SUPPLEMENT TO THE

STATE IMPLEMENTATION PLAN

FOR

WASHINGTON STATE

A Plan for Attaining and Maintaining

National Ambient Air Quality Standards for

Ozone in Central Puget Sound

WASHINGTON STATE DEPARTMENT OF ECOLOGY

January 1993

#93-06 C

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APPENDICES TO THE WASHINGTON STATE IMPLEMENTATION PLAN REFERENCED IN THIS ATTAINMENT PLAN

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Amendments to the Federal Clean Air Act require states with areas that exceed national ambient air quality standards for ozone or carbon monoxide to develop plans for each such area that, when implemented, will reduce air pollutants sufficiently for the standards to be attained. These attainment plans must be adopted by the state and submitted to the Environmental Protection Agency (EPA) as amendments to the State Implementation Plan (SIP). There are three areas in Washington State violating the standard for carbon monoxide--Central Puget Sound, including portions of King, Pierce, and Snohomish Counties, a portion of Clark County around Vancouver, and a portion of Spokane County including the City of Spokane. Two areas violate the ozone standard--the Clark County portion of the Portland-Vancouver Interstate Air Quality Maintenance Area, and Central Puget Sound, including King, Pierce, and Snohomish Counties.

Through a combined effort of state agencies, the Puget Sound Air Pollution Control Agency, and the Puget Sound Regional Council, the region's transportation planning organization, an attainment plan has been prepared in accordance with requirements of the Federal Clean Air Act for submittal to EPA by the statutory November 16, 1992, deadline. Key elements of the plan are as follows:

* Emission inventories
* Expanded and enhanced vehicle inspection and maintenance program
* Requirements for point sources of volatile organic compounds and nitrogen oxide to report emissions (emission statement requirements)
* Contingency measures for failure to attain the ozone standard by the statuatory deadline
* Revisions to rules for major new sources

Approvable plans must include a number of prescribed elements, including those noted above. In **marginal** ozone nonattainment areas, such as Central Puget Sound, the presumption that implementation of required control strategies will be all that is needed to attain standards. If the area fails to attain, a contingency plan is automatically implemented. The State must track and report on progress toward attainment and the accuracy of growth forecasts.

As public involvement opportunities have thus far been limited, comments on this and supplemental portions of the plan will continue until January 1993, when follow-up hearings are scheduled.

ACKNOWLEDGEMENTS

Without the efforts of numerous individuals in state government and in regional and local governments, this supplement to the Washington State Implementation Plan would not have been possible. Rather than risk overlooking someone who contributed materially to this document, we use this opportunity to acknowledge the agencies contributing significantly to this effort. At the state level, we extend our gratitude for work well done to the Air Quality Program and the Industrial Section of the Washington State Department of Ecology and the Washington State Department of Transportation. Special appreciation goes to the Puget Sound Air Pollution Control Agency and the Puget Sound Regional Council.

We look forward to working further with these agencies to solve the region's air quality problems.

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1.0 INTRODUCTION

This chapter describes the basic organization of this update to the Washington State Implementation Plan. Section 1.1 describes the nature of the air quality problems addressed in this plan. In section 1.2, maps and descriptions are provided that detail the areas in the state that fail to attain the national ambient air quality standard for carbon monoxide (CO) or ozone (O_3), and thus are subject to the planning requirements of Title I of the 1990 Amendments to the Clean Air Act. In addition, a map of SIP requirements and where each is addressed in this document is provided in section 1.3. Finally, an overview of the organization of this document is provided in section 1.4.

1.1 Description of the Air Pollution Problem in Washington State

Washington's air may look pristine, but this is an increasingly false perception because much of the pollution is invisible. Carbon monoxide has been found at unhealthful levels in urban and suburban areas. Ambient ozone concentrations have been found at unhealthful levels in Washington's mountain regions. Its origin is generally from congested urban and suburban areas upwind.

Washington's population has grown to nearly 5 million people during the past century. The decisions affecting air quality made by each individual and business become more significant because of our rapid growth. Despite two decades of success in limiting air pollution, economic and population growth threaten to overthrow existing control measures like the basic vehicle inspection and maintenance program and reasonably available control technologies for industrial sources. Each year we spill about 2.5 million tons of harmful gases and particles into the air over Washington.

In 1989 Washington motor vehicles spilled 1,000,000 tons of carbon monoxide, 188,000 tons of volatile organic compounds, and 106,000 tons of nitrogen oxides into the ambient air. In 1990 Washington industry emitted 44,000 tons of volatile organic compounds, and 59,000 tons of nitrogen oxides into the ambient air. Outdoor burning (yard debris, slash, and agricultural burning) and woodstove use are important sources of these pollutants as well. Over time these emissions have translated into two ozone nonattainment areas. Nonattainment areas are areas in which monitors have repeatedly recorded exceedances of national ambient air quality standards over a three-year period for ozone. The two O_3 nonattainment areas that currently exist are King, Pierce and part of Snohomish counties and the Vancouver Air Quality Maintenance Area.

1.2 Nonattainment Areas

On March 15, 1991, the Governor of Washington State designated the urban areas of Puget Sound and Spokane and the Vancouver portion of the Portland-Vancouver Interstate Air Quality Maintenance Area as nonattainment areas for carbon monoxide (CO). King, Pierce, and Snohomish Counties and the Vancouver Air Quality Maintenance Area were also designated as nonattainment areas for ozone (O_3). This action was taken in accordance with Section 107 of the Federal Clean Air Act as amended in 1990. A detailed map of this nonattainment area, showing boundaries and monitoring sites, is available for public inspection at U.S. Environmental Protection Agency, Region 10 in Seattle and at the Department of Ecology, Air Quality Program, in Lacey.

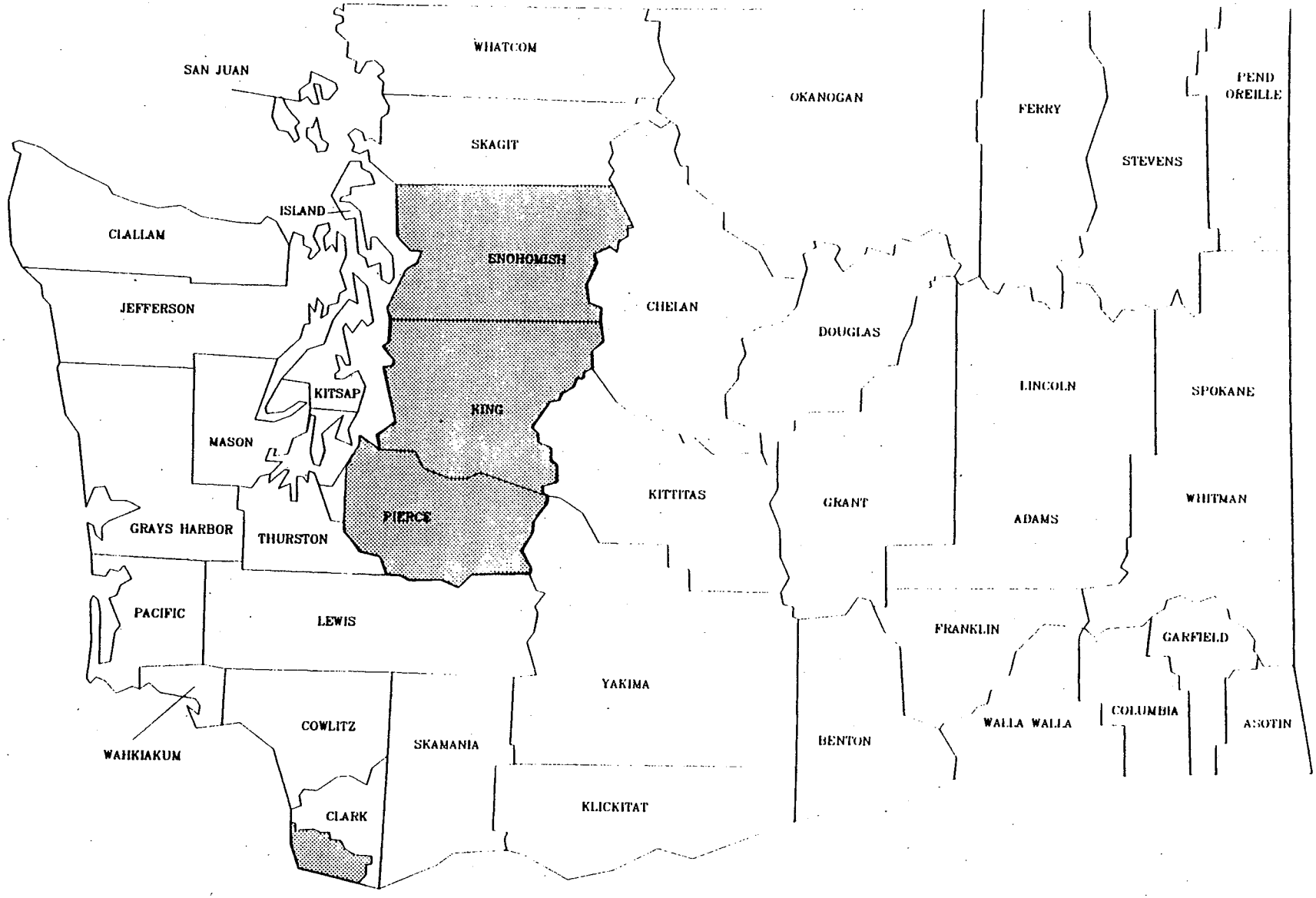
1.2.1 Puget Sound Ozone Nonattainment Area Boundary Determinations.

Initially, discussions on developing specific nonattainment area boundaries focused on whether the Puget Sound area actually was a nonattainment area. After reviewing validated 1990 ozone data, it was evident that the Puget Sound area was an ozone nonattainment area with a *design value* of 0.131. Conceptually, design values are used to categorize nonattainment areas in terms of the level of severity. The categories are set out in the Federal Act. The determination of design values was based on EPA guidance. Design values were based upon monitored ozone data from 1988-1990. An explanation of the data and calculations appears in chapter 2.3.

On February 12, 1991, the Department of Ecology met with representatives of the Puget Sound Council of Governments, the Puget Sound Air Pollution Control Agency, the EPA, and the Washington State Department of Transportation to discuss boundary definition of the nonattainment area. After a review of traffic growth patterns, locations of major industries, and air quality problems in the area, the State of Washington and EPA Region X initially agreed that King, Pierce, and Snohomish Counties should be designated as *marginal* ozone nonattainment areas.

Ecology has since reanalyzed information regarding these boundaries and recommended to EPA that a portion of Snohomish County not be included in the nonattainment area. In reanalyzing pertinant geographic information, Ecology determined that 95 percent of the present and projected population, virtually all of the nitrogen oxide sources and volitile organic compound sources could be accounted for in boundaries that were less than county wide. EPA has since responded to this recomendation. Effective December 30, 1992, EPA revised the Puget Sound ozone nonattainment area boundary to only extend north far enough to include the urbanized portion of Snohomish County (see 57 Federal Register 56762, November 30, 1992). This plan deals with the revised nonattainment area rather than the entire three county nonattainment area. The maps show the original three county nonattainment area and the revised boundary.

Ozone(O_3) Areas



1.3 Map of SIP Requirements

The purpose of this section is to provide a brief overview of planning requirements from Title I of the 1990 Federal Clean Air Act Amendments. These requirements pertain to areas of Washington State that fail to attain the national ambient air quality standards described in section 1.2; the standards themselves are described in Chapter 2.0. The specific requirements may be found either in the Act itself, in regulations promulgated pursuant to the Act and codified in the Code of Federal Regulations, and in numerous guidance documents issued by the U.S. Environmental Protection Agency.

For areas with less severe problems, the measures prescribed by the Act are presumed to be enough to achieve attainment. Severity classifications for ozone nonattainment areas are (in order of increasing severity): marginal, moderate, serious, severe, and extreme. The Puget Sound ozone nonattainment area is classified as marginal, and thus subject to a limited number of requirements. Violations of the standard after the attainment date (December, 1993) automatically bumps the area up to the next higher classification (moderate) and subjects the area to additional requirements.

The following table summarizes Federal Clean Air Act requirements for the Puget Sound ozone nonattainment area addressed in this plan. The table contains section numbers to aid the reader in finding where the requirement is addressed in this document, "ADD" if the requirement appears as an addendum to this specific attainment plan, or "APP" if the information is found in an appendix to the State Implementation Plan.

TABLE 1.1

MAP OF SIP REQUIREMENTS
FOR THE PUGET SOUND OZONE NONATTAINMENT AREA

REQUIREMENT		LOCATION
1.	Emission inventory	2.5
2.	Vehicle I/M Requirements	5.1, APP
3.	Transportation conformity requirements	5.2, APP
4.	VOC RACT fixup rules	7.2
5.	Emission statement requirements	N/A
6.	New source review rules	7.4

1.4 Organization of Document

This document, along with the State Implementation Plan appendices, represents a complete attainment plan for the Puget Sound ozone nonattainment area, meeting all of the 1990 Clean Air Act Title I requirements for areas that violate the national ambient air quality standard. Reference is made to State Implementation Plan appendices. Generally, these appendices are referenced by several attainment plan, including plans for different pollutants (CO, ozone, particulation matter, etc.). Addenda, on the other hand, apply to a specific attainment plan. Appendices and addenda are listed separately in the Table of Contents.

Chapter 1.0 describes this nonattainment area and summarizes planning requirements. It also discusses the geographic extent of the problem area. Chapter 2.0 addresses the national ambient air quality standards for ozone, health impacts associated with nonattainment of standards, and inventories of the sources contributing to violations.

Chapters 3.0 through 6.0 describe control measures targeting transportation-related sources of precursors of ozone. Included in the appendices are new or updated regulations for an expanded and enhanced vehicle inspection and maintenance program and conformity requirements for transportation plans and projects.

Chapter 7.0 and accompanying appendices describe measures to control significant point and area sources of precursors of ozone.

Finally, Chapter 8.0 summarizes any elements of this attainment plan that are either incomplete at this time or in draft form subject to further refinement. Specific, date-certain commitments for completion of these outstanding plan elements are included in this section.

2.0 AIR QUALITY OVERVIEW

This chapter provides basic information on the health effects from excessive levels of ozone, the ozone monitoring network and a summary of monitored values and meteorology for the area. Finally, emission inventories are summarized for each nonattainment area in section 2.5.

2.1 Standards

In 1967, Congress passed the first Clean Air Act. The Act directs the U.S. Environmental Protection Agency (EPA) to address air quality problems throughout the nation. A major provision of the Act requires EPA to identify priority pollutants which, if unregulated, would cause adverse human health effects. The Act also specifies that EPA set and enforce a National Ambient Air Quality Standard (NAAQS) for each of these pollutants. The EPA has identified and set NAAQS for six priority pollutants: carbon monoxide, lead, nitrogen oxides, ozone, particulate matter, and sulfur dioxide.

The NAAQS established by EPA set numerical values at *threshold levels*. Threshold levels are the values below which no adverse effects will be experienced. Standards are set at two threshold levels: **primary standards**, which define the air quality required to prevent any adverse impact on human health; and **secondary standards**, which are set to prevent adverse effects on vegetation, property or other environmental considerations. With some pollutants, secondary standards are established at a lower level than primary standards. With other pollutants, primary and secondary standards are identical.

The standards also reflect the fact that people can tolerate brief exposures to higher levels of a pollutant while longer exposure to lower concentrations can lead to health impacts. To account for this, standards are set for different time periods. For ozone, the standard is set for a one-hour period.

The ozone standard is given in parts per million (ppm). The primary and secondary standards are identical, not to exceed 0.12 ppm one hour average. The NAAQS for ozone is violated when the expected number of exceedances is greater than 1.0 per year over any three consecutive years. The expected number of exceedances takes into account the likelihood that exceedances would have occurred on days when sampling data is missing (reference 40 CFR Part 50, Appendix H).

2.2 Health Effects of Pollutants

Scientists today are convinced that air pollution is a contributing factor to the three major types of diseases that cause sickness and death in our society--heart disease, lung disease, and cancer. Once in the air, pollutants can travel for many miles. In addition, unlike other forms of environmental pollution, people in impacted areas have no choice but to breath polluted air. Because of this, the impacts of air pollution are not necessarily limited to those people who live in cities or near the sources of pollution.

Ozone is a major harmful ingredient in smog. It is not emitted directly into the air but is produced in the atmosphere when gases or vapors of organic chemicals (hydrocarbons) combine with nitrogen oxide compounds in the presence of sunlight. The major ingredients of ozone are released from a variety of sources. Manmade sources include refineries, gas stations, motor vehicles, chemical plants, paints, and solvents. Harmful ozone in the lower atmosphere should not be confused with ozone in the upper atmosphere which protects us from ultraviolet radiation.

Ozone is primarily a respiratory irritant and can impair the lung's ability to function. Some of the symptoms caused by ozone exposure are headache, coughing, wheezing, chest discomfort, and difficulty in breathing. These symptoms may be more pronounced in individuals engaged in vigorous physical exercise.

Ozone levels currently monitored in most major metropolitan areas are unhealthy for the general population. Field studies show interference with normal functioning of the human lung in healthy persons can occur at ozone concentrations as low as 0.12 ppm (the standard) and pain and discomfort at concentration levels from 0.12 to greater than 0.20 ppm. Other studies show persistent lung function decrements in children resulting from an ozone episode of five days with a high one-hour concentration of 0.18 ppm.

Animal studies show that ozone also interferes with the functioning of many components of the immune systems, a phenomenon observed in several studies with ozone levels frequently encountered in the air. Also, an increased susceptibility to respiratory infection has been demonstrated in laboratory animals. However, there has been no conclusive evidence indicating that these effects occur in humans.

Asthmatics are more susceptible to the effects of ozone than normal individuals, and have been shown to experience increased asthmatic attacks from ozone exposure. Other groups of individuals who are at higher risk to the effects of ozone include those with conditions such as bronchitis, emphysema, and heart disease, as well as the elderly.

Eye irritation is a symptom that is associated with high ozone levels. However, this is due to other photochemical oxidants such as peroxyacetyl nitrate (PAN) and aldehydes. When ozone levels are high, the levels of these pollutants are usually high as well.

Evidence from scientific studies of vegetation indicates that ozone can reduce agricultural yields, impact forests, and cause damage to many human-made and natural materials. This is an especially important issue around Puget Sound since the highest ozone levels are found in and near commercial forests. In the 1970s, EPA initiated the National Crop Loss Assessment Network (NCLAN) to study the effects of pollutants on important crop species. Evidence from the NCLAN studies indicate that several major cash crops experience 10 percent or more losses in yield when the daytime ozone concentration exceeds 0.04 to 0.05 ppm during the growing season. Field studies demonstrate that ambient ozone in many regions of the country can reduce plant yield in specific crops by 20 to 33 percent. Potential costs due to crop losses are estimated at two billion to three billion dollars per year.

A large-scale study to determine the nature and extent of suspected ozone damage to forests was undertaken in the 1960s. The study confirmed that ozone caused damage to foliage, loss of leaves, decreased photosynthesis, and curtailed growth. The study was not able to determine the extent of this damage. However, many scientists think ozone is a major contributor to declines in forest growth.

2.3 Monitoring Sites and Design Value

Under the 1990 Amendments to the Federal Clean Air Act, the Governor of the State of Washington was required to submit a list by March 15, 1991 that designated all areas of the state as attainment, nonattainment or unclassifiable for national ambient air quality standards for ozone and carbon monoxide. The list submitted on behalf of the Governor by the Director of the Washington State Department of Ecology recommended the designation of King, Pierce and Snohomish counties as a new ozone nonattainment area based on Ecology and U.S. Environmental Protection Agency analysis of ozone monitoring data. This section discusses ozone monitoring sites in the Puget Sound nonattainment area, and the design value and classification of the area. The *design value* is an index to the degree of severity of nonattainment.

2.3.1 Monitoring Sites

Table 2.1 lists the ozone monitoring sites for Puget Sound and the period of record for each site.

In 1974, Ecology began a monitoring program to determine sites of maximal concentration for ozone. Ozone monitors were placed on concentric compass points around Seattle and initially moved outward 5 kilometers each year. The western segment was discontinued because of the lack of elevated concentrations on land west of Puget Sound. Since 1974 twenty-two monitoring sites have been used to establish the spatial representation of the ozone monitoring network.

TABLE 2.1

OZONE MONITORING SITES

DESIGNATION[1]/ STATE ID	MONITORING SITE/ LOCATION	PERIOD OF RECORD
NAMS 1700002A	Lake Sammamish State Park 20050 SE 56th Lake Sammamish	12/01/75-Present
SPM 1700007A	Weyerhaeuser Mill, Enumclaw WEYCO Mill - Main Office Building Enumclaw	08/12/85-Present
SLAMS 2700007A	Pack Forest Approximately 0.6 mile north of La Grande on Highway 7	05/30/85-Present

[1] NAMS, National Ambient Monitoring Station; SLAMS, State and Local Ambient Monitoring Station; SPM, Special Purpose Monitoring

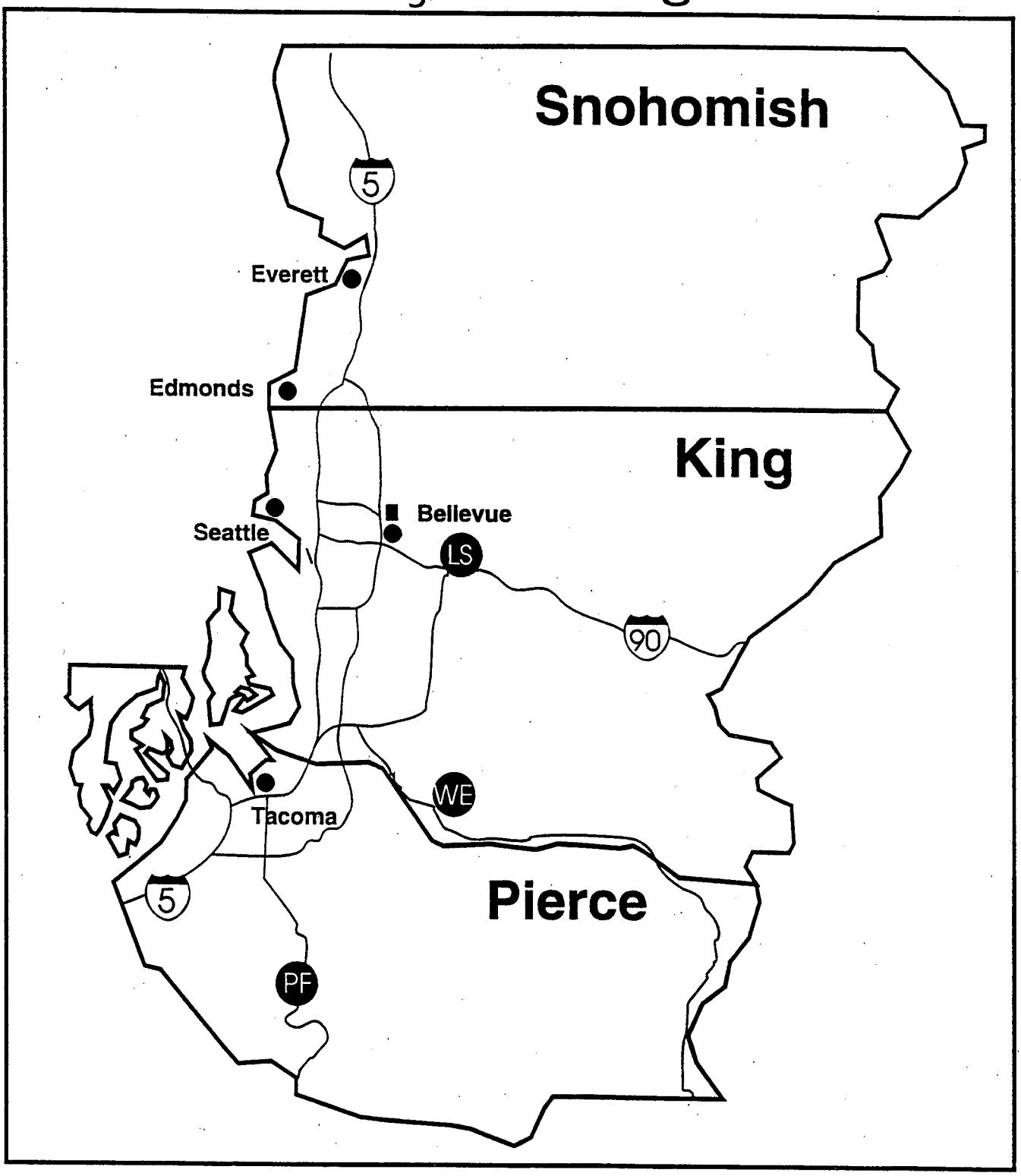
Using this methodology, three ozone monitoring sites have been identified as representative ozone monitoring sites for the Puget Sound area. These sites are: Lake Sammamish, east of Seattle; Enumclaw, east of Tacoma; and Pack Forest, south of Seattle and Tacoma (see map).

2.3.2 Design Value and Classification

Design values are calculated from monitoring data according to the methodology set forth in the June 18, 1990 memorandum from William G. Laxton (EPA, 1990). The memorandum states as follows:

> The form of the ozone NAAQS requires the use of a 3-year period to determine the average number of exceedances per year. Because of basic considerations associated with control strategy modeling, the following basic approach for ozone design values has been in use since 1981. If there are 3 complete years of ozone data, then the fourth highest daily maximum during the 3-year period is the design value for the site. If only 2 complete years of data are available, then the third highest is used and, if only one complete year is available, then the second highest is used. In this approach, a year of ozone data is considered complete if valid

King, Snohomish and Pierce County Ozone (O_3) Monitoring Sites



Monitoring Sites

- LS — Lake Sammamish
- PF — Pack Forest
- WE — Weyerhauser Enumclaw

daily maximums are available for at least 75 percent of the ozone season. Note that because of the form of the ozone NAAQS, data are combined over multiple years but they are not combined from different sites.

