AIR QUALITY

Methods and Data Report

January 2007

Columbia River CROSSING

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KEY TERMS AND ABBREVIATIONS

AADT	Annual Average Daily Traffic
API	Area of potential impact
AQMA	Air quality management area
CAA	Clean Air Act
CFR	Code of Federal Regulations
CO	Carbon monoxide
DEIS	Draft Environmental Impact Statement
DEQ	Oregon Department of Environmental Quality
DOT	U.S. Department of Transportation
Ecology	Washington State Department of Ecology
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
LOS	Level-of-service
MPO	Metropolitan Planning Organization
MSAT	Mobile Source Air Toxic
MTIP	Metropolitan Transportation Improvement Plan
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO_x	Nitrogen oxides
OAQPS	Office of Air Quality Planning and Standards (EPA)
OAR	Oregon Administrative Rule
ODOT	Oregon Department of Transportation
PATA	Portland Air Toxics Assessment
$PM_{2.5}$	Particulate Matter (aerodynamic diameter of 2.5 micrometers or less)
PM_{10}	Particulate Matter (aerodynamic diameter of 10 micrometers or less)

ppm	parts per million
ROD	Record of Decision
RTC	Southwest Washington Regional Transportation Council
RTP	Regional Transportation Plan
SAAQS	State Ambient Air Quality Standards
SIP	State Implementation Plan
SWCAA	Southwest Washington Clean Air Agency
TIP	Transportation Improvement Program
TSP	Total Suspended Particulate
$\mu g/m^3$	micrograms per cubic meter
V/C	Volume-to-capacity ratio
VMT	Vehicle miles traveled
VOC	Volatile organic compounds
WAC	Washington Administrative Code
WSDOT	Washington Department of Transportation

1. Air Quality

1.1 Purpose

An Air Quality Technical Report will be prepared in support of the Draft Environmental Impact Statement (DEIS) for the Interstate 5 (I-5) Columbia River Crossing (CRC) project. The purpose of the report will be to compare air pollutant emissions of the alternatives, describe the air quality impacts of the alternatives, and address potential mitigation measures for impacts, if needed. The report will include a discussion of the following elements:

- Existing air quality conditions in areas potentially affected by the alternatives
- Regulations and policy governing evaluation of impacts and mitigation
- Methodology used in the analysis
- Impacts of the alternatives (short-term, long-term, cumulative, and indirect)
- Potential mitigation measures

The purpose of this methods and data report is to describe the analysis procedures that will be followed by this DEIS. There are well developed standards and analysis methods for air quality impacts from criteria pollutants. The U.S. Environmental Protection Agency (EPA) has developed National Ambient Air Quality Standards (NAAQS) for the six criteria pollutants: carbon monoxide (CO), lead, ozone, nitrogen dioxide, sulfur dioxide, and particulate matter. On recent transportation projects, mobile source air toxic (MSAT) pollutants have caused more concern than criteria pollutants. Despite the concerns, there are no NAAQS for MSAT pollutants nor specific regulatory analysis requirements, and the analysis methods are still being developed.

1.2 Analysis Area

Air quality will be evaluated on a regional emissions basis and a subarea emissions basis. The regional area will cover Multnomah, Clackamas, Washington and Clark Counties. The subareas will consist of the crossing area, south of the bridge crossing area, and north of the bridge crossing area. Local impacts will be evaluated for CO adjacent to poorly performing intersections at the I-5 ramp terminals. The project vicinity and surrounding jurisdictions are shown on Figure 1-1.

