

AIR QUALITY TECHNICAL MEMORANDUM

***SR 167 – 8th Street E Vicinity to 15th Street SW Vicinity
Northbound HOT Lane***

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**Washington State
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TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
WHAT IS THE PROPOSED PROJECT AND WHY IS IT NEEDED?.....	1
WHAT IS THE PURPOSE OF THIS TECHNICAL MEMORANDUM?	1
WHAT ARE THE PROJECT'S POTENTIAL EFFECTS?	1
WHAT MITIGATION MEASURES ARE PROPOSED FOR THIS PROJECT?.....	2
CHAPTER 1: INTRODUCTION.....	3
WHAT IS THE PROPOSED PROJECT AND WHY IS IT NEEDED?.....	3
WHAT IS AIR QUALITY?	3
CHAPTER 2: EXISTING AIR QUALITY CONDITIONS.....	5
WHAT ARE THE EXISTING METEOROLOGY CONDITIONS?	5
HOW IS INFORMATION ABOUT AIR QUALITY COLLECTED AND ANALYZED?	6
WHAT ARE THE AIR POLLUTANTS WITHIN THE PROJECT AREA?.....	11
HOW ARE THESE POLLUTANTS MONITORED IN THE PROJECT AREA?.....	13
CHAPTER 3: POTENTIAL PROJECT EFFECTS.....	16
WILL THE PROJECT HAVE ANY EFFECTS ON AIR QUALITY?	17
HOW WILL PROJECT CONSTRUCTION CONTRIBUTE TO POLLUTANTS?	24
WILL THERE BE ANY INDIRECT EFFECTS TO AIR QUALITY?	24
WILL THERE BE ANY CUMULATIVE EFFECTS TO AIR QUALITY?.....	25
CHAPTER 4: MITIGATION MEASURES.....	26
WHAT MITIGATION MEASURE WILL BE TAKEN DURING PROJECT CONSTRUCTION?	26
WHAT MITIGATION MEASURE WILL BE TAKEN DURING PROJECT OPERATION?	27
CHAPTER 5: REFERENCES.....	28
LIST OF EXHIBITS	
<hr/>	
EXHIBIT 1: VICINITY MAP.....	3
EXHIBIT 2: NATIONAL, STATE, AND LOCAL AMBIENT AIR QUALITY STANDARDS.....	7
EXHIBIT 3: MAINTENANCE / ATTAINMENT MAP.....	10
EXHIBIT 4: TRENDS IN CO LEVELS IN KING COUNTY.....	14
EXHIBIT 5: TRENDS IN PARTICULATE LEVELS IN KING COUNTY	14
EXHIBIT 6: PM PEAK CONGESTION.....	18
EXHIBIT 7: GHG EMISSIONS BY SECTOR, 2005, US AND WASHINGTON STATE.....	20
EXHIBIT 8: TRENDS IN MOBILE SOURCE AIR TOXICS LEVELS NATIONWIDE	23
EXHIBIT 9: CONSTRUCTION TASKS	24

LIST OF ACRONYMS AND ABBREVIATIONS

ADT	Average daily traffic
CAA	Clean Air Act
CFC	Chloro fluoro compounds
CH ₄	Methane
CO	Carbon monoxide
CO ₂	Carbon dioxide
Ecology	Washington State Department of Ecology
EF	Emission factor
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Administration
GHGs	Greenhouse gasses
HOV	High-occupancy vehicle
HOT	High-occupancy and toll
MP	Milepost
MSATs	Mobile Source Air Toxics
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NO _x	Oxides of nitrogen
NO ₂	Nitrogen dioxide
O ₃	Ozone
Pb	Lead
PM ₁₀	Particulate matter smaller than 10 microns in diameter
PM _{2.5}	Particulate matter smaller than 2.5 microns in diameter
ppm	Part per million
PSCAA	Puget Sound Clean Air Agency
SEPA	State Environmental Policy Act
SO ₂	Sulfur dioxide
SR	State route
TSP	Total suspended particulate
VMT	Vehicle miles traveled
WASIST	Washington State Intersection Screening Tool
WSDOT	Washington State Department of Transportation

EXECUTIVE SUMMARY

What is the proposed project and why is it needed?

The Washington State Department of Transportation (WSDOT) plans to widen the State Route (SR) 167 roadway to construct a new northbound high-occupancy toll (HOT) lane from the vicinity of 8th Street E (MP 10.2) in Pierce County, Washington to the vicinity of 15th Street SW in Auburn (MP 14.26), King County, Washington. Ramp meters will be installed at northbound on-ramps at the SR 167 interchanges with Ellingson Road, and 8th Street E. SR 167 is an important thoroughfare for cars, trucks, and transit in the Green River Valley. This additional capacity will relieve congestion and improve safety for commuters traveling northbound on SR 167.

What is the purpose of this technical memorandum?

This technical memorandum describes the existing air quality in the SR 167 corridor area, discusses the regulatory issues, examines the potential project effects, and recommends mitigation measures.

What are the project's potential effects?

Because the SR 167 project adds capacity to the highway, and adds meters to some freeway ramps, intersection carbon monoxide (CO) modeling or hot spot analysis is required. The Washington State Intersection Screening Tool (WASIST) was used to model CO concentrations. No exceedances of State and Federal CO standards were found. Vehicle volumes are substantial (128,000 average daily traffic [ADT] by the year 2030), but are lower than the Federal Highway Administration's (FHWA) threshold (140,000 ADT) above which a quantitative analysis of mobile source air toxics (MSATs) is required. Significant effects to existing air quality are not expected as a result of the operations of this project.

As an overall benefit and positive effect, there will be a slight decrease in vehicle emissions as the high-occupancy vehicle (HOV)/high-occupancy toll (HOT) lane relieves congestion and allows slightly higher average vehicle speeds along the SR 167 corridor.

SR 167 – 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane

Increases in emissions of greenhouse gases will occur as the vehicle-miles on SR 167 increase. Offsetting this to some degree are that HOV lanes reduce stop-and-go traffic, conserve fuel and enable vehicles to reduce emission rates by traveling close to the speed limit.

No operational air effects were identified and no operational air quality mitigation is proposed. Construction activities such as demolition, earth-moving, and paving tasks may generate fugitive dust and particulate matter and other pollutants. Yet effects to air quality from the construction of the new HOV/HOT lane is expected to be minimal as existing residences are 200 feet from the centerline of SR 167 at the north portion of the project, and no closer than 150 feet from the closest paved lanes in the south portion of the project.

