2004 Gorge Emissions Inventory for Modeling

Point and Area Sources

Revision 0

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1.1 BACKGROUND

"Visibility" is a key component of the Management Plan goal of protecting and enhancing the scenic resources of the Columbia River Gorge National Scenic Area (Scenic Area). Visibility is generally associated with the conditions that allow appreciation of the inherent beauty of landscape features. Scenic resources include the scenic quality of lands seen from key viewing areas, landscape settings and vistas. While it is important to maintain the landscape features to meet certain scenic qualities, it is equally important to be able to see these landscape features. Visibility was the metric that was chosen by the Scenic Area Air Quality Study Plan (Study Plan) that would provide the best measure with a limited budged for understanding air quality within the Scenic Area.

The Scenic Area is unique in geologic structure, meteorology and topography. It is located close to a major urban area on the west end that can influence air quality conditions on the west end and through the Scenic Area. A number of large industrial sources are located on the east end of the Scenic Area as well as several smaller urban areas that can influence air quality conditions on the east end and through the Scenic Area. In addition there are a number of smaller communities and industrial sources within the Scenic Area that can directly influence air quality conditions within the Scenic Area. The Scenic Area has a major Interstate Highway, a major State Highway and two major railroad routes that traverse the length of the Scenic Area. The Scenic Area is also divided by the Columbia River that provides for marine transportation by barges and a host of recreational boating opportunities. Because of the unique setting of the Scenic Area many major categories of emission sources are represented either in or near the Scenic Area. It is important to identify each type of source and to quantify the emissions from each of these sources to better understand the complex interactions and the causes and effects of emissions from each of these sources on Scenic Area air quality.

From the onset of the Study Plan it was recognized that the federal, state and local air quality agencies would have a large and complex task in developing a good understanding of air pollution impacts within and surrounding the Scenic Area. Three major activities are encompassed within the Columbia River Gorge National Scenic Area - Air Quality Study Plan. Those three activities are identified as an ambient air monitoring program to collect ambient air quality data, compilation of an emissions inventory for the period being analyzed and thirdly, developing and running a three dimensional chemical transport modeling system. All three of these activities provide data that if used individually can lead an individual to draw certain conclusions about the causes and effects of air quality within the Scenic Area. However, to be truly informed, all three activities need to be well understood in their own right and then used together to understand the unique aspects and influences that act within the Scenic Area. This document describes the emissions inventory.

1.2 POLLUTANTS

We know that introduction of particulate matter and certain gases into the atmosphere interferes with the ability of an observer to see landscape features. For purposes of this emission inventory five atoms, in order of their relative sizes play significant roles in determining air quality. These five are hydrogen, oxygen, nitrogen, carbon and sulfur. Through industrial and complex atmospheric processes these atoms can be transformed into compounds that play a more significant role in visibility impairment. The most common compounds are sulfur dioxide which ultimately converts to sulfates such as ammonium sulfate ($(NH_4)_2SO_4$), nitrogen oxides (NOx) that convert to nitrates such as nitric acid or ammonium nitrate (NH_4NO_3), and hydrocarbons. Carbon plays a big role either as elemental carbon or organic carbon and is included in the definition of particulate matter (PM). Particulate matter is present in various sizes that are generally defined as total suspended particulate (PM – less than 100 microns in diameter), PM_{10} (PM – less than 10 microns in diameter) and $PM_{2.5}$ (PM – less than 2.5 microns in diameter). Each pollutant or compound has a unique set of characteristics that contributes to visibility impairment when present in the ambient air. The higher the concentration of the pollutants, the more visibility is impaired.

1.3 THE IMPORTANCE OF EMISSIONS INVENTORY

An emissions inventory is important for two major reasons. First, by itself, it can be used to develop a conceptual understanding of the many different and varied sources that may impact the Scenic Area, and to some degree the potential magnitude of the impacts based just on the types and amounts of emissions. Second, the emissions estimate inventory is one of the foundational pillars to the modeling activity that will simulate air emissions within the Scenic Area. An air dispersion model is deemed to be performing well when it can simulate actual monitored air concentrations that have already occurred. The better a model simulates the past, the better the confidence of future-year modeling scenarios and resulting strategy development. That simulation can only be achieved when there is a high quality emission input.

The emissions inventory provided in this document is a summary of the data that was provided to the Columbia River Gorge Air Quality Project modeling contractor for use in upcoming air quality modeling. This document summarizes the total quantity of estimated emissions and for some categories can identify the quantity of estimated emissions on a county wide basis. How these pollutants interact and contribute to impairment is driven by meteorology, topography, time and distance from the Scenic Area. Therefore, it is important to understand not only how much is emitted into the ambient air but when and where. The emission estimates will be used as input into the air dispersion model to identify and describe the amount of pollutants at a given location at a specific point in time. Data presented herein are estimates of the amount of pollutants as they are emitted from identified sources.

1.4 INVENTORY AREA

The area included in the emission inventory includes counties in both Washington and Oregon. 28 counties in Washington and 24 counties in Oregon were determined to be most likely to influence visibility in the Scenic Area and therefore a comprehensive inventory was performed for these counties. The following map shows the counties included.

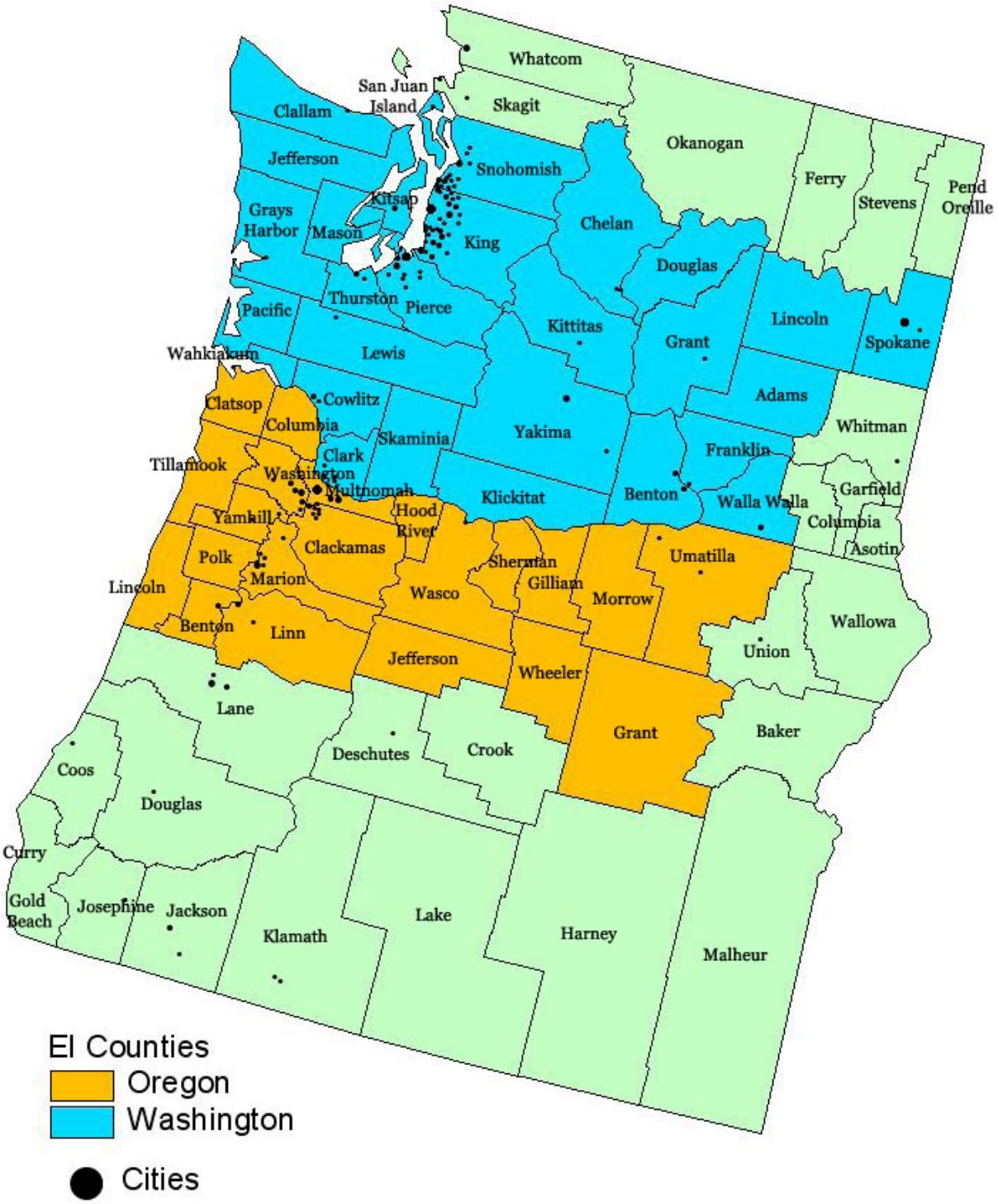
Whatcom
San Juan Island
Skagit
Okanogan
Ferry
Stevens
Pend Oreille
Clallam
Jefferson
Snohomish
Kitsap
Grays Harbor
Mason
King
Chelan
Douglas
Lincoln
Spokane
Pacific
Thurston
Pierce
Kittitas
Grant
Wahkiakum
Lewis
Adams
Clatsop
Cowlitz
Columbia
Skaminia
Yakima
Whitman
Clark
Franklin
Tillamook
Washington
Multnomah
Klickitat
Benton
Walla Walla
Garfield
Columbia
Yamhill
Hood River
Asotin
Polk
Clackamas
Sherman
Umatilla
Lincoln
Marion
Wasco
Gilliam
Morrow
Wallowa
Benton
Linn
Jefferson
Union
Wheeler
Lane
Grant
Baker
Deschutes
Crook
Coos
Douglas
Curry
Gold Beach
Josephine
Jackson
Klamath
Lake
Harney
Malheur
EI Counties
Oregon
Washington
Cities

Figure 1

1.5 TIME FRAME OF INVENTORY

Comprehensive ambient monitoring was performed in the Scenic Area from November 2003 through February 2005. The purpose of this inventory is feed into ambient visibility modeling to learn more about visibility trends in the Scenic Area. Therefore every effort was made to create a calendar year 2004 emission inventory.

2. WASHINGTON 2004 COLUMBIA RIVER GORGE EMISSION INVENTORY

This document presents the development of the calendar year 2004 Base-Year Washington emission inventory for the Columbia River Gorge National Scenic Area (Scenic Area) for Washington State. This section of the inventory was complied by the Southwest Clean Air Agency (SWCAA) and discusses stationary point sources, area sources and nonroad mobile sources.

2.1 STATIONARY POINT SOURCES

Point sources are stationary facilities such as power plants, chemical plant, pulp mills and other facilities not considered an area source. As part of this inventory, SWCAA included, as a minimum, the following sources:

Sources within 16 km of the Scenic Area with potential emissions greater than:

- 100 TPY for CO
- 40 TPY for NOx
- 10 TPY for VOC
- 10 TPY for SO_2
- 10 TPY for PM_{10}

Sources within SWCAA's Jurisdiction (Clark, Cowlitz, Lewis, Skamania and Wahkiakum counties) with potential emissions greater than:

- 100 TPY for CO
- 40 TPY for NOx
- 40 TPY for VOC
- 40 TPY for SO_2
- 15 TPY for PM_{10}

Sources within the inventory area:

- All Title V sources

Air quality in Washington State is regulated by one of seven local air agencies or a Regional Office of the Washington State Department of Ecology (WDOE). These agencies are most knowledgeable about the individual sources within their jurisdiction. SWCAA's jurisdiction includes Clark, Cowlitz, Lewis, Skamania and Wahkiakum counties. Therefore SWCAA relied upon other agencies for data from point sources for counties outside of SWCAA's jurisdiction. The WDOE collects point source data from the local air agencies within Washington State except for the Puget Sound Clean Air Agency (PSCAA) which provided 2004 data for its jurisdiction directly to SWCAA. SWCAA provided data for its counties. Emission estimates are generally based on facility throughput and emission factors from the following: 1) continuous emission monitors, 2) stack testing, 3) manufacturer specifications, 4) engineering judgement, 5) EPA emission factors, 6) material balance, 7) EPA programs such as Tanks or 8) other emission factors.

In addition to traditional point sources, SWCAA included emissions from dairies as point sources because ammonia is expected to be an important influence in visibility in the Scenic Area. The location and number of milk cows was provided by WDOE. Emissions from dairy cattle were estimated based on 2003 dairy information provided by the WDOE containing the number of milk cows at each dairy. An ammonia emission factor of 28 kg/animal-year from Battye et al. (2003) was used. A PM emission factor of 3.04 kg/animal-year and a VOC emission factor of 8.75 kg/animal-year from SJVAPCO were used.

2.2 STATIONARY AREA SOURCES

Stationary area sources include those sources which are not major industrial sources that were included in the point source portion of the inventory. Only specific categories have been inventoried under this category and are delineated below.

2.2.1 Small Stationary Fossil Fuel and Wood Use

This category includes small furnaces, heaters, heating units, and cooking devices, which produce emissions less than 100 tons/year of an individual pollutant. Four main types of fuel are used within the inventory domain by industrial, commercial/institutional, and residential sources: fuel oils, natural gas, liquefied petroleum gas (LPG), and wood. Wood fuel use is only evaluated for residential sources in which it is primarily used in fireplaces, wood stoves, and furnaces. For the purpose of the area source inventory fossil fuel and wood fuel use is evaluated for space heating or cooking purposes only; use of these fuels by industrial and commercial sources for other purposes is included in the point source inventory.

2.2.1.1 Commercial/Institutional and Industrial Combustion

Fuel oil emissions from industrial and commercial sources are from fossil fuel consumption in large or small boilers, furnaces, heaters, space heaters, and other heating devices. For this inventory, industrial and commercial consumption includes residual oil, distillate oil, natural gas and liquefied petroleum gas (LPG). Emission rates for the different fuel types were obtained from AP-42 Chapter 1: External Combustion Sources per the Emission Inventory Improvement Plan (EIIP) Vol. III document.

2.2.1.1.1 Commercial/Institutional and Industrial Natural Gas Combustion

Natural gas fuel consumption was estimated based on data obtained from regional and local natural gas suppliers in Washington State. In some cases the local suppliers provided a breakdown of residential/commercial versus industrial consumption. However in most cases this data was not available. The State Energy Data Report (SEDR) provided state total natural gas consumption for Washington State for 2001 broken down by residential, commercial/institutional and industrial use. This statewide ratio was applied to each county to obtain a natural gas fuel consumption for residential, commercial/institutional and industrial facilities for each county. Emission factors for natural gas combustion were obtained from AP-42 section 1.4 “Natural Gas Combustion” (7/98).

2.2.1.1.2 Commercial/Institutional and Industrial Fuel Oil and LPG Combustion

The State Energy Data Report (SEDR) provided state total fuel oil and LPG combustion for Washington State for 2001 broken down by residential, commercial/institutional and industrial use. To proportion this data to a county level, county employment data was used. For industrial consumption, the ratio of county employment in SIC code 31 to the state total was used. For commercial/institutional consumption, the ratio of county employment in SIC code 50-99 was used as well as the number of heat degree days for each county. Emission factors are from AP-42 section 1.3 “Fuel Oil Combustion” (9/98) and AP-42 section 1.5 “Liquefied Petroleum Gas Combustion” (10/96).

2.2.1.2 Residential Fossil Fuel Combustion

Residential fossil fuel emissions are primarily from fuel consumption in furnaces, space heaters, other heating devices, and cooking.

2.2.1.2.1 Residential Natural Gas Combustion

Natural gas fuel consumption was estimated based on data obtained from regional and local natural gas suppliers in Washington State. In some cases the local suppliers provided a breakdown of residential/commercial versus industrial consumption. However in most cases this data was not available. The State Energy Data Report (SEDR) provided state total natural gas consumption for Washington State for 2001 broken down by residential, commercial/institutional and industrial use. This statewide ratio was applied to each county to obtain a natural gas fuel consumption for residential, commercial/institutional and industrial facilities for each county. Emission factors for natural gas combustion were obtained from AP-42 section 1.4 "Natural Gas Combustion" (7/98).

2.2.1.2.2 Residential Fuel Oil and LPG Combustion

The State Energy Data Report (SEDR) provided state total fuel oil and LPG combustion for Washington State for 2001 broken down by residential, commercial/institutional and industrial use. To proportion this data to a county level the number of residents using each fuel type was used as well as the number of heat degree days for each county. Emission factors are from AP-42 section 1.3 "Fuel Oil Combustion" (9/98) and AP-42 section 1.5 "Liquefied Petroleum Gas Combustion" (10/96).

2.2.1.3 *Residential Wood Combustion*

Residential wood combustion consists of home heating and recreational use of woodstoves, fireplaces, fireplace inserts and central furnaces.

The measure of activity for residential wood combustion is the amount of wood burned. The Washington State University (WSU) telephone survey of wood heating and outdoor burning habits in Idaho, Oregon and Washington included questions to estimate the number of households using each type of wood burning device (Central Furnace, Certified (Phase I, Phase II) and Non-certified Inserts and Woodstoves, and Fireplaces); how much wood was burned per device; and seasonal, daily and hourly usage rates. The geographic subgroups, county assignments, and number of households in each subgroup were the same as in the above section.

The WSU survey gathered information on pellets, presto logs and cords of wood burned. A cord contains 128 ft^3 (4' x 4' x 8'). The solid volume may range from 60-100 ft^3. An average solid volume of 85 ft^3 was used in this inventory. The weight of a cord of wood varies with moisture content and species type. It was assumed that moisture content was 20% (legal moisture limit). Species type was defined using several sources. In a 1985 survey done by Market Trends, Inc., species burned were identified for western and eastern Washington. The survey was used to identify species for western Washington. Average weight of a cord of wood was 2607 lbs in western Washington.

The WSU survey provided information on the number of cords burned per device. Pellets used were given in number of 40 lb bags used, and presto logs as number of logs burned. A presto log manufacturer in Spokane estimated the weight of a log as 8 lbs.

Emission factors in pounds of pollutant per ton of wood burned were taken from AP-42 sections 1.9 "Residential Fireplaces" (10/96) and 1.10 "Residential Wood Stoves" (10/96). Certified stoves and inserts were assumed to be 50% catalytic and 50% non-catalytic.

