Chapter 4 Environmental Consequences

Introduction

The technical information upon which the following reports are based is contained in individual discipline studies that address the project's potential impacts on affected areas of the environment. The complete technical studies are available for review at:

Washington State Department of Transportation
2714 North Mayfair Street
Spokane, WA 99207-2090

Biological and Physical Impacts

Air Quality

Studies and Coordination

National Ambient Air Quality Standards (NAAQS)

The Federal Clean Air Act amendments of 1990 require all states to control air pollution emission sources so that ambient air quality standards are met and maintained. Areas within each state that do not meet NAAQS are classified as nonattainment areas for specific pollutants.

Portions of Spokane County have been designated nonattainment areas for carbon monoxide (CO) and particulate matter smaller than or equal to 10 microns in diameter (PM_{10}). Only CO impacts are addressed quantitatively in this analysis, because there are currently no computer modeling programs or guidance to quantify PM_{10}. The Environmental Protection Agency (EPA) is considering reclassifying the Spokane area from a moderate to a serious PM_{10} nonattainment area.

Ozone precursor emissions are not addressed, because Spokane County presently meets ozone attainment standards.

The state of Washington has adopted the NAAQS listed in Table 4-1.

Transportation Plans

The NSF is a project identified within the Regional Transportation Plan prepared for Spokane by Spokane Regional Transportation Council (SRTC), and the plan has been determined to conform with the Clean Air Act State Implementation Plan (SIP). Because of this, this project is in compliance with the federal conformity rules under 40 CFR Part 51. The corridor study analysis is included within the regional transportation plan and the 20-year Washington Statewide Multimodal Transportation Plan. It is not yet included within the regional Transportation Improvement Program (TIP). A TIP is a transportation investment strategy required under ISTEA. It addresses the goals of the long range plans and lists priority projects and activities for the region. The TIP covers only a three-year period and the project must be funded. Each phase or segment of the NSF will be programmed into a TIP.

Pollutant	Standard
Particulates (PM_{10})	
Annual Arithmetic Average	50 g/m3
24-hour Average	150g/m3
Carbon Monoxide	
8-hour Average	9 ppm
1-hour Average	35 ppm

NOTES:
- g/m3 = micrograms per cubic meter
- ppm = parts per million
- Annual standards never to be exceeded; short-term standards not to be exceeded more than once per year unless noted.
- The NAAQS include primary standards and secondary standards. For pollutants addressed in this study, primary and secondary standards are identical.

Federal and State of Washington Ambient Air Quality Standards

Table 4-1

State Implementation Plan (SIP)

This project is in a nonattainment area for carbon monoxide and must conform to the purpose and intent of the SIP. This is a federal and state requirement for all transportation activities. The key conformity requirements for this project are:

- It cannot cause or contribute to any new violation of national ambient air quality standards.
- It cannot increase the frequency or severity of any existing violation of the standards.
- It cannot delay timely attainment of the standards.

~~There is no construction money available at this time; therefore, this project cannot be included in the three-year TIP. Because conformity is not determined until the project is in the TIP, it is currently unknown whether This project is in compliance with the federal conformity rules under 40 CFR Part 51.~~

Method of Project Air Quality Analysis

The ambient air quality effects of highway traffic emissions were evaluated using the CALINE3 line source dispersion model. The CALINE3 model is specifically designed to evaluate air quality impacts of highway projects. EPA Region 10 concurred with the use of CALINE3 for this analysis.

Vehicle emission rates for the dispersion model were calculated using the Environmental Protection Agency (EPA) MOBILE 5.0a emission factor program. The Washington State Department of Transportation (WSDOT) also recommends the MOBILE 5.0a program for CO modeling.

At a meeting held February 11, 1993, the state Department of Ecology (Clint Bowman), Washington State Metropolitan Planning Organization, Air Pollution Control Authority, and representatives of the Clean Air Act Coalition agreed on use of the CALINE3 and MOBILE 5.0a programs (per Peter Downey, WSDOT). Ron Edgar of Spokane County Air Pollution Control Authority (SCAPCA) was not present but gave verbal concurrence (per Peter Downey).

