Portland-Vancouver Air Quality Maintenance Area (Oregon Portion) and Salem-Keizer Area Ozone Maintenance Plan

Oregon Department of Environmental Quality
811 SW Sixth Avenue
Portland, OR 97204

Adopted by the Environmental Quality Commission
February 22, 2007

Oregon State Implementation Plan
Section 4.50

Portland-Vancouver AQMA
(Oregon portion)
And
Salem-Keizer Area
8-hour Ozone Maintenance Plan

Table of Contents

For more information

If you have questions or would like more information, including a copy of the proposed rule revisions or appendices, please contact David Collier at DEQ's Air Quality Division in Portland at (503) 229-5946, or collier.david@deq.state.or.us.

List of Tables

List of Figures

Appendices

4.50.0 Acknowledgement and Summary

4.50.0.1 Acknowledgements

Without the efforts of numerous individuals in state and local governments who are dedicated to healthy air, this maintenance plan would not have been possible. Special appreciation goes to:

Principal Authors: Marianne Fitzgerald and David Collier, DEQ Air Quality Planning

Principal Contributors:

<u>Oregon Department of Environmental Quality</u>	
Andy Ginsburg	Division Administrator, Air Quality
Dick Pedersen`	Division Administrator, Northwest Region
David Collier	Manager, Air Quality Planning
Cory Ann Wind	Acting Manager, Northwest Region Air Quality
Cheryll Hutchens	Manager, Western Region Air Quality
Gerry Preston	Manager, Air Quality Technical Services
Jeffrey Stocum	Acting Manager, Air Quality Technical Services
Wes Risher	Air Quality Technical Services
Svetlana Lazarev	Air Quality Technical Services
Chris Swab	Air Quality Technical Services
Phil Allen	Air Quality Technical Services
Susan Drake	Northwest Region Air Quality
Karen White-Fallon	Western Region Air Quality
<u>Southwest Clean Air Agency</u>	
Bob Elliott	Executive Director
Paul Mairose	Chief Engineer
Wade Strange	Air Quality Engineer (former)
Laurie Hulse-Moyer	Air Quality Scientist
<u>Washington Department of Ecology</u>	
Doug Schneider	Air Quality Program, SIP Coordination
Clint Bowman	Air Quality Program, Meteorology
Sally Otterson	Air Quality Program, Emission Inventories
Cristiana Figueroa-Kaminsky	Air Quality Program (former)

<u>Metro</u>
Mark Turpel
Pam Peck
Andy Cotugno

<u>Salem-Keizer Area Transportation Study</u>
Mike Jaffe

4.50.0.2 Executive Summary

The Portland area has violated federal clean air standards for ground level ozone (commonly known as smog) as recently as 1998. In 1996, the Oregon Department of Environmental Quality (DEQ) and the Southwest Clean Air Agency (SWCAA) developed Ozone Maintenance Plans for the Portland-Vancouver Air Quality Maintenance Area (AQMA) that included several strategies to reduce air pollutants and ensure compliance with the one-hour ozone standard. These strategies were successful in reducing smog forming emissions and no violations of the ozone standard have occurred in the Portland-Vancouver area since 1998.

In 1997, the U. S. Environmental Protection Agency (EPA) revised the national ambient air quality standard (NAAQS) for ozone from a one-hour average of 0.12 parts per million (ppm) to an 8-hour average of 0.08 ppm, and in 2005 EPA revoked the one-hour ozone standard. This 2006 ozone maintenance plan is a revision to the 1996 maintenance plan for the Portland-Vancouver area, and ensures continued compliance with the new 8-hour ozone standard through at least 2015. The plan also includes an ozone maintenance plan for the Salem-Keizer Area Transportation Study (SKATS) air quality area. Both the Portland-Vancouver and Salem areas are included in the ozone modeling and maintenance analysis. An ozone maintenance plan update for the Vancouver portion of the Portland-Vancouver AQMA is being prepared by the Southwest Clean Air Agency in Vancouver, Washington. These plans are required by the federal Clean Air Act, federal regulations and EPA guidance.

This 2006 maintenance plan continues the same strategies adopted for the Portland-Vancouver AQMA in 1996 to reduce and manage volatile organic compounds (VOC) and nitrogen oxide (NO_x) emissions. Air quality data and projections show that ozone levels can still occasionally approach or exceed the 8-hour ozone standard in the Portland-Vancouver area, but that with the existing strategies in place, both the Portland and Salem areas will maintain compliance with the 8-hour ozone standard. The suite of strategies described below work together to protect air quality as growth and population pressures increase over the next ten years. Implementing this suite of strategies will also reduce emissions of air toxics and greenhouse gases that are important emerging issues of concern.

The following strategies will remain in the Portland-Vancouver Ozone Maintenance Plan as they currently apply to sources in the Portland area:

- Motor Vehicle Inspection Program;
- Emission Standards for Industrial Sources of VOC;
- New Source Review Program for new and expanding major industrial facilities;
- Voluntary Parking Ratio Rules;
- Barge Loading Rules that control VOCs from gasoline delivery operations;
- Aerosol Paint Rules that lower VOC content from spray paints sold in the Portland area;
- Motor Vehicle Refinishing Rules that require low-emitting painting methods at autobody repair shops; and
- Public education and outreach that encourages people to voluntarily reduce emissions, such as not mowing lawns and driving less on Clean Air Action Days (now called Air Pollution Advisories).

Strategies that have reduced VOC emissions in the Salem SKATS air quality area will also remain in place, including emission standards for existing industrial sources of VOC.

The 2006 maintenance plan includes updates to several programs:

- Revised rules for Employee Commute Options in the Portland Area to reduce administrative burdens while maintaining alternative commute programs at larger employers;
- Updated rules for Industrial Emission Management in the Portland area, to reestablish the growth allowance for new and expanding major industrial sources and ensure that the ozone standard will not be violated even under conservative industrial growth assumptions;
- Designated Salem/SKATS as an ozone maintenance area under state rules;
- Revised rules for new and expanding major industrial sources in the Salem area, to remove the most stringent industrial emission control equipment requirements for sources in nonattainment areas, known as Lowest Achievable Emission Rate, and replace them with emission control requirements known as Best Achievable Control Technology that are consistent with what is required in Portland and continue to provide a high level of emission control; and
- Amended DEQ rules to reflect the new federal ozone air quality standard, from the old one-hour standard (which EPA has revoked) to the current federal 8-hour standard of 0.08 ppm, three year rolling average.

DEQ is tracking legal issues which may result in a need to amend the maintenance plan in the future. This maintenance plan was prepared under the guidance of EPA's 2004 Final Rule to Implement the 8-Hour Ozone NAAQS-Phase 1 (69 FR 23951, 40 CFR 51.900). On December 22, 2006 the U.S. Court of Appeals released a decision to "vacate the 2004 rule and remand the matter to EPA" (*South Coast Air Quality Management District v. EPA*). In particular, the court ruled that certain requirements adopted for the 1-hour ozone standard, such as conformity and contingency plans, must be retained to prevent backsliding. Depending on how EPA interprets the court's decision in new guidance and rules, this maintenance plan may need to be amended. In the interim, the existing 1-hour ozone maintenance plan requirements will remain federally enforceable until EPA approves this 8-hour ozone maintenance plan.

4.50.1 Background

Ground level ozone, also known as smog, is an air pollutant formed in the atmosphere by a chemical reaction of volatile organic compounds (VOC) and oxides of nitrogen (NO_x). This reaction is most intense on hot summer days with poor ventilation. Ozone is a strong respiratory system irritant that aggravates respiratory illnesses, impairs athletic performance, and can cause permanent respiratory system damage. Ozone can be especially harmful to older people and children, and can damage crops and other materials. In the past, motor vehicles and industrial operations have been the major sources of ozone precursors. Now, other sources such as household products, paints, construction equipment, watercraft and lawnmowers are major contributors to ozone formation.

Historically, the Portland-Vancouver and Salem-Keizer areas violated the national ambient air quality standard (NAAQS) for ground level ozone[1]. The Portland-Vancouver Air Quality Maintenance Area (AQMA) and the Salem-Keizer Area Transportation Study (SKATS) areas were designated nonattainment for ozone on March 3, 1978 under the 1977 Clean Air Act Amendments. Plans were subsequently developed to reduce ozone precursor emissions of VOC and NO_x, and bring the areas into compliance (attainment) with standards. Under the 1990 Clean Air Act Amendments, the Portland-Vancouver AQMA was designated a "marginal"

[1] Ozone monitoring sites were established in Oregon beginning in the early 1970s (see Appendix D10-1).

ozone nonattainment area, and Salem-Keizer Transportation Area Study was designated "nonattainment/insufficient data".

4.50.1.1 Portland-Vancouver AQMA

Over several decades, efforts to reduce smog forming emissions in the Portland area have included a combination of federal, state, and local emission control strategies. The first State Implementation Plan was adopted in 1972; the first Portland-Vancouver AQMA Ozone Attainment Plan was adopted on July 16, 1982 and approved by EPA on October 7, 1982. Some of the control strategies in the 1982 ozone attainment plan included a vehicle inspection and maintenance program for Portland-area motor vehicles (1975), motor vehicle trip reduction and traffic flow improvements and measures; and industrial VOC controls (1978). Area source controls on gasoline station vapors were added in 1991. The original ozone maintenance plans for Portland-Vancouver were adopted by the Oregon Environmental Quality Commission (EQC) on July 12, 1996 and the Board of Directors of the Southwest Air Pollution Control Authority on March 19, 1996. The Portland and Vancouver Interstate AQMA Ozone Maintenance Plans were approved by EPA on May 19, 1997 (62 FR 27204).

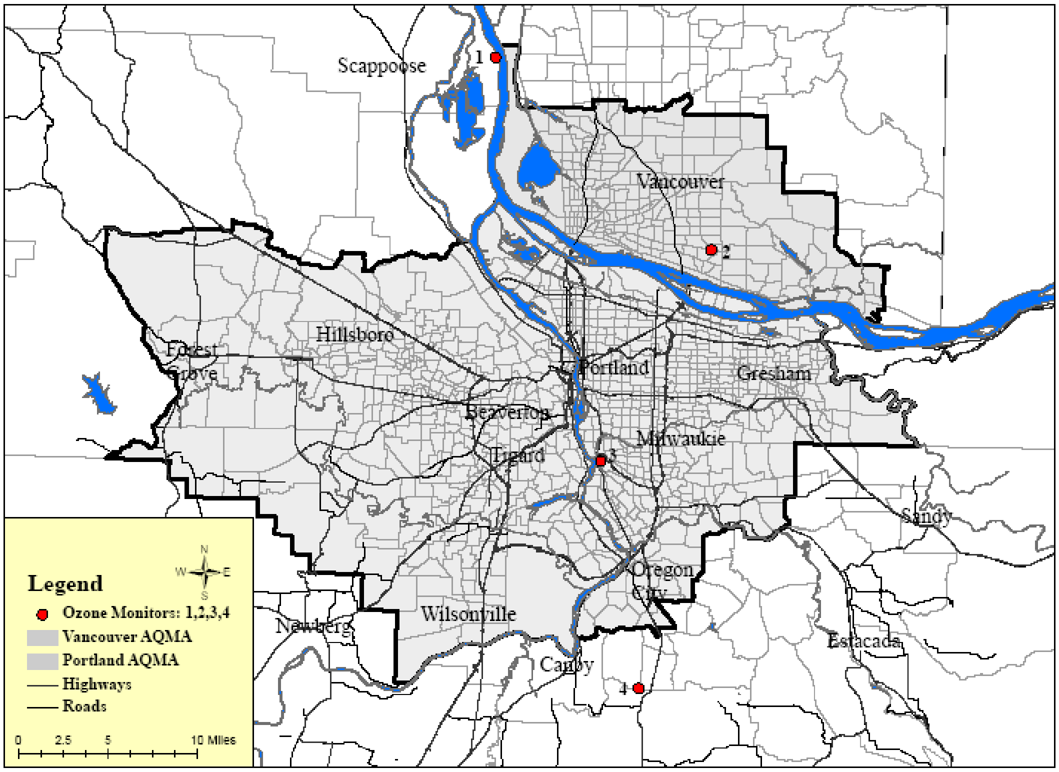
A violation of the one-hour ozone standard did occur in July 1998 at the Carus monitoring site (see Appendix D10-1). The violation occurred during a time when the one-hour ozone standard was temporarily revoked so it did not trigger the one-hour ozone contingency plan. DEQ's analysis demonstrated that this violation occurred before all emission reduction measures had been fully implemented so no additional measures were needed. Since 1998, there have been no violations of the one-hour ozone standard, and no violations of the 8-hour ozone standard.

In 1997, the U. S. Environmental Protection Agency (EPA) revised the ozone standard from a one-hour average of 0.12 parts per million (ppm) to an 8-hour average of 0.08 ppm. After a lengthy legal challenge, the courts upheld the 8-hour ozone standard in 2002. EPA adopted rules to implement the 8-hour ozone standard on April 30, 2004, and revoked the one-hour standard effective June 15, 2005. EPA designated the State of Oregon "Unclassifiable/Attainment" with the 8-hour ozone standard, effective June 15, 2004 (69 FR 23858, April 30, 2004).

EPA rules to implement the 8-hour ozone standard (69 FR 23951, April 30, 2004) require DEQ to prepare this 2006 maintenance plan update for the Portland-Vancouver area to ensure continued compliance with the 8-hour ozone standard. In accordance with the same EPA rules, Oregon also requests that EPA remove the obligation to prepare a second one-hour ozone maintenance plan.

Meteorological and population growth factors over the past ten years indicate that the number of days with elevated ozone levels should have risen, but instead has remained relatively stable (see Appendix D10-2). Ozone levels have been going down slightly while the population and vehicle miles traveled continued to grow. An analysis that compared episodes with the highest ozone values in 1998 with episodes with similar meteorology in 2003 showed that maximum ozone values were lower in 2003 than 1998 despite similar temperatures, wind speeds and solar radiation levels. This stable ozone trend indicates that the ozone strategies that reduced emissions are working.

Figure 1: Portland-Vancouver Interstate Air Quality Maintenance Area

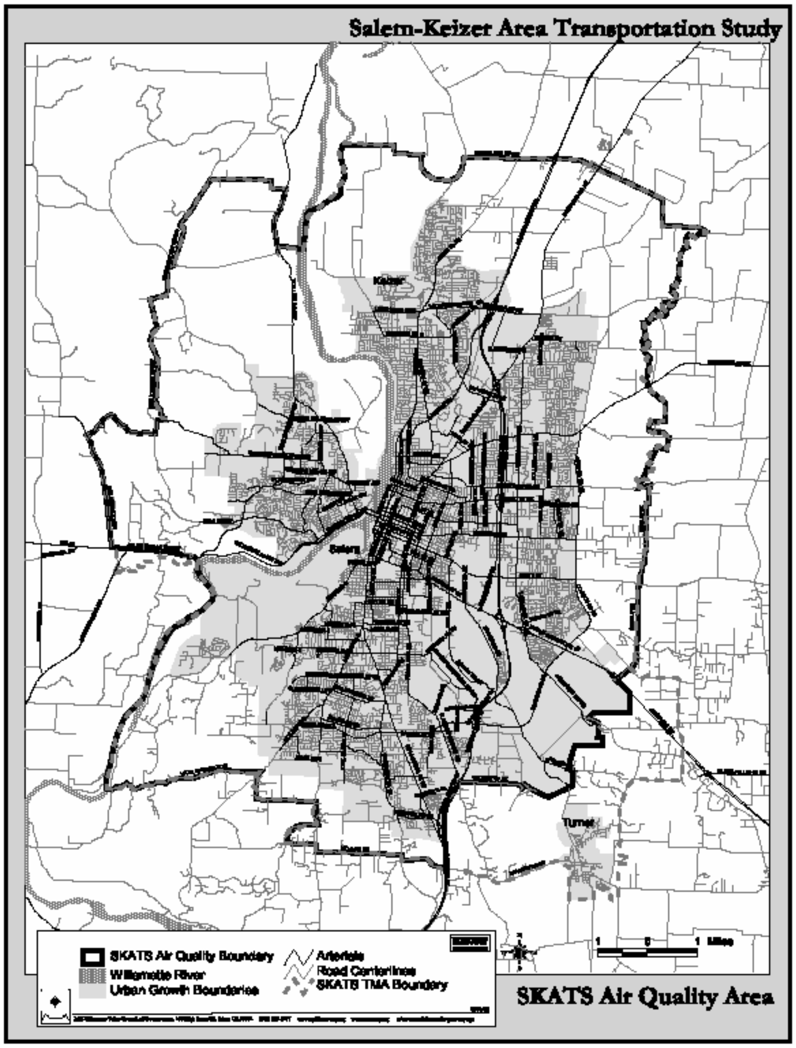


4.50.1.2 Salem-Keizer Area Transportation Study (SKATS) Air Quality Area

The Salem area marginally violated the federal air quality standard for ozone in the 1970s and was designated an ozone nonattainment area on March 3, 1978 under the 1977 Clean Air Act Amendments. The Mid-Willamette Valley Council of Governments recommended the nonattainment area as the area within the Salem-Keizer Area Transportation Study boundary (SKATS) (see Figure 2). This includes portions of Marion and Polk County, including the cities of Salem and Keizer.

Salem's ozone concentrations are influenced by emissions of ozone precursors in the Portland area. In 1979 the Salem area was defined under EPA guidelines as a "rural" ozone nonattainment area, and an Attainment Plan was adopted by the EQC in September, 1980 and approved by EPA on April 12, 1982. Salem's attainment plan under the rural ozone policy consists of three elements: 1) controls on major existing sources of volatile organic compounds under Reasonably Available Control Technology (RACT) rules, 2) controls on major new VOC sources under Lowest Achievable Emission Rate (LAER) rules, and 3) an approved plan for the Portland-Vancouver AQMA, which is the major urban area upwind of Salem. All of these program elements remain in place.

Figure 2: Salem-Keizer Area Transportation Study Air Quality Area



DEQ had developed a maintenance plan and requested redesignation of the Salem SKATS to attainment in 1987, but EPA returned the plan because EPA did not believe it contained sufficient emission inventory data and forecasts. Due to low ambient ozone levels and agency budget cuts, DEQ discontinued the Salem ozone monitor from 1987 through 1994 and was not able to complete the necessary planning work for redesignation. Under the 1990 Clean Air Act Amendments, SKATS was designated a nonattainment area with incomplete data. In 1995, DEQ reinstated the ozone monitor to support development of a maintenance plan for Salem, but was unable to secure staffing resources to complete the plan.

No violations of the federal one-hour standard have been recorded at the Salem/Turner ozone monitoring site since 1996, and no violations of the 8-hour ozone standard have ever been recorded (see Figure 3 and Tables 1 and 2). Salem SKATS was designated in attainment with the 8-hour ozone NAAQS effective June 15, 2004 (69 FR 23858, April 30, 2004).