2.2.2 Solvent Utilization

The use of solvents in the coating categories is for painting, repainting and finishing processes. Solvents used for these categories include high performance coatings, primers, and lacquers. Solvent use for degreasing categories is to remove foreign material before or after assembly to allow greater adhesion of coatings or to provide a cleaner part for re-installation.

This category includes liquid organic solvents capable of dissolving other substances to form a homogeneous mixture. These dissolved substances may be in liquid, solid, or gaseous form. Solvents may be used in industrial, commercial, or consumer applications and contribute to atmospheric VOC emissions through evaporation.

2.2.2.1 Surface Coating/Cleaning/Degreasing

Emission sources from surface coating that are primarily evaluated as area sources include: architectural surface coating, auto body refinishing, traffic markings, factory finished wood, wood furniture manufacturing, machinery/equipment manufacturing, electronic component manufacturing, ship/boat building & repair, miscellaneous manufacturing, industrial maintenance coatings, and special purpose coating. Surface coating process operations of these types utilize solvent-based coatings which generate VOC emissions during application and drying. Cleanup operations are also a source of solvent evaporation. Each source category type inventoried is described below.

This category includes consumer and commercials solvent use and graphic arts. Emissions calculated based on factors from EIIP Volume III Chapters 5 and 7 and county population data.

For each Source Classification Code (SCC), area and point source combined emissions were calculated using emission factor's given in EIIP Vol. III table 6.5-2 (p.6.5-4) and table 8.5-1 (p. 8.5-2) for SIC categories. Corresponding NAICS numbers and NAICS employee populations per county were obtained electronically from US Census Bureau websites. Employee populations were then multiplied by per employee emission factor's to obtain emissions.

<u>Source Classification Codes (SCC)</u>

The following SCC's are covered within this section:

Surface coating

24-01-005-000	Auto Refinishing: SIC 7532-Total: All Solvent Types
24-01-015-000	Factory Finished Wood: SIC 2426 thru 242-Total: All Solvent Types
24-01-020-000	Wood Furniture: SIC 25-Total: All Solvent Types
24-01-040-000	Metal Cans: SIC 341-Total: All Solvent Types
24-01-045-000	Metal Coils: SIC 3498-Total: All Solvent Types
24-01-050-000	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)-Total: All Solvent Types
24-01-055-000	Machinery and Equipment: SIC 35-Total: All Solvent Types
24-01-065-000	Electronic and Other Electrical: SIC 36 - 363-Total: All Solvent Types
24-01-070-000	Motor Vehicles: SIC 371-Total: All Solvent Types
24-01-080-000	Marine: SIC 373-Total: All Solvent Types

Degreasing: Open Top Degreasing

24-15-105-000	Solvent Furniture and Fixtures (SIC 25): Total: All Solvent Types
24-15-110-000	Primary Metal Industries (SIC 33): Total: All Solvent Types
24-15-120-000	Fabricated Metal Products (SIC 34): Total: All Solvent Types
24-15-125-000	Industrial Machinery and Equipment (SIC 35): Total: All Solvent Types
24-15-130-000	Electronic and Other Elec. (SIC 36): Total: All Solvent Types
24-15-135-000	Transportation Equipment (SIC 37): Total: All Solvent Types
24-15-140-000	Instruments and Related Products (SIC 38): Total: All Solvent Types
24-15-145-000	Miscellaneous Manufacturing (SIC 39): Total: All Solvent Types
24-15-150-000	Transportation Maintenance Facilities (SIC 40-45): Total: All Solvent Types
24-15-155-000	Automotive Dealers (SIC 55): Total: All Solvent Types
24-15-165-000	Miscellaneous Repair Services (SIC 76): Total: All Solvent Types

Degreasing: Conveyerized Degreasing

24-15-205-000	Furniture and Fixtures (SIC 25): Total: All Solvent Types
24-15-210-000	Primary Metal Industries (SIC 33): Total: All Solvent Types
24-15-220-000	Fabricated Metal Products (SIC 34): Total: All Solvent Types
24-15-225-000	Industrial Machinery and Equipment (SIC 35): Total: All Solvent Types
24-15-230-000	Electronic and Other Elec. (SIC 36): Total: All Solvent Types
24-15-235-000	Transportation Equipment (SIC 37): Total: All Solvent Types
24-15-240-000	Instruments and Related Products (SIC 38): Total: All Solvent Types
24-15-245-000	Miscellaneous Manufacturing (SIC 39): Total: All Solvent Types
24-15-250-000	Trans. Maintenance Facilities (SIC 40-45): Total: All Solvent Types
24-15-255-000	Automotive Dealers (SIC 55): Total: All Solvent Types
24-15-265-000	Miscellaneous Repair Services (SIC 76): Total: All Solvent Types

Degreasing: Cold Cleaning

24-15-305-000	Furniture and Fixtures (SIC 25): Total: All Solvent Types
24-15-310-000	Primary Metal Industries (SIC 33): Total: All Solvent Types
24-15-320-000	Fabricated Metal Products (SIC 34): Total: All Solvent Types
24-15-325-000	Industrial Machinery and Equipment (SIC 35): Total: All Solvent Types
24-15-330-000	Electronic and Other Elec. (SIC 36): Total: All Solvent Types
24-15-335-000	Transportation Equipment (SIC 37): Total: All Solvent Types
24-15-340-000	Instruments and Related Products (SIC 38): Total: All Solvent Types
24-15-345-000	Miscellaneous Manufacturing (SIC 39): Total: All Solvent Types
24-15-350-000	Transportation Maintenance Facilities (SIC 40-45): Total: All Solvent Types
24-15-355-000	Automotive Dealers (SIC 55): Total: All Solvent Types
24-15-365-000	Miscellaneous Repair Services (SIC 76): Total: All Solvent Types

2.2.2.2 Architectural Coating

Architectural surface coatings include paints, stains, varnishes and other protective and decorative coatings. Emissions were calculated using the methodology in EIIP Chapter 3. This methodology uses national census data on architectural coatings, an average VOC content for solvent and water based paints to obtain a pound per person VOC emission factor. This emission factor and county population data is used to calculate emissions.

2.2.2.3 Traffic Marking

This category includes the application of roadway markings to facilitate the safe movement of traffic. Emissions were calculated using the methodology in EIIP Chapter 14. This methodology uses national census data on traffic paint usage, an average VOC content for solvent and water based paints to obtain a per capita emission factor. This emission factor and county population data is used to calculate emissions. A credit for Clark County's maintenance plan rule of 51.5% was included, consistent with the ozone inventory.

2.2.3 Automotive Gasoline Distribution

Gasoline distribution includes emissions from gasoline station activities such as evaporative losses from gasoline trucks and the filling of gasoline retail outlet storage tanks. Total statewide gasoline distribution for 2004 was obtained from the Washington Department of Transportation. Although the Washington State department of Licensing previously tracked gasoline distribution by county for Washington State, this data has not been available since 1998. SWCAA county distribution is based on SWCAA records. Benton and Puget Sound agencies provided estimated values for their counties. All other counties were estimated based on state totals, minus known counties, and vehicle miles traveled. Local clean air agencies estimates data were used to estimate Stage I and Stage II data. Emission factors from AP-42 Section 5.2 "Transportation and Marketing of Petroleum Liquids" were used.

2.2.4 Residential Outdoor Burning

This category includes both residential yard waste burning and residential trash burning.

2.2.4.1 Residential Yard Waste Burning

The measure of activity for residential yard waste burning is the amount of material burned. In 2001, Washington State University under contract to the Idaho Department of Environmental Quality conducted a telephone survey of wood heating and outdoor burning habits in Idaho, Oregon and Washington. The survey included questions to estimate the fraction of households that burned yard waste and the number of legal size piles (4') burned per household per year. In Washington, the survey defined four geographic groups in Washington: 1) incorporated cities, 2) unincorporated western WA, 3) unincorporated eastern WA with forest lands, and 4) unincorporated eastern WA without forest lands. A county's incorporated areas were assigned to the first group. Unincorporated areas were assigned to one of the last three groups.

The emission rate for unspecified forest burning were taken from EPA's AP-42 §13.1 (Oct. 1996). Emission rates are given in pounds of pollutant per ton of material burned.

2.2.4.1 Residential Municipal Waste Burning

Residential municipal waste burning is outdoor burning of household waste. This activity is banned in the state of Washington, but still occurs illegally indoors (fireplaces/stoves) and outdoors.

The measure of activity for residential trash burning is the amount of material burned. The Washington State University telephone survey of wood heating and outdoor burning habits in Idaho, Oregon and Washington described in the section above included questions to estimate the fraction of households that burned trash. The geographic subgroups, county assignments, and number of households in each subgroup were the same as in that section.

The amount of trash burned per household was taken from an Emission Inventory Improvement Program (EIIP) recommendation. The EIIP reported that the amount of trash actually burned was approximately 50% of the combustible trash produced. This was the amount used in this inventory and was 5.4 lbs per household per day for households that burn trash.

The emission factors for trash burning are from the EIIP Table 16.4-1 and AP-42 Section 2.5-1. The emission rate is given in pounds of pollutant per ton of material actually burned.

2.2.5 AMMONIA AREA SOURCES

2.2.5.1 Fertilizer Application

Ammonia emissions from fertilizer application were estimated based on statewide fertilizer purchase contained in the Washington State Department of Agriculture Pesticide Management Division 2003-2004 Annual Tonnage Report and emission factors from Battye et al. "Development and Selection of Ammonia Emission Factors." Because the fertilizer purchase quantity was only available at the state level, the emissions calculated were distributed to all agricultural land in the state equally. Agricultural land cover data was available in the Multi-resolution Land Characteristics, National Land Cover Data (MRLC).

2.2.5.2 Other Livestock

Other livestock includes beef cows, pigs, sheep, horses and ponies and chickens. Animal population per county was obtained from Washington Agricultural Statistics. Emission factors are based on Battye et al (2003).

2.2.5.3 Pets

Methodology and emission factors are based on Chitjian, et al. "1997 Gridded Ammonia Emissions Inventory Update for the South Coast Air Basin." Final Report. 2000. Pet population is based on a ratio of human population for urban and rural areas. Ammonia emission factors are in units of lb/animal-year.

2.2.5.4 Humans

Ammonia emissions from humans include perspiration and respiration losses as well as untreated human waste. The calculation methodology is based on Chitjian, et al. "1997 Gridded Ammonia Emissions Inventory Population data is from Intercensusal /Postcensual Population Estimates, 1990-2004." Emissions factors are from Dickson, R.J. et al. "Development of the Ammonia Emission Inventory for the Southern California Air Resources Board." Prepared for Electric Power Research Institute, Palo Alto, CA by Radian Corporation, Sacramento, CA. 1991. Sip. Ref. 550 (b) and are in units of lb/person-year. Infants were assumed to be 0 to 3 years of age. County census data provides population estimates of children 0 to 4 years of age. The 0 to 4 year of age census data was multiplied by 75% to estimate the infant population.

2.3 NONROAD MOBILE SOURCES

For the Scenic Area inventory domain, non-road mobile emission source categories inventoried include gasoline, compressed natural gas (CNG), liquefied petroleum gas (LPG), and diesel-powered vehicles and equipment, as well as commercial and recreational waterborne vessels, aircraft, and railroads.

2.3.1 NONROAD VEHICLES AND EQUIPMENT

The Nonroad Mobile category includes emission estimates from gasoline, diesel, compressed natural gas (CNG) and liquefied petroleum gas (LPG) fueled equipment. In the EPA NONROAD2005 model, equipment types are compiled into 12 categories:

Recreational Vehicles	Logging
Construction	Airport Service
Industrial	Underground Mining
Lawn and Garden	Oil Field
Agricultural	Railway Maintenance
Commercial	Marine Recreation

This model was used to calculate emissions in tons per seasonal day (tpsd) for a typical weekday for both winter (October – May) and summer (June – September) for each Washington County within the Scenic Area inventory area. Snow blower and snow mobile emissions were deleted from the lawn and garden category of the NONROAD (2005) output file for counties located in Southwest Washington as they are not a common source of emissions in these areas.

Inputs into the nonroad model included seasonal temperatures, fuel Reid vapor pressure, oxygen content and sulfur content as follows.

2004 Columbia River Gorge National Scenic Area Air Quality Study: NONROAD2005 Model Run Inputs: Summertime Runs
Summer Runs: June - September

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
	Baseline	Fuel O2	Fuel	-------- Fuel Sulfur Wt% --------			Stage II	----- Temperature, F -----		
County	Fuel RVP	wt%	RVP	Gasoline	Diesel	CNG/LPG	Control	Avg High	Avg Low	Avg
ADAMS	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	82.7	51.7	67.2
BENTON	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	85.2	58.1	71.6
CHELAN	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	84.5	55.3	69.9
CLALLAM	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	67.7	51.9	59.8
CLARK	8.3	1.24%	8.3	0.0121	0.2283	0.0123	0%	77.1	53.1	65.1
COWLITZ	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	77.0	54.1	65.5
DOUGLAS	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	81.2	55.0	68.1
FRANKLIN	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	82.3	53.9	68.1
GRANT	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	83.5	56.6	70.1
GRAYS HARBOR	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	67.8	54.0	60.9
ISLAND	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	72.1	52.6	62.4
JEFFERSON	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	71.8	53.0	62.4
KING	8.2	1.24%	8.2	0.0121	0.2283	0.0123	0%	74.2	56.0	65.1
KITSAP	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	74.9	54.5	64.7
KITTITAS	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	80.3	51.5	65.9
KLICKITAT	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	84.1	49.9	67.0
LEWIS	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	77.1	53.8	65.5
LINCOLN	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	80.9	50.3	65.6
MASON	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	74.6	51.9	63.3
PACIFIC	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	70.7	50.7	60.7
PIERCE	8.2	1.24%	8.2	0.0121	0.2283	0.0123	0%	74.3	51.0	62.6
SKAMANIA	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	77.1	49.9	63.5
SNOHOMISH	8.2	1.24%	8.2	0.0121	0.2283	0.0123	0%	73.7	53.9	63.8
SPOKANE	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	78.0	54.4	66.2
THURSTON	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	75.1	49.9	62.5
WAHKIAKUM	8.5	1.24%	8.5	0.0121	0.2283	0.0123	0%	73.9	50.1	62.0
WALLA WALLA	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	84.3	58.2	71.2
YAKIMA	8.5	1.24%	8.5	0.0160	0.2283	0.0123	0%	84.1	54.0	69.0

(1) Clark Co summer RVP based on Portland OR limits. King, Pierce, Snohomish Co summer RVP based on voluntary agrement levels. All other data based on 1999 survey by Alliance of Automobile Manufacturers (AAM)

(2) Based on ARCO EtOH blended year round at 10% etOH with approximately 35.95% of the gas supplied is ARCO

(3) From Note 2, the Vol % EtOH blended annually = 3.0%.
Seasonal fuel RVP = (baseline fuel RVP) + (RVP increase caused by 3.0 Vol % EtOH blended).
A conservative estimate of fuel RVP increase due to 3.0 vol % EtOH blended and a terminal RVP of 9 is 1 RVP.
This conservative estimate is based on ref. 580c, Figure 3, p. 32, and ref. 580b, figure on p. 21.

(4) MOBILE6 gasoline sulfur defaults (ref. 610). The numbers are averages, and account for Tier 2 requirements.

	-------2004-------	
County	ppm	wt%
Western WA	121	0.0121
Eastern WA	160	0.0160

(wt% = ppm/10,000)

(5) Diesel sulfur inputs from the NONROAD model runs EPA used to develop the 2004 Nonroad Diesel Engine Final Rule (ref. 602).

(6) Estimated by Ron Brunner, Gas Processors Association (ref. 512). This is a conservative estimate, based on maximum sulfur allowable in HD5 propane rated for engine use.

(8) NOAA Climatological Data for 2004 See Worksheet "WA temps"

2004 Columbia River Gorge National Scenic Area Air Quality Study: NONROAD2005 Model Run Inputs: Wintertime Runs

Winter Runs: October - May

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
	Baseline	Fuel O2	Fuel	-------- Fuel Sulfur Wt% --------			Stage II	----- Temperature, F -----		
County	Fuel RVP	wt%	RVP	Gasoline	Diesel	CNG/LPG	Control	Avg High	Avg Low	Avg
ADAMS	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	51.4	32.2	41.8
BENTON	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	55.3	36.0	45.6
CHELAN	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	52.0	29.9	41.0
CLALLAM	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	52.9	38.7	45.8
CLARK	11.7	1.24%	11.7	0.0121	0.2283	0.0123	0%	55.8	38.3	47.0
COWLITZ	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	56.7	40.2	48.4
DOUGLAS	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	49.1	31.1	40.1
FRANKLIN	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	54.0	34.4	44.2
GRANT	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	52.6	32.9	42.7
GRAYS HARBOR	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	53.9	40.9	47.4
ISLAND	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	55.7	41.1	48.4
JEFFERSON	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	54.3	42.1	48.2
KING	11.9	1.24%	11.9	0.0121	0.2283	0.0123	0%	55.2	41.2	48.2
KITSAP	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	55.2	39.9	47.6
KITTITAS	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	50.2	29.3	39.8
KLICKITAT	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	55.0	31.9	43.4
LEWIS	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	56.9	39.2	48.1
LINCOLN	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	50.2	29.8	40.0
MASON	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	54.3	37.7	46.0
PACIFIC	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	54.6	36.8	45.7
PIERCE	11.9	1.24%	11.9	0.0121	0.2283	0.0123	0%	54.8	38.2	46.5
SKAMANIA	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	52.8	35.2	44.0
SNOHOMISH	11.9	1.24%	11.9	0.0121	0.2283	0.0123	0%	55.5	39.3	47.4
SPOKANE	12.1	2.37%	12.1	0.0160	0.2283	0.0123	0%	47.9	31.9	39.9
THURSTON	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	54.5	36.9	45.7
WAHKIAKUM	12.1	1.24%	12.1	0.0121	0.2283	0.0123	0%	56.7	37.2	47.0
WALLA WALLA	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	55.8	36.8	46.3
YAKIMA	12.1	1.24%	12.1	0.0160	0.2283	0.0123	0%	54.6	32.6	43.6

(1) Clark Co summer RVP based on Portland OR limits. King, Pierce, Snohomish Co summer RVP based on voluntary agrement levels.
All other data based on 1999 survey by Alliance of Automobile Manufacturers (AAM)
(2) Based on ARCO EtOH blended year round at 10% etOH with approximately 35.95% of the gas supplied is ARCO
Spokane county based on oxygen requirement of 2.7% for Nov 1st to Feb 29th (this requirement is no longer in effect but was in 2004)
(3) Baseline fuel RVP of greater than 10.5 is not affected by the addition of EtOH. This is a conservative estimate based on
ref. 580c, Figure 3, p. 32, and ref. 580b, figure on p. 21.
(4) MOBILE6 gasoline sulfur defaults (ref. 610). The numbers are averages, and account for Tier 2 requirements.