Emission factors were calculated for the years 1993 (existing), 2010, and 2020. Because CO emissions are highest during winter months, emission rates were calculated for a winter temperature of 33°F.

Background concentration (or ambient level) is a summation of all carbon monoxide concentrations that are from other than project mobile sources. Included are natural sources, point sources, non-project mobile sources, residential and industrial heating, and other industrial stacks. The background concentration is intended to represent a conservative constant that is used homogeneously throughout the project area. It is then added to the predicted values to be compared with the NAAQS for a more accurate picture of the project's effect on the area. For this area, an ambient concentration of 3 parts per million (ppm) for one hour concentration of CO was used as a reasonable and conservative estimate.

Carbon monoxide concentrations were estimated at locations referred to as receptors. Modeled receptor sites are those where the maximum total CO concentration is likely to occur and where the general public is likely to have continuous access. A total of 43 receptor sites were modeled. They are identified in Table 4-2 and shown in Figure 4-1. One set of receptors was used to model CO concentrations under both existing and future-year conditions, to facilitate comparison of conditions.

Coordination With Appropriate Air Quality Agencies

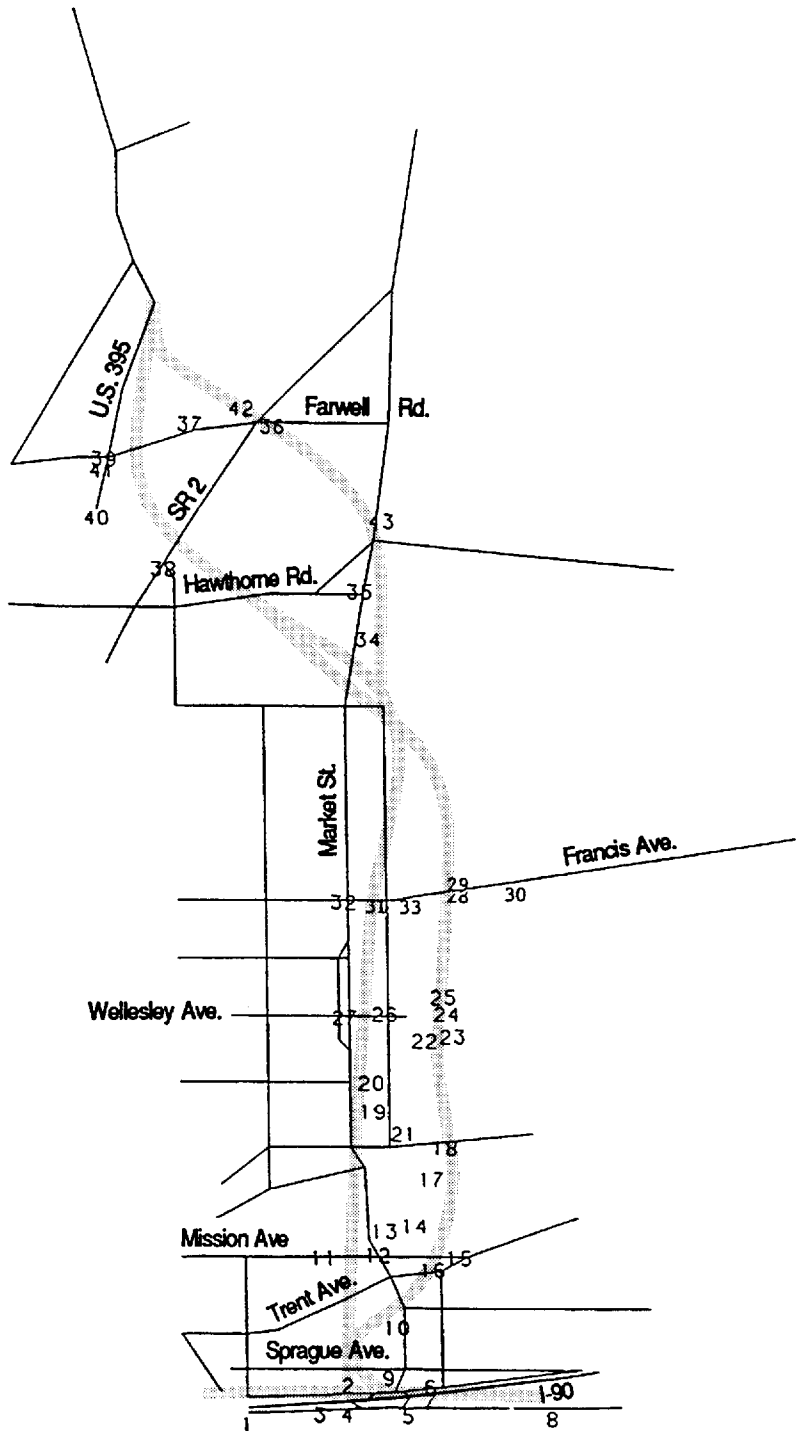
Traffic data used in this air quality analysis were provided by SRTC and KJS Associates, Inc. The SRTC data included traffic volumes, vehicle speeds, and roadway geometrics. KJS Associates, Inc., provided arterial speed and level of service (LOS) data.