4.50.2 Ozone Trends and Compliance with Standards

Figure 3 shows the ozone trends measured at monitoring sites for the Portland, Vancouver, and Salem areas for the period 1997 through 2005. Table 1 shows the highest maximum 8-hour average ozone concentrations measured for 1998[2], 2003, 2004, and 2005. While these peak values are important in assessing public health risk, they are not used to determine official compliance with the federal ozone standard. Compliance with the standard is based on a statistical method that looks at the three year average of the 4^{th} highest (maximum 8-hr average) ozone value each year. If the three-year average of the 4th highest value at any monitoring site exceeds the standard, the area is in violation. Table 2 shows the rolling three-year average of 4^{th} high values for 1998, 2003, 2004, and 2005. It is these "design values" that are compared to the 0.08 ppm ozone standard to determine compliance. Under EPA's calculation convention, a value of 0.084 ppm would round down to 0.08 ppm (i.e. in compliance), while a value of 0.085 ppm or higher would be a violation.

Key ozone monitoring sites include the "Carus" site in Portland, "Mountain View" site in Vancouver, and the "Turner" site in Salem (see Appendix D10-1).

The values illustrated in Tables 1 and 2, together with the 2015 Maintenance Demonstration described in Section 4.50.5.4 show that ozone levels can still occasionally approach or exceed the 8-hour ozone standard in the Portland-Vancouver area, but that with the existing strategies in place, the region will maintain compliance with the 8-hour ozone standard. DEQ's analysis in Section 4.50.5.4 suggests that there is not currently a need to add new ozone strategies for the Portland and Salem areas, but that existing emission reduction and growth management strategies should be continued with revisions described in Section 4.50.4.

---

[2] 1998 is included in the table because that year had the most recent violation of the 1-hour ozone standard in Portland and the July 1998 episode was used in the modeling analysis.

Figure 3: Portland-Vancouver and Salem 8-Hour Ozone Values

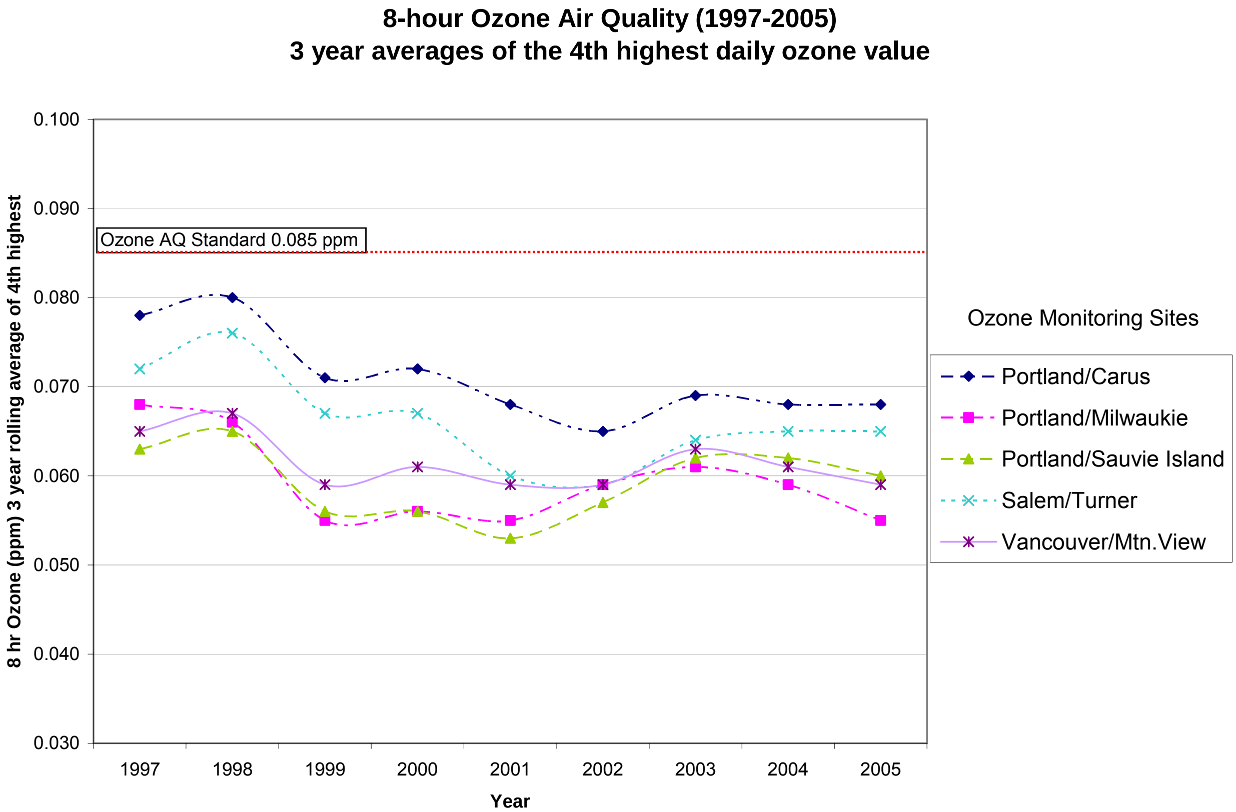


Table 1: 8-Hour Ozone Maximum Values

8-hour ozone standard = 0.08 ppm

Exceedance ≥ 0.085 ppm maximum daily 8-hour average

Monitoring Site	1998 8-hour Maximum	2003 8-hour Maximum	2004 8-hour Maximum	2005 8-hour Maximum
Portland/Carus	0.116	0.084	0.084	0.079
Portland/Milwaukie	0.100	0.068	0.077	0.063
Portland/Sauvie Island	0.077	0.073	0.061	0.065
Vancouver/ Mountain View	0.078	0.077	0.066	0.076
Salem/Turner	0.098	0.080	0.068	0.080

Table 2: 8-Hour Ozone 4th High, Design Values
Design Value = 4th highest 8-hour average, averaged over three years
8-hour ozone standard = 0.08 ppm
Violation ≥ 0.085 ppm design value

Monitoring Site	1998 Design Value	2003 Design Value[3]	2004 Design Value	2005 Design Value
Portland/Carus	0.080	0.070	0.068	0.068
Portland/Milwaukie	0.066	0.060	0.059	0.055
Portland/Sauvie Island	0.065	0.060	0.062	0.060
Vancouver/ Mountain View	0.065	0.063	0.061	0.060
Salem/Turner	0.076	0.060	0.065	0.065

4.50.3 Attainment Inventory

DEQ developed an attainment emission inventory for the year 2002. The emission inventory reflects detailed estimates of emissions from all sources, grouped into four major categories:

- Industrial Point Sources (sources with a DEQ air quality permit),
- On-Road Mobile Sources (e.g. motor vehicles and trucks),
- Non-Road Mobile Sources (e.g. lawnmowers, construction equipment and other engines), and
- Area Sources (e.g. household products, print shops, degreasing and surface coating operations, pesticide application, open burning and wildfires).

The 2002 Consolidated Emissions Reporting Rule (CERR) emissions data submitted by DEQ and SWCAA to EPA's National Emission Inventory (NEI) were used as the basis for the 2002 attainment year inventory. This 2002 county-by-county annual inventory was developed following the currently accepted methodologies for the National Emission Inventory. Appendix D10-3 and Appendix D10-4 describe the emissions inventory calculations in more detail.

Table 3 contains the annual countywide estimates for the Portland-Vancouver AQMA, Oregon portion (Clackamas, Multnomah and Washington Counties) and Salem SKATS (Marion and Polk Counties) in tons/year. Tables 4 and 5 contain the countywide estimates, seasonally adjusted for a typical summer day. Tables 4 and 5 are considered the "attainment inventory" for the Portland-Vancouver AQMA and Salem-Keizer area Ozone Maintenance Plan.

EPA guidance requires an emission inventory for three pollutants: VOC, NO_x and carbon monoxide (CO). VOC and NO_x are the most critical precursor emissions that contribute to ozone formation, so these pollutants are highlighted in the emission inventory tables throughout this maintenance plan.

[3] 2003 Design Value was used to determine the attainment designation for Portland-Vancouver AQMA (January 22, 2004 letter from DEQ to EPA). Design value is calculated using the 4th highest ozone value at each monitoring site, averaged over 3 years.

Table 3: Portland and Salem 2002 Annual Emissions (tons/year)

Portland Area 2002 Attainment Inventory
Annual Emissions (tons/year)
Clackamas, Multnomah, Washington Counti

Source Type	2002 VOC	2002 NO_x	2002 CO
AREA	92,946	5,808	104,621
NON-ROAD	13,247	17,344	153,204
ON-ROAD	23,683	36,786	288,435
POINT	3,056	2,522	2,214
Total	132,931	62,461	548,474

Salem-Area 2002 Attainment Inventory
Annual Emissions (tons/year)
Marion, Polk Counties

Source Type	2002 VOC	2002 NO_x	2002 CO
AREA	20,297	1,646	34,547
NONROAD	2,401	3,159	27,025
ON-ROAD	9,331	11,276	116,116
POINT	218	302	30
Total	32,247	16,383	177,719

Area source emissions were calculated following EPA guidance for the 2002 NEI. Area sources are the largest category of emission sources. Some of the significant area sources of VOC emissions in both Portland and Salem include surface coating and household consumer products. Graphic arts and degreasing operations are also significant area sources of VOC emissions in the Portland area, and agricultural open burning and gasoline storage and transportation are significant sources of VOC emissions in the Salem area, on a typical summer day.

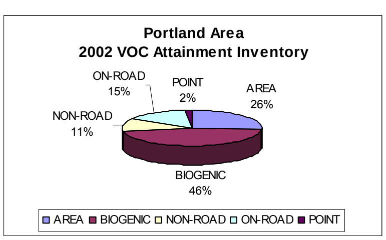
Non-road mobile source emissions were calculated using EPA's draft NONROAD2002 model and other methods following EPA guidance for the NEI. Significant sources of non-road VOC emissions include 2-stroke and 4-stroke gasoline engines such as lawn and garden and construction equipment, as well as diesel engines, boats and personal watercraft.

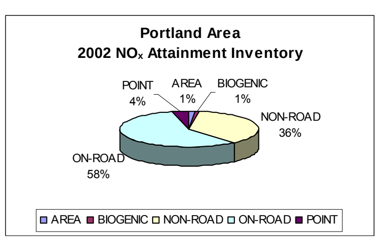
On-road mobile source emissions were calculated using Mobile 6.2 emissions and traffic data from the Oregon Department of Transportation. Gasoline vehicles are a major source of VOC and NO_x emissions, as well as diesel powered vehicles.

Table 4: Portland Area 2002 Attainment Inventories (lb/day)

Portland Area 2002 Attainment Inventory
Typical Summer Day, lb/day
Clackamas, Multnomah, Washington Counties

Source Type	2002 VOC	2002 NO_x	2002 CO
AREA	253,871	5,529	26,644
BIOGENIC	437,910	3,890	
NON-ROAD	110,188	136,713	1,202,805
ON-ROAD	139,542	216,750	1,699,493
POINT	17,020	14,913	12,202
Total	958,531	377,794	2,941,144





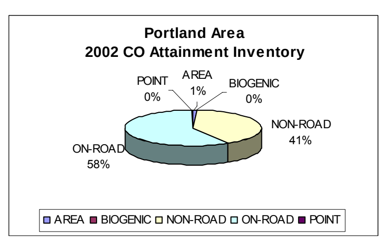
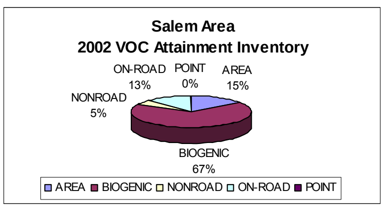
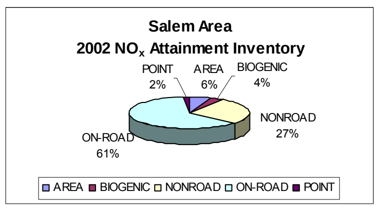


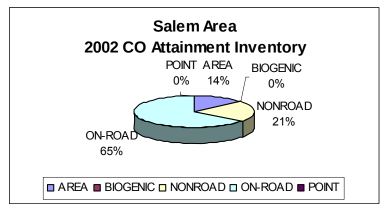
Table 5: Salem Area 2002 Attainment Inventories (lb/day)

Salem-Area 2002 Attainment Inventory
Typical Summer Day, lb/day
Marion, Polk Counties

Source Type	2002 VOC	2002 NO_x	2002 CO
AREA	66,252	6,227	148,513
BIOGENIC	296,719	3,803	
NONROAD	20,462	28,793	219,294
ON-ROAD	54,980	66,442	684,169
POINT	1,198	1,701	188
Total	439,610	106,967	1,052,164







Point source emissions for the 2002 Attainment Inventory are based on data submitted by permitted facilities and reflect actual 2002 emissions reported in annual permit reports to DEQ. Within the Portland-Vancouver AQMA, industrial point sources that emit more than 10 tons/year of VOC, 40 tons/year of NO_x, or 100 tons/year of CO were inventoried. Outside of the Portland-Vancouver AQMA (including Salem), point sources that emit more than 40 tons/year of NO_x or 100 tons/year of VOC or CO were inventoried. Stack parameters, activity, and exact location were collected to provide the most comprehensive accounting possible and to support the ozone dispersion model used in the maintenance demonstration. Point source emissions are a relatively small percentage of the 2002 attainment inventory.

Biogenic emissions are produced by life substances (e.g. terpenes from pine trees) as opposed to anthropogenic emissions that are produced by human activities. Biogenic emissions data was provided by WSU for the modeling study (Appendix D10-4) and calculated by county for this emissions inventory.

4.50.4 Portland and Salem Control Strategies

4.50.4.1 Portland-Vancouver AQMA Ozone Maintenance Plan

The Portland-Vancouver AQMA Ozone Maintenance Plan (Oregon portion) includes federal, state and local emission control programs. All four major source categories of ozone precursor emissions are affected by rules that reduce emissions from these sources. Several of the strategies provide benefits beyond VOC and NO_x emission reductions, such as air toxics and greenhouse gas emission reductions, traffic congestion reduction, energy savings, and overall cost-savings for the transportation systems.

The existing Portland-Vancouver AQMA Ozone Maintenance Plan strategies will remain in place and work together to protect air quality as the population increases over the next ten years. These strategies have successfully reduced VOC and NO_x emissions and also reduce emissions of air toxics and greenhouse gases that are emerging issues of concern.

The following strategies will remain in the Portland Ozone Maintenance Plan as they currently apply to sources in the Portland area:

- Motor Vehicle Inspection Program (OAR 340-256-0300 through 0470);
- Emission Standards for VOC Point Sources (Reasonably Available Control Technology) for existing major industrial facilities (OAR 340-232-0010 through 0230);
- New Source Review Program for new and expanding major industrial facilities (OAR 340-224-0010 through 0100 and 340-225-0010 through 0090);
- Voluntary Parking Ratio Rules (OAR 340-242-0300 through 0390);
- Barge Loading Rules and Stage I vapor recovery systems that control VOCs from gasoline delivery operations (included within OAR 340-232);
- Aerosol Paint Rules that lower VOC content from spray paints sold in the Portland area (OAR 340-242-0700 through 0750);
- Motor Vehicle Refinishing Rules that require low-emitting painting methods at autobody shops (OAR 340-242-0600 through 0630); and
- Public education and outreach that encourages people to voluntarily reduce emissions, such as not mowing lawns and driving less on Clean Air Action Days (now called Air Pollution Advisories).

The following strategies in the Portland-Vancouver Ozone Maintenance Plan (Oregon portion) have been modified:

- Employee Commute Options Program (OAR 340-242-0010 through 0290): Program requirements now focus on larger employers (100 or more employees) and reduce the survey requirements from annual to every two years (see detail below), and
- Industrial Emission Management Program (OAR 340-242-0400 through 0440): Re-establish the industrial growth allowance for new and modified major industrial sources to ensure that the ozone standard will not be violated even under conservative growth assumptions (see detail below).

In June, 2005, the Environmental Quality Commission amended the Motor Vehicle Inspection Program rules to replace the “enhanced” vehicle inspection test with the “basic” vehicle inspection test for vehicle model years 1981-1995. This change is reflected in the modeling projections and maintenance demonstration of this plan.

Stage II vapor recovery system requirements for gas stations will remain in effect until the motor vehicle fleet reflects widespread use of on-board canister systems. The Stage II rules will be revised at that time (prior to 2015). The eventual shift from Stage II vapor recovery to on-board canisters is reflected in the 2015 modeling projections and maintenance demonstration of this plan.

Transportation control measures are no longer enforceable under conformity rules (40 CFR 51.900) so these measures are removed from the Portland AQMA Ozone Maintenance Plan. However, the Employee Commute Options program will remain in the maintenance plan, and DEQ and Metro will implement a voluntary program to monitor growth in motor vehicle emissions of VOC and NO_x in the Portland area as described in Section 4.50.4.1.3.

4.50.4.1.1 Changes to the Employee Commute Options Rule

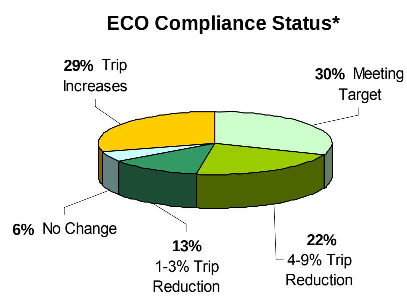
The Employee Commute Options Program rules adopted in 1996 (OAR 340-242-0010 through 0290) require Portland-area employers with more than 50 employees to implement programs that would reduce single-occupancy commute travel by 10%. Affected employers must provide incentives for employee use of alternative commute options. The incentives must have the potential to reduce commute trips to the work site by 10% within three years of completing an initial employee survey. Annual surveys measure progress toward this goal.

Annual survey data indicates that larger employers are more likely to comply with ECO and provide meaningful transportation options to their employees. Larger employers represent most of the employees in the region. For example,

- Employers with more than 100 employees generate 92% of the total trip reduction.
- Employers with more than 100 employees make up 86% of the total ECO affected *employees*.
- Employers with more than 100 employees make up 53% of the total ECO affected *employers*.

Key program statistics*:

- Number of employer work sites >50 employees: 1212
- Estimated number of employees affected: 250,000
- Annual Vehicle Miles Traveled reduced: 35.4 million



*based on survey data from worksites with>50 employees as of August 2005. Not all employers are required to survey.

Smaller companies make up the majority of employers who are behind with ECO compliance. DEQ has modified the ECO program to more effectively focus on larger employers that produce the most significant amount of emission reduction benefit, and to streamline reporting requirements. Program changes include:

- Changing the threshold for rule applicability from “more than 50” employees to “more than 100” employees;
- Changing survey requirements from annual to every two years;
- Requiring all employers with more than 100 employees that have not developed a plan to submit an approved plan, or demonstrate that they participate in an equivalent commute trip reduction program, such as EPA’s Best Workplaces for Commuters program or TriMet’s Passport program;

- Modifying survey requirements to allow an employer to submit follow-up survey results with less than 75% response rate. DEQ will assign single occupancy vehicle trips to the percentage of employees who did not respond up to the 75% rate;
- Eliminating the 2006 sunset date since the ozone maintenance plan does not sunset; and
- Requiring employers that qualify for exemptions (e.g. through restricted parking ratios) to certify every two years that they continue to qualify for the exemption.