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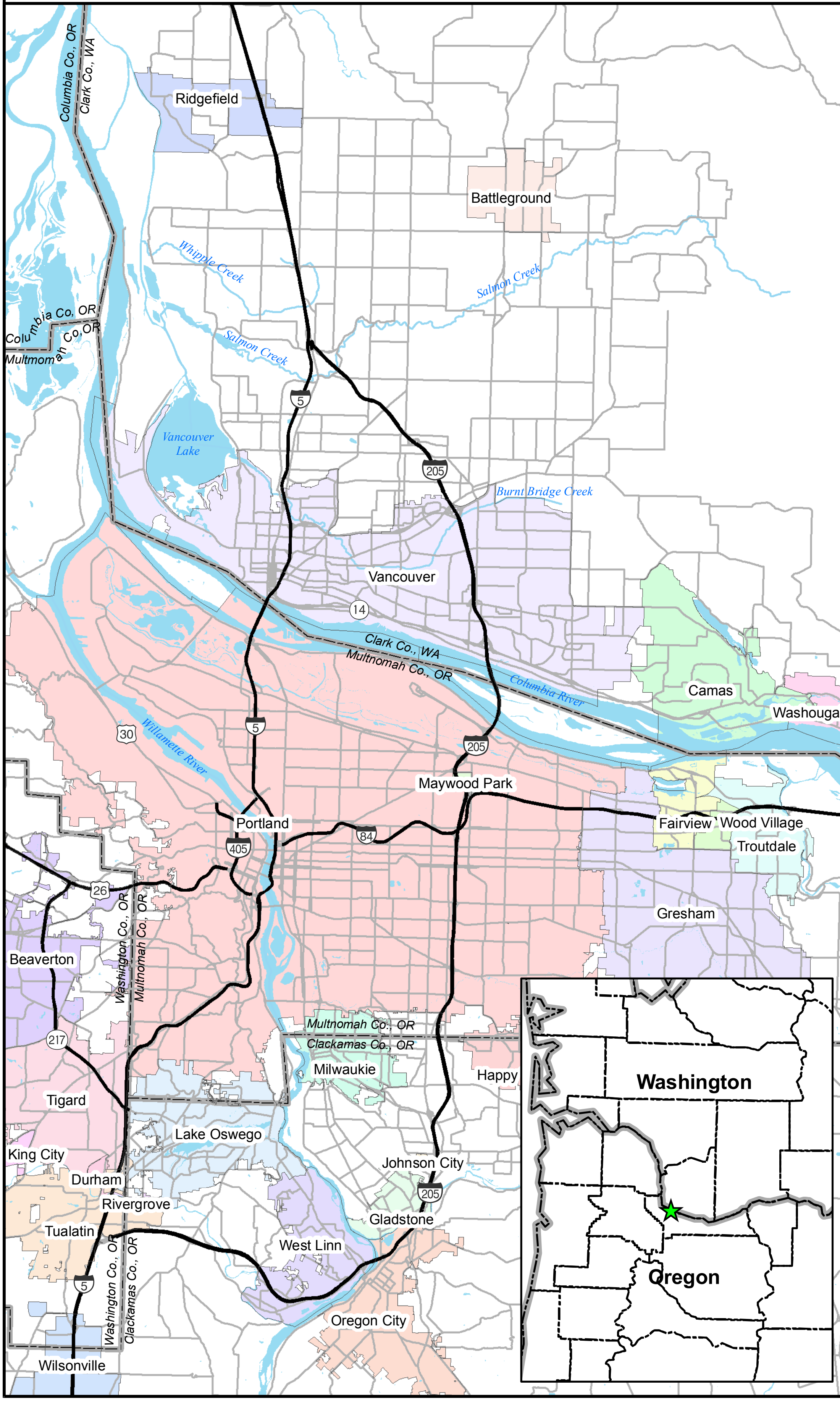
Figure 1-1: Project Vicinity and Surrounding Jurisdictions



Project Area

N W E S

0 1 2 3 4
Miles

Geographic Data Standards:
Projected Coordinate System:
State Plane - Washington South
Units: US Foot

Data Source(s):
Metro RLIS, ODOT, ESRI, Parametrix

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Columbia River CROSSING

Analysis by K. Benck, N. Banks: Analysis Date: 22-Dec-2005: Plot Date: 23-Feb-2006: File Name: MDR_Location.mxd

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1.3 Relevant Laws and Regulations

1.3.1 Federal

- Clean Air Act (CCA)

  This comprehensive public law forms the basis for a broad range of regulations that control allowable emissions and concentrations of air pollutants in the environment.

- 40 CFR 50. EPA. "National Primary and Secondary Air Quality Standards." *U.S. Code of Federal Regulations*.

  The federal government has established NAAQS to protect the public from air pollution. The NAAQS are shown in Table 1-1.