	-------2004-------	
County	ppm	wt%
Western WA	121	0.0121
Eastern WA	160	0.0160

(wt% = ppm/10,000)
(5) Diesel sulfur inputs from the NONROAD model runs EPA used to develop the 2004 Nonroad Diesel Engine Final Rule (ref. 602).
(6) Estimated by Ron Brunner, Gas Processors Association (ref. 512). This is a conservative estimate, based on maximum sulfur allowable in HD5 propane rated for engine use.

(8) NOAA Climatological Data for 2004 See Worksheet "WA temps"

3.3.2 Railroad

This category includes both line-haul and switch yard locomotives. Burlington Northern Santa Fe (BNSF) and Union Pacific (UP) provided fuel consumption for each track segment as well as fuel consumption for switchyard engines for 2004. Based on conversations with Amtrak, the 2002 fuel consumption provided to WDOE was determined to be representative of 2004 data and was used in this inventory.

Emission factors are based on EPA 420-F-97-051 "Emission Factors for Locomotives" assuming a 92.17% uncontrolled and 7.83% Tier 1 Fleet Mix.

3.3.3 Barge/Ship

This category includes all ship and barge traffic along the Columbia River.

A previous study undertaken through the Northwest Regional Technical Center (NWRTC) Demonstration Project conducted an emissions inventory for ships for the Northwest U.S. (Corbett, 2001). This project estimated both towboat fuel use as well as all other boats, including tugboats. Based on this report the majority of fuel consumption in the Scenic Area is from towboat. Chris Dager, with the Tennessee Valley Authority (TVA), provided updated 2004 towboat fuel consumption data for the Columbia and Snake River segments based on TVA's Barge Costing Model. NOx, CO and VOC emission factors are from European Environmental Agency, Atmospheric Emission

Inventory Guidebook EPEM Co-operative Programme for Monitoring and Evaluation of the Long Range Transmission of Air Pollutants in Europe, The Core Inventory of Air Emissions in Europe (CORINAIR), October 2002. The PM emission factor is from Lloyd's Register Engineering Services, Lloyd's Register of Shipping Maritime Exhaust Emission Research Programme, 1995. The SOx emission factor is based on a fuel sulfur content of 1.5% by weight.

3.3.4 Aircraft

Aircraft emissions were provided by the WDOE and Puget Sound Clean Air Agency. Emissions are based on landing and takeoff activity at each airport and airplane emission factors.

2.4 Notable Sources Not Included in this Report

On Road Mobile – Although on road mobile vehicles are a significant contributor of emissions in the area and will be included in future Scenic Area work, they are not included in this report. These data will be generated by running the EPA mobile 6 model at the time the emissions model (SMOKE) is run.

Biogenic Sources – Biogenic sources ere not included in this report. Biogenic emissions will be estimated using the BEIS model by Environ and included in the inventory at a later date. In addition, emissions from volcanic activity at Mt. St. Helens are not included in this report but will be included in the model.

Agricultural Burning – Agricultural burning emissions are not included in the Washington section of this report. WDOE provided individual agricultural burning events within the state of Washington. Individual dates with agricultural burning events that coincide with the modeling episodes will be included in the inventory but are not included in this report.

Wildfires –Individual dates with wildfire events that coincide with the modeling episodes will be included in the inventory but are not included in this report.

Landfill Emissions – Landfill emissions were not included and are estimated to be minimal.

Fires –Structure – Structural emissions were not included and are estimated to be minimal.

Gorge Project 2004 Point Source Estimated Emissions Including CAFOs: Emissions in Tons per Year: Washington

County	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
Adams		138		15		43
Benton	106	285	451	196	17	78
Chelan	500		9	1269	7	2
Clallam	1111	21	298	191	392	64
Clark	853	106	870	365	175	616
Cowlitz	3870	134	3692	815	1854	2245
Douglas	1		2	7	0	3
Franklin		251		27		79
Grant	0	454	0	50	0	142
Grays Harbor	1484	197	949	639	404	193
Island	27	34	22	35	1	35
Jefferson	1614	47	544	303	349	70
King	2733	312	5065	324	861	971
Kitsap	43		49	33		61
Kittitas		5		1		1
Klickitat	504	18	116	132	38	119
Lewis	5105	237	16066	1972	6905	340
Mason	354		68	161		199
Pacific	35	44	73	24	6	24
Pierce	1560	117	1026	372	327	686
Skamania	21		31	27	1	11
Snohomish	3803	371	815	83	378	750
Spokane	349	53	778	303	56	873
Thurston	4	169	7	18		459
Wahkiakum		11		1		3
Walla Walla	1155	25	1106	211	591	2330
Yakima	847	1865	126	348	5	1858
TOTAL	**26078**	**4758**	**32163**	**7906**	**12366**	**12212**

Gorge Project 2004 Point Source Estimated Emissions: Emissions in Tons per Year: Washington

County	Plant Name	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
Adams							
	Bar E Dairy		45.77		4.97		14.30
	Country Morning Farms		38.50		4.18		12.03
	JS Holsteins, Inc.		20.33		2.21		6.35
	Stahl Hutterian Brethren		6.16		0.67		1.93
	Sunny Royal Slope Dairy, Inc		6.16		0.67		1.93
	V & M Dairy, LLC		20.79		2.26		6.50
Benton							
	A & B Asphalt	7.99		4.40	0.26	8.80	2.32
	Agrium US Inc	2.00	202.00	215.00	16.00		
	AJ's Crushing & Concrete				2.99		
	Benton Public Utilities District #1	0.08	0.04	0.27	0.07		
	ConAgra Foods Packaged Foods Company Inc dba La	25.60	6.04	30.50	25.81	0.18	17.00
	Framatome ANP, Inc			0.43			
	Gunderson Northwest				130.30		5.05
	Harvest States Co-Grain				2.41		
	Inland Asphalt Company	11.38		4.47	1.47	3.88	2.82
	Milne Fruit Products	6.33		10.56	0.43	0.04	0.41
	Penford Food Ingredients	8.46		4.07	1.07	0.31	1.34
	Sandvik Special Metals LLC	0.90		6.90	0.10		2.20
	Tessenderlo Kerley Inc	1.40	0.30	1.60			
	Transtate Asphalt (01)	0.80		0.70	3.80	1.00	0.70
	Tree Top Inc	8.94	0.51	11.09	0.89	0.09	0.60
	Twin City Foods	6.40		27.20			12.90
	U.S. Dept of Energy	15.00	14.00	11.00	3.00	3.00	13.00
	Williams Pipeline	10.79		122.69	0.43	0.02	0.14
	Grandview Dairy		36.96		4.01		11.55
	Hang Four Dairy		21.25		2.31		6.64
	Pete Petersen Dairy		3.70		0.40		1.16
Chelan							
	Aluminum Co of America Wenatchee Works	500.00		9.00	1269.00	7.00	2.00
	K Ply	338.00		46.00	49.00	5.00	42.00
	Nippon Paper Industries	773.00		252.00	140.10	387.00	15.00
	Blue Mountain Dairy		5.24		0.57		1.64
	Elida Smith Dairy		2.71		0.29		0.85
	Lonnie F. Booth Dairy		0.99		0.11		0.31
	Maple View Farm, LLC		10.32		1.12		3.22
	Willow-Wist Farm, Inc.		1.79		0.19		0.56
Clark							
	Attbar, Inc.				0.07		66.20
	Boise Cascade Corporation	0.99		1.57	0.42	0.02	11.80
	Bonneville Power Administration / Vancouver	0.19		0.50	0.45	0.02	6.74
	City of Vancouver / Westside Wastewater Treatment I	0.92		2.46	0.50	0.31	0.14
	Clark Public Utilities / River Road Generating Project	7.68	4.08	68.64	31.55	3.72	0.15
	Columbia Machine, Inc.	0.30		1.18	1.24	0.01	6.35
	Columbia Rock & Aggregates, Inc.	0.01		0.12	0.77	0.02	0.00
	DeWils Industries, Inc.				2.37		33.74
	Excelsior Packaging West, LLC	0.14		0.64	0.08	0.00	23.09
	Fort James Camas LLC	801.00		709.00	191.00	151.00	345.00
	Frito-Lay, Inc.	22.31		17.41	24.99	0.11	2.04
	George Schmid & Sons / Evergreen Pit	0.11		0.51	0.48	0.03	0.04
	Great Western Malting Company	2.74		25.54	23.26	17.51	17.77
	Hambleton Lumber Sales LLC	0.26		5.54	5.16	0.76	8.76
	Linear Technology Corporation	0.51		0.49	0.13	0.01	7.64
	Matsushita Kotobuki Electronics Industries						6.80
	Northwest Pipeline Company / Washougal	6.51		9.52	1.25	0.36	0.42
	Pacific Rock Products, LLC / S3 - Fisher Quarry				14.58		
	SEH America, Inc.	2.25	0.26	9.91	11.93	0.10	6.39
	Tesoro Refining and Marketing Company						3.67
	Tetra Pak Materials LP	0.28		0.69	1.84	0.00	13.50
	Thompson Metal Fab, Inc.	1.68		7.61	3.18	0.50	9.75
	Tidewater Barge Lines, Inc.						7.17
	United Grain Corporation				36.89		
	Vancouver Ice & Fuel Oil Company	0.00		0.26	0.13	0.00	2.20
	Vancouver Iron & Steel, Inc.	0.17		0.37	0.37	0.18	0.33
	WaferTech LLC	4.81	1.21	7.71	1.38	0.12	4.63
	Andersen Dairy #3001		19.28		2.09		6.03
	Andersen Dairy #3015		16.94		1.84		5.29
	Arwana Farms		12.94		1.40		4.04
	Huntington Dairy #29		1.08		0.12		0.34

Gorge Project 2004 Point Source Estimated Emissions: Emissions in Tons per Year: Washington

County	Plant Name	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
	Johnston Dairy, LLC		9.39		1.02		2.94
	Lagler's Dairy		14.78		1.61		4.62
	Mountain View Dairy		3.70		0.40		1.16
	Segert Rietdyk Dairy		1.23		0.13		0.39
	Stauffer Dairy		3.85		0.42		1.20
	Van Tol Dairy		4.77		0.52		1.49
	Velvet Acres Dairy		5.85		0.64		1.83
	Vrieswyk Dairy		7.08		0.77		2.21
Cowlitz							
	CENEX Harvest States / Kalama				23.07		
	Cowlitz Water Pollution Control	0.39		0.47	0.03	0.07	11.66
	Kalama Export Company, LLC				28.74		
	Longview Fibre	1954.00	47.00	1459.00	456.13	804.00	1073.00
	Northwest Hardwoods - Longview	2.59		35.45	11.79	0.32	8.46
	Noveon Kalama, Inc.	57.65	0.59	99.94	27.02	2.47	72.57
	Port of Longview				2.04		0.30
	RSG Forest Products, Inc.				28.02		
	Steelscape, Inc.	5.33		28.05	6.93	0.09	3.68
	Weyerhaeuser Co	1850.00	69.00	2069.00	196.00	1047.00	1070.00
	Weyerhaeuser Company / Green Mountain Sawmill				33.43		
	Donald Farms		7.70		0.84		2.41
	Ferguson Brothers Farm, LLC		7.70		0.84		2.41
	Prolific Enterprises		2.37		0.26		0.74
Douglas							
	Greater Wenatchee Regional Landfill & Recycling	0.77		2.10	6.58	0.10	3.34
Franklin							
	Brubaker Dairy, LLC		3.08		0.33		0.96
	C & R Dairy		9.12		0.99		2.85
	CC & H Enterprises, Inc.		29.20		3.17		9.12
	Dan-Maur Farms		6.16		0.67		1.93
	Davidson Brothers / Freeman		18.48		2.01		5.78
	De Groot Dairy LLC Othello		14.48		1.57		4.52
	Five D Farms		73.92		8.03		23.10
	K & D Farms, Inc.		14.78		1.61		4.62
	L.A. Holsteins		15.40		1.67		4.81
	Lewis Dairy		1.23		0.13		0.39
	Thomasson Double T Dairy		5.48		0.60		1.71
	Van Batavia Farms, Inc.		33.88		3.68		10.59
	Zurcher Dairy		26.18		2.84		8.18
Grant							
	Grant County PUD No 2 Ephrata	0.07	0.00	0.13	0.40		0.13
	Behling Dairy Management		27.72		3.01		8.66
	Bill Fekkes Dairy		40.04		4.35		12.51
	By-Ko Dairy, Inc.		4.00		0.43		1.25
	Callahan Dairy		23.10		2.51		7.22
	Chamberlain Dairy, Inc.		9.86		1.07		3.08
	Cole Dairy Inc.		16.63		1.81		5.20
	Dave Richner Dairy		4.71		0.51		1.47
	De Hoog Dairy		10.47		1.14		3.27
	Dieringer Dairy		13.71		1.49		4.28
	Don Voss Dairy		3.02		0.33		0.94
	Forester Farms		2.93		0.32		0.91
	John E. Avila Dairy		23.10		2.51		7.22
	Juergens Brothers Dairy, LLC		3.85		0.42		1.20
	Kallstrom Dairy		3.70		0.40		1.16
	Low Bird Dairy		2.68		0.29		0.84
	Lublin Dairy		2.46		0.27		0.77
	Marlin Dairy		5.85		0.64		1.83
	Mickelsen Dairy, Inc.		16.94		1.84		5.29
	NelKen Farms		12.32		1.34		3.85
	North Star Dairy		29.26		3.18		9.14
	Reynolds Dairy		7.70		0.84		2.41
	Rockchuck Dairy		4.31		0.47		1.35
	Roylance Brothers Dairy Farm		33.88		3.68		10.59
	Roylance Brothers Dairy Farm		20.02		2.17		6.26
	S Diamond Bar Corp.		9.39		1.02		2.94
	Schons Dairy Farm, LLC		1.85		0.20		0.58
	Smith Brothers Farms		87.93		9.55		27.48
	Sno-View Holstein Dairy		9.24		1.00		2.89
	Todd and Eva Buys Dairy		3.23		0.35		1.01

Gorge Project 2004 Point Source Estimated Emissions: Emissions in Tons per Year: Washington

County	Plant Name	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
	Vanhulle Dairy, Inc.		20.24		2.20		6.32
Grays Harbor							
	Grays Harbor Paper LP	703.80		311.70	191.70	10.90	10.60
	Morton International	7.70		9.40	0.40		51.30
	Panel Tech Int. LLC						14.50
	Sierra Pacific Industries - Cogeneration	321.40	43.89	123.20	3.00	38.00	2.00
	Simpson Door Co	6.00		32.00	75.00	2.00	4.00
	Westport Shipyard Inc						32.20
	Weyerhaeuser Co.	445.00		473.00	352.00	353.00	31.00
	Austin Farm		4.62		0.50		1.44
	Cedarville Dairy		9.24		1.00		2.89
	Doelman Porter Creek Dairy		23.19		2.52		7.25
	Gary Bower Dairy		3.11		0.34		0.97
	Goeres Dairy		8.93		0.97		2.79
	Gordon Dairy, Inc.		3.08		0.33		0.96
	Kegley Dairy		3.33		0.36		1.04
	Martin Clark Dairy		3.63		0.39		1.14
	Olympic View Dairy, LLC		8.47		0.92		2.65
	Oord Dairy #2		58.58		6.36		18.31
	Smiley Farms LP		20.02		2.17		6.26
	Triple L Dairy		3.23		0.35		1.01
	Vetter Dairy		3.57		0.39		1.12
Island							
	NAS Whidbey	27.00	0.05	22.00	31.00	1.00	24.00
	Danielson Farms		11.09		1.20		3.47
	Muzzall Farms		4.62		0.50		1.44
	Sherman - Bishop Farms, Inc.		14.48		1.57		4.52
	Valley View Dairy		3.70		0.40		1.16
Jefferson							
	Pt Townsend Paper	1614.00	32.00	544.00	301.00	349.00	65.00
	Bishop Dairy		2.77		0.30		0.87
	Chimacum Dairy		2.00		0.22		0.63
	Gee-Gem Dairy		1.57		0.17		0.49
	Out-R-Way Dairy		1.54		0.17		0.48
	Valley View Dairy		7.08		0.77		2.21
King							
	Ash Grove Cement Co, E Marginal	1285.38	2.78	1265.59	43.25	141.68	157.27
	Ball Metal Beverage Container Corp						151.85
	Boeing Commercial Airplane Auburn	26.61	0.04	167.97			69.10
	Boeing Commercial Airplane Renton		0.71	46.93			72.49
	Kenworth Truck Co - Renton	1.05		4.76	0.12	0.02	96.31
	King Co Ntrl Res Wastewater Treatment	101.94		126.13	1.19	2.47	6.19
	King Co Solid Waste Op Sec Cedar Hills	7.30		78.71		49.58	0.03
	Lafarge North America Inc	496.86		2342.37	156.51	450.77	
	Mutual Materials Co, Newcastle	30.92		9.02	22.42	17.26	0.62
	Nucor Steel Seattle Inc	721.90		274.72		68.86	47.43
	Rexam Beverage Can Co	2.70		3.22	0.24	0.02	111.15
	Saint-Gobain Containers Inc			395.95	62.69	111.52	
	Seattle Steam Co, Western	30.27		260.21	3.36	18.49	1.10
	Todd Pacific Shipyards Corp	0.20		0.82	0.55	0.00	8.80
	United States Bakery, Franz Northern Div						130.34
	Washington University of Power Plant & Hospital	28.35		89.10			
	Western Pneumatic Tube Co						21.72
	Alder Grove Dairy		7.24		0.79		2.26
	Benthem Dairy		8.01		0.87		2.50
	Boise Creek Farm		5.24		0.57		1.64
	Charles Krainick Dairy		23.87		2.59		7.46
	Cherry Valley Farms		5.39		0.59		1.68
	Clemans Mountain Dairy		3.14		0.34		0.98
	De Groot Brothers Dairy, LLC		9.24		1.00		2.89
	Don Van Hoof Dairy		4.62		0.50		1.44
	Gary W Sells Dairy		7.08		0.77		2.21
	Good Hope Dairy		4.62		0.50		1.44
	Green Acres Dairy, LLC		8.78		0.95		2.74
	Gwerders Swiss Acres		9.24		1.00		2.89
	Henry Van Dam Dairy		9.86		1.07		3.08
	Hy-Grass Farms, Inc.		12.01		1.30		3.75
	Jim and Holly Potocnik Dairy		2.56		0.28		0.80
	John and Marlene Koopman Dai		9.24		1.00		2.89
	Josie Dairy		4.00		0.43		1.25

