of the NAAQS for CO. DEQ does not measure CO in the vicinity of the project area; however DEQ does monitor CO in downtown Portland, Oregon. Table 3 shows CO concentrations for the DEQ monitoring station in downtown Portland for the period 1997 and 2006.

Table 3: Portland Ambient CO Concentrations[1]

Year	Highest 1-hour (ppm)	Highest 8-hour (ppm)	Number of Exceedances of the 8-hour Average CO Standard[2]
1997	9.6	5.9	0
1998	8.1	4.7	0
1999	12.6	7.3	0
2000	6.3	3.7	0
2001	5.4	3.4	0
2002	7.1	3.4	0
2003	5.1	3.4	0
2004	14.4	3.8	0
2005	4.5	2.7	0
2006	10.6	3.6	0

Source: DEQ 2006 Oregon Air Quality Data Summaries.

Note: ppm = parts per million.

[1]Old Postal Building, 510 SW 3rd Avenue, Portland, monitoring station.

[2] Nonoverlapping 8-hour averages that exceed 9 ppm when rounded to the nearest whole ppm.

The data in Table 3 show that no exceedance has been recorded in Portland between 1997 and 2006.

4 METHODOLOGY

4.1 OVERVIEW OF TRANSPORTATION CONFORMITY REQUIREMENTS

Federal regulations require states to prepare SIPs which are statewide air quality planning documents that establish methods to bring air quality in non-attainment areas into compliance with the NAAQS and to maintain compliance. Non-attainment areas that return to compliance are called "maintenance areas." The Portland metropolitan area, including the NW Saltzman Road: NW Cornell to NW Bauer Woods Drive Improvement Project area is a maintenance area for carbon monoxide.

40 CFR 93 (*Determining Conformity of Federal Actions to State or Federal Implementation Plans*) sets forth requirements designed to implement section

176(c) of the Clean Air Act (CAA), as amended (42 U.S.C. 7401 *et seq.*), and the related requirements of Title 23 U.S.C. 109(j), with respect to the conformity of transportation plans, programs, and projects which are developed, funded, or approved by the United States Department of Transportation (US DOT), and by metropolitan planning organizations (MPOs) or other recipients of funds under Title 23 U.S.C. or the Federal Transit Laws (49 U.S.C. Chapter 53). Oregon Administrative Rule (OAR) 340-252 (*Transportation Conformity*) implements these requirements in the state or Oregon. With certain exceptions, OAR 340-252 requires conformity determinations for approval, funding or implementation of FHWA/FTA transportation projects, or regionally significant projects by a recipient of funds under title 23 U.S.C. A regionally significant project is defined as 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 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. At a minimum, the following types of transportation facilities would be included:

(a) All principal arterial highways;

(b) All fixed guideway transit facilities that offer an alternative to regional highway travel; and

(c) Any other facilities determined to be regionally significant through interagency consultation pursuant to OAR 340-252-0060.

There are two parts to demonstrating conformity for transportation projects. The first requires that estimated pollutant emissions for all projects in a non-attainment or maintenance area remain below the regional emissions budget established in the SIP for on-road mobile sources. To address regional emissions in the Portland metropolitan area, Metro performs a regional emissions analysis each time the RTP is updated. A project included in a conforming RTP and Transportation Improvement Program (TIP) has been analyzed for regional emissions effects.

The second requirement states that no individual project may cause a violation of the NAAQS or an increase in the frequency or severity of an existing violation. Compliance with the NAAQS is demonstrated by a project-level hot spot analysis of congested intersections.

The NW Saltzman Road: NW Cornell to NW Bauer Woods Drive Improvement Project is a minor arterial improvement which does not add new roadway capacity, and which is funded through the Washington County MSTIP program.

The MSTIP program funds transportation projects through a permanent tax levy which is part of the Washington County property tax. The project is not a recipient of funds from US DOT, ODOT, Metro (the local MPO), Title 23 U.S.C. or 49 U.S.C. Chapter 53. The project is therefore not required to demonstrate federal transportation conformity.