Regulation of air quality in Washington is divided between the EPA, Region 10, located in Seattle, Washington, and the Washington State Department of Ecology (Ecology) in Olympia. Air regulations in Spokane County are enforced by the Spokane County Air Pollution Control Authority (SCAPCA). Staff members at state and local regulatory agencies were contacted regarding the content and assumptions used in this analysis.

	Receptor Number and Location	1-Hour	8-Hour
1.	Liberty Park	5	4
2.	Libby Center	5	4
3.	House located along 4th Ave. between Smith and Greene Streets	6	4
4.	House located along 4th Ave. east of Greene Street	5	4
5.	Sheridan School	5	4
6.	Houses along north side of 4th Avenue west of Havana Street	7	5
7.	Houses along south side of 2nd Avenue west of Havana Street	6	4
8.	Trailer Park near Sprague Avenue interchange	4	3
9.	Structure located west of Thor Place, south of 1st Street, east of Ferrall Street and north of 2nd Street	5	4
10.	Structure on NW corner of Freya Street and Alki Avenue	5	4
11.	Chief Garry Park	6	4
12.	House at NE corner of Mission Avenue and Greene Street	9	7
13.	Spokane Community College - west campus	5	4
14.	Spokane Community College - east campus	4	3
15.	Structure at SW corner of Trent Avenue and Mission Avenue	9	7
16.	Structure along north side of Trent Avenue between Julia and Myrtle Streets	6	4
17.	House on SE corner of Havana Street and Buckeye Avenue	4	3
18.	House between Frederick and Euclid Avenues west of Havana Street	4	3
19.	House west of Ralph Street north of Euclid Avenue	4	3
20.	Wild Horse Park	4	3
21.	Esmeralda Golf Course Club House	4	3
22.	House at NW corner of Rich Avenue and Florida Street	4	3
23.	House near end of Longfellow Road	4	3
24.	House at NW corner of Wellesley Avenue and Havana Street	4	3
25.	House located north of Wabash Avenue between Dearborn and Lloyd Roads	4	3
26.	Structure at NW corner of Freya Street and Wellesley Avenue	6	4
27.	Structures at SW corner of Wellesley Avenue and Market Street	6	4
28.	House SW of Francis Avenue/Florida Street intersection	4	3
29.	House on NW corner of Francis Avenue and Myrtle Street	5	4
30.	House located along west side of Havana Street south of Decatur Avenue	3	2
31.	House at SE corner of Freya Street and Francis Avenue	5	4
32.	House at SW corner of Francis Avenue and Market Street	7	5
33.	House located along SW corner of Francis Avenue and Julia Street	5	4
34.	Structures located east of North Option and north of Fairview Rd	4	3
35.	Structure west of alignment at Market Street/Hawthorne Road Intersection	5	4
36.	Northwood Junior High School	4	3
37.	Houses located east of Market/Greene north alignment, north of Farwell Road	4	3
38.	Structure located between Market/Greene mainline and northbound off-ramp at US 2 interchange on South Option	4	3
39.	House SW of US 395/Farwell Road intersection	6	4
40.	Houses west of South Option and south of Pine Acre Golf Course	5	4
41.	Shopping center located SW of US 395/Farwell Road intersection	6	4
42.	Farwell School	4	3
43.	Trailer Park located NE of proposed Stoneman interchange	4	3