What mitigation measures are proposed for this project?

The use of Best Construction Management Practices will be implemented that will avoid or minimize air quality effects; therefore, no additional mitigation measures are recommended.

CHAPTER 1 INTRODUCTION

What is the proposed project and why is it needed?

The Washington State Department of Transportation (WSDOT) plans to widen the State Route (SR) 167 roadway to construct a new northbound high-occupancy toll (HOT) lane from the vicinity of 8th Street E (MP 10.2) in Pierce County, Washington to the vicinity of 15th Street SW in Auburn (MP 14.26), King County, Washington (Exhibit 1). This new HOT lane will be a continuation of a northbound HOT lane that was constructed for the HOT Lane Pilot Project, which extends from the I-405 interchange in Renton to 15th Street SW in Auburn.

High Occupancy Toll (HOT) lanes are managed lanes intended to increase mobility by allowing more vehicle use of the HOV lane. HOT lanes maintain free, priority status for transit and carpools, the same as a HOV lane, but also allow single occupancy vehicles to pay a toll to use the lane. Toll rates are variable, depending upon the level of congestion.

The construction of the HOT lane will require widening the roadway to the outside of the existing pavement between 6th Avenue N in Algona and 5th Avenue S in Pacific. Ramp meters will be installed at northbound on-ramps at the SR 167 interchanges with Ellingson Road, and 8th Street E. All of the proposed widening work will occur within the WSDOT right-of-way

SR 167 is an important thoroughfare for cars, trucks, and transit in the Green River Valley. The additional capacity that this project will provide to SR 167 will relieve congestion and improve safety for commuters traveling northbound.

What is air quality?

Air quality refers to the level of pollutants in the atmosphere. Air pollutants can not only be harmful to humans, they can also affect plants, animals, and materials. Federal and state regulations require that the effects of a proposed project on air quality be evaluated.

Exhibit 1
Vicinity Map



Regulatory Framework

Federal, state, and local regulations require that air quality be considered with the project. The primary regulations that apply are:

- National Environmental Policy Act (NEPA), 42 USC Section 4321
- Clean Air Act (CAA) of 1970, 42 USC 7401 et seq.
- Clean Air Act Amendments (CAAA)
- Federal Implementing Regulations
- State Environmental Policy Act (SEPA), WAC 197-11 and WAC 468-12
- Clean Air Washington Act (CAWA) of 1991, RCW 70.94
- State Implementing Regulations, WAC 173-420
- State Fugitive Dust Regulations, WAC 173-400-040
- Puget Sound Clean Air Agency (PSCAA)

CHAPTER 2 EXISTING AIR QUALITY CONDITIONS

The existing air quality and general meteorological conditions in the project area are described in this section.

What are the existing Meteorology Conditions?

The project site is subject to the same meteorological conditions that affect the Puget Sound. This region has a marine climate, dominated by cool, moist winds coming off the ocean. Winter conditions are characterized by marine disturbances originating in the Pacific Ocean. These storms are the source of the fall rains which usually begin in mid-October and continue with few interruptions through the spring months. Daytime temperatures are typically in the 40s and low 50s with nighttime temperatures in the 30s. The succession of Pacific disturbances is broken only once or twice each winter by the movement of cold polar-continental air originating in northern Canada and moving southward over Washington. Under such conditions daytime temperatures will drop to around freezing and nighttime temperatures can reach 10 to 20 degrees Fahrenheit. Rainfall averages four to nine inches per month in the November through February period. Snow is frequent at the onset of cold weather but accumulations are generally less than two feet at lower elevations (such as the project site). Winter winds are generally southerly, ranging from the southeast to the southwest.

During the spring the effects of the maritime low-pressure disturbances lessen and the periods of improving weather, associated with high-pressure systems, lengthen. Daily high temperatures average 70 to 80 degrees Fahrenheit during July, August and September with nighttime lows in the 50s and 60s. Rainfall averages about one inch per month in July and August and about two inches per month in May, June and September. Summer winds have a pronounced northerly component, ranging from the north to the northwest.

Temperature inversions are common throughout the Puget Sound area in the fall and winter. They are characterized by stagnant atmospheric conditions that tend to trap and concentrate pollutants. In most cases these pollutant-trapping

inversions have an upper "lid" at an altitude between 1000 and 3000 feet and occur during the night and break up by early afternoon. The project lies at less than 1000 feet elevation and thus lies within the areas subject to inversions.

How is information about air quality collected and analyzed?

Air quality in the study area is regulated by three agencies: the U.S. Environmental Protection Agency (EPA); the Washington State Department of Ecology (Ecology); and the Puget Sound Clean Air Agency (PSCAA). Each agency has its own role in regulating air quality. The PSCAA has local authority for the regulation and permitting of stationary sources and construction emissions. Ecology regulates mobile sources. The EPA sets air quality standards and has oversight authority over PSCAA and Ecology.

The EPA has developed National Ambient Air Quality Standards (NAAQS) for six criteria pollutants to protect the public health and welfare. The NAAQS specify maximum concentrations for:

- Nitrogen dioxide (NO₂)
- Carbon monoxide (CO)
- Ground-level Ozone (O₃)
- Lead (Pb)
- Sulfur dioxide (SO₂)
- Total suspended particulate matter and particulate matter (less than 10 microns in diameter [PM₁₀] and less than 2.5 microns in diameter [PM_{2.5}], respectively)

An important task of regional transportation planning agencies is to ensure that the air quality within a region does not significantly deteriorate below established standards. This SR 167 HOT lane project is included in the current 2007-2010 Transportation Improvement Program (as WSDOT project 816701-B) and the 2007 State Improvement Plan. In addition, Ecology and PSCAA have the authority to adopt more stringent standards (Current state and local standards are equivalent to the Federal standards.). Exhibit 2 provides a listing of established Federal, state, and local ambient air