Regardless of the fact that the project is not required to demonstrate conformity, the section of Saltzman Road included in the NW Saltzman Road: NW Cornell to NW Bauer Woods Drive Improvement Project is included in the most recently approved Metropolitan Transportation Improvement Program (MTIP) for financial years 2008 to 2011 (dated August 30, 2007). The 2007 Air Quality Conformity report for the 2008-2011 MTIP was adopted by the Metro Joint Policy Advisory Committee on Transportation (JPACT) and the Metro Council, and approved by the U.S. DOT on January 16, 2008.

Metro is currently updating the RTP. The NW Saltzman Road project is included in the final draft Metro 2035 RTP (dated January 18, 2008); however, the description included in the RTP does not include approximately 900 feet on the north end of the alignment between NW Burton Street and NW Bauer Woods Drive. At present, the RTP includes the project as NW Saltzman Road from NW Cornell to NW Burton Street. The federal component of the new RTP was approved by the Metro Council and the JPACT on Transportation on December 13, 2007; the air quality analysis was approved by the U.S. DOT on February 29, 2008.

A hot spot analysis for the worst performing project-affected intersection was performed to provide information on potential local air quality effects of the project. The hot spot analysis is discussed in more detail below.

4.2 HOT SPOT ANALYSIS METHODOLOGY

Generally, intersections that do not warrant traffic signals do not have high enough traffic volumes to result in CO impacts. In addition, well-performing intersections with a level of service (LOS) of A, B, or C generally do not cause CO impacts.

A hot spot analysis was performed for the NW Saltzman Road: NW Cornell to NW Bauer Woods Drive Improvement Project. The methodology generally followed the U.S. EPA's G*uideline for Modeling Carbon Monoxide from Roadway Intersections* November 1992.

There are two project-affected signalized intersections that are predicted to operate at LOS D, E or F in the future. These are the intersections of NW Cornell Road and NW Saltzman Road, and NW Thompson Road and NW Saltzman Road. Table 4 shows the LOS data for these two intersections for the years

included in the analysis. The intersection with the worst traffic operating conditions was analyzed. On the basis of the LOS data, the worst performing intersection was found to be the intersection of NW Cornell Road and NW Saltzman Road. This intersection currently operates at LOS E, and is predicted to operate at LOS F in the year of opening (2012) and the future planning horizon year (2030).

Table 4: Project Affected Signalized Intersection LOS

Intersection	Existing Year (2007)	Year of Opening (2012)	Planning Horizon Year (2030)
NW Cornell Road & NW Saltzman Road	E	F	F
NW Thompson Road & NW Saltzman Road	B	C	D
Source: David Evans & Associates, Inc.			

There is a possibility that the intersection of NW Dogwood Street and NW Saltzman Road may meet signal warrants in the future depending on potential development associated with certain elements of the Cedar Mill Town Center Plan adopted by Washington County in 2000 (David Evans & Associates, 2008). Even if signal warrants are met at the intersection of NW Dogwood Street and NW Saltzman Road, it is unlikely that the potential for air quality impacts would exceed that at the intersection of NW Cornell Road and NW Saltzman Road due to the relatively higher absolute numbers of vehicles using the latter intersection during daily peak periods.

The EPA MOBILE 6.2 model was used to calculate vehicle emission rates for the hot spot analysis. The EPA dispersion model CAL3QHC was used to estimate 1-hour CO concentrations near the intersection. Eight-hour CO concentrations were calculated from the predicted 1-hour concentrations, using a persistence factor of 0.76. The highest predicted 1-hour and 8-hour CO concentrations were compared to the 1-hour and 8-hour CO NAAQS shown in Table 1 to evaluate compliance. Input assumptions used in both EPA models are included in Appendix A.

5 ANALYSIS RESULTS

5.1 LONG-TERM (HOT SPOT) IMPACTS

The highest forecast 1-hour and 8-hour concentrations for the future conditions at the intersection of NW Cornell Road and NW Saltzman Road are shown in Table 5. CO concentrations are predicted for the existing year (2007), the first year of facility operation (2012), and for the planning horizon year (2030). The predicted CO concentrations are all well below the 1-hour and 8-hour CO standards shown in Table 1, and do not exceed ambient air quality standards.

Table 5: Predicted CO Concentrations for the Intersection of NW Cornell Road and NW Saltzman Road

Condition	1-Hour Concentration (ppm)	8-Hour Concentration (ppm)
Existing Year (2007)	5	4
Year of opening (2012) No Build	5	3
Year of opening (2012) Build	5	3
Horizon Year (2030) No Build	4	3
Horizon Year (2030) Build	4	3
Note: CAL3QHC predictions of maximum 1-hour CO concentrations include an ambient 2 ppm background CO concentration. 8-hour CO concentrations are calculated from the 1-hour maximum concentration (including background CO concentrations) using a persistence factor of 0.76.		