Gorge Project 2004 Point Source Estimated Emissions: Emissions in Tons per Year: Washington

County	Plant Name	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
	Keller Dairy		17.31		1.88		5.41
	Kenneth Kosters Dairy		0.62		0.07		0.19
	Kruse Family LP		4.31		0.47		1.35
	Lawrence Van Hoof Dairy		7.39		0.80		2.31
	Mike Lanting Dairy		7.24		0.79		2.26
	Nestlé Regional Training Cen		3.08		0.33		0.96
	Norman Brook Farm, Inc.		4.16		0.45		1.30
	Plateau Farms		3.08		0.33		0.96
	Prijatel Brothers		2.34		0.25		0.73
	Richard and Judith Van Dam D		10.78		1.17		3.37
	Ritter Dairy		5.61		0.61		1.75
	Robert T. Baker Dairy		9.73		1.06		3.04
	Schakel Dairy		10.63		1.15		3.32
	Smith Brothers Dairy #2		2.00		0.22		0.63
	Stolz and Daughters Dairy		2.53		0.27		0.79
	Storbo Brothers Dairy		6.16		0.67		1.93
	Suhoversnik Dairy		8.01		0.87		2.50
	Thomasson Dairy		12.32		1.34		3.85
	Two Sisters Dairy, Inc.		1.23		0.13		0.39
	Van Beek Dairy, LLC		8.47		0.92		2.65
	Van Ess Dairy		13.86		1.50		4.33
	Wallin Dairy #2		7.08		0.77		2.21
	Wetzel Family, LLC		10.78		1.17		3.37
	Willie De Jong Dairy		15.71		1.71		4.91
Kitsap							
	US Navy Naval Station Bremerton NSB	43.01		48.62			
	US Navy Puget Sound Naval Shipyard PSNS				32.70		60.97
Kittitas							
	Scott Dairy		4.62		0.50		1.44
Klickitat							
	Calpine Goldendale Energy Center	0.24	0.72	7.86	1.48	0.47	0.70
	PUD No. 1 of Klickitat County	242.00	0.38	36.00	8.00	26.00	6.50
	Roosevelt Regional Landfill	1.20		5.10	68.40	2.40	70.20
	SDS Lumber Company	260.95		67.50	52.60	9.05	36.44
	Mountain Laurel Jerseys, Inc		3.45		0.37		1.08
	Mountain Meadows Dairy, Inc.		8.32		0.90		2.60
	Whitewater Holsteins, Inc.		5.54		0.60		1.73
Lewis							
	Atlas Castings and Technology	3.54		24.70	11.13	0.01	3.65
	Cascade Coating, Inc.	0.31		0.37	0.03	0.00	122.03
	Cascade Hardwoods, Inc. / Ribelin Road	5.56		25.06	31.93	0.70	6.35
	Chehalis Power LP / Chehalis Generation Facility	15.89	6.52	85.86	58.29	5.99	10.09
	Hampton Drying Company	0.03		1.30	0.95	0.84	1.27
	Hampton Lumber Mills/Washington, Inc.-Morton	30.54		53.75	64.60	0.79	29.16
	Hampton Lumber Mills/Washington, Inc.-Packwood	61.97		41.48	10.30	3.40	13.80
	Hampton Lumber Mills/Washington, Inc.-Randle	216.51		34.83	42.02	0.94	37.16
	Hardel Mutual Plywood Corporation	2.66		19.16	15.06	0.31	10.14
	Northwest Hardwoods - Centralia	5.97		36.60	4.48	0.86	9.60
	Northwest Pipeline Company / Chehalis	18.03		15.18	2.48	0.48	1.29
	Puget Sound Energy	5.59		8.33	0.71	0.34	0.35
	Transalta Centralia Generation, LLC	4703.56	7.20	15646.41	1110.69	6886.04	18.43
	TransAlta Centralia Mining, LLC	27.29		55.88	590.19	4.13	5.85
	WestFarm Foods	6.82		14.66	5.09	0.13	0.47
	Westside Quarry, Inc.	0.53		2.46	0.02	0.16	0.20
	Alpine Dairy		4.93		0.54		1.54
	Andrew and Linda Styger Dair		1.63		0.18		0.51
	Aust Dairy		1.14		0.12		0.36
	B & P Dairy		5.54		0.60		1.73
	Barnes Dairy		1.42		0.15		0.44
	Brannan Farms		3.23		0.35		1.01
	Brower Dairy		4.62		0.50		1.44
	Brunoff Farms, Inc.		12.32		1.34		3.85
	Business Enterprises Unlimit		3.08		0.33		0.96
	Claquato Farms, Inc. #1		6.78		0.74		2.12
	Cowlitz Bend Dairy		2.00		0.22		0.63
	Cowlitz Dairy		7.70		0.84		2.41
	Cowlitz Meadows Dairy, Farm		1.39		0.15		0.43
	Cowlitz Meadows Dairy, Inc.		1.29		0.14		0.40
	Daryl Germann Farms		3.02		0.33		0.94
	Doelman Chehalis Dairy		12.91		1.40		4.03

Gorge Project 2004 Point Source Estimated Emissions: Emissions in Tons per Year: Washington

County	Plant Name	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
	Ethan Allen Farms		3.39		0.37		1.06
	Hill Dairy		1.05		0.11		0.33
	James Wedam Dairy		1.05		0.11		0.33
	Jeg and Sons Dairy		1.17		0.13		0.37
	John and Mary Mallonee Dairy		1.60		0.17		0.50
	Kesting Dairy, Inc.		8.78		0.95		2.74
	Lacamas Dairy		3.23		0.35		1.01
	Lady Woods Holsteins, Inc.		11.86		1.29		3.71
	Larson Dairy		4.22		0.46		1.32
	Leprechaun Holsteins, Inc.		9.24		1.00		2.89
	Maple Water Farm		1.57		0.17		0.49
	Mickelsen Dairy, Inc.		32.34		3.51		10.11
	Misty Morning Dairy		40.04		4.35		12.51
	Osborn Dairy (Deskins)		4.03		0.44		1.26
	Paradise Farms		3.70		0.40		1.16
	Qiynah Farm		2.40		0.26		0.75
	Rosecrest Farm		2.77		0.30		0.87
	Roy Kinsman Dairy		6.78		0.74		2.12
	Rudolph Kaech Dairy		1.60		0.17		0.50
	Sun-Ton Dairy		5.76		0.63		1.80
	Til-Tom Dairy		3.79		0.41		1.18
Lincoln							
	D & J's Cloverleaf Ranch		2.68		0.29		0.84
Mason							
	Olympic Panel Products LLC				47.00		124.80
	Simpson Timber Co	354.00		68.00	114.00		74.00
Pacific							
	Weyerhaeuser - Raymond	35.00		73.00	19.00	6.00	10.00
	Hodel Dairy		1.08		0.12		0.34
	Jim Wilson Dairy		4.40		0.48		1.38
	Kuttel Dairy		2.31		0.25		0.72
	New Haven Farm		2.62		0.28		0.82
	Oxbow Dairy		5.39		0.59		1.68
	Portmann Dairy Farm		4.00		0.43		1.25
	Robert Zieroth Dairy		4.16		0.45		1.30
	Wildhaber Dairy		16.72		1.82		5.23
	Willapa River Holsteins		3.70		0.40		1.16
Pierce							
	Boeing Commercial Airplane, Frederickson						53.50
	Dynea Overlays Inc						40.42
	Frederickson Power LP	0.20		30.30	28.20	1.70	13.10
	Graymont Western US Inc	65.80		263.21	148.22	100.90	
	Lianga Pacific Inc						70.95
	Pierce Co Recycling Composting and Disposal LLC	26.43					
	Professional Coatings Inc						183.49
	Puget Sound Energy, Frederickson	0.58		5.28	0.28	1.48	0.02
	Simpson Tacoma Kraft	1367.70		624.00	173.00	215.00	122.40
	Toray Composites, America, Inc						27.42
	US Oil & Refining Co	99.48		103.43	9.46	7.99	138.69
	Albert Dairy Farm		6.47		0.70		2.02
	Blossom Time Dairy		5.85		0.64		1.83
	Burton Haugen Dairy		8.47		0.92		2.65
	Faith Dairy, Inc.		12.94		1.40		4.04
	Hlede Farms		2.22		0.24		0.69
	Inglin Dairy		8.93		0.97		2.79
	Lee Haakenson Dairy		1.48		0.16		0.46
	Len Soler Dairy		1.36		0.15		0.42
	Mountain View Dairy, Inc.		7.08		0.77		2.21
	Soler Farms		6.78		0.74		2.12
	Valley Dairy Farms, Inc.		36.96		4.01		11.55
	Vern Anderson Dairy		18.02		1.96		5.63
Skamania							
	High Cascade Veneer, Inc.	8.33		2.04	1.25	0.21	1.06
	Hood River Sand, Gravel & Ready Mix, Inc.	0.00		0.00	0.42	0.00	0.00
	Molded Fiber Glass Companies Northwest	0.02		0.07	0.06	0.00	1.16
	Northwest Pipeline Company / Willard	3.16		4.46	0.56	0.28	0.04
	Wilkins, Kaiser & Olsen, Inc.	9.38		24.23	24.40	0.70	9.06
Snohomish							
	Boeing Commercial Airplane Group - Everett	42.30	2.05	59.80			215.48
	Brunswick Family Boat Co						81.67

Gorge Project 2004 Point Source Estimated Emissions: Emissions in Tons per Year: Washington

County	Plant Name	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
	Glacier Bay Catamarans						26.71
	Jeld-Wen of Everett Inc	98.76		7.94	8.41	5.91	11.27
	Kimberly-Clark Corporation	3662.00	4.00	747.00	35.00	372.00	301.00
	Alfred and Bev Soler Dairy		3.85		0.42		1.20
	Bartelheimer Brothers, Inc.		22.02		2.39		6.88
	Bueler Farms, Inc.		16.94		1.84		5.29
	Camano-Vu Dairy Farm		4.93		0.54		1.54
	Cliffhaven Jersey Farm		5.30		0.58		1.66
	Country Charm Dairy		12.63		1.37		3.95
	Darlington Farms		16.94		1.84		5.29
	Dettling Dairy Farm, LP		15.40		1.67		4.81
	Ellingsen Farms, Inc.		6.93		0.75		2.17
	Frohning Dairy, Inc.		3.39		0.37		1.06
	Giles Dairy		3.70		0.40		1.16
	Groeneveld Farms, Inc.		5.70		0.62		1.78
	Hofstra Dairy		8.62		0.94		2.70
	Hollandia Farms, LP		15.40		1.67		4.81
	John and Helen Deck Dairy		16.02		1.74		5.01
	Kosterland Dairy		2.00		0.22		0.63
	Kwant Dairy		2.16		0.23		0.67
	Louis Stangeland Farm #1		8.72		0.95		2.72
	Louis Stangeland Farm #2		8.38		0.91		2.62
	Mark and Lynne Hereth Dairy		2.68		0.29		0.84
	Mark Prieto Dairy		0.65		0.07		0.20
	Misich Dairy Farm		7.39		0.80		2.31
	Neff Farms		4.56		0.49		1.42
	Nick Van Dam Dairy		8.01		0.87		2.50
	Normanna Farm, Inc.		4.93		0.54		1.54
	North Fork Dairy		2.06		0.22		0.64
	No-Vu Dairy		0.77		0.08		0.24
	Rick Mouw's Dairy		12.63		1.37		3.95
	S.D.I. Farms, Inc.		4.31		0.47		1.35
	Sather Dairy		1.54		0.17		0.48
	Sildahl Farms		3.23		0.35		1.01
	Silwood Dairy Farms		9.24		1.00		2.89
	Skyhart Farms		1.63		0.18		0.51
	Spane Dairy		5.39		0.59		1.68
	Stilli-Ridge Dairy, Inc.		4.71		0.51		1.47
	Strawder Dairy		4.37		0.47		1.37
	Struiksma Dairy		8.69		0.94		2.71
	Sundown Farms, Inc.		8.62		0.94		2.70
	Thomas Farm Crops, Inc.		24.33		2.64		7.60
	Tillman Dairy, Inc.		13.09		1.42		4.09
	Van Putten Dairy		2.77		0.30		0.87
	Vos Dairy, Inc.		10.78		1.17		3.37
	Werkhoven Dairy, Inc.		17.49		1.90		5.47
	Youngren Farms, Inc.		22.36		2.43		6.99
Spokane							
	Affordable Custom Cabinets				1.56		18.29
	Avista Corp	0.02		0.26	0.02	0.02	0.03
	Brooklyn Iron Works				0.69		18.00
	Central Premix Gravel Plant				3.73		
	Columbia Lighting	1.70	0.10	2.00	0.21	0.10	21.60
	Columbia Paint & Coatings	0.10	0.00	0.10	0.15	0.00	28.31
	Conoco Phillips Company	4.10		1.63			51.42
	CXT-Precast Plant	0.50	0.00	0.59	0.40	0.00	6.24
	Deaconess Medical Center	4.51	0.03	5.78	0.42	0.07	0.59
	Dept of Social & Health Services	4.79	0.03	5.97	0.48	0.05	0.73
	Dept of Veterans Affairs Medical Center	2.00	0.03	2.95	0.32	0.29	0.13
	Eastern Washington University	11.42	0.07	15.41	1.04	0.08	2.44
	Exxonmobil Spokane Terminal						38.80
	Fairchild AFB	3.27	0.11	14.04	1.07	0.22	9.05
	Fiber-Tech Industries				1.22		61.40
	Haakon Industries	0.19	0.10	10.22	2.15	0.10	19.21
	Holly Refining & Marketing Co	6.00		2.40			13.80
	Holy Family Hospital	2.13	0.01	2.84	0.21	0.02	0.15
	Honeywell Electronic Materials			0.35			7.60
	Huntwood Industries	0.14	0.00	0.71	0.08	0.00	170.94
	Inland Asphalt	3.34		3.22	5.81	0.04	2.01
	Inland Empire Paper	26.90	1.20	148.00	23.30	5.30	54.00

Gorge Project 2004 Point Source Estimated Emissions: Emissions in Tons per Year: Washington

County	Plant Name	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
	Kaiser Trentwood	58.15	0.47	69.20	48.63	0.43	256.38
	Melcher Mfg Co Inc						7.59
	Mutual Materials	38.50		11.40	164.51	21.50	6.20
	Northside Landfill	0.14		1.50	1.00	0.30	0.31
	Reliance Trailer Co LLC				0.46		20.53
	Sacred Heart Medical Center	9.65	0.06	12.39	0.88	0.13	1.15
	Saint Lukes Rehabilitation Institute	1.41	0.01	1.76	0.13	0.02	0.14
	Select Farms						1.97
	Shamrock Paving Inc	18.80	0.01	4.79	9.82	0.04	1.90
	Transcanada GTN System	103.32		109.94	3.56	2.20	8.93
	Travis Pattern	5.80	0.03	0.71	13.75	1.47	8.81
	Triumph Composite Systems, Inc	1.76	0.01	2.09	2.06	0.01	19.09
	Valley Hospital & Medical Center	0.00	0.00	0.02	0.00	0.00	0.00
	Waste To Energy	40.00	5.40	347.70	10.60	23.30	0.60
	BettyDon Jersey Farm		3.20		0.35		1.00
	Darilane Farms		6.10		0.66		1.91
	Double T Dairy		3.70		0.40		1.16
	Dunrenton Ranch, LLC		3.08		0.33		0.96
	Heinemann Dairy		2.96		0.32		0.92
	Hutchinson Dairy		0.77		0.08		0.24
	Kimebert Farm		3.33		0.36		1.04
	R.E. Courchaine & Sons		4.00		0.43		1.25
	Reiter's Holstein Dairy		2.19		0.24		0.68
	Reitmeier Dairy Farm		1.39		0.15		0.43
	Schmidt's Dairy		1.23		0.13		0.39
	Selkirk Jerseys		2.16		0.23		0.67
	T & D Dairy		0.86		0.09		0.27
	Teel Dairy Farm		10.78		1.17		3.37
Thurston							
	AMTECH CORPORATION						42.00
	CROWN CORK & SEAL CO INC	1.00		4.00			176.00
	LASCO BATHWARE	3.00		3.00			188.00
	Beaver Creek Dairy		27.72		3.01		8.66
	Doelman James Road Dairy		29.26		3.18		9.14
	Doelman Rainier Dairy		15.22		1.65		4.75
	Dragt Dairy		16.94		1.84		5.29
	Foster Dairy		3.39		0.37		1.06
	Joel Yackley Dairy		2.74		0.30		0.86
	Keith Fagernes Dairy		1.85		0.20		0.58
	Larry Wilson Dairy		1.85		0.20		0.58
	Odie's Acres		1.60		0.17		0.50
	Plowman Dairy		15.40		1.67		4.81
	Plowman Dairy, LLC		21.25		2.31		6.64
	Scattercreek Dairy		7.45		0.81		2.33
	Van's Dairy		3.11		0.34		0.97
	Winter Dairy		21.56		2.34		6.74
Wahkiakum							
	Aegerter Dairy		2.31		0.25		0.72
	Grays River Holsteins		3.20		0.35		1.00
	Little Island Dairy		4.16		0.45		1.30
	Sunny Sands Farm		1.45		0.16		0.45
Walla Walla							
	Boise White Paper LLC	759.20	24.90	889.80	206.00	587.90	2319.60
	Pacific Gas Transmission Co Station 7	106.00		72.60	0.90	1.00	2.50
	Pacific Gas Transmission Co Station 8	289.40		143.90	4.20	2.00	7.50
Yakima							
	Canam Steel Corp	0.10		0.40	6.10		74.40
	Pactiv				2.28		402.29
	Shields Bag & Printing Co	0.80		3.80			565.10
	Terrace Heights Landfill	0.30		1.60	12.93	0.10	11.40
	Trail Wagons Inc	0.20		0.20			51.50
	Western RV	0.60		0.70			68.20
	Yakima Resources LLC	844.80	0.20	119.10	124.00	4.70	102.60
	Art Driesen & Sons Dairy		13.86		1.50		4.33
	Benjert Farms, Inc.		17.25		1.87		5.39
	Bron Dairy		30.80		3.34		9.63
	Buena Dairy		12.32		1.34		3.85
	C & L Dairy		12.32		1.34		3.85
	C & L Dairy II		9.24		1.00		2.89
	Castle Grove Dairy		28.18		3.06		8.81