SR 167 – 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane

quality standards. The pollutants listed are referred to as

Exhibit 2 National, State, and Local Ambient Air Quality Standards				
Pollutant	National Standards		Washington State	Puget Sound Region
	Primary	Secondary		
Nitrogen Dioxide (NO₂)				
Annual Average (ppm)	0.05	0.05	0.05	0.05
Carbon Monoxide (CO)				
8-hour Average (ppm)	9	NS	9	9
1-hour Average (ppm)	35	NS	35	35
Ozone (O₃)				
8-hour Average (ppm)	0.075	0.075	NS	NS
1-hour Average (ppm)	0.075	0.075	0.12	0.12
Lead (Pb)				
Maximum Arithmetic Mean (µg/m ³ averaged over calendar quarter)	1.5	1.5	NS	1.5
Sulfur Dioxide (SO₂)				
Annual Arithmetic Average (ppm)	0.03	NS	0.02	0.02
24-hour Average (ppm)	0.14	NS	0.10	0.10
3-hour Average (ppm)	NS	0.50	NS	NS
1-hour Average (ppm)	NS	NS	0.40	0.40
Particulate Matter				
PM₁₀				
Annual Arithmetic Average (µg/m ³)	50	50	50	50
24-hour Average (µg/m ³)	150	150	150	150
PM_{2.5}				
Annual Arithmetic Average (µg/m ³)	15	15	NS	NS
24-hour Average (µg/m ³)	65	65	NS	NS
Total Suspended Particulates (TSP)				
Annual Arithmetic Average (µg/m ³)	NS	NS	60	NS
24-hour Average (µg/m ³)	NS	NS	150	NS
<p><i>Source: U.S. EPA (2003) and PSCAA (2002)</i> <i>ppm = parts per million</i> <i>µg/m³ = micrograms per cubic meter</i> <i>PM₁₀ = particulate matter smaller than 10 microns in diameter</i> <i>PM_{2.5} = particulate matter smaller than 2.5 microns in diameter</i> <i>NS = no standard</i></p>				

criteria pollutants.

Ecology and PSCAA operate air quality monitoring stations to obtain data on actual ambient air quality concentrations. Information from these stations assists in providing background level concentrations that can be incorporated into the CO hot spot modeling analysis of intersections. CO emission rates in the Puget Sound region are taken from the WASIST v.1.0 model (Washington State Intersection Screening Tool).

Areas of the country exceeding the NAAQS for a given pollutant are classified as non-attainment (see footnote 1, in the Executive Summary). In 1991, the western portions of Snohomish, King, and Pierce counties were designated non-attainment areas for CO, and nearly all of the three counties were declared non-attainment areas for O₃. Based upon monitoring results that show no limits exceeded for several years, in 1996 the EPA re-designated the Puget Sound area as being in attainment for CO and O₃. However, former non-attainment areas are required to continue to maintain air quality by adhering to a maintenance plan developed as part of the re-designation process. Because of this project's location, it is required to conform to a CO maintenance plan.

There are two areas that have air quality monitoring requirements that relate to any effects analysis. The two geographic areas with two different potential pollutant and particulate effects are:

1. The Auburn area, including the entire project, that is classified as a "maintenance area" for the pollutants emitted by motor vehicles; carbon monoxide (CO) and ozone (O₃).
2. The Kent area, located just north of the project, is classified as a maintenance area for particulate matter (PM₁₀). This area is in close enough proximity to the project area that it requires consideration.

A maintenance area is defined as an area that formerly exceeded Federal and state air quality standards and now meets those standards; however, the area requires close attention to maintain good air quality. Projects in maintenance

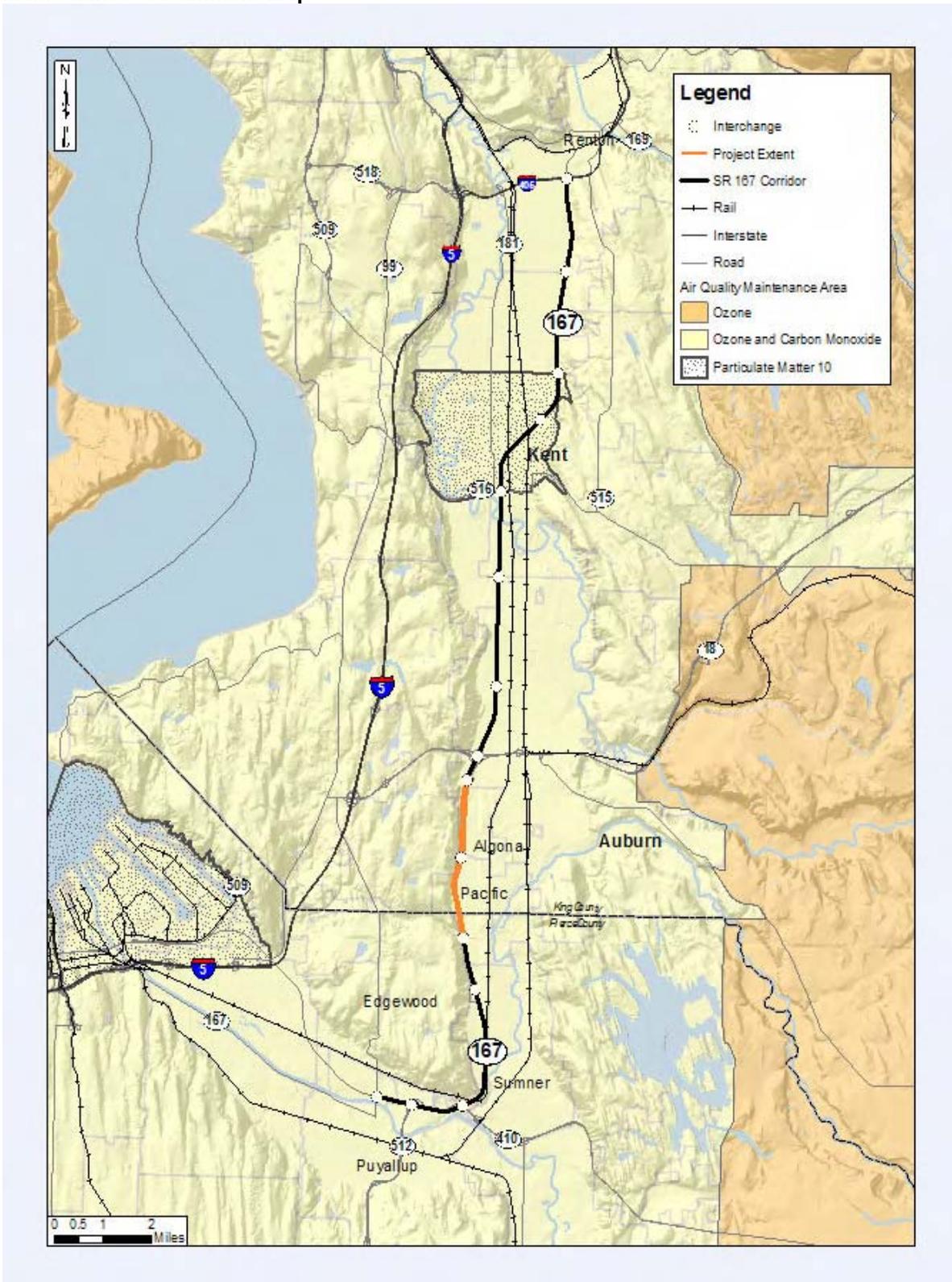
SR 167 – 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane

areas and nonattainment areas¹ are required to perform project-level air quality and dispersion analysis for project-related intersections where traffic delays may result in increased CO levels. The maintenance and non-attainment areas for the region are illustrated in Exhibit 3.

¹ The Clean Air Act and Amendments of 1990 define a "nonattainment area" as a locality where air pollution levels persistently exceed National Ambient Air Quality Standards or that contributes to ambient air quality in a nearby area that fails to meet standards.

SR 167 – 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane

Exhibit 3
Maintenance / Attainment Map



Highway projects, such as this one, located within the CO maintenance areas must demonstrate conformity. Project-level conformity is demonstrated by modeling CO levels at the location where the highest concentrations would be expected, such as congested signalized intersections where large numbers of cars are idling for a minute or more.

What are the air pollutants within the project area?

In the Puget Sound region motor vehicles are the predominant source of CO and greenhouse gas emissions (such as carbon dioxide [CO₂], methane [CH₄], chloro fluoro compounds [CFCs], and others), and a significant source of the nitrogen dioxide (NO₂) and volatile organic compound emissions, which react to form ozone. The primary effects to air quality generated by highway construction projects are the dispersion of dust particles, known as “fugitive dust,” during earth moving and excavation. Other pollutants include fine particulate matter, CO, and oxides of nitrogen (NO_x).

Objectionable odors are another form of air pollution and are caused by a variety of compounds emitted by the diesel exhaust of heavy machinery and asphalt paving. In addition, motor vehicles emit toxic compounds, known as mobile source air toxics (MSATs), from the combustion of diesel and gasoline fuels.

The following is a more detailed discussion of the pollutants emitted by motor vehicle and construction equipment.

Particulate Matter (TSP, PM₁₀, and PM_{2.5})

Particulate matter consists of particles of wood smoke, diesel smoke, dust, pollen, or other materials. It has traditionally been measured in two forms: total suspended particulate (TSP) and PM₁₀ (respirable or fine particulate matter).

The PM₁₀ is a subset of TSP and is defined as being smaller than 10 micrometers in diameter. Due to concerns about the effect of very fine particulate matter such as that found in wood smoke and combustion engine exhaust, the EPA in 1997 established separate regulations for particulate matter smaller than 2.5 microns in diameter (PM_{2.5}).

Coarse particles greater than 10 micrometers (such as fugitive dust from earth-moving) settle out of the air fairly close to where they are produced. PM₁₀ (and to an even greater degree PM_{2.5}) remains suspended in the air for long periods of time and is readily inhalable deep into the smaller airways of human lungs. High ambient concentrations of PM₁₀ and PM_{2.5} contribute to impaired respiratory functioning. Fine particulate matter is primarily responsible for haze that impairs the visibility of distant objects.

The diesel engines of trucks and heavy equipment are a significant source of particulate matter. Particulate matter from diesel engines and other sources has come under increased scrutiny as a source of hazardous air pollutants.

Ozone

Ozone (O₃) is a pungent-smelling, colorless gas. It is a pulmonary irritant that affects lung tissues and respiratory functions and, at concentrations between 0.15 and 0.25 ppm, causes lung tightness, coughing, and wheezing. O₃ is produced in the atmosphere when nitrogen oxides and some hydrocarbons chemically react under the effect of strong sunlight. Unlike CO, however, O₃ and the other reaction products do not reach their peak levels closest to the source of emissions. Rather, they affect downwind locations after the primary pollutants have had time to mix and react under sunlight.

Sulfur Dioxide

Sulfur dioxide (SO₂) is a colorless, corrosive gas with a bitter taste. It has been associated with respiratory diseases. Sources of SO₂ include diesel engines, power plants, paper mills and smelters. SO₂ reacts with atmospheric moisture to form sulfuric acid.

Nitrogen Dioxide

Nitrogen dioxide (NO_x) is a brownish, poisonous gas, which reacts with water vapor to form nitric acid. It has been associated with respiratory diseases and is one of the essential precursors in the formation of O₃. Nitrogen Dioxide is formed from the high temperature combustion of fuels (such as diesel

engines) and subsequent atmospheric reactions. NO_x, in the form of nitric acid reacts with sulfuric acid to create “acid rain,” which damages vegetation and freshwater marine ecosystems.

Carbon Monoxide

Carbon monoxide (CO) is a toxic, clear and odorless gas. CO interferes with the blood's ability to absorb oxygen and impairs the heart's ability to pump blood. It is the primary priority pollutant associated with motor vehicle traffic. Monitoring for CO is performed throughout much of the urbanized portions of the state by Ecology. The highest concentrations of CO are found immediately adjacent to large urban intersections and congested arterials. Concentrations rapidly decrease as the distance from these sources increases.

Mobile Source Air Toxics

Mobile source air toxics (MSATs) consist of a wide variety of pollutants emitted by gasoline and diesel-powered motor vehicles; particularly formaldehyde, benzene, and diesel particulate matter. Health effects include potential cancer risks and ground water pollution. Useful mitigation measures have been undertaken on a regional basis, such as the phase-out of lead in gasoline, the introduction of low-sulfur diesel fuel and the installation of particulate traps on diesel buses. The particulate matter emissions from diesel engines have been shown to contain several types of MSATs.