Table 1-1. State and Federal Ambient Air Quality Standards[a]

Pollutant	Averaging Time	Federal	Oregon	Washington
CO	8-hour[b]	9 ppm	9 ppm	9 ppm
	1-hour[b]	35 ppm	35 ppm	35 ppm
Lead	Calendar Quarter	1.5 μg/m^3	1.5 μg/m^3	1.5 μg/m^3
Ozone	8-hour[c]	0.08 ppm		-
	1-hour[d]		0.12 ppm	
Nitrogen Dioxide	Annual Arithmetic Mean	0.053 ppm	0.053 ppm	0.05 ppm
Sulfur Dioxide	Annual Arithmetic Mean	0.03 ppm	0.02 ppm	0.02 ppm
	24-hour	0.14 ppm	0.10 ppm	0.10 ppm
	3-hour	0.5 ppm	0.50 ppm	0.50 ppm
	1-hour Average (Annual)	-	-	0.4 ppm
	1-hour Average (7 day period)	-	-	0.25 ppm
Total Suspended Particulate (TSP)	Annual Geometric Mean	-	-	60 μg/m^3
	24-hour Average	-	-	150 μg/m^3
PM_{10}	3-year Average of Annual Arithmetic Mean	-	50 μg/m^3	50 μg/m^3
	24-hour Average	150 μg/m^3	150 μg/m^3	150 μg/m^3
$PM_{2.5}$	3-year Average of Annual Arithmetic Mean	15 μg/m^3	-	15 μg/m^3
	3-year Average of 98th Percentile of 24-hour concentrations	35 μg/m^3	-	65 μg/m^3

Note: ppm = parts per million; μg/m^3 = micrograms per cubic meter; PM_{10} = particulate 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.

[a] Sources: EPA Office of Air Quality Planning and Standards (OAQPS); Oregon Department of Environmental Quality (DEQ); Washington Administrative Code (WAC 173, Sections 470, 474, 475).

[b] Not to be exceeded more than once per year.

[c] The 3-year average of the 4th-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The federal 1-hour ozone standard was revoked in June 2005.

[d] DEQ is proposing to revise the state 1-hour standard to match the 8-hour federal standard.

Geographic areas where concentrations of a pollutant exceed the ambient air quality standards are classified as nonattainment (do not attain standards) areas. Previously designated nonattainment areas now in compliance with air quality standards are classified as maintenance areas. Areas that meet the standards are classified as attainment (attain standards) areas. Federal regulations require states to prepare State

Implementation Plans (SIPs) that identify emission reduction strategies for nonattainment and maintenance areas. Portland and Vancouver are CO maintenance areas. The Portland-Vancouver area is an attainment area for all other pollutants.

EPA recently revised the NAAQS for particulate matter. The revised standards are shown in Table 1-1. The revised standards became effective on December 18, 2006, and the planned implementation will follow the schedule outlined below.

- ○ States will make recommendations by November 2007 for areas to be designated attainment and nonattainment.
- ○ EPA will make final designations by November 2009; those designations would become effective in April 2010.
- ○ For areas designated as nonattainment areas, states would prepare SIPs outlining how emissions would be reduced to meet the standards. SIPs would be due 3 years after designations, in April 2013.
- ○ States must meet the standards by April 2015 or April 2020 under some special circumstances.

As a result of the anticipated regulatory schedule for these pollutants, attainment or nonattainment designations would not become effective until 2010. Therefore, specific regulatory standard changes for these pollutants would not impact the project prior to the record of decision (ROD) for the project, which is expected late 2008 or early 2009.

- 40 CFR 86. EPA. “Control of Emissions from New and In-Use Highway Vehicles and Engines.” *U.S. Code of Federal Regulations*.

  Starting in the early 1970s, EPA promulgated numerous regulations to control air pollutant emissions from motor vehicles. The most recent regulations were promulgated in the early 2000s and adopted controls on heavy duty diesel vehicles, sulfur in fuels, and air toxic emissions from mobile sources. While these standards will not apply directly to the project alternatives, they apply to all vehicles on the highway system and are the regulatory controls responsible for substantial reductions in vehicle emissions since the 1970s and additional projected vehicle emissions reductions over the next 25 to 30 years.

1.3.2 State

Oregon

- Oregon Administrative Rule (OAR) 340 Division 202. DEQ. “Ambient Air Quality Standards and PSD Increments.”

  In addition to the NAAQS, DEQ has established State Ambient Air Quality Standards (SAAQS) that are at least as stringent as the NAAQS. These standards are listed in Table 1-1.

- OAR 340 Division 252. DEQ. “Transportation Conformity.”

  The transportation conformity regulations establish criteria and procedures for determining conformity with SIPs. This rule covers transportation plans, programs, and projects in Oregon that are developed, funded, or approved by the United States Department of Transportation (DOT) and by metropolitan planning organizations (MPOs) or other recipients of funds under Title 23 of the U.S.C. or the Federal Transit

Laws. DEQ has identified control strategies in their SIP for compliance with the ambient air quality standards and the maintenance of healthy air quality in the Portland metropolitan area.

