Air Quality Screening Analysis Summary

November 2001

This technical memorandum summarizes the results of a first-level impact screening for the ten options being reviewed to determine the impacts that specific corridor improvements might have on the existing traffic patterns within the I-5 corridor. The level of analysis is general and based on available transportation network model forecast results. The purpose of the information is to provide a comparison of the various options' impacts to air quality within the study area. The calculated numbers use the latest emission modeling tools and capture the effects of both freeway and arterial traffic on air quality.

Background

The project study area is located in the Portland-Vancouver Metropolitan Area, which encompasses parts of Oregon and Washington. Air quality in the project area is regulated by the U.S. Environmental Protection Agency (EPA), Oregon State Department of Environmental Quality (ODEQ), Washington State Department of Ecology (WA DOE), and Southwest Air Pollution Control Agency (SWAPCA). Assumptions used in this analysis were coordinated with the Southwest Washington Regional Transportation Council (RTC) and the Portland Metropolitan Planning Organization (Metro).

Under the Clean Air Act, EPA has established the National Ambient Air Quality Standards (NAAQS), which specify maximum concentrations for carbon monoxide (CO), particulate matter less than 10 micrometers in size (PM_{10}), particulate matter less than 2.5 micrometers in size ($PM_{2.5}$), ozone (O_3), sulfur dioxide, lead, and nitrogen dioxide. The eight-hour ozone and $PM_{2.5}$ standards have recently been upheld by the Supreme Court, but have not yet been implemented by EPA. The study area lies in the Portland-Vancouver Air Quality Maintenance areas for Carbon Monoxide (CO) and Ozone (O_3). Air quality maintenance areas are regions that have recently attained compliance with the NAAQS. Maps of air quality monitoring networks for Oregon and Washington are attached to this memo. A violation of the CO NAAQS was recorded in Vancouver in 1999, and violations of the O_3 NAAQS were recorded in the Portland area in 1996 and 1998. No other violations of these standards have been recorded in the area from 1996 through 2001 (EPA, 2001).

CO is a colorless, odorless, poisonous gas that reduces the blood's oxygen-carrying capability. In urban areas, motor vehicles are often the source of over 90 percent of the CO emissions that cause ambient levels to exceed the NAAQS (EPA, 1992). Areas of high CO concentrations are usually localized, occurring near congested roadways and intersections during autumn and winter. They are associated with light winds and stable atmospheric conditions.

Particulate matter includes small particles of dust, soot, and organic matter suspended in the atmosphere. Particles less than 10 micrometers in size are measured as PM_{10}, and particles less than 2.5 micrometers in size are measured as $PM_{2.5}$. Particulate matter may carry absorbed toxic substances, and a particle itself may be inherently toxic. Sources of particulates include motor vehicles, industrial boilers, wood stoves, open burning, and dust from roads, quarries, and construction activities. Particulates emitted from diesel vehicles pose specific health risks when compared to other types of particulate matter. EPA research (EPA, 1993) found that components of diesel particulates (primarily high-molecular-weight organic compounds) have several negative health effects, including carcinogenesis, accumulation of particles in the lungs, tissue inflammation, respiratory irritation, and other related effects. The EPA's Clean Air Scientific Advisory Committee is currently reviewing recent health assessment data on diesel emissions. However, the data is not yet available for citation.

Ozone is a highly toxic form of oxygen and a major component of the complex chemical mixture that forms photochemical smog. Ozone is not produced directly, but is formed by a reaction between sunlight, nitrogen oxides (NO_x), and volatile organic compounds (VOC). Ozone is primarily a product of regional vehicular traffic, and point-source and fugitive emissions of ozone precursors. Ozone irritates the eyes and respiratory tract and increases the risk of respiratory and heart diseases. Maximum ozone levels generally occur during warm summer periods between noon and early evening, at locations several miles downwind from the sources, after NO_x and HC have had time to mix and react under sunlight.

Other chemicals or classes of chemicals in motor vehicle emissions that are considered hazardous by EPA include benzene; formaldehyde; 1,3-butadiene; acetaldehyde; and gasoline vapors (EPA, 1993). Benzene emissions in the Puget Sound region are substantially higher than the national average. The emissions of these compounds are much lower than the emissions of the pollutants evaluated in this study, and would vary between the alternatives in a similar fashion to the pollutants presented here.