The Employee Commute Option Program has been effective in reducing the amount of vehicle miles traveled by single-occupancy-vehicles in the Portland area, thereby reducing air pollution and traffic congestion in the region. The ECO program has resulted in an estimated annual reduction of over 100 tons of VOCs and over 85 tons of NO_x. In addition to the benefits to ozone air quality, DEQ estimates that the ECO program is also effective in reducing over 22,000 tons per year of carbon dioxide (a greenhouse gas), as well as associated air toxics emissions (most notably benzene). DEQ's proposed rule changes would streamline the program and make it more effective in encouraging alternative commute trips among larger employers while providing relief to smaller employers. The program is one of many efforts in the Portland area to reduce single-occupancy vehicle trips and DEQ will continue to partner with regional alternative transportation programs in these efforts.

DEQ will continue to focus on larger employers (those with over 100 employees) who account for over 90% of the trip and emission reduction achieved by the ECO program. Therefore, DEQ believes there will be no significant loss in emission reduction benefit from ECO by focusing the program on larger employers.

<u>4.50.4.1.2 Industrial Emission Management Rules</u>

The 1996 Portland-Vancouver Ozone Maintenance Plan included an industrial emissions growth allowance that could be used by new and expanding major industry in lieu of obtaining emission offsets. This 2006 maintenance plan update continues this approach to managing industrial emissions growth. The growth allowance program is described below.

Under the existing Industrial Emission Management Rules adopted in 1996 (OAR 340-242-0400 through 0440), new or expanding major industrial sources located within 100 km of the Portland-Vancouver AQMA must "offset" emission increases of more than 40 tons/year of VOC and NO_x by obtaining an equivalent decrease from another facility. However, the offset requirement can be satisfied by obtaining an allocation from an emissions growth allowance set aside for this purpose. This 2006 maintenance plan update reestablishes the growth allowance for new and expanding major VOC and NO_x industrial sources, creates an administrative and public process for releasing the growth allowance in increments, and retains the emission offset requirement as a safeguard. The growth allowance has been included in the modeled 2015 ozone maintenance demonstration.

<u>Growth Allowance Program Procedures</u>

This plan reestablishes the industrial growth allowance at 5,000 tons for VOC and 5,000 tons for NO_x[4]. The owner or operator of a proposed major source or major modification may apply to DEQ for an allocation of the growth allowance in lieu of providing an emission offset. As

[4] The 2006 growth allowance balance is approximately 750 tons for VOC and 200 tons for NO_x. This balance would be replaced with the reestablished growth allowance.

required in the existing rules, the growth allowance will be allocated on a first come first served basis, with one exception. Sources that previously reduced their allowable emissions through the voluntary Plant Site Emission Limit (PSEL) donation program will receive priority access to the growth allowance.

Consumption of the growth allowance will continue to be monitored and tracked by DEQ. DEQ will establish the 5,000 ton limit as a maximum cap. As a safeguard, however, DEQ will only authorize the initial use of up to 1,000 tons of VOC and 1000 tons of NO_x, and hold the balance in reserve. If at some point in the future 750 tons or more of this initial increment is used for either or both pollutants, DEQ will conduct an analysis of ozone levels and expected trends to determine if conditions support the release of another 1,000 ton increment. DEQ will provide an opportunity for the public to comment on the results of the analysis and DEQ's recommendation whether to release the next 1,000 ton increment prior to making its decision. DEQ will not authorize any further allocation of the growth increment if it thought such action could jeopardize compliance with the ozone standard. If conditions show no risk to the health standard, DEQ will authorize allocation of another 1,000 ton increment.

If any single source applies to the Environmental Quality Commission to receive more than 1,000 tons of VOC or NO_x, DEQ will conduct the analysis to determine whether an additional 1,000 tons can be released without jeopardizing ozone air quality prior to making a recommendation to the EQC regarding the source application.

This process will be repeated until the final 1,000 ton increment, or when approximately 4,000 tons of the growth allowance of either pollutant is consumed. The growth allowance cap of 5,000 tons could only be increased through a SIP revision that is approved by EPA. The increase could utilize new federally enforceable emission reductions and shutdown credits that were not relied on in the maintenance demonstration. Any such increase to the growth allowance above the 5,000 ton cap for either VOC or NO_x will be subject to public comment and approval by EPA. Federally enforceable emission reductions include requirements adopted by EPA, requirements adopted by the EQC and approved by EPA as a revision to the Oregon State Implementation Plan, and requirements established by a federally enforceable permit condition. If the growth allowance is consumed, and cannot be reestablished, emission offsets for VOC and NO_x will be required for new and expanding major industry.

This administrative process of incremental allocation will help DEQ better manage future industrial emission increases and respond to any unforeseen changes in future conditions, such as significant increases in summertime temperatures or future changes to the federal ozone standard.

DEQ may temporarily reduce the amount of growth allowance that may be allocated to new or modified major industrial sources if monitored ozone concentrations exceed the "risk of violation" or "actual violation" thresholds described in the contingency plan (Section 4.50.7.2.1). DEQ will provide reasonable advance notice to affected industries if there is a possibility that the growth allowance could be reduced or if contingency plan requirements of OAR 340-224-0060(5) do not allow an allocation from the growth allowance to be used to meet offset requirements.

The emissions growth allowance approach described above works together with several other elements in the maintenance plan, including the tracking of emission growth, ambient ozone monitoring, the emission offset backstop requirement, and the early warning and action elements in the contingency plan, to meet air quality management goals and protect compliance with standards. The Industrial Emissions Management Rules provide both flexibility for future economic opportunity and protection of public health through compliance with the ozone air quality standard.

4.50.4.1.3 Transportation Conformity and Transportation Control Measures

Under EPA's 2004 ozone implementation rules (40 CFR 51.900), neither general conformity nor transportation conformity is required for areas attaining the 8-hour ozone standard. This means that new transportation project plans will no longer need to demonstrate that they conform to the ozone maintenance plans in the Portland-Vancouver AQMA. Although transportation control measures can no longer be enforced through the conformity process, DEQ and Metro (the Portland-area metropolitan planning organization) have agreed to informally track VOC, NO_x, air toxics and greenhouse gas emissions when Metro assesses conformity for the purposes of the Portland Carbon Monoxide Maintenance Plan as a voluntary program to assess impacts of transportation emissions on air quality over time. In addition, when Metro assesses VMT/Capita for purposes of the Portland Carbon Monoxide Maintenance Plan Contingency Plan, the information will also be used for the Portland-Vancouver AQMA Ozone Contingency Plan (see Section 4.50.7.2.2). This approach is consistent with the EPA ozone implementation rule preamble that recommends states develop voluntary programs to address motor vehicle emissions growth (69 FR 23987-88). The Metro Council adopted Resolution 06-3695, For the Purpose of Recommending Approval by the Oregon Environmental Quality Commission of the Draft 2006 Portland-Vancouver AQMA (Oregon Portion) and Salem Keizer Area Ozone Maintenance Plan, on May 25, 2006.

4.50.4.2 Salem SKATS Ozone Maintenance Plan

DEQ will retain existing strategies in the Salem-Keizer Area Transportation Study (SKATS) Air Quality Area Attainment Plan that was adopted in 1980 and revised in 1982, including Emission Standards for VOC Point Sources (OAR 340-232-0010 through 0230) and continued reliance on the control strategies in the Portland-Vancouver AQMA Ozone Maintenance Plan, with some updates:

- Designate Salem/SKATS as an ozone maintenance area under state rules;
- Modify control technology requirements for new and expanding major industrial sources from "Lowest Achievable Emission Rate" (LAER) to "Best Available Control Technology" (BACT), while retaining all other new source review requirements; and
- Adopt a contingency plan that includes a commitment to adopt measures to reduce emissions if the Salem area is at risk of violating or violates the ozone standard in the future.

Salem was designated an ozone "nonattainment" area under state rules, and major new and modified industrial sources that emit 40 tons/year or more of VOC or NO_x were required to install the most stringent level of emission control technology known as "Lowest Achievable Emission Rate" (LAER). Once designated a "maintenance" area under state rules, the same universe of sources (40 tons/year or more of VOC or NO_x) will be required to install "Best Achievable Control Technology" (BACT) that is the same as is required in Portland.

LAER and BACT are determined by DEQ on a case-by-case basis to prevent air pollution and require installation of pollution control equipment through the facility's air permit. LAER reflects the most stringent level of emission control achievable at the time of permitting. LAER is typically required in areas violating or at risk of violating air quality standards and must be installed regardless of cost. BACT is established by DEQ using an analysis that starts with a review of EPA's control technology clearinghouse and LAER technologies that are required for similar facilities within the U.S. If the permit applicant demonstrates that the cost to install LAER would be much greater at this facility than it was at other facilities where it has been installed, the applicant may justify a lower control level as BACT. BACT is typically used in maintenance and attainment areas that are in compliance with air quality standards, and can provide an equivalent or very high level of control that will not interfere with maintenance of the ozone standard.

Under the Clean Air Act, Salem is designated as a federal ozone attainment area. Under this federal designation, emission control technology (BACT) would only be required for Federal Major Sources (those sources in 28 categories emitting 100 tons/year or more of VOC or NO_x, or other sources emitting 250 tons/year or more). However, as an Oregon ozone maintenance area, BACT controls will continue to be required for sources emitting 40 tons/year of VOC or NO_x. Keeping the current 40 tons/year threshold for triggering BACT and other New Source Review requirements will better protect future compliance with the ozone standard in the Salem area. All other requirements for New Source Review in Salem remain the same, including the current exemption from the need to provide emission offsets or use a growth allowance for sources locating within SKATS because much of Salem's emissions transport from the Portland area. New or expanding major industrial sources within 100 km of the Portland-Vancouver AQMA (which includes part of the Salem area) will continue to be required to evaluate their impact on ozone levels in Portland.

4.50.5 Maintenance Demonstration (Portland-Vancouver and Salem)

4.50.5.1 Ozone Modeling Study

DEQ and SWCAA teamed with Washington State University (WSU), the Washington Department of Ecology and EPA to study ozone formation using a computer dispersion model (see Appendix D10-4, "Historical and Future Ozone Simulations using the MM5/SMOKE/CMAQ System in the Portland/Vancouver Area", WSU, 12/31/05 final report). The purpose of the study was to develop a predictive tool to forecast future ozone concentrations based on emission projections and summer meteorology in which ozone formation occurs.

The modeling study simulated two historical high ozone episodes that occurred during the summer of 1997 and 1998. The study compared actual ozone levels measured (monitored) during the 1997 and 1998 events to model predicted ozone levels for the same period in order to test and validate model performance. The model performed within EPA guidelines for both episodes. The model performance testing verifies that the CMAQ model can predict future ozone concentrations for the region (see Appendix D10-4 for more information on model performance testing).

The modeling team selected the July 26-28, 1998 episode as the basis for future year projections because ozone levels were much higher in 1998 than in 1997, and meteorology reflected worst case conditions that contribute to ozone formation in the Portland area (high temperatures and low wind speeds, with predominant winds from the north). Methodology for developing the modeling emissions data is detailed in the WSU modeling report (Appendix D10-4).

4.50.5.2 Growth Projections

The 2015 emissions forecast used in the modeling study reflects 2002 emissions, increased by expected growth in various sectors. The 2002 emission inventory reflects the 2002 Consolidated Emissions Reporting Rule (CERR) emissions data submitted by DEQ and SWCAA to the National Emission Inventory (NEI) and documented in Appendix D10-3 and 4. Growth factors for various source sectors were derived from the 2002 "Economic Report to the Metro Council, 2000-2030 Regional Forecast for the Portland-Vancouver, Metropolitan Area" (see Appendix D10-5).

For the 2015 Maintenance Demonstration, the following growth assumptions were included in the forecast:

Area sources: Area source emissions were calculated following EPA guidance for the 2002 NEI. The 2015 emissions inventory assumes a linear, non-compounding population growth rate of 1.8% per year, and household growth rate of 2.0% per year (see Appendix D10-5). Table 6 describes population trends in the Portland and Salem areas, although the Metro data was used in the growth projections.

Table 6: Portland and Salem Area Population Projections

	2000 Estimate	2003 Estimate	2005 Forecast	2010 Forecast	2015 Forecast
Oregon	3,436,750	3,541,500	3,618,200	3,843,900	4,095,708
Portland Area* (Clackamas, Multnomah and Washington Counties)	1,451,650	1,503,900	1,540,055	1,646,124	1,759,470
Portland Area** (Clackamas, Multnomah, Washington and Clark Counties)	1,789,460		1,956,300	2,134,300	2,287,000
Salem Area* (Marion and Polk Counties)	349,000	359,900	368,347	395,973	427,781

* Prepared by the Oregon Office of Economic Analysis, April 2004
**"Economic Report to the Metro Council, 2002-2030 Regional Forecast," page 4

Non-road mobile sources: EPA's draft NONROAD2004 model was used to estimate non-road mobile source emissions for 2015. This model incorporates the latest assumptions and rules, including EPA's Tier 4 non-road diesel engine standards and non-road diesel fuel sulfur standards associated with the Tier 4 rule. Railroads, marine vessels and airports were estimated independently of the NONROAD model (see Appendix D10-4). Aircraft emissions for the four airports with the Portland AQMA were calculated using Port of Portland data (Aviation Demand Forecast Update for Portland International Airport, Port of Portland, November 4, 1999, and associated spreadsheets), which was also used in the 2002 NEI submittal.

On-road mobile sources: 2015 emissions estimates used in the modeling analysis are based on travel demand forecast models run by Metro and the Southwest Regional Transportation Council for the Portland-Vancouver AQMA, and Department of Transportation data and projections for the modeling domain outside of the AQMA. This includes full implementation of federal motor vehicle emission control programs and the DEQ Vehicle Inspection Program rule revisions adopted in June 2005.

Point sources: DEQ developed two different growth scenarios for major industrial (point) sources, and their purpose is discussed in more detail below in Section 4.50.5.3. The two scenarios include:

- 2015 Projection: reflecting actual 2002 emissions from existing industry, increased by expected employment projections in the "Economic Report to Metro Council, 2000-2030 Regional Forecast for the Portland-Vancouver Metropolitan Area".
- 2015 Maintenance Demonstration: reflecting a conservative estimate of maximum permitted levels for existing industry and the reestablished industrial growth allowance.

4.50.5.3 Forecast and Maintenance Inventory

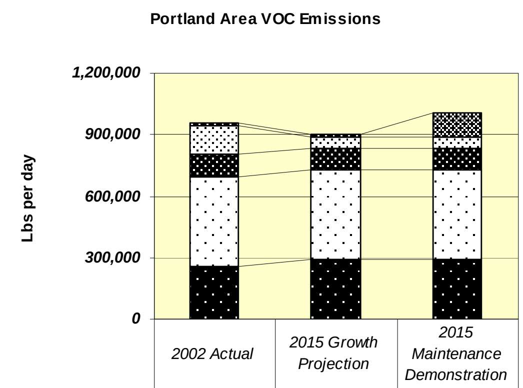
As noted above, DEQ developed two different growth scenarios for major industrial (point) sources, and they are used for different purposes. The first growth scenario (called "2015 Projection" as seen in Figures 4 and 5) reflects the 2002 estimate of actual industrial emissions, increased by Metro's regional employment projections for that sector. This projection represents a baseline estimate of actual future year emissions, given expected growth, and is described in the WSU modeling report as the managed growth simulation projection (Appendix D10-4).

The second growth scenario (called "2015 Maintenance Demonstration" as seen in Figures 4 and 5) represents a very conservative estimate of possible future year emissions. The 2015 Maintenance Demonstration reflects maximum "legally allowable" emission levels currently permitted for existing industry, plus the emissions growth allowance reestablished for new industry growth. This 2015 Maintenance Demonstration represents the most conservative estimate of possible future industrial emissions for purposes of the maintenance plan.

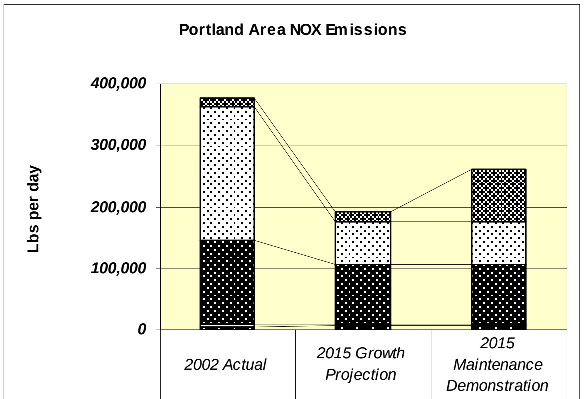
Table 7 and 8 and Figures 4 and 5 below show the 2002 estimate of actual emissions and the conservative growth scenario "2015 Maintenance Demonstration" described above. Figures 4 and 5 also show the intermediate 2015 Growth Projection described in the WSU report. Some sources, such as on-road vehicles, are projected to emit less VOC and NO_x in 2015 than in 2002. Overall, the total emissions of VOC and NO_x will be lower in 2015 than in 2002, even though the projections are based on very conservative assumptions.

Both VOC and NO_x emissions are involved in the formation of ozone and the relative amounts of each (VOC/NO_x ratio) can influence the level of ozone formation. DEQ's modeling analysis shows that of the two pollutants, VOC is the primary driver of ozone formation in the urban Portland and Salem areas. Both VOC and NO_x emission reduction strategies continue to be important to reducing ozone formation.