Gorge Project 2004 Point Source Estimated Emissions: Emissions in Tons per Year: Washington

County	Plant Name	CO	NH_3	NO_x	PM_{10}	SO_x	VOC
	Circle B Dairy		13.86		1.50		4.33
	D & A Farms		32.31		3.51		10.10
	D & B Dairy Farm		15.09		1.64		4.72
	De Jong Dairy		20.02		2.17		6.26
	De Vries Family Farm, LLC		77.00		8.36		24.06
	den Hoed Dairy, Inc.		22.18		2.41		6.93
	Denis and Jeanette Olson Dai		1.36		0.15		0.42
	DeRuyter Brothers #2		63.14		6.86		19.73
	DeRuyter Brothers Dairy		63.14		6.86		19.73
	Destiny Dairy		11.09		1.20		3.47
	Double P Dairy		9.55		1.04		2.98
	Elliott Dairy		1.39		0.15		0.43
	Ev and Hank Haak Dairy		36.96		4.01		11.55
	Familia Salazar Dairy		4.25		0.46		1.33
	Finlandia Dairy		12.54		1.36		3.92
	Frieslandia Dairy, LLC		28.49		3.09		8.90
	George De Ruyter Dairy		70.62		7.67		22.07
	George Geertsma Dairy		13.09		1.42		4.09
	Golob Dairy, Inc.		19.62		2.13		6.13
	H & S Dairy		43.12		4.68		13.48
	Halma Dairy		7.70		0.84		2.41
	Hansen Dairy		9.24		1.00		2.89
	Haringa Dairy		12.63		1.37		3.95
	Harrison Road Dairy		7.70		0.84		2.41
	Harry Van Boven Dairy, Inc.		9.24		1.00		2.89
	Hidden Valley Dairy		36.96		4.01		11.55
	Independence Dairy		16.02		1.74		5.01
	J & J Bosma Dairy		44.97		4.88		14.05
	Jayelle Dairy		23.10		2.51		7.22
	John Koopmans Dairy		38.50		4.18		12.03
	John Prins Dairy		21.56		2.34		6.74
	Kamstra Dairy		7.39		0.80		2.31
	Kargrass Livestock		3.08		0.33		0.96
	Liberty Dairy		70.84		7.69		22.14
	Maple Grove Dairy		44.35		4.82		13.86
	Meeker Brothers		1.48		0.16		0.46
	Mensonides Dairy, LLC		36.96		4.01		11.55
	Mensonides Dairy, LLC 2		81.62		8.86		25.51
	Newhouse Dairy		13.86		1.50		4.33
	Oord Dairy #1		58.61		6.36		18.32
	Pride & Joy Dairy		7.70		0.84		2.41
	Prins Dairy #2		5.24		0.57		1.64
	R & M Haak and Sons		27.72		3.01		8.66
	R.E.H. Dairy		7.30		0.79		2.28
	Riverview Ranch		30.80		3.34		9.63
	S.L.I. Dairy		7.70		0.84		2.41
	Scheenstra Farms, Inc.		22.33		2.42		6.98
	Scott Smeenk Dairy		2.65		0.29		0.83
	Sky Ridge Farm		30.80		3.34		9.63
	Southside Dairy Inc.		12.32		1.34		3.85
	Springer One		50.91		5.53		15.91
	Sunny Dene Ranch		30.80		3.34		9.63
	Sunny Dene Ranch I		27.72		3.01		8.66
	Sunnyside Quality Dairy, Inc		18.45		2.00		5.77
	Sunnyveld Dairy		31.42		3.41		9.82
	Swager Dairy		18.48		2.01		5.78
	T & D Dairy		9.24		1.00		2.89
	T & D Dairy II		26.18		2.84		8.18
	The Cow Palace		122.92		13.35		38.41
	Tony Veiga Dairy		41.58		4.51		12.99
	Udder View Farms LP		13.86		1.50		4.33
	Vander Meulen Dairy		24.64		2.68		7.70
	View Point Dairy		46.20		5.02		14.44
	Vis-Sir Dairy		19.25		2.09		6.02
TOTAL		**26078.48**	**4898.56**	**32163.42**	**7920.79**	**12366.33**	**12255.62**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated CO Emissions in Tons per Year: Washington

	Commercial/Institutional Fuel Consumption	Industrial Fuel Consumption	Aircraft	Locomotives	Marine Vessels	Open Burning: Residential	Residential NG/Oil Consumption	Residential Wood Combustion
Adams	4.2	65.8	281.13	209.5		22.9	3.7	609.0
Benton	27.1	76.7	538.09	204.2	68.5	175.7	18.8	6823.7
Chelan	26.5	37.0	90.11	78.1		128.3	19.3	3804.5
Clallam	1.1	2.6	560.20			208.1	1.3	4600.2
Clark	75.4	122.9	406.19	124.1	206.1	816.7	56.2	20515.2
Cowlitz	11.9	229.1	451.82	87.9	267.3	202.7	8.7	5382.7
Douglas	1.4	1.8	230.37	27.6		63.3	1.7	1637.8
Franklin	57.0	83.5	618.28	169.0		55.9	40.8	2057.5
Grant	9.7	125.3	1876.42	65.9		118.5	6.7	3015.1
Grays Harbor	10.9	42.5	296.14	0.01		160.9	9.7	4408.2
Island	9.3	13.4	127.94			252.8	8.5	5168.0
Jefferson	0.6	1.7	294.94			108.5	1.2	2226.7
King	521.4	817.2	3283.78	211.0	921.9	2642.0	444.7	95860.2
Kitsap	37.9	57.2	87.37	0.01		667.3	39.8	14125.5
Kittitas	9.7	13.0	75.08	22.9		72.1	8.2	2121.7
Klickitat	1.3	2.7	31.18	277.9	96.4	45.2	1.9	1108.2
Lewis	15.1	25.3	591.89	58.1		201.4	10.9	4453.5
Lincoln	2.2	2.8	91.31	132.0		21.6	3.4	529.0
Mason	55.4	76.6	261.69	0.01		225.8	39.5	4206.8
Pacific	0.3	2.0	47.15		178.2	104.2	0.6	2118.6
Pierce	297.0	419.9	96.20	101.2	846.7	1547.1	228.1	40091.3
Skamania	0.8	1.5		116.3	43.9	39.2	0.8	749.3
Snohomish	331.5	535.4	334.81	137.7	131.4	1389.7	240.1	34795.5
Spokane	210.7	297.8		881.3		583.1	176.3	22093.2
Thurston	54.8	74.9	549.43	44.7		554.6	42.4	12979.1
Wahkiakum	0.0	0.1				15.4	0.2	289.7
Walla Walla	19.3	24.4	341.43	62.9		71.5	16.3	9668.9
Yakima	62.0	138.5	444.58	23.1		301.5	54.6	9860.0
Total	**1854.5**	**3291.5**	**12007.5**	**3035.4**	**2760.5**	**10796.0**	**1484.0**	**315299.2**

Gorge Project 2004 Area Source Estimated NH3 Emissions in Tons per Year: Washington

	CAFO: Total	Fertilizer Application	Other Livestock	Pets	Humans
Adams	137.7	1006.8	354.4	4.4	5.7
Benton	61.9	641.9	23.1	40.6	55.8
Chelan		55.4	7.5	17.9	22.6
Clallam	21.0	40.4	48.9	17.3	21.3
Clark	100.9	100.4	391.9	76.9	138.3
Cowlitz	17.8	28.9	206.1	25.0	31.4
Douglas		620.0	130.2	9.0	11.4
Franklin	251.4	650.0	554.0	14.9	19.5
Grant	454.1	1155.7	1708.5	20.5	26.4
Grays Harbor	153.0	45.0	91.9	18.1	22.7
Island	33.9	31.2	33.2	19.6	24.6
Jefferson	15.0	6.9	25.5	7.1	8.6
King	313.2	61.2	133.9	358.8	633.8
Kitsap		4.6	34.3	48.0	85.4
Kittitas		143.2	355.5	9.4	11.6
Klickitat	17.3	243.6	310.1	5.1	6.3
Lewis	223.4	153.6	1063.6	18.5	23.2
Lincoln	2.7	1169.6	327.3	2.7	3.3
Mason		8.1	21.7	13.3	16.5
Pacific	48.4	17.3	64.7	5.5	6.7
Pierce	116.5	63.5	167.3	149.3	266.6
Skamania		3.5	6.9	2.6	3.3
Snohomish	365.3	86.6	450.3	129.4	231.2
Spokane	45.7	650.0	329.7	86.7	153.9
Thurston	169.3	88.9	648.1	43.8	77.5
Wahkiakum	11.1	19.6	35.1	1.0	1.2
Walla Walla		759.7	13.7	14.9	18.6
Yakima	1864.8	637.3	1745.0	45.6	82.9
Total	**4424.5**	**8493.1**	**9282.5**	**1205.8**	**2010.2**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated NOx Emissions in Tons per Year: Washington

	Commercial/Institutional Fuel Consumption	Industrial Fuel Consumption	Aircraft	Locomotives	Marine Vessels	Open Burning: Residential	Residential NG/Oil Consumption	Residential Wood Combustion
Adams	5.6	87.5	1.5	2045.5		0.9	11.4	11.9
Benton	45.2	122.5	2.9	1993.5	527.9	7.1	50.7	121.1
Chelan	36.7	59.4	0.5	760.6		4.9	49.8	66.3
Clallam	4.9	13.4	3.0			8.5	6.4	76.2
Clark	106.9	264.7	2.2	1203.5	1587.7	33.3	149.1	339.9
Cowlitz	18.3	329.9	2.4	855.2	2059.0	8.3	23.5	89.2
Douglas	2.8	3.7	1.2	263.5		2.4	6.2	29.0
Franklin	70.0	132.9	3.3	1637.7		2.3	98.8	37.0
Grant	14.4	180.4	10.2	643.7		4.6	16.9	59.9
Grays Harbor	15.7	79.5	1.6	0.1		6.6	29.1	73.1
Island	13.3	21.6	0.7			10.2	25.7	85.5
Jefferson	2.5	8.7	1.6			4.4	5.5	36.9
King	833.9	1,820.4	1373.5	2040.9	6994.82	109.7	1,348.4	1590.3
Kitsap	56.1	84.6	8.9	0.1		27.1	131.5	233.9
Kittitas	14.3	20.2	0.4	224.1		2.8	24.1	37.0
Klickitat	2.3	8.1	0.2	2713.7	742.9	1.7	7.0	19.8
Lewis	20.6	55.4	3.2	565.8		8.2	27.6	73.7
Lincoln	3.0	3.9	0.5	1288.6		0.8	12.6	10.6
Mason	67.6	105.0	1.4	0.1		9.1	95.0	69.6
Pacific	1.2	10.6	0.3		1372.7	4.2	2.9	35.1
Pierce	395.7	666.7	0.5	980.9	6424.4	63.2	605.8	664.4
Skamania	1.2	4.0		1135.7	337.9	1.6	2.5	12.4
Snohomish	419.8	1,055.7	18.4	1337.4	997.1	56.7	595.4	576.5
Spokane	297.2	500.1		8599.7		23.2	507.6	375.8
Thurston	78.1	118.2	3.0	436.4		22.6	116.0	215.0
Wahkiakum	0.1	0.7				0.6	0.9	4.8
Walla Walla	26.7	46.0	1.8	614.6		2.8	46.8	168.4
Yakima	85.0	244.9	2.4	224.6		11.7	161.2	170.0
Total	**2639.1**	**6048.9**	**1445.7**	**29566.0**	**21044.5**	**439.8**	**4158.1**	**5283.2**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated PM10 Emissions in Tons per Year: Washington

	Commercial/Institutional Fuel Consumption	Industrial Fuel Consumption	Locomotives	Marine Vessels	Open Burning: Residential	Residential NG/Oil Consumption	Residential Wood Combustion	CAFO: Total	Other Livestock
Adams	0.4	6.6	52.8		10.3	0.6	82.2	15.0	5.1
Benton	3.6	9.2	51.4	70.4	81.2	3.4	919.2	6.7	
Chelan	2.9	4.5	19.6		57.0	3.5	512.3		
Clallam	0.4	1.0			96.2	0.2	614.6	2.3	0.6
Clark	8.4	19.7	31.1	211.7	379.0	10.2	2744.5	11.0	2.1
Cowlitz	1.5	24.9	22.1	274.5	94.2	1.6	720.5	1.9	0.8
Douglas	0.2	0.3	6.8		27.8	0.3	220.7		1.8
Franklin	5.4	10.0	42.3		25.7	7.7	277.2	27.3	8.0
Grant	1.1	13.6	16.6		53.3	1.2	407.3	49.3	23.6
Grays Harbor	1.2	5.9	0.003		74.9	1.7	590.2	16.6	1.2
Island	1.0	1.6			116.7	1.4	689.9	3.7	0.4
Jefferson	0.2	0.6			50.1	0.1	297.3	1.6	0.3
King	66.8	135.2	52.7	272.8	1241.7	75.8	12861.4	34.0	1.1
Kitsap	4.4	6.4	0.003		308.3	6.5	1886.4		0.2
Kittitas	1.1	1.5	5.8		32.0	1.4	285.7		4.5
Klickitat	0.2	0.6	70.0	99.1	19.8	0.3	149.3	1.9	4.2
Lewis	1.6	4.1	14.6		93.2	2.0	595.0	24.3	3.6
Lincoln	0.2	0.3	33.2		9.7	0.5	71.5	0.3	4.5
Mason	5.2	7.9	0.003		104.0	7.4	560.9		0.2
Pacific	0.1	0.8		183.0	48.1	0.1	282.8	5.3	0.9
Pierce	30.8	50.1	25.3	250.5	718.6	41.3	5365.0	12.7	1.8
Skamania	0.1	0.3	29.3	45.1	18.1	0.1	99.9		0.1
Snohomish	32.3	78.7	34.5	38.9	644.9	44.7	4654.8	39.7	2.8
Spokane	23.3	37.5	221.8		265.2	30.8	2973.2	5.0	3.8
Thurston	6.1	8.9	11.3		256.9	7.6	1735.1	18.4	1.5
Wahkiakum	0.0	0.0			7.1	0.0	38.6	1.2	0.5
Walla Walla	2.1	3.4	15.9		32.4	2.8	1302.1		
Yakima	6.6	18.3	5.8		135.1	9.4	1327.4	202.5	24.1
Total	**207.5**	**451.9**	**762.9**	**1445.9**	**5001.3**	**262.8**	**42265.3**	**480.4**	**98.0**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated SOx Emissions in Tons per Year: Washington

	Commercial/Institutional Fuel Consumption	Industrial Fuel Consumption	Aircraft	Locomotives	Marine Vessels	Open Burning: Residential	Residential NG/Oil Consumption	Residential Wood Combustion
Adams	1.8	18.5	0.23	202.5		0.1	8.5	1.2
Benton	40.7	61.3	0.45	197.4	277.9	1.2	21.0	13.6
Chelan	16.2	30.1	0.08	74.3		0.8	14.5	7.8
Clallam	11.2	20.2	0.47			1.4	10.5	9.4
Clark	54.2	37.9	0.34	115.0	835.7	5.6	55.6	41.8
Cowlitz	13.1	19.5	0.38	83.1	1083.8	1.4	9.9	10.9
Douglas	3.5	3.1	0.19	23.0		0.4	7.2	3.4
Franklin	7.0	66.1	0.51	155.4		0.4	10.2	4.1
Grant	9.2	61.8	1.56	63.7		0.8	4.1	6.1
Grays Harbor	8.6	56.7	0.25	0.01		1.1	20.5	8.9
Island	7.0	11.1	0.11			1.7	18.9	10.6
Jefferson	5.7	13.1	0.25			0.7	9.0	4.6
King	672.2	1,658.4	129.31	191.8	1027.0	18.3	984.7	192.2
Kitsap	34.8	32.7	0.87	0.01		4.5	122.8	29.0
Kittitas	8.8	9.4	0.06	22.2		0.5	15.7	4.3
Klickitat	2.2	9.5	0.03	268.7	391.0	0.3	8.4	2.3
Lewis	8.3	8.1	0.49	55.0		1.4	6.8	9.1
Lincoln	1.4	1.1	0.08	127.6		0.1	15.2	1.1
Mason	5.5	27.4	0.22	0.01		1.5	7.8	8.7
Pacific	2.7	16.0	0.04		722.5	0.7	4.8	4.4
Pierce	134.2	328.2	0.07	93.5	941.9	10.5	228.7	81.5
Skamania	1.0	0.7		112.4	177.8	0.3	2.3	1.5
Snohomish	81.2	819.5	1.83	128.8	146.2	9.5	104.2	70.8
Spokane	147.0	285.9		848.3		3.9	303.6	44.5
Thurston	40.9	57.3	0.46	43.2		3.8	53.4	26.5
Wahkiakum	0.3	1.0				0.1	1.5	0.6
Walla Walla	11.7	33.3	0.28	60.8		0.5	27.8	19.7
Yakima	35.5	157.1	0.37	21.7		2.0	106.8	20.0
Total	**1366.0**	**3844.9**	**138.9**	**2888.4**	**5603.8**	**73.3**	**2184.3**	**638.7**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated VOC Emissions in Tons per Year: Washington