Automobiles also emit greenhouse gases, primarily carbon dioxide (CO_2). CO_2 emissions are proportional to fuel consumption. Passenger cars emit on average 225 grams CO_2 per kilometer traveled (0.8 pounds per mile) and sport-utility vehicles and light trucks emit about 50 percent more CO_2 per mile. Because CO_2 emissions are directly proportional to fuel consumption, they vary with speed and are lowest at a speed of approximately 45 mph,

where most automobiles are most fuel efficient. Because the emissions pattern relative to vehicle speed is similar to that of CO, CO_2 emissions would vary between the alternatives in a similar pattern to CO emissions, but the emissions would be an order of magnitude greater than the emissions of CO.

Methodology

Air quality impacts were assessed by estimating the total daily pollutant emissions from transportation sources on arterial streets that crossed each of the screenlines evaluated in the transportation analysis, and for three segments of I-5. The first value includes all vehicle emissions on arterial streets from an area with an average width of one-quarter mile, centered around each screenline. For the three freeway segments, total emissions were calculated for all freeway links between the analyzed limits. Because the screenline and freeway analyses use different assumptions, the screenline analysis may not be validly compared to the freeway analysis. The results of the screenline analysis may be compared between the different options and the results of the freeway analysis may likewise be compared.

Link volumes, lengths, and travel times were taken from the transportation network model for a.m., p.m., mid-day off-peak, and nighttime off-peak periods. Average vehicle speeds were calculated using link length and travel-time values. Emissions per mile traveled for carbon monoxide (CO), volatile organic compounds (VOC), oxides of nitrogen (NO_x), and particulate matter less than 10 microns (PM_{10}) were calculated for each link. Emission factors for CO, VOC, and NO_x were developed using the latest draft version of MOBILE 6, the latest mobile source emission factor model developed by EPA. Because the latest draft of the Mobile 6 model does not yet include particulate emissions, PM_{10} emissions were estimated using the Part 5 model. Only exhaust particulates were included in the emissions calculations. Assumptions used with the Part 5 model may result in underprediction of current PM_{10} emissions relative to future emissions because the model does not capture future benefits of low sulfur diesel. Input file assumptions were coordinated with ODEQ to ensure that appropriate assumptions for the Portland-Vancouver area were used. The emission model files used in this study likely differ from those that will be adopted by ODEQ and Metro for conformity determination in the Portland area, because the MOBILE 6 model may be modified before final adoption and before additional regionally specific data is developed. Separate emission files were not developed for Vancouver after considering the purpose of this study. The relative comparison between alternatives would not have changed if the emission files been modified for Vancouver.

In addition to the computed pollutant emissions, ozone and hazardous air pollutants are of concern. Ozone is not produced directly, but is formed by a reaction between sunlight, nitrogen oxides (NO_x), and volatile organic compounds (VOCs). The values calculated for NO_x and VOC emissions are a surrogate for ozone production in the study area.

Other chemicals or classes of chemicals in motor vehicle emissions considered hazardous by the EPA include benzene; formaldehyde; 1,3-butadiene; acetaldehyde; and gasoline vapors (EPA, 1993a). The emissions of these compounds are much lower than the emissions of the pollutants calculated in the memo, and would vary between the alternatives in a similar fashion to the pollutants presented here.

Results

Pollutant emissions in the future were modeled to be less than current emissions for all pollutants except PM_{10}. As described in the methodology section, this may be partially attributable to a limitation of the methodology used. Comparison between options in the 2020 horizon year consistently shows the baseline financially committed no-build option to have the lowest pollutant emissions because capacity would be severely constrained under that option.

Arterial screenline emissions varied between the alternatives by between 0 and 15 percent (Table 1). In general, the planned regional priority baseline and TDM options would have the lowest emissions because there would be the lowest traffic under that alternative, but not as much shift off of I-5 as under the baseline financially committed no-build. The highest screenline pollutant emissions were observed with options 7 and 8. CO, VOC, and NO_x emissions ranged between 1 and 15 percent higher than under the financially committed no-build option and between 11 and 22 percent higher than the priority baseline option. The results of the various options may be compared at the individual arterial screenlines in Tables 2 through 5.