Sensitive Receptors and Carbon Monoxide Modeling Locations With Existing Conditions

Table 4-2



Numbers represent sensitive receptor locations

Existing Road Network and Modeled Receptor Locations
Figure 4-1

Affected Environment

Table 4-3 shows the second maximum CO values at Spokane area monitoring stations. (The highest readings are not used, due to the likelihood that they are anomalous.)

Station Designation and State ID*	Monitoring Station	Year	2nd Maximum Value in ppm (Exceeding)
SLAMS 3278013A	Post Office Building	1990	6.2
	W. 904 Riverside Avenue	1991	5.9
		1992	Out of
		1993	Service
SLAMS 3278017A	Darl Apartments	1990	8.4
	N. 2528 Division Street	1991	7.4
		1992	Out of
		1993	Service
SPM 3278045A	Spokane Club	1990	6.5
	W. 1002 Riverside Avenue	1991	8.3
		1992	7.3
		1993	6.4
SLAMS 3278039A	Jack and Dan's Tavern	1990	(11.5)
	(Hamilton Street)	1991	(11.0)
	N. 1226 Hamilton Street	1992	(9.8)
		1993	(9.7)
SPM 3278044A	Empire Ford**	1990	(10.8)
	W. 423 3rd Avenue	1991	(11.8)
		1992	(10.1)
		1993	(11.8)
SLAMS 3278043A	Backdoor Tavern	1990	9.2*
	N. 1227 Division Street	1991	8.7
		1992	7.2
		1993	7.8

SLAMS: State and Local Ambient Monitoring Station
SPM: Special Purpose Monitoring
*While the 1990 second maximum of 9.2 ppm at the backdoor Tavern site is numerically higher than the 9 ppm, all values below 9.4 ppm are rounded down according to EPA convention.
** CO standards were exceeded for one day on February 5, 1994 at Empire Ford

1990-91 Second Maximum Monitoring Values for Spokane County
Table 4-3

Table 4-4 shows monitoring station results for PM_{10}.

Station Number	Monitoring Station	Parameter	PM_{10} g/m3					
			'88	'89	'90	'91	'92	'93
SLAMS 3200013E	Country Homes N. 9004 Country Homes Blvd.	Annual arithmetic mean	42	34	34	33	30	35
		24 hours - 2nd highest	141	79	251	132	96	268
NAMS 3278009E	Crown Z E. 3530 Ferry Street	Annual arithmetic mean	52	45	48	46	45	43
		24 hours - 2nd highest	182	168	268	105	136	207
NAMS 3278040A	Spokane Autoglass S. 224 Post Street	Annual arithmetic mean	47	41	39	37	38	42
		24 hours - 2nd highest	168	165	148	81	84	156

NOTES:

Spokane County exceeded the 24-hour PM_{10} standard for at least one monitoring station from 1988 to 1990.

The annual PM_{10} ambient standard was exceeded at the Crown Zellerbach monitoring station only in 1988.

No exceedance occurred during 1991 or 1992.

Summary of PM_{10} Air Quality Monitoring Data for Spokane County

Table 4-4

As previously mentioned, carbon monoxide (CO) is the pollutant modeled as representative of all other air pollutants. CO in the atmosphere is very common and widely distributed, and its specific effects on human health are well documented. CO combines with the hemoglobin in red blood cells to form carboxyhemoglobin (CoHb). This displaces the oxygen normally bound to the hemoglobin, and results in reduced red blood cell oxygen carrying capacity. The sections of the population most sensitive to CO are children, fetuses, the elderly, and those in ill health.