The results show that there will slight be an improvement in localized CO concentrations between the existing and the future conditions. Traffic volumes increase between the existing (2007) and the future (2012 and 2030) analysis years; however, increased volumes are more than offset by reductions in individual vehicle emissions resulting from technology improvements over the same period. As a result, the estimated 1-hour and 8-hour CO concentrations for future years are lower than existing conditions.

5.2 SHORT-TERM CONSTRUCTION IMPACTS

Construction activities may cause short-term increases in air pollutant emissions. The construction contractor will be required to comply with all local, state, and federal regulations concerning air pollution abatement related to construction activities. Mitigation measures normally used include applying water or suppressants during dry weather and taking other measures, such as truck and equipment washing, to prevent the transport of dirt and dust from construction areas onto nearby roads. To reduce the effect of construction delays on traffic flow and resultant emissions, when possible, road or lane closures should be restricted to non-peak traffic periods. Construction activities are not expected to cause significant air quality impacts.

6 SUMMARY

No long-term air quality impacts or exceedances of the NAAQS are expected as a result of the project. No mitigation is required.

7 BIBLIOGRAPHY

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APPENDIX A

MOBILE 6.2 and CAL3QHC Input Assumptions

MOBILE and CAL3QHC Model Input Assumptions

The input assumptions used in the MOBILE 6.2 model to estimate emission factors are shown in Table A-1.

Table A1
Summary of MOBILE 6.2 Input Command Options Used in the
NW Saltzman Road: NW Cornell to NW Thompson Road Improvement Project Hot Spot Analysis

Command	Comment	Use for this analysis?
MOBILE6 INPUT FILE	Required	Y
RUN DATA	Required	Y
SCENARIO RECORD:	Required; scenario name	Y
END OF RUN	Required	Y
User Manual Section 2.8.3 All Output Commands		
POLLUTANT: CO	CO only	Y
NO REFUELING	Not pertinent to CO EFs	N
User Manual Section 2.8.4 Descriptive Output Commands		
REPORT FILE	Designate output file name if different from input file name	N
EXPAND BUS EFS	Not needed for default M6 provides 8 vehicle categories used in M5	N
EXPAND HDDV EFS		
EXPAND HDGV EFS		
EXPAND LDT EFS		
EXPAND EXHAUST	Default is composite EFs only	N
EXPAND EVAPORATIVE	Not needed for CO	N
User Manual Section 2.8.5 Database Output Commands		
User Manual Section 2.8.6 External Condition Commands		
CALENDAR YEAR	Analysis years	Y, existing (2007), year of opening (2012), design year (2030)
EVALUATION MONTH	January is default	Y, default
MIN/MAX TEMPERATURE	Required	Y, 31.5 and 44.1
HOURLY TEMPERATURES	Not required if Min/Max provided	N
ALTITUDE	Low is default	N
ABSOLUTE HUMIDITY	75 grains per lb is default	Y, 30.9
CLOUD COVER	0 is default	N
PEAK SUN	10am to 4pm is default	N
SUNRISE/ SUNSET	6am, 9pm are defaults	N
User Manual Section 2.8.7 Vehicle Fleet Characteristic Commands		
REG DIST	Option to provide distribution for each of 16 composite vehicle types	Y, use external file, PDX04.d provided by DEQ for all analysis years