- OAR 340 Division 254. DEQ. "Rules for Indirect Sources."

  The indirect source rules regulate parking facilities and other indirect sources with associated parking. In the project area, parking lots with a capacity of 1,000 or more parking spaces would be regulated.

Washington

- Washington State Department of Transportation (WSDOT). 2006. "Environmental Procedures Manual, Chapter 425 (Air Quality)."

  This manual outlines procedures and documentation requirements for air quality studies performed for WSDOT projects.

- Washington Administrative Code (WAC). "Ambient Air Quality Standards." WAC 173.470, 474, and 475.

  In addition to the NAAQS, Washington State Department of Ecology (Ecology) has established SAAQS that are at least as stringent as the NAAQS. These standards are listed in Table 1-1.

- WAC. "Conformity of transportation activities to air quality Implementation Plans." WAC 173.420.

  The transportation conformity rules require Ecology and WSDOT to develop criteria and guidance for demonstrating and assuring conformity of transportation plans, programs, and projects to the purpose of the SIP for attaining and maintaining the NAAQS and meeting the requirements of the CAA. The Southwest Washington Clean Air Agency (SWCAA) is responsible for conformity planning in Vancouver, and has identified control strategies in their SIP for compliance with the ambient air quality standards and the maintenance of healthy air quality in the Portland-Vancouver metropolitan area.

  DEQ and SWCAA cooperate on management of air quality in the Portland-Vancouver metropolitan area. DEQ updated its CO Maintenance Plan SIP in 2004 and is currently preparing an 8-hour Ozone Maintenance Plan SIP. SWCAA is preparing both a CO and an 8-hour Ozone Maintenance Plan SIP. All of the plans are expected to be submitted in early 2007 to EPA for approval. To demonstrate conformity for a project in the Portland-Vancouver area, the project must be included in a conforming Regional Transportation Plan (RTP) and Metropolitan Transportation Improvement Plan (MTIP), and a hot spot analysis must be performed to analyze potential CO impacts at intersections where traffic volumes would be affected by the proposed project. This analysis must be completed before the ROD for a National Environmental Protection Act (NEPA) project.

  Metro in Oregon and the Southwest Washington Regional Transportation Council (RTC) in Washington perform regional conformity analyses of all transportation projects included in their respective RTPs and transportation improvements programs (TIPs) to address long-term impacts. Total CO emissions associated with all planned projects are evaluated to determine if the projects will cumulatively exceed the emissions budget for on-road mobile sources in the air quality SIPs. If the emissions are within the emissions budget, then no regional adverse air quality impacts would occur as a result of the planned projects, and the RTPs and TIPs are found to conform. DEQ and SWCAA have developed separate budgets for the Portland-Vancouver metropolitan air quality management area (AQMA). The motor vehicle emissions budgets for CO in Portland and Vancouver are shown in Table 1-2.

Table 1-2. Maintenance Area CO Motor Vehicle Emission Budgets

City	Year	CO Motor Vehicle Emissions Budgets (lbs/winter day)
Portland	2005	1,238,575
	2010	1,033,578
	2017	1,181,341
Vancouver[a]	2006	260,000

Source: http://www.epa.gov/fedrgstr/EPA-AIR/1996/July/Day-29/pr-23557.html and letter from EPA Region 10 to Stephanie Hallock dated 2/15/2005.

Emission budgets have not been prepared by SWCAA for years after 2006. RTC conforms to this budget for subsequent years.

1.4 Data Sources and Data Collection Methods

1.4.1 General Methods

The air quality analysis will use secondary data (traffic information) and assumptions about the local vehicle fleet to estimate regional and project subarea pollutant emissions and local CO concentrations. Pollutant emissions data will be produced by Metro for regional and subarea analyses using the MOBILE6.2 model. The calculation methods used by Metro staff will be compatible with those used in current conformity analysis work. Assumptions used will generally be similar to those used in the Delta Park Environmental Assessment (EA). Metro and RTC will coordinate to develop emission rates based on consultation with DEQ and SWCAA. If it is necessary to run the MOBILE6.2 model to develop CO emission rates for hot spot analyses, the assumptions listed in Table A-1 of the Appendix will be used. Local CO concentrations will be predicted using the CAL3QHC model and input assumptions shown in Table 1-3.