The national primary standards for CO were based on evidence that CoHb levels as low as 2.5 percent (15 ppm) in non-smokers may cause impairment in time interval discrimination. The normal concentration of CoHb in non-smokers is about 0.5 percent (cigarette smokers have CoHb levels of about 5 percent). Exposure to an average CO concentration of 10 ppm for eight or more hours results in CoHb levels of about 2 percent in a non-smoker. Therefore, the national ambient CO maximum one hour and average eight hour standards (35 ppm and 9 ppm respectively) are set to protect against occurrence of CoHb levels above 2 percent.

Health concerns associated with suspended particles focus on particles small enough to reach the lungs when inhaled. Few particles larger than 10 microns in diameter reach the lungs (a micron is equal to one-millionth of a meter).

Although CO is important from the standpoint of human health, it is not toxic to vegetation at concentrations encountered in polluted atmospheres. From the

standpoint of vegetation damage, this class of pollutants is relatively unimportant (Applied Science Associates 1978).

Impacts

(For discussion of construction activity impacts, see the Construction Activity Impacts section of this EIS.)

PM10 Conditions

Operation of the project could result in localized increases in PM*10* emissions from paved freeway and ramp surfaces. Emissions from paved surfaces consist primarily of traction material placed on the roadways during snow and ice conditions. The SCAPCA is working with state, county, and local agency staff to identify ways to reduce paved road emissions. It is assumed that new mitigation measures would be used to reduce emissions from area roads both before and after project construction.

The new control strategies and mitigation measures for the SIP PM*10* were approved by EPA for non windblown particulate matter on 9 July 1996. Some of the changes include: paving key Spokane county/city roads, controlling dust on unpaved roads, and additional street sweeping. Some steps, such as street sweeping, are already in use.

CO Conditions

Tables 4-5 and 4-5a show modeled CO concentrations for both the Market/Greene and the Havana alternatives.

2010 Conditions

No-Build Alternative

The highest peak 1-hour CO concentration under this alternative would be approximately 12 ppm at Receptor 15. The highest 8-hour concentration would be approximately 9 ppm at Receptor 15. Neither the peak 1-hour nor the 8-hour standard would be exceeded under this alternative, although the projected CO concentration at Receptor 15 would equal the 8-hour standard of 9 ppm.

Market/Greene Alternative — South Option

CO concentrations at most receptors within the project area would be similar to those for the Market/Greene Alternative — North Option. The highest peak 1-hour CO concentrations (7 ppm) in the northern portion of the project area occur at Receptors 40 and 41. No exceedance of the peak 1-hour or 8-hour NAAQS would occur under this alternative.

	No-Build		2010 North Option		South Option		No-Build		2020 North Option		South Option	
Rec. #	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr
1	5	4	5	4	5	4	5	4	5	4	5	4
2	5	4	5	4	5	4	5	4	7	5	7	5
3	5	4	5	4	5	4	6	4	5	4	5	4
4	5	4	5	4	5	4	5	4	6	4	6	4
5	5	4	5	4	5	4	5	4	5	4	6	4
6	5	4	6	4	6	4	6	4	7	5	7	5
7	6	4	6	4	6	4	6	4	6	4	6	4
8	5	4	5	4	5	4	5	4	5	4	5	4
9	5	4	5	4	5	4	5	4	5	4	5	4
10	5	4	5	4	5	4	5	4	5	4	5	4
11	8	6	9	6	9	7	8	6	9	7	7	5
12	9	7	9	6	9	7	10	7	9	7	9	7
13	5	4	4	3	5	4	5	4	5	4	5	4
14	5	4	4	3	5	4	5	4	5	4	4	3
15	12	9	10	7	10	7	14	10	13	9	14	10
16	7	5	7	5	8	6	7	5	7	5	7	4
17	4	3	4	3	4	3	4	3	4	3	4	3
18	4	3	4	3	4	3	4	3	4	3	4	3
19	5	4	5	4	5	4	5	4	6	4	5	4
20	4	3	5	4	5	4	4	3	7	5	7	5
21	4	3	4	3	4	3	4	3	4	3	4	3
22	4	3	4	3	4	3	4	3	4	3	4	3
23	4	3	4	3	4	3	4	3	4	3	4	3
24	4	3	4	3	4	3	4	3	4	3	4	3
25	4	3	4	3	4	3	4	3	4	3	4	3
26	7	5	10	7	10	7	7	5	6	4	6	4
27	7	5	6	4	6	4	7	5	7	5	7	5
28	4	3	6	4	5	4	4	3	6	4	6	4
29	5	4	6	4	8	6	6	4	7	5	8	6
30	4	3	4	3	4	3	4	3	4	3	4	3
31	5	4	6	4	6	4	5	4	6	4	6	4
32	7	5	7	5	7	5	8	6	7	5	7	5
33	5	4	6	4	6	4	6	4	6	4	6	4
34	4	3	4	3	4	3	4	3	4	3	4	3
35	6	4	5	4	5	4	6	4	5	4	6	4
36	4	3	4	3	4	3	4	3	4	3	4	3
37	4	3	4	3	4	3	4	3	4	3	4	3
38	4	3	4	3	4	3	4	3	4	3	4	3
39	6	4	7	5	6	4	6	4	6	4	6	4
40	4	3	7	5	7	5	4	3	4	3	6	4
41	5	4	9	7	7	5	6	4	5	4	5	4
42	4	3	4	3	4	3	4	3	4	3	4	3
43	5	4	5	4	5	4	5	4	4	3	5	4