Figure 4: Portland Area VOC and NOx Emissions (lb/day) and 2015 Maintenance Demonstration

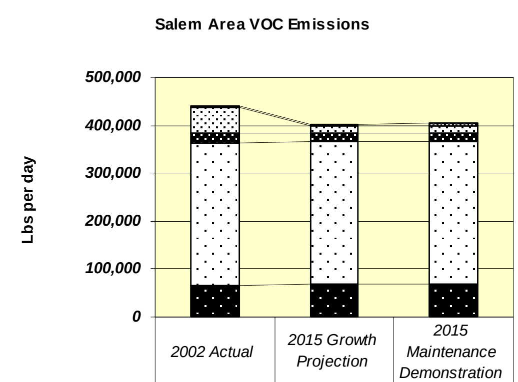


	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
POINT	17,020	18,304	119,943
ON-ROAD	139,542	54,521	54,521
NONROAD	110,188	101,699	101,699
BIOGENIC	437,910	437,910	437,910
AREA	253,871	291,098	291,098

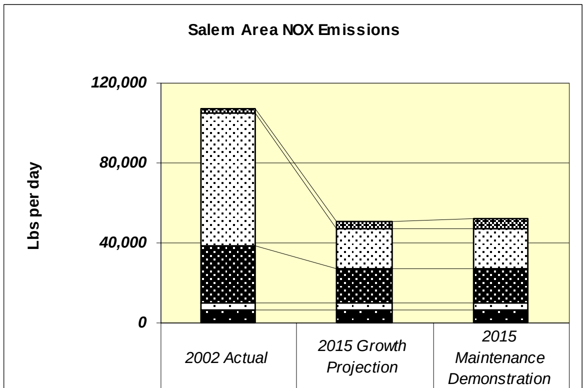


	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
POINT	14,913	16,783	86,780
ON-ROAD	216,750	68,910	68,910
NONROAD	136,713	95,638	95,638
BIOGENIC	3,890	3,890	3,890
AREA	5,529	6,157	6,157

Figure 5: Salem Area VOC and NOx Emissions (lb/day) and 2015 Maintenance Demonstration



	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
POINT	1,198	1,657	6,021
ON-ROAD	54,980	16,004	16,004
NONROAD	20,462	17,901	17,901
BIOGENIC	296,719	296,719	296,719
AREA	66,252	68,416	68,416



	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
POINT	1,701	3,168	4,701
ON-ROAD	66,442	20,582	20,582
NONROAD	28,793	16,618	16,618
BIOGENIC	3,803	3,803	3,803
AREA	6,227	6,400	6,400

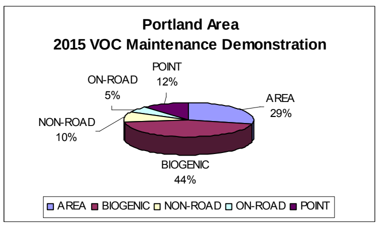
Table 7

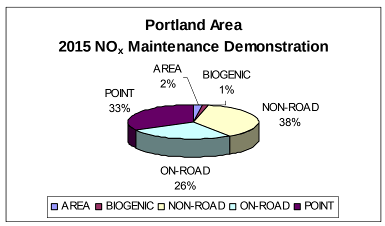
Portland Area 2015 Maintenance Demonstration
Typical Summer Day, lb/day
Clackamas, Multnomah, Washington Counties

Source Type	2015 VOC	2015 NO_x	2015 CO
AREA	291,098	6,157	29,373
BIOGENIC	437,910	3,890	--
NON-ROAD	101,699	95,638	2,260,810
ON-ROAD	54,521	68,910	560,955
POINT	119,943	86,780	108,526
Total	1,005,171	261,375	2,959,664

Portland Area 2015 Maintenance Demonstration
Annual Emissions (tons/year)
Clackamas, Multnomah, Washington Counties

Source Type	2015 VOC	2015 NO_x	2015 CO
AREA	108,109	5,822	139,992
NON-ROAD	13,308	17,223	330,324
ON-ROAD	8,538	10,339	127,923
POINT	21,721	15,191	19,768
Total	151,675	48,574	618,007





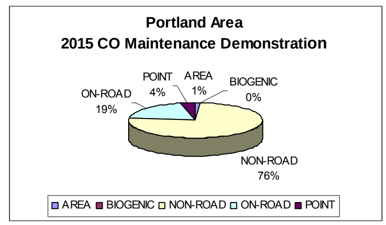


Table 8

Portland Area VOC and NO_x Emissions, (lb/day), % Change 2002-2015

(Clackamas, Multnomah, Washington Counties)

Source Type	2002 Actual (VOC, lbs per day)	2015 Maintenance Demonstration (VOC, lbs per day)	% Change
AREA	253,871	291,098	14.7%
BIOGENIC	437,910	437,910	
NONROAD	110,188	101,699	-7.7%
ON-ROAD	139,542	54,521	-60.9%
POINT	17,020	119,943	604.7%
	----------	----------	
Totals	958,531	1,005,171	

Source Type	2002 Actual (NOX, lbs per day)	2015 Maintenance Demonstration (NOX, lbs per day)	% Change
AREA	5,529	6,157	11.4%
BIOGENIC	3,890	3,890	
NONROAD	136,713	95,638	-30.0%
ON-ROAD	216,750	68,910	-68.2%
POINT	14,913	86,780	481.9%
	----------	----------	
Totals	377,794	261,375	

The Portland area on-road emissions are expected to decrease significantly: 61% less VOC emissions and 68% less NO_x emissions. This is primarily due to implementation of federal motor vehicle emission and fuel standards and continuing implementation of the vehicle inspection program. Non-road emissions also show a 30% decrease in NO_x emissions due to the phase-in of federal emission and fuel standards. Area source emissions are expected to increase due to increases in population that affect categories such as architectural surface coating and consumer solvent use. Point source "actual" emissions are not expected to change significantly (see Figure 4), although Table 8 describes the difference between "actual" emissions in the 2002 attainment inventory and the "allowable" emissions and growth allowance in the 2015 Maintenance Demonstration[5].

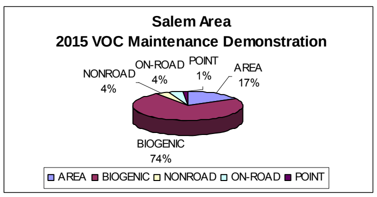
Table 9

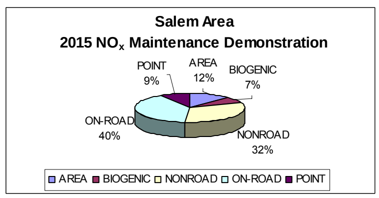
Salem Area 2015 Maintenance Demonstration
Typical Summer Day, lb/day
Marion, Polk Counties

Source Type	2015 VOC	2015 NO_x	2015 CO
AREA	68,416	6,400	150,443
BIOGENIC	296,719	3,803	--
NONROAD	17,901	16,618	386,600
ON-ROAD	16,004	20,582	167,507
POINT	6,021	4,701	4,435
Total	405,062	52,103	708,985

Salem-Area 2015 Maintenance Demonstration
Annual Emissions (tons/year)
Marion, Polk Counties

Source Type	2015 VOC	2015 NO_x	2015 CO
AREA	22,594	1,581	42,428
NONROAD	2,334	3,062	55,138
ON-ROAD	2,724	3,326	42,445
POINT	1,079	846	767
Total	28,731	8,815	140,779





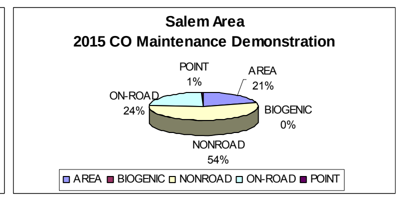


Table 10

Salem Area VOC and NO_x Emissions, (lb/day), % Change 2002-2015

(Marion & Polk Counties)

Source Type	--- VOC, lbs per day --- 2002 Actual	2015 Maintenance Demonstration	% Change
AREA	66,252	68,416	3.3%
BIOGENIC	296,719	296,719	
NONROAD	20,462	17,901	-12.5%
ON-ROAD	54,980	16,004	-70.9%
POINT	1,198	6,021	402.8%
	----------	----------	
	439,610	405,062	

Source Type	--- NOX, lbs per day --- 2002 Actual	2015 Maintenance Demonstration	% Change
AREA	6,227	6,400	2.8%
BIOGENIC	3,803	3,803	
NONROAD	28,793	16,618	-42.3%
ON-ROAD	66,442	20,582	-69.0%
POINT	1,701	4,701	176.4%
	----------	----------	
	106,967	52,103	

Salem area on-road emissions are also expected to decrease significantly: 71% less VOC emissions and 69% less NO_x emissions. This is primarily due to implementation of federal motor vehicle emission and fuel standards. Non-road emissions also show a 42% decrease in NO_x emissions due to the phase-in of federal emission and fuel standards.

Point source "actual" emissions are not expected to change significantly (see Figure 5), although Table 10 describes the difference between "actual" emissions in the 2002 attainment inventory and the "allowable" emissions and growth allowance in the 2015 Maintenance

[5] The projected point source increase in the 2015 Maintenance Demonstration is based on the most conservative assumptions for industrial sources, and includes maximum allowable (permitted) emissions from existing sources plus the growth allowance.

Demonstration. The 2015 Maintenance Demonstration also includes one proposed energy facility that has since withdrawn its permit application.

Area sources in the Salem area are projected to increase slightly due to increases in population. The Salem area will also benefit from the phase in of on-board canister systems in motor vehicles that control gasoline vapors while refueling. This change is not as noticeable in the Portland area due to existing Stage II gasoline vapor controls.

4.50.5.4 Maintenance Demonstration

DEQ used the "2015 Maintenance Demonstration" emission forecast and worst-case meteorology from the 1998 high ozone event in the CMAQ model to estimate future ozone concentrations for the Portland and Salem areas in 2015. Compliance with the 8-hour ozone NAAQS is demonstrated when the fourth highest daily maximum 8-hour average ozone concentration, averaged over three consecutive years (i.e. Design Value), is equal to or less than 0.08 ppm[6] .

Figure 6: Portland-Vancouver and Salem Ozone Maintenance Demonstration

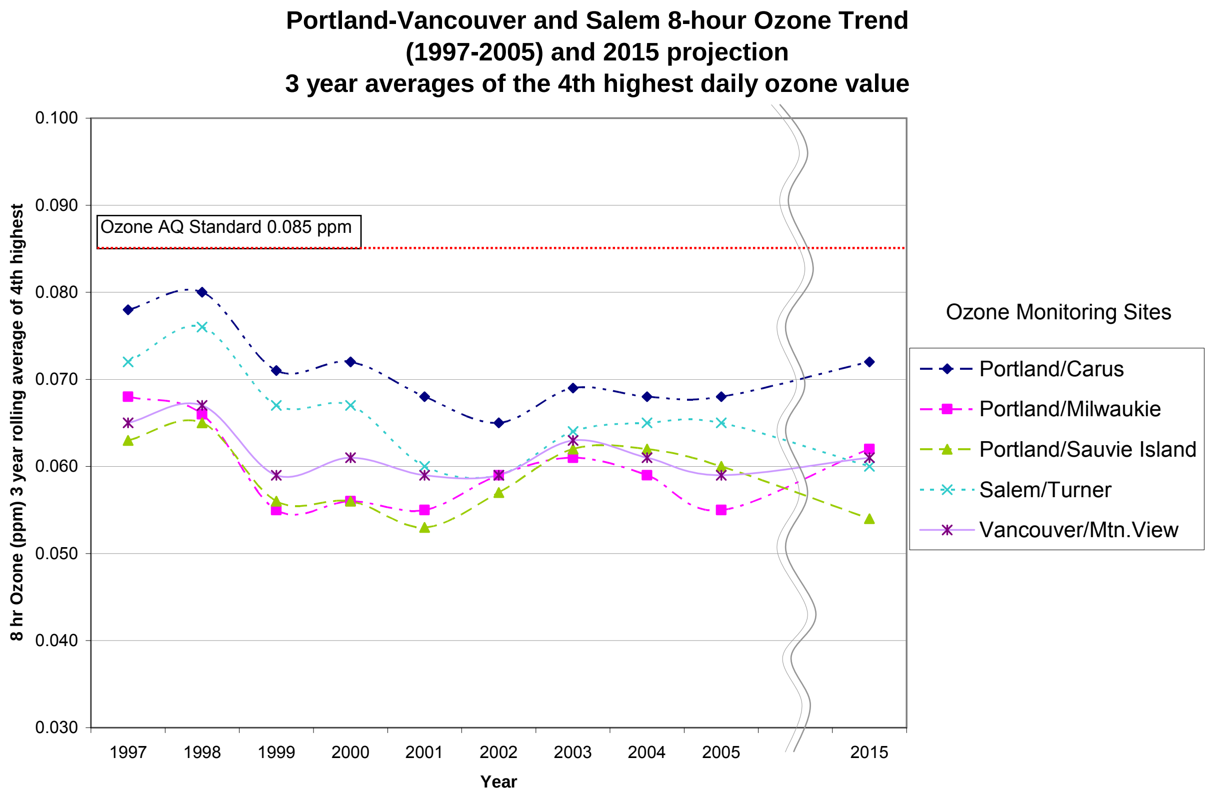


Figure 6 shows the ozone compliance trend for the Portland-Vancouver and Salem areas, including the 2015 maintenance demonstration forecast. Figure 6 and Table 11 show that the Portland-Vancouver and Salem-Keizer areas will remain in compliance with the 8-hour ozone standard. Table 11 also shows that peak ozone concentrations can exceed the standard,

---

[6] Under EPA's calculation convention, a value of 0.084 ppm would round down to 0.08 ppm (i.e. in compliance), while a value of 0.085 ppm or higher would be a violation.

illustrating the need to continue the suite of emission reduction strategies that limit ozone formation in the Portland and Salem areas, and for actively managing emissions growth from new industry.

Table 11 shows the maximum 8-hour ozone concentrations predicted for the key Portland, Vancouver, and Salem monitoring sites. Table 11 also shows the 2015 predicted "Design Value", which is used to compare to the ozone standard for purposes of determining compliance. WSU's modeling analysis also confirms that the existing monitoring network is capturing the areas of highest ozone concentrations. For more information on the modeled attainment test calculation of design values, see Appendix D10-6.

Table 11: 2015 Maintenance Demonstration
8-hour ozone standard = 0.08 ppm
Exceedance ≥ 0.085 ppm maximum
Violation ≥0.085 ppm predicted design value

Monitoring Site	1998 Predicted Maximum	2015 Predicted Maximum	2015 Predicted Design Value*
Portland/Carus	0.098	0.094	0.072
Portland/Milwaukie	0.092	0.096	0.062
Portland/Sauvie Island	0.082	0.076	0.054
Vancouver/ Mountain View	0.083	0.081	0.061
Salem/Turner	0.088	0.075	0.060

*Predicted Design Value is calculated using the EPA statistical procedure called the Relative Reduction Factor described in Appendix D10-5 and EPA 8-hour ozone modeling guidance. Predicted design value is compared to the 8-hour ozone standard to determine compliance.

Again, Figure 6 and Table 11 illustrate that the Portland-Vancouver AQMA and Salem SKATS will maintain compliance with the 8-hour ozone standard through 2015, with concentrations ranging from 14% to 29% below the standard. The Carus monitoring site, downwind of Portland, has traditionally been the site with the highest ozone readings in the region. The model predicted that the Milwaukie site would produce a slightly higher maximum value under meteorological conditions similar to the 1998 episode, and the maximum values at both Milwaukie and Carus would exceed the standard. However, the model also confirmed that the Carus site is expected to remain the highest and most important site for determining compliance with the ozone standard. The 4th high predicted design values at Carus and all other sites demonstrate continued compliance with the ozone NAAQS.

4.50.6 <u>Air Quality Monitoring (Portland and Salem)</u>

DEQ will continue to operate an ozone air quality monitoring network in accordance with 40 CFR 58 to verify maintenance of the 8-hour ozone standard in Portland and Salem (see Appendix D10-1). Any modification to the ambient air monitoring network, such as removal of duplicative or unnecessary monitors, will be accomplished through close consultation with EPA Region 10. Proposed network modifications would be accompanied by technical and statistical analysis sufficient to document a given monitor may be removed because it is unnecessary or duplicative in the case of network reductions, or to justify the value of investing in monitoring network enhancements. In accordance with 40 CFR 58, the final network design will be subject to the approval of the EPA Regional Administrator.

4.50. 7 <u>Contingency Plan</u>

The maintenance plan must include a process to quickly prevent or correct any measured violation of the 8-hour ozone standard. This process of investigation and (if needed) corrective action is called the “contingency plan”. Contingency plans typically have several stages of action depending on the severity of monitored ozone levels. Ambient ozone thresholds are established in the contingency plan as early-warning action levels. If monitored ozone levels exceed these action levels, the contingency provisions are triggered.

<u>4.50.7.1 Request To Replace the Portland-Vancouver AQMA 1-Hour Contingency Plan With an 8-Hour Contingency Plan</u>

EPA revoked the one-hour ozone standard, effective June 15, 2005 (69 FR 23951, April 30, 2004). In accordance with EPA rules implementing the 8-hour ozone standard (40 CFR 51.900), DEQ requests that the one-hour ozone contingency plan be removed from the Portland-Vancouver AQMA Ozone Maintenance Plan, and replaced with a contingency plan that addresses the 8-hour ozone standard as described below.

<u>4.50.7.2 Portland-Vancouver AQMA 8-hour Ozone Contingency Plan</u>

This contingency plan includes two sets of contingency measures. The provisions specified under Part A of the Contingency Plan for the Portland-Vancouver AQMA are linked to ambient concentrations of ozone and would be triggered if measured ozone levels at any of the ozone monitoring sites (Mountain View, Sauvie Island, Milwaukie, or Carus) exceed the early-warning thresholds below, or if a violation of the 8-hour ozone standards occurs. The provisions specified under Part B of the Contingency Plan are linked to increases in the average amount of vehicle use per person in the Portland metropolitan area, and would only affect the Oregon portion of the Portland-Vancouver AQMA.

<u>4.50.7.2.1 Part A, Contingency Plan Based On Ambient Concentrations in Portland or Vancouver</u>

PHASE 1: ELEVATED OZONE LEVELS
If the air quality index (AQI) is forecast to be within the “orange” range for ozone air quality (unhealthy for sensitive populations), or 8-hour daily maximum ozone values approach 0.100 ppm or greater, and meteorological conditions conducive to ozone formation are expected to persist, DEQ and SWCAA will issue an advisory to inform the public of air quality levels and voluntary actions they can take to limit exposure to unhealthy air pollution levels and reduce emissions.

PHASE 2: RISK OF VIOLATION
If monitored 8-hour ozone levels at any site within the Portland-Vancouver area registers an annual fourth high monitored value of 0.085 ppm or greater within a single ozone season or 0.080 ppm or greater averaged over two years, DEQ and SWCAA will assess the likely emissions and meteorological events contributing to elevated ozone levels. DEQ may form a planning group to assist DEQ in its review. The DEQ could recommend that no action be taken if it is determined that: (a) elevated ozone levels were caused by an event that is unlikely to

occur again, or (b) high ozone levels were caused by an uncontrollable event, such as a severe wildfire, or (c) federal regulations that will reduce ozone precursor emissions are scheduled to be implemented within two years. If it is determined that the event did not meet the criteria above, DEQ will evaluate options for appropriate action, including the option for additional emission reduction strategies to prevent future exceedances or a violation of the 8-hour ozone standard.

PHASE 3: ACTUAL VIOLATION
If a violation of the 8-hour ozone standard occurs, DEQ and SWCAA will determine the emissions and meteorological events contributing to the violation. If the violation is not due to an uncontrollable event or other criteria in Phase 2, DEQ will identify new strategies necessary to ensure compliance with the 8-hour ozone standard within 18 months of the conclusion of the ozone season that prompted the contingency plan, and revise the maintenance plan as needed to correct the violation. A revised maintenance plan would be submitted to EPA for approval.

Measures that would be considered for implementation include the following:

- Reinstatement of applicable measures as defined in 40 CFR 51.900, which includes the Enhanced Inspection/Maintenance Test for certain model year vehicles[7];
- Contingency Plan Requirements described in OAR 340-224-0060(5) that reinstate the LAER and offset requirements and eliminate the growth allowance until a revised maintenance plan is adopted by the EQC and approved by EPA;
- Other measures as appropriate.