Freeway emissions varied similarly to screenline emissions. Emissions of the various pollutants under the range of future options ranged between 11 and 86 percent higher than under the baseline financially committed no-build

option. As with the screenline analysis, capacity constraint under the no-build option would limit the number of trips served in the region, thereby reducing the number of vehicles emitting pollutants along I-5. The highest freeway pollutant emissions were observed with options 2, 3c, 6, and 7. For options 2, 3c, and 7 CO and NO_x emissions were between 27 and 29 percent higher and VOC emissions were between 24 and 86 percent higher than under the baseline option. The highest overall freeway emissions were modeled for option 6, with CO, VOC, and NO_x emissions 40, 86, and 38 percent higher than for the baseline option. The results of the various options may be compared for individual freeway segments in Tables 6 through 9.

In summary, localized emissions tended to increase in the analysis in areas where additional capacity would occur under an option. In the options that would provide the most new freeway capacity, the freeway emissions would be higher, but the arterial emissions would be reduced because the trips would be served by the freeway. For the west arterial option, the opposite behavior occurs, with freeway emissions reduced, but arterial emissions increasing. The reversible lanes option demonstrates an interesting trend; while freeway emissions would not increase as much under that option as under the option with a fourth lane in each direction, arterial emissions would also increase. This appears to result from the increased capacity in the peak-hour serving more peak-hour peak-direction trips, but the reverse-direction trips needing to find alternative travel patters; therefore, shifting to the arterial system.

Table 1. Summary of Daily Pollutant Emissions (Kilograms per Day)

	Arterial Screenline Emissions				Freeway Emissions			
Option Package	CO	VOC	NO_x	PM_{10}	CO	VOC	NO_x	PM_{10}
Existing Conditions (2000)	5,523	519	850	28	18,838	1,442	3,146	85
Baseline 1A: No-Build, Financially Committed System	3,805	155	141	36	10,600	350	390	95
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	3,807	152	141	37	11,806	390	432	106
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	3,798	152	141	36	11,858	391	434	106
Baseline 1D: Planned Regional Priority Baseline System	3,534	140	131	34	11,888	393	435	106
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	3,872	153	143	37	13,711	655	499	113
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	3,815	151	141	37	13,655	651	497	112
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 Lane Bridge	3,793	148	140	36	14,818	651	539	123
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	4,057	156	149	39	13,644	435	500	121
Option 8: Add New West Arterial	4,317	167	159	41	11,918	394	436	107
Option 10: Enhanced TDM	3,622	143	134	35	11,786	388	432	105

Table 2. Arterial Screenline Daily Carbon Monoxide Emissions

Option Package	CO Emissions by Screenline (Kilograms per Day)												Total
	A	B	C	D	E-1	E-2	F-1	F-2	G-1	G-2	H-1	H-2	CO
Existing Conditions (2000)	0	642	954	1,573	146	308	208	250	237	147	908	152	5,523
Baseline 1A: No-Build, Financially Committed System	0	431	595	1,148	93	375	126	123	168	90	531	125	3,805
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	0	536	595	1,118	90	228	127	152	148	79	615	119	3,807
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	0	527	597	1,114	91	228	127	152	148	79	616	119	3,798
Baseline 1D: Planned Regional Priority Baseline System	0	493	575	1,050	79	205	124	197	165	58	507	82	3,534
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	0	509	591	1,035	89	213	126	240	207	91	663	108	3,872
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	0	498	586	1,029	87	210	121	236	193	90	650	117	3,815
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 lane Bridge	0	434	581	1,070	68	202	111	235	199	94	678	121	3,793
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	0	445	574	1,066	252	188	229	228	195	93	669	116	4,057
Option 8: Add New West Arterial	368	631	527	1,058	83	211	141	220	237	87	635	119	4,317
Option 10: Enhanced TDM	0	503	544	1,014	71	202	115	239	166	89	575	104	3,622