Concentration in Parts per Million (ppm)

Modeled Carbon Monoxide Concentrations for the Market/Greene Alternative (Preferred Alternative)

Table 4-5

	No-Build		2010 North Option		South Option		No-Build		2020 North Option		South Option	
Rec. #	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr	1-Hr	8-Hr
1	5	4	5	4	5	4	5	4	5	4	5	4
2	5	4	5	4	5	4	5	4	6	4	6	4
3	5	4	5	4	5	4	6	4	6	4	6	4
4	5	4	5	4	5	4	5	4	5	4	6	4
5	5	4	5	4	5	4	5	4	6	4	5	4
6	5	4	6	4	6	4	6	4	7	5	7	5
7	6	4	6	4	5	4	6	4	6	4	6	4
8	5	4	5	4	5	4	5	4	5	4	5	4
9	5	4	5	4	5	4	5	4	5	4	5	4
10	5	4	5	4	5	4	5	4	6	4	6	4
11	8	6	6	4	7	5	8	6	8	6	7	5
12	9	7	8	6	7	5	10	7	8	6	8	6
13	5	4	5	4	5	4	5	4	5	4	5	4
14	5	4	4	3	5	4	5	4	5	4	5	4
15	12	9	9	7	9	7	14	10	11	8	11	8
16	7	5	9	7	9	7	7	5	9	6	9	7
17	4	3	4	3	4	3	4	3	4	3	4	3
18	4	3	4	3	4	3	4	3	5	4	5	4
19	4	3	4	3	4	3	5	4	4	3	4	3
20	4	3	4	3	4	3	4	3	4	3	4	3
21	4	3	4	3	4	3	4	3	4	3	4	3
22	4	3	4	3	4	3	4	3	5	4	5	4
23	4	3	4	3	4	3	4	3	4	3	4	3
24	4	3	4	3	5	4	4	3	5	4	5	4
25	4	3	5	4	4	3	4	3	5	4	5	4
26	7	5	6	4	6	4	7	5	7	5	6	4
27	7	5	6	4	6	4	7	5	6	4	6	4
28	4	3	6	4	7	5	4	3	7	5	7	5
29	5	4	8	6	9	7	6	4	10	7	11	8
30	4	3	4	3	4	3	4	3	5	4	5	4
31	5	4	5	4	5	4	5	4	6	4	6	4
32	7	5	6	4	6	4	8	6	7	5	7	5
33	5	4	6	4	6	4	6	4	6	4	6	4
34	4	3	4	3	4	3	4	3	4	3	4	3
35	6	4	5	4	5	4	6	4	5	4	5	4
36	4	3	4	3	4	3	4	3	4	3	4	3
37	4	3	4	3	4	3	4	3	4	3	4	3
38	4	3	4	3	4	3	4	3	4	3	5	4
39	6	4	6	4	6	4	6	4	6	4	6	4
40	4	3	4	3	7	5	4	3	4	3	7	5
41	5	4	6	4	8	6	6	4	4	3	6	4
42	4	3	4	3	3	2	4	3	4	3	4	3
43	5	4	4	3	4	3	5	4	5	4	5	4