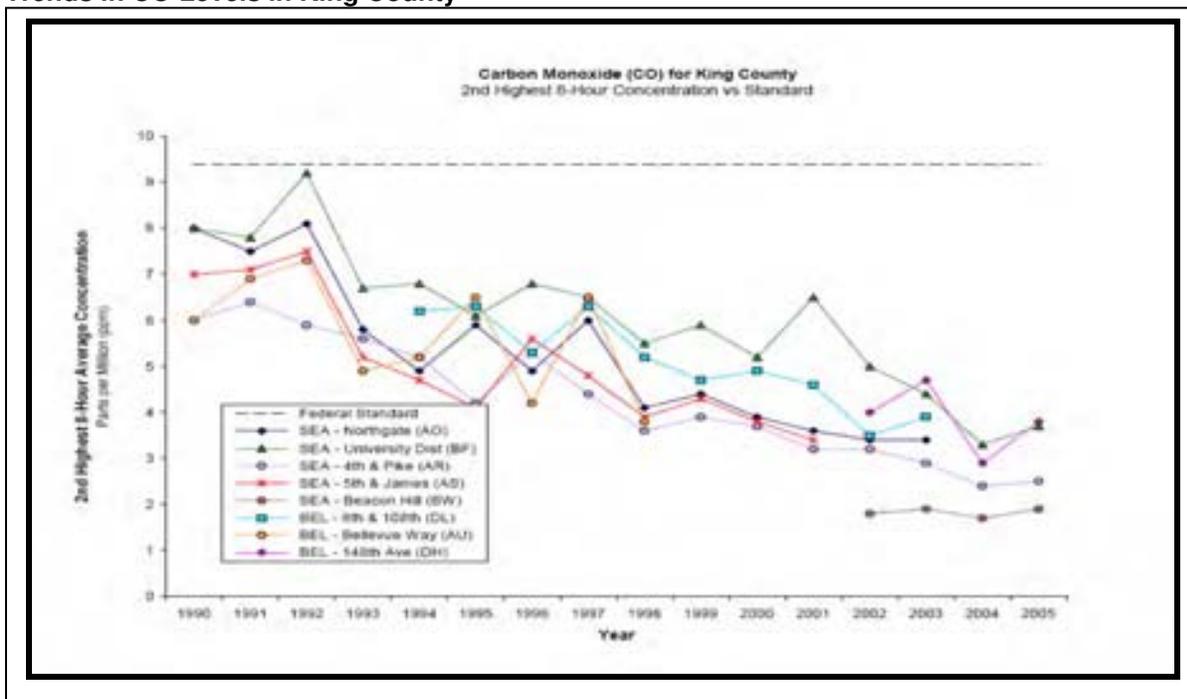
How are these pollutants monitored in the project area?

The closest station monitors particulate matter in the City of Kent, at the corner of James Street and Central Avenue, 6.4 miles to the north.

As illustrated in Exhibit 4, the regional trends for CO in King County, including Seattle and Bellevue, are trending downward. Exhibit 5 illustrates how particulate levels at the City of Kent monitoring station and in comparison to the Seattle and Bellevue stations, is also trending downward. Therefore, it is reasonable to conclude that within the project area, based on regional and local monitoring, the pollutant concentrations are trending downward.

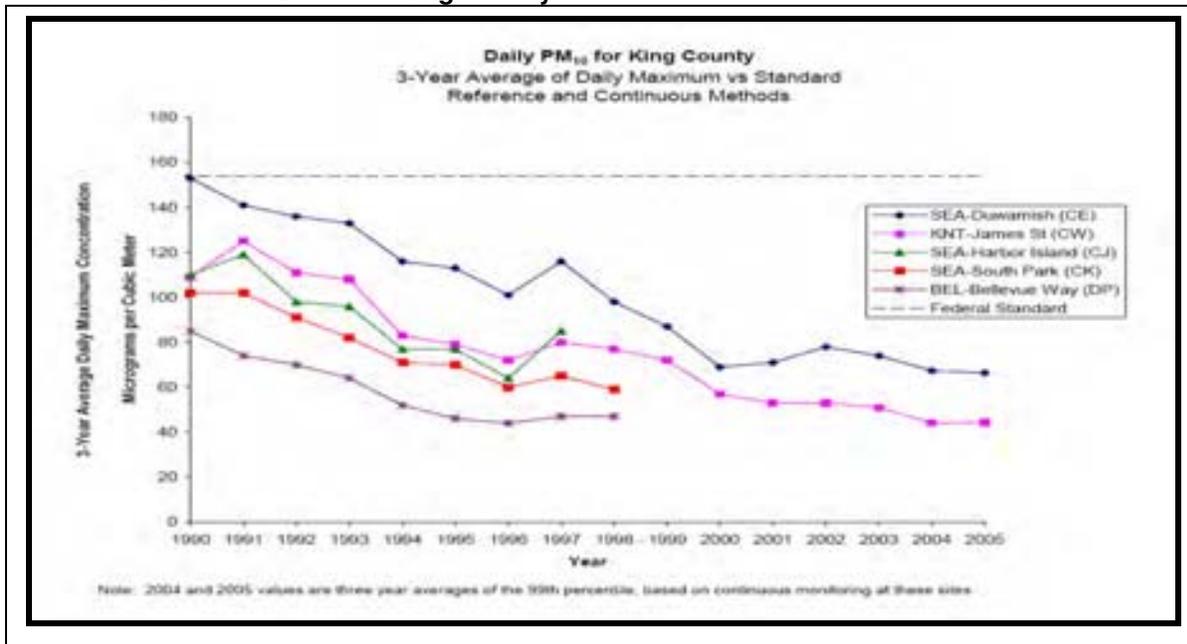
SR 167 – 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane

**Exhibit 4
Trends in CO Levels in King County**



Source: Puget Sound Clean Air Agency

**Exhibit 5
Trends in Particulate Levels in King County**



Source: Puget Sound Clean Air Agency

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CHAPTER 3 POTENTIAL PROJECT EFFECTS

WSDOT reviewed existing data, project plan sets, and construction methods to identify areas of potential effects and to determine appropriate mitigation measures. The expected direct, indirect, and cumulative effects of the proposed project were determined by the process recommended in the *WSDOT Environmental Procedures Handbook*, Chapter 412, and the Council of Environmental Quality regulations (40 CFR 1508.7). The following definitions guided the analysis of effects for air quality:

Direct effects are defined as the immediate effects of the project. Direct effects include all negative and positive immediate effects from project-related actions.

Indirect effects are sometimes called secondary effects and usually occur later in time, after project construction. These effects can be negative or positive.