Table 1-3. Summary of CAL3QHC Input Command Options

Meteorological Variables	
Averaging Time	60 minutes
Surface Roughness	175.00 (City land-use - "Office" category)
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)	current Portland area factor cited in ODOT air quality manual 0.70 for Vancouver area
Ambient Background Concentration	current background concentrations to be coordinated with DEQ and SWCAA staff
Site Variables	
Receptor Coordinates	At least 3 meters from each traveled roadway on both sides of the street[a], at distances of 3 meters, 25 meters, and 50 meters from the cross street. Height 1.8 meters.

[a] Distances are measured 3 meters from the queue line and 3 meters from the lane edge. All receptor locations will be verified to ensure that none are placed in the roadway.

1.4.2 Summary of Applicable Regulations and Data Needs

Table 1-4. Summary of Applicable Regulations and Information Needs

Regulation	Citation	Trigger(s)	Information to be Used	Gaps, Timing Issues, Other Possible Information Shortfalls
National Environmental Policy Act of 1969	NEPA requires that "reasonably foreseeable" direct, indirect, and cumulative effects of a proposed action be considered in the decision making process.	Disclose the effects of the alternatives to the public and decision makers.	Regional and subarea emissions for CO, volatile organic compounds (VOCs), nitrogen oxides (NO_x), fine particulate matter ($PM_{2.5}$) and coarse particulate matter (PM_{10}), and six mobile source air toxic (MSAT) pollutants.	The pollutant emissions information can be supplied directly from Metro's link-by-link regional emissions model. Timing, exact data transfer formats, and specific subareas to be analyzed will need to be coordinated with Metro.
Transportation Conformity	OAR 340 Division 252 and WAC 173-420	Federally funded transportation plan, program, or project affecting intersections with level-of-service (LOS) D, E, or F or that will have a LOS of D, E, or F as a result of the alternatives in a CO or a particulate matter nonattainment or maintenance area. This analysis is required prior to the ROD. Because traffic data will not be available at the level of detailed required, this analysis will not be performed under the Draft EIS. The conformity analysis will be completed for the preferred alternative under the Final EIS. The information shown in the following column will be used to perform intersection analyses for I-5 ramp intersections. The purpose of the analysis will be to allow the public to observe and compare project alternative effects for this limited subset of highly affected areas.	Ranking of signalized I-5 ramp terminal intersections affected by the alternatives and having a LOS of D, E, or F by traffic volume and LOS for the design year. Traffic data for three intersections in Washington and three intersections in Oregon. Intersection selection will be based on the worst combined LOS (based on v/c and delay) and entering volume. The following data are required for the peak traffic hour for existing conditions, and the design year: Intersection configuration for existing conditions and any planned intersection improvements; including the number of lanes, lane widths, lengths of dedicated turn lanes, cross walks, or stop lines. Signal cycle timing for each movement, average free flow speed for each link, and saturated flow and actual flow for each movement. Arrival type (1 to 5, representing worst-to-best platoon arrival at signal) and signal type (pre-timed, actuated, or semi-actuated).	The conformity analysis will not be performed until the Final EIS effort. For the Draft EIS, several of the poorest performing intersections will be selected and analyzed for purposes of disclosing project impacts. Traffic data for these intersections will be needed in time to complete the analysis. A public review and comment is required for conformity analysis. Because this analysis will not be completed until the Final EIS, opportunities for the public to review the conformity determination will have to be provided separately or with the Final EIS process.

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1.4.3 Summary of Other Factors Affecting Data Collection

There are no other known factors affecting data collection.

1.5 Effects Guidelines

An air quality impact could occur with a violation of the NAAQS or SAAQS summarized in Table 1-1. CO is the only pollutant of concern for violation of the NAAQS or SAAQS related to transportation projects in the Portland-Vancouver metropolitan area.

1.6 Long-Term Operational Impacts Approach

The operational impacts analysis will provide information to the public and decision makers on pollutant emissions for the alternatives. The focus of the air quality analysis for the Draft EIS will be to evaluate the regional and subarea pollutant emissions differences between the alternatives and No-Build options. This comparison will show the broad effects of the proposed alternatives.

1.6.1 Criteria Pollutants

CO is the only pollutant subject to specific regulatory analysis requirements because it is subject to the transportation conformity regulation analysis requirements. A discussion of the status of the project in the conforming regional transportation plans will be provided. In addition, local CO impacts will be evaluated by performing hot spot analyses at up to six intersections split between Washington and Oregon for the purpose of providing information to the public and decision makers. Conformity level hot spot analyses will not be completed until the Final EIS effort.