	Auto Gas Storage & Transport	CAFO: Total	Other Livestock	Commercial/Institutional Fuel Consumption	Degreasing Cold Cleaning	Degreasing: Conveyorized	Degreasing: Open Top	Surface Coating
Adams	153.4	43.0	201.5	0.3	16.6	0.4	0.4	18.0
Benton	488.3	19.3	8.7	2.0	180.7	6.1	6.1	300.7
Chelan	179.8		2.8	1.8	140.5	4.6	4.6	135.6
Clallam	133.4	6.6	25.9	0.1	103.3	2.4	2.4	183.2
Clark	321.8	31.5	111.7	5.3	461.7	24.1	24.1	463.8
Cowlitz	155.1	5.6	45.1	0.9	181.6	7.2	7.2	670.3
Douglas	116.2		72.9	0.1	32.8	1.0	1.0	3.3
Franklin	184.7	78.6	315.1	3.8	149.1	3.3	3.3	121.1
Grant	269.6	141.9	944.3	0.7	106.1	4.0	4.0	75.3
Grays Harbor	192.6	47.8	50.8	0.8	182.6	7.2	7.2	293.5
Island	115.5	10.6	17.7	0.7				105.6
Jefferson	94.4	4.7	13.6	0.1	32.5	1.8	1.8	46.5
King	1593.0	97.9	63.5	38.4	3,039.8	195.0	195.0	6071.0
Kitsap	256.8		16.0	2.7	336.3	10.0	10.0	680.9
Kittitas	305.2		193.6	0.7	61.2	1.7	1.7	30.1
Klickitat	70.9	5.4	173.2	0.1	12.9	0.8	0.8	22.3
Lewis	198.5	69.8	205.6	1.0	131.3	4.3	4.3	148.6
Lincoln	95.8	0.8	184.1	0.2	11.4	0.3	0.3	9.8
Mason	124.2		11.3	3.7	56.6	1.7	1.7	56.7
Pacific	63.5	15.1	36.3	0.0	18.2	0.5	0.5	23.3
Pierce	655.1	36.4	87.1	20.3	1,179.4	40.5	40.5	1751.3
Skamania	7.0		3.7	0.1	13.5	0.5	0.5	23.1
Snohomish	530.2	114.1	144.0	22.2	1,020.2	56.8	56.8	1628.9
Spokane	1038.5	14.3	173.2	14.7	792.8	51.7	51.7	941.7
Thurston	615.3	52.9	107.2	3.8	309.7	8.4	8.4	1645.0
Wahkiakum	6.2	3.5	19.7	0.0	5.1	0.3	0.3	22.5
Walla Walla	122.7		5.1	1.3	67.1	3.0	3.0	125.5
Yakima	517.8	582.7	977.5	4.3	310.3	12.8	12.8	597.5
Total	**8605.3**	**1382.7**	**4211.5**	**130.0**	**8953.2**	**450.2**	**450.2**	**16195.0**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated VOC Emissions in Tons per Year: Washington (continued)

	Graphic Arts	Industrial Fuel Consumption	Non-Industrial Solvent Use	Aircraft	Locomotives	Marine Vessels	Open Burning: Residential	Residential NG/Oil Consumption
Adams	10.9	4.5	57.0	9.0	79.1		3.4	0.8
Benton	100.8	5.8	529.8	17.1	77.1	22.2	26.4	3.4
Chelan	44.5	2.8	233.7	2.9	30.2		19.2	3.2
Clallam	42.8	0.4	225.1	17.8			31.3	0.6
Clark	249.1	10.9	1309.4	12.9	49.8	66.9	122.9	9.7
Cowlitz	61.9	16.4	325.5	14.4	34.3	86.7	30.5	1.6
Douglas	22.2	0.2	116.8	7.3	12.6		9.5	0.5
Franklin	37.1	6.3	194.7	19.7	68.7		8.4	6.0
Grant	50.9	9.0	267.5	59.7	24.9		17.8	1.1
Grays Harbor	45.0	3.5	236.4	9.4	0.004		24.2	2.1
Island	48.6	1.0	255.5	4.1			38.0	1.9
Jefferson	17.6	0.3	92.2	9.4			16.3	0.5
King	1,162.4	74.1	6108.8	259.8	87.1	218.7	398.2	97.2
Kitsap	155.7	4.1	818.1	4.1	0.004		100.3	10.0
Kittitas	23.3	1.0	122.3	2.4	8.7		10.8	1.7
Klickitat	12.5	0.3	65.9	1.0	105.0	31.3	6.8	0.6
Lewis	46.0	2.3	241.5	18.8	22.7		30.3	1.7
Lincoln	6.6	0.2	34.8	2.9	49.9		3.2	1.0
Mason	33.0	5.4	173.5	8.3	0.004		33.9	5.7
Pacific	13.7	0.3	71.7	1.5		57.8	15.7	0.3
Pierce	483.6	31.6	2541.5	3.2	40.8	200.9	232.8	39.7
Skamania	6.6	0.1	34.5		43.9	14.2	5.9	0.2
Snohomish	419.1	45.2	2202.6	13.8	54.6	31.2	209.1	36.7
Spokane	280.8	23.0	1475.7		335.2		87.5	35.3
Thurston	142.0	5.6	746.4	17.5	16.9		83.4	7.8
Wahkiakum	2.5	0.0	13.0				2.3	0.1
Walla Walla	36.9	2.0	193.7	10.9	23.8		10.7	3.3
Yakima	147.9	11.0	777.1	14.2	9.1		45.2	11.4
Total	**3703.8**	**267.4**	**19465.1**	**542.1**	**1174.5**	**729.8**	**1623.9**	**283.7**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated VOC Emissions in Tons per Year: Washington (continued)

	Residential Wood Combustion	Architect. Coating	Asphalt Paving	Traffic Marking
Adams	380.3	25.0	4.5	3.5
Benton	4219.7	231.7	41.5	32.0
Chelan	1913.9	102.2	18.3	14.1
Clallam	2022.6	98.5	17.6	13.6
Clark	9744.8	572.7	102.6	44.9
Cowlitz	2632.6	142.4	25.5	19.7
Douglas	767.2	51.1	9.2	7.1
Franklin	1273.8	85.2	15.3	11.8
Grant	1885.6	117.0	21.0	16.2
Grays Harbor	2189.0	103.4	18.5	14.3
Island	2147.6	111.8	20.0	15.5
Jefferson	928.1	40.3	7.2	5.6
King	53188.4	2671.9	478.6	369.4
Kitsap	6024.9	357.8	64.1	49.5
Kittitas	1063.7	53.5	9.6	7.4
Klickitat	502.3	28.8	5.2	4.0
Lewis	1958.0	105.6	18.9	14.6
Lincoln	331.3	15.2	2.7	2.1
Mason	1617.7	75.9	13.6	10.5
Pacific	877.1	31.4	5.6	4.3
Pierce	19361.8	1111.6	199.1	153.7
Skamania	294.5	15.1	2.7	2.1
Snohomish	16498.1	963.4	172.5	133.2
Spokane	12247.0	645.5	115.6	89.2
Thurston	5917.8	326.5	58.5	45.1
Wahkiakum	112.5	5.7	1.0	0.8
Walla Walla	4878.6	84.7	15.2	11.7
Yakima	5176.9	339.9	60.9	47.0
Total	**160155.8**	**8513.7**	**1524.8**	**1142.9**

Gorge Project 2004 Nonroad Model Output: Emissions in Tons per Day: Washington

	CO		NO_x		PM_{10}		SO_x		VOC	
County	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Adams	2.62	8.58	0.70	4.49	0.08	0.51	0.07	0.49	0.23	0.94
Benton	13.05	43.45	1.99	5.48	0.20	0.61	0.21	0.58	1.18	4.05
Chelan	10.45	24.43	0.88	1.71	0.11	0.24	0.09	0.17	1.78	4.16
Clallam	8.59	32.30	0.88	2.00	0.10	0.22	0.09	0.17	1.15	5.03
Clark	34.60	97.95	5.09	7.89	0.46	0.77	0.52	0.79	2.41	6.54
Cowlitz	12.12	23.35	1.60	2.21	0.15	0.21	0.16	0.20	1.66	2.76
Douglas	3.04	10.36	0.56	2.75	0.06	0.32	0.06	0.30	0.34	1.61
Franklin	6.57	16.67	1.33	4.50	0.13	0.49	0.15	0.49	0.50	1.73
Grant	8.69	31.93	1.43	7.58	0.16	0.90	0.14	0.80	1.05	5.77
Grays Harbor	9.76	22.80	0.90	1.57	0.11	0.18	0.09	0.14	1.73	3.20
Island	6.50	24.26	0.68	1.38	0.07	0.14	0.07	0.13	0.60	2.13
Jefferson	8.81	18.23	0.79	1.53	0.12	0.17	0.09	0.15	2.45	3.27
King	311.10	747.95	26.57	40.15	2.37	3.64	2.37	3.46	20.00	38.13
Kitsap	21.40	71.08	2.39	4.05	0.26	0.43	0.26	0.41	1.89	5.65
Kittitas	7.53	14.73	0.57	1.50	0.10	0.20	0.06	0.16	2.06	2.42
Klickitat	8.84	8.63	0.38	1.42	0.10	0.18	0.04	0.15	3.02	1.70
Lewis	10.09	19.67	1.08	1.78	0.12	0.20	0.12	0.18	1.57	2.37
Lincoln	3.24	12.97	0.77	5.66	0.09	0.66	0.08	0.62	0.39	2.14
Mason	5.13	20.83	0.54	1.09	0.06	0.16	0.05	0.09	0.75	4.10
Pacific	2.64	11.17	0.20	0.60	0.03	0.09	0.02	0.05	0.49	2.21
Pierce	83.38	244.06	10.94	17.13	1.09	1.74	1.18	1.76	6.86	16.14
Skamania	13.21	4.44	0.20	0.27	0.14	0.04	0.02	0.03	5.52	1.01
Snohomish	83.66	232.24	8.75	13.87	0.72	1.18	0.72	1.10	6.26	12.89
Spokane	45.61	112.80	4.70	9.52	0.41	0.94	0.42	0.91	3.06	6.50
Thurston	17.39	59.68	2.61	4.27	0.26	0.46	0.29	0.45	1.38	4.73
Wahkiakum	0.29	2.13	0.03	0.11	0.00	0.02	0.00	0.01	0.05	0.45
Walla Walla	8.02	17.95	1.03	4.33	0.12	0.48	0.11	0.46	1.43	2.06
Yakima	21.26	50.83	2.30	5.56	0.22	0.59	0.22	0.56	1.79	3.73
Total	**767.59**	**1985.47**	**79.89**	**154.40**	**7.84**	**15.77**	**7.70**	**14.81**	**71.60**	**147.42**

3. OREGON 2004 COLUMBIA RIVER GORGE EMISSION INVENTORY

This section presents the development of the 2004 Base-Year Oregon emission inventory for the Columbia River Gorge(Scenic Area) inventory domain (Domain) illustrated below. Emissions in the inventory documented here represent estimated emissions that occur annually. The Oregon portion of this inventory was compiled by the Oregon Department of Environmental Quality (DEQ).

3.1 STATIONARY POINT SOURCES

3.1.1 INTRODUCTION AND SCOPE

Point sources are defined as permitted, stationary commercial or industrial sources. Emission information has been compiled and reported for individual point sources within the defined Scenic Area inventory domain. Permitted facilities were chosen for inclusion based on their legal limit of emissions and where they were located in the domain.

Industrial Permitted Size Inclusion

- Within the Scenic Area boundary +16 KM the size cutoffs below were used
  - 100 TPY for CO
  - 40 TPY for NOx
  - 10 TPY for VOC
  - Every SO_2 Source

- Outside the 16 KM buffer zone boundary PSD size levels were utilized
  - 100 TPY for CO
  - 40 TPY for NOx
  - 40 TPY for VOC
  - 40 TPY for SO_2
  - 15 TPY for PM_{10}

Significant point source categories in the inventory domain counties include pulp and paper production, iron and steel production, manufacturing, sawmills, bakeries, graphic arts (printing operations), manufacturing of equipment and other products, and wholesale and retail trade (including that of petroleum and petroleum products), and boiler emissions from commercial and industrial sources.

3.1.2 METHODOLOGY AND APPROACH

Point sources inventoried include those required to have a Federal Operating Permit under Title V of the Federal Clean Air Act, and sources required to obtain an Air Contaminant Discharge Permit (ACDP) under Oregon State rules. The DEQ Air Contaminant Source Information System (ACSIS) database contains permitting and annual emissions data for Title V sources, and permitting data for ACDP sources. Both the permitted emissions (also known as the Plant Site Emission Limit, or PSEL) and estimated actual emissions were used as criteria for generating the point source list in the inventory.

Initial estimates of emissions are made when a permit is issued. Emission factors are used to calculate permitted pollutant levels are based on: 1) methods and procedures given in EPA AP-42, 2) the result of detailed local studies or experience, 3) source tests, 4) chemical mass balance calculations, or 5) through EPA computer programs such as Tanks 4.0x. DEQ staff use these emission factors together

with the process rate data, provided annually by the sources under permit, to estimate annual emissions.

Emissions for certain Title V sources (based on permitted emissions size) are calculated on an annual basis for fulfilling reporting requirements of the Consolidated Emission Reporting Rule (CERR). DEQ Program Operations staff inventoried Title V sources for 2004 and regional staff completed 2004 ACDP source emissions using an MS Access database application for those meeting the size cutoffs outlined above. DEQ staff compiled and/or checked operating status, emission factor, location, source process, throughput, operating schedule, PSEL, emissions, stack parameter, and source classification code (SCC) data using the application.

If stack parameter data wasn't available, it was supplemented with EPA default stack data based on the facility's SIC code.

3.2 STATIONARY AREA SOURCES

The area source categories considered during the development of the inventory domain inventory were identified from categories submitted to EPA under the CERR for the 2002 National Emission Inventory (NEI).

Initial county-level volatile organic compound (VOC), nitrogen oxide (NOX), carbon monoxide (CO), sulfur oxides (SOX), particulate matter (PM_{10} and $PM_{2.5}$), and ammonia (NH_3) emission estimates were queried from the ODEQ AMEE database that calculates estimated emissions from area, non-road, and on-road sources that were developed for the 2002 NEI. These emissions were based on the following emission factor-based approaches: 1) *per-capita* emission factors, 2) *commodity consumption*-related emission factors, 3) *level-of-activity*-based emission factors, and 4) *employment*-related emission factors. The estimation procedure is summarized in the following sections.

These 2002 emissions were grown to 2004 to represent the Scenic Area inventory domain base year by applying regional growth projections from METRO. Emissions from certain sources such as field burning, orchard heating and conventional fireplaces and woodstoves were given no growth and held constant for the 2 year period. The growth rates are detailed in the table below.

Gorge Growth Factors	Percent	Growth Parameter Data
Population (Zoning & Land Use Based)	0.019	Linear, Non-Compounding
Housing Growth & Land Use Projections	0.020	Linear, Non-Compounding
Commerical Employment & Land Use Projections	0.010	Linear, Non-Compounding
Industrial Employment & Land Use Projections	0.003	Linear, Non-Compounding
Field burning, orchard heating, orchard pruning burning, Woodstoves - Conventional & FP Insert, Exempt Pellet Stoves	0	No Growth

Each of the major area source categories, is comprised of area source types. The following sections describe these major categories, with subsections corresponding to individual area source types.

3.2.1 Small Stationary Fossil Fuel and Wood Use

This category includes small furnaces, heaters, heating units, and cooking devices, which produce emissions less than 100 tons/year. Four main types of fuel are used within the inventory domain by

industrial, commercial/institutional, and residential sources: fuel oils, natural gas, liquefied petroleum gas (LPG), and wood. Wood fuel use is only evaluated for residential sources in which it is primarily used in fireplaces, wood stoves, and furnaces. For the purpose of the area source inventory fossil fuel and wood fuel use is evaluated for space heating or cooking purposes only; use of these fuels by industrial and commercial sources for other purposes is included in the point source inventory.

3.2.1.1 Commercial/Institutional and Industrial Combustion

Fuel oil emissions from industrial and commercial sources are from fossil fuel consumption in large or small boilers, furnaces, heaters, space heaters, and other heating devices. For this inventory, industrial and commercial consumption includes residual oil, distillate oil and kerosene use, natural gas and liquefied petroleum gas (LPG).

The 2002 State Energy Data Report supplied the amount of each fuel type consumed in Oregon for the year. This report also distinguished between commercial and industrial fuel consumption. The 2002 Oregon Covered Employment & Payrolls Report from the Oregon Labor Market Information System (OLMIS) supplied the yearly average employment number of commercial and industrial employees for each category per county. Countywide use of a fuel type was apportioned by the following formula:

2002 State fuel use total * the ratio of county employees / state employees

Emissions were then estimated by using the amount of distillate, residual, natural gas, or LPG burned in each county and multiplying it against the emission factors s from the EPA document C*ompilation of Air Pollutant Emission Factors,* (AP-42, 5th Edition), Table 1.3-1. The emission factors for industrial and commercial/institutional distillate fuel oil are the same. The LPG emission factors are also from EPA AP-42, Table 1.5-1 while the natural gas emission factors are from EPA's FIRE 6.2 database.

3.2.1.2 Residential Fossil Fuel Combustion

Residential fossil fuel emission sources are primarily from fuel consumption in furnaces, space heaters, other heating devices, and cooking. Fuel oil use emissions estimates for residential sources are calculated using the amount of distillate oil and kerosene, natural gas, and liquefied petroleum gas (LPG) burned in Oregon during 2002 and apportioning it to the county level based on fuel use by housing unit.

*2002 Estimated County Occupied Housing Units = 2002 estimated HU * 2000 Occupied HU ratio*

Additionally the 2002 housing unit fuel use data is not available at the county level. Therefore the state-wide fuel use was apportioned to each county with the following formula.