Table A1 Summary of MOBILE 6.2 Input Command Options Used in the NW Saltzman Road: NW Cornell to NW Thompson Road Improvement Project Hot Spot Analysis		
Command	Comment	Use for this analysis?
DIESEL FRACTIONS	Option to use locality specific diesel fractions for 14 of 16 vehicle types	N, use M6 defaults
MILE ACCUM RATE	Option to supply mileage accumulation rates by vehicle age	N, use M6 defaults
NGV FRACTION	Option to indicate % of natural gas vehicles	N
NGV EF	Only needed if NGV FRACTION is used	N
User Manual Section 2.8.8 Activity Commands		
VMT FRACTIONS	Option to allocate VMT to specific vehicle types	N, use M6 defaults
VMT BY FACILITY	Option to allocate VMT to roadway types by vehicle class	N, use M6 defaults
VMT BY HOUR	Option to allocate fraction of the VMT by hour of the day	N, use M6 defaults
SPEED VMT	Option to allocate VMT by average speed on fwys or arterials	N, use M6 defaults
AVERAGE SPEED	Option to designate a single average speed to use for the entire day on specific roadway type	Y, see Note 1
STARTS PER DAY	Option to specify starts per day for specific classes for weekdays/weekends	N, use M6 defaults
START DIST	Option to allocate engine starts by hour of day	N, use M6 defaults
SOAK DISTRIBUTION	Option to enter vehicle soak duration distribution	N, use M6 defaults
HOT SOAK ACTIVITY	Option to specify a hot soak duration distribution for each of 14 daily time periods	N (not used for CO)
DIURN SOAK ACTIVITY	Option to specify a diurnal soak time distribution for each of 18 daily time periods.	N (not used for CO)
WE DA TRI LEN DI	Option to specify the fraction of weekday VMT occurring during trips of various durations at each hour of the day.	N
WE EN TRI LEN DI	Option to specify the fraction of weekend VMT that occurs during trips of various durations at each hour of the day.	N
WE VEH US	Option to apply weekend activity information in emissions calculations	N, use M6 default
User Manual Section 2.8.9 State Programs		
STAGE II REFUELING	Option to include Stage II vapor recovery system requirements	N (not used for CO)
ANTI-TAMP PROG	Option to include an anti-tampering program. Year program started, earliest model year to be covered, final model year covered by program, 14 vehicle types subject to ATP (toggle: 1=no, 2=yes); ATP benefit discontinued; ATP inspection frequency; program compliance rate; 8 inspections ATP will conduct (air pump system disabled, catalyst removal, fuel inlet restrictor disabled, tailpipe lead deposit test, EGR disabled, evaporative system disabled, PCV system disabled, missing gas cap.	Y 75, 75, 95, 22222 (light-duty gasoline vehicle classes), 22222222 (heavy-duty gasoline vehicle classes), 1 (gasoline buses not included), 12 (ATP benefit is not discontinued and ATP inspection frequency is every 2 years), 090.0 (90% compliance), 22212221 (all inspection types

Table A1 Summary of MOBILE 6.2 Input Command Options Used in the NW Saltzman Road: NW Cornell to NW Thompson Road Improvement Project Hot Spot Analysis		
Command	Comment	Use for this analysis?
		conducted except tailpipe lead deposit test and missing gas cap)
2.8.9.4 I/M Program Commands	Option to include an I/M program	Y
2.8.9.4.a I/M Options	I/M Options: program number, IM program start yr, end year (in our case the end year = the analysis year), frequency, program type, inspection test type	1, 1975, 1980, 2 (biennial), T/O, 2500/IDLE (basic exhaust test) 2, 1996, 2025, 2, T/O, OBD I/M (for the on-board diagnostics test for vehicles 1996 or newer)
2.8.9.4.b I/M MODEL YEARS	Required if I/M selected; I/M program number used in 2.8.9.4a, first model year covered by I/M program, last model year	1 1975 1980 2 1981 1995 3 1996 2025
2.8.9.4.c I/M VEHICLES	Required– indicate which of the 14 vehicle classes are subject to testing	Gasoline vehicle classes subject to I/M. (only gasoline-fueled vehicles can be modeled for I/M in MOBILE
2.8.9.4.d I/M STRINGENCY	Required- defines the expected exhaust inspection failure rate for pre-1981 model year vehicles covered by the I/M program	37.4%
2.8.9.4.e I/M COMPLIANCE	Required- percentage of fleet subject to I/M that actually goes thru the entire I/M process to receive a “pass”.	90%
2.8.9.4f I/M WAIVER RATES	Required- vehicles that fail an initial I/M test & do not pass a retest but receive a certificate of compliance	0% (waiver rate for the pre-1981 model year vehicles) 0% (waiver rate for 1981 and later model year vehicles)