The primary years of data generally used by EPA for ozone classifications were 1987-89. Since 1990 ozone data became available before the March 15, 1991 state submission to EPA, the State of Washington elected to base the ozone designation and classification on 1988-90 data. Maximum concentrations for the years 1988-90 and associated site design values are shown in Table 2.2. As noted above, the determination of design value depends on the number of years of valid data (percent valid data of at least 75 percent).

TABLE 2.2

1988-90 MONITORING SITE DESIGN VALUES

MONITORING SITE DESIGNATION[1] & STATE ID	YEAR	DESIGN VALUE MAXIMA 1ST	2ND	3RD	4TH	PER-CENT VALID
Lake Sammamish State Park	1988	0.140	0.110	0.100	0.080	96%
Lake Sammamish	1989	0.090	0.080	0.070	0.070	90%
NAMS 1700002A	1990	0.126	0.123	0.108	0.096	91%
Weyerhaeuser Mill,	1988	0.110	0.080	0.060	0.060	**<75%**
Enumclaw	1989	0.100	0.090	0.090	0.070	**<75%**
SPM 1700007A	1990	0.149	0.131	0.126	0.118	76%
Pack Forest	1988	0.110	0.110	0.100	0.100	**<75%**
SLAMS 2700007A	1989	0.103	0.093	0.084	0.082	79%
	1990	0.130	0.127	0.107	0.105	**<75%**

[1] NAMS, National Ambient Monitoring Station; SLAMS, State and Local Ambient Monitoring Station; SPM, Special Purpose Monitoring

Design values at two sites exceed the ozone standard of 0.12 ppm. The sites and design values are as follows:

- Weyerhaeuser Mill, Enumclaw 0.131
- Pack Forest 0.127

The highest of the site design values is the design value for the Weyerhaeuser Mill in Enumclaw. So, 0.131 becomes the design value for the Puget Sound ozone nonattainment area. Under the Section 181(a) of the Federal Clean Air Act, a nonattainment area with a design value of 0.131 is classified as marginal. Classification as marginal triggers a set of control requirements designed to bring the area into attainment by November 15, 1993. EPA formally designated King, Pierce and Snohomish counties as a marginal ozone nonattainment area on November 6, 1991 (FR 56694) with an effective date of January 6, 1992.

2.3.3 1991 Monitoring Data

Since the classification of the Puget Sound ozone nonattainment area was determined in early 1991, an additional year of data has become available. The maxima for the years 1989-91 are presented in Table 2.3 along with recalculation of the design value for this new three-year period. Monitoring site design values of 0.124 and below indicate attainment of the standard (because of rounding).

TABLE 2.3

1989-91 MONITORING SITE DESIGN VALUES

MONITORING SITE DESIGNATION[1] & STATE ID	YEAR	DESIGN VALUE MAXIMA 1ST	2ND	3RD	4TH	PER-CENT VALID
Lake Sammamish State Park Lake Sammamish NAMS 1700002A	1989 1990 1991	0.090 0.126 0.109	0.080 0.123 0.100	0.070 0.108 0.091	0.070 0.096 0.086	90% 91% 96%
Weyerhaeuser Mill, Enumclaw SPM 1700007A	1989 1990 1991	0.100 0.149 0.112	0.090 0.131 0.109	0.090 0.126 0.105	0.070 0.118 0.099	<75% 76% 99%
Pack Forest SLAMS 2700007A	1989 1990 1991	0.103 0.130 0.099	0.093 0.127 0.094	0.084 0.107 0.093	0.082 0.105 0.090	79% <75% 97%

[1] NAMS, National Ambient Monitoring Station; SLAMS, State and Local Ambient Monitoring Station; SPM, Special Purpose Monitoring

In contrast to the previous three-year period of 1988-90, design values at only one site exceed the ozone standard of 0.12 ppm. The site and design value are as follows:

- Weyerhaeuser Mill, Enumclaw 0.126

The Weyerhaeuser Mill in Enumclaw had the highest design value in both three-year periods. The design value for this monitoring site is thus the design value for the nonattainment area. Reducing the design value from 0.131 based on 1988-90 to 0.126 based on 1989-91 would not affect the classification of Puget Sound as marginal.

2.4 Emission Inventories

This section presents and discusses inventories of the sources of emissions of precursors of ozone for the Puget Sound nonattainment area. Section 182(a)(1) of the Federal Clean Air Act requires the State to submit a comprehensive, accurate, current inventory of actual emissions for each marginal ozone nonattainment area by November 16, 1992, as part of the state implementation plan. Congress gave EPA the responsibility for developing guidance for inventory preparation and submission.

The U.S. Environmental Protection Agency requires an emission inventory for base-year 1990 that is based on conditions that existed during the typical ozone weekday during 1990. *Typical ozone season weekday* refers to activities that occur during summer weekdays, averaged on a daily basis. The base-year inventory includes emissions of volatile organic compounds (VOC), nitrogen oxides (NO_x), and carbon monoxide (CO) from point, area, non-road mobile, and on-road mobile (or simply, mobile) sources. The ozone inventory includes CO because both CO and NO_x are combustion products and controls reducing emissions of one may lead to increased emissions of the other. CO concentrations in an ozone inventory may differ from those in a CO inventory due to differences in sources and temperatures between the summer ozone season and the winter peak CO season.

Point sources are stationary sources emitting NOx, VOC, or CO at or above a cutoff level. For the SIP inventories, the cutoff levels for Puget Sound were 25 tons per year for CO and NO_x and 10 tons per year for VOC. Area sources include emissions from stationary sources that are too small to be included in the point source inventory. Area sources include such diverse sources as residential space heating, outdoor burning, and small industrial facilities. The VOC area source inventory includes biogenic emissions from vegetation. Non-road mobile sources include sources such as aircraft, ships, locomotives, lawn and garden equipment, construction equipment, and farm equipment. On-road mobile sources include cars, trucks, buses, and motorcycles.

TABLE 2.4

TYPICAL O_3 SEASON WEEKDAY EMISSIONS IN THE PUGET SOUND O_3 NONATTAINMENT AREA

Category	Weekday Emissions (lb/day) VOC	NO_x	CO
Point Sources	67,000 (3%)	45,000 (6%)	176,000 (4%)
Area Sources			
Biogenic[2]	948,000 (44%)	---	---
Non-biogenic	394,000 (18%)	31,000 (4%)	398,000 (8%)
VOC Subtotal	1,342,000 (63%)		
Non-Road Mobile Sources	209,000 (10%)	255,000 (32%)	948,000 (19%)
Mobile Sources	515,000 (24%)	467,000 (59%)	3,470,000 (70%)
TOTAL	2,133,000	798,000	4,992,000

[2] Biogenic emissions apply only to the area source inventory for volatile organic compounds.

The U.S. Environmental Protection Agency emission inventory guidance (for example, EPA, February 1991) provides additional administrative and submittal requirements. Each state is to have an approved inventory preparation plan, to submit draft base-year 1990 inventories for EPA review by May 1, 1992, and to submit final base year 1990 emission inventories to EPA by November 16, 1992.

The Washington State Department of Ecology received approval of its inventory preparation plan on October 1, 1991. Completion of inventories and inventory documentation took longer than expected due to the scope and complexity of the requirements of EPA guidance.

The Puget Sound Air Pollution Control Agency (PSAPCA) prepared point and area source inventories. The non-road mobile source inventory included with PSAPCA's emission inventories is based upon an early version of EPA's 1992 Seattle study. The Seattle study is a component of a larger project in which EPA developed revised methodology to calculate non-road mobile source inventories for ozone nonattainment areas throughout the United States. The Washington State Department of Ecology prepared the mobile source inventory. The Puget Sound Regional Council developed vehicle miles traveled (VMT) data for the mobile source inventory.

Ecology used required EPA methodology for mobile source inventories to determine that the typical ozone season runs from July through September. As allowed by EPA guidance, PSAPCA used the summer reporting period from June through August for point, area, and non-road mobile source inventories. Typical ozone season weekday emissions for base-year 1990 are summarized in Table 2.4.

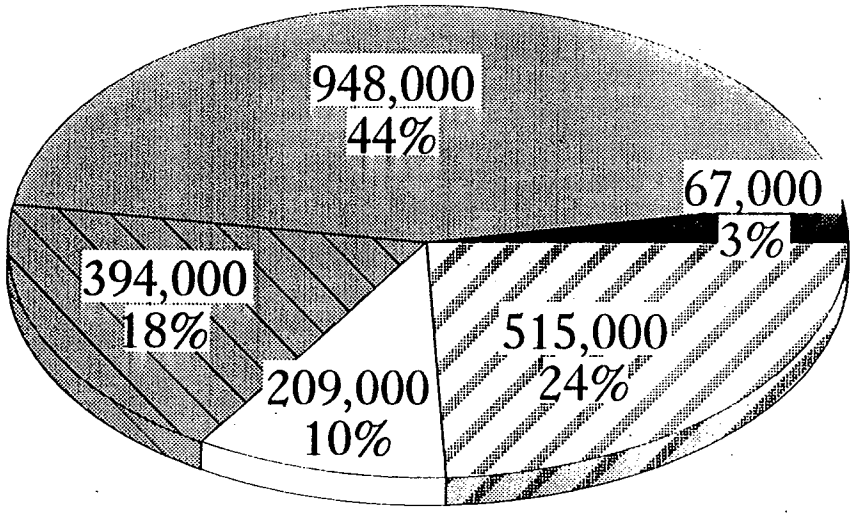
Mobile sources accounted for the majority of base-year 1990 NO_x and CO emissions. Together, mobile sources and non-road mobile sources were responsible for about 90 percent of emissions for both pollutants.

Mobile sources and area sources accounted for almost 90 percent of VOC emissions. The majority of VOC emissions however were area source emissions. The majority of area source emissions (71 percent) were biogenic emissions from vegetation. Miscellaneous organic solvents were responsible for 72 percent of the non-biogenic area source emissions. Mobile sources accounted for 25 percent of total VOC emissions (see Figure 2.1 for VOC and NO_x emissions).

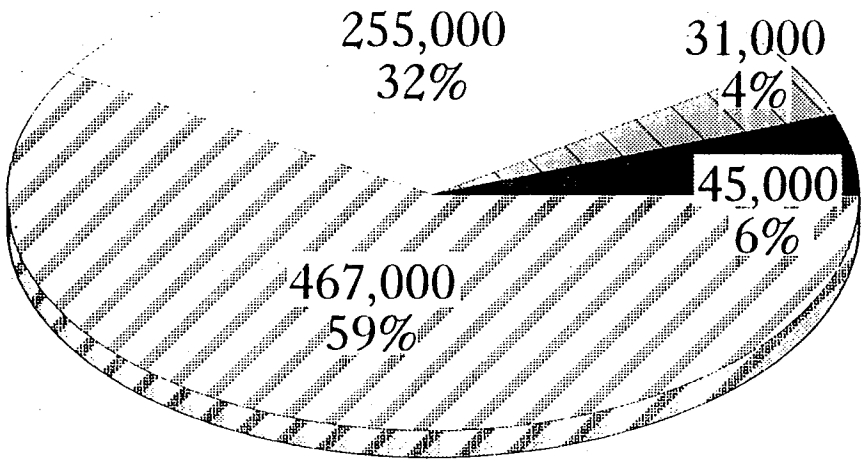
See Addendum A, Emission Inventories for detailed summaries of the 1990 emission inventory. These summaries were submitted to EPA on November 16, 1992.

Puget Sound Ozone (O_3) Area

Weekday Emissions (lb/day)



Volatile Organic Compounds (VOC)



Nitrogen Oxides (NO_X)

- Non-Road Mobile Sources
- Point Sources
- Area Sources (Biogenic)
- Area Sources (Non-biogenic)
- On-Road Mobile Sources

REFERENCES

U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Memorandum, *Ozone and Carbon Monoxide Design Value Calculations*, from William G. Laxton, Director, Technical Support Division, Research Triangle Park, NC (June 18, 1990).

U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guidance for Initiating Ozone/CO SIP Emission Inventories Pursuant to the 1990 Clean Air Act Amendments*, Research Triangle Park, NC (February 1991).

3.0 TRANSPORTATION PLANNING

3.1 SIP Requirements

In both carbon monoxide (CO) and ozone (O_3) nonattainment areas, highway vehicles are significant contributors of the emissions resulting in exceedances of national ambient air quality standards. The goal of transportation-air quality planning is to address the issue of increasing mobile source emissions due to population growth by (1) identifying transportation-related actions that will improve air quality and (2) establishing processes for determining transportation improvements in order to gain optimum air quality benefits and help attain and maintain national ambient air quality standards.

The 1990 Federal Clean Air Act Amendments recognized the importance of highway mobile sources by requiring specific amendments to state implementation plans (SIPs) for CO and O_3 nonattainment areas. These specific provisions include vehicle inspection and maintenance and conformity requirements for ozone nonattainment areas.

But transportation has an even larger role in the Federal Clean Air Act. It is related to basic SIP requirements such as an inventory of the sources of emissions causing nonattainment and the control strategy used to demonstrate attainment of the standard. It is also related to more comprehensive requirements. These include the requirement of Section 174 of the Act that planning processes be developed to involve state, regional, and local agencies in the development and implementation of attainment plans. Another such requirement is the requirement under Section 176(c) for transportation projects to conform to the SIP.

In order to comply with the requirements of the Federal Clean Air Act, this and the following three chapters constitute the transportation element of this attainment plan. This element is composed of three parts:

- a description of the transportation air quality planning process required by Section 174 (section 3.2);
- transportation control measures (chapter 4.0);
- control strategies related to transportation, including vehicle inspection and maintenance (section 5.1) and transportation conformity (5.2);

3.2 Planning Process

Section 174 of the Federal Clean Air Act requires coordination between the state and regional and local governments in developing and implementing elements of attainment

plans for CO and O_3 nonattainment areas. States are required to review and revise existing planning procedures before the statutory deadline for plan submittal of November 15, 1992. States are given the option of continuing with the existing agency responsible for plan development or designating a new agency comprised of representatives from:

- the State air quality planning agency;
- the State transportation planning agency;
- the metropolitan planning organization (MPO) designated to conduct the cooperative, comprehensive, and continuing transportation planning process for the area under Section 134 of Title 23, United States Code;
- an organization responsible for air quality maintenance and planning process; and
- any other organization that may have SIP submittal or implementation responsibilities.

The Governor has delegated the authority to submit SIPs to EPA on behalf of the Governor to the Director of the Washington State Department of Ecology. Ecology recognizes the need to play the central coordinating role in the continuing development and updating of the SIPs. At the same time, Ecology recognizes the need for local involvement if control strategies in SIPs are to be effective as well as the need to utilize the expertise of local, regional, and state agencies in the SIP development process.

Ecology held a series of meetings and discussions with local, regional, and state agencies in the nonattainment areas. It was generally agreed that the metropolitan planning organizations (MPOs) for each nonattainment area would provide forums for a collaborative process focused on the development of the transportation element. These MPOs are the Puget Sound Regional Council (PSRC), the Spokane Regional Council (SRC), and the Southwest Washington Regional Transportation Council (SWRTC). All serve as coordinating bodies for local governments in an urban area. All are generally responsible for conducting a continuing, coordinated, and comprehensive regional transportation planning process.

Puget Sound Regional Council has organized a transportation element development forum for the Puget Sound area. The forum has brought together state and local authorities to address a range of policy, technical, and implementation issues related to a SIP submittal. The process initiated by PSRC has resulted in transportation planning procedures that are supported by all levels of government and will lead to continued cooperation in the development of attainment plan strategies (see State Implementation Plan Appendix E, Regional Transportation Planning Processes).

Section 3.2.1 below discusses the roles of different levels of government involved in the transportation element. The significance of the regional transportation improvement program for funding highway and transit projects, and the importance of TIP conformity reviews are addressed in section 3.2.2.

3.2.1 Participants and Responsibilities

Many participants on the regional, state, and federal levels are involved (directly and indirectly) in the development of the transportation element. A general description of the roles and responsibilities of these agencies follows.

A. Regional Organizations

1. Metropolitan Planning Organizations

MPOs acting in concert with appropriate local agencies have developed and are expected to continue to develop most transportation strategies designed to affect vehicle use. Many important decisions are made at this level, e.g., the inclusion of transportation projects in the regional transportation improvement plan (TIP). Metropolitan Planning Organizations will also have significant roles in the selection of projects eligible for federal Intermodal Surface Transportation Efficiency Act (ISTEA) funding.

In the Puget Sound ozone nonattainment area, PSRC is coordinating the development of the regional transportation element of the plan. This responsibility includes the development of processes and procedures to involve local elected officials and the public. PSRC has also provided the data necessary for mobile source emission inventory development.

2. Local Air Authorities

The local air authorities (in this area, PSAPCA) work in conjunction with the MPOs and Ecology in the coordination of the planning processes and as technical support, especially in development of the point and area source portions of the attainment plan. The local air authorities also are directly involved with the transportation technical working groups that were formed by the MPOs for the transportation element development.

B. State Agencies

1. Washington State Department of Ecology

The Department of Ecology's Air Quality Program is the State's air pollution control agency. Ecology is responsible for overall SIP development and for SIP submittal to EPA Region X. It is also responsible for state programs for nonattainment areas such as

conformity, and vehicle emission inspection and maintenance. Ecology participates in the transportation element forums developed by the MPOs. As the State air quality control agency, Ecology was responsible for the development of policies and criteria relating to air quality planning for the CO/O_3 nonattainment areas in Washington State.

2. The Washington State Department of Transportation

The Washington State Department of Transportation (WSDOT) works closely with Ecology and PSRC in helping to develop planning processes and was a co-author of the transportation conformity rule. Washington State Department of Transportation was also active in coordinating efforts statewide to meet transportation requirements of the 1990 Clean Air Act Amendments. The Washington State Department of Transportation is directly involved in supportive air quality programs and projects such as high occupancy vehicle (HOV) lanes and park and ride facilities across the State.

C. Federal Agencies

1. U.S. Environmental Protection Agency

The U.S. Environmental Protection Agency is responsible for administering the Federal Clean Air Act, including producing regulations, guidance, and technical documents for SIP development. In addition, EPA is responsible for providing technical assistance for transportation-related air quality planning and implementation of plans.

2. The Federal Highway Administration

The Federal Highway Administration (FHWA) is responsible for federal transportation certification documents important for funding state and local transportation projects. The FHWA is also the primary authority in establishing conformity determinations for regional TIPs.

3.2.2 Significance of the TIP Process and Conformity Review

A transportation improvement program (TIP) is a local or regional government's action plan for transportation projects for its road, highway, and public transportation systems normally for a six-year period. The TIP is a programming mechanism that documents the anticipated timing, costs, and resource allocations of the sponsoring agency. Through the TIP, metropolitan planning organizations (MPOs) have had a direct influence on regional prioritization and funding of projects.

The passage of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), a federal act which addresses transportation in a comprehensive manner, has strengthened and enhanced the role of MPOs in the TIP process. Metropolitan Planning

Organizations have a significant role in determining those projects eligible for ISTEA funding, including congestion mitigation and air quality improvement program funds, which are directed toward transportation programs in nonattainment areas.

Ultimately, the projects comprising the regional TIP must pass the review of the MPOs. Generally speaking, project selection for the TIP is more important in nonattainment areas because of the possibility of air quality impacts. The TIP must pass a conformity review to determine that TIP projects must not degrade the air quality of a region or delay timely attainment of national ambient air quality standards. All TIPs are finally subject to Federal Highway Administration approval for conformity.

In Washington State, the regional TIP conformity review is crucial because the conformity analysis will focus on regionally significant projects. PSRC has prepared a detailed summary of its TIP development and adoption process (see State Implementation Plan Appendix E, Regional Transportation Planning Processes).

REFERENCES

U.S. Environmental Protection Agency, *1992 Transportation & Air Quality Planning Guidelines*, Office of Mobile Sources, Ann Arbor, MI (July 1992).

4.0 TRANSPORTATION CONTROL MEASURES

The U.S. Environmental Protection Agency (EPA) considers the list of transportation control measures found in Section 108(f)(1)(A) to be reasonably available control measures (RACM) for transportation. At this time neither Ecology nor PSRC is committing to new transportation RACM.

The Puget Sound Regional Council has prepared a summary of RACMs implemented between 1990 and the present. The summary is presented in Table 4.1. These RACM are not included in the base-year 1990 emission inventory and thus are available as potential control measures for attaining national ambient air quality standards. While the summaries are only informational, these and additional RACM may be used as control strategies should future air quality monitoring indicate that they are needed for attainment.

TABLE 4.1

CENTRAL PUGET SOUND STATE IMPLEMENTATION PLAN TRANSPORTATION CONTROL MEASURES IMPLEMENTED OR PROGRAMMED FOR IMPLEMENTATION BETWEEN 1990 AND 1992

TCM	JURISDICTION(S)/ AGENCY(IES) RESPONSIBLE	COMMENTS/ ("AIR QUALITY CONFORMITY ASSESSMENT" (TIP APPENDIX H), TCM REFERENCE #)
TCMs IMPLEMENTED BETWEEN 1990 AND 1992		
Northgate transit center, P&R lot.	WSDOT District 1, Metro	Completed in 1991. (32, 135, 136, 137)
Increase transit level of service at Northgate.	WSDOT District 1, Metro, Seattle	Completed in 1991. (32, 135, 136, 137)
Increase express service at Northgate.	WSDOT District 1, Metro, Seattle	Completed in 1991. (32, 135, 136, 137)
Freeway station (flyer stop), I-5 at NE 45th St.	WSDOT District 1	Located east of I-5 and North of NE 45th Street at 7th Avenue NE. (64)
Expansion of Purdy P&R lot from 65 to 200 stalls.	WSDOT District 3	Project revised from "P&R lot north of Tacoma Narrows Bridge." (95)
Seattle CBD transit tunnel ("Downtown Seattle Transit Project").	WSDOT District 1, Metro, Seattle	Included surface and transit-service improvements. Completed in 1990. (129, 157)
Require new accessory parking facilities to reserve carpool/vanpool spaces at Northgate.	Seattle	Built at the same time as Northgate Transit Center & P&R lot. (193)
TCMs SCHEDULED FOR IMPLEMENTATION IN 1992		
Reduce diesel buses in Seattle CBD.	Metro, Seattle	Purchase of dual-powered buses. (127, 155)
Improve bike access to other modes in Bellevue.	Metro	(145)
Expand P&R lots Metro-systemwide.	Metro, Seattle	(148, 151)

5.0 CONTROL STRATEGIES RELATED TO TRANSPORTATION

In most areas, the primary source of carbon monoxide (CO) and ozone (O_3) pollution is transportation-related. Two solutions to transportation-related pollution are; first, to reduce the amount of motor vehicle travel and second, to reduce the pollution from the fleet of vehicles operating within the nonattainment area. This chapter summarizes the new vehicle air pollution control programs, required as part of this attainment plan supplement to the State Implementation Plan, to be implemented within the Puget Sound ozone nonattainment area: expanded and enhanced vehicle inspection and maintenance, and transportation conformity requirements. The regulations implementing these programs may be found in State Implementation Plan Appendix B, State Regulations. Coupled with the federal new car performance standards, significant improvements in motor vehicle emissions are anticipated.

5.1 Vehicle Emission Inspection and Maintenance Program

The basic purpose of a vehicle emission inspection and maintenance program is to first identify, and then require, emission-related repairs to the worst-polluting vehicles operating in the nonattainment area. The following represents a summary of the current status of Washington's vehicle inspection and maintenance program. The recently adopted regulation is found in State Implementation Plan Appendix B, State Regulations.

The amendments to the Motor Vehicle Emission Inspection Regulation (Chapter 173-422 WAC) received extensive public review through the Washington State Department of Ecology's rule development process. After preparation of a Responsiveness Summary submitted as a supplement to the State Implementation Plan Appendix F, Responsiveness Summaries, Ecology adopted the amendments on October 26, 1992.

The purpose of the rule is to improve air quality in areas that exceed federal air quality standards due to motor vehicles. The amendments were needed to comply with current state and federal law. The proposed revision satisfies many, but not all, federal requirements. Additional amendments to the state regulation will be necessary. The U.S. Environmental Protection Agency (EPA) adopted the regulation on the operation of motor vehicle emission inspection programs on November 5, 1992.

The Federal Clean Air Act requires areas exceeding national air quality standards for motor vehicle related air pollutants to have a motor vehicle emission inspection program. Washington's two ozone nonattainment areas also violate CO standards.

To encourage proper emission related maintenance of motor vehicles, the motor vehicle emission inspection program was started in the Seattle area in 1982 and expanded to

Spokane in 1985. New federal and state laws dictated expansion and enhancement of the inspection program.

The amendments to the State's rule reflected the following new federal and state requirements:

Federal requirements

The Clean Air Amendments of 1990 require motor vehicle emission inspection programs to:

- Have computerized emission testing.
- Allow waivers for vehicles only when over $450 has been spent on emission-related repairs, not covered by warranty, in addition to the cost of replacing missing or tampered emission control equipment.
- Inspect the vehicle emission control diagnostic system and require the repair of any problems identified by the diagnostic system.
- Enforce vehicle owner compliance through the registration only of complying vehicles and on-road testing of vehicles.
- Achieve an emission reduction to be set by the Environmental Protection Agency. This reduction is to equal what will be achieved by an inspection program combining emission testing plus an inspection to detect tampering with emission control equipment, with on-road testing.
- Operate in compliance with guidance from the Environmental Protection Agency. This guidance will include requirements to:

  Require proof that vehicles subject to an emission recall notice have been repaired.

  Conduct reinspection only with proof of repairs after the initial inspection failure.

  Deny registration to vehicles with tampered emission control equipment.

State requirements

Chapter 70.120 RCW, Motor Vehicle Emission Control, directs the Department of Ecology to adopt rules for the administration of the motor vehicle emission inspection program.