Vehicles are the primary source of VOCs and NO_x emissions in the Portland-Vancouver metropolitan area. The public has expressed concern regarding emissions of particulates, lead and air toxic pollutants. To address public concern, and provide information on the relative effects of the project alternatives, regional emission estimates will be provided for CO, VOCs, NO_x, PM_{10}, and $PM_{2.5}$ for the project alternatives. In addition, if coated bridges are included in the alternatives considered, potential VOC emissions from bridge coating operations will be estimated. Particulate emissions estimates will also be provided for project subareas. Inputs to the MOBILE 6.2 model for regional and subarea emissions estimates will be coordinated between Metro, DEQ, RTC, and SWCAA. Vehicle lead emissions are no longer a concern since the use of lead in gasoline was phased out. Lead will be addressed in the construction analysis only; air toxic emissions are discussed in the next section.

1.6.2 Air Toxic Pollutants

Because air toxic emissions are a public concern, an analysis will be performed to allow the public to evaluate the changes in regional and project subarea emissions that would result from the project alternatives. EPA has identified six priority MSATs: diesel particulate emissions, benzene, formaldehyde, 1,3-butadiene, acrolein, and acetaldehyde. Emission estimates for the MSATs will be developed on a regional and subarea basis for each of the project alternatives.

The subareas will be the bridge crossing area, south of the bridge crossing area, and north of the bridge crossing area. The estimates can be provided by Metro from the regional link-by-link emissions model. Inputs to the MOBILE 6.2 model for regional and subarea emissions estimates will be coordinated between Metro, DEQ, RTC, and SWCAA.

The emissions projected for the project alternatives will be compared to the emissions used as the basis for concentration and health-related analyses that will be included in the soon to be published Portland Air Toxics Assessment (PATA).

The Federal Highway Administration (FHWA) released guidance for analysis of air toxic pollutants in NEPA documents on February 3, 2006. The project will follow the guidance in its analysis, as appropriate. The guidance identifies interstates in urban areas with average annual daily traffic (AADT) volumes in the range of 140,000 to 150,000 or greater by the design year as projects with higher potential MSAT effects. I-5 is projected to have AADT volumes between 150,000 and 200,000 by 2020. An emissions-based analysis for air toxic pollutants is proposed for the I-5 CRC project because the current state of development of analysis tools and standards for air toxic pollutants is insufficient for production of reliable and meaningful results for concentration or health risk based analyses. In considering the appropriate MSAT analysis for the I-5 CRC project, FHWA identified three primary concerns regarding attempting to use an approach other than the regional and subarea emissions-based analysis:

1. The MOBILE6.2 model is not designed to predict emissions levels for a particular location. The model estimates emission factors based on an assumed typical trip and average speeds during the trip. Because of this estimation method, the model is best suited to predict relative emissions levels between alternatives on a regional basis. The model has additional limitations for estimating particulate emissions which has led EPA to recommend against its use for PM_{10} project level conformity analyses.

2. Attempting to model pollutant dispersion rather than emissions would be inappropriate because the level of accuracy of dispersion models is far less than the expected change in MSAT levels. It is common for dispersion models to be off by as much as a factor of two between modeled and monitored values. Projects conducting MSAT emission analysis to date, have typically predicted pollutant increases of 5 percent or less. Therefore, the total predicted change in emissions would be within the margin of error of a dispersion model making any results meaningless.

3. The link between increased roadway emissions and health consequences is unclear and difficult to model. Because people are exposed to MSAT pollutants at home, school, work and other locations, as well as on roadways, it is impossible to predict how much of an effect a particular change in roadway emissions would have in overall exposure or what effect on health that change would have.

Additional information on FHWA's consideration of MSAT analysis for the I-5 CRC project is included in Table A-1 of the Appendix.

It is also worth noting that previous MSAT analyses on transportation projects have forecasted large declines in emissions over time irrespective of the alternative chosen. Reduced emissions are projected to result from cleaner fuels and new combustion and emission control technologies in use in future years. Like the analysis for the I-5 Delta Park to Lombard project, emissions analyses using MOBILE6.2 along with projected increases in vehicle travel typically show a 50 to 80 percent decline in study area emissions between the base year and the design year, and then some small incremental change between Build and No-Build. Given this well-documented trend, using dispersion models and other advanced techniques alternatives, with their associated uncertainties, would not be expected to add information of value to the decision-making process.