Concentration in Parts per Million (ppm)

Modeled Carbon Monoxide Concentrations for the Havana Alternative
Table 4-5a

Market/Greene Alternative (Preferred Alternative) — North Option (Preferred Alternative)

The highest peak 1-hour CO concentration would be 10 ppm at Receptors 15 and 26, and 9 ppm for Receptor 41 along the North Option segment of this alignment. The highest 8-hour concentration would equal 7 ppm, a 2 ppm reduction from the No-Build Alternative. No exceedance of the peak 1-hour or 8-hour NAAQS would occur under this alternative.

Havana Alternative — South Option and North Option

CO concentrations at most receptors would be similar under both the Havana Alternative South and North Options. Modeled CO concentrations never vary by more than 1 ppm between the two options, except at Receptor 41, where 1-hour CO concentrations increase from 6 ppm under the North Option to 8 ppm under the South Option. Under this alternative, the highest CO concentration (9 ppm) is projected to occur at Receptors 15, 16, and 29. The 8-hour concentration at the three receptors would equal 7 ppm. No exceedance of the peak 1-hour or 8-hour standard would occur under this alternative.

2020 Conditions

Operation of the 2020 No-Build Alternative and the 2020 Market/Greene Alternative — South Option would result in exceeding the 8-hour CO standard in the Trent Avenue/Mission Avenue intersection vicinity under the existing configuration. Eastbound Mission Avenue is projected to operate at LOS F, with westbound at LOS E. Both eastbound and westbound Trent Avenue are projected to operate at LOS D. Preliminary engineering studies show that improvements to the intersections above would be necessary to facilitate efficient traffic circulation.

In response to this finding, WSDOT performed an LOS analysis using an intersection design that is part of a future Trent Avenue improvement project. The analysis used traffic data from the 2020 Market/ Greene Alternative — South Option. With the proposed or comparable channelization modifications, this intersection will operate between LOS A and C. These modifications would significantly improve traffic flow, resulting in a reduction in emission rates to within the CO NAAQS. This mitigation is applicable to both the 2020 No-Build Alternative and the 2020 Market/Greene Alternative — South Option.

The NAAQS are not projected to be violated under the preferred alternative with the North Option connection. However WSDOT has opted to commit to the Trent Avenue improvements to avoid violations based on borderline projections at this location under the Market/Greene with North Connection alternative.

No-Build Alternative

In comparison with 2010 conditions, projected 2020 CO concentrations at most receptors would not change significantly. The highest modeled 1-hour concentration would equal 14 ppm at Receptor 15. The 8-hour concentration would equal 10 ppm. If the No-Build Alternative were selected, it is likely that an exceedance of the NAAQS would occur at or near Receptor 15. The second highest modeled 1-hour CO concentration would equal 10 ppm at Receptor 12. The 8-hour concentration would equal 7 ppm at this receptor.

Market/Greene Alternative (Preferred Alternative) — North Option (Preferred Alternative)

The highest peak 1-hour CO concentration would be 13 ppm at Receptor 15 and 6 ppm at Receptor 39 along the North Option segment of this alignment. The 8-hour concentration would equal 9 ppm. An exceedance of the NAAQS would not occur; however, the projected CO concentration at Receptor 15 would equal the 8-hour standard of 9 ppm.

Market/Greene Alternative — South Option

The highest projected CO for the 1-hour concentration (14 ppm) under this alternative would occur at Receptor 15, with 6 ppm at Receptors 35, 39, and 40. The 8-hour concentration would equal 10 ppm, resulting in an exceedance of the NAAQS. Projected CO concentrations would not vary significantly between this alternative and the Market/Greene Alternative — North Option, because the alignments in this area would be identical.