<u>4.50.7.2.2 Part B, Contingency Plan Based on Significant Increase in Vehicle Miles Traveled in the Oregon portion of the Portland-Vancouver AQMA</u>

EPA's 8-hour ozone implementation rule (69 FR 23987-88, April 30, 2004) notes that although states cannot implement conformity for attainment areas as a matter of federal law, they could still work with their metropolitan planning organizations to develop a voluntary program to address motor vehicle emissions growth. Metro has agreed to informally track motor vehicle VOC and NO_x emissions at the same time as they are demonstrating conformity with the Portland Carbon Monoxide Maintenance Plan emissions budget. In addition, Metro has agreed to the following contingency measures for the Portland Carbon Monoxide Maintenance Plan that are also appropriate as voluntary measures for addressing ozone precursor emissions within the Portland metropolitan area. Although transportation control measures cannot be enforced and are removed from the Portland AQMA Ozone Maintenance Plan, other measures to reduce vehicle miles traveled (VMT) such as the Employee Commute Option program and public education and outreach remain in the ozone maintenance plan. In addition, DEQ participates in Metro's Regional Transportation Options program which includes many efforts in the Portland area designed to reduce single-occupancy vehicle trips.

PHASE 1: 5% VMT INCREASE
Metro will review and verify the local average vehicle miles traveled per capita (VMT/capita) for the Oregon portion of the Portland-Vancouver Air Quality Maintenance Area derived from the

---

[7] Although EPA requires all former applicable measures such as the Enhanced Inspection/Maintenance test be included in the contingency plan, DEQ believes that reinstating enhanced testing would not be feasible or cost effective, and would evaluate other more effective measures if the contingency plan is triggered.

most recent estimates of population and daily vehicle miles traveled from federal and state sources.

If daily VMT/capita exceeds a 5 % increase above the 2002 rate for two successive years, the Standing Committee [TPAC, as defined at OAR 340-252-0060(2)(b)(A)(iii)] shall be convened to:

a) determine whether there is a data problem with the trigger;

b) if there is not a data problem with the trigger, identify and analyze the effectiveness of those local actions that could reduce air pollutant emissions; and,

c) determine whether a recommendation should be made to JPACT to initiate local action to reduce VMT/capita until the 2002 level is once again attained.

PHASE 2: 10% VMT INCREASE

Metro will review and verify local VMT/capita values derived from the most recent estimates of population and daily vehicle miles traveled from federal and state sources.

If average daily VMT/capita exceeds a 10 percent increase above the 2002 rate for the Oregon portion of the Portland-Vancouver Air Quality Maintenance Area for two successive years, the following measures will become required Transportation Control Measures for the region (as determined by the programming of funds for specified projects) under the Portland Carbon Monoxide Maintenance Plan:

a) Washington County Commuter Rail within six years after exceeding the 10% increase above the 2002 VMT/capita rate,

b) Interstate 205 Light Rail Transit (I-205 LRT) within six years after exceeding the 10% increase above the 2002 VMT/capita rate;

c) An increase of efforts for the Regional Travel Options Program sufficient to increase the number of employers reached by the program by at least 5 % per year the number of employers currently subject to the DEQ Employee Commute Options program. Alternatively, specific projects from the Regional Transportation Options program could be substituted.

d) An increase of funding of at least 5% per year greater than current funding for Transit Oriented Development projects.

e) Other programs or projects consistent with state and federal law as may be determined by the Metro Council after consultation with the Joint Policy Advisory Committee on Transportation.

4.50.7.3 Salem SKATS 8-Hour Ozone Contingency Plan

PHASE 1: ELEVATED OZONE LEVELS
If the air quality index (AQI) is forecast to be within the “orange” range for ozone air quality (unhealthy for sensitive populations), or 8-hour daily maximum ozone values reach 0.100 ppm or greater, and meteorological conditions conducive to ozone formation are expected to persist,

DEQ will issue an advisory to inform the public of air quality levels and actions they can take to limit exposure to unhealthy air pollution levels and reduce emissions.

PHASE 2: RISK OF VIOLATION
If monitored 8-hour ozone levels at any site within the Salem/Turner area registers an annual fourth high monitored value of 0.085 ppm or greater within a single ozone season, or 0.080 ppm or greater averaged over two years, DEQ will assess the likely emissions and meteorological events contributing to elevated ozone levels. DEQ may form a planning group to assist DEQ in its review. The DEQ could recommend that no action be taken if it is determined that: (a) elevated ozone levels were caused by an event that is unlikely to occur again, or (b) high ozone levels were caused by an uncontrollable event, such as a severe wildfire, or (c) federal regulations that will reduce ozone precursor emissions are scheduled to be implemented within two years. If it is determined that the event did not meet the criteria above, DEQ will evaluate options for appropriate action, including the option for additional emission reduction strategies to prevent future exceedances or a violation of the 8-hour ozone standard.

PHASE 3: ACTUAL VIOLATION
If a violation of the 8-hour ozone standard occurs, DEQ will determine the probable emissions and meteorological events contributing to the violation. If the violation is not due to an uncontrollable event or other criteria in Phase 2, DEQ will identify new strategies necessary to ensure compliance with the 8-hour ozone standard within 18 months of the conclusion of the ozone season that prompted the contingency plan, and revise the maintenance plan as needed to correct the violation. Contingency plan requirements described in OAR 340-224-0060(5) that reinstate the LAER requirement would also apply until a revised maintenance plan is adopted by the EQC and approved by EPA.

4.50.8 Verification of Continued Attainment (Portland-Vancouver and Salem)

DEQ will continue to monitor ambient air quality ozone levels as described in the Contingency Plan. The Contingency Plan triggers that are based on ambient concentrations are intended to prevent violations of the 8-hour standard in the Portland-Vancouver and Salem areas. DEQ will update countywide emission inventories every three years as required by the Consolidated Emission and Reporting Rule (CERR) update of the National Emissions Inventory. If ambient ozone levels increase, DEQ will compare CERR updates with the 2002 and 2015 emissions inventories and evaluate the assumptions used in the 2015 emissions projections to determine whether emissions are increasing at a rate not anticipated in the maintenance plan.

Appendices

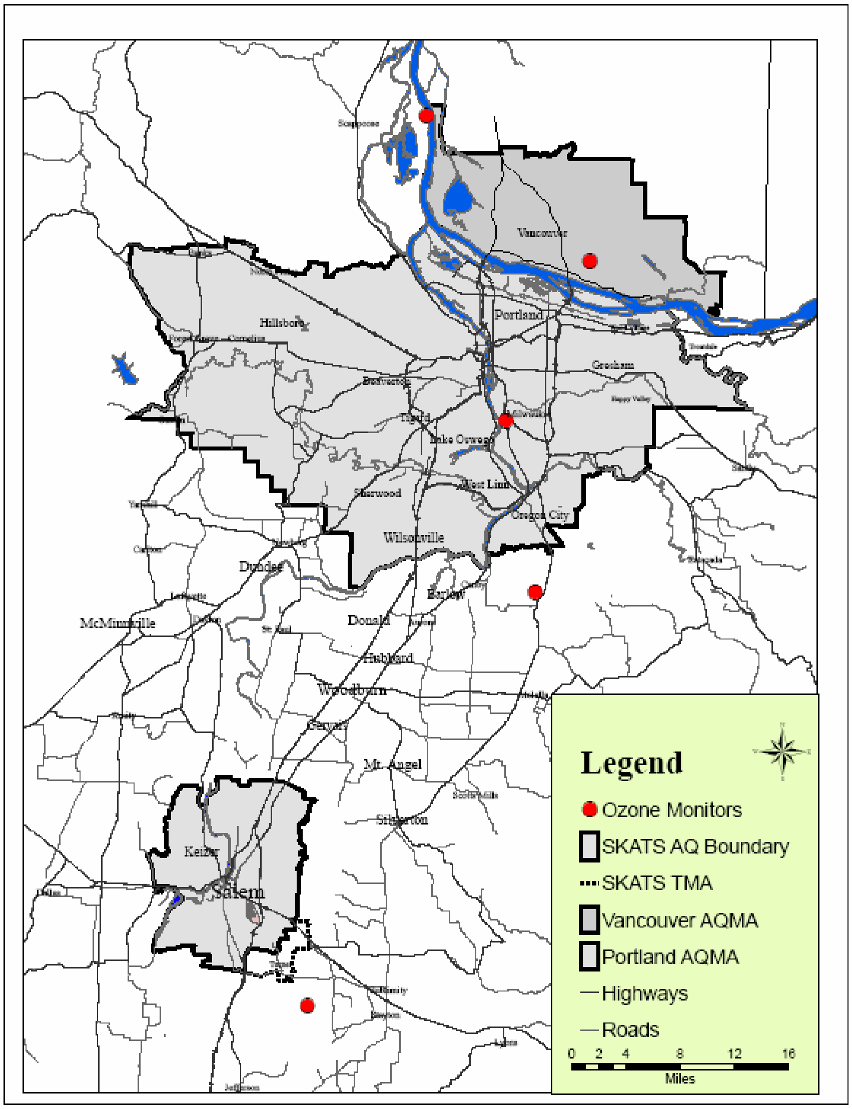
1. Ozone Monitoring Network (Vancouver-Portland-Salem regional area map and site description)
2. 1992 to 2005 Meteorological Factors Conducive to Ozone Formation in the Portland-Vancouver Area (ODEQ, April 2006)
3. Emission Inventory
    a. Annual Emissions Inventory
    b. Typical Summer Day Emissions Inventory
    c. Summary of Portland Area Emissions
    d. Summary of Salem Area Emissions
4. Historical and Future Ozone Simulations Using the MM5/SMOKE/CMAQ System in the Portland-Vancouver Area (WSU, December 31, 2005)
5. Economic Report to the Metro Council, 2000-2030 Regional Forecast for the Portland-Vancouver Metropolitan Area (Metro’s Data Resource Center, December 2002 final draft)

6. Modeled Attainment Test

References

- "Maintenance Plan Guidance Document for Certain 8-hour Ozone Areas Under Section 110(a)(1) of the Clean Air Act" (memo dated May 20, 2005 from Lydia Wegman, EPA). The May 20, 2005 guidance applies to areas designated in attainment with the 8-hour ozone standard and preparing maintenance plans under Section 110(a)(1) of the Clean Air Act and 40 CFR 51.905(c) and (d).
- "Demonstrating Noninterference Under Section 110(l) of the Clean Air Act When Revising a State Implementation Plan" (draft EPA Guidance, 6/8/05)
- "1-Hour Ozone Maintenance Plans Containing Basic I/M Programs (memo dated May 12, 2004 from Tom Helms, EPA)
- April 30, 2004 Federal Register (69 FR 23951), Final Rule to Implement the 8-Hour Ozone NAAQS-Phase 1
- July 8, 2005 Federal Register (70 FR 39413), Notice of Final Rulemaking regarding Nonattainment Major New Source Review Implementation under 8-Hour Ozone NAAQS
- "Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS" (EPA-450/R-05-002, October, 2005)
- "Emission Inventory Guidance for Implementation of Ozone and Particulate Matter NAAQS and Regional Haze" (EPA-454/R-05-001, August 2005, updated November 2005)
- "2002 Base Year Emission Inventory SIP Planning: 8-hr Ozone, PM 2.5 and Regional Haze Programs" (memo dated November 18, 2002 from Lydia Wegman, EPA)
- "Procedures for Processing Requests to Redesignate Areas to Attainment" (memo dated September 4, 1992 from John Calcagni, EPA)

Appendix D10-1
Portland-Vancouver AQMA and Salem SKATS
Ozone Monitoring Network



Monitoring Sites (north to south):

1. Sauvie Island (Portland, OR) (background site)
2. Mountain View (Vancouver, WA)
3. Milwaukie (Portland, OR)
4. Carus (Portland, OR) (traditionally highest ozone values)
5. Turner (Salem, OR)

DEQ and SWCAA Continuous Air Monitoring Method for Ozone: Ultraviolet Photometry
The air sample enters a chamber with an ultraviolet lamp at one end and detector at the other. The ozone in the sample stream absorbs the ultraviolet light at a specific wavelength. The amount absorbed is proportional to the amount of ozone in the air stream. The detector then sends an amplified signal to the recorder. This is an EPA Federal Reference Method.

8-hour Ozone Air Quality Data (DEQ Air Quality Annual Report, 2004)

STATION LOCATION AND NUMBER	Year	SUMMER AVERAGE	1-HOUR MAXIMUM (date)	# OF DAYS >0.125 ppm	8-HOUR AVERAGE MAXIMUM	4TH HIGHEST 8-HOUR AVERAGE	# OF DAYS >0.085 ppm	3 YEAR AVG OF 4TH HIGH
Portland Area	1994	0.029	0.117 (07/21)	0	0.084 (07/21)	0.078 (07/27)	2	0.079†
Carus (SPR)	1995	0.027	0.099 (06/30)	0	0.084 (09/01)	0.073 (09/14)	1	0.072†
13575 Spangler Road	1996	0.029	0.149 (07/26)	1	0.112 (07/26)	0.099 (07/27)	7	0.083†
Canby	1997	0.025	0.085 (07/04)	0†	0.074 (07/04)	0.062 (05/13)	0	0.078
DEQ# 10093 EPA# 410050004	1998	0.026	0.137 (07/28)	3†	0.116 (07/26)	0.081 (09/01)	3	0.080
	1999	0.028	0.102 (07/10)	0†	0.080 (07/09)	0.072 (07/28)	0	0.071
	2000	0.025	0.086 (06/28)	0†	0.071 (06/03)	0.065 (07/30)	0	0.072
	2001	0.025	0.099 (08/09)	0†	0.080 (08/09)	0.069 (06/20)	0	0.068
	2002	0.025	0.101 (07/22)	0†	0.085 (07/10)	0.063 (07/21)	1	0.065
	2003	0.029	0.097 (07/29)	0†	0.084 (09/03)	0.075 (07/28)	0	0.069
	2004	0.025	0.105 (07/24)	0†	0.084 (07/24)	0.067 (08/11)	0	0.068
	2005	0.025	0.093 (08/04)	0†	0.079 (08/04)	0.064 (07/27)	0	.068
Milwaukie High Sch (MHS)	1994	0.018	0.103 (07/20)	0	0.087 (07/20)	0.057 (07/21)	1	0.060†
11300 SE 23rd	1995	0.018	0.110 (07/18)	0	0.092 (07/18)	0.067 (05/29)	1	0.059†
DEQ# 10095 EPA# 410052001	1996	0.019	0.145 (07/14)	2	0.120 (07/14)	0.085 (07/13)	4	0.069†
	1997	0.016	0.101 (07/20)	0	0.082 (07/04)	0.054 (07/19)	0	0.068†
	1998	0.018	0.124 (07/26)	0†	0.100 (07/26)	0.061 (08/31)	1	0.066†
	1999	0.015	0.080 (06/14)	0†	0.054 (07/09)	0.051 (05/23)	0	0.055†
Milwaukie (MSJ)	2000	0.018	0.085 (06/04)	0†	0.068 (06/04)	0.056 (08/23)	0	0.056
St. Johns Church	2001	0.018	0.082 (08/10)	0†	0.066 (08/10)	0.059 (08/12)	0	0.055
DEQ# 23306 EPA# 410052002	2002	0.020	0.116 (07/22)	0†	0.082 (07/22)	0.063 (08/13)	0	0.059
	2003	0.021	0.091 (06/07)	0†	0.068 (06/06)	0.061 (07/28)	0	0.061
	2004	0.017	0.094 (07/24)	0†	0.077 (07/24)	0.054 (08/15)	0	0.059
	2005	0.016	0.083 (05/27)	0†	0.063 (05/27)	0.050 (08/14)	0	0.055

Sauvie Island (SIS)	1994	0.023	0.102 (07/20)	0	0.086 (07/20)	0.062 (07/21)	1	0.066†
Social Security Beach	1995	0.022	0.103 (07/18)	0	0.089 (07/18)	0.061 (07/17)	1	0.063†
DEQ# 14152 EPA# 410090004	1996	0.026	0.096 (08/10)	0	0.084 (07/13)	0.076 (07/26)	0	0.066†
	1997	0.022	0.081 (07/04)	0†	0.064 (07/04)	0.053 (05/11)	0	0.063
	1998	0.023	0.093 (07/26)	0†	0.077 (07/27)	0.066 (08/28)	0	0.065
	1999	0.021	0.070 (07/09)	0†	0.056 (07/09)	0.049 (09/22)	0	0.056
	2000	0.022	0.080 (06/04)	0†	0.066 (06/27)	0.054 (06/03)	0	0.056
	2001	0.025	0.089 (08/10)	0†	0.068 (08/10)	0.056 (05/10)	0	0.053
	2002	0.025	0.084 (07/10)	0†	0.067 (08/13)	0.061 (06/12)	0	0.057
	2003	0.025	0.088 (09/03)	0†	0.073 (09/03)	0.069 (07/28)	0	0.062
	2004	0.023	0.074 (07/24)	0†	0.061 (07/23)	0.058 (07/22)	0	0.062
	2005	0.023	0.080 (08/04)	0†	0.065 (08/04)	0.055 (08/14)	0	0.060
Salem Area	1995	0.022	0.105 (06/30)	0	0.072 (09/01)	0.064 (07/16)	0	-
Cascade Jr High (CJH)	1996	0.028	0.130 (07/26)	1	0.104 (07/26)	0.092 (08/10)	10	-
10226 Marion Rd. SE	1997	0.024	0.082 (07/04)	0†	0.067 (07/04)	0.061 (08/12)	0	0.072
Turner	1998	0.024	0.121 (07/27)	0†	0.098 (07/27)	0.077 (08/28)	1	0.076
DEQ# 10130 EPA# 410470004	1999	0.023	0.083 (09/21)	0†	0.074 (07/09)	0.065 (07/10)	0	0.067
	2000	0.020	0.075 (07/30)	0†	0.064 (07/30)	0.059 (06/26)	0	0.067
	2001	0.021	0.087 (08/09)	0†	0.068 (07/03)	0.057 (08/12)	0	0.060
	2002	0.023	0.097 (07/10)	0†	0.072 (07/12)	0.063 (08/13)	0	0.059
	2003	0.028	0.096 (09/04)	0†	0.080 (09/03)	0.072 (07/30)	0	0.064
	2004	0.021	0.086 (08/11)	0	0.068 (08/11)	0.062 (07/24)	0	0.065
	2005	0.023	0.100 (08/04)	0†	0.080 (08/04)	0.063 (05/27)	0	0.065

*Parts per million
† The 8hour ozone standard became effective in 1998;
1-hour values are no longer evaluated for attainment purposes.
The 8 hr standard is the 3-year average of the 4th highest value.