The Clean Air Washington Act of 1991, House Bill 1028, directs that:

- Repair expenditures, required by the vehicle owner for a 1980 or earlier model vehicle to be waived, increases to $100 from the current $50. [RCW 70.120.070(1)(b)]

- When required by the Environmental Protection Agency, all vehicles will be required to expend at least $450 before being waived. [RCW 70.120.070(1)(b)]

- Annual inspections of vehicles will occur only when necessary to meet Environmental Protection Agency requirements. [RCW 70.120.170(1)] The current regulation requires bi-annual inspections.

- Ecology will include emission control equipment checks in the inspection. [RCW 70.120.150(1)]

- A smoke opacity inspection of diesel vehicles will be established. [RCW 70.120.170(2)(a)]

- An emission inspection will occur before the registered owner of a licensed vehicle changes. [RCW 46.16.015(1) and RCW 70.120.170(1)]

- Authorization to self-inspect vehicles may be granted to an operator of one or more diesel heavy duty trucks and to an operator of fifteen or more vehicles recognized as a fleet by the Department of Licensing. The fee for the fleet and diesel inspection program is to offset Ecology's cost to administer the self-inspection program. [RCW 70.120.080]

- Vehicles fueled by propane, liquid petroleum gas, or natural gas are exempt from the inspection requirements. [RCW 46.16.015 (2) (d)]

States must comply with specific Federal Clean Air Act requirements, adopt an EPA model program or equivalent, and comply with many detailed EPA program and reporting requirements. A specific federal requirements that may be a problem for Washington State is on-road testing. The differences in design between the EPA model program and Washington's program are as follows:

EPA Program	Washington State Program
Annual Tests	Biennial Tests
Light Duty Gasoline Vehicles (LDGV)	All Gasoline Vehicles
Tampering Checks for 84 and Newer	Tampering Checks for 81 and Newer
Pre-81 Stringency, 20%	Pre-81 Stringency, 28%
Waiver Rate, 1% of Failed Vehicles	Waiver Rate, 15% of Failed Vehicles
Compliance rate, 98%	Compliance Rate, 90%
Emission Tests:	Emission Tests:
Transient, 86 and Newer	Loaded Steady-State LDGV
Two-speed, 81-85	Two-speed, Heavy Duty Gas Vehicles
Idle, 68-80	Opacity Check, Diesels
Compliance with Recalls	None
On-Road Testing	None

The Environmental Protection Agency has acknowledged that no existing state motor vehicle emission inspection program is acceptable. Major changes in the motor vehicle emission inspection program design and operation may be needed to conform with EPA rules. The extent of these changes cannot be fully determined until the State has evaluated the equivalency of its program through the use of the EPA MOBILE5.0 vehicle emission model and emission inventory projections. The State of Washington is proceeding with implementation of its program to meet state implementation plan (SIP) requirements for vehicle inspection and maintenance programs in carbon monoxide and ozone nonattainment areas. The State of Washington commits to making appropriate revisions to comply with 40 CFR 51 promulgated on November 5, 1992.

State adoption of the vehicle inspection and maintenance rule on October 26, 1992, resulted in the following:

Effective January 1, 1993

- The expenditure on repairs required, before a 1980 or earlier model vehicle can be waived from meeting the emission standards, increases from $50 to $100.

- An emission inspection is required before changing the registered owner of a licensed vehicle.

- The inspection report is valid for license renewal or changing the registered owner for six months rather than the present ninety days.

- The penalty for a person residing in an inspection area who registers their vehicle outside the inspection area increases to $250 from the current $100.

- Vehicles fueled by propane,liquid petroleum gas, or natural gas are exempt from the inspection requirements.

Effective June 1, 1993

- The present Seattle and Spokane vehicle inspection areas are expanded and a new Clark County inspection area established. In the Puget Sound area, the expansion includes the entire urban area of King and Snohomish counties and for the first time, the urban area of Pierce county .

- A smoke check is conducted on all diesel vehicles except those partially registered in another state. Currently diesel vehicles are exempt.

- Passenger cars and light duty trucks have emissions tested on a dynamometer. Testing the vehicle with a load on the engine helps obtain more consistent and realistic emission readings. Vehicles not given a loaded test on the dynamometer (that is, heavy duty trucks and constant four wheel drive vehicles) are given a second-chance test if they fail the emission test.

- The inspection of 1994 and later model vehicles includes an inquiry of the vehicle emission control diagnostic system. The repair of any identified problems is required.

Effective June 1, 1995

- 1981 and newer model vehicles will fail the emission inspection if the primary emission control components are missing or inoperative.

Washington's vehicle emission inspection and maintenance program is administered by the Washington State Department of Ecology. Ecology's primary function is to assist the public with information and help ensure proper repairs are made of vehicles that fail the inspection. Emission testing is done by a contractor. The enforcement of the inspection requirement is done through a denial of registration for non-compliance vehicles. Ecology audits the inspection contractor's performance.

The program is statutorily revenue neutral. The fees paid by vehicle owners compensate the inspection contractor and recover the program appropriation from the state general fund. The appropriation, including indirect, for the 91-93 biennium is $5.9 million. Enhancement and expansion of the program will require an additional $1.9 million. A budget request is being submitted for the 93-95 biennium.

In conclusion, amendments to the current vehicle inspection and maintenance rule were needed to comply with state and federal requirements. The State of Washington is submitting the proposed revision to comply with federal implementation plan requirements for carbon monoxide and ozone attainment plans. The proposed revision satisfies many, but not all, of the federal requirements. The State of Washington commits to making appropriate revisions to comply with 40 CFR 51 promulgated on November 5, 1992.

The revised regulation (173-422 WAC, October 26, 1992), has been submitted as an amendment to the State Implementation Plan, Appendix B, State Regulations, on November 16, 1992. The Responsiveness Summary for the regulation is included in State Implementation Plan Appendix F, Responsiveness Summaries.

5.2 Transportation Conformity

This section describes the federal and state conformity requirements. The State's draft regulation "Conformity of Transportation Activities to Air Quality Implementation Plans" (Chapter 173-420 WAC) is included in State Implementation Plan Appendix B, State Regulations along with the Responsiveness Summary for the regulation, which will be included in State Implementation Plan Appendix F, Responsiveness Summaries. Public hearings were held on the draft rule during November, 1992 and adoption is scheduled for January, 1993. Upon adoption, the final rule will be submitted as a SIP amendment.

The Conformity Requirement

Conformity is the federal and state requirement that transportation activities conform to the purpose and intent of the SIP (Section 176(c) of the Federal Clean Air Act and RCW 70.94.037, respectively). Conformity focuses upon the transportation system and the transportation activities which contribute to the air pollution problem. The purpose of conformity is to ensure that transportation activities improve, or at least do not worsen, air quality.

Conformity has been a federal requirement since the early 1970's. As a result of the enactment of the Clean Air Washington Act in 1991, it is also a state requirement. Conformity with the Federal and State Clean Air Acts means "that transportation plans, programs, and projects conform to the SIP's purpose of achieving and maintaining the national ambient air quality standards."

The key conformity requirements are that transportation activities:

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

The Washington Clean Air Act generally mirrors the federal Act in its conformity requirements. The specific state requirements are contained in the state's draft conformity regulation, Chapter 173-420 WAC. Additional guidance and criteria may be required after the U.S. Environmental Protection Agency (EPA) and U.S. Department of Transportation (USDOT) finally adopt conformity regulations. To date, EPA and USDOT have issued only interim conformity guidelines. The State will make a commitment for necessary revisions to its conformity rule and a schedule for rulemaking after having had a reasonable period to review adopted federal conformity regulations.

Transportation activities within, or that affect, nonattainment areas are subject to conformity. Transportation activities include plans, programs, and projects. This means the state transportation policy plan, the regional transportation plan, the transportation element of local comprehensive plans, and transit management plans must comply with the conformity rule. The state transportation improvement program, regional transportation improvement programs (TIPs), city six-year street programs, county six-year road programs and public transit six-year transit development and financial programs must also comply with the rule. State, regional, and local projects must comply with the rule. " Project" is defined broadly enough to cover expenditure of funds on transportation facilities and operational changes to transportation systems, such as high

occupancy vehicle (HOV) lanes and to include privately funded projects. Transportation control measures (TCMs) included in the SIP are also subject to conformity. Figure 5.1 illustrates these transportation activities within nonattainment areas that are affected by the conformity requirement.

Conformity Process and Analysis

The proposed conformity rule (Chapter 173-420 WAC) uses the existing requirements of the Clean Air Act, the new federal Intermodal Surface Transportation Efficiency Act (ISTEA), the State Growth Management Act (GMA), and the State and National Environmental Policy Acts (SEPA and NEPA) to establish a conformity process. The proposed rule uses the SIP and the federal requirements to establish the methodology, analysis, and content that are used to determine conformity.

The conformity process is designed to occur simultaneously with the coordination processes required under ISTEA, GMA, and SEPA and NEPA. These acts require coordination among local, regional, and state levels of government, among adjacent jurisdictions, among agencies addressing transportation issues and among agencies with expertise and permit responsibility for transportation or air quality. Figure 5.2 illustrates the coordination and relationships among the plans, programs, and projects.

In this process, conformity analysis occurs primarily at the regional level, although there is also project level analysis. This is not only consistent with the historical approach, but with current practice and with the regional emphasis in ISTEA. The municipal planning organizations (MPOs), which have regional responsibilities for coordinating transportation planning in urbanized areas, also have performed the air quality analysis used to determine conformity and thus are best situated to undertake the responsibilities of an improved and strengthened conformity effort. In the areas subject to conformity the MPOs are also the regional transportation planning organizations under the State Growth Management Act. The regional focus is also consistent with the regional nature of the air pollution problem. The MPO in the Puget Sound region is the Puget Sound Regional Council.

Plan Process

When cities, counties, MPOs, and the State are developing plans, they should include discussion of air quality issues and initiatives, such as goals, principles, and projects that they coordinate on and on which they are required to be consistent under the GMA. For the purposes of conformity, the coordination and consistency is most important with the regional transportation plan of the MPO. If the coordination and consistency with the regional plan can be demonstrated, the local government can reasonably rely upon the conformity determination of the regional plan to satisfy conformity requirements.

The following are key questions to address during the planning process:

- Does the local comprehensive plan or transportation plan address air quality? Are there goals and policies or standards that address air quality?
- Is the local comprehensive plan or transportation plan consistent with the regional transportation plan of the MPO?
- Are specific SIP TCMs proposed for implementation in the jurisdiction specifically identified in the plan?

Program Process

When cities, counties, MPOs, and the State are developing six-year street and road programs, regional transportation improvement programs (TIPs), and the State TIP; they should identify TCMs and other regionally significant projects for inclusion in the MPO TIP. The MPO conducts the conformity analysis on its TIP. If coordination and consistency with the regional TIP can be demonstrated then the local government can reasonably rely upon the conformity determination of the TIP for their conformity.

The following are key questions to address during the program process:

- Are specific SIP TCMs proposed for implementation in the jurisdiction specifically identified in the transportation improvement program?
- Have the regionally significant projects on the state and local TIPs been submitted to the MPO for inclusion in their TIP?
- Has the regional TIP of the MPO been determined to conform to the SIP?
- Is the jurisdiction's TIP consistent with the regional TIP?

Project Process

When cities, counties, and the State are developing projects, the conformity determination will be the responsibility of each jurisdiction. The conformity process is designed to occur as part of the existing SEPA and NEPA procedures. However only projects on the regional transportation system will undergo specific conformity analysis. Strictly local projects are deemed to conform if the TIP and comprehensive plan from which they come have been found to conform. Figure 5.3 illustrates how individual projects are processed under conformity. Projects of regional significance must be included in the regional plan and TIP; whereas, the strictly local residential street project need not be. Projects using federal funding must be placed on the regional TIP regardless of their regional significance.

The following are key questions to address during the project process:

- Is the project on the regional transportation system (regionally significant)?
- Is the project identified in the jurisdiction's comprehensive plan or transportation plan? Does the plan conform?
- Is the project identified in the jurisdiction's TIP? Is it an exempt project? Is it a TCM? Is it a general project? Does the TIP conform?
- Has the air quality analysis been performed and does the design of the project conform?
- Is the construction design of the project unchanged from the conforming design?
- Does the final environmental document contain a conformity statement?

One reason for the local responsibility for conformity analysis at the project level is because project level conformity analysis is primarily CO hotspot analysis rather than ozone analysis. Ozone is a regional problem that is best analyzed at the regional level. Regardless of the entity responsible, the conformity analysis must be conducted in accordance with the conformity rule.

Air Quality Analysis

Under the conformity rule, 173-422 WAC, the analysis procedures and methodology used in determining conformity are selected through a consultative process involving, in this region, the Puget Sound Regional Council, the U.S. Department of Transportation, U.S. Environmental Protection Agency, Ecology, the Washington State Department of Transportation (WSDOT), the Puget Sound Air Pollution Control Agency, and other interested representatives of the public. The procedures and methodology selected must comply with the rule and the SIP and be of a type authorized by EPA and USDOT.

Throughout this process, SIP air quality input will be provided at the appropriate points by Ecology Air Quality Program staff. The Puget Sound Air Pollution Control Agency, EPA, and others may provide information as well.

Transportation Control Measures

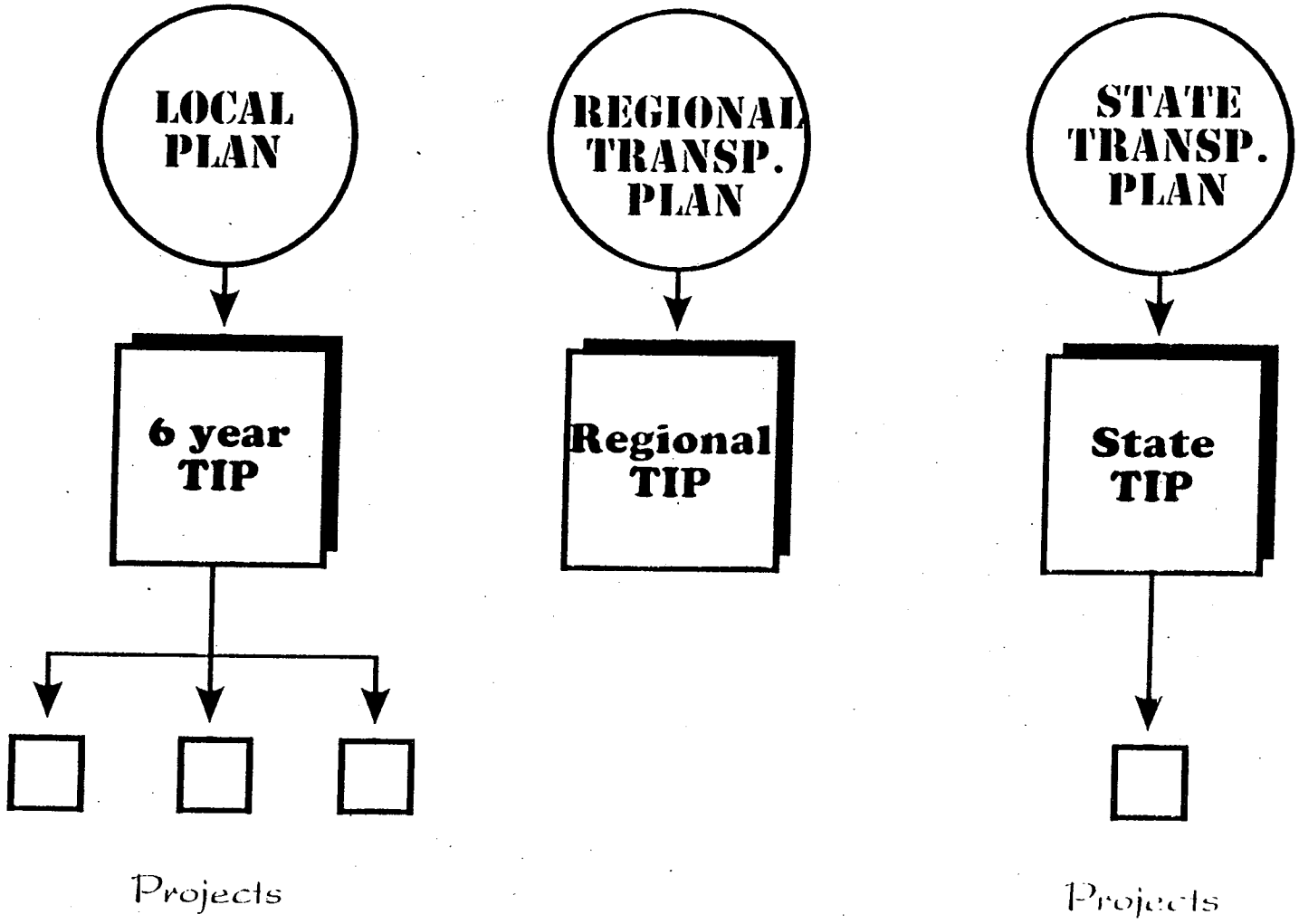
Any agency involved in transportation or air quality may propose transportation control measures (TCMs) to reduce air pollution. TCMs are included in the SIP and should be included in the appropriate transportation plan and program. Once a TCM is included in the SIP, it must be accompanied by a written commitment from the lead agency. This

written commitment should be included in the plans and programs of the lead agency as well. Co-sponsors of TCMs should provide similar commitment and documentation. This documentation is used in demonstrating the coordination and consistency between agencies, plans, and programs and thus is critical in achieving conformity.

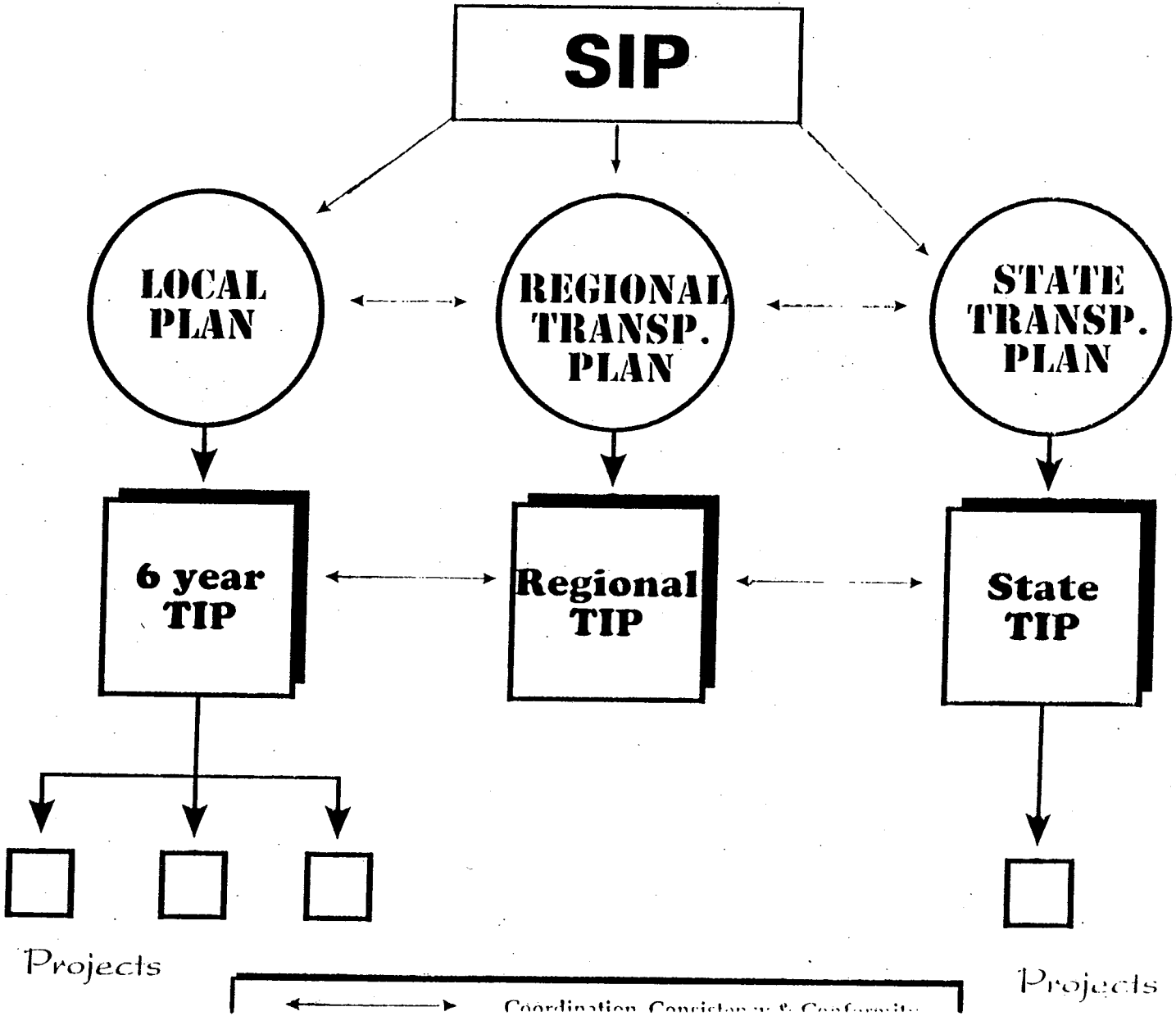
Effects of the Conformity Determination on Funding and Approvals

There must be a determination of conformity in order for transportation activities to be approved or funded. If it is determined that there is not conformity with the SIP, then the transportation plan, program, or project should be modified until there is conformity. If conformity is not achieved then the plan, program, or project cannot be approved or funded. Since projects from non-conforming TIPs cannot be approved or funded, a single project can prevent all other projects in the nonattainment area from being built if it results in the regional TIP not being able to conform. A similar situation exists at the plan level as well.

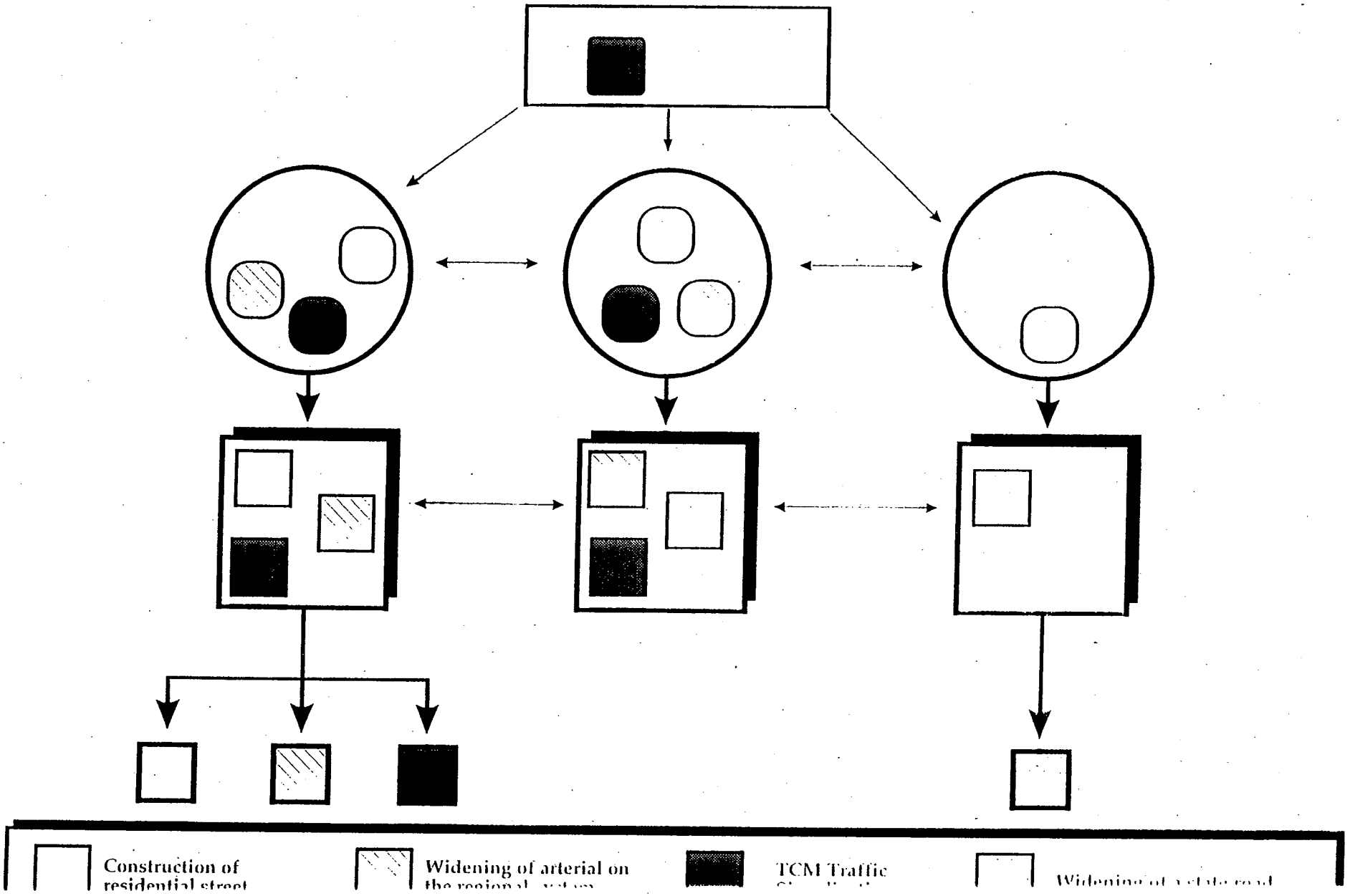
Transportation Activities Subject to Conformity



Conformity Relationships



Conformity



6.0 POINT AND AREA SOURCES

6.1 SIP Requirements

This chapter addresses State Implementation Plan (SIP) requirements of the Federal Clean Air Act for point and area sources The Federal Clean Air Act includes some specific point source requirements for marginal ozone nonattainment. These include a plan to require annual reporting of point source volatile organic compound or nitrogen oxide emissions (Section 182(a)(3)(B)). This is discussed in section 6.2. Washington State's New Source Review rules are being revised to meet the requirements of Sections 172(c)(5), 173, 182(a)(2)(C), and 182(a)(4). The revisions are discussed in section 6.3.