*2002 County Fuel Use = (2002 Statewide fuel use) * (2002 County Occupied Hu/2002 State Total Occupied Housing Unit)*

The emissions were calculated by multiplying emission factors for combustion of the various fuels by the amount used. Emission factors are from the EPA AP-42, Table 1.3-1. Total distillate and kerosene

use is combined for emission estimate purposes. EPA AP-42 does not provide separate emission factors for the two fuels when used in a residential furnace. In addition, use of kerosene as a space heating fuel, particularly in furnaces, is limited in Oregon. The LPG emission factors are also from AP-42, Table 1.5-1 while the natural gas emission factors are from the FIRE 6.2 database.

3.2.1.3 Residential Wood Combustion

Wood is an important residential space heating source in Oregon. As a heating source, wood contributes a significant percentage of pollutants to the airshed when compared to fuel oil and natural gas.

Emission estimations for this category rely upon the tabulated results of the Wood Burning Stove Survey for Idaho, Oregon and Washington State, 2001. Activity level estimates are primarily determined utilizing specific regions of Oregon to sample the population in an area. Survey results data provides information on households with wood burning devices, annual usage, and wood stove types in use. Using the survey results and housing unit data (from the US census), the tons of wood burned by device for each survey area can be calculated. Specific calculation methodologies are included in the sections below. The emission estimation methodology applied is similar to that utilized in the EIIP documents (Vol. 3, Ch. 2) with changes reflecting the several years experience of the AQ/Technical Services/Emission Inventory Group.

The mass of a cord of wood was taken from the work done on the 2002 Oregon National Emission Inventory which referenced the Oregon DEQ 1993 Wood Heating Survey and calculated as follows:

> 1) The fuel loading (mass) of a "typical" cord of wood is developed for each city surveyed. The 'typical cord mass' for each city is determined by weighting number survey respondent information for % of wood species burned and percentage of each wood species burned during the heating season. The principle wood species available for wood burning are different on the east (pine) and west (fir) sides of the Cascade crest in Oregon and the mixture of wood available for burning affects the mass of a typical cord of wood. Weighted data was utilized to determine the species mixture of a typical cord of wood for that city. Cord wood mass was then calculated by multiplying each type of wood in the typical cord by the density of that wood type. Recent comparison of emission inventory estimates to mathematical receptor modeling results has led to adjustment in the density of a cord of wood which is actually burned. A cord of wood (with a volume of 128 ft^3) is not "solid wood" throughout its' entire volume. For these estimates, the weight of the cord of wood is estimated using a density of 80 ft^3/cord and from this density the typical cord weight (tons/cord) is calculated for each city.

The information below was taken from the Wood Burning Stove Survey for Idaho, Oregon and Washington State, 2001[517] and determined as follows:

> 2) The number of cords of wood burned in each of the five state regions was evaluated. The quantity (cords) of wood burned in each region is highly variable.
>
> The severity of the heating season affects the cords of wood burned. The survey information is assumed, based on the question, to ask for annual use. The survey year Heating Degree Day (HDD) data is from the National Weather Service climate divisions for the State of Oregon.

3) The results of the wood burning stove survey were used to determine the distribution of wood burning devices in the wood burning households for each region. The State of Oregon was divided into 5 wood burning regions. The wood burning region designations follow county boundaries. Counties contained within a specific region have the average wood burning device distribution for that region applied. Data from surveyed cities in each region were used to calculate a regional average distribution of wood burning devices by wood burning housing units.

4) The residential wood heating survey results (averaged into wood burning regions) were used to determine tons of wood burned (by wood heating device) for each county. The regional average distribution of wood burning devices in wood burning households were used to determine the device distribution applied to an individual county.

5) The tons of wood burned by wood burning device for each county are allocated to tons burned per housing unit based upon estimated county housing units for 2002 as follows:

Tons Burned in wood stove devices =
(Housing Units Burning Wood %) * (Wood burning HU [each device] %) * (Cords Burned per HU[each device]) * (Tons/Cord of wood) * (HDD Ratio) * (Number of County Housing Units)

The emission factors are from AP-42 and FIRE 6.2 database.

3.3 Commercial Food Preparation

3.3.1 Charbroiling

This source category covers the emissions produced from commercial charbroiling at restaurants. Emissions for this category are calculated based on emission factors given in the EIIP *Area Source Category Method Abstract – Charbroiling*. The annual amount of meat charbroiled per restaurant is determined based on methodology in the aforementioned EIIP document. The number of restaurants per county was acquired from the Oregon Restaurant Association (ORA) Database of Restaurants. The division of restaurants with various equipment was taken from CARB methodology for Charbroiling and Deep Fat Frying.

3.3.2 Commercial Deep Fat Frying

This source category covers the emissions produced from commercial deep fat frying. Emissions for this category are calculated based on emission factors given in AP-42 section 9.13.3 “Snack Chip Deep Fat Frying” on recommendation from Raman Patel of South Coast Air Quality Management District. The annual amount of food fried per restaurant is determined based on methodology in the EIIP Charbroiling document. The number of restaurants per county was acquired from the Oregon Restaurant Association (ORA) Database of Restaurants. The division of restaurants with various equipment was taken from CARB methodology for Charbroiling and Deep Fat Frying.

3.4. Solvent Utilization

The use of solvents in the coating categories is for painting, repainting and finishing processes. Solvents used for these categories include high performance coatings, primers, and lacquers. Solvent

use for degreasing categories is to remove foreign material before or after assembly to allow greater adhesion of coatings or to provide a cleaner part for re-installation.

This category includes liquid organic solvents capable of dissolving other substances to form a homogeneous mixture. These dissolved substances may be in liquid, solid, or gaseous form. Solvents may be used in industrial, commercial, or consumer applications and contribute to atmospheric VOC emissions through evaporation.

3.4.1 Surface Coating/Cleaning/Degreasing

Industrial surface coating operations with VOC emissions >10 tpy are included in the point source inventory. Emission sources from surface coating that are primarily evaluated as area sources include: architectural surface coating, auto body refinishing, traffic markings, factory finished wood, wood furniture manufacturing, machinery/equipment manufacturing, electronic component manufacturing, ship/boat building & repair, miscellaneous manufacturing, industrial maintenance coatings, and special purpose coating. Surface coating process operations of these types utilize solvent-based coatings which generate VOC emissions during application and drying. Cleanup operations are also a source of solvent evaporation. Each source category type inventoried is described below.

For each SCC, area and point source combined emissions were calculated using emission factors given in EIIP Vol. III table 6.5-2 (p.6.5-4) and table 8.5-1 (p. 8.5-2) for SIC categories. Corresponding NAICS numbers and NAICS employee populations per county were obtained electronically from US Census Bureau websites. Employee populations were then multiplied by per employee emission factors to obtain emissions. Double counting was eliminated by matching point source emissions to area source SCC's and subtracting out these emissions.

Source Classification Codes (SCC)

The following SCC's are covered within this section:

Surface coating

24-01-005-000	Auto Refinishing: SIC 7532-Total: All Solvent Types
24-01-015-000	Factory Finished Wood: SIC 2426 thru 242-Total: All Solvent Types
24-01-020-000	Wood Furniture: SIC 25-Total: All Solvent Types
24-01-040-000	Metal Cans: SIC 341-Total: All Solvent Types
24-01-045-000	Metal Coils: SIC 3498-Total: All Solvent Types
24-01-050-000	Miscellaneous Finished Metals: SIC 34 - (341 + 3498)-Total: All Solvent Types
24-01-055-000	Machinery and Equipment: SIC 35-Total: All Solvent Types
24-01-065-000	Electronic and Other Electrical: SIC 36 - 363-Total: All Solvent Types
24-01-070-000	Motor Vehicles: SIC 371-Total: All Solvent Types
24-01-080-000	Marine: SIC 373-Total: All Solvent Types

Degreasing: Open Top Degreasing

24-15-105-000	Solvent Furniture and Fixtures (SIC 25): Total: All Solvent Types
24-15-110-000	Primary Metal Industries (SIC 33): Total: All Solvent Types
24-15-120-000	Fabricated Metal Products (SIC 34): Total: All Solvent Types
24-15-125-000	Industrial Machinery and Equipment (SIC 35): Total: All Solvent Types
24-15-130-000	Electronic and Other Elec. (SIC 36): Total: All Solvent Types
24-15-135-000	Transportation Equipment (SIC 37): Total: All Solvent Types
24-15-140-000	Instruments and Related Products (SIC 38): Total: All Solvent Types

24-15-145-000 Miscellaneous Manufacturing (SIC 39): Total: All Solvent Types
24-15-150-000 Transportation Maintenance Facilities (SIC 40-45): Total: All Solvent Types
24-15-155-000 Automotive Dealers (SIC 55): Total: All Solvent Types
24-15-165-000 Miscellaneous Repair Services (SIC 76): Total: All Solvent Types

Degreasing: Conveyerized Degreasing
24-15-205-000 Furniture and Fixtures (SIC 25): Total: All Solvent Types
24-15-210-000 Primary Metal Industries (SIC 33): Total: All Solvent Types
24-15-220-000 Fabricated Metal Products (SIC 34): Total: All Solvent Types
24-15-225-000 Industrial Machinery and Equipment (SIC 35): Total: All Solvent Types
24-15-230-000 Electronic and Other Elec. (SIC 36): Total: All Solvent Types
24-15-235-000 Transportation Equipment (SIC 37): Total: All Solvent Types
24-15-240-000 Instruments and Related Products (SIC 38): Total: All Solvent Types
24-15-245-000 Miscellaneous Manufacturing (SIC 39): Total: All Solvent Types
24-15-250-000 Trans. Maintenance Facilities (SIC 40-45): Total: All Solvent Types
24-15-255-000 Automotive Dealers (SIC 55): Total: All Solvent Types
24-15-265-000 Miscellaneous Repair Services (SIC 76): Total: All Solvent Types

Degreasing: Cold Cleaning
24-15-305-000 Furniture and Fixtures (SIC 25): Total: All Solvent Types
24-15-310-000 Primary Metal Industries (SIC 33): Total: All Solvent Types
24-15-320-000 Fabricated Metal Products (SIC 34): Total: All Solvent Types
24-15-325-000 Industrial Machinery and Equipment (SIC 35): Total: All Solvent Types
24-15-330-000 Electronic and Other Elec. (SIC 36): Total: All Solvent Types
24-15-335-000 Transportation Equipment (SIC 37): Total: All Solvent Types
24-15-340-000 Instruments and Related Products (SIC 38): Total: All Solvent Types
24-15-345-000 Miscellaneous Manufacturing (SIC 39): Total: All Solvent Types
24-15-350-000 Transportation Maintenance Facilities (SIC 40-45): Total: All Solvent Types
24-15-355-000 Automotive Dealers (SIC 55): Total: All Solvent Types
24-15-365-000 Miscellaneous Repair Services (SIC 76): Total: All Solvent Types

The degreasing VOC emission factor is from Emission Inventory Improvement Program (EIIP) Vol. III Area Sources: Preferred and Alternate Methods Table 6.5-2 on page 6.5-4.

The surface coating VOC emission factor for auto refinishing (24-01-005-000), and wood furniture - SIC 25 (24-01-020-000) was taken from "Short List AMS SCC's & Emission Factors."

All other VOC emission factors are from Emission Inventory Improvement Program (EIIP) Vol. III Area Sources: Preferred and Alternate Methods Table 8.5-1 on page 8.5-2.

3.4.2 Architectural Coating

Architectural surface coatings includes paints, stains, varnishes, and other protective and decorative coatings A lb/person VOC emission factor was calculated by dividing the sum of the use factors in EIIP by a non-weighted, composite EF calculated from 63 FR 48848. Any category given in the 63 FR 48848 may contain both solvent-based and water-based coatings, and in addition the EPA does not have composite emission factors for solvent-based and water-based coatings available. Accordingly, it was assumed that a non-weighted, composite VOC emission factor could be calculated from all categories presented in 63 FR 48848, and that percentages for water-based and solvent-based coatings

based upon the VOC emission factor given in EIIP could be applied to the composite VOC emission factor. The composite per capita emission factor used is 10.69 lbs/person/yr.

3.4.3 Traffic Marking Coatings

This category covers the application of roadway markings, paint or other, to facilitate the safe movement of vehicles, bicyclists, and pedestrians. At the state level, the Oregon Department of Transportation was able to provide quantities by county for the calendar year in question. Complete coverage of Oregon was accomplished for all ODOT jurisdictional areas. At the county and city level data was more difficult to obtain so EIIP alternative methods 2 and 3 were applied leading to mixed results. With the change in product formulations and an increasing reliance on preformed tapes and thermo plastics, VOC emissions from this category are dropping rapidly.

3.4.4 Paper Coating

This category of surface coating covers the emissions that are released from the finishing processes involved in paper manufacture, NAICS 322

Because there was not a specific emission factor for Paper Coating the VOC emission factor is the average of *Other Product Coatings* and *Other Special Purpose Coatings* from EIIP Volume III, Chapter 8 Table 8.5-2. The emission factor is 0.7 lbs/person/yr.

3.4.5 Special Purpose Coating

The emissions from this category includes "…coatings used for applications such as maintenance operations at industrial and other facilities, auto refinishing, traffic paints, marine finishes, and aerosol sprays.", p. 8.2-1.

VOC emission factor of 0.8 lbs/person/year is from EIIP Volume III, Table 8.5-2.

3.4.6 Plastic Parts Coating

EPA support documentation for the surface coating of plastic parts products NESHAP was used to derive NAICS employee HAP emission factors in lbs/employee/year. NAICS employee populations per county were obtained electronically from US Census Bureau websites, and the populations were multiplied by NAICS employee emission factors to obtain emissions. Double counting was eliminated by matching point source emissions to area source SCC's and subtracting out these emissions.

Sources for this category can be separated into four subcategories:

Thermoplastic olefin (TPO) coating

Emissions from coating operations on highly visible automotive olefinic plastics parts such as such as bumper fascias and filler strips, exterior grills, interior door and dash panels, and airbag covers.

Headlamp coating

Emissions from hard, clear coatings used as reflective agents in headlamps, coatings that typically emit high levels of VOCs during the drying process.

Assembled on-road vehicle coating

Emissions from the painting of assembled vehicles such as motor homes & travel trailers, cargo & utility trailers, buses and shuttle buses, and autos and light trucks (for cosmetic reasons or as part of collision repair).

General purpose coatings

Emissions from all plastic parts coating activities except those mentioned above.

An estimated average number of employees per facility was derived using industry total employment from Table 2-4 (Production Costs of Industries Producing Coated Plastic Parts: 1997), and industry number of companies from Table 2-7 (Measurements of Concentration of Industries Manufacturing Coated Plastic Parts: 1997), both located in the EPA Economic Impact Analysis document (EPA-452/R-03-019).

The final VOC emission factor in lbs/employee/yr is the sum of all the HAP emission factors. It is 670 lbs/employee/yr.

3.4.7 Dry Cleaning (petroleum solvents)

Emission estimations for non-perc drycleaning are based on field verification of most dry cleaning facilities in the state, coupled with a mail survey of all dry cleaners. The necessary data was supplied by the Hazardous Waste section in the Land Quality Division at DEQ. The emissions calculation method is a material mass balance. The amount of solvent evaporated to the atmosphere from a facility is equal to the amount of solvent contained in still bottoms produced at the facility in 2002 subtracted from the amount of solvent purchased by that facility in 2002. To increase the accuracy of the emissions estimation, an average of 2001 and 2002 data was used to estimate emissions applied to 2002 because solvent may be purchased in one year and used in the following year.

Emissions were then divided by county population to obtain per capita emission factors. Sources of fugitive emissions from dry cleaning facilities include losses from leaky process equipment, in-plant evaporative losses during clothing transfer and handling, and emissions from distillation units and "muck" cookers.

Total evaporative loss from Stoddard, Exxon DF 2000, and Shell Sol D60 based dry cleaning processes at commercial dry cleaning facilities is included. Emissions from GreenEarth solvent were not considered as the solvent is exempt from environmental regulation. Emissions from RYNEX biodegradable dry cleaning fluid were not considered as the components of this solvent are not considered hazardous under the OSHA Hazard Communication Standard.

3.4.8 Graphic Arts

The emission estimation method for calculation of VOC emissions from graphical art facilities is alternative method #1, Ink Sales Emission Factor Method, from EIIP Vol. III, Ch.7. National ink consumption was allocated to county levels through the use of national and county NAICS employee populations from the US Census Bureau County Business Patterns web site. Uncontrolled emissions were calculated from county ink consumption using the *Component VOC Emission Factors from Graphic Arts Operations* given in Table 7.5-2 (p. 7.5-8).

Alternative method #1 does not include emission factors for screen and digital printing, coinciding with a lack of ink consumption and market share data from NAPIM, data for these categories may be

unknown. Therefore only NAICS 323110 (commercial lithographic), 323111 (commercial gravure), 323112 (commercial flexographic), and 323119 (other commercial – letterpress and engraving) printing types were included for the category (see comments and recommendations section below). NAICS employee data was used to partition the total US ink consumption estimate to OR county ink consumption using:

*(OR county NAICS employees / total US NAICS employees) * (total US ink consumed)*

3.4.9 Asphalt paving

Total cutback and emulsified asphalt used in Oregon was obtained through a survey of asphalt suppliers. VOC emissions were calculated by determining the percentage of diluent used in cutback formulation (25.5 %) and percentage of diluent evaporation (10 %). This follows the general method presented in EIIP Volume III, Chapter 17 *Asphalt Paving*. Chevron supplied solvent percentages within their product, comprising most of the cutback asphalt use in Oregon. Their solvent for cutback preparation is called MC250.

In the emulsified asphalt the % of diluent ranged from 1 to 12% (provided by Chevron) and an evaporation percentage of 100% was used. The equation used from EIIP is shown below.

$$\text{Tons VOC} = \frac{\text{Tons asphalt} * \text{Vol diluent \%} * \text{diluent density} * \text{\% evaporated}}{\text{Density of asphalt}}$$

3.4.10 Asphalt Roofing

This category covers VOC emission from process of Asphalt Roofing. Emissions are generated through the heating of liquid asphalt that is then applied to roofing sheets (Squares) and final surface coating of the roof.