Both direct and indirect effects can be temporary or permanent.

Cumulative effects are those that “result from incremental consequences of an action when added to other past and reasonably foreseeable future actions.” The cumulative effects of a project may be undetectable when viewed in the individual context of direct or indirect effects. However, cumulative effects can add to other disturbances and eventually lead to a measurable environmental change.

Cumulative effects include effects from a proposed project that, when combined with neighboring projects, may lead to a cumulative effect on the environment.

Will the project have any effects on air quality?

Based on the available information and the monitoring information reviewed in Exhibit 4 and 5, the SR 167 project will not have direct effects on air quality. Therefore, there are no indirect effects or cumulative effects. There will not be any generated emissions of the priority pollutants that exceed the National Ambient Air Quality Standards (NAAQS) for either carbon monoxide (CO) or particulate matter (PM₁₀ and PM_{2.5}).

The current average daily traffic volumes of 110,000 vehicles will rise to 131,900 by the year 2040, an increase of 16 percent; however, CO emission rates will fall by 53 percent over the same period of time due to the clean air act fuel and engine requirements.

The decline in emission rates, plus some reductions in slow-moving congested traffic, will combine to reduce emissions along the SR 167 corridor.

The Washington State Intersection Screening Tool (WASIST) was used to quantify the CO concentrations at two of the most congested freeway ramps which will become metered as a part of this project. These intersections are currently signalized, with the pm peak congestion level of service shown in Exhibit 6. Intersection modeling for the existing year, year of opening and design year was performed using the pm peak hour traffic. The maximum one-hour and eight-hour CO concentrations for the Existing as well as the Build and No Build Alternatives with the greatest levels of congestion are shown in Exhibit 6.

SR 167 – 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane

**Exhibit 6
PM Peak Congestion**

	SR 167 + 8 th St E		SR167 + Ellingson		SR 167 + 15 th St SW	
	PM Peak Congestion					
LOS 2007	D		A		D	
LOS 2020 No Project	D		B		B	
LOS 2020 with Project	D		B		D	
LOS 2040 No Project	D		D		D	
LOS 2040 with Project	E		C		E	
	1-Hour CO in PPM	8-Hour CO in PPM	1-Hour CO in PPM	8-Hour CO in PPM	1-Hour CO in PPM	8-Hour CO in PPM
2020 with Signal	8.3	6.7	6.8	5.7	7.6	6.2
2040 with Signal	9.2	7.3	9.1	7.3	8.2	6.6

The projected CO levels in Exhibit 6 are all below the CO emission standards shown in Exhibit 2. Maximum allowable 8-hour CO levels are limited to 9 ppm, and the 1 hour limit is 35 ppm. The 8-hour CO projections for the year 2040 are 7.3 ppm at 8th street E, 7.3 ppm at Ellingson Rd, and 6.6 at 15th Street SW. Because these intersections have the highest traffic volumes, and there is no exceedance of the NAAQS, it can be assumed that other intersections along the corridor will also be below the NAAQS. This project meets the Federal requirements for conformity (40 CFR 93.109) based on the latest plan assumptions and the WASIST estimation model. The project does not cause or contribute to new localized CO or PM₁₀ violation or increase the violation frequency.

Mobile Source Air Toxics (MSATs)

The purpose of this project is to facilitate traffic flow on SR 167. This project will add capacity to the highway by providing a high-occupancy toll (HOT) lane. By the design

year of 2040 Average Daily Traffic (ADT) volumes in the project area will total 134,000. This is less than the 140,000 daily trips, cited by the EPA as the level where more detailed analysis is warranted. As a result, this project will generate minimal air quality effects for the Clean Air Act (CAA) criteria pollutants and has not been linked with any special MSAT concerns. Consequently, this effort is exempt from quantitative analysis for MSATs.

This project adds capacity to the existing roadway but does not increase ADT compared to the No-Build scenario. According to the EPA's MOBILE6 emissions model, emissions of all the priority MSATs, with the exception of diesel particulate matter, will decrease as speeds increase. Therefore, assuming traffic volumes and emissions remain the same under the Build scenario as the No-Build; the added capacity should increase speeds, and reduce overall MSAT emissions, with the possible exception of diesel particulate matter.

Furthermore, as a result of EPA's national control programs², emissions will likely be lower than present levels in the 2040 design year (see Exhibit 6). Local conditions may differ from these national projections in terms of fleet mix and turnover, vehicle-miles traveled (VMT) growth rates, and local control measures. However, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in nearly all cases. Therefore, based on the expected speed increase under the Build scenario, and reduced emissions resulting from EPA programs, we can reasonably conclude that MSAT emissions in the projected area will be lower in the year 2040 than they are today.

Impacts from Greenhouse Gases

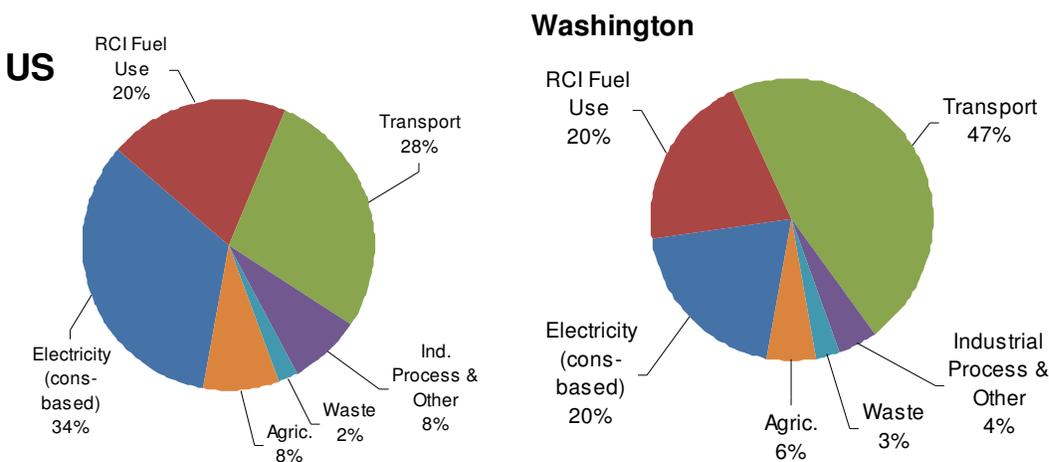
Climate changing greenhouse gases (GHGs) come in several forms. The gases associated with transportation are water vapor, carbon dioxide (CO₂), methane (also known as marsh gas), and nitric oxide (found in dentists' offices as laughing

² The EPA's national control programs are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020.

gas). CO₂ makes up the bulk of the emissions from transportation and are the focus of this evaluation. Any process that burns fossil fuel releases carbon dioxide into the air. Vehicles are a significant source of greenhouse gas emissions and contribute to global warming primarily through the burning of gasoline and diesel fuels.