The air quality conditions modeled in the Trent Avenue/Mission Avenue intersection area are based on operating Level of Service (LOS) F. Vehicles traveling through the intersection would experience significant delay, causing queues to build at intersection approaches. Improvement to these intersections would be necessary for traffic to move efficiently through the area and improve overall air quality.

Havana Alternative — North Option

The highest peak 1-hour concentration would be 11 ppm at Receptor 15 and 6 ppm at Receptor 39. The highest 8-hour concentrations would be 8 ppm. CO concentrations under 2020 conditions would vary only slightly from those modeled for 2010 conditions. No exceedance of the peak 1-hour or 8-hour standard would occur under this alternative.

The primary reason that air quality in the Trent Avenue/Mission Avenue area would improve under the Havana Alternative is that the intersection would be reconfigured during project construction to facilitate traffic flow. Additionally, data shows that traffic volumes along Trent and Mission Avenues would be lower than those projected under the Market/Greene Alternative.

Modeled CO concentrations vary slightly from the No-Build Alternative. Slight changes in CO concentrations are a result of variations in traffic volumes and distribution.

Havana Alternative — South Option

The highest peak 1-hour concentration of 11 ppm would occur at Receptors 15 and 29, with 6 ppm at Receptors 39 and 41 along the South Option segment of this alignment. The 8-hour concentration would equal 8 ppm. No exceedance of the peak 1-hour or 8-hour standard would occur under this alternative. As expected, CO concentrations at receptors located in the northern portion of the project area would generally be higher with the Havana Alternative than with the No-Build Alternative.

I-90 Collector/Distributor (C/D) System (part of the Preferred Alternative)

Operation of the I-90 C/D would improve operation of I-90 and arterial streets between the Liberty Park and Sprague Avenue interchanges. The C/D would draw local traffic off mainline I-90 to a separate freeway network, relieving projected congestion problems on mainline I-90 and accommodating local travel demand to and from I-90 in this area (KJS & Associates 1993).

~~If the I-90 C/D is not constructed as part of the proposed project, the resulting traffic congestion along I-90 and at major arterial intersections within the vicinity would likely cause ambient CO levels to increase over those projected assuming operation with the I-90 C/D. CO emissions usually increase as vehicle speeds decrease. While emission rates calculated for 2020 are lower than under existing conditions, the increased number of vehicles operating at congested speeds without the C/D system would likely generate CO in concentrations high enough to cause exceedance of the 8-hour CO standard at receptors in the I-90 vicinity.~~

Mitigation

No adverse impacts are expected; therefore, no mitigation is proposed. Additionally, building the North Spokane Freeway will not delay implementation of any Transportation Control Measures (TCM) or strategies approved by the SRTC Board and adopted by local governing bodies. The proposed preferred alternative incorporates TSM strategies and measures and is recognized under the current congestion management system program.

Noise

Studies and Coordination

Traffic data used for traffic noise modeling was provided by the Spokane Regional Transportation Council (SRTC).

Noise and Noise Standards

Sound travels through the air as waves of minute air pressure fluctuations caused by some type of vibration. Measurements of these fluctuations are reported in a logarithmic decibel (dB) scale. Most sounds consist of a broad range of frequencies. Several frequency weighting schemes have been used to develop composite decibel scales that approximate the way the human ear responds to noise levels. The "A-weighted" decibel scale (dBA) is the most widely used for this purpose. Typical A-weighted noise levels for various types of sound sources are summarized in Table 4-6.

Varying noise levels are often described in terms of the equivalent constant dB level. Equivalent noise levels (Leq) are used to develop single value descriptions of average noise exposure over various periods of time. The Leq data used for these average noise exposure descriptors are generally based on A-weighted sound level measurements.

The nature of dBA scales is such that individual dBA ratings for different noise sources cannot be added directly to give the dBA rating of the combination of the sources. Two noise sources producing equal dBA ratings at a given location will produce a composite noise level 3 dBA greater than either sound alone. When two noise sources differ by 10 dBA, the composite noise level will be only 0.4 dBA