Ozone nonattainment areas that were designated nonattainment prior to adoption of the 1990 Amendments are required to revise their regulations to reflect reasonably available control technology (RACT) for ozone precursors. Since this is a new (post-1990) nonattainment area, these so-called "RACT fix-ups" are not required as part of this attainment plan. It is worth noting, however, that state regulations were revised in May, 1991.

6.2 Emission Statement Requirements

Emission statement provisions are required by the 1990 Clean Air Act Amendments and apply to stationary sources of NO_x and VOC in ozone nonattainment areas. Classes or categories of sources that emit less than 25 tons may be excluded if they are included in the attainment plan emission inventory (Section 182(a)(3)(B) of the Act).

In its "*Draft* Guidance on the Implementation of an Emission Statement Program" (July 1992), EPA interprets the requirements for emission statements. All owners and operators of stationary sources of NO_x and VOC subject to this requirement in the Puget Sound ozone nonattainment area are required to submit the information supplied by the source listed in the following Table 6.1. Sources subject to this requirement are 1) sources in O_3 nonattainment areas that emit, or have the potential to emit, greater than 25 tons per year (tpy) of NO_x; 2) sources in O_3 nonattainment areas that emit, or have the potential to emit, greater than 25 tpy of VOC but less than 100 tpy VOC and that came on line after 1990; and 3) sources in O_3 nonattainment areas that emit, or have the potential to emit, greater than 100 tpy of VOC. Additionally, if a source emits at least the minimum established reporting level of VOC or NO_x (for example, 25 tpy or more in an O_3 nonattainment area), and the other pollutant is emitted at less than 25 tpy, then the other pollutant should also be included in the emission statement. The items listed in Table 6.1 will be required by Ecology and the Puget Sound Air Pollution Control Agency (PSAPCA) in the annual emission inventory update.

TABLE 6.1

MINIMUM EMISSION STATEMENT DATA

SUPPLIED BY THE SOURCE

* certification of data accuracy

* - official to take legal responsibility for accuracy

source identification information

- name, physical location, and mailing address
- latitude and longitude
- 4-digit Standard Industrial Classification code

operating schedule

- percentage of annual throughput (percentage of annual activity by season)
- days per week on the normal operating schedule
- hours per day during normal operating schedule
- hours per year on the normal operating schedule

emissions information/estimates (to include annual and typical O_3 season day emissions)

* - estimated and actual VOC and NO_x emissions at the segment level (in tons per year for annual & pounds per day for typical O_3 season day)

* - estimated emissions method code
- calendar year for the emissions

* - emission factor, if applicable, process data
- annual process rate (annual throughput)

* - peak O_3 season daily process rate control equipment information
- current primary and secondary control equipment identification codes
- current combined control equipment efficiency (percentage)

TABLE 6.1 (continued)

SUPPLIED BY ECOLOGY OR LOCAL AIR AUTHORITY

SIP revision by Nov. 15, 1992

+ identification codes (AIRS, AFS point number, AFS segment number)
+ value for rule effectiveness
+ source emissions data entered annually into AIRS

    - Source Classification Codes and descriptions for each segment
    - current Rule Effectiveness factors at Source Classification Code pollutant level
    - Rule Effectiveness method code

+ quarterly Emission Statement Status Report (beginning 7/1/93)

    - total number of facilities from which data was requested
    - number of facilities that met the provisions
    - number of facilities that did not meet the provisions

+ specification of peak ozone season to source

* Starred items in Table 6.1 are additions to the present reporting requirements.

Under Washington State law, RCW 70.94.141 and RCW 70.94.331 authorize Ecology and local authorities to "require access to records, books, files, and other information specific to the control, recovery or release of air contaminants into the atmosphere." WAC 173-400-105 states that "the owner or operator of a source shall upon notification by the director of ecology, maintain records on the type and quantity of emissions from the source and other information deemed necessary to determine whether the source is in compliance with applicable emission limitations and control measures."

Much of the required information is already collected in the regular annual point source inventory. Ecology and PSAPCA commit to begin supplying the required information to EPA by the mandatory date specified in the Act--November 15, 1993 - and annually thereafter.

6.3 New Source Review Rules

The 1990 Amendments to the Federal Clean Air Act necessitate changes to New Source Review regulations. This section summarizes those changes.

6.3.1 New Source Review Background

In 1977, Congress amended the Federal Clean Air Act to establish preconstruction permitting requirements for major new and modified sources in nonattainment areas. To receive a permit in such areas, major new and modified sources must (among other things):

* obtain emission offsets, to assure that reasonable progress is made towards attaining the National Ambient Air Quality Standards (NAAQS); and

* comply with the "lowest achievable emission rate" (LAER).

In areas that are not meeting the NAAQS (that is, nonattainment areas), a major source must go through a New Source Review (NSR) process in which control requirements are based on the Lowest Achievable Emission Rate (LAER) standard. A new major source of volatile organic compounds (VOC) or nitrous oxides (NO_x) that proposes to build in an ozone nonattainment area, must obtain an emission offset with a ratio of between 1.1 and 1.5 to 1. For other criteria pollutants, emission offsets must be greater than emission increases resulting from the construction of the new or modified source. An emission offset means that a proposed new or modified source will need to guarantee that emissions within the area are reduced overall by more than an equal amount. The emission offset ratio determines by how much more the proposed emission must be reduced. These emission reductions must be achieved through reductions at the same or another facility in the nonattainment area.

The 1990 Federal Clean Air Act Amendments require all ozone nonattainment areas to submit, within two years of enactment, NSR programs that comply with the provisions of Section 182 that apply to their classification. Under Section 182(f), SIPs must also apply NSR to major new sources of NO_x to the same extent required for major sources of VOCs (See Sections 182(a)(2)(C), (c), (d), and (e)). Major NO_x sources in NO_2 attainment areas must also meet the PSD requirements.

Washington's General Regulation for Sources of Air Pollution (Chapter 173-400 WAC) is being updated to reflect new or revised provisions in both the State and Federal Clean Air Acts (See State Implementation Plan Appendix B, State Regulations, for text of the rule). These changes address the State's new source review process, establish a new section which identifies criteria and procedures for excusing unavoidable excess emissions, procedural changes accommodating the operating permit program, revisions to incorporate certain federal requirements by reference, and the updating of enforcement and penalty provisions to address changes in state law.

6.3.2 Current Status of Rule

The Department of Ecology has been working, since January 1992, with an advisory committee made up of representatives from businesses, environmental groups, local air quality control authorities, and the U.S. Environmental Protection Agency to translate the State and federal requirements into Washington State's rule. Public hearings were first held in October 1992.

Substantial revisions have been made under the direction of the advisory committee, and the rulemaking schedule has been revised accordingly. Ecology intends to submit the rule as an amendment to the SIP upon adoption as an update to Appendix B, State Regulations.

Ecology commits to the following revised rulemaking schedule for partial adoption and partial re-proposal:

- Jan 16 - Feb 15 — Ecological Commission Review period.
- Feb 16 — Special Assistant to the Director is briefed on the partial adoption, and the Director of Ecology signs Rule-making Order (CR103). Special Assistant to the Director is briefed on the re-proposal portion and signs Proposed Rule-making Form (CR102).
- Mar 17 — CR102 is published in the *State Register* for re-proposal portion. Ads are placed in newspapers announcing the beginning of the public comment period.

- Mar 22 — Partial adoption portion effective.
- Apr 6, Apr 7, Apr 8 — Public hearings in Spokane, Seattle, and Vancouver for re-proposal portion.
- Apr 19 — End of public comment period.
- May 22 - Jun 21 — Ecological Commission review period.
- Jul 6 — Special Assistant to the Director is briefed on final rule and signs CR103.
- Aug 6 — Rule effective.

6.3.3 Proposed Revisions to New Source Review Sections

Ecology is proposing to amend the procedures for new source review to address recent changes in state and federal law.

- The State regulation has been amended to reflect the definition of "major source" found in the federal CAAA (WAC 173-400-030(41)). The effect of this change is lower minimum size for sources undergoing New Source Review based on the pollutant emitted and severity of the area's air quality problems. In most areas, if a source emits or has the potential to emit more than 100 tons of a given pollutant, it must undergo NSR. However, for example, in areas designated as "serious" for carbon monoxide the cutoff for NSR is 50 tons.

- The amended State regulation incorporates the emission offset requirement found in Section 182(a)(4) of the Federal Clean Air Act, which sets new emission offset ratios between 1.1 and 1.5 to 1, depending on the severity of the air quality problem in an area (WAC 173-400-112(4)).

- The State regulation has been amended to require most major emitters of NO_x to use the same controls as major sources of VOCs. [WAC 173-400-030 (41)]

- The amended State regulation eliminates growth allowances for construction permits in nonattainment areas. New sources must find case-by-case offsets at their own facility or another facility in the nonattainment area.

REFERENCES

Nelson, Mike and Stewart Kaufman, *Evaluating Effects of Wood Smoke Control Legislation in Washington State on Electrical Customers*, Tabulated Results, Washington State energy Office, Seattle (June 1990).

OMNI Environmental Services, Inc., *Environmental Impacts of Advanced Biomass Combustion Systems*, Final Report (DOE/BP-61196-1/April 1988/2C), U.S. Department of Energy, Pacific Northwest and Alaska Regional Biomass Energy Program (January 1988).

OMNI Environmental Services, Inc., *In-Home Performance of Certified Pellet Stoves in Medford and Klamath Falls, Oregon* (DOE/BP-041-1431/August 1990/250), U.S. Department of Energy and the Oregon Department of Environmental Quality (July 18, 1990).

OMNI Environmental Services, Inc., *In-Home Performance of Exempt Pellet Stoves in Medford, Oregon* (DOE/BP-04143-2/August 1991/4C), U.S. Department of Energy, Oregon Department of Energy, Tennessee Valley Authority and Oregon Department of Environmental Quality (July 5, 1991).

Puget Sound Air Pollution Control Agency and Washington State Department of Ecology, *State Implementation Plan for Particulate Matter in Kent Valley*, Supplement (November 1991).

Puget Sound Air Pollution Control Agency and Washington State Department of Ecology, *State Implementation Plan for Particulate Matter in Seattle Duwamish Valley*, Supplement (November 1991).

U.S. Environmental Protection Agency, *Draft guidance on the Implementation of an Emission Statement Program*, Office of Air Quality Planning and Standards, Office of Air and Radiation (July 1992).

Washington State Department of Ecology, *State Implementation Plan for Particulate Matter in the Spokane Study Area* (November 1991).

Washington State Department of Ecology, *State Implementation Plan for Particulate Matter in the Tacoma tideflats, Pierce County* (November 1991).

Addenda for
Puget Sound Ozone Nonattainment Area

ADDENDUM A EMISSION INVENTORY

- Seattle-Tacoma Ozone Nonattainment Area
  King, Pierce and Snohomish Counties, WA
  1990 Base Year Emissions Inventory - Emission Summaries
  (November 1992)

Seattle-Tacoma Ozone Nonattainment Area
King, Pierce and Snohomish Counties, WA
1990 Base Year Emissions Inventory

Prepared by

Puget Sound Air Pollution Control Agency
Engineering Department, Air Quality Planning Group
110 Union St, Suite #500, Seattle, WA 98101-2038

and

Washington State Department of Ecology

October 1992

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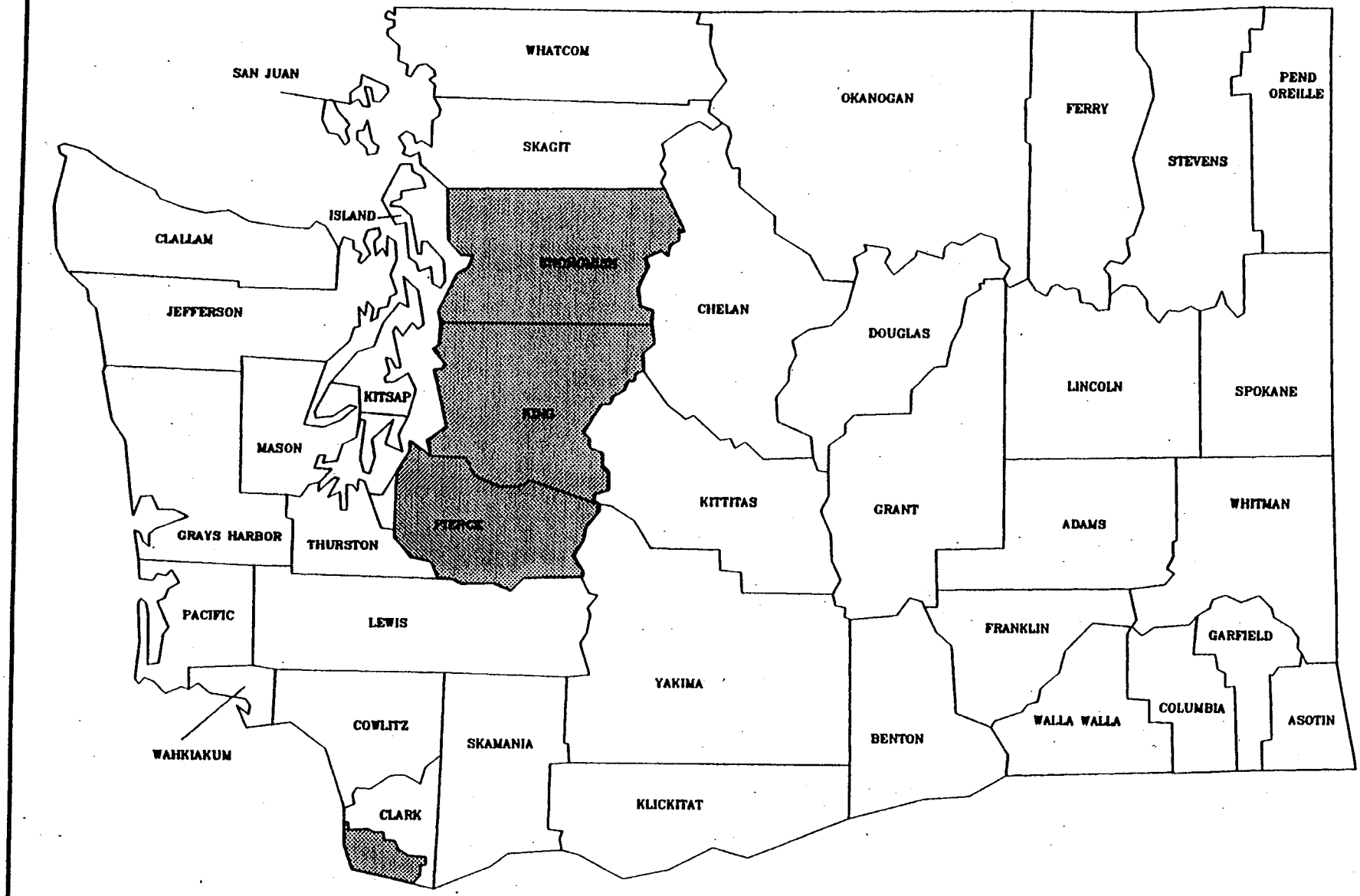
Ozone(O_3) Areas



Introduction

1. Contents

This report describes the methods used to estimate actual carbon monoxide, nitrogen oxide and volatile organic air emissions during calendar year 1990 from all sources within Washington State's King, Pierce and Snohomish Counties. This area was designated nonattainment for ozone as of January 6, 1992 with a classification of marginal (Federal Register, Vol. 56, No. 215, November 6, 1991, page 56847). Emissions during average peak ozone days are calculated from percentage operation estimates representing June through August, 1990 (July through September - on-road mobile sources).

2. Data Availability on EPA Systems

Point source emissions presented on this report are also stored on EPA's National Computer Center AIRS (Aerometric Information Retrieval System) Facility Subsystem (AFS). Stationary area source, non-road mobile source and on-road mobile source emissions are stored on the AIRS AMS (Area Mobile Source) data system.

3. Major Contributors

Many People and agencies have contributed to the completion of this report. Of particular note are Sally Otterson of Washington State Department of Ecology, Dave Kircher and the Engineering and the Air Quality Planning group staff at PSAPCA, and staff of the Puget Sound Regional Council.

4. Contact Persons

For further information on specific categories, please contact:

Gerry Pade	Point Sources	206-689-4065
Tony Agyei	Stationary Area Sources	206-689-4054
Tony Agyei	Non-road Mobile Sources	206-689-4054
Sally Otterson	On-road Mobile Sources	206-664-8644
John Anderson	General/Quality Assurance	206-689-4051

Source Summary

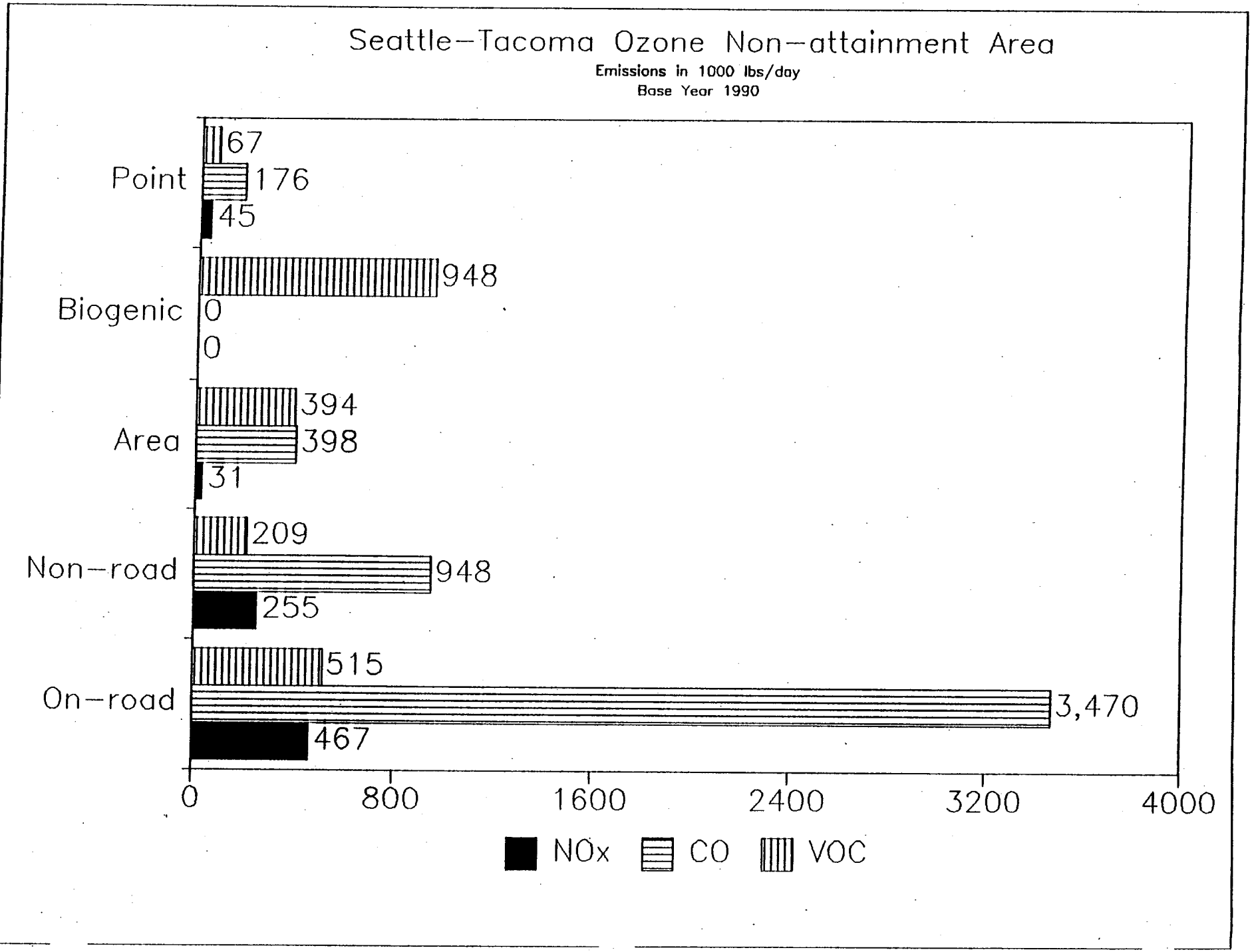
Seattle-Tacoma Ozone Nonattainment Area
King, Pierce and Snohomish Counties, WA
1990 Base Year Emissions Inventory

Category	CO 1000 T/yr 1990	CO 1000 lbs/day Jun-Aug	NOx 1000 T/yr 1990	NOx 1000 lbs/day Jun-Aug	VOC 1000 T/yr 1990	VOC 1000 lbs/day Jun-Aug
Point Sources	22	176 (4%)	8	45 (6%)	10	67 (3%)
Stationary Area Sources (SAS)						
Biogenic					94	948 (44%)
Non-biogenic	100	398 (8%)	8	31 (4%)	69	394 (18%)
Non-Road Mobile Sources (NRM)	97	948 (19%)	33	255 (32%)	20	209 (10%)
On-Road Mobile Sources (ORM)		3,470 (70%)		467 (59%)		515 (24%)
TOTAL All Sources		4,992		798		2,133

CO = Carbon Monoxide
NOx = Nitrogen Oxides
VOC = Volatile Organic Compounds

1990 County Statistics

County	Population (%)	Households (%)	Employment (%)
King	1,507,319 (59%)	615,792 (61%)	821,276 (62%)
Pierce	586,203 (23%)	214,652 (21%)	275,961 (21%)
Snohomish	465,642 (18%)	171,713 (17%)	236,330 (18%)
Total	2,559,164 (100%)	1,002,157 (100%)	1,333,740 (100%)


Seattle–Tacoma Ozone Non–attainment Area
Emissions in 1000 lbs/day
Base Year 1990
Point
67
176
45
Biogenic
948
0
0
Area
394
398
31
Non–road
209
948
255
On–road
515
3,470
467
0
800
1600
2400
3200
4000
NOx
CO
VOC

POINT SOURCES

Point sources are defined at PSAPCA as facilities whose actual emissions equal or exceed twenty-five tons per year of carbon monoxide, nitrogen oxides, particulate matter, sulfur oxides or ten tons of volatile organic compounds or toxic air contaminants. This report includes in this category only those point sources in the ozone nonattainment area whose carbon monoxide or nitrogen oxides actual emissions were twenty-five or more tons in 1990 or whose volatile organic compound actual emissions were ten or more tons in 1990. Calendar year 1990 emission data for Kaiser Aluminum, Simpson Tacoma Kraft, Scott Paper and Weyerhaeuser Kraft were received from Sally Otterson of Ecology on April 21, 1992. Average daily emissions during June through August of 1990 were obtained from "%Jun-Aug", "Days/Week" and "Weeks/Year" data fields completed by facilities, as shown in Appendix C.