STATION LOCATION AND NUMBER	Year	SUMMER AVERAGE	1-HOUR MAXIMUM (date)	# OF DAYS >0.125 ppm	8-HOUR AVERAGE MAXIMUM	4TH HIGHEST 8-HOUR AVERAGE	# OF DAYS >0.085 ppm	3 YEAR AVG OF 4TH HIGH
Vancouver Area	1995	0.021	0.117 (7/19)	0	n/a	n/a	0	n/a
Mt. View High School 1500 SE Blairmont Dr Vancouver	1996	0.022	0.112 (07/19)	0	n/a	n/a	0	n/a
AIRS #530110011	1997	0.02	0.077 (07/04)	0	n/a	n/a	0	n/a
	1998	0.021	0.102 (07/28)	0	0.078 (07/27)	0.07 (08/28)	0	n/a
	1999	0.021	0.080 (09/22)	0	0.061 (07/09)	0.057 (08/23)	0	n/a
	2000	0.021	0.104 (06/04)	0	0.073 06/04)	0.059 (06/27)	0	0.062
	2001	0.022	0.089 (05/22)	0	0.071 (08/10)	0.063 (06/20)	0	0.06
	2002	0.023	0.086 (07/10)	0	0.073 (7/22)	0.056 (06/25)	0	0.059
	2003	0.026	0.098 (09/03)	0	0.077 (09/03)	0.069 (06/07)	0	0.063
	2004	0.021	0.083 (08/09)	0	0.066 (07/24)	0.056 (06/21)	0	0.06
	2005	0.023	0.090 (05/27)	0	0.076 (005/27)	0.057 (08/19)	0	0.060

Appendix D10-2

1992 to 2005 Meteorological Factors Conducive to Ozone Formation in the Portland-Vancouver Area
(ODEQ, April 2006)

Please contact DEQ for a copy of this appendix

Air Quality Division
(503) 229-5177
aqinfo@deq.state.or.us

Or

Anthony Barnack
Air Quality Division
Report Author
(503) 229-5713
barnack.anthony@deq.state.or.us

Appendix D10-3
Emission Inventory

The Portland-Vancouver AQMA and the Salem-Keizer Area Transportation Study air quality area were designated "Unclassifiable/Attainment" with the 8-hour ozone National Ambient Air Quality Standard (NAAQS) on April 30, 2004 (69 FR 23829-30), as demonstrated through air quality monitoring data. EPA requires this maintenance plan to demonstrate continued compliance for at least ten years following EPA designation. WSU performed a modeling analysis that forecasted ozone levels to 2015 and determined that these areas will continue to meet the standard.

The maintenance plan accommodates future growth and provides for the protection of public health by ensuring compliance with the 8-hour ozone standard. The maintenance plan continues emission reduction strategies needed to maintain compliance. To approve the maintenance plan, EPA requires permanent and enforceable reductions in emissions to remain in effect throughout the maintenance period.

In compliance with published EPA requirements, this emission inventory is provided as a part of the State's revisions to its State Implementation Plan (SIP) to formulate a strategy to maintain the NAAQS. The principal components for development and documentation for the maintenance plan inventories include stationary point sources, stationary area sources, non-road mobile sources, on-road mobile sources, biogenic emission sources, quality assurance implementation, and emissions summaries. The geographic focus for this emission inventory is the Oregon portion of the Portland-Vancouver AQMA and the Salem-Keizer Area Transportation Study (SKATS) air quality area. Countywide estimates are used to facilitate comparison with future year National Emission Inventory submittals. The emissions inventory for the Portland-Vancouver AQMA (Oregon portion) includes Clackamas, Multnomah and Washington counties. The emissions inventory for the Salem-Keizer SKATS air quality area includes Marion and Polk counties. A complete copy of the emission inventory is on file at DEQ and available upon request.

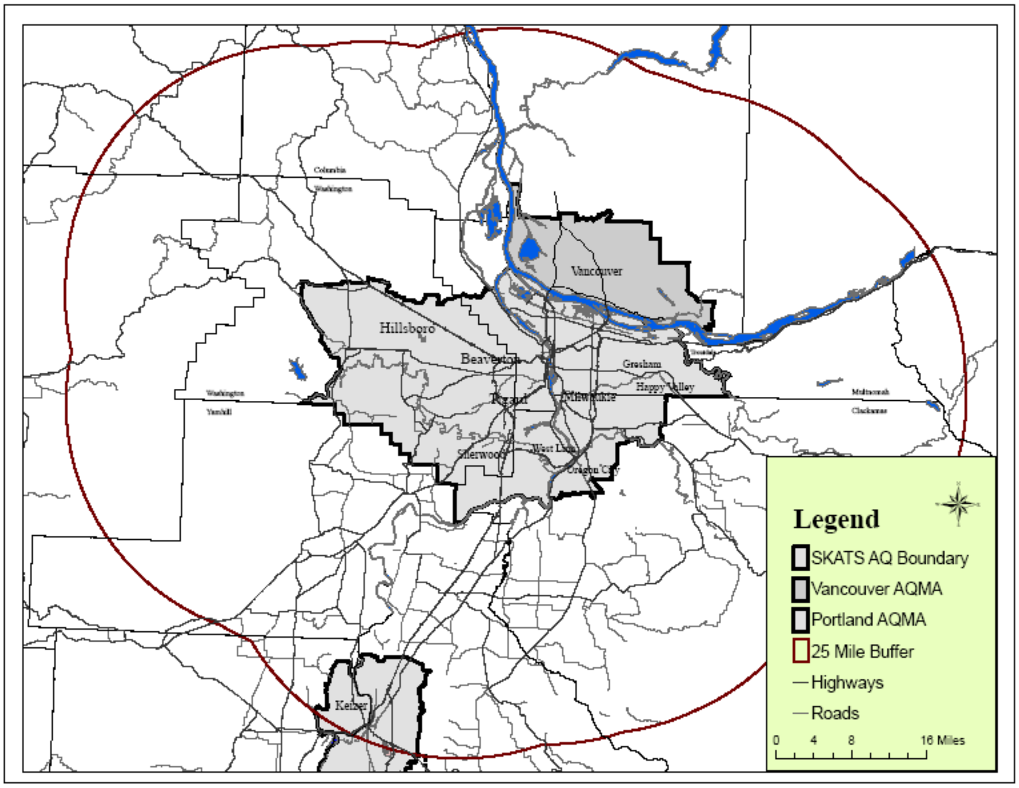
The WSU modeling study (Appendix D10-4) describes the emissions inventory that was used to validate the model and evaluate the 2015 projection. The model meteorology was based on a July 1998 episode in which the Portland area violated the one-hour ozone NAAQS at the Carus monitoring site.

Point source emissions from sources that are not Title 5 point sources were inventoried by DEQ regional staff and SWCAA using the following parameters:

Geographic Area	VOC	NOx	CO
AQMA	>10 tons/year	>40 tons/year	>100 tons/year
25-mile buffer	>100 tons/year	>40 tons/year	>100 tons/year
Modeling domain	>100 tons/year	>40 tons/year	>100 tons/year

In this document the terms "annual emissions" and "typical summer day" emissions are used to categorize the estimated emissions for a particular time period. The annual emissions, in tons per year, are a total amount of emissions for the source category that occurred throughout the year. The typical summer day emissions, in pounds per day, are based on the ozone season period from May 1st through September 30th as one in which, historically, the 8-hour ozone standard would most likely be exceeded.

Point Source Inventory Area



Annual Emission Inventory

The attainment year emission inventory (2002) for area sources, non-road mobile and on-road mobile sources and Title 5 point sources was developed from the DEQ 2002 Consolidated Emissions Reporting Rule (CERR) National Emission Inventory (NEI) submittal. For point sources, DEQ used 2002 “actual” data generated from point source annual reports for the attainment year inventory. For the 2015 maintenance demonstration, DEQ used “allowable” data generated from point source permits that represents the maximum allowable emissions that could be generated at each facility. Washington sources were grown proportionally. The 2015 maintenance demonstration also included a growth allowance in both Oregon and Washington. 5,000 tons VOC and 5,000 tons NO_x were added to areas zoned for industrial growth in the Oregon portion of the Portland-Vancouver AQMA, and a proportional amount of 411 tons of VOC and 1,313 tons of NO_x was added to areas zoned for industrial growth in the Washington portion of the Portland-Vancouver AQMA.

The annual emission inventory is summarized in Tables 12 and 13 below. The annual emissions are included for ease of comparison with future year CERR National Emission Inventory submittals.

Table12: Portland Area VOC and NO_x Emissions (tons/year)

Portland Area VOC Emissions
Annual Emissions (tons/year)
Clackamas, Multnomah, Washington Counties

Source Type	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
AREA	92,946	108,109	108,109
NON-ROAD	13,247	13,308	13,308
ON-ROAD	23,683	8,538	8,538
POINT	3,056	3,292	21,721
Total	132,931	133,246	151,675

Portland Area NO_x Emissions
Annual Emissions (tons/year)
Clackamas, Multnomah, Washington Counties

Source Type	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
AREA	5,808	5,822	5,822
NON-ROAD	17,344	17,223	17,223
ON-ROAD	36,786	10,339	10,339
POINT	2,522	2,862	15,191
Total	62,461	36,245	48,574

Portland Area CO Emissions
Annual Emissions (tons/year)
Clackamas, Multnomah, Washington Counties

Source Type	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
AREA	104,621	139,992	139,992
NON-ROAD	153,204	330,324	330,324
ON-ROAD	288,435	127,923	127,923
POINT	2,214	2,364	19,768
Total	548,474	600,603	618,007

Table13: Salem Area VOC and NO_x Emissions (tons/year)

Salem Area VOC Emissions
Annual Emissions (tons/year)
Marion, Polk Counties

Source Type	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
AREA	20,297	22,594	22,594
NON-ROAD	2,401	2,334	2,334
ON-ROAD	9,331	2,724	2,724
POINT	218	302	1,079
Total	32,247	27,954	28,731

Salem Area NO_x Emissions
Annual Emissions (tons/year)
Marion, Polk Counties

Source Type	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
AREA	1,646	1,581	1,581
NON-ROAD	3,159	3,062	3,062
ON-ROAD	11,276	3,326	3,326
POINT	302	577	846
Total	16,383	8,547	8,815

Salem Area CO Emissions
Annual Emissions (tons/year)
Marion, Polk Counties

Source Type	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
AREA	34,547	42,428	42,428
NON-ROAD	27,025	55,138	55,138
ON-ROAD	116,116	42,445	42,445
POINT	30	329	767
Total	177,719	140,341	140,779

Typical Summer Day Emission Inventory

For the 2002 base year and 2015 maintenance demonstration, DEQ used the countywide inventory for area, on-road and non-road sources. DEQ generated the typical summer day emission inventory using the Sparse Matrix Operator Kernel Emissions Modeling System (SMOKE) model to make the seasonal adjustments to the annual emissions inventory. Complete descriptions of the seasonal adjustment factors used to develop typical summer day emissions can be found in the Inventory Preparation Plan, available from DEQ. The SMOKE model was used to seasonally adjust the emissions for the CMAQ model validation, 2002 attainment inventory and 2015 maintenance demonstration emissions inventories.

Fireplace and woodstove emissions were not included in the seasonally-adjusted area source inventory because they would not likely be used during meteorological conditions conducive to ozone formation (hot, stagnant summer days). Wildfires, prescribed fires and structural fires were also not included in the 2002 Attainment Inventory and 2015 maintenance demonstration inventory because the modeling team's research on source activity during the July 1998 episode indicated that these emissions were not significant during the 1998 episode.

Typically, industrial production and emissions are fairly constant throughout the year.

Figures 7 and 8, and Tables 14 and15, describe the typical summer day emissions inventories in Portland and Salem.

Figure 7: Top Ten Sources, Portland

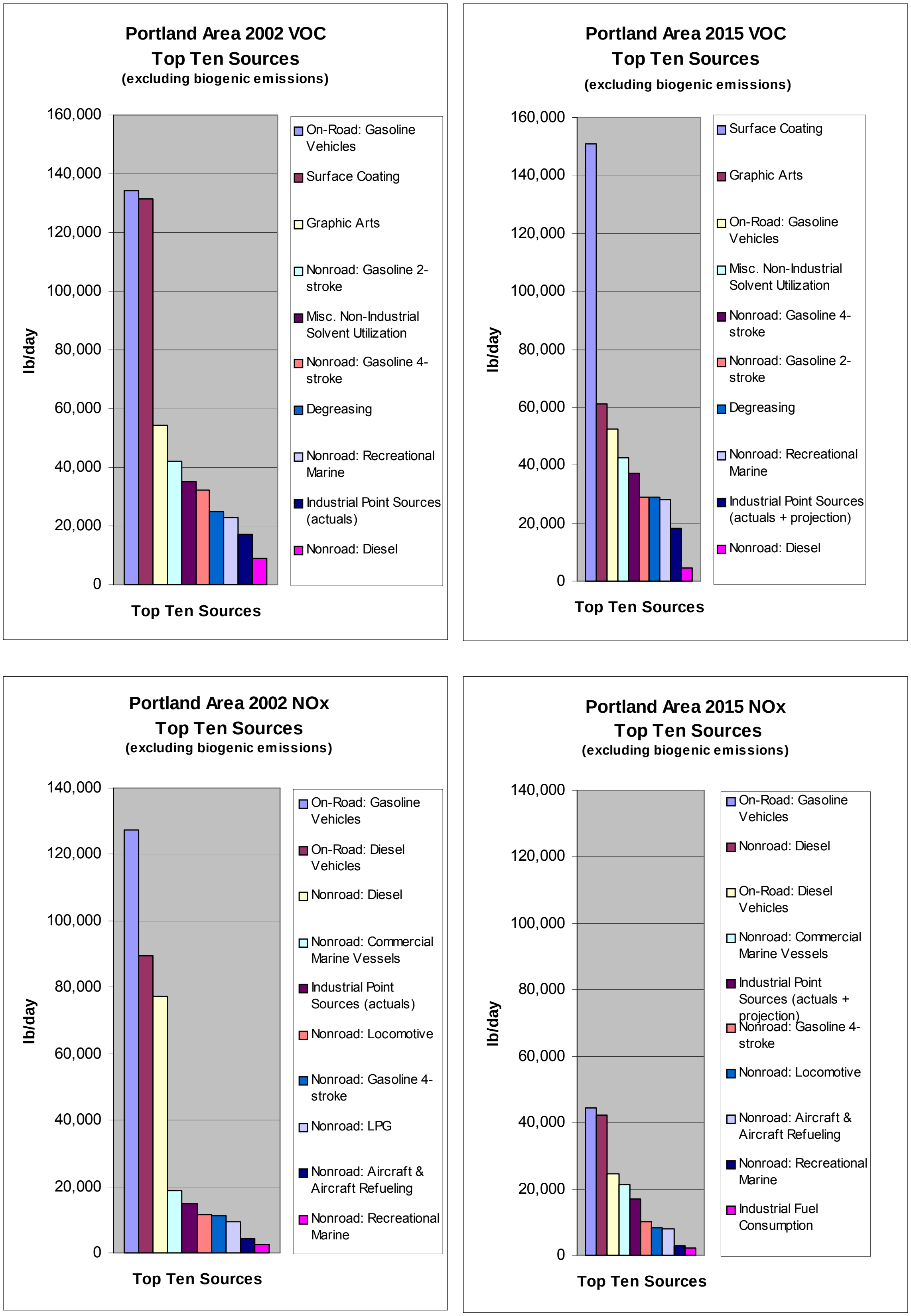
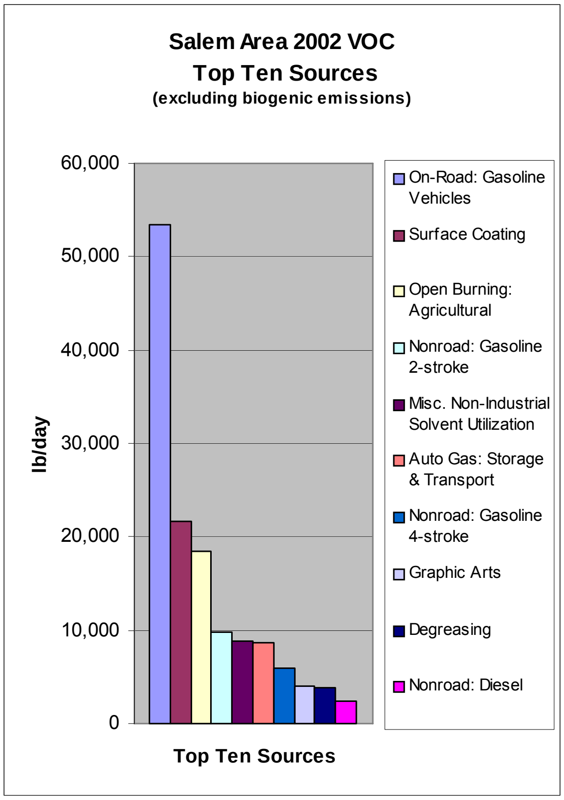
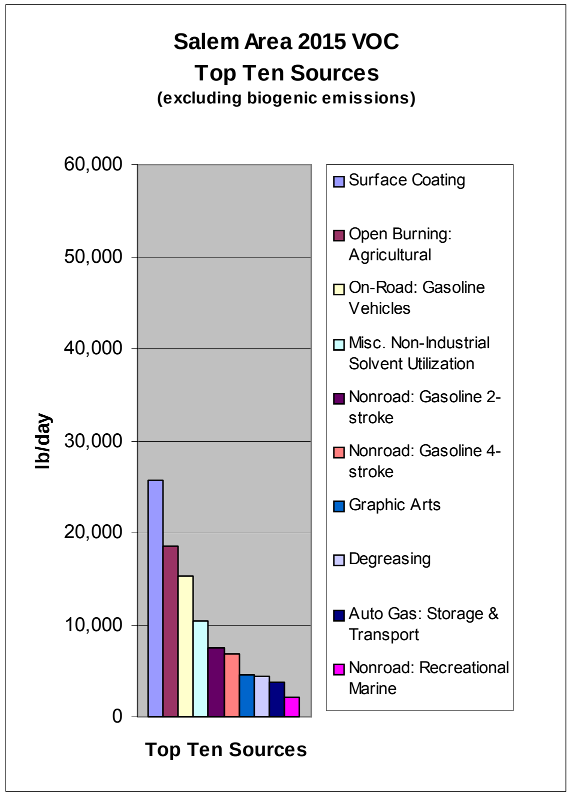
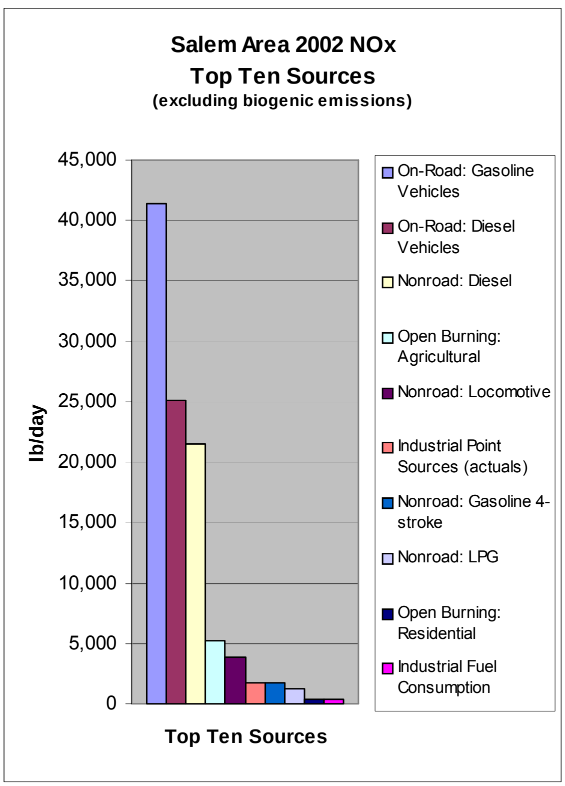
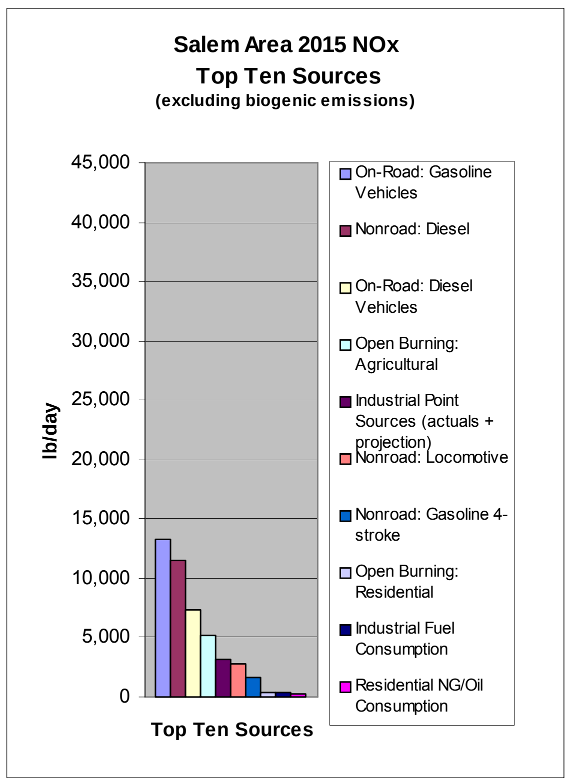


Figure 8: Top Ten Sources, Salem









Summary of Portland AQMA Emissions (Clackamas, Multnomah, and Washington Counties)

A summary of the Portland-Vancouver AQMA Ozone Maintenance Plan Emission Inventory for Point, Area, Non-road Mobile and On-road Mobile sources of VOC and NO_x emissions is presented in the following section. Percentages reflect anthropogenic (human-caused) emissions; biogenic emissions have been subtracted from this summary (see Tables 14 and 15). A full copy of the emission inventory is available upon request from DEQ.