Table 3. Arterial Screenline Daily Volatile Organic Compound Emissions

Option Package	VOC Emissions by Screenline (Kilograms per Day)												Total
	A	B	C	D	E-1	E-2	F-1	F-2	G-1	G-2	H-1	H-2	VOC
Existing Conditions (2000)	0	60	96	147	15	32	22	23	23	14	73	14	519
Baseline 1A: No-Build, Financially Committed System	0	17	25	46	4	19	6	5	7	4	18	5	155
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	0	21	25	45	4	10	6	6	6	3	20	5	152
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	0	21	25	45	4	10	6	6	6	3	20	5	152
Baseline 1D: Planned Regional Priority Baseline System	0	20	24	42	3	9	5	7	7	2	17	3	140
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	0	21	25	41	4	9	5	9	8	4	22	4	153
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	0	20	25	41	4	9	5	9	8	4	22	5	151
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 lane Bridge	0	17	25	42	3	9	5	9	8	4	23	5	148
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	0	18	24	42	9	8	8	8	8	4	22	5	156
Option 8: Add New West Arterial	14	23	22	42	4	9	6	8	10	4	21	5	167
Option 10: Enhanced TDM	0	20	23	40	3	9	5	9	7	4	19	4	143

Table 4. Arterial Screenline Daily Oxides of Nitrogen Emissions

Option Package	NO_x Emissions by Screenline (Kilograms per Day)												Total
	A	B	C	D	E-1	E-2	F-1	F-2	G-1	G-2	H-1	H-2	NO_x
Existing Conditions (2000)	0	98	148	241	23	48	32	38	37	23	140	23	850
Baseline 1A: No-Build, Financially Committed System	0	16	22	42	3	15	5	4	6	3	20	5	141
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	0	20	22	41	3	9	5	6	5	3	23	4	141
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	0	19	22	41	3	9	5	6	5	3	23	4	141
Baseline 1D: Planned Regional Priority Baseline System	0	18	21	39	3	8	5	7	6	2	19	3	131
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	0	19	22	38	3	8	5	9	8	3	25	4	143
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	0	18	22	38	3	8	5	9	7	3	24	4	141
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 lane Bridge	0	16	22	39	3	8	4	9	7	3	25	4	140
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	0	16	21	39	9	7	8	8	7	3	25	4	149
Option 8: Add New West Arterial	13	23	20	39	3	8	5	8	9	3	24	4	159
Option 10: Enhanced TDM	0	18	20	37	3	8	4	9	6	3	22	4	134

Table 5. Arterial Screenline Daily Particulate Emissions

Option Package	PM_{10} Emissions by Screenline (Kilograms per Day)												Total
	A	B	C	D	E-1	E-2	F-1	F-2	G-1	G-2	H-1	H-2	PM_{10}
Existing Conditions (2000)	0	3	5	8	1	2	1	1	1	1	4	1	28
Baseline 1A: No-Build, Financially Committed System	0	4	6	11	1	3	1	1	2	1	5	1	36
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	0	5	6	11	1	2	1	1	1	1	5	1	37
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	0	5	6	11	1	2	1	1	1	1	6	1	36
Baseline 1D: Planned Regional Priority Baseline System	0	5	6	10	1	2	1	2	2	1	5	1	34
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	0	5	6	10	1	2	1	2	2	1	6	1	37
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	0	5	6	10	1	2	1	2	2	1	6	1	37
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 lane Bridge	0	4	6	10	1	2	1	2	2	1	6	1	36
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	0	4	6	10	2	2	2	2	2	1	6	1	39
Option 8: Add New West Arterial	4	6	5	10	1	2	1	2	2	1	6	1	41
Option 10: Enhanced TDM	0	5	5	10	1	2	1	2	2	1	5	1	35

Table 6. Freeway Daily Carbon Monoxide Emissions

Option Package	CO Emissions by Freeway Segment (Kilograms per Day)			Total CO
	Columbia to Going Interchanges, Portland	Mill Plain Blvd. to SR 500 Interchanges, Vancouver	78th to 134th Interchanges, Vancouver	
Existing Conditions (2000)	7,074	4,863	6,901	18,838
Baseline 1A: No-Build, Financially Committed System	3,780	2,398	4,422	10,600
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	4,039	2,851	4,915	11,806
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	4,092	2,850	4,916	11,858
Baseline 1D: Planned Regional Priority Baseline System	4,100	2,851	4,937	11,888
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	4,751	3,341	5,619	13,711
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	4,715	3,324	5,616	13,655
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 lane Bridge	5,353	3,453	6,012	14,818
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	5,050	3,166	5,429	13,644
Option 8: Add New West Arterial	4,110	2,822	4,986	11,918
Option 10: Enhanced TDM	4,048	2,816	4,921	11,786