1990 Base Year Ozone Season Point Source Emissions

PSAPCA#	AIRS#	SIC#	Name	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lbs/day Jun-Aug	VOC ton/yr 1990	VOC lbs/day Jun-Aug
			King County						
10599	033-00559	3443	Ace Tank & Equipment Co					21	197
26199	033-00261	2649	American Envelope Seattle					34	260
10025	033-00161	2499	American Millwork Inc					57	571
21468	033-00068	3411	American National Can Co					227	1,246
16004	033-00033	5171	ARCO Petroleum Products					77	421
28393	033-00233	3732	Arima Marine International					29	264
20086	033-00234	3471	Art Brass Plating Inc					21	159
21413	033-00136	5171	B P Oil Co (Renton)					31	194
22172	033-00227	7216	Bakker's Fine Dry Cleaning					38	295
11656	033-00004	3221	Ball-Incon Glass Packaging			1,345	7,390		
13117	033-00015	3721	Boeing Commercial (Auburn)			63	482	455	3,498
10460	033-00104	3721	Boeing Commercial (Kent/BN)					18	98
10107	033-00146	3721	Boeing Commercial (NBF)					168	926
13125	033-00052	3721	Boeing Commercial (Renton)			45	246	595	560
13121	033-00061	3761	Boeing Defense/Space (Kent)			26	147	98	560
13124	033-00156	3761	Boeing Defense/Space (Plant II)			51	283	796	4,372
28557	033-00202	3674	Boeing Defense/Space (Renton)			47	287	21	127
13119	033-00053	3721	Boeing Military (DC)			26	205	34	269
10121	033-00228	3728	BP Chemicals					42	327
10385	033-00188	3479	Capital Industries Inc					82	633
10416	033-00139	2673	Cello Bag Co Inc					393	3,020
16028	033-00203	3089	Chemgrate Corp					52	401
28365	033-00177	3731	Delta Marine Industries Inc					16	128
28611	033-00861	3751	Derby Cycle Corp					25	214

PSAPCA#	AIRS#	SIC#	Name	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lbs/day Jun-Aug	VOC ton/yr 1990	VOC lbs/day Jun-Aug
12249	033-00122	2893	Flint Ink Corp					38	293
15113	033-00240	3089	Furon Aerospace Components					16	157
10873	033-00007	2051	Gai's Seattle French Baking Co					202	1,927
28563	033-00286	2431	Genie Industries Inc					10	94
10242	033-00242	2851	Guardsman Products Inc					27	205
11016	033-00194	3728	Heath Tecna Aerospace Co					55	302
14046	033-00017	3241	Holnam Inc Ideal Division	274	1,624	1,705	10,115		
11979	033-00195	3471	Hytek Finishes Co					15	116
11102	033-00243	3471	Industrial Plating Corp					15	116
11195	033-00034	3275	James Hardie Gypsum WA Inc			29	157		
12077	033-00167	2652	James River Corp (Ridgway)					33	301
13460	033-00021	3462	Jorgensen Earle M Co	106	2,586	32	785		
11244	033-00196	3089	K-2 Corp					89	89
11230	033-00037	3711	Kenworth Truck (PACCAR)					189	1,457
10138	033-00101	4953	King Co Pub Wks Cedar Hills	53	292	25	137		1
11285	033-00285	2051	Langendorf Baking Co of Sea					93	594
17625	033-00197	3713	Livingston Molded Products					34	267
16066	033-00211	2521	Lundstead Inc					39	237
15075	033-00213	2673	Mohawk Northern Plastics					15	113
10088	033-00138	4952	Munic of METRO Sea (W Pt)	57	311	365	2,004	47	257
11568	033-00039	3251	Mutual Materials Co (Renton)			33	250		
11705	033-00166	3471	Northwest Plating Co					27	211
16307	033-00245	3949	O'Brien International Inc					22	100
12800	033-00170	2491	Pacific Sound Resources					50	370

PSAPCA#	AIRS#	SIC#	Name	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lbs/day Jun-Aug	VOC ton/yr 1990	VOC lbs/day Jun-Aug
28777	033-00157	2673	Princeton Packaging Inc (Kent)					188	1,076
26303	033-00263	7641	Professional Coating Inc					76	583
16328	033-00216	3471	Protective Coatings Inc					72	557
11044	033-00244	2491	RDK Prefinish Inc					39	297
14004	033-00229	3585	Red Dot Corp					33	377
10249	033-00199	3411	Reynolds Metals Seattle Can					177	972
13574	033-00051	2869	Rhone-Poulenc (Closed)					215	1,653
15117	033-00151	2851	Rudd Co					23	176
11579	033-00241	3399	Salmon Bay Steel (Kent)	2,287	12,568	31	169	45	245
10281	033-00006	3312	Salmon Bay Steel Corp (W Sea)	3,871	73,740	115	2,198	76	1,455
13786	033-00048	4961	Seattle Steam Corp	83	238	216	618	30	85
12181	033-00168	2711	Seattle Times					49	257
16002	033-00031	5171	Shell Oil Co (Harbor Island)					42	258
28388	033-00283	2851	Skills Inc (Metal)					33	254
14002	033-00221	3089	Tempress Inc					27	150
16003	033-00045	5171	Texaco Refining & Marketing					24	141
12539	033-00012	3731	Todd Pacific Shipyards Corp					112	861
21320	033-00023	8221	WA. Univ of. Pwr Plt & Hosp			77	304		
10044	033-00201	2434	Western Cabinet & Millwork					169	1,355
20100	033-00225	3317	Western Pneumatic Tube Co					29	205
12756	033-00013	2421	Weyerhaeuser Co (Snoqualmie)	93	621	68	451	33	220
			King County Totals	6,824	91,980	4.299	26,228	5,838	37,929
			Pierce County						
10019	053-00186	3089	Accurate Plastics (Closed)					35	304
14242	053-00126	3088	American Reinforced Plastics					30	358
20939	053-00052	5171	B P Oil Co (Tacoma)					37	197

PSAPCA#	AIRS#	SIC#	Name	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lbs/day Jun-Aug	VOC ton/yr 1990	VOC lbs/day Jun-Aug
11820	053-00005	3274	Continental Lime Inc			34	226		
12711	053-00012	2621	Boise Cascade W Tacoma Mill	151	830	127	700	47	256
10340	053-00009	2431	Buffelen Woodworking Co	31	241			32	248
11132	053-00111	2671	Darling Corp					39	296
12048	053-00038	2672	Dyno Overlays Inc					325	2,079
10911	053-00085	2499	Girard Custom Coaters Inc					135	1,250
11669	053-00232	2436	Graham Plywood Co WTD Ind					14	107
13461	053-00019	3334	Kaiser Aluminum & Chemical	11,078	60,867	28	154	148	813
13511	053-00030	2431	Lianga Pacific Inc					51	391
28386	053-00283	3089	Norcore Plastics Inc					29	226
11053	053-00002	2812	Occidental Chemical Corp			208	1,146		
15185	053-00151	2051	Pacific Northwest Baking					34	26
10064	053-00215	2499	Pasquier Panel Products Inc					49	375
21331	053-00097	4953	Pierce Co Pub Works Lnd Recv	53	290				
11974	053-00007	2436	Puget Sound Plywood Inc	24	203			24	204
28778	053-00218	2672	Rainier Plywood Co Plastics					63	657
12317	053-00008	2621	Simpson Tacoma Kraft Co	1,962	10,991	735	4,116	521	2,918
13828	053-00021	2911	Sound Refining Crysen					32	188
21332	053-00032	5171	Superior Oil Co Time Oil					34	188
16321	053-00127	8611	TNT Auto Warehousing Co					17	130
28780	053-00074	4911	Tacoma City Light			97	533	18	99
12444	053-00220	3714	TAM Engineering Corp					27	224
21276	053-00013	9711	U S Air Force McChord AFB	28	5	119	22	19	107
21277	053-00020	9711	U S Army Fort Lewis			136		48	
12609	053-00011	3296	U S G Interiors					12	97
12593	053-00022	2911	U S Oil & Refining Co	34	264	174	1,335	374	2,874
21279	053-00016	9223	Washington State McNeil Is					10	32

PSAPCA#	AIRS#	SIC#	Name	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lbs/day Jun-Aug	VOC ton/yr 1990	VOC lbs/day Jun-Aug
			Pierce County Totals	13,361	73,691	1,658	8,232	2,204	14,88
			Snohomish County						
15206	061-00152	3442	Alpine Industries					11	11
10336	061-00336	2431	Barmon Door					25	23
20350	061-00080	3732	Bayliner Marine Brunswick					38	35
13120	061-00039	3721	Boeing Commer(Everett)			62	338	971	5,33
10356	061-00103	3479	Calvert Industries Inc					70	59
10122	061-00237	2434	Cascade Cabinet Corp					99	75
16029	061-00204	3081	Chemical Proof Corp					22	20
10104	061-00015	2911	Chevron USA Inc Asphalt	66	740	27	307	10	11
21424	061-00038	5171	Chevron USA Point Wells					115	65
26072	061-00260	3444	Coastal Manufacturing					13	9
17061	061-00170	2434	Crestline Corp					32	29
10663	061-00017	2431	Nord/Jeld-Wen of Everett	146	1,210			8	6.
17033	061-00173	3089	Northwest Composites Inc					98	62
10223	061-00102	3732	Olympic Boat Co					14	14
20700	061-00081	3089	Reynolds Corp					28	21
12164	061-00002	2621	Scott Paper Co	563	3,095	1,320	7,255	461	2,53
12378	061-00047	2421	Summit Timber Co Inc	46	292			47	30
15203	061-00248	3471	TC Systems Inc					39	30
16338	061-00163	2431	Tiz's Door Sales Inc					40	30
15119	061-00222	3724	Tramco Inc					30	16
12598	061-00014	5171	Unocal Corp (Edmonds)					32	17
28575	061-00226	3499	Waste Management NW					14	10
12754	061-00008	2611	Weverhaeuser Co Kraft Mill	909	5,091	449	2,518	85	47
			Snohomish County Totals	1,730	10,428	1,858	10,418	2,302	14,18
			Point Source Totals	21,915	176,099	7,815	44,878	10,344	66,99

$$lb/day = [(tons/1990)(2000lb/ton)(\%Jun-Aug/25)]/[(Days/Week)(Weeks/Year)]$$

Blank cells or sources not listed are less than 25 tons/year or 1 lb/day

Stationary Area Sources

Summary emission tables follow below. Detailed description of procedures are found in the companion document: "Stationary Area Sources Emission Inventory for Carbon Monoxide and Precursors of Ozone, Base Year 1990, Puget Sound Air Pollution Control Agency, June 1992 Draft."

1990 Base Year Ozone Season Stationary Area Source Emissions
King County

PSAPC A #	AIRS/ AMS SCC #	Source Category	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lb/day Jun-Aug	VOC tons/yr 1990	VOC lb/day Jun-Aug
29211	21-02-002-000	Industrial Bituminous Coal			71	455		
29001	21-02-004-000	Industrial Distillate Oil	124	792	495	3,172		
29021	21-02-006-000	Industrial Natural Gas	153	981	613	3,928	12	7
29211	21-02-007-000	Industrial LPG	69	443	277	1,775		
29231	21-03-004-000	Commercial Distillate Oil	80	89	319	357		
29241	21-03-006-000	Commercial Natural Gas	133	149	533	597	11	1
29271	21-04-002-000	Residential Bituminous Coal	272	261			30	2
29271	21-04-004-000	Residential Distillate Oil	154	147	164	590	10	
29281	21-04-006-000	Residential Natural Gas	202	194	1,008	968	53	5
29291	21-04-007-000	Residential LPG			28	27		
29301	21-04-008-001	Residential Fireplaces Wood	1,875	1,800	28	27	414	39
29311	21-04-008-030	Certified Catalytic Wood Stoves	496	476			81	7
29321	21-04-008-051	Conventional Wood Stoves	14,900	14,304	181	174	1,808	1,73
29331	21-04-008-052	Non-certified Catalytics Stoves	1,073	1,031			213	20
29341	21-04-008-053	Pellet-fired Wood Stoves	167	161	59	57	73	7
29401	26-01-030-000	Residential Garbage Burning	152	834	15	83	40	22
29411	26-10-020-000	Land Clearing Burning	11,473	74,797	598	3,894	2,271	14,80
29421	26-10-030-000	Yard Waste Burning	876	5,711	46	297	173	1,13
29431	26-10-010-000	Slash Burning	8,251	73,351	161	1,431	559	4,97
29441	28-10-001-000	Forest Wild Fires	94	1933	36	352	207	2,02
29451	28-10-030-000	Structural Fires	707	3,876			130	71
29461	28-10-040-000	Aircraft Engine Tests	479	2,623			16	8

PSAPCA #	AIRS/ AMS SCC #	Source Category	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lb/day Jun-Aug	VOC tons/yr 1990	VOC lb/day Jun-Aug
29471	26-20-030-000	Small Landfills	42	227	164	910		
29481	26-30-020-000	Wastewater Treatment (POTW)					85	463
29491	26-50-000-000	Treatment Facilities (TSDF)					11	63
29761	27-01-220-000	Biogenics					30,142	304,000
29751	24-95-000-000	Miscellaneous Organic Solvents					26,535	170,096
29771	25-01-060-000	Gasoline Distribution Losses					5,538	24,615
29781	24-61-800-000	Pesticide Application					26	286
		King County Totals	~~44,486~~	~~209,718~~	4,796	19,094	68,438	526,139
			4572	184,180				
		Pierce County						
29003	21-02-004-000	Industrial Distillate Oil			59	380		
29023	21-02-006-000	Industrial Natural Gas			73	470		
29213	21-02-007-000	Industrial LPG			33	212		
29233	21-03-004-000	Commercial Distillate Oil			62	68		
29243	21-03-006-000	Commercial Natural Gas	36	39	144	157		
29273	21-04-002-000	Residential Bituminous Coal	138	126			15	1
29273	21-04-004-000	Residential Distillate Oil	30	28	120	112		
29283	21-04-006-000	Residential Natural Gas	48	44	240	224	13	1
29303	21-04-008-001	Residential Fireplaces Wood	1,496	1,391			331	30
29313	21-04-008-030	Certified Catalytic Wood Stoves	395	368			65	6
29323	21-04-008-051	Conventional Wood Stoves	11,889	11,057	144	134	1,442	1,34
29333	21-04-008-052	Non-certified Catalytics Stoves	857	797			170	15
29343	21-04-008-053	Pellet-fired Wood Stoves	133	124	47	44	58	5
29403	26-01-030-000	Residential Garbage Burning	213	1,165	21	117	56	30
29413	26-10-020-000	Land Clearing Burning	7,488	48,822	390	2,542	1,482	9,66
29423	26-10-030-000	Yard Waste Burning	1,082	7,053	56	367	214	1,39
29433	26-10-010-000	Slash Burning	369	3,213	8	70	30	26
29443	28-10-001-000	Forest Wild Fires	2,396	23,433	31	303	177	1,73
29453	28-10-030-000	Structural Fires	287	1,573	7	36	53	28
29473	26-20-030-000	Small Landfills			50	276		
29763	27-01-220-000	Biogenics					25,210	254,00

PSAPC A #	AIRS/ AMS SCC #	Source Category	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lb/day Jun-Aug	VOC tons/yr 1990	VOC lb/day Jun-Aug
29753	24-95-000-000	Miscellaneous Organic Solvents					10,320	66,152
29773	25-01-060-000	Gasoline Distribution Losses					1,756	11,449
29783	24-61-800-000	Pesticide Application					7	77
		Pierce County Totals	26,857	99,233	1,485	5,512	41,399	347,275
		Snohomish County						
29004	21-02-004-000	Industrial Distillate Oil	34	215	135	862		
29024	21-02-006-000	Industrial Natural Gas	42	267	167	1,067		
29214	21-02-007-000	Industrial LPG			75	482		
29234	21-03-004-000	Commercial Distillate Oil			33	47		
29244	21-03-006-000	Commercial Natural Gas			66	80		
29274	21-04-002-000	Residential Bituminous Coal	36	38				
29274	21-04-004-000	Residential Distillate Oil			63	66		
29284	21-04-006-000	Residential Natural Gas	27	28	134	139		
29304	21-04-008-001	Residential Fireplaces Wood	1,972	2,051	29	30	436	453
29314	21-04-008-030	Certified Catalytic Wood Stoves	521	542			86	
29324	21-04-008-051	Conventional Wood Stoves	15,672	16,299	190	198	1,901	1,977
29334	21-04-008-052	Non-certified Catalytics Stoves	1,129	1,174			225	234
29344	21-04-008-053	Pellet-fired Wood Stoves	176	183	62	65	77	80
29404	26-01-030-000	Residential Garbage Burning	181	990			48	262
29414	26-10-020-000	Land Clearing Burning	3,216	20,968	168	1,092	637	4,150
29424	26-10-030-000	Yard Waste Burning	909	5,928	47	309	180	1,170
29434	26-10-010-000	Slash Burning	393	3,416			12	100
29444	28-10-001-000	Forest Wild Fires	4,980	48,719	64	626	367	3,590
29454	28-10-030-000	Structural Fires	276	1,510	6	35	51	27
29464	28-10-040-000	Aircraft Engine Tests	2,244	12,296	58	318	75	41
29474	26-20-030-000	Small Landfills	31	168	122	670	2	1
29484	26-30-020-000	Wastewater Treatment (POTW)					278	1,52

PSAPCA #	AIRS/ AMS SCC #	Source Category	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lb/day Jun-Aug	VOC tons/yr 1990	VOC lb/day Jun-Aug
29494	26-50-000-000	Treatment Facilities (TSDF)					9	5
29764	27-01-220-000	Biogenics					38.728	390.00
29754	24-95-000-000	Miscellaneous Organic Solvents					8.198	52.54
29774	25-01-060-000	Gasoline Distribution Losses					1.596	10.40
29784	24-61-800-000	Pesticide Application					94	1.02
		Snohomish County Totals	31.839	114.792	1.419	6.086	53.000	468.35
		Totals	~~109.182~~	~~423.743~~	7.700	30.692	162.837	1,341.76

100,468 398,205

Blank cells or categories not listed are less than 25 tons/year or 1 lb/day

Non-road Mobile Sources

Summary emission tables follow below. Detailed description of procedures are found in the companion document: "Non-road Mobile Sources Emission Inventory for Carbon Monoxide and Precursors of Ozone, Base Year 1990, Puget Sound Air Pollution Control Agency, June 1992 Draft."

1990 Base Year Ozone Season Nonroad Mobile Source Emissions

PSAPCA #	AIRS/ AMS SCC #	Source Category	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lb/day Jun-Aug	VOC tons/yr 1990	VOC lb/day Jun-Aug
		King County						
29601	22-60-003-000	Gasoline Indust/Comml Equipt	15,058	114,591	391	2,976	715	5,441
29701	22-70-003-000	Diesel Indust/Comml Equipt	281	2,138	1,294	9,847	105	799
29611	22-60-002-000	Gasoline Construction Equipt	8,113	88,513	277	3,022	369	4,026
29711	22-70-002-000	Diesel Construction Equipt	1,495	16,311	4,613	50,328	384	4,189
29621	22-60-005-001	Gasoline Farm Tractor	122	1,550				
26721	22-70-005-001	Diesel Farm Tractor	274	3,483	689	8,734	100	1,266
29641	22-60-001-011	Off Road Motorcycles	862	8,060			461	4,3[illegible]
29661	22-60-004-000	Lawn/Garden Equipment	10,877	118,233	56	609	1,076	11,69[illegible]
29801	22-75-001-000	Military Aircraft	61	336			34	187
29811	22-75-020-001	Commercial Aircraft	3,679	20,162	1,469	8,049	1,672	9,163
29831	22-75-050-000	General Aviation Aircraft	2,423	13,275			70	384
29841	22-75-020-021	Air Taxi	1,402	7,684			54	297
29961	22-85-001-000	Switching Yard Locomotives	59	378	333	2,133	33	214
29971	22-85-002-000	Line Haul Locomotives	269	1,724	2,119	13,583	91	581
29901	22-80-002-000	Underway Commercial Vessels	1,370	7,508	7,283	39,911	449	2,461
29911	22-80-003-000	Dockside Commercial Vessels	44	241	372	2,039	60	329
29921	22-80-004-000	Recreational Marine Vessels	14,289	177,184	655	8,116	5,764	71,474
		King County Totals	60,678	581,371	19,551	149,347	11,437	116,81[illegible]

Appendix A--Point Source Data Element Conversion File

The Point Source Emission Inventory Quality Assurance Program identifies the specific data elements which have been collected, stored in PSAPCA's HP3000 data base and entered into EPA's AIRS AFS data base. These elements are listed below.

I. Ozone State Implementation Plan Emission Inventory Point Sources
- A. Annual Emission Threshold (Excluding gasoline bulk stations)
  - 1. Plant
    - a. CO/NOx = 25 tons/year
    - b. VOC = 10 tons/year
  - 2. Segment
    - a. CO/NOx/VOC = 1000 lb/year
- B. Data Sources
  - 1. PSAPCA Registration Data Base
  - 2. PSAPCA Area Source Emission Inventory
  - 3. WA State Department of Revenue Business Tax Records
  - 4. EPA Toxic Release Information System (TRIS) Data Base
- C. EPA Aerometric Information Retrieval System (AIRS) Facility Subsytem (AFS)
  - 1. Direct Data Entry
    - a. Identification
      - (1). State Code = 53 or WA
      - (2). County Code = 033 (King), 053 (Pierce), 061 (Snohomish)
      - (3). Plant Numbers (CDS and NEDS)
      - (4). New Facility Information
        - (a). Government Facility Code = 0 (Non-governmental), 1 (Federal), 2 (State), 3 (County), 4 (City), 5 (District)
        - (b). Air Program Code = 0 (SIP Source)
        - (c). Air Program Status = O (Operating)
        - (d). Pollutant = CO, NO2, or VOC
        - (e). State Pollutant Compliance Status = 0 (Unknown)
        - (f). State Pollutant Classification = A1 (>100 tpy), A2 (50-100 tpy), or B (<50 tpy)
        - (g). State Atainment/Nonattainment = N (Nonattainment)
    - b. Plant General
      - (1). Plant Name
      - (2). Street Address
      - (3). City
      - (4). Street Address Zip Code
      - (5). Primary Standard Industrial Classification (SIC) Code
      - (6). Local Control Region = C
      - (7). Year of Emission Inventory = 90
      - (8). Universal Transverse Mercator (UTM) Zone = 10
      - (9). UTM Coordinates
        - (a). Horizontal
        - (b). Vertical
      - (10). Contact Person-Emissions
      - (11). Telephone Number
      - (12). User Plant Number = PSAPCA Registration Number
    - c. Point General
      - (1). Point Number
      - (2). Compliance/Emissions Indicator = E

(3). Percentage Annual Throughput
(a). December - February
(b). March - May
(c). June - August
(d). September - November
(4). Hours per Day
(5). Days per Week
(6). Hours per Year
(7). Point Description

d. Segment General
(1). Segment Number
(2). Source Classification Code (SCC)
(3). Confidential Indicator = Y
(4). Segment Description
(5). Annual Fuel/Process Rate
(6). Optional Fuel/Process Rate Units

e. Segment Pollutant
(1). Pollutant Code = CO, NO2, VOC
(2). Estimated Emissions
(3). Decimal Position
(4). Units = PY (lb/year)
(5). Method Code

f. Segment Comment
(1). Comment Number = PSAPCA Reference Number
(2). Comment Identifier = E
(3). Comment = PSAPCA Emission Calculation Reference

2. HP3000 to AIRS/AFS Conversion File

Trans Type	Seq #	Data Element	Value	Start Col	End Col	Len
10	1	State	53	1	2	2
10	1	County		3	5	3
10	1	Plant ID		6	10	5
10	1	Transaction Type	10	11	12	2
10	1	Sequence #	1	13	13	1
10	1	Plant Name		16	55	40
10	1	Update Code	C	80	80	1
10	2	State	53	1	2	2
10	2	County		3	5	3
10	2	Plant ID		6	10	5

PSAPCA #	AIRS/ AMS SCC #	Source Category	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lb/day Jun-Aug	VOC tons/yr 1990	VOC lb/day Jun-Aug
		Pierce County						
29603	22-60-003-000	Gasoline Indust/Comml Equipt	1,961	14,923	51	388	93	708
29703	22-70-003-000	Diesel Indust/Comml Equipt	37	282	169	1,286	14	107
29613	22-60-002-000	Gasoline Construction Equipt	2,486	27,122	85	927	142	1,549
29713	22-70-002-000	Diesel Construction Equipt	458	4,997	1,414	15,428	118	1,287
29623	22-60-005-001	Gasoline Farm Tractor	111	1,406				
26723	22-70-005-001	Diesel Farm Tractor	248	3,147	622	7,892	90	1,144
29643	22-60-001-011	Off Road Motorcycles	272	2,543			225	2,104
29663	22-60-004-000	Lawn/Garden Equipment	4,071	44,251			403	4,381
29803	22-75-001-000	Military Aircraft	1,516	8,307	285	1,559	842	4,613
29813	22-75-020-001	Commercial Aircraft	27	147			12	67
29833	22-75-050-000	General Aviation Aircraft	668	3,660			19	106
29963	22-85-001-000	Switching Yard Locomotives			125	800	13	80
29973	22-85-002-000	Line Haul Locomotives	126	809	994	6,371	43	273
29903	22-80-002-000	Underway Commercial Vessels	173	948	1,235	6,768	64	351
29913	22-80-003-000	Dockside Commercial Vessels	417	2,285	3,500	19,180	564	3,191
29923	22-80-004-000	Recreational Marine Vessels	6,250	77,500	269	3,336	2,522	31,273
		Pierce County Totals	18,821	192,327	8,749	63,935	5,164	51,234
		Snohomish County						
29604	22-60-003-000	Gasoline Indust/Comml Equipt	3,447	26,232	89	677	164	1,248
29704	22-70-003-000	Diesel Indust/Comml Equipt	64	487	296	2,253	24	183
29614	22-60-002-000	Gasoline Construction Equipt	1,438	15,689	49	535	84	916
29714	22-70-002-000	Diesel Construction Equipt	265	2,891	816	8903	68	742
29624	22-60-005-001	Gasoline Farm Tractor	179	2,274			10	122
29634	22-60-005-005	Gasoline Other Farm Equipt	66	832				
26724	22-70-005-001	Diesel Farm Tractor	403	5,114	1,011	12,825	147	1,860
29734	22-70-005-005	Diesel Other Farm Equipt			34	425		
29644	22-60-001-011	Off Road Motorcycles	293	2,740			243	2,272
29664	22-60-004-000	Lawn/Garden Equipment	3,224	35,045			319	3,468
29804	22-75-001-000	Military Aircraft	105	577			58	320

PSAPCA #	AIRS/ AMS SCC #	Source Category	CO tons/yr 1990	CO lb/day Jun-Aug	NOx tons/yr 1990	NOx lb/day Jun-Aug	VOC tons/yr 1990	VOC lb/day Jun-Au
29814	22-75-020-001	Commercial Aircraft	61	335			28	1
29834	22-75-050-000	General Aviation Aircraft	1,323	7,252			38	2
29844	22-75-020-021	Air Taxi	45	248				
29964	22-85-001-000	Switching Yard Locomotives			83	533		
29974	22-85-002-000	Line Haul Locomotives	106	676	831	5,324	36	2
29904	22-80-002-000	Underway Commercial Vessels	287	1,573	1,222	6,697	88	4
29924	22-80-004-000	Recreational Marine Vessels	5,848	72,515	253	3,137	2,359	29,2
		Snohomish County Totals	17,154	174,480	4,684	41,309	3,666	41,4
		Totals	96,653	948,178	32,984	254,591	20,267	209,5

Blank cells or categories not listed are less than 25 tons/year or 1 lb/day

Trans Type	Seq #	Data Element	Value	Start Col	End Col	Len
10	2	Transaction Type	10	11	12	2
10	2	Sequence #	2	13	13	1
10	2	Street Address		16	45	30
10	2	Update Code	C	80	80	1
10	3	State	53	1	2	2
10	3	County		3	5	3
10	3	Plant ID		6	10	5
10	3	Transaction Type	10	11	12	2
10	3	Sequence #	3	13	13	1
10	3	City Name		16	45	30
10	3	Zip Code		46	54	9
10	3	Primary SIC		55	58	4
10	3	Local Control Region	C	67	68	2
10	3	Update Code	C	80	80	1
10	6	State	53	1	2	2
10	6	County		3	5	3
10	6	Plant ID		6	10	5
10	6	Transaction Type	10	11	12	2
10	6	Sequence #	6	13	13	1
10	6	Year of Emission Inventory	90	16	17	2
10	6	UTM Zone	10	18	19	2
10	6	UTM Horizontal Coordinate		20	23	4
10	6	UTM Vertical Coordinate		24	28	5
10	6	Contact Person (Emissions)		42	61	20
10	6	Telephone Number		62	71	10
10	6	Update Code	C	80	80	1
10	7	State	53	1	2	2
10	7	County		3	5	3
10	7	Plant ID		6	10	5
10	7	Transaction Type	10	11	12	2
10	7	Sequence #	7	13	13	1
10	7	User Plant ID		21	32	12
10	7	Update Code	C	80	80	1
30	3	State	53	1	2	2
30	3	County		3	5	3
30	3	Plant ID		6	10	5
30	3	Transaction Type	30	11	12	2
30	3	Sequence Number	3	13	13	1
30	3	Point Number		16	18	3
30	3	Compliance/Emissions Indicator	E	19	19	1
30	3	% Throughput Dec-Feb		30	31	2
30	3	% Throughput Mar-May		32	33	2