Portland Area VOC and NO_x Emissions, (lb/day)

(Clackamas, Multnomah, Washington Counties)

Source Type	VOC, lbs per day: 2002 Actual	VOC, lbs per day: 2015 Growth Projection	VOC, lbs per day: 2015 Maintenance Demonstration	Source Type	NO_x, lbs per day: 2002 Actual	NO_x, lbs per day: 2015 Growth Projection	NO_x, lbs per day: 2015 Maintenance Demonstration
AREA	253,871	291,098	291,098	AREA	5,529	6,157	6,157
BIOGENIC	437,910	437,910	437,910	BIOGENIC	3,890	3,890	3,890
NONROAD	110,188	101,699	101,699	NONROAD	136,713	95,638	95,638
ON-ROAD	139,542	54,521	54,521	ON-ROAD	216,750	68,910	68,910
POINT	17,020	18,304	119,943	POINT	14,913	16,783	86,780
	----------	----------	----------		----------	----------	----------
Totals	958,531	903,531	1,005,171	Totals	377,794	191,378	261,375
Totals Minus Biogenic	520,621	465,621	567,260		373,904	187,487	257,485

2002 Attainment Inventory (Clackamas, Multnomah, and Washington Counties)

During an ozone season day, on-road mobile sources contribute 27% of the VOC and 58% of the total NO_x air emissions in the Oregon portion of the Portland-Vancouver AQMA. On-road mobile source emissions are based on motor vehicle travel on a typical summer day and the seasonal adjustment factor reflects the fact that emissions would likely increase during the summer months when tourism traffic picks up. Gasoline vehicles contribute 26% of the VOC emissions and 34% of the NO_x emissions within the on-road mobile category; diesel vehicles contribute 24% of the NO_x emissions.

Stationary area sources comprise 49% of the VOC and 1% of the NO_x air emissions in the Portland area on a typical summer day. Within the area source category, surface coating contributes 25% of the VOC emissions while consumer solvents contribute 7% and graphic arts contribute 10% of the VOC emissions. NO_x emissions from area sources are insignificant.

Non-road mobile sources contribute 21% of the VOC and 37% of the NOx emissions on a typical summer day. Off-highway diesel equipment comprises 21% of the daily NO_x emissions; 8% of the VOC emissions originate from 2-cycle engines within the non-road mobile source category.

Stationary point sources comprise 3% of the VOC and 4 % of the NO_x emissions in the Portland area on a typical summer day.

Biogenic emissions which are produced by life substances (e.g. terpenes from pine trees) contribute 46% of the total VOC during a typical summer day. Washington State University provided the biogenic emissions data and these emissions are assumed to remain unchanged in the future, although urban development does modify the amount, location and type of vegetation over time.

2015 Maintenance Demonstration (Clackamas, Multnomah, and Washington Counties)
During an ozone season day, on-road mobile sources contribute 12% of the VOC and 37% of the NO_x air emissions in the Oregon portion of the Portland-Vancouver AQMA. On-road mobile source emissions are based on motor vehicle travel on a typical summer day and the seasonal adjustment factor reflects the fact that emissions would likely increase during the summer months when tourism traffic picks up. Gasoline vehicles contribute 11% of the VOC emissions and 24% of the NO_x emissions within the on-road mobile category; diesel vehicles contribute 13% of the NO_x emissions.

Stationary area sources comprise 63% of the VOC and 3% of the NO_x emissions in the Portland area on a typical summer day. Within the area source category, surface coating contributes 32% of the VOC emissions while consumer solvents contributes 9% and graphic arts contribute 13% of the VOC emissions.

Non-road mobile sources contribute 22% of the VOC and 51% of the NO_x emissions on a typical summer day. Off-highway diesel equipment comprises 23% of the daily NO_x emissions.

Stationary point sources comprise 4% of the VOC and 9 % of the NO_x emissions in the Portland area on a typical summer day.

Biogenic emissions which are produced by life substances (e.g. terpenes from pine trees) contribute 48% of the total VOC during a typical summer day. Washington State University provided the biogenic emissions data and these emissions are assumed to remain unchanged in the future, although urban development does modify the amount, location and type of vegetation over time.

Summary of Salem-Keizer (SKATS) Emissions (Marion and Polk Counties)

A summary of the Salem-Keizer Area Ozone Maintenance Plan Emission Inventory for Point, Area, Non-road Mobile and On-road Mobile sources of VOC and NO_x emissions is presented in the following section. Percentages reflect anthropogenic (human-caused) emissions; biogenic emissions have been subtracted from this summary (see Tables 12 and 13). A full copy of the emission inventory is available upon request from DEQ.

Salem Area VOC and NO_x Emissions, (lb/day)

(Marion & Polk Counties)

	--------- VOC, lbs per day ---------				--------- NO_x, lbs per day ---------		
Source Type	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration	Source Type	2002 Actual	2015 Growth Projection	2015 Maintenance Demonstration
AREA	66,252	68,416	68,416	AREA	6,227	6,400	6,400
BIOGENIC	296,719	296,719	296,719	BIOGENIC	3,803	3,803	3,803
NONROAD	20,462	17,901	17,901	NONROAD	28,793	16,618	16,618
ON-ROAD	54,980	16,004	16,004	ON-ROAD	66,442	20,582	20,582
POINT	1,198	1,657	6,021	POINT	1,701	3,168	4,701
	----------	----------	----------		----------	----------	----------
Totals	439,610	400,698	405,062	Totals	106,967	50,571	52,103
Totals Minus Biogenic	142,891	103,979	108,343		103,163	46,768	48,300

2002 Attainment Inventory (Marion and Polk Counties)

During an ozone season day, on-road mobile sources contribute 38% of the VOC and 64% of the NO_x emissions in the Salem-Keizer area. On-road mobile source emissions are based on motor vehicle travel on a typical summer day and the seasonal adjustment factor reflects the fact that emissions would likely increase during the summer months when tourism traffic picks up. Gasoline vehicles contribute 35% of the VOC emissions and 40% of the NO_x emissions within the on-road mobile category. On-road diesel vehicles contribute 24% of the NO_x emissions.

Stationary area sources comprise 46% of the VOC and 6% of the NO_x emissions in the Salem area on a typical summer day. Within the area source category, surface coating contributes 15% of the VOC emissions while agricultural open burning contributes 13% and consumer solvents contributes 6% of the VOC emissions.

Non-road mobile sources contribute 14% of the VOC and 28% of the NO_x emissions on a typical summer day. Off-highway diesel equipment comprises 21% of the daily NO_x emissions; 7% of the total VOC emissions originate from 2-cycle engines within the non-road mobile source category.

Stationary point sources comprise 1% of the VOC and 2 % of the NO_x emissions in the Salem area on a typical summer day.

Biogenic emissions contribute 67% of the total VOC during a typical ozone season day. Biogenic emissions data was provided by Washington State University and these emissions were assumed to remain unchanged in the future, although urban development does modify the amount, location and type of vegetation over time.

2015 Maintenance Demonstration (Marion and Polk Counties)

During an ozone season day, on-road mobile sources contribute 15% of the VOC and 44% of the NO_x emissions in the Salem-Keizer area. On-road mobile source emissions are based on motor vehicle travel on a typical summer day and the seasonal adjustment factor reflects the fact that emissions would likely increase during the summer months when tourism traffic picks up. Gasoline vehicles contribute 15% of the VOC emissions and 28% of the NO_x emissions within the on-road mobile category. On-road diesel vehicles contribute 16% of the NO_x emissions.

Stationary area sources comprise 66% of the VOC and 13% of the NO_x emissions in the Salem area on a typical summer day. Within the area source category, surface coating contributes 25% of the VOC emissions while agricultural open burning contributes 18% and consumer solvents contributes 10% of the VOC emissions.

Non-road mobile sources contribute 17% of the VOC and 36% of the NO_x emissions on a typical summer day. Off-highway diesel equipment comprises 25% of the daily NOx emissions; 7% of the VOC emissions originate from 2-cycle engines within the non-road mobile source category.

Stationary point sources comprise 2% of the VOC and 7 % of the NO_x emissions in the Salem area on a typical summer day. This includes one proposed energy facility that has since withdrawn its permit application and will not be constructed.

Biogenic emissions contribute 74% of the total VOC during a typical ozone season day. Biogenic emissions data was provided by Washington State University and these emissions were assumed to remain unchanged in the future, although urban development does modify the amount, location and type of vegetation over time.

Table14: 2002 Emission Inventory grouped by SCC codes

Multnomah/Washington/Clackamas County 2002 Totals

Sector	GroupDesc	VOC tpy	VOC lbs per day
BIOGENIC	Biogenic Emissions	--	437,910
ON-ROAD	On-Road: Gasoline Vehicles	22,782.1	134,234
AREA	Surface Coating	21,807.8	131,550
AREA	Graphic Arts	8,233.3	54,416
NONROAD	Nonroad: Gasoline 2-stroke	5,133.6	42,041
AREA	Misc. Non-Industrial Solvent Utilization	5,729.8	35,026
NONROAD	Nonroad: Gasoline 4-stroke	4,149.6	32,054
AREA	Degreasing	4,428.0	25,049
NONROAD	Nonroad: Recreational Marine	2,311.1	22,692
POINT	Industrial Point Sources (actuals)	3,055.6	17,020
NONROAD	Nonroad: Diesel	882.6	9,035
ON-ROAD	On-Road: Diesel Vehicles	900.8	5,308
AREA	Auto Gas: Storage & Transport	674.7	3,888
NONROAD	Nonroad: LPG	431.7	2,513
AREA	Open Burning: Agricultural	83.4	1,874
NONROAD	Nonroad: Aircraft & Aircraft Refueling	173.8	953
AREA	Open Burning: Residential	125.4	774
NONROAD	Nonroad: Locomotive	94.1	516
AREA	Municipal (non-TV) Landfills	89.5	490
NONROAD	Nonroad: Commercial Marine Vessels	67.2	368
AREA	POTWs	64.8	355
AREA	Food Preparation	55.3	299
AREA	Non-Perc Drycleaning	8.6	50
AREA	Industrial Fuel Consumption	45.4	46
AREA	Residential NG/Oil Consumption	27.5	27
AREA	Commercial/Institutional Fuel Consumption	25.1	26
NONROAD	Nonroad: CNG	2.9	17
AREA	Residential Wood Combustion	51,141.0	--
AREA	Prescribed Burning	209.3	--
AREA	Structure Fires	194.9	--
AREA	Wildfires	2.0	--
	Totals	**132,930.8**	**958,531**
	Totals minus BIOGENIC	**--**	**520,621**
Sector	**GroupDesc**	**NOX tpy**	**NOX lbs per day**
ON-ROAD	On-Road: Gasoline Vehicles	21,588.8	127,204
ON-ROAD	On-Road: Diesel Vehicles	15,197.7	89,546
NONROAD	Nonroad: Diesel	7,393.6	77,376
NONROAD	Nonroad: Commercial Marine Vessels	3,444.7	18,875
POINT	Industrial Point Sources (actuals)	2,522.0	14,913
NONROAD	Nonroad: Locomotive	2,136.6	11,707
NONROAD	Nonroad: Gasoline 4-stroke	1,494.6	11,174
NONROAD	Nonroad: LPG	1,619.4	9,441
NONROAD	Nonroad: Aircraft & Aircraft Refueling	795.2	4,357
BIOGENIC	Biogenic Emissions	--	3,890
NONROAD	Nonroad: Recreational Marine	241.4	2,371
AREA	Industrial Fuel Consumption	1,895.3	1,940
NONROAD	Nonroad: CNG	179.9	1,089
AREA	Residential NG/Oil Consumption	1,030.4	1,003
AREA	Commercial/Institutional Fuel Consumption	972.8	996
AREA	Open Burning: Agricultural	106.0	854
AREA	Open Burning: Residential	100.9	545
NONROAD	Nonroad: Gasoline 2-stroke	38.3	322
AREA	Municipal (non-TV) Landfills	34.9	191
AREA	Residential Wood Combustion	1,545.2	--
AREA	Prescribed Burning	97.2	--
AREA	Structure Fires	24.8	--
AREA	Wildfires	0.8	--
	Totals	**62,460.5**	**377,794**
	Totals minus BIOGENIC	**--**	**373,904**
Sector	**GroupDesc**	**CO tpy**	**CO lbs per day**
ON-ROAD	On-Road: Gasoline Vehicles	284,222.4	1,674,671
NONROAD	Nonroad: Gasoline 4-stroke	120,950.2	938,194
NONROAD	Nonroad: Recreational Marine	8,874.4	87,136
NONROAD	Nonroad: Gasoline 2-stroke	9,639.3	79,662
NONROAD	Nonroad: Diesel	4,016.7	41,986
NONROAD	Nonroad: LPG	6,341.5	36,886
ON-ROAD	On-Road: Diesel Vehicles	4,212.7	24,822
AREA	Open Burning: Agricultural	692.9	15,341
POINT	Industrial Point Sources (actuals)	2,214.3	12,202
NONROAD	Nonroad: Aircraft & Aircraft Refueling	2,179.3	11,942
AREA	Open Burning: Residential	1,708.1	9,732
NONROAD	Nonroad: CNG	713.3	4,319
NONROAD	Nonroad: CMV	274.2	1,502
NONROAD	Nonroad: Locomotive	215.2	1,179
AREA	Industrial Fuel Consumption	644.9	660
AREA	Residential NG/Oil Consumption	393.2	383
AREA	Commercial/Institutional Fuel Consumption	350.1	358
AREA	Municipal (non-TV) Landfills	30.8	169
AREA	Residential Wood Combustion	97,247.4	--
AREA	Prescribed Burning	2,466.6	--
AREA	Structure Fires	1,063.3	--
AREA	Wildfires	23.4	--
	Totals	**548,474.2**	**2,941,144**

Marion/Polk County 2002 Totals

Sector	GroupDesc	VOC tpy	VOC lbs per day
BIOGENIC	Biogenic Emissions	--	296,719
ON-ROAD	On-Road: Gasoline Vehicles	9,079.5	53,497
AREA	Surface Coating	3,470.3	21,586
AREA	Open Burning: Agricultural	814.6	18,503
NONROAD	Nonroad: Gasoline 2-stroke	1,166.2	9,854
AREA	Misc. Non-Industrial Solvent Utilization	1,455.4	8,829
AREA	Auto Gas: Storage & Transport	1,502.6	8,660
NONROAD	Nonroad: Gasoline 4-stroke	733.7	5,921
AREA	Graphic Arts	602.9	3,985
AREA	Degreasing	666.8	3,772
NONROAD	Nonroad: Diesel	223.0	2,409
NONROAD	Nonroad: Recreational Marine	168.6	1,656
ON-ROAD	On-Road: Diesel Vehicles	251.6	1,483
POINT	Industrial Point Sources (actuals)	218.2	1,198
AREA	Open Burning: Residential	110.9	719
NONROAD	Nonroad: LPG	59.4	347
NONROAD	Nonroad: Locomotive	29.3	161
AREA	POTWs	22.0	121
NONROAD	Nonroad: Aircraft & Aircraft Refueling	20.2	111
AREA	Food Preparation	10.8	58
AREA	Industrial Fuel Consumption	7.8	8
AREA	Residential NG/Oil Consumption	6.0	6
AREA	Commercial/Institutional Fuel Consumption	3.7	4
AREA	Non-Perc Drycleaning	0.4	3
NONROAD	Nonroad: CNG	0.4	2
AREA	Residential Wood Combustion	11,133.3	--
AREA	Prescribed Burning	464.6	--
AREA	Structure Fires	15.5	--
AREA	Wildfires	9.1	--
	Totals	**32,247.1**	**439,610**
	Totals minus BIOGENIC	**--**	**142,891**
Sector	**GroupDesc**	**NOX tpy**	**NOX lbs per day**
ON-ROAD	On-Road: Gasoline Vehicles	7,018.7	41,355
ON-ROAD	On-Road: Diesel Vehicles	4,257.7	25,087
NONROAD	Nonroad: Diesel	1,959.4	21,479
AREA	Open Burning: Agricultural	344.2	5,201
NONROAD	Nonroad: Locomotive	713.4	3,909
BIOGENIC	Biogenic Emissions	--	3,803
POINT	Industrial Point Sources (actuals)	301.6	1,701
NONROAD	Nonroad: Gasoline 4-stroke	211.0	1,692
NONROAD	Nonroad: LPG	222.5	1,302
AREA	Open Burning: Residential	63.0	341
AREA	Industrial Fuel Consumption	313.6	321
AREA	Residential NG/Oil Consumption	225.6	220
NONROAD	Nonroad: Recreational Marine	17.6	173
NONROAD	Nonroad: CNG	24.4	152
AREA	Commercial/Institutional Fuel Consumption	141.7	145
NONROAD	Nonroad: Gasoline 2-stroke	7.8	70
NONROAD	Nonroad: Aircraft & Aircraft Refueling	2.8	16
AREA	Residential Wood Combustion	336.4	--
AREA	Prescribed Burning	215.7	--
AREA	Wildfires	3.8	--
AREA	Structure Fires	2.0	--
	Totals	**16,383.0**	**106,967**
	Totals minus BIOGENIC	**--**	**103,163**
Sector	**GroupDesc**	**CO tpy**	**CO lbs per day**
ON-ROAD	On-Road: Gasoline Vehicles	114,928.6	677,172
NONROAD	Nonroad: Gasoline 4-stroke	21,578.1	173,631
AREA	Open Burning: Agricultural	6,223.8	140,948
NONROAD	Nonroad: Gasoline 2-stroke	2,199.2	18,979
NONROAD	Nonroad: Diesel	1,040.6	11,390
AREA	Open Burning: Residential	1,236.9	7,315
ON-ROAD	On-Road: Diesel Vehicles	1,187.6	6,997
NONROAD	Nonroad: Recreational Marine	647.6	6,358
NONROAD	Nonroad: LPG	871.8	5,093
NONROAD	Nonroad: Aircraft & Aircraft Refueling	519.5	2,846
NONROAD	Nonroad: CNG	97.1	607
NONROAD	Nonroad: Locomotive	71.2	390
POINT	Industrial Point Sources (actuals)	30.0	188
AREA	Industrial Fuel Consumption	111.0	114
AREA	Residential NG/Oil Consumption	86.1	84
AREA	Commercial/Institutional Fuel Consumption	51.3	53
AREA	Residential Wood Combustion	21,170.5	--
AREA	Prescribed Burning	5,476.1	--
AREA	Wildfires	107.4	--
AREA	Structure Fires	84.3	--
	Totals	**177,718.7**	**1,052,164**