Table 7. Freeway Daily Volatile Organic Compound Emissions

Option Package	VOC Emissions by Freeway Segment (Kilograms per Day)			Total VOC
	Columbia to Going Interchanges, Portland	Mill Plain Blvd. to SR 500 Interchanges, Vancouver	78th to 134th Interchanges, Vancouver	
Existing Conditions (2000)	585	357	500	1,442
Baseline 1A: No-Build, Financially Committed System	139	77	134	350
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	147	92	151	390
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	148	92	151	391
Baseline 1D: Planned Regional Priority Baseline System	150	92	151	393
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	242	168	245	655
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	239	167	245	651
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 lane Bridge	231	170	250	651
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	172	98	165	435
Option 8: Add New West Arterial	150	91	154	394
Option 10: Enhanced TDM	147	90	151	388

Table 8. Freeway Daily Oxides of Nitrogen Emissions

Option Package	NO_x Emissions by Freeway Segment (Kilograms per Day)			Total NO_x
	Columbia to Going Interchanges, Portland	Mill Plain Blvd. to SR 500 Interchanges, Vancouver	78th to 134th Interchanges, Vancouver	
Existing Conditions (2000)	1,180	813	1,152	3,146
Baseline 1A: No-Build, Financially Committed System	137	88	165	390
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	146	105	181	432
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	148	105	181	434
Baseline 1D: Planned Regional Priority Baseline System	148	105	182	435
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	172	122	205	499
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	171	121	205	497
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 lane Bridge	192	126	221	539
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	183	117	201	500
Option 8: Add New West Arterial	149	104	184	436
Option 10: Enhanced TDM	147	103	182	432

Table 9. Freeway Daily Particulate Emissions

Option Package	PM_{10} Emissions by Freeway Segment (Kilograms per Day)			Total PM_{10}
	Columbia to Going Interchanges, Portland	Mill Plain Blvd. to SR 500 Interchanges, Vancouver	78th to 134th Interchanges, Vancouver	
Existing Conditions (2000)	33	21	30	85
Baseline 1A: No-Build, Financially Committed System	35	21	38	95
Baseline 1B: Constrained Baseline w/o Delta Park & Rose Quarter Improvements	38	25	43	106
Baseline 1C: Constrained Baseline w/ Delta Park Widening and Rose Quarter Ramp Improvements	38	25	43	106
Baseline 1D: Planned Regional Priority Baseline System	38	25	43	106
Option 2: Express Bus/ 3 Lanes w/supplemental 4 Lane Bridge	40	26	47	113
Option 3C: LRT/ 3 Lanes w/supplemental 4 Lane Bridge	40	26	47	112
Option 6: Express Bus/ Add 4th Lane (HOV) w/supplemental 6 lane Bridge	47	27	49	123
Option 7: LRT/Add 4th Lane (Reversible) w/supplemental 6 Lane Bridge	46	28	47	121
Option 8: Add New West Arterial	38	25	44	107
Option 10: Enhanced TDM	38	25	43	105

References

Oregon Department of Environmental Quality, 2001. Mobile 5ah input files. Portland, 2001.

U.S. Environmental Protection Agency, 1992. Automobiles and Carbon Monoxide. Fact Sheet Number EPA-400-F-92-005. Ann Arbor, Michigan. 1992.

U.S. Environmental Protection Agency, 1993. Motor Vehicle-Related Air Toxics Study. Report Number EPA-420-R-93-005. Ann Arbor, Michigan. 1993.

U.S. Environmental Protection Agency, 1994. Users' Guide to Mobile5. Report Number EPA-AA-AQAB-94-01. Ann Arbor, Michigan. 1994.

U.S. Environmental Protection Agency, 1995. Compilation of Air Pollutant Emission Factors, Fifth Edition (AP-42). 1995.

U.S. Environmental Protection Agency. March, 1999. Transportation Air Quality.