Trans Type	Seq #	Data Element	Value	Start Col	End Col	Len
30	3	% Throughput Jun-Aug		34	35	2
30	3	% Throughput Sep-Nov		36	37	2
30	3	Hours per Day		38	39	2
30	3	Days per Week		40	40	1
30	3	Hours per Year		41	44	4
30	3	Update Code	C	80	80	1
30	4	State	53	1	2	2
30	4	County Code		3	5	3
30	4	Plant ID		6	10	5
30	4	Transaction Type	30	11	12	2
30	4	Sequence Number	4	13	13	1
30	4	Point Number		16	18	3
30	4	Compliance/Emissions Indicator	E	19	19	1
30	4	Point Description		33	57	25
30	4	Update Code	C	80	80	1
40	1	State	53	1	2	2
40	1	County		3	5	3
40	1	Plant ID		6	10	5
40	1	Transaction Type	40	11	12	2
40	1	Sequence Number	1	13	13	1
40	1	Point ID		16	18	3
40	1	Compliance/Emissions Indicator	E	19	19	1
40	1	Segment ID		20	21	2
40	1	Source Classification Code		25	32	8
40	1	Confidential Indicator	Y	33	33	1
40	1	Segment Description		34	58	25
40	1	Annual Fuel/Process Rate		59	65	7
40	1	Update Code	C	80	80	1
40	5	State	53	1	2	2
40	5	County		3	5	3
40	5	Plant ID		6	10	5
40	5	Transaction Type	40	11	12	2
40	5	Sequence Number	5	13	13	1
40	5	Point ID		16	18	3
40	5	Compliance/Emissions Indicator	E	19	19	1
40	5	Segment ID		20	21	2
40	5	Optional Fuel/Process Rate Units		22	61	40
40	5	Update Code		80	80	C
41	1	State	53	1	2	2

Trans Type	Seq #	Data Element	Value	Start Col	End Col	Len
41	1	County		3	5	3
41	1	Plant ID		6	10	5
41	1	Transaction Type	41	11	12	2
41	1	Sequence Number	1	13	13	1
41	1	Point ID		16	18	3
41	1	Compliance/Emissions Indicator	E	19	19	1
41	1	Segment ID		20	21	2
41	1	Pollutant Code		22	30	9
41	1	Emisions Type Indicator	ESTI	31	34	4
41	1	Emissions Value		35	41	7
41	1	Decimal Position		42	42	1
41	1	Units Code	PY	43	44	2
41	1	Method Code		45	45	1
41	1	Update Code	C	80	80	1
47	1	State	53	1	2	2
47	1	County		3	5	3
47	1	Plant ID		6	10	5
47	1	Transaction Type	47	11	12	2
47	1	Sequence Number	1	13	13	1
47	1	Point ID		16	18	3
47	1	Compliance/Emissions Indicator	E	19	19	1
47	1	Segment ID		20	21	2
47	1	Comment Number		22	24	3
47	1	Comment Identifier	E	25	25	1
47	1	Comment		26	77	52
47	1	Update Code	C	80	80	1

Appendix B--Point Source Fuel Use

The point source fuel use is subtracted from the total fuel use in the area to obtain the stationary fuel use. The tabulation below gives the point source fuel use of natural gas, distillate oil and residual oil.

Point Source Natural Gas Combustion 1990

Reg#	Name	SCC #	Point #	Seg #	1000 therm
	King County				
13117	Boeing Commercial (Auburn)	1-02-006-02	1	1	8,709
13117	Boeing Commercial (Auburn)	1-02-006-03	1	2	42
10460	Boeing Commercial (Kent/BN)	1-02-006-02	1	1	522
10107	Boeing Commercial (NBF)	1-02-006-02	1	1	1,669
13121	Boeing Defense/Space (Kent)	1-02-006-02	1	1	3,782
13124	Boeing Defense/Space (Plant II)	1-02-006-02	1	1	6,855
13119	Boeing Military (DC)	1-02-006-01	1	1	3,649
11016	Heath Tecna Aerospace Co	1-02-006-02	2	1	477
11979	Hytek Finishes Co	1-02-006-03	1	1	595
11230	Kenworth Truck (PACCAR)	1-02-006-02	1	1	1,254
11285	Langendorf Baking Co of Seattle	1-02-006-03	3	1	602
11568	Mutual Materials Co (Renton)	1-02-006-02	1	1	3,383
12800	Pacific Sound Resources	1-02-006-02	1	2	1,005
12539	Todd Pacific Shipyards Corp	1-02-006-02	1	2	1,403
	King County Total				33,947
	Pierce County				
12711	Boise Cascade Corp	1-02-006-02	1	1	407
12711	Boise Cascade Corp	1-02-006-02	2	1	407
12711	Boise Cascade Corp	1-02-006-02	3	1	407
11053	Occidental Chemical Corp	1-02-006-02	1	1	7,814
11974	Puget Sound Plywood Inc	1-02-006-02	1	2	134
12593	U. S. Oil & Refining Co	1-02-006-02	2	2	2,192
	Pierce County Total				11,361
	Snohomish County				
13120	Boeing Commercial (Everett)	1-02-006-01	1	1	9,118
12164	Scott Paper Co	1-02-006-01	2	1	*
	Snohomish County Total				*
	Total				*

Point Source Distillate Oil Combustion 1990

Reg#	Name	SCC #	1000 gal
	King County		
10460	Boeing Commercial (Kent/BN)	1-02-005-01	1
10107	Boeing Commercial (NBF)	1-02-005-01	77
13125	Boeing Commercial (Renton)	1-02-005-01	360
13119	Boeing Military (DC)	1-02-005-01	86
13460	Jorgensen Earle M Co	1-02-005-01	22
11230	Kenworth Truck (PACCAR)	1-02-005-01	20
16002	Shell Oil Co (Harbor Island)	1-02-005-01	150
12539	Todd Pacific Shipyards Corp	1-02-005-01	132
21320	WA. Univ of, Pwr Plt & Hosp	1-03-004-01	706
	King County Total		1,554
	Pierce County		
13461	Kaiser Aluminum & Chemical	1-02-005-01	*
	Total		*

Point Source Residual Oil Combustion 1990

Reg#	Name	SCC #	1000 gal
	King County		
13124	Boeing Defense/Space (Plant II)	1-02-004-01	177
12800	Pacific Sound Resources	1-02-004-04	32
13786	Seattle Steam Corp	1-02-004-01	728
21320	WA, Univ of, Pwr Plt & Hosp	1-03-004-01	706
12756	Weyerhaeuser Co (Snoqualmie)	1-02-004-01	142
	King County Total		1,785
	Pierce County		
12711	Boise Cascade Corp	1-02-004-01	942
11053	Occidental Chemical Corp	1-02-004-04	137
12317	Simpson Tacoma Kraft Co	1-02-004-01	*
21277	U S Army Fort Lewis	1-03-004-01	1,839
12593	U S Oil & Refining Co	1-02-004-01	841
	Pierce County Total		*

* Confidential

Reg#	Name	SCC #	1000 gal
	Snohomish County		
13120	Boeing Commercial (Everett)	1-02-004-01	168
12164	Scott Paper Co	1-02-004-01	*
12378	Summit Timber Co	1-02-004-01	14
12598	Unocal Corp (Edmonds)	1-02-004-01	42
12754	Weyerhaeuser Co Kraft Mill	1-02-004-01	*
	Snohomish County Total		3,163
	Total		16,133

* Confidential

No Point Source Bituminous Coal Combustion 1990

Appendix C--1990 Point Source Ozone Season Operation Schedule

PSAPCA#	AIRS#	SIC#	Name	% Jun-August	Days/ Week	Weeks/ Yr
			King County			
10599	033-00559	3443	Ace Tank & Equipment Co	30	5	52
26199	033-00261	2649	American Envelope Seattle Div	25	5	52
10025	033-00161	2499	American Millwork Inc	26	4	52
21468	033-00068	3411	American National Can Co	25	7	52
16004	033-00033	5171	ARCO Petroleum Products Co	25	7	52
28393	033-00233	3732	Arima Marine International Inc	30	5	52
20086	033-00234	3471	Art Brass Plating Inc	25	5	52
21413	033-00136	5171	B P Oil Co (Renton)	28	7	52
22172	033-00227	7216	Bakker's Fine Dry Cleaning	25	5	52
11656	033-00004	3221	Ball-Incon Glass Packaging	25	7	52
13117	033-00015	3721	Boeing Commercial (Auburn)	25	5	52
10460	033-00104	3721	Boeing Commercial (Kent/BN)	25	7	52
10107	033-00146	3721	Boeing Commercial (NBF)	25	7	52
13125	033-00052	3721	Boeing Commercial (Renton)	25	7	52
13121	033-00061	3761	Boeing Defense/Space (Kent)	25	7	50
13124	033-00156	3761	Boeing Defense/Space (Plant II)	25	7	52
28557	033-00202	3674	Boeing Defense/Space (Renton)	20	5	52
13119	033-00053	3721	Boeing Military (DC)	25	5	50
10121	033-00228	3728	BP Chemicals	25	5	52
10385	033-00188	3479	Capital Industries Inc	25	5	52
10416	033-00139	2673	Cello Bag Co Inc	25	5	52
16028	033-00203	3089	Chemgrate Corp	25	5	52
28365	033-00177	3731	Delta Marine Industries Inc	25	5	50
28611	033-00861	3751	Derby Cycle Corp	21	4	49
12249	033-00122	2893	Flint Ink Corp	25	5	52
15113	033-00240	3089	Furon Aerospace Components	25	4	52
10873	033-00007	2051	Gai's Seattle French Baking Co	31	5	52
28563	033-00286	2431	Genie Industries Inc	25	4	52
10242	033-00242	2851	Guardsman Products Inc	25	5	52

PSAPCA#	AIRS#	SIC#	Name	% Jun-August	Days/ Week	Weeks/ Yr
11016	033-00194	3728	Heath Tecna Aerospace Co	25	7	52
14046	033-00017	3241	Holnam Inc Ideal Division	27	7	52
11979	033-00195	3471	Hytek Finishes Co	25	5	52
11102	033-00243	3471	Industrial Plating Corp	25	5	51
11195	033-00034	3275	James Hardie Gypsum WA Inc	25	7	52
12077	033-00167	2652	James River Corp (Ridgway)	30	5	52
13460	033-00021	3462	Jorgensen Earle M Co	28	2	46
11244	033-00196	3089	K-2 Corp	25	4	50
11230	033-00037	3711	Kenworth Truck (PACCAR)	25	5	52
10138	033-00101	4953	King Co Pub Wks Cedar Hills	25	7	52
11285	033-00285	2051	Langendorf Baking Co of Sea	25	6	52

PSAPCA#	AIRS#	SIC#	Name	% Jun-August	Days/ Week	Weeks/ Yr
17625	033-00197	3713	Livingston Molded Products	25	5	51
16066	033-00211	2521	Lundstead Inc	20	5	52
15075	033-00213	2673	Mohawk Northern Plastics	25	5	52
10088	033-00138	4952	Munic of METRO Sea (W Pt)	25	7	52
11568	033-00039	3251	Mutual Materials Co (Renton)	25	5	52
11705	033-00166	3471	Northwest Plating Co	25	5	52
16307	033-00245	3949	O'Brien International Inc	15	5	52
12800	033-00170	2491	Pacific Sound Resources	24	5	52
28777	033-00157	2673	Princeton Packaging Inc (Kent)	25	7	50
26303	033-00263	7641	Professional Coating Inc	25	5	52
16328	033-00216	3471	Protective Coatings Inc	25	5	52
11044	033-00244	2491	RDK Prefinish Inc	25	5	52
14004	033-00229	3585	Red Dot Corp	30	4	52
10249	033-00199	3411	Reynolds Metals Seattle Can	25	7	52
13574	033-00051	2869	Rhone-Poulenc (Closed)	25	5	52
15117	033-00151	2851	Rudd Co	25	5	52
11579	033-00241	3399	Salmon Bay Steel Corp (Kent)	25	7	52
10281	033-00006	3312	Salmon Bay Steel Corp (W Sea)	50	7	30
13786	033-00048	4961	Seattle Steam Corp	13	7	52
12181	033-00168	2711	Seattle Times	24	7	52
16002	033-00031	5171	Shell Oil Co (Harbor Island)	28	7	52
28388	033-00283	2851	Skills Inc (Metal)	25	5	52
14002	033-00221	3089	Tempress Inc	25	7	51
16003	033-00045	5171	Texaco Refining & Marketing	27	7	52
12539	033-00012	3731	Todd Pacific Shipyards Corp	25	5	52
21320	033-00023	8221	WA, Univ of, Pwr Plt & Hosp	18	7	52
10044	033-00201	2434	Western Cabinet & Millwork	25	5	50
20100	033-00225	3317	Western Pneumatic Tube Co	22	5	50
12756	033-00013	2421	Weyerhaeuser Co (Snoqualmie)	25	6	50
			Pierce County			
10019	053-00186	3089	Accurate Plastics Inc (Closed)	28	5	51
14242	053-00126	3088	American Reinforced Plastics	30	4	51
20939	053-00052	5171	B P Oil Co (Tacoma)	24	7	52

PSAPCA#	AIRS#	SIC#	Name	% Jun-August	Days/ Week	Weeks/ Yr
11820	053-00005	3274	Continental Lime Inc	29	7	50
12711	053-00012	2621	Boise Cascade W Tacoma Mill	25	7	52
10340	053-00009	2431	Buffelen Woodworking Co	24	5	50
11132	053-00111	2671	Darling Corp	25	5	52
12048	053-00038	2672	Dyno Overlays Inc	20	5	50
10911	053-00085	2499	Girard Custom Coaters Inc	30	5	52
11669	053-00232	2436	Graham Plywood Co WTD Ind	25	5	52
13461	053-00019	3334	Kaiser Aluminum & Chemical	25	7	52
13511	053-00030	2431	Lianga Pacific Inc	25	5	52
28386	053-00283	3089	Norcore Plastics Inc	25	5	52
11053	053-00002	2812	Occidental Chemical Corp	25	7	52
15185	053-00151	2051	Pacific Northwest Baking	25	5	52
10064	053-00215	2499	Pasquier Panel Products Inc	25	5	52
21331	053-00097	4953	Pierce Co Pub Works Lnd Recv	25	7	52
11974	053-00007	2436	Puget Sound Plywood Inc	26	5	50
28778	053-00218	2672	Rainier Plywood Co Plastics	25	4	48
12317	053-00008	2621	Simpson Tacoma Kraft Co	25	7	51
13828	053-00021	2911	Sound Refining Crysen	25	7	52
21332	053-00032	5171	Superior Oil Co Time Oil	25	7	52
16321	053-00127	8611	TNT Auto Warehousing Co	25	5	52
28780	053-00055	4911	Tacoma City Light	25	7	52
12444	053-00220	3714	TAM Engineering Corp	25	5	49
21276	053-00013	9711	U S Air Force McChord AFB	25	7	52
21277	053-00020	9711	U S Army Fort Lewis	0	7	36
12609	053-00011	3296	U S G Interiors	26	5	52
12593	053-00022	2911	U S Oil & Refining Co	25	5	52
21279	053-00016	9223	Washington State McNeil Is	15	7	52
			Snohomish County			
15206	061-00152	3442	Alpine Industries	35	5	52
10336	061-00336	2431	Barmon Door	30	5	51
20350	061-00080	3732	Bayliner Marine Brunswick	30	5	52
13120	061-00039	3721	Boeing Commercial (Everett)	25	7	52
10356	061-00103	3479	Calvert Industries Inc	22	4	52

PSAPCA#	AIRS#	SIC#	Name	% Jun-August	Days/ Week	Weeks/ Yr
10122	061-00237	2434	Cascade Cabinet Corp	25	5	52
16029	061-00204	3081	Chemical Proof Corp	30	5	52
10104	061-00015	2911	Chevron USA Inc Asphalt Ref	51	7	52
21424	061-00038	5171	Chevron USA Inc Point Wells	26	7	52
26072	061-00260	3444	Coastal Manufacturing	25	5	52
17061	061-00170	2434	Crestline Corp	30	5	52
10663	061-00017	2431	Nord/Jeld-Wen of Everett Inc	27	5	52
17033	061-00173	3089	Northwest Composites Inc	25	6	52
10223	061-00102	3732	Olympic Boat Co	25	4	50
20700	061-00081	3089	Reynolds Corp	25	5	52
12164	061-00002	2621	Scott Paper Co	25	7	52
12378	061-00047	2421	Summit Timber Co Inc	25	6	52
15203	061-00248	3471	TC Systems Inc	25	5	52
16338	061-00163	2431	Tiz's Door Sales Inc	25	5	52
15119	061-00222	3724	Tramco Inc	25	7	52
12598	061-00014	5171	Unocal Corp (Edmonds)	25	7	52
28575	061-00226	3499	Waste Management Northwest	25	5	52
12754	061-00008	2611	Weyerhaeuser Co Kraft Mill	25	7	51

APPENDIX D--ON-ROAD MOBILE SOURCES

On-road mobile source emissions were calculated by link for eight vehicle types and five functional classifications. Several agencies were involved in the estimation of on-road mobile source emissions. The key activities and responsible agencies are outlined below.

AGENCY ROLES

a. Traffic Counting - PSRC, WSDOT
b. Network Modeling - PSRC
c. Regional Growth Forecast - PSRC
d. Emission Factors - Ecology
e. HPMS reporting to FHWA - WSDOT
f. Forecasting from HPMS data - PSRC

DERIVATION OF VEHICLE MILES TRAVELED (VMT) DATA

Highway Performance Monitoring System (HPMS) data was used to estimate VMT. The WSDOT provided HPMS data to PSRC. PSRC used network model to spatially allocate the VMT to the link level and develop a speed for each link. Both HPMS data and the use of the network model are described below.

HPMS

Detailed information on HPMS is beyond the scope of this inventory. WSDOT follows the procedures in ref. 3 for calculating VMT.

Urban areas are sampled separately. VMT estimates were provided for the Federal Aid Urbanized Area (FAUA) that included each volume group within all sampled functional systems for Interstate, Other Freeway/Expressway, Principal Arterial, Minor Arterial, Collectors and Local. Volume on the Local functional system is not specifically counted, but is an assumed percentage of the other functional classifications. VMT outside of the FAUA was estimated by the PSRC based on the relationship of HPMS and modeled VMT in the FAUA.

Dates and number of hours over which ground counts were collected for the HPMS sample segments, factors used to expand HPMS segment data into FAUA VMT estimates by facility class/volume group, and number of road miles by facility/volume group may be found in references 2 and 3.

Counts on sample segments not actually counted in a given year are not adjusted. Monthly, day of week and hourly adjustment factors were provided by WSDOT from an analysis of Permanent Traffic Recording stations (PTRs) in the vicinity of urban areas and some short term counts at spot locations within the urban vicinity. VMT used in the inventory was average weekday, adjusted for Oct-Dec (see section titled "General Procedure for Estimating On-road Vehicle Emissions" below).

Procedures for Adjusting Network Model Output to HPMS

The following information was provided by the PSRC:

The VMT estimates derived from HPMS differ from the Regional Council model results in both extent and completeness. The HPMS estimates are for the urbanized portion of three counties, include all roads, do not include estimated speeds, and provide no spatial distribution. The Regional Council model covers four counties, does not specifically include local roads (though these area generalized as zone centroid connectors), and provides both speed and VMT for each individual link.

The 1990 network corresponded to existing conditions in 1990 and was used to calibrate the PSRC modeling process to the reported values of HPMS. The link data for 1990 were already available as part of the PSRC work program.

Since the Regional Council model covers an area larger than the urbanized area used for HPMS (entire counties of King, Pierce, Snohomish, and Kitsap), it was necessary to identify those model links which are within the urbanized area. A linear transformation was used to convert the start and end coordinates of each link from the Regional Council model to longitude/latitude. While this conversion is approximate, the process give the consistency required for dispersion analysis. AtlasGIS was used to assign a zone number to each link in each network, based on the location of the midpoint of the link. Zones 1, 2, and 3 were the 1980 urbanized areas (FAU boundaries used for HPMS) of King, Snohomish and Pierce Counties, respectively. Zone 4 included all other links in the area. (Those links classified as zone 4, and in Kitsap Co. as identified by lat/long, were removed).

The facility types used to describe links in the PSRC transportation network correspond approximately to the road classifications used in HPMS. For the purposes of calibration and forecasting the following equivalences were used:

UTPS facility type	HPMS road classification
1,2 (freeway, expressway)	Interstate, other freeway
3,4,6 (urban arterial, one-way, rural arterial)	Principal, minor arterial
5 (Centroid connector)	Collector
Intrazonal trips	Local roads

These equivalences were base on similarity of description, road miles, and VMT. The following table shows the HPMS and modeled VMT for 1990 and the adjustment factors derived from these data. All values except factors are in thousands.

	HPMS	Model	Factor
Freeway	20,358	21,317	0.9550
Arterial	22,121	19,799	1.1173
Collector (from local)	4,346	6,850	1.0
Other Local	3,283	276.84 trips	11.859 mi/trip

Since the Regional Council model does not include local roads, the total number of intra-zonal trips (which are not assigned to the network) was used to estimate local VMT.

The link data were provided to Ecology for daily, am, and pm time periods. The link data included: node A lat/long, node B lat/long, HPMS zone (1 = King Co., 2 = Snohomish Co., 3 = Pierce Co., 4 = region outside of urbanized area), model facility type (see above), link distance (mi), volume (adjusted by HPMS factors), VMT (adjusted), and congested speed. Local VMT estimates were provided by providing intrazonal VMT by transportation analysis zone, using the centroid lat/long as coordinates.

Link speeds were the network model output speeds (before HPMS adjustment). The assumed speed for intra-zonal trips was 15 mph.

The formula used to calculate total HPMS VMT was:

(0.9550 x (T1+T2)) + (1.1173 x (T3+T4+T6)) + T5 + (11.859 x Intrazonal Trips)

where Tn represents the total model VMT for facility type n within the HPMS region.

Since the Regional Council model does not explicitly include the collector and local streets, these VMTs were estimated by using the network centroid connectors to represent collectors and 43% of the local streets, and the number of intrazonal trips to represent the remaining local traffic.

INPUTS TO MOBILE4.1

1. Typical Daily Emissions

1.1. Base Year 1990 Summertime Ozone (CO, NOx, VOC), No I/M Program

1.1.1. Control Section Flag Settings

PROMPT = 1 no prompting, vertical format
IOUNEW = blank N/A
PROJID = Typical Day Summertime Ozone, No I/M Program
TAMFLG = 1 M4.1 tampering rates
SPDFLG = 1 one speed for all vehicle types
VMFLAG = 1 M4.1 VMT mix
MYMRFG = 3 user supplied registration distribution, M4.1 mileage accumulation rate
NEWFLG = 1 M4.1 basic exhaust emission rates
IMFLAG = 1 no I/M program
ALHFLG = 1 no additional correction factors
ATPFLG = 1 no anti-tampering program
RLFLAG = 5 zero out refueling emission factors
LOCFLG = 2 one LAP record for all scenarios
TEMFLG = 1 input max and min temperatures will be used for all
OUTFMT = 1 220 column numerical output
PRTFLG = 4 calculate emission factors for CO, NOx and HC
IDLFLG = 1 no idle emission factors
NMHFLG = 3 calculate VOC hydrocarbons
HCFLAG = 1 print sum of VOC components

1.1.2. One-time Data Section

The settings in the control section above determine information required in this section. Registration distribution values (24 records) and the Local Area Parameter record are required.

Registration distribution values were determined using information from the Dept. of Licensing (DOL). Data from July 1989 to June 1990 was compiled to determine the July 1, 1990 registration distribution. Data was available for 1978 to 1990 model years; years prior to 1978 were categorized as "older." The fraction of vehicles in the "older" category was allocated to years 1977 to 1966 and older by using the national default values. The equation used was:

$$Year_i = \frac{N_i}{N_{tot}} \times W_{tot}$$

where i = 1977 - 1966 and older
N = national default model year fraction
W = Washington model year fraction
tot = sum of fractions for years 1977 - 1966 and older

The values for LDGV and LDGT1 were used for LDDV and LDDT respectively according to EPA guidance. DOL does not classify vehicles by weight, but by use. The category containing non-commercial trucks was used for both LDGT1 and LDGT2.

Using the Washington specific model year registration distribution resulted in a significant emissions increase.

The local area parameter record contains the following: Scenario name, ASTM volatility class, minimum daily temperature, maximum daily temperature, period 1 RVP, period 2 RVP, period 2 start year, oxygenated fuel flag, diesel sales flag. Each shall be detailed below.

Scenario Name Puget Sound

ASTM Volatility Class Enter a blank; no longer used.

Minimum and Maximum Daily Temperatures The draft temperature determination guidance distributed at the MOBILE4.1 Workshop held in Nov. 1991 at EPA Region X was used to estimate the temperature inputs (ave. min., ave. max., ambient). The following procedure was used for ozone season temperature determination:

1. Determine the Three Year Period

The years 1988-90 were used as the most recent three year period.

2. Determine the Three Month Period With the Most Violations

The report AMP440 from the Air Quality Subsystem of AIRS was run in order to tally all days with violations of the O3 standard by month. For the Puget Sound, July - September was the three month period with the highest frequency of violations.