Table15: 2015 Emission Inventory grouped by SCC codes

Multnomah/Washington/Clackamas County 2015 Totals

Sector	GroupDesc	**VOC** tpy	**VOC** lbs per day
BIOGENIC	Biogenic Emissions	--	437,910
AREA	Surface Coating	24,883.0	151,071
AREA	Graphic Arts	9,287.4	61,383
ON-ROAD	On-Road: Gasoline Vehicles	8,211.7	52,324
AREA	Misc. Non-Industrial Solvent Utilization	7,026.0	42,764
NONROAD	Nonroad: Gasoline 4-stroke	5,429.7	37,204
NONROAD	Nonroad: Gasoline 2-stroke	3,603.6	28,890
AREA	Degreasing	5,101.8	28,861
NONROAD	Nonroad: Recreational Marine	2,860.5	28,087
POINT	Industrial Point Sources (actuals + projection)	3,291.9	18,304
NONROAD	Nonroad: Diesel	890.1	4,685
AREA	Auto Gas: Storage & Transport	453.9	2,616
ON-ROAD	On-Road: Diesel Vehicles	326.0	2,197
AREA	Open Burning: Agricultural	83.4	1,874
NONROAD	Nonroad: Aircraft & Aircraft Refueling	287.2	1,573
AREA	Open Burning: Residential	157.9	974
AREA	Municipal (non-TV) Landfills	110.8	607
NONROAD	Nonroad: Locomotive	89.6	491
AREA	POTWs	80.2	440
NONROAD	Nonroad: CMV	75.8	415
NONROAD	Nonroad: LPG	70.7	351
AREA	Food Preparation	62.3	337
AREA	Non-Perc Drycleaning	10.7	62
AREA	Industrial Fuel Consumption	46.6	48
AREA	Residential NG/Oil Consumption	34.6	33.7
AREA	Commercial/Institutional Fuel Consumption	28.4	29
NONROAD	Nonroad: CNG	0.5	3
AREA	Residential Wood Combustion	60,285	--
AREA	Structure Fires	245.5	--
AREA	Prescribed Burning	209.3	--
AREA	Wildfires	2	--
	Totals	**133,246.1**	**903,531**
	Totals minus BIOGENIC	**--**	**465,621**

Sector	GroupDesc	**NOX** tpy	**NOX** lbs per day
ON-ROAD	On-Road: Gasoline Vehicles	6,742.5	44,490
NONROAD	Nonroad: Diesel	8,033.4	42,327
ON-ROAD	On-Road: Diesel Vehicles	3,596.5	24,420
NONROAD	Nonroad: Commercial Marine Vessels	3,885.7	21,292
POINT	Industrial Point Sources (actuals + projection)	2,861.9	16,783
NONROAD	Nonroad: Gasoline 4-stroke	1,556.6	10,248
NONROAD	Nonroad: Locomotive	1,539.7	8,437
NONROAD	Nonroad: Aircraft & Aircraft Refueling	1,425.5	7,811
BIOGENIC	Biogenic Emissions	--	3,890
NONROAD	Nonroad: Recreational Marine	298.8	2,934
AREA	Industrial Fuel Consumption	1,947.1	1,993
NONROAD	Nonroad: LPG	363.9	1,803
AREA	Residential NG/Oil Consumption	626.9	1,264
AREA	Commercial/Institutional Fuel Consumption	1,097.3	1,123
AREA	Open Burning: Agricultural	106.0	854
AREA	Open Burning: Residential	127.1	687
NONROAD	Nonroad: Gasoline 2-stroke	73.3	558
AREA	Municipal (non-TV) Landfills	43.2	237
NONROAD	Nonroad: CNG	45.6	228
AREA	Residential Wood Combustion	1,744.9	--
AREA	Prescribed Burning	97.2	--
AREA	Structure Fires	31.3	--
AREA	Wildfires	0.8	--
	Totals	**36,245.2**	**191,378**
	Totals minus BIOGENIC	**--**	**187,487**

Sector	GroupDesc	**CO** tpy	**CO** lbs per day
NONROAD	Nonroad: Gasoline 4-stroke	294,269.2	1,988,938
ON-ROAD	On-Road: Gasoline Vehicles	127,031.9	554,972
NONROAD	Nonroad: Recreational Marine	10,983.9	107,848
NONROAD	Nonroad: Gasoline 2-stroke	14,200.1	106,586
NONROAD	Nonroad: Diesel	4,190.5	22,012
NONROAD	Nonroad: Aircraft & Aircraft Refueling	3,901.2	21,376
AREA	Open Burning: Agricultural	692.9	15,341
POINT	Industrial Point Sources (actuals)	2,364.1	13,028
AREA	Open Burning: Residential	2,151.5	12,258
NONROAD	Nonroad: LPG	1,990.2	9,836
ON-ROAD	On-Road: Diesel Vehicles	891.2	5,983
NONROAD	Nonroad: CMV	309.3	1,695
NONROAD	Nonroad: Locomotive	263.0	1,441
NONROAD	Nonroad: CNG	216.7	1,077
AREA	Industrial Fuel Consumption	662.5	678
AREA	Residential NG/Oil Consumption	495.2	482
AREA	Commercial/Institutional Fuel Consumption	394.9	404
AREA	Municipal (non-TV) Landfills	38.2	209
AREA	Residential Wood Combustion	131,727.3	--
AREA	Prescribed Burning	2,466.6	--
AREA	Structure Fires	1,339.3	--
AREA	Wildfires	23.4	--
	Totals	**600,603.2**	**2,864,167**

Marion/Polk County 2015 Totals

Sector	GroupDesc	**VOC** tpy	**VOC** lbs per day
BIOGENIC	Biogenic Emissions	--	296,719
AREA	Surface Coating	4,108	25,702
AREA	Open Burning: Agricultural	815	18,503
ON-ROAD	On-Road: Gasoline Vehicles	2,629	15,341
AREA	Misc. Non-Industrial Solvent Utilization	1,743	10,409
NONROAD	Nonroad: Gasoline 2-stroke	880	7,461
NONROAD	Nonroad: Gasoline 4-stroke	957	6,872
AREA	Graphic Arts	680	4,495
AREA	Degreasing	783	4,432
AREA	Auto Gas: Storage & Transport	648	3,732
NONROAD	Nonroad: Recreational Marine	209	2,049
POINT	Industrial Point Sources (actuals + projection)	302	1,657
NONROAD	Nonroad: Diesel	229	1,193
AREA	Open Burning: Residential	140	905
ON-ROAD	On-Road: Diesel Vehicles	95	663
NONROAD	Nonroad: Locomotive	28	152
AREA	POTWs	27	149
NONROAD	Nonroad: Aircraft & Aircraft Refueling	23	125
AREA	Food Preparation	12	66
NONROAD	Nonroad: LPG	10	48
AREA	Industrial Fuel Consumption	8	8
AREA	Residential NG/Oil Consumption	8	7
AREA	Commercial/Institutional Fuel Consumption	4	4
AREA	Non-Perc Drycleaning	1	3
NONROAD	Nonroad: CNG	0.1	0.3
AREA	Residential Wood Combustion	13,124	--
AREA	Prescribed Burning	465	--
AREA	Structure Fires	19	--
AREA	Wildfires	9	--
	Totals	**27,954.4**	**400,698**
	Totals minus BIOGENIC	**--**	**103,979**

Sector	GroupDesc	**NOX** tpy	**NOX** lbs per day
ON-ROAD	On-Road: Gasoline Vehicles	2,279.6	13,239
NONROAD	Nonroad: Diesel	2,222.7	11,560
ON-ROAD	On-Road: Diesel Vehicles	1,046.6	7,343
AREA	Open Burning: Agricultural	344.2	5,201
BIOGENIC	Biogenic Emissions	--	3,803
POINT	Industrial Point Sources (actuals + projection)	577.5	3,168
NONROAD	Nonroad: Locomotive	512.6	2,809
NONROAD	Nonroad: Gasoline 4-stroke	230.8	1,615
AREA	Open Burning: Residential	79.3	430
AREA	Industrial Fuel Consumption	322.2	330
AREA	Residential NG/Oil Consumption	73.5	277
NONROAD	Nonroad: LPG	49.4	246
NONROAD	Nonroad: Recreational Marine	21.8	214
AREA	Commercial/Institutional Fuel Consumption	159.9	164
NONROAD	Nonroad: Gasoline 2-stroke	15.8	126
NONROAD	Nonroad: CNG	5.8	29
NONROAD	Nonroad: Aircraft & Aircraft Refueling	3.2	18
AREA	Prescribed Burning	215.7	--
AREA	Residential Wood Combustion	379.9	--
AREA	Structure Fires	2.5	--
AREA	Wildfires	3.8	--
	Totals	**8,546.7**	**50,571**
	Totals minus BIOGENIC	**--**	**46,768**

Sector	GroupDesc	**CO** tpy	**CO** lbs per day
NONROAD	Nonroad: Gasoline 4-stroke	49,162.9	343,740
ON-ROAD	On-Road: Gasoline Vehicles	42,184.9	165,709
AREA	Open Burning: Agricultural	6,223.8	140,948
NONROAD	Nonroad: Gasoline 2-stroke	3,102.8	24,101
AREA	Open Burning: Residential	1,558.0	9,214
NONROAD	Nonroad: Recreational Marine	801.5	7,870
NONROAD	Nonroad: Diesel	1,098.7	5,719
NONROAD	Nonroad: Aircraft & Aircraft Refueling	586.0	3,211
POINT	Industrial Point Sources (actuals)	329.5	1,813
ON-ROAD	On-Road: Diesel Vehicles	260.2	1,799
NONROAD	Nonroad: LPG	272.2	1,349
NONROAD	Nonroad: Locomotive	86.0	471
NONROAD	Nonroad: CNG	28.1	139
AREA	Industrial Fuel Consumption	114.0	117
AREA	Residential NG/Oil Consumption	108.4	106
AREA	Commercial/Institutional Fuel Consumption	57.9	59
AREA	Residential Wood Combustion	28,676.7	--
AREA	Prescribed Burning	5,476.1	--
AREA	Structure Fires	106.2	--
AREA	Wildfires	107.4	--
	Totals	**140,341.1**	**706,364**

Appendix D10-4
Modeling and Maintenance Demonstration
Historical and Future Ozone Simulations Using the MM5/SMOKE/CMAQ System
in the Portland-Vancouver Area

WSU Modeling Study

The Oregon Dept. of Environmental Quality, Washington Dept. of Ecology (Ecology), Southwest Clean Air Agency (SWCAA), Washington State University (WSU) and EPA Region 10 teamed together to perform photochemical modeling for the Portland-Vancouver Air Quality Maintenance Area to improve our understanding of the potential for ozone exceedances in the future. The modeling work involved simulation of a July 1998 episode meteorology that had the highest ozone levels observed in recent years. The model results were compared to available observed data, and the 1998 episode was used as a basis for evaluation of future year (2015) growth projections.

The agencies contracted with WSU to use the CMAQ dispersion model to help assess the status of the Portland-Vancouver airshed with respect to the national ambient air quality standard for tropospheric ozone. The Turner monitoring site is included within the modeling domain and allowed DEQ to asses the status of the Salem-Keizer airshed at the same time.

The modeling effort is documented in the report, “Historical and Future Ozone Simulations Using the MM5/SMOKE/CMAQ System in the Portland-Vancouver Area” (WSU, December 31, 2005), in this Appendix. Although most of the modeling effort has been performed by WSU, DEQ recently developed the technical capability to run the SMOKE and CMAQ simulations in-house.

2015 Projection

The “managed growth projection simulation” in the WSU modeling report is the modeling results described as the “2015 Projection” in the Portland-Vancouver and Salem-Keizer Ozone Maintenance Plan. The emission inventory that was used in that modeling simulation is detailed in an appendix to the WSU report.

2015 Maintenance Demonstration

The “2015 Maintenance Demonstration” in the Portland-Vancouver and Salem-Keizer Ozone Maintenance Plan uses the same emission inventory as the “2015 Projection,” except for point sources. Point sources within Oregon were based on the maximum allowable permitted emission limits (Plant Site Emission Limits), and within Washington were based on proportional growth. A point source growth allowance was added to both inventories: 5,000 tons VOC and 5,000 tons NO_x were added to areas zoned for industrial growth in the Oregon portion of the Portland-Vancouver AQMA, and a proportional amount of 411 tons of VOC and 1,313 tons of NOx was added to areas zoned for industrial growth in the Washington portion of the Portland-Vancouver AQMA. The results of the modeled attainment test are described in Appendix D10-6.

Please contact DEQ for a copy of this appendix

Air Quality Division
(503) 229-5177
aqinfo@deq.state.or.us

Appendix D10-5

Economic Report to the Metro Council
2000-2030 Regional Forecast
for the Portland-Vancouver Metropolitan Area
(Data Resource Center, Metro, December 2002 final draft)

Please contact DEQ for a copy of this appendix

Air Quality Division
(503) 229-5711
aqinfo@deq.state.or.us

Appendix D10-6
Modeled Attainment Test

Appendix D10-6 details how DEQ, Ecology and SWCAA applied the modeled attainment test to the 2015 Maintenance Demonstration modeling results.

The modeled attainment test is an exercise in which an air quality model is used to simulate current and future air quality. The 8-hour NAAQS for ozone requires the fourth highest 8-hour daily maximum ozone concentration, averaged over three consecutive years, to be less than 80 ppb[8] . The recommended attainment test is one in which model estimates are used in a "relative" rather than "absolute" sense. That is, take the ratio of the model's future to current (baseline) predictions at ozone monitors. EPA calls these ratios "relative reduction factors". Future ozone concentrations are estimated at existing monitoring sites by multiplying a modeled relative reduction factor at locations near each monitor by the observation-based, monitor-specific, "baseline" ozone design value. The resulting predicted future concentrations are compared to 84 ppb.

For more information, see "Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS" (EPA-450/R-05-002, October, 2005).

[8] Because of rounding conventions in which non-significant figures are truncated, a modeling estimate of <85 ppb is equivalent to <= 84 ppb. Attainment is demonstrated when a modeling target of future estimates of ozone concentrations are <=84 ppb.

Portland-Vancouver AQMA and Salem SKATS Analysis of 8-Hour Ozone Maintenance using the CMAQ dispersion model attainment test
(see "Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS" (EPA-450/R-05-002, October 2005)

Step 1. Current Design Value (1998 "observed" values)

Year	4th High (ppb)					
	Carus	Milwaukie	Sauvie Island	Mt View	Turner	Wishram*
1996	99	85	76	81	92	70
1997	62	54	53	53	61	60
1998	81	61	66	69	77	63
1999	72	51	49	57	65	63
2000	65	56	54	58	59	66

Monitoring Site	Design Values			Current Design Value (DVC)
	1996-1998	1997-1999	1998-2000	
Carus	81	72	73	75.0
Milwaukie	67	55	56	59.3
Sauvie Island	65	56	56	59.1
Mountain View	68	60	61	62.9
Turner	77	68	67	70.4
Wishram*	64	62	64	63.4

Step 2. Determination of Maintenance, 2015 projection including growth allowance

Carus

Day	Current Design Value (DVC)	1998 Baseline 8-Hour Max	2015 Predicted 8-Hour Max	Relative Reduction Factor (RRF)	Future Design Value (DVF)
1		90	86		
2		97	92		
3		107	103		
Mean	75.0	98	94	0.955	71.7

Milwaukie

Day	Current Design Value (DVC)	1998 Baseline 8-Hour Max	2015 Predicted 8-Hour Max	Relative Reduction Factor (RRF)	Future Design Value (DVF)
1		86	93		
2		91	92		
3		98	102		
Mean	59.3	92	96	1.046	62.1

Sauvie Island

Day	Current Design Value (DVC)	1998 Baseline 8-Hour Max	2015 Predicted 8-Hour Max	Relative Reduction Factor (RRF)	Future Design Value (DVF)
1		70	69		
2		90	79		
3		87	80		
Mean	59.1	82	76	0.923	54.5

Mountain View

Day	Current Design Value (DVC)	1998 Baseline 8-Hour Max	2015 Predicted 8-Hour Max	Relative Reduction Factor (RRF)	Future Design Value (DVF)
1		76	81		
2		86	77		
3		88	87		
Mean	62.9	83	81	0.975	61.3

Turner

Day	Current Design Value (DVC)	1998 Baseline 8-Hour Max	2015 Predicted 8-Hour Max	Relative Reduction Factor (RRF)	Future Design Value (DVF)
1		74	64		
2		101	88		
3		89	73		
Mean	70.4	88	75	0.852	60.0

Wishram*

Day	Current Design Value (DVC)	1998 Baseline 8-Hour Max	2015 Predicted 8-Hour Max	Relative Reduction Factor (RRF)	Future Design Value (DVF)
1		55	51		
2		56	51		
3		59	52		
Mean	63.4	57	52	0.910	57.7

*The Wishram monitoring site is not within the Portland-Vancouver AQMA or Salem Area Ozone Maintenance Plan areas.
Wishram data is included here for informational purposes only.