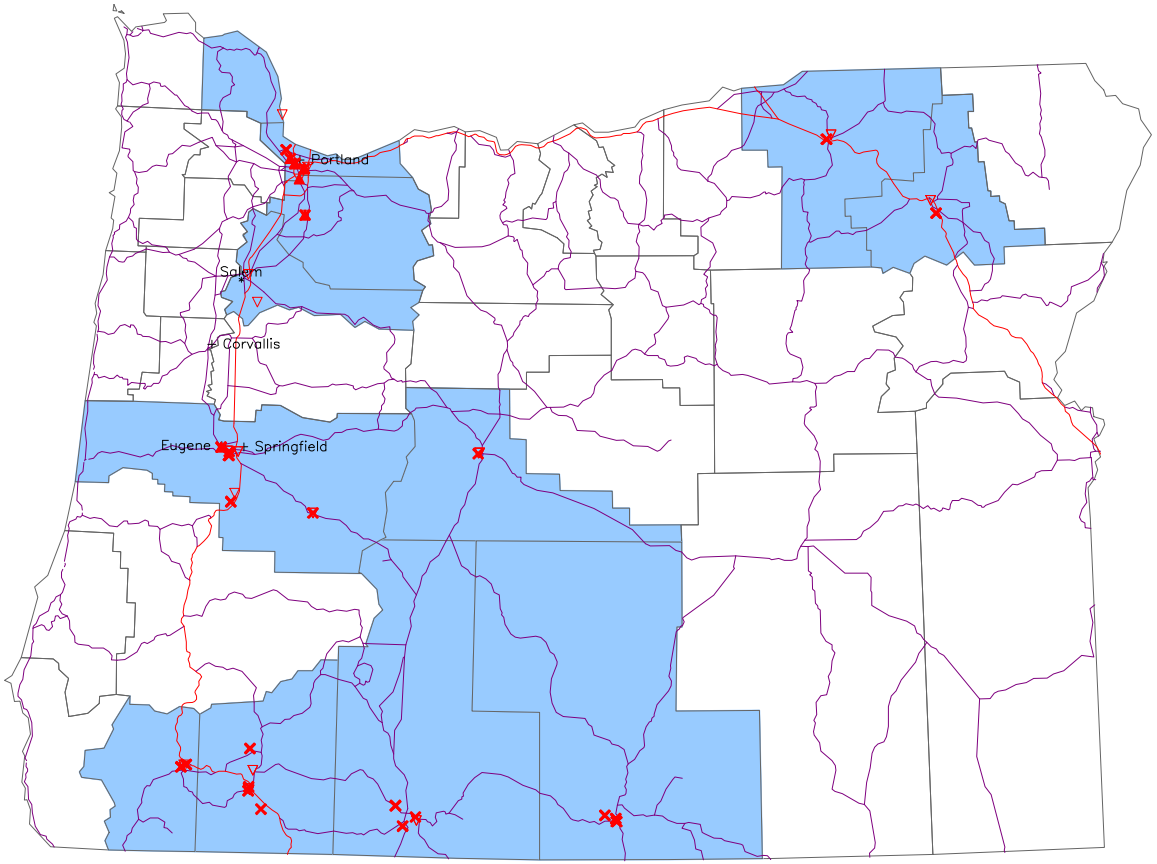
U.S. Environmental Protection Agency, 2001. AIRS Database. 2001.

U.S. Environmental Protection Agency, 2001a. Mobile 6 Draft Users' Guide. 2001.

Oregon

Currently Active Monitors for CO, NO2, O3, or PM10

Shaded Counties have Monitors



Highway: Interstate US/State

Monitor Location:

▲ (9) NAMS	▽ (32) SLAMS	✕ (41) Other	✚ (0) Unknown
★ (0) Industrial	○ (0) Tribal	◇ (0) Index Site	◆ (0) Non-EPA
◀ (0) PAMS/VOC	H (0) PAMS/NA	● (0) PAMS/SL	◁ (0) PAMS(pend)