Puget Sound

	May	June	July	Aug	Sep	Oct
# Violation Days 1988					1	
1989						
1990			2	2		
Total Violation Days			2	2	1	

3. Determine the Ten Highest Exceedances

The report AMP440 from the Air Quality Subsystem of AIRS lists the ten highest values for each monitoring site by year. This report was used to determine the ten highest exceedances occurring July - September. Only six values were violations, so the ten values chosen were the ten highest concentrations.

4. Temperatures to be Used in Min, Max and Ambient Temperature Calculations

Puget Sound

Date	Monitoring Site	ppm	minF	maxF
7-20-88	53-053-0005	0.110	58	95
9-2-88	53-033-0010, 53-053-1008	0.110	59	98
9-3-88	53-033-0010	0.140	56	92
7-11-90	53-033-0018	0.124	62	89
7-12-90	53-033-0010	0.126	66	87
7-20-90	53-033-7001	0.118	59	90
7-21-90	53-033-7001	0.131	61	94
8-4-90	53-033-7001	0.115	61	92
8-10-90	53-033-7001	0.126	60	90
8-11-90	53-033-7001	0.149	63	94
8-12-90	53-033-7001	0.116	60	89

5. Calculate Average Daily Minimum, Maximum and Ambient Temperature

Average Min = 60, Average Max = 92, Ambient = 81.

Period 1 and 2 RVP, Period 2 Start Year RVP was calculated based on the draft guidance submitted at the MOBILE4.1 Workshop held in Nov. 1991 at EPA Region X. At the suggestion of Mark Wolcott, OMS, the MVMA 1990 summary sheets (Seattle RVP) included in the draft guidance were used to determined RVP. Summer RVP was used since the 3 month period falls with May-Sept. The first equation was used: 0.75 x 9.5(average RVP of reg. unleaded) + 0.25 x 9.6(average RVP of premium unleaded) = 9.5. The legal limit for summer RVP is 10.5. This means that a 1.0 safety margin is allowed (Ref. 4) for future years (1992) when the legal limit is 9.0. At the suggestion of John Raymond of Ecology, the safety margin of 0.3 listed in Ref. 4 will be used instead. Period 1 RVP was therefore set to 9.5, and Period 2 RVP to 8.7. Period 2 Start Year was 1992.

Oxygenated Fuel Flag (OXYFLG) = 1 no oxygenated fuel information

Diesel Sales Fraction Flag (DSFLAG) = 1 no alternate diesel sales fractions

1.1.3. Scenario Section

Only the first scenario record is appropriate according to the flag settings in the control and one-time data sections. The scenario record consists of the region, calendar year, average speed, ambient temperature, and operating mode fractions. In detail:

Region = 1 low altitude

Calendar Year = Per M4.1 Manual, emission factors and VMT mix for 1990 and 1991 will be run and averaged for the 1990 base year.

Average Speed = Scenarios will be run for speeds between 3 and 65 mph using 1 mph increments.

Ambient Temperature = This will be input according to the procedure listed above under min/max temperature determination; however, MOBILE4.1 will not use this value since TEMFLG = 1.

Operating Mode Fractions = The default values of PCCN = 20.6, PCHC = 27.3, and PCCC = 20.6 will be used.

1.2. Base Year 1990 Summertime Ozone (CO, NOx, VOC), I/M Program

1.2.1. Control Section Flag Settings

Make the following changes to setting listed above:

PROJID = Typical Day Summertime Ozone (CO, NOx, VOC), I/M Program
IMFLAG = 2 I/M program

1.2.2. One-time Data Section

The settings in the control section above determine information required in this section. Everything listed above remains unchanged. Additional records defining the I/M program are required. Dept. of Ecology and Dept. of Licensing records were used to define the required information. The required elements are: Program start year, stringency level, first and last model years subject to the program, waiver rates, compliance rate, program type, frequency of inspection, vehicle types covered, test type, and alternate I/M credits. In detail:

Program Start Year: July 1, 1985

Stringency Level: The actual 1990 failure rate among all light duty pre-1981 vehicles tested was be used to determine the stringency level, since there are no testing or data reporting errors. Using this methodology, the stringency rate was 28%

Jan. 1, 1990 - Dec. 31, 1990

MODEL YEARS	TOTAL INIT. TESTS	INITIAL FAIL	PERCENT
1968-1980	126,568	34,841	27.5 = 28%

Model Years of Vehicles Subject to the Requirements of the Program:

First (earliest) Model Year: 1968
Last (latest) Model Year: 2020

Waiver Rates:

Jan. 1, 1990 - Dec. 31, 1990, Retests counted through June 30, 1991

MODEL YEARS	INITIAL FAIL	RETEST WAIVED	PERCENT
1968-1980	34,841	5,069	14.6 = 15%
1981-1991	20,963	2,913	13.9 = 14%

Compliance Rate: The compliance rate was determined using vehicles with a September 1990 expiration date. A detailed analysis for the entire year was not available. To determine the number of vehicles completing test requirements, test data was tabulated from July 1 - Dec. 31, 1990 in order to count those who may have completed test requirements either before or after the month of September. Four categories of vehicles were subtracted from the total number of vehicles requiring testing: vehicles that were not relicensed, vehicles that registered outside of the testing area, vehicles that were not gasoline powered, and vehicles that received an out of area exemption. The compliance rate was 90%.

September 1990, Tests counted July 1, 1990 - Dec. 31, 1990

VEHICLES MAILED RENEWAL NOTICE	VEHICLES SUBTRACTED FROM TOTAL NOTICES	VEHICLES COMPLETING TEST REQUIREMENTS	PERCENT
37,759	7,531	27,319	90

There are also vehicles operating in the test area which have entered from outside the area. A 1987 compliance survey found 82.9% of the vehicles in the Bellevue area came within the area. In order to account for this, the emission factors used for VMT inside of the I/M testing area will be weighted using the formula: (survey rate = 0.829) x (factors calculated with I/M) + (1 - survey rate = 0.171) x (factors calculated without I/M).

Program Type: Centralized

Frequency of Inspection: Biennial

Vehicle Types Covered by Program: All Four Types: LDGV, LDGT1, LDGT2, and HDGV

Test Type: 2500/idle

Whether Or Not Alternate I/M Credits Are To Be Supplied For Each Of Two Technology Groups: No

1.2.3. Scenario Section

Same as scenario section listed above

The MOBILE4.1 input files were run for speed = 19.6 and OUTFMT = 4 as examples, and are included as the following pages.

References

1. Department of Ecology. Fuel and I/M Program Data. John Raymond.

2. User's Guide to MOBILE4.1. July 1991.

3. Draft Temperature Guidance (for 1991(2) release of Procedures for Emission Inventory Preparation, Vol. IV: Mobile Sources. EPA-450/4-81-026d.

4. Final Temperature and RVP Guidance (for 1991(2) release of Procedures for Emission Inventory Preparation, Vol. IV: Mobile Sources. EPA-450/4-81-026d.

5. Air Quality Subsystem of AIRS. Reports AMP300RP and AMP440, 1987-90.

6. Climatological Data, Washington, National Oceanic and Atmospheric Administration. SeaTac Airport data.

7. "Standard Specification for Automotive Gasoline," Annual Book of ASTM Standards.

8. Mike Lidgard, EPA Region 10.

```
1           PROMPT  -  no prompting, vertical format
Puget Sound (Base Year 1990) Typical Day Summertime Ozone, No I/M Program
1           TAMFLG  -  M4.1 tampering rates
1           SPDFLG  -  one speed for all vehicle types
1           VMFLAG  -  M4.1 VMT mix
3           MYMRFG  -  user supplied reg. dist., M4.1 mileage accum. rate
1           NEWFLG  -  M4.1 basic exhaust emission rates
1           IMFLAG  -  no I/M program
1           ALHFLG  -  no additional correction factors
1           ATPFLG  -  no anti-tampering program
5           RLFLAG  -  zero out refueling emissions
2           LOCFLG  -  one local area parameter record for all scenarios
1           TEMFLG  -  calculate exhaust temperatures
4           OUTFMT  -  80 column descriptive
4           PRTFLG  -  calculate factors for CO, NOx and HC
1           IDLFLG  -  no idle emission factors
3           NMHFLG  -  calculate VOC hydrocarbons
1           HCFLAG  -  print sum of VOC components
 .047 .065 .064 .068 .069 .071 .069 .048 .043 .051          LDGV, MY AGES 1-10
 .052 .060 .057 .056 .037 .029 .021 .023 .017 .012         LDGV, MY AGES 11-20
 .009 .008 .006 .005 .015                                  LDGV, MY AGES 21-25
 .045 .066 .054 .056 .070 .061 .060 .044 .034 .041         LDGT1, MY AGES 1-10
 .042 .057 .051 .056 .042 .026 .035 .035 .029 .020         LDGT1, MY AGES 11-20
 .015 .014 .012 .009 .027                                  LDGT1, MY AGES 21-25
 .045 .066 .054 .056 .070 .061 .060 .044 .034 .041         LDGT2, MY AGES 1-10
 .042 .057 .051 .056 .042 .026 .035 .035 .029 .020         LDGT2, MY AGES 11-20
 .015 .014 .012 .009 .027                                  LDGT2, MY AGES 21-25
 .013 .021 .020 .018 .022 .023 .022 .015 .014 .018          HDGT, MY AGES 1-10
 .020 .068 .080 .101 .078 .064 .058 .066 .048 .036         HDGT, MY AGES 11-20
 .032 .032 .022 .022 .084                                  HDGT, MY AGES 21-25
 .047 .065 .064 .068 .069 .071 .069 .048 .043 .051          LDDV, MY AGES 1-10
 .052 .060 .057 .056 .037 .029 .021 .023 .017 .012         LDDV, MY AGES 11-20
 .009 .008 .006 .005 .015                                  LDDV, MY AGES 21-25
 .045 .066 .054 .056 .070 .061 .060 .044 .034 .041         LDDT, MY AGES 1-10
 .042 .057 .051 .056 .042 .026 .035 .035 .029 .020         LDDT, MY AGES 11-20
 .015 .014 .012 .009 .027                                  LDDT, MY AGES 21-25
 .030 .032 .032 .029 .035 .040 .036 .022 .029 .030          HDDT, MY AGES 1-10
 .033 .051 .034 .117 .050 .058 .071 .079 .050 .038         HDDT, MY AGES 11-20
 .025 .021 .021 .008 .029                                  HDDT, MY AGES 21-25
 .016 .023 .034 .044 .073 .065 .058 .073 .102 .088          MC, MY AGES 1-10
 .084 .339 .000 .000 .000 .000 .000 .000 .000 .000         MC, MY AGES 11-20
 .000 .000 .000 .000 .000                                  MC, MY AGES 21-25
Puget Sound O3    60.  92.   9.5  8.7  92 1 1          LAP Record
1 90 19.6 81.0 20.6 27.3 20.6          SCENARIO RECORDS
1 91 19.6 81.0 20.6 27.3 20.6
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
1Puget Sound (Base Year 1990) Typical Day Summertime Ozone, No I/M Program

 MOBILE4.1(4Nov91)
0
-M 49 Warning:+                1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+                1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+                1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+               0.997     MYR sum not = 1. (will normalize)
-M 49 Warning:+                1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+                1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+               0.999     MYR sum not = 1. (will normalize)
0Puget Sound O3
                    Minimum Temp: 60. (F)    Maximum Temp: 92. (F)
                    Period 1 RVP:  9.5       Period 2 RVP:  8.7 Period 2 Yr: 1992
0VOC HC emission factors include evaporative HC emission factors.
0
0User supplied veh registration distributions.
0Cal. Year: 1990          Region: Low          Altitude:  500. Ft.
F                      I/M Program: No       Ambient Temp:  83.8 / 83.8 / 83.8

                    Anti-tam. Program: No    Operating Mode:  20.6 / 27.3 / 20.6
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 19.6   19.6   19.6          19.6   19.6   19.6   19.6   19.6
   VMT Mix:  0.655  0.166  0.081         0.027  0.010  0.002  0.053  0.007
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  3.81   5.12   6.04   5.42 18.77   0.75   1.00   4.38   8.99   4.64
 Exhst  CO: 29.13  41.29  41.68  41.42 203.38  1.70   1.95  15.80  28.04  35.80
 Exhst NOX:  1.60   2.11   2.32   2.18  6.29   1.66   1.92  25.28   0.76   3.12

0User supplied veh registration distributions.
0Cal. Year: 1991          Region: Low          Altitude:  500. Ft.
F                      I/M Program: No       Ambient Temp:  83.8 / 83.8 / 83.8

                    Anti-tam. Program: No    Operating Mode:  20.6 / 27.3 / 20.6
0Veh. Type:  LDGV  LDGT1  LDGT2   LDGT   HDGV   LDDV   LDDT   HDDV   MC   All Veh
+
 Veh. Spd.: 19.6   19.6   19.6          19.6   19.6   19.6   19.6   19.6
   VMT Mix:  0.649  0.171  0.081         0.027  0.009  0.002  0.055  0.006
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  3.50   4.80   5.54   5.04 17.41   0.77   1.07   4.18   8.56   4.30
 Exhst  CO: 26.34  37.87  37.97  37.90 185.84  1.74   2.03  15.44  26.38  32.68
 Exhst NOX:  1.49   1.99   2.15   2.04  6.12   1.69   1.97  23.99   0.79   2.98
```

```
1           PROMPT  -  no prompting, vertical format
Puget Sound (Base Year 1990) Typical Day Summertime Ozone, I/M Program
1           TAMFLG  -  M4.1 tampering rates
1           SPDFLG  -  one speed for all vehicle types
1           VMTFLAG -  M4.1 VMT mix
3           MYMRFG  -  user supplied reg. dist., M4.1 mileage accumulation rate
1           NEWFLG  -  M4.1 basic exhaust emission rates
2           IMFLAG  -  I/M program
1           ALHFLG  -  no additional correction factors
1           ATPFLG  -  no anti-tampering program
5           RLFLAG  -  zero out refueling emissions
2           LOCFLG  -  one local area parameter record for all scenarios
1           TEMFLG  -  calculate exhaust temperatures
4           OUTFMT  -  80 clouun descriptive
4           PRTFLG  -  calculate factors for CO, NOx and HC
1           IDLFLG  -  no idle emission factors
3           NMHFLG  -  calculate VOC hydrocarbons
1           HCFLAG  -  print sum of VOC components
 .047 .065 .064 .068 .069 .071 .069 .048 .043 .051          LDGV, MY AGES 1-10
 .052 .060 .057 .056 .037 .029 .021 .023 .017 .012          LDGV, MY AGES 11-20
 .009 .008 .006 .005 .015                                   LDGV, MY AGES 21-25
 .045 .066 .054 .056 .070 .061 .060 .044 .034 .041          LDGT1, MY AGES 1-10
 .042 .057 .051 .056 .042 .026 .035 .035 .029 .020          LDGT1, MY AGES 11-20
 .015 .014 .012 .009 .027                                   LDGT1, MY AGES 21-25
 .045 .066 .054 .056 .070 .061 .060 .044 .034 .041          LDGT2, MY AGES 1-10
 .042 .057 .051 .056 .042 .026 .035 .035 .029 .020          LDGT2, MY AGES 11-20
 .015 .014 .012 .009 .027                                   LDGT2, MY AGES 21-25
 .013 .021 .020 .018 .022 .023 .022 .015 .014 .018          HDGT, MY AGES 1-10
 .020 .068 .080 .101 .078 .064 .058 .066 .048 .036          HDGT, MY AGES 11-20
 .032 .032 .022 .022 .084                                   HDGT, MY AGES 21-25
 .047 .065 .064 .068 .069 .071 .069 .048 .043 .051          LDDV, MY AGES 1-10
 .052 .060 .057 .056 .037 .029 .021 .023 .017 .012          LDDV, MY AGES 11-20
 .009 .008 .006 .005 .015                                   LDDV, MY AGES 21-25
 .045 .066 .054 .056 .070 .061 .060 .044 .034 .041          LDDT, MY AGES 1-10
 .042 .057 .051 .056 .042 .026 .035 .035 .029 .020          LDDT, MY AGES 11-20
 .015 .014 .012 .009 .027                                   LDDT, MY AGES 21-25
 .030 .032 .032 .029 .035 .040 .036 .022 .029 .030          HDDT, MY AGES 1-10
 .033 .051 .034 .117 .050 .058 .071 .079 .050 .038          HDDT, MY AGES 11-20
 .025 .021 .021 .008 .029                                   HDDT, MY AGES 21-25
 .016 .023 .034 .044 .073 .065 .058 .073 .102 .088          MC, MY AGES 1-10
 .084 .339 .000 .000 .000 .000 .000 .000 .000 .000          MC, MY AGES 11-20
 .000 .000 .000 .000 .000                                   MC, MY AGES 21-25
85 28 68 20 15 14  90 1 2 2222 2 11          Puget Sound I/M
Puget Sound O3    60.  92.   9.5  8.7  92 1 1          LAP Record
1 90 19.6 81.0 20.6 27.3 20.6          SCENARIO RECORDS
1 91 19.6 81.0 20.6 27.3 20.6
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
1Puget Sound (Base Year 1990) Typical Day Summertime Ozone, I/M Program

 MOBILE4.1(4Nov91)
0
-M 49 Warning:+                  1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+                  1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+                  1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+                 0.997     MYR sum not = 1. (will normalize)
-M 49 Warning:+                  1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+                  1.00     MYR sum not = 1. (will normalize)
-M 49 Warning:+                 0.999     MYR sum not = 1. (will normalize)
0I/M program selected:
0     Start year (January 1):                1985
      Pre-1981 MYR stringency rate:           28%
      First model year covered:              1968
      Last model year covered:               2020
      Waiver rate (pre-1981):                15.%
      Waiver rate (1981 and newer):          14.%
      Compliance Rate:                       90.%
      Inspection type:                       Centralized
      Inspection frequency                   Biennial
      Vehicle types covered:                 LDGV - Yes
                                             LDGT1 - Yes
                                             LDGT2 - Yes
                                             HDGV - Yes
      1981 & later MYR test type:            2500 rpm / Idle
0Puget Sound O3
                    Minimum Temp: 60. (F)   Maximum Temp: 92. (F)
                    Period 1 RVP:  9.5      Period 2 RVP:  8.7 Period 2 Yr: 1992
0VOC HC emission factors include evaporative HC emission factors.
0
0User supplied veh registration distributions.
0Cal. Year: 1990              Region: Low          Altitude:  500. Ft.
F                          I/M Program: Yes      Ambient Temp:  83.8 / 83.8 / 83.8
                  Anti-tam. Program: No          Operating Mode:  20.6 / 27.3 / 20.6
0Veh. Type:  LDGV  LDGT1  LDGT2  LDGT   HDGV   LDDV   LDDT   HDDV   MC    All Veh
+
 Veh. Spd.: 19.6   19.6   19.6          19.6   19.6   19.6   19.6   19.6
   VMT Mix:  0.655  0.166  0.081         0.027  0.010  0.002  0.053  0.007
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  3.49   4.69   5.69   5.02 18.39   0.75   1.00   4.38   8.99   4.32
 Exhst  CO: 23.11  33.36  32.66  33.13 189.60  1.70   1.95  15.80  28.04  29.44
 Exhst NOX:  1.58   2.05   2.25   2.11  6.28   1.66   1.92  25.28   0.76   3.09

0User supplied veh registration distributions.
0Cal. Year: 1991              Region: Low          Altitude:  500. Ft.
                           I/M Program: Yes      Ambient Temp:  83.8 / 83.8 / 83.8
                  Anti-tam. Program: No          Operating Mode:  20.6 / 27.3 / 20.6
0Veh. Type:  LDGV  LDGT1  LDGT2  LDGT   HDGV   LDDV   LDDT   HDDV   MC    All Veh
+
 Veh. Spd.: 19.6   19.6   19.6          19.6   19.6   19.6   19.6   19.6
   VMT Mix:  0.649  0.171  0.081         0.027  0.009  0.002  0.055  0.006
0Composite Emission Factors (Gm/Mile)
 VOC    HC:  3.18   4.37   5.19   4.63 17.07   0.77   1.07   4.18   8.56   3.98
 Exhst  CO: 20.54  30.16  29.34  29.90 173.08  1.74   2.03  15.44  26.38  26.55
 Exhst NOX:  1.46   1.92   2.07   1.97  6.12   1.69   1.97  23.99   0.79   2.95
```

GENERAL PROCEDURE FOR ESTIMATING ON-ROAD VEHICLES EMISSIONS

1. Determine Appropriate Application of Emission Factors

MOBILE4.1 was run for 1.1 and 1.2 above. In order to apply the resulting factors to VMT data by link, the I/M area had to be determined. The I/M area is defined by zip code boundaries. An approximation to the I/M area was used to assign appropriate emission factors. The approximation was the area enclosed in the polygon defined by connecting the following points in order (values in lat-long coordinates): A = 122.438333, 47.870278; B = 122.185833, 47.870278; C = 122.185833, 47.781944; D = 122.045278, 47.781944; E = 122.045278, 47.431111, F = 122.438333, 47.431111.

Outside of the I/M area, factors generated in 1.1 above were used. Within the I/M area, emission factors from both 1.1 and 1.2 were used. There are vehicles operating in the test area which have entered from outside the area. A 1987 compliance survey found 82.9% of the vehicles in the Bellevue area came within the area. In order to account for this, the emission factors used for VMT inside of the I/M testing area were weighted using the formula: (survey rate = 0.829) x (factors calculated with I/M) + (1 - survey rate = 0.171) x (factors calculated without I/M).

2. Emissions Calculations

VMT data by link defined with A and B node coordinates was compiled into a database. An I/M area flag was generated using the A and B coordinates. If both A and B were contained in the I/M polygon, then the I/M flag was set to YES. If either A or B was not in the I/M polygon, then the I/M flag was set to NO.

The emission factors generated above were put into "lookup" tables. These tables included speed, emission factors and an I/M area flag.

The VMT files and the emission factor files were linked by matching speeds and the I/M flag. The VMT estimates were then multiplied by the emission factors and VMT mix to get emission rates. The links were then summed for the total on-road vehicle emission rate by county, roadway classification and vehicle class. Roadway classification was provided by the PSRC, and was different than those used by HPMS.

3. Seasonal Adjustment

The VMT data provided by the PSRC represented weekday traffic. The Dept. of Transportation provided monthly adjustment factors for interstate and non-interstate volume based on traffic counts ("Adjustment Factors for Vehicle Miles Traveled"). The average of the factors for Jul. - Sep. was used to adjust VMT and emissions. The interstate factor (1.081) was applied to the freeways category, and the non-interstate factor (1.051) was used for all the other roadway classifications. Emissions are detailed in the following tables.