1.7 Short-Term Construction Impacts Approach

Construction impacts to air quality will be addressed qualitatively. A general comparison of the relative potential impacts of the alternatives will be based on factors such as expected construction duration, general types of construction activity, extent of construction area, and potential for traffic and bus rerouting. Diesel emissions from construction equipment will be discussed qualitatively. The potential for soil-borne lead to become airborne will be discussed, based on data in the available literature or from other agencies.

1.8 Cumulative Impact Analysis Approach

The project team will address the cumulative impacts approach through a separate technical memorandum. Cumulative impacts may occur when a project's effects are combined with those from past, present, and future projects. They can also result from individually small but collectively significant actions that occur over a long period of time. Specific elements, like the appropriate base year and the geographic scale of analysis, may vary by discipline area. The NEPA scoping process will provide the necessary forum for addressing these items, as well as the overall framework for cumulative effects.

1.9 Mitigation Measures Approach

Air quality impacts would occur if predicted CO concentrations cause a new exceedance, or increase an existing exceedance of the NAAQS mitigation measures, such as modifications to signal timing or intersection configuration, would need to be developed in coordination with the design team.

Various mitigation measures are available to reduce emissions from construction activities. These measures will be discussed qualitatively.

1.10 References

40 CFR 50. Environmental Protection Agency. “National Primary and Secondary Air Quality Standards.” *U.S. Code of Federal Regulations*.

40 CFR 86. Environmental Protection Agency. “Control of Emissions from New and In-Use Highway Vehicles and Engines.” *U.S. Code of Federal Regulations*.

Oregon Administrative Rule (OAR) 340 Division 202. Oregon Department of Environmental Quality. “Ambient Air Quality Standards and PSD Increments.” *Oregon Administrative Rules*.

Oregon Administrative Rule (OAR) 340 Division 252. Oregon Department of Environmental Quality. "Transportation Conformity." *Oregon Administrative Rules*.

Oregon Administrative Rule (OAR) 340 Division 254. Oregon Department of Environmental Quality. "Rules for Indirect Sources." *Oregon Administrative Rules*.

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U.S. Environmental Protection Agency. "Portland, Oregon Motor Vehicle Emissions Budget Adequacy." Letter dated February 15, 2005, from EPA Region 10 to Stephanie Hallock, Oregon DEQ.

Washington Administrative Code (WAC). "Conformity of transportation activities to air quality implementation plans." WAC 173.420.

Washington Administrative Code (WAC). "Ambient Air Quality Standards." WAC 173.470, 474, and 475.

WSDOT. 2006. "Environmental Procedures Manual, Chapter 425 (Air Quality)."

Appendix

Table A-1. Summary of MOBILE6.2 Input Command Options for Use in the Air Quality Analysis

Input Command Options	Comment	Used for this Analysis?
MOBILE6 INPUT FILE	Required	Y
RUN DATA	Required	Y
SCENARIO RECORD : South Corridor	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 because 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 (2005), design year (2030)
EVALUATION MONTH	January is default	N, 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, R02PDX2.d provided by DEQ for all analysis years
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

Input Command Options	Comment	Used for this Analysis?
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 nostarts.d file
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 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, 1995, 2 (biennial), T/O, 2500/IDLE (basic exhaust test) 2, 1996, 2030, 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 1995 2 1996 2030
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.

Input Command Options	Comment	Used for this Analysis?
		(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 through the entire I/M process to receive a "pass."	90%
2.8.9.4.f I/M WAIVER RATES	Required- vehicles that fail an initial I/M test and 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)
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 and ASM 2525/5015 FINAL Programs, 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	N
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 AHEAD	Option to turn off the effects of the Pull Ahead mitigation program	N (not used for CO)
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

Input Command Options	Comment	Used for this Analysis?
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 speeds shown in the CAL3QHC guidance document (27 mph for collectors, and 33 and 40 mph for arterials) as determined by the intersections that are ranked for the analysis.

FHWA understands that there is some interest in use of microscale modeling, either localized “hotspot” emissions and/or dispersion modeling at the link level, or perhaps even a PATA-like approach, for MSAT analysis of the I-5 CRC project. FHWA has several concerns with use of microscale modeling for project-level MSAT assessments.