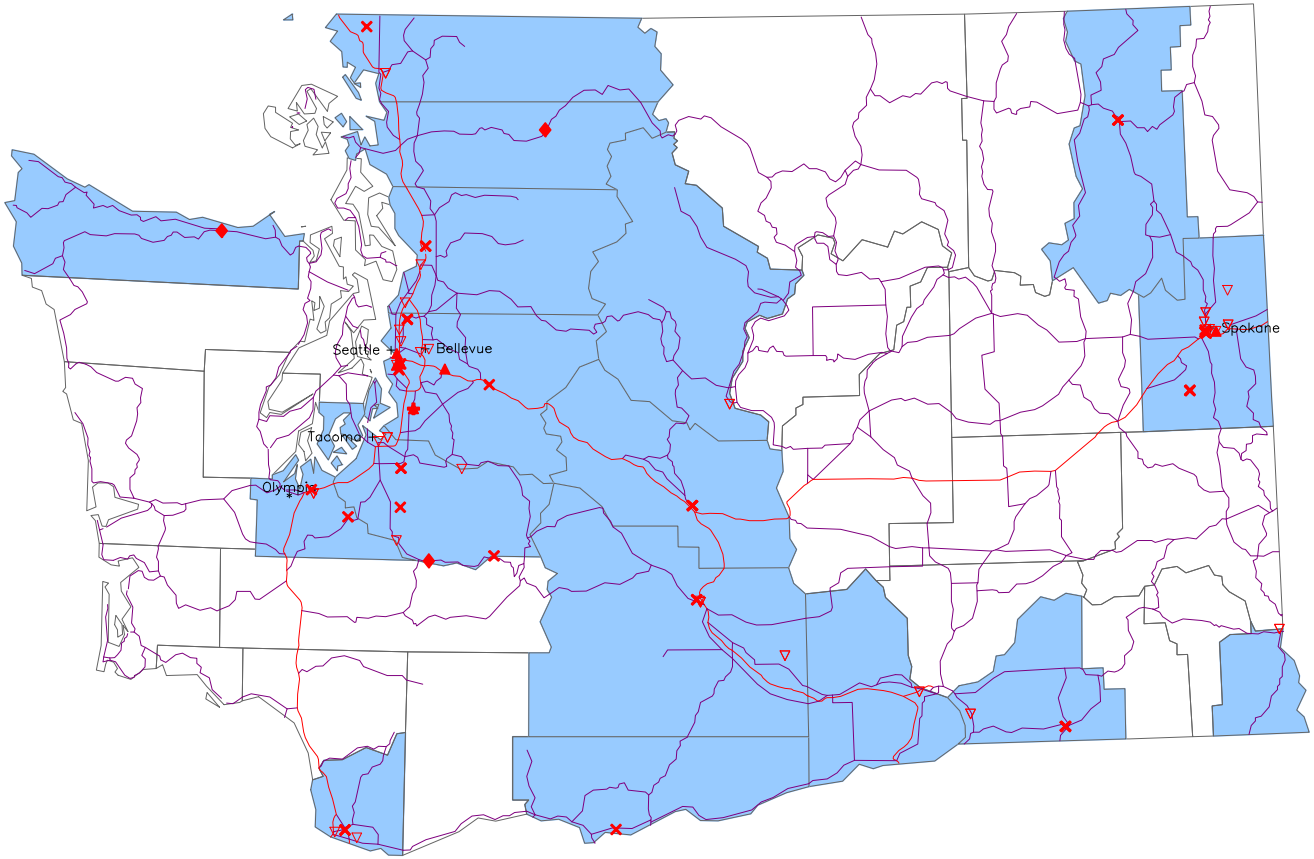
Source: US EPA Office of Air and Radiation, AIRS Database

10/12/01

Washington

Currently Active Monitors for CO, NO2, O3, or PM10

Shaded Counties have Monitors



Highway: — Interstate — US/State

Monitor Location:

- ▲ (6) NAMS
- ▽ (41) SLAMS
- ✕ (32) Other
- ✚ (1) Unknown
- ★ (0) Industrial
- ○ (0) Tribal
- ◇ (0) Index Site
- ◆ (3) Non–EPA
- ◀ (0) PAMS/VOC
- H (0) PAMS/NA
- ● (0) PAMS/SL
- ◁ (0) PAMS(pend)

Source: US EPA Office of Air and Radiation, AIRS Database

10/12/01