National estimates show that the transportation sector (including on-road, construction, airplanes and boats) accounts for almost 30 percent or more of total domestic CO₂ emissions.¹ However, in Washington State, transportation accounts for nearly half of GHG emissions because the state relies heavily on hydropower for electricity generation unlike other states that rely on fossil fuels such as coal, petroleum, and natural gas to generate electricity. The next largest contributors to total gross GHG in Washington are fossil fuel combustion in the residential, commercial, and industrial (RCI) sectors at 20 percent; and in electricity generation facilities, also 20 percent. Exhibit 7 shows the gross GHG emissions by sector, nationally and Washington State.

**Exhibit 7
GHG Emissions by Sector, 2005, US and Washington State**



Source: *Leading the Way: A Comprehensive Approach to Reducing Greenhouse Gases in Washington State*, Washington Climate Advisory Team, 2008, page 33.

What efforts are underway to reduce greenhouse gas emissions in Washington State?

In February 2007, the Governor issued Executive Order 07-02 requiring state agencies to find ways to reduce greenhouse gas emissions and adapt to the future that climate change may create.

On May 3, 2007, the Washington legislature passed Senate Bill 6001 which, among other things, adopted Governor Gregoire's Climate Change goals into state law. The law aims to achieve 1990 greenhouse gas levels by 2020, a 25 percent reduction below 1990 levels by 2035, and 50 percent by 2050.

WSDOT is part of the solution. We are aggressively pursuing strategies to address climate change and we recognize our responsibility to support the Governor's initiative. While the goals are clear, we also recognize that technical guidance and regulations to implement these goals are currently in development and will not be sufficiently determined before project environmental documentation is completed for this project.

At this time, the main way to reduce greenhouse gas emissions from transportation is to reduce the amount of fuel consumed by drivers. This can be achieved three ways:

- create more efficient driving conditions (for example, reduced traffic congestion)
- introduce more fuel-efficient vehicles
- reduce the amount of driving (for example, telecommuting, transit, carpooling, more efficient movement of goods and services)

As a state, we have made some progress towards each of the three efforts. The Governor and Legislature funded a 16-year plan to meet Washington State's most critical transportation needs. WSDOT and our transportation partners, including city, county, and transit agencies, are in various stages of development on a specific list of projects selected by the Legislature to help with better movement of people and goods. The revenue is invested in a three tiered strategy designed to maximize the efficiency of the system:

Tier 1 – Low cost / high return from active traffic management, ramp metering, incident response combined with transportation demand management (including commute trip reduction, park & ride, local land use planning).

Tier 2 – Moderate to higher cost/benefits from improvements in road network like adding short lanes to connect interchanges, direct access ramps for transit and high-occupancy vehicles, center turn lanes to allow better traffic flow.

Tier 3 – Higher cost/corridor wide benefit from major investments in high-occupancy vehicle lanes (HOV), high-occupancy tolled lanes (HOT), transit, commuter rail, general purpose roadway lanes, interchange modifications, bus access.

Many of our local, regional, and statewide transportation system improvements and ongoing programs will help to reduce the number of miles that vehicles need to travel each year (typically referred to VMT).³ In addition, the Governor and Legislature are actively working toward related improvements in land use decision making and more efficient transportation technology. In 2005 and 2007 the state legislature mandated vehicles sold in Washington starting with 2009 model years meet updated California emission standards. The new vehicle standards will reduce greenhouse gas emissions, and help reduce carbon monoxide and ozone pollutants. Researchers are also working to reduce the carbon content of motor fuel for the future.

What effect will the transportation improvements from this project have on greenhouse gas emissions?

Quantitative modeling tools to evaluate greenhouse gas emissions at the project level are limited at this time, but better tools are under development and will be available from

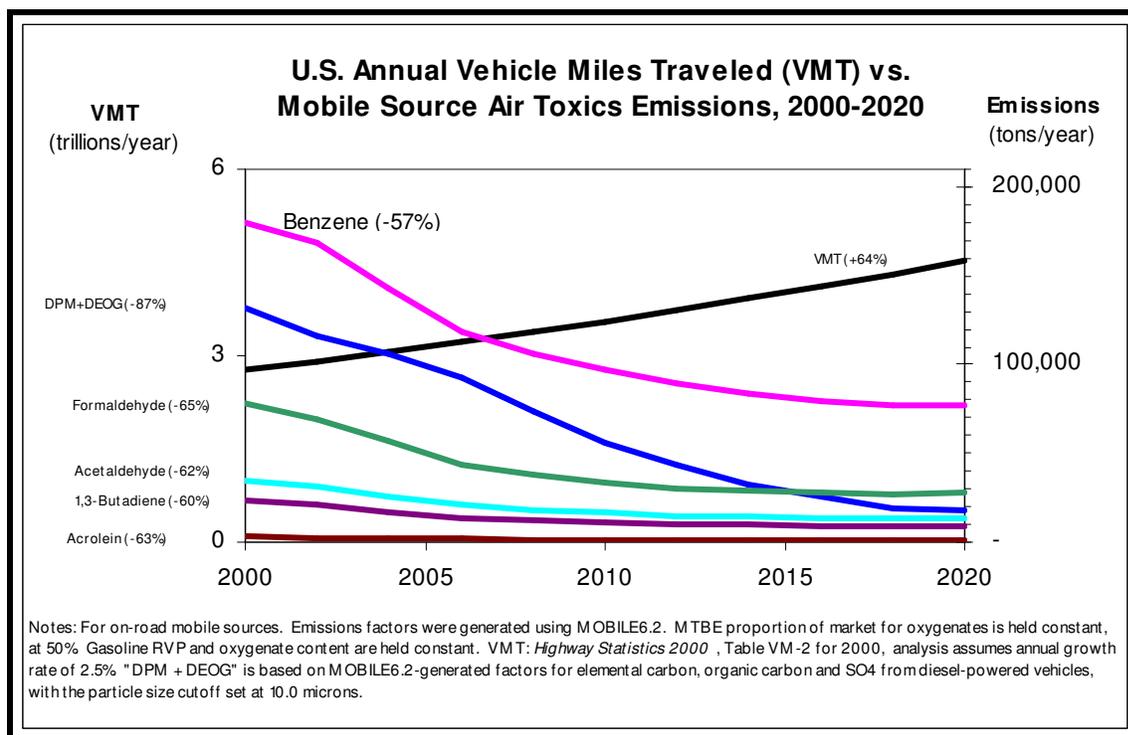
³VMT is typically defined as the number of miles that an average vehicle is estimated to drive each year. However, for transportation projects with set boundaries, VMT can also refer to the aggregate number of miles that all the vehicles travel using the specific roadway use within the specific project area. Per person (or per capita) VMT in Washington is stable at 9,000 miles per person since the 1980s, meaning the number of vehicle miles has grown at roughly the same pace as the number of new residents. Methods of reducing VMT typically target transferring trips from single occupant vehicles to multiple person vehicles like carpools, vanpools, and transit.