Puget Sound Ozone (Base Year 1990) On-road Mobile Sources
Seasonally Adjusted Average Daily NOx Emissions in lb/day

HPMS Zone Name	Facility Type Name	Link Miles	Average Daily VMT	LDGV	LDGT1	LDGT2	ALL LDGT	HDGT	LDDV	LDDT	HDDT	MC	ALL VEHICLES
King	Freeway	315	13,103,816	29,066	10,666	5,352	16,018	5,991	481	111	38,369	228	90,094
	Multi-lane Limited Access	40	777,064	1,608	588	296	884	332	26	5	2,038	12	4,896
	Urban Arterial	593	5,286,292	11,057	3,936	2,013	5,949	2,117	179	39	14,005	75	33,360
	Urban One-way Arterial	39	448,448	956	333	171	504	173	16	3	1,261	6	2,915
	Centroid Connector	615	2,845,817	6,310	2,096	1,106	3,201	1,015	118	25	9,248	33	19,909
	Other Arterial	1,142	8,480,086	17,721	6,365	3,248	9,612	3,415	281	60	22,223	119	53,341
	Local	0	3,574,757	7,945	2,626	1,389	4,016	1,269	149	32	11,680	39	25,077
	Total	2,743	34,516,279	74,663	26,610	13,575	40,185	14,312	1,249	275	98,824	511	229,592
Snohomish	Freeway	85	3,648,424	8,577	3,162	1,586	4,748	1,709	141	34	11,339	67	26,566
	Multi-lane Limited Access	6	58,381	139	50	25	76	26	2	1	178	1	421
	Urban Arterial	75	579,650	1,220	441	225	666	234	19	4	1,526	8	3,673
	Centroid Connector	160	764,512	1,703	568	300	867	272	32	7	2,487	8	5,365
	Other Arterial	498	2,948,070	6,136	2,225	1,131	3,356	1,203	97	20	7,624	43	18,447
	Local	0	1,323,006	2,958	985	521	1,506	470	56	12	4,323	15	9,319
	Total	824	9,322,043	20,731	7,431	3,788	11,219	3,915	345	78	27,476	143	63,792
Pierce	Freeway	97	4,046,787	9,452	3,498	1,754	5,253	1,892	156	37	12,465	75	29,278
	Multi-lane Limited Access	19	339,436	708	263	132	395	149	12	3	907	5	2,175
	Urban Arterial	266	2,009,192	4,211	1,537	782	2,319	821	66	14	5,222	29	12,663
	Urban One-way Arterial	0	3,543	7	3	1	4	1	0	0	9	0	23
	Centroid Connector	276	1,070,122	2,341	806	421	1,228	397	40	9	3,185	13	7,197
	Other Arterial	650	3,495,677	7,309	2,676	1,359	4,035	1,438	114	24	9,028	53	21,964
	Local	0	1,189,735	2,667	892	472	1,364	423	49	11	3,888	13	8,399
	Total	1,309	12,154,492	26,696	9,675	4,922	14,597	5,120	436	98	34,704	187	81,699
Outside	Freeway	158	2,920,216	7,020	2,588	1,299	3,887	1,364	116	28	9,159	56	21,586
	Multi-lane Limited Access	295	1,805,525	3,789	1,402	705	2,107	801	62	15	4,959	29	11,741
	Urban Arterial	40	194,087	414	145	75	220	76	7	1	541	2	1,260
	Centroid Connector	784	2,020,597	4,704	1,694	865	2,559	851	76	19	6,037	33	14,249
	Other Arterial	1,378	3,779,877	7,919	2,918	1,475	4,392	1,607	125	27	9,973	59	24,064
	Local	0	2,696,316	6,044	2,020	1,070	3,090	957	112	24	8,809	29	19,032
	Total	2,654	13,416,618	29,891	10,767	5,489	16,255	5,657	498	114	39,479	209	91,932
	Grand Total	7,531	69,409,433	151,981	54,483	27,774	82,256	29,004	2,529	565	200,482	1,049	467,015

Puget Sound Ozone (Base Year 1990) On-road Mobile Sources
Seasonally Adjusted PM Peak Period (3 hrs) NOx Emissions in lb/3 hrs

HPMS Zone Name	Facility Type Name	Link Miles	PM Peak (3hrs) VMT	LDGV	LDGT1	LDGT2	ALL LDGT	HDGT	LDDV	LDDT	HDDT	MC	ALL VEHICLES
King	Freeway	305	3,592,285	7,733	2,828	1,425	4,253	1,576	126	28	9,966	58	23,697
	Multi-lane Limited Access	40	275,958	575	207	105	312	114	9	2	733	4	1,746
	Urban Arterial	605	1,889,244	3,986	1,403	721	2,124	742	65	15	5,134	25	12,071
	Urban One-way Arterial	40	150,426	324	111	58	169	57	5	1	438	2	996
	Centroid Connector	619	905,795	2,028	672	354	1,026	321	38	8	3,022	11	6,442
	Other Arterial	1,212	3,058,526	6,456	2,288	1,174	3,462	1,204	104	23	8,257	41	19,516
	Local	0	1,130,322	2,512	830	439	1,270	401	47	9	3,693	13	7,929
	Total	2,821	11,002,556	23,615	8,339	4,276	12,615	4,415	396	87	31,242	154	72,396
Snohomish	Freeway	85	992,296	2,225	820	412	1,232	452	37	9	2,904	17	6,862
	Multi-lane Limited Access	6	19,176	45	17	8	25	8	1	0	58	0	139
	Urban Arterial	81	209,276	441	160	81	241	84	7	1	557	3	1,333
	Centroid Connector	160	243,686	545	182	96	277	86	11	2	809	3	1,731
	Other Arterial	508	1,035,498	2,166	779	397	1,176	415	35	7	2,708	15	6,513
	Local	0	418,768	936	312	165	477	148	18	4	1,368	4	2,950
	Total	840	2,918,699	6,359	2,270	1,159	3,429	1,194	108	23	8,405	43	19,528
Pierce	Freeway	97	1,155,110	2,559	948	476	1,424	522	42	10	3,323	19	7,886
	Multi-lane Limited Access	20	102,394	214	79	40	119	43	3	1	269	1	650
	Urban Arterial	274	685,873	1,443	523	267	790	277	23	5	1,796	9	4,337
	Urban One-way Arterial	0	929	2	1	0	1	0	0	0	3	0	6
	Centroid Connector	276	341,700	750	257	135	392	126	13	3	1,032	4	2,316
	Other Arterial	673	1,197,251	2,517	914	466	1,380	485	40	8	3,137	17	7,572
	Local	0	376,601	844	283	149	432	133	16	3	1,231	4	2,659
	Total	1,340	3,859,858	8,330	3,006	1,532	4,538	1,587	137	31	10,791	55	25,427
Outside	Freeway	156	852,549	2,008	736	371	1,107	386	32	8	2,600	15	6,145
	Multi-lane Limited Access	295	547,891	1,156	424	214	638	238	19	4	1,526	8	3,584
	Urban Arterial	40	60,441	131	45	23	68	23	2	0	181	1	407
	Centroid Connector	785	615,329	1,415	509	260	768	257	23	5	1,817	9	4,287
	Other Arterial	1,384	1,268,126	2,659	975	494	1,469	534	42	9	3,350	20	8,071
	Local	0	860,760	1,930	645	342	987	306	36	7	2,812	9	6,076
	Total	2,660	4,205,095	9,299	3,334	1,703	5,038	1,744	154	34	12,286	63	28,570
	Grand Total	7,661	21,986,208	47,604	16,949	8,671	25,620	8,939	795	175	62,724	315	145,920

Puget Sound Ozone (Base Year 1990) On-road Mobile Sources
Seasonally Adjusted Average Daily VOC Emissions in lb/day

HPMS Zone Name	Facility Type Name	Link Miles	Average Daily VMT	LDGV	LDGT1	LDGT2	ALL LDGT	HDGT	LDDV	LDDT	HDDT	MC	ALL VEHICLES
King	Freeway	315	13,103,816	39,109	13,006	7,826	20,832	8,571	116	29	3,379	1,455	73,273
	Multi-lane Limited Access	40	777,064	2,557	854	511	1,365	560	7	2	239	88	4,805
	Urban Arterial	593	5,286,292	20,376	6,966	4,083	11,049	4,413	66	17	2,015	642	38,475
	Urban One-way Arterial	39	448,448	2,008	696	403	1,098	431	6	2	200	58	3,793
	Centroid Connector	615	2,845,817	17,050	6,003	3,389	9,393	3,647	56	14	1,716	421	32,222
	Other Arterial	1,142	8,480,086	32,637	11,135	6,489	17,624	6,930	105	30	3,144	1,018	61,317
	Local	0	3,574,757	21,448	7,561	4,262	11,823	4,609	70	16	2,183	528	40,581
	Total	2,743	34,516,279	135,186	46,221	26,963	73,184	29,161	427	110	12,875	4,211	254,467
Snohomish	Freeway	85	3,648,424	10,985	3,662	2,183	5,845	2,327	30	8	889	409	20,435
	Multi-lane Limited Access	6	58,381	199	67	40	107	41	1	0	17	6	370
	Urban Arterial	75	579,650	2,327	794	457	1,251	480	7	2	215	69	4,341
	Centroid Connector	160	764,512	4,680	1,648	923	2,571	985	15	3	462	112	8,809
	Other Arterial	498	2,948,070	10,972	3,721	2,173	5,894	2,316	35	9	1,034	348	20,550
	Local	0	1,323,006	8,240	2,904	1,620	4,524	1,722	26	6	808	195	15,484
	Total	824	9,322,043	37,403	12,796	7,395	20,191	7,871	114	29	3,426	1,140	69,990
Pierce	Freeway	97	4,046,787	12,407	4,134	2,448	6,582	2,597	35	9	991	452	23,008
	Multi-lane Limited Access	19	339,436	1,104	367	217	583	234	3	1	96	38	2,053
	Urban Arterial	266	2,009,192	7,763	2,633	1,522	4,155	1,602	24	5	707	238	14,454
	Urban One-way Arterial	0	3,543	17	5	3	8	3	0	0	1	0	30
	Centroid Connector	276	1,070,122	5,778	2,022	1,132	3,154	1,184	18	5	552	146	10,812
	Other Arterial	650	3,495,677	13,207	4,469	2,590	7,059	2,723	40	9	1,199	410	24,579
	Local	0	1,189,735	7,557	2,662	1,477	4,139	1,555	23	5	726	176	14,151
	Total	1,309	12,154,492	47,832	16,292	9,388	25,680	9,899	143	35	4,272	1,459	89,086
Outside	Freeway	158	2,920,216	9,016	3,012	1,789	4,801	1,882	23	6	725	331	16,740
	Multi-lane Limited Access	295	1,805,525	5,755	1,914	1,134	3,048	1,234	17	4	501	200	10,729
	Urban Arterial	40	194,087	872	302	173	475	185	3	1	85	25	1,641
	Centroid Connector	784	2,020,597	8,210	2,823	1,614	4,437	1,663	22	7	728	249	15,282
	Other Arterial	1,378	3,779,877	13,304	4,466	2,613	7,078	2,779	40	8	1,183	432	24,756
	Local	0	2,696,316	17,108	6,027	3,344	9,372	3,524	54	12	1,647	398	32,043
	Total	2,654	13,416,618	54,265	18,543	10,668	29,211	11,266	158	39	4,870	1,635	101,190
	Grand Total	7,531	69,409,433	274,686	93,852	54,415	148,267	58,198	842	213	25,444	8,445	514,734

Puget Sound Ozone (Base Year 1990) On-road Mobile Sources
Seasonally Adjusted PM Peak Period (3 hrs) VOC Emissions in lb/3 hrs

HPMS Zone Name	Facility Type Name	Link Miles	PM Peak (3hrs) VMT	LDGV	LDGT1	LDGT2	ALL LDGT	HDGT	LDDV	LDDT	HDDT	MC	ALL VEHICLES
King	Freeway	305	3,592,285	11,584	3,875	2,311	6,187	2,515	35	9	1,045	406	21,721
	Multi-lane Limited Access	40	275,958	1,021	346	204	550	221	3	1	98	33	1,921
	Urban Arterial	605	1,889,244	7,804	2,687	1,565	4,252	1,686	25	6	779	236	14,751
	Urban One-way Arterial	40	150,426	754	262	150	412	158	2	1	73	21	1,416
	Centroid Connector	619	905,795	6,079	2,132	1,204	3,337	1,245	19	4	569	142	11,368
	Other Arterial	1,212	3,058,526	12,753	4,388	2,538	6,926	2,706	41	12	1,244	382	23,997
	Local	0	1,130,322	6,781	2,390	1,347	3,737	1,458	22	5	691	167	12,831
	Total	2,821	11,002,556	46,775	16,081	9,320	25,401	9,989	147	38	4,498	1,387	88,004
Snohomish	Freeway	85	992,296	3,085	1,028	612	1,640	657	9	2	261	111	5,749
	Multi-lane Limited Access	6	19,176	66	22	13	35	14	0	0	5	2	123
	Urban Arterial	81	209,276	867	296	170	467	179	3	1	81	25	1,619
	Centroid Connector	160	243,686	1,571	554	310	864	328	5	1	152	37	2,951
	Other Arterial	508	1,035,498	4,045	1,381	802	2,183	852	13	3	387	125	7,588
	Local	0	418,768	2,609	919	513	1,431	544	8	2	255	62	4,901
	Total	840	2,918,699	12,244	4,200	2,420	6,620	2,574	38	10	1,141	363	22,931
Pierce	Freeway	97	1,155,110	3,673	1,224	723	1,947	773	11	2	307	129	6,824
	Multi-lane Limited Access	20	102,394	366	123	71	194	77	1	0	33	12	680
	Urban Arterial	274	685,873	2,743	934	538	1,472	564	8	2	252	82	5,111
	Urban One-way Arterial	0	929	4	2	1	3	1	0	0	0	0	8
	Centroid Connector	276	341,700	1,903	666	372	1,038	390	6	2	181	47	3,560
	Other Arterial	673	1,197,251	4,777	1,627	936	2,563	982	15	3	438	143	8,898
	Local	0	376,601	2,392	843	468	1,311	492	7	2	230	56	4,479
	Total	1,340	3,859,858	15,859	5,419	3,110	8,529	3,278	49	12	1,441	468	29,561
Outside	Freeway	156	852,549	2,806	945	557	1,502	586	8	2	238	98	5,226
	Multi-lane Limited Access	295	547,891	1,926	647	379	1,027	410	6	1	171	63	3,595
	Urban Arterial	40	60,441	333	116	66	182	67	1	0	30	8	620
	Centroid Connector	785	615,329	2,522	868	496	1,364	512	7	2	226	76	4,698
	Other Arterial	1,384	1,268,126	4,583	1,544	901	2,445	955	14	3	411	146	8,536
	Local	0	860,760	5,461	1,924	1,068	2,992	1,125	17	4	526	127	10,229
	Total	2,660	4,205,095	17,633	6,044	3,467	9,511	3,655	53	13	1,602	519	32,905
	Grand Total	7,661	21,986,208	92,509	31,744	18,317	50,061	19,497	287	72	8,682	2,736	173,400

Puget Sound Ozone (Base Year 1990) On-road Mobile Sources
Seasonally Adjusted Average Daily CO Emissions in lb/day

HPMS Zone Name	Facility Type Name	Link Miles	Average Daily VMT	LDGV	LDGT1	LDGT2	ALL LDGT	HDGT	LDDV	LDDT	HDDT	MC	ALL VEHICLES
King	Freeway	315	13,103,816	221,642	82,472	36,568	119,040	76,212	239	58	11,869	2,818	430,891
	Multi-lane Limited Access	40	777,064	13,204	4,863	2,230	7,093	4,780	17	3	794	169	26,000
	Urban Arterial	593	5,286,292	118,222	44,097	20,446	64,543	40,270	142	32	6,858	1,536	231,066
	Urban One-way Arterial	39	448,448	12,695	4,751	2,241	6,991	4,234	15	3	717	166	24,765
	Centroid Connector	615	2,845,817	124,920	46,406	22,670	69,076	41,186	137	32	6,792	1,574	243,173
	Other Arterial	1,142	8,480,086	195,004	72,432	33,728	106,159	63,099	217	50	10,551	2,365	376,595
	Local	0	3,574,757	157,530	58,497	28,533	87,029	52,267	173	39	8,621	1,962	306,942
	Total	2,743	34,516,279	843,216	313,516	146,415	459,932	282,048	939	217	46,201	10,590	1,639,432
Snohomish	Freeway	85	3,648,424	75,186	27,940	12,419	40,358	21,949	65	16	3,243	877	141,385
	Multi-lane Limited Access	6	58,381	1,427	532	240	771	393	1	0	61	17	2,665
	Urban Arterial	75	579,650	14,998	5,502	2,613	8,115	4,522	15	3	728	163	28,483
	Centroid Connector	160	764,512	35,742	13,201	6,493	19,694	11,291	37	8	1,825	417	68,864
	Other Arterial	498	2,948,070	64,690	23,885	11,144	35,029	20,700	70	16	3,427	763	124,418
	Local	0	1,323,006	64,049	23,608	11,646	35,254	19,894	64	15	3,191	726	122,929
	Total	824	9,322,043	256,092	94,666	44,554	139,220	78,750	252	58	12,475	2,963	488,745
Pierce	Freeway	97	4,046,787	85,922	31,775	14,253	46,028	24,726	71	17	3,596	950	160,966
	Multi-lane Limited Access	19	339,436	6,064	2,205	1,023	3,228	2,062	6	1	321	65	11,722
	Urban Arterial	266	2,009,192	48,911	17,868	8,476	26,344	14,757	49	11	2,367	524	92,764
	Urban One-way Arterial	0	3,543	117	43	21	64	34	0	0	5	1	220
	Centroid Connector	276	1,070,122	43,677	16,108	7,853	23,961	12,922	42	9	2,060	470	82,965
	Other Arterial	650	3,495,677	81,933	29,967	14,152	44,119	24,729	82	18	3,968	879	155,390
	Local	0	1,189,735	60,398	22,185	11,003	33,187	18,158	58	13	2,869	653	115,094
	Total	1,309	12,154,492	327,023	120,150	56,781	176,931	97,388	309	69	15,186	3,542	619,121
Outside	Freeway	158	2,920,216	66,463	24,633	11,005	35,637	17,939	53	13	2,653	770	123,266
	Multi-lane Limited Access	295	1,805,525	31,111	11,392	5,233	16,625	10,999	35	8	1,695	343	60,676
	Urban Arterial	40	194,087	5,776	2,141	1,021	3,161	1,842	6	1	304	69	11,136
	Centroid Connector	784	2,020,597	63,134	23,396	10,905	34,301	16,794	51	13	2,606	684	117,337
	Other Arterial	1,378	3,779,877	78,224	28,586	13,378	41,964	24,835	81	17	3,937	856	149,587
	Local	0	2,696,316	136,544	50,162	24,873	75,035	41,120	130	29	6,504	1,480	260,292
	Total	2,654	13,416,618	381,251	140,310	66,414	206,724	113,530	357	81	17,699	4,201	722,294
	Grand Total	7,531	69,409,433	1,807,582	668,643	314,164	982,807	571,715	1,856	425	91,561	21,296	3,469,592

Puget Sound Ozone (Base Year 1990) On-road Mobile Sources
Seasonally Adjusted PM Peak Period (3 hrs) CO Emissions in lb/3 hrs

HPMS Zone Name	Facility Type Name	Link Miles	PM Peak (3hrs) VMT	LDGV	LDGT1	LDGT2	ALL LDGT	HDGT	LDDV	LDDT	HDDT	MC	ALL VEHICLES
King	Freeway	305	3,592,285	64,902	24,025	10,890	34,915	22,131	72	17	3,564	815	126,129
	Multi-lane Limited Access	40	275,958	5,786	2,147	998	3,146	1,990	6	1	333	75	11,311
	Urban Arterial	605	1,889,244	47,378	17,713	8,273	25,986	15,982	56	13	2,718	616	92,535
	Urban One-way Arterial	40	150,426	4,970	1,858	890	2,748	1,604	5	1	269	66	9,642
	Centroid Connector	619	905,795	45,172	16,761	8,293	25,055	14,097	46	11	2,307	576	87,070
	Other Arterial	1,212	3,058,526	80,222	29,858	14,031	43,889	25,809	88	20	4,311	977	154,969
	Local	0	1,130,322	49,797	18,492	9,020	27,512	16,526	55	13	2,726	620	97,034
	Total	2,821	11,002,556	298,227	110,855	52,396	163,251	98,139	329	75	16,229	3,745	578,690
Snohomish	Freeway	85	992,296	19,226	7,098	3,200	10,298	5,997	18	4	913	223	36,599
	Multi-lane Limited Access	6	19,176	478	178	80	257	130	0	0	20	5	891
	Urban Arterial	81	209,276	5,699	2,093	997	3,090	1,715	5	1	276	62	10,825
	Centroid Connector	160	243,686	12,178	4,495	2,227	6,722	3,805	13	3	613	144	23,426
	Other Arterial	508	1,035,498	24,654	9,135	4,274	13,410	7,816	26	6	1,299	292	47,398
	Local	0	418,768	20,274	7,473	3,687	11,160	6,298	20	4	1,010	230	38,912
	Total	840	2,918,699	82,508	30,471	14,465	44,936	25,761	82	19	4,132	956	158,052
Pierce	Freeway	97	1,155,110	22,936	8,420	3,839	12,259	7,090	22	5	1,067	251	43,534
	Multi-lane Limited Access	20	102,394	2,173	795	372	1,167	686	2	0	108	23	4,153
	Urban Arterial	274	685,873	17,708	6,488	3,084	9,571	5,291	18	4	849	189	33,558
	Urban One-way Arterial	0	929	35	13	6	19	11	0	0	2	0	65
	Centroid Connector	276	341,700	14,569	5,369	2,630	7,998	4,306	14	3	684	158	27,673
	Other Arterial	673	1,197,251	30,800	11,301	5,362	16,664	9,190	30	6	1,476	330	58,371
	Local	0	376,601	19,119	7,023	3,483	10,506	5,748	18	4	908	207	36,432
	Total	1,340	3,859,858	107,339	39,408	18,775	58,183	32,322	104	23	5,094	1,158	203,786
Outside	Freeway	156	852,549	20,099	7,464	3,363	10,827	5,581	17	4	851	235	37,533
	Multi-lane Limited Access	295	547,891	11,291	4,142	1,939	6,081	3,837	13	3	598	125	21,899
	Urban Arterial	40	60,441	2,368	879	431	1,310	714	2	1	116	29	4,529
	Centroid Connector	785	615,329	19,027	7,051	3,295	10,346	5,158	16	4	805	206	35,487
	Other Arterial	1,384	1,268,126	27,452	10,051	4,715	14,765	8,641	28	6	1,375	301	52,455
	Local	0	860,760	43,588	16,013	7,940	23,953	13,127	42	9	2,076	473	83,092
	Total	2,660	4,205,095	123,825	45,600	21,683	67,283	37,059	118	28	5,820	1,369	234,995
	Grand Total	7,661	21,986,208	611,900	226,333	107,320	333,653	193,280	633	146	31,274	7,228	1,175,523

ON-ROAD QUALITY CONTROL/ASSURANCE

Estimating emissions from on-road mobile sources required developing emission factors to be used with vehicle miles traveled data. Derivation of VMT was documented by the PSRC and DOT and may be found in the text above. The focus of QA in this section is on MOBILE4.1 runs and the combining of the resulting emissions factors with the VMT data.

Prioritizing Sources and Data Elements

Fields for which there were no MOBILE4.1 defaults were priority fields. One additional priority field was the model year registration distribution. A distribution specific to Washington was developed using State Dept. of Licensing data.

Data Sources

The PSRC was identified as the only agency that could provide link VMT data necessary for modeling. The WSDOT provided HPMS values to the PSRC so that adjustments could be made to their network model output. The WSDOT supplied seasonal, daily and hourly adjustment factors based on traffic counts. More detail on data sources used to estimate emissions are documented in the inventory text.

Emission Estimation Methods and Consistency of Application

All MOBILE4.1 inputs are fully documented in the inventory text. Sample input and output files are provided in hardcopy. All input and output files are available on disk on request from EPA. Use of emission factors and VMT data are also explained in the inventory text. All databases and spreadsheets used for calculating emissions may also be made available for review.

Calculations

Calculations were performed by calculated fields in database files. Summaries were obtained using computer programs to total emissions by county, roadway classification and vehicle type. Seasonal summaries were obtained using calculated fields in report definitions. Again, these are available at request.

Seasonal Adjustment and Typical Day

Verified air quality violation data was used to determine the three month ozone season (Jul-Sept, documented above). The VMT provided by the PSRC represented a typical weekday, so no daily adjustment was necessary. A peak period adjustment was not made since that also was specifically provided by the PSRC. A monthly adjustment was made using WSDOT estimates from traffic data. The average monthly adjustment value for Jul-Sept was used.

Geographical Allocation

The VMT provided was specifically for the non-attainment area; therefore, no adjustments were necessary.

Validation Procedures

Externally, the inventory was reviewed by EPA and Radian Corp. An independent review (by inventory personnel not involved with on-road emissions estimations) was done to ensure reasonableness and consistency of data and calculations. It was performed as the inventory was being completed and during proofing of the draft. The entire process was checked from beginning to end for each of the files used. Because file names were coded to specific M4.1 runs and specific inventories, many of the checks concerned making sure that files were named properly (i.e. they contain the information they are supposed to contain). Checks performed ensured that:

1. M4.1 input files contain the flag settings and inputs documented in the inventory text
2. all calculations (temperature, RVP, I/M parameters) were accurate
3. M4.1 input files matched the output files (proper naming of files)
4. the files used to capture the M4.1 output data were named properly
5. I/M factors were applied as specified in the inventory text
6. the right emission factors were combined with the VMT data (speed, pollutant, I/M area had to match.
7. summary file totals matched the link by link files emissions totals
8. hardcopy summaries match the database summary files

The EPA QA standard range checklist was used to check data. Results were compared to previous area source work, particularly to the 1988 SIP effort. Data was also reviewed by PSAPCA.

AREA MOBILE SOURCE (AMS) CATEGORY CODES USED

While Jul-Sept was the three month period chosen according to MOBILE4.1 guidance, the default in AMS states Jun-Aug. Activity level, period throughput and operating schedule, and emission factors were entered so as to produce the correct annual and seasonal emissions.

Emissions estimates will vary slightly from the text since AMS assumed 364 days operation, rather than 365 in the period calculation.

Rural area emissions were obtained by apportioning the VMT occurring outside of the urban area to the three counties based on the proportion of the total urban VMT occurring in each county. Rural category codes are shown next to the urban codes.

AMS information should never be reviewed without the accompanying inventory text.

Common Data	Provider:	**S (State)**	Begin Month:	**July**
	EI Type:	**B (Base Year)**	End Month:	**September**
	Base Year:	**1990**	Emiss. Type:	**AC**
	State:	**53**		
	Counties:	**033,053,061**	Units CO Seas.:	**201 (Pounds)**
	Zone:	**none**	Pollutant Codes:	**CO, VOC, NO2**

Category		AMS Code
LDGV	Interstate	22-01-001-230, -110
	Principal Art.	22-01-001-270, -130
	Collector	22-01-001-310, -170
	Local	22-01-001-330, -210
LDGT1	Interstate	22-01-020-230, -110
	Principal Art.	22-01-020-270, -130
	Collector	22-01-020-310, -170
	Local	22-01-020-330, -210
LDGT2	Interstate	22-01-040-230, -110
	Principal Art.	22-01-040-270, -130
	Collector	22-01-040-310, -170
	Local	22-01-040-330, -210
LDGT	Interstate	22-01-060-230, -110
	Principal Art.	22-01-060-270, -130
	Collector	22-01-060-310, -170
	Local	22-01-060-330, -210
HDGT	Interstate	22-01-070-230, -110
	Principal Art.	22-01-070-270, -130
	Collector	22-01-070-310, -170
	Local	22-01-070-330, -210
LDDV	Interstate	22-30-001-230, -110
	Principal Art.	22-30-001-270, -130
	Collector	22-30-001-310, -170
	Local	22-30-001-330, -210

Category		AMS Code
LDDT	Interstate	22-30-060-230, -110
	Principal Art.	22-30-060-270, -130
	Collector	22-30-060-310, -170
	Local	22-30-060-330, -210
HDDT	Interstate	22-30-070-230, -110
	Principal Art.	22-30-070-270, -130
	Collector	22-30-070-310, -170
	Local	22-30-070-330, -210
MC	Interstate	22-01-080-230, -110
	Principal Art.	22-01-080-270, -130
	Collector	22-01-080-310, -170
	Local	22-01-080-330, -210

On-road mobile categories were chosen for the "best fit" of the functional classification categories. Categories provided by the PSRC were aggregated as follows: Freeway = Interstate, Multi-lane Limited Access + Urban Arterial + Urban One-way Arterial + Other Arterial = Principal Arterial, Centroid Connector = Collector, Local/Intrazonal = Local.