1. **The MOBILE6.2 model is not well suited for microscale analysis.** MOBILE6.2, like its predecessors, is a trip-based model – emission factors are projected based on a typical trip, and on average speeds for this typical trip. This means that MOBILE6.2 in not designed to predict emission factors for a specific vehicle speed at a specific location. This is described in the *Technical Guidance on the Use of MOBILE6 for Emission Inventory Preparation,* August 2004, p. 38, and in EPA’s November 2003 document *Frequently Asked Questions on MOBILE6,* which states: “... it is important to note that even a single average speed represents a trip-length average of many cars traveling over a driving schedule, not the instantaneous speed of a single vehicle. Like MOBILE5, MOBILE6 is not really designed for micro-scale modeling. [p.32].” Use of MOBILE6.2 to generate microscale emission rates for diesel particulate matter is particularly problematic, because the MOBILE6.2 particulate emission rates are not sensitive to a number of environmental and travel activity variables, including speed. This is discussed at length in EPA’s March 10, 2006 rulemaking on analysis of $PM_{2.5}$ and PM_{10} hotspots in the transportation conformity process (71 FR 12498), which rules out use of MOBILE6.2 for purposes of $PM_{2.5}$ and PM_{10} project-level hotspot analyses.

   Emissions estimates from MOBILE6.2 are considered more reliable at larger geographic scales of analysis than at microscale levels of analysis. MOBILE6.2 characterizes aggregate emissions summed from different roadways with less error than it characterizes emissions on any specific roadway. It is best suited for relative emissions analysis comparing roadway alternatives, particularly for the larger projects that by their nature incorporate a wide range of travel activity (e.g., the projects themselves represent an average speed similar to the way MOBILE6.2 is constructed). This is the analysis approach that is supported by FHWA’s recent MSAT analysis guidance and the approach that was used for the I-5 Delta Park to Lombard project.

2. **The uncertainty associated with available dispersion models is typically greater than the difference in emissions resulting from projects.** FHWA is aware that dispersion models and combinations of models have been used in many research studies nationwide in the context of 1) model-to-monitor comparison studies designed to improve analytical techniques, and 2) dispersion modeling studies to characterize regional distributions of HAP concentrations. However, there is a fundamental difference in the level of accuracy needed in a research setting to test applications of models to identify potential hotspot

issues for further study (e.g., the PATA study) verses the level of accuracy needed to define impacts in the NEPA context and provide a decision maker with information that is precise enough to distinguish between alternatives.

Model-to-monitor comparison studies have shown that predictions of concentrations that occur at a specific time and location are poorly correlated with actually observed concentrations; agreement between modeled and monitored values within a factor of two is generally considered success in these types of studies. However, in a NEPA analysis of an individual roadway project, the change in MSAT emissions is typically much less than that. For the projects that have received MSAT emissions analysis in NEPA thus far, the difference in emissions between build and no-build has been on the order of 5%; for the I-5 Delta Park to Lombard project, the difference was 0.36%. Thus, air dispersion models are much less precise than the change in MSAT emissions being assessed. Given these limitations, and coupled with the purpose of the analysis which is to help distinguish between alternatives in NEPA, FHWA has concluded that emissions analysis alone is sufficient to characterize the MSAT impacts of NEPA alternatives.

3. **Changes in roadside concentrations are an incomplete measure of changes in health outcomes.** Even if we were able to accurately model localized changes in emissions and concentrations, we face the problem that exposure to near roadway concentrations of MSATs is only part of a person's daily exposure to MSAT pollutants. MSAT exposure is also dependent on the time people spend at various locations to commute, work, shop, attend school, or for other activities, and the concentration at those locations. There are indoor sources of some of these pollutants; for example, formaldehyde is a well-know indoor air pollutant. Thus, a new or expanded roadway has only an incremental impact on total daily MSAT exposure, and assessing MSAT exposure is not a simple matter of calculating the impacts of a roadway in isolation from these other sources of exposure. A 5% change in concentrations near a roadway does not imply a 5% change in health outcomes, and exposure modeling would be needed to translate changes in roadside concentrations to changes in overall exposure. However, exposure modeling is also an inexact science that involves considerable uncertainty, and even if it were precise enough to meaningfully characterize the impact of a 5% change in emissions, this level of effort is clearly outside of the scope of a NEPA analysis for an individual project.

It is also worth noting that all MSAT analyses to date have shown large declines in emissions over time irrespective of the alternative chosen. Like the analysis for the I-5 Delta Park to Lombard project, emissions analyses using MOBILE6.2 along with projected increases in vehicle travel typically show a 50-80% decline in study area emissions between the base year and the design year, and then some small incremental change between Build and No-Build. Given this well-documented trend, it is not clear how use of dispersion models and other advanced techniques (with their associated uncertainties) would add value to the process.

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