SR 167 – 8th Street E Vicinity to 15th Street SW Vicinity Northbound HOT Lane

the US Environmental Protection agency within the next several years.²

In general, increases in emissions of greenhouse gases will occur as the vehicle-miles on SR 167 increase. Offsetting this to some degree are that HOV lanes reduce stop-and-go traffic, conserve fuel and enable vehicles to reduce emission rates by traveling close to the speed limit. Exhibit 8 shows the trends of Mobile Source Air Toxics Levels Nationwide.

**Exhibit 8
Trends in Mobile Source Air Toxics Levels Nationwide**



Source: FHWA Interim Guidance on Air Toxic Analysis in NEPA Documents, 2006

How will project construction contribute to pollutants?

The construction of the project will include numerous tasks, each generating a variety of pollutants. Construction activities such as demolition, earth-moving, and paving tasks will generate fugitive dust and particulate matter and other pollutants from the use of heavy machinery. Construction activities such as upgrading, signage and road striping will produce minimal air effects, while road grading and laying asphalt may create more noticeable effects. The levels and duration of the effects to the air quality will vary with construction activities. Exhibit 9 summarizes these tasks and emissions.

**Exhibit 9
Construction Tasks**

Construction Task	Source of Emissions	Emissions
Removing existing concrete & paved surfaces	Track/wheel loaders, bulldozer, haul trucks	CO, PM ₁₀ , PM _{2.5} , NO _x , SO ₂ , fugitive dust, MSATs, CO ₂
Removing of concrete debris	Haul trucks, primary crusher, aggregate screens	Same as above
Re-grading of roadbed, laying the aggregate base	Track/wheel loaders, bulldozer, grader	Same as above
Trenching for new utilities	Backhoe, gravel trucks	Same as above
Paving roads	Concrete trucks, asphalt trucks, asphalt rollers	CO, PM ₁₀ , PM _{2.5} , NO _x , SO ₂ , MSATs, CO ₂
Painting lane markers	Paint spray equipment	Odorous compounds, MSATs, CO ₂

Source: SR 167 Air Quality Technical Memo, August 2008

Will there be any indirect effects to air quality?

No indirect effects are expected from this project. The SR 167 HOT lane project will add capacity to the highway or improve traffic flow to reduce congestion and improve safety.

Will there be any cumulative effects to air quality?

No cumulative effects are expected from this project. The SR 167 HOT lane project will add capacity to the highway or improve traffic flow to reduce congestion. The addition of capacity normally eases congestion, improves travel times, and ultimately helps to improve air quality.

Additionally, it is important to note that with Federal regulations on reducing harmful vehicle emissions, the present and future reductions in vehicular emissions have and will continue to improve air quality.

CHAPTER 4 MITIGATION MEASURES

What mitigation measures shall be taken during project construction?

The project must adhere to the WSDOT construction specifications and Best Construction Management Practices to reduce air quality effects. Emphasis will be on fugitive dust from earth moving and excavation. Some potential mitigation measures that must be implemented:

- Spray exposed soil with water or other suppressant to reduce emissions of PM₁₀ and the deposition of particulate matter.
- Minimize dust emissions during transport of fill material or soil by wetting down or covering the load.
- Promptly clean up spills of transported material on public roads.
- Schedule hauling and other work tasks to minimize congestion of existing vehicle traffic.
- Locate construction equipment and truck staging areas away from residences as practical, and in consideration of potential effects on other resources.
- Provide wheel washers to remove particulate matter that would otherwise be carried offsite by construction vehicles.
- Cover dirt, gravel, and debris piles, as needed, to reduce dust and wind-blown debris.
- Minimize on-site odors by covering loads of hot asphalt.
- Maintain construction equipment in good mechanical condition to help minimize exhaust emissions.
- Minimize greenhouse gas emissions by reducing the traffic backups and delays, using detours or night-time construction.
- Work with the contractor to establish equipment staging areas and material transfer sites so as to reduce the amount of time the engines of heavy equipment are running while waiting, thus reducing fuel usage and emissions.

Impacts to air quality from the construction of new high-occupancy toll (HOT) lanes are expected to be minimal as existing residences are 200 feet from the centerline of SR 167 at the northern portion of the project, and no closer than 150 feet from the closest paved lanes in the southern portion of the project.

What mitigation measures will be taken during project operation?

Because the SR 167 project adds capacity to the highway, and will not alter any of the timed signalized intersections, no air effects were identified and therefore no operational air quality mitigation measures are required.

¹ This percentage is based on 2004 data from the International Energy Administration and is consistent with 1996 guidelines on greenhouse gas emissions calculations issued by the Intergovernmental Panel on Climate Change (IPCC).

² Some projects have applied EPA's equation: fuel consumed (FC) is the amount of fuel that would be used to operate a vehicle or bus. The emission factor (EF) is the amount of CO₂ that would be emitted during combustion of a gallon of fuel. This equation does not take into account the speed of vehicles on the roadway and is not a recommended analysis method for transportation projects. Light duty vehicles are most efficient at moderate speeds in the range of 40 to 55 miles per hour. Current modeling systems available in Washington State are not able to account for speed. The result is that we are unable to show the effect of this improvement in traffic flow on emissions until future EPA tailpipe emission models are issued.

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