Table A1 Summary of MOBILE 6.2 Input Command Options Used in the NW Saltzman Road: NW Cornell to NW Thompson Road Improvement Project Hot Spot Analysis		
Command	Comment	Use for this analysis?
2.8.9.4.g I/M CUTPOINTS	Not Required	N
2.8.9.4.h EXEMPTION AGE	Optional- the age at which vehicles become exempt from the I/M program. Default is 25 years; MOBILE6 does not calculate emissions for vehicles older than 25 years.	N
2.8.9.4.i I/M GRACE PERIOD	Optional- age at which vehicles first become subject to I/M testing	Y 4 years for OBD, N for 2500/IDLE Program
2.8.9.4.j NO I/M TTC CREDITS	Optional- eliminates I/M credit that the model assigns to a technical training program	N default is full I/M credit for technician training
2.8.9.4.k I/M EFFECTIVENESS	Optional- correction factor that reduces the exhaust I/M credit for test and repair programs by a specified amount	N (default is 100% or full credit assigned to all I/M program types)
2.8.9.4.l I/M DESC FILE	Optional-	N
User Manual Section 2.8.10 Fuel Commands		
FUEL PROGRAM	Option to specify an RFG program, Tier 2 sulfur phase-in schedules, or to specify sulfur content of gasoline after 1999.	N (no program, standard Tier2 phase in schedule is default)
SULFUR CONTENT	Option to enter sulfur content of fuels up to 1999 year	N
OXYGENATED FUELS	Option to include oxygenated gasoline	Y, Pre-2008: 10% Ethyl Alcohol (0.034% O2 by weight) in 30% of fuels; Post-2008: 10% Ethyl Alcohol (0.034% O2 by weight) in 100% of fuels. No RVP waiver.
FUEL RVP	Required	Y, 15
SEASON	Default is winter when January is used	N
NO CLEAN AIR ACT	Option to model vehicle emissions as if 1990 Amendments had not been implemented	N
NO DEFEAT DEVICE	Option to turn off the effects of the HDDV NOx off-cycle emission effects	N (not used for CO)
NO NOX PULL	Option to turn off the effects of the Pull Ahead mitigation	N (not used for CO)

Table A1 Summary of MOBILE 6.2 Input Command Options Used in the NW Saltzman Road: NW Cornell to NW Thompson Road Improvement Project Hot Spot Analysis		
Command	Comment	Use for this analysis?
AHEAD	program	
NO REBUILD	Option to turn off effects of the Rebuild mitigation program	N (not used for CO)
REBUILD EFFECTS	Option to change the Rebuild program effectiveness rate	N (not used for CO)
Tier 2 Emission Standards and Fuel Requirements	Option to override the defaults	N
94+ LDG IMP	Option to override default certification standard phase-in schedule for Tier 1, NLEV and Tier 2 programs	N
NO 2007 HDDV RULE	Option to override default settings for 2007 HDDV emission standards	N
Note 1: The AVERAGE SPEED command will be used to model the emission factors for the speeds required for CAL3QHC input. Those speeds will include 2.5 miles per hour (mph) for the calculation of an idle emission factor and the other relevant speeds shown in the CAL3QHC guidance document (33 mph).		

The emission factors used in the hot spot analysis are listed in Table A-2.

Table A-2 MOBILE 6.2 Emission Factor Calculations (g/m)			
Year	Speed (mph)	EF	Idle EF[1]
2007	2.5	52.636	131.590
2007	33	18.744	
2012	2.5	35.086	87.715
2012	33	13.825	
2030	2.5	25.733	64.333
2030	33	10.197	
[1] Idle EF = $EF_{2.5mph}$ * 2.5			

The CAL3QHC assumptions used in the hot spots analysis are listed in Table A-3.

Table A3 Summary of CAL3QHC Input Command Options	
CAL3QHC Model Input Assumptions	
Meteorological Variables	
Averaging Time	60 minutes
Surface Roughness	108.00 (Single family residential)
Wind Speed	1 meter/second
Wind Angle	0 to 360 degrees in 10 degree increments
Stability Class	4 (D)
Mixing Height	1,000 meters
Persistence Factor (1- hour to 8-hour)	0.76 (Based on agreement between DEQ and ODOT for Portland area)
Ambient Background Concentration	2.0 ppm
Site Variables	
Receptor Coordinates	-At least 3 meters from each traveled roadway on both sides of the street, at distances of 3 meters, 25 meters, and 50 meters from the cross street. -Height 1.8 meters.