The calculation methodology is from the EIIP Area Source Category Method Abstract - *Asphalt Roofing Kettles*. Total asphalt roofing materials for the State of Oregon was obtained from the Asphalt Roofing Manufacturers Association. The total amount of asphalt used was then apportioned to the county level using a percentage of county NAICS 23561 employee vs. total NAICS 23651 employees. Once the apportionment was made the county asphalt amount could then by multiplied by the VOC emission factor of 6.2 lbs/ton to determine pounds VOC emitted.

3.4.11 Agricultural Pesticide Application

This source category covers the emissions of VOCs from the application of agricultural insecticides herbicides, fungicides and other chemicals. They are applied to protect the crops from insect pests, competition from other growing plants, and the reduction in quality from fungus growth. These chemicals are formulated in many forms such as liquids, powders, or granules and can be "sprinkled" on the ground, applied through spraying devices, or even distributed through the irrigation water. They can also be applied prior to crop planting or at varying times through the growing season.

The VOC emissions are based on the amount of chemicals applied. The chemical usage lists for the given crop are based on an Oregon, California, or national average use of 3-5 states from 1998, 1999 and 2000 as provided by the National Agricultural Statistics Service. These documents supply a per acre application rate of the active ingredient as determined by the undertaken survey. The VOC

emissions are calculated by combining the application rate, a formula from the Emission Inventory Improvement Program, and the acres of each crop harvested. The crop acreage is from the Oregon State University Extension Service, Oregon Agricultural Information Network, Commodity Data Sheets. The EIIP Volume III, chapter 9 formula for estimating emissions from the active ingredient is:

E = R x A x PA x EF

where:

E = emissions from the active ingredient
R = pounds of pesticide applied per year per harvested acre
A = total harvested acres
PA = fraction active ingredient in the pesticide applied
EF = emission factor from Table 9.4-4 based on vapor pressure of active ingredient

Or from the inert ingredients in the pesticide applied:

E = R x A x PI x PVI

where:

E = emissions from inert ingredients
R = pounds of pesticide applied per year per harvested acre
A = total harvested acres
PI = fraction inert ingredient in the pesticide applied
PVI = fraction VOC in the product formulation from Table 9.4-3
Emissions are included in the Misc. Non-industrial solvent uses category.

3.4.12 Consumer Products Usage

The 1999 NEI guidance document included per capita emission factors for the estimation of VOC emissions from consumer products. These emission factors were applied to the county populations. National VOC reduction regulations were adjusted in accordance with 63FR48819 National Volatile Organic Compound Emission Standards for Consumer Products which called for a 20% reduction in VOC emissions. VOC emissions are estimated from:

Personal care items - include hair care products, deodorants, fragrance products, nail care, facial and body treatments, and oral care products.

Household products - include hard surface cleaners, laundry products, fabric and carpet care products, dishwashing products, waxes and polishes, air fresheners, and shoe and leather care products.

Automotive aftermarket products - include detailing products such as waxes and polishes, and maintenance and repair products such as antifreeze and windshield washer fluid.

Adhesive and sealants - include household glues, art and craft adhesives, and sealants such as spackling and caulking compounds.

FIFRA pesticides - include insecticides, fungicides, nematicides, and herbicides. This emission estimate covers all non-agricultural use including anything applied by a commercial company for any of the above conditions.

Miscellaneous category - includes those consumer products that are not covered elsewhere such as art and craft supplies, pressurized food products, and office supplies.

3.5 Fossil Fuel Transport and Storage

3.5.1 Aviation Gas Transport

After loading of a tanker truck covered under the facility's air permit, the second step in fuel distribution is the transport of the gasoline from the tank farm to the retail outlet. As leak proof as the tanker trucks may be there is still a small loss of vapors due to this segment of the distribution.

Total gallons of jet fuel and aviation gas sold during 2002 in the State of Oregon was acquired from Fuel Tax Group at ODOT. Information on the county level was unavailable. Therefore the total gallons were apportioned to the county level by the number of county aircraft landing and take-offs (LTO) which was assumed to be representative of fueling at the county level. The 2002 county LTO's were divided by the State total LTO's to arrive at a percentage. This percentage was then applied to the gallons reported sold by the State Fuels Tax Report (which is considered very reliable information). Fuel availability at airports throughout the State was researched on the AirNav web site: www.airnav.com.

The methodology presented in the EIIP Chapter 11 Gasoline Marketing was followed including the application of the 1.25 gasoline transportation adjustment factor which allows for some fuel to be transported more than once. The final apportioned 1000 gallons per county was then multiplied by the VOC emission factor presented in the EIIP Chapter 11 Gasoline Marketing, Table 11.3-1 to arrive at the total emissions.

3.5.2 Automotive Gasoline Transport

Stage I gasoline marketing also includes the distribution of gasoline to bulk plants and retail outlets via tanker truck. The category includes evaporative loss (fugitive emissions) from gasoline tanker trucks during this segment of the distribution. The alternate method approved by the EIIP is to allot statewide gasoline distribution to the county level using county percentages calculated from gasoline retail sales data taken from the Census of Retail Trade (US Census Bureau). The latest available year for Census of Retail Trade data is 1997, so it was assumed that the county percentages of the state total gasoline sales remained the same for 2002 (at least within the assumed margin of error). County gasoline use was calculated by multiplying 2002 OR gasoline sold (in gallons), reported by the ODOT Fuels Tax Group, by the county percentage determined from the Census of Retail Trade data.

*Emissions = (Gasoline dispensed in region) * (1.25) * (unloaded truck EF + loaded truck EF)*

As 1.25 (the transportation adjustment factor) has been used previously in the throughput, the VOC emission factor = *(unloaded truck EF + loaded truck EF)* = (0.055 + 0.005) = 0.06, where the truck EFs have been taken from Table 11.3-1 in the EIIP.

3.5.3 Stage 1Balanced Submerged Filling

This category includes the filling of gasoline retail outlet (gas station) storage tanks. These tanks are commonly referred to as USTs (underground storage tanks), as virtually all of them are underground. The emissions from this category cover only the release of vapors from the unloading of the gasoline from the tanker truck into the UST. Balanced submerged filling (controlled filling) is the term for filling a UST with a pipe that deposits the new fuel under the surface level of the fuel already in the

tank to minimize the volatilization of the gasoline. It also combines a vapor collection system to collect the existent vapors from entering the atmosphere as they are displaced from the UST. Splash filling (uncontrolled filling) consists of placing the truck's fill line into the tank, turning on the flow and allowing the gasoline to "splash" into the tank. Splash filling occurs with no additional vapor recovery. Most if not all of the stations in the Portland area, at the west end of the Scenic Area, utilize the balanced filling process.

In the inventory domain counties, the alternate method approved by the EIIP is to allot statewide gasoline distribution to the county level using county percentages calculated from gasoline retail sales data taken from the Census of Retail Trade (US Census Bureau). The latest available year for Census of Retail Trade data is 1997, so it was assumed that the county percentages of the state total gasoline sales remained the same for 2002 (at least within the assumed margin of error). County gasoline use was calculated by multiplying 2002 statewide gasoline sold (in gallons), reported by the ODOT Fuels Tax Group, by the county percentage determined from the Census of Retail Trade data.

3.5.4 UST Breathing & Emptying

The emissions from this phase of the distribution process occur between the tank and the dispensing pump. During a 24-hour period, changes in atmospheric conditions (heat and pressure) can cause some of the gasoline to expand, evaporate, and be emitted from the tank, a process called "breathing". Vapors may also be lost through "working", in which escape occurs through tiny leaks in the system as the gas is being drawn from the tank to the fuel pump.

The VOC emission factor for UST breathing and working is 1.0 lb/1000 gallons throughput from EIIP Vol. III, Chapter 11 (2001 update), Table 11.3-1. The throughput is the same amount of gallons as was used for filling the tanks in the previous section.

3.5.5 Marine Vessel Transport

This category covers the emissions from the transport of gasoline in river barges as they travel up the Columbia River from the Port of Portland on the way to Pasco, Washington and pass through the Scenic Area airshed. For tanker transport, the amount of gasoline that was transported up the river was determined from US Army Corps of Engineers' Navigation Data Center, Waterborne Commerce Statistics Center,. The web address is http://www.iwr.usace.army.mil/ndc/wcsc/pdf/wcuspac02.pdf . For barge transport, the amount of gasoline transported upriver was provided by Greg Grunow (DEQ NWR-AQ).

The distance vessels traveled in counties in the Scenic Area was estimated from river mile data and a map of Oregon. The total time vessels spent loaded in the airshed was calculated from an assumption that barges travel inland at approximately 5.8 miles/hr. This is calculated from the time it takes a Tidewater barge to travel to Pasco, Washington; a distance of 223 river miles, taking 32-36 hours. The distance divided by the speed of the barge gives the length of time vessels spent in each airshed.

To calculate the emissions, an AP-42 emission factor for barge transit losses (p 5.2-11) was applied.

$$\textit{transit loss, lb/week} * \textit{1000 gal transported} = 0.1 * P * W$$

Where P = true vapor pressure of the transported liquid (AP-42, Table 7.1-2) = 5.2 @ 60 ºF

W = density of the condensed vapors (lb/gal) = 5.1 @ 60 ºF

VOC emission factor, lb/week 1,000 gal transported = 0.1*5.2*5.1 = 2.65

This emission factor was applied to both barges and tankers. The emission factor was modified to work with the time the barge spends in the airshed area:

VOC emission factors, lb/week * 1000 gal transported * (1 week / 7 days) * (1 day / 24 hours) = 0.016 lb/hr 1000 gal transported

3.6 Waste Disposal, Treatment, and Recovery

This category includes disposal, treatment, recovery and clean-up of solid wastes by incineration and open burning.

3.6.1 Industrial Incineration

Any and all industrial incineration in Oregon is now included in the permitted point source inventory.

3.6.2 Industrial Open Burning

Industrial open burning is prohibited throughout Oregon areas except by special letter permit issued by a Regional Office. As such, this category is considered to have no emissions for the year 2004.

3.6.3 Residential Open Burning

Residential open burning is the on-site burning of waste leaves, landscape refuse, and other refuse or solid waste by Oregon residents on their property. It is inventoried in 3 distinct categories: Yard Waste - Leaf Species (26-10-000-100), Yard Waste - Brush (26-10-000-400), and Residential-Household Waste (26-10-030-000) combusted in a "burn barrel".

3.6.3.1 Yard Waste Burning

Throughout most of Oregon, yard waste burning is allowed. In the tri-county area of Multnomah, Clackamas, and Washington counties, there exists a complete ban on residential open burning inside the Domestic Open Burning Boundary, also known as the Burn Ban Boundary (BBB), except by special hardship permit. This area encompasses the high density residential area within the Portland urban areas. Therefore the population inside this boundary was estimated from GIS mapping data. The ban boundary was overlaid on the census tract information for the 2000 year. All the population tracks that the boundary ran through were simply cut in half to estimate their portion of the population. This population plus that located completely inside this boundary was then subtracted from the 2000 county population. The ratio of this population was then applied to the 2002 county populations to estimate the inventory year population in the burn ban boundary.

In many of the cities in the modeling domain inventory counties there are also burning restrictions in place (including a 3 or 6 mile buffer area depending on population levels) around the urbanized areas. Kevin Downing in the DEQ AQ Program Operations Section provided a summary table of counties,

cities and what type of burning ban or restriction category applied there. The city populations plus 5% of each city population (to account for the people who live in the 3 or 6 mile buffer area) was then removed from the county total if there was a ban in place.

EPA reports an average yearly yard waste generation rate of 0.1 tons/person/year. Not all of this waste is subjected to burning as composting, recycling, or chipping are viable alternatives that are practiced by many people. Therefore, only a certain percentage is assumed to be subjected to burning here in Oregon. According to the EPA, grass clippings make up 50% of the yearly production, and they are assumed to be not burned. The remaining 50% of the generated weight is allocated to leaf burning (25%) and to brush burning (25%) and then the appropriate set of VOC, CO, and NO_x emission factors are applied.

The general equation for the calculation of this category is:

[Population of the county – (restricted populations)] * [yard debris per person generation rate] * [amount subjected to burning] * % of the yard debris that is considered leaves [or brush] * the appropriate set of emission factors.

3.6.3.2 Residential Municipal Waste Burning

This category covers the emissions from the residential open burning of household (municipal) waste. This is any type of waste that would normally be sent to a landfill but in rural areas, where trash collection may be unavailable, it is burned instead. Often it is burned in an old 55 gallon drum. Due to low combustion temperatures and low oxygen levels combustion is almost always incomplete.

Residential municipal waste burning is the only form of residential burning that is prohibited in many places in Oregon. Municipal waste burning is banned in Willamette Valley city areas greater than 1,000 population plus an additional 3 or 6 mile radius. Kevin Downing in the DEQ AQ Program Operations Section provided a summary table of counties, cities and what type of ban or restriction category applied there. The city populations plus 5% of each city population was then removed from the county total. The 5% is an adjustment suggested by Kevin Downing to account for the people who live in the 3 or 6 mile buffer area. Exactly as described in the Yard Waste category, the tri-county areas of Multnomah, Clackamas, and Washington there exists a complete ban on municipal garbage burning.

An Oregon specific waste generation rate was created by using data compiled by the DEQ Land Quality Division and reported in The Oregonian 10/8/99. This rate is 7.2 lbs garbage/person/day generation. It is also reported that on average 2.7 lbs/person/day is recycled or reclaimed. That leaves 4.5 lbs/person/day that is thrown away or 0.825 tons/person/year. In the areas where burning is allowed, this is the starting value of garbage that has the potential to be burned.

Not all of the 0.825 tons/person/year is burned however. The majority is simply thrown away. Therefore there is a correction factor of 32% applied to the activity value to estimate the amount subjected to burning. This value is the high end of a range (25%-32%) suggested for use. This more conservative value was chosen for two reasons. According to the 2000 Census, Oregon ranks 12th in the nation (1 is least dense) for people/sq. mile with 35.6 and many of the rural portions of Oregon have less than 1 person/sq. mile. This suggests a high probability of burning. The second reason for

choosing the higher burn subjected value is to somewhat compensate for the 50% actual burn factor (described next) which under real world scenarios seems low.

The EPA test data reports that by weight only 50% of the garbage burned is actually combusted ["the air emission sampling was stopped when the weight of the garbage pile stopped decreasing although the pile continued to smolder." To account for this finding, there is a 50% factor applied after the 32% reduction above. In the real world, according to direct conversations with a burn barrel user, the remaining garbage smolders for hours. In addition, the next bag of garbage is burned right on top of the previous bag and therefore any leftover material has a second (or third) chance to combust

The emission factors used are from EIIP Vol. 3, Table 16.4-1 (p. 16.4-3) in the Open Burning Chapter.

3.6.4 Publicly Owned Treatment Plants

This category addresses fugitive NH_3 emissions that occur during sewage treatment at municipal water treatment plants. "Off-gasses" may be emitted from the wastewater during different stages of the treatment process, such as screening and solids settlement in open tanks. In addition, Publicly owned Treatment Works (POTWs) utilizing the activated sludge process typically employ aeration tanks, which may also contribute to fugitive emissions.

POTW design flow rates in million gallons per day (MGD) were compiled for each county from data supplied by Judy Johndohl (DEQ WQ-SWM). The NH_3 emission factor was taken from Final 1997 Gridded Ammonia Emission Inventory Update for the South Coast Air Basin 500. County total POTW design flow rates were then multiplied by the emission factors to obtain emissions for each county.

3.6.5 Landfills

This category covers the emissions from Municipal Solid Waste (MSW) Landfills as defined in the 5th edition of AP-42. These fugitive emissions come from the aerobic and anaerobic decay of the waste material. The rate of methane generation is directly related to the material in the landfill, moisture content, and length of time the material has been in the place. Higher cellulose content contribute to higher methane generation rates.

This inventory was based on emissions estimates from the Landfill Gas Emission Model (LandGEM, Version 2.01) for waste in place at the end of 2002. LandGEM provided emission from municipal solid waste based on site specific or default parameters selected for the model runs. The computer model uses a first order decomposition rate equation and estimates annual emissions for the specified year. Actual 2002 emission were taken from AQ permit applications and were compared to the LandGEM output. If emissions were reported as gas-to-flares or sold offsite, the emissions were adjusted downward from the uncontrolled LandGEM emission estimates using the collection efficiency of any LFG collection system. Flare, fugitive, vehicular, and internal combustion emissions included in the permit PSEL were added to the emissions estimate for each landfill. Finally emissions from all landfills were totaled by county.

3.6.6 Agricultural Field Burning

Field burning, by self-sustaining ignition of grass stubble and crop residue, is conducted in-place to prepare land for new growth. Field burning is a significant activity in the Willamette River Valley and in Eastern Oregon. Agricultural field burning can occur on a variety of crop types for different purposes. Three types of burning occur: 1) open field burning, 2) propaning, and 3) stack burning. In open field burning the entire field is set on fire (a type of broadcast burn) in which the straw or stubble is burned in situ. The fires are typically head fires (wind-aided). Backfire burning (against the wind) was not considered for the inventory as backfires are traditionally set to burn buffers between fields that are being head fire burned. For propaning, the straw is mechanically removed (usually by bailing) and a propane burner is pulled behind a tractor to burn the remaining biomass in the field in situ under high temperature. For stack burning, the straw or other crop residue is removed from the field and burned at another location. Field burning activity creates emissions in two phases; active flaming and smoldering. Field burning activity occurs throughout the year but generally occurs either after crop harvest or as part of land preparation for planting.

Field burning activity is regulated by Oregon Administrative Rules (OAR 340, Division 266) in the Willamette valley region of Oregon (from Lane County northward).

The acreage grown for each commodity came from the 1997 Oregon Census of Agriculture. This is the most recent data as this document is published only every 5 years. The covered crops were all types of grass seed, spring and winter wheat, cereal grains, and mint. For Fee Counties it is assumed that the non-grass burning reported as "Cereal Grain" is for Barley, Wheat, or “other grains” and is included in the “Cereal calculations”.

The loading factors are calculated from the 1987 OMNI study information; specifically % of loose straw is from p. 45, while 1.91 tons/acre is from Table 4, p. 23 - “Initial Dry Straw Loading” column.

Open headfire burning = 6.82 tons/acre
Omni study indicates that 1.91 tons per acre are propaned after 72 % of the loose straw is removed.
Therefore calculating in reverse yields the amount there before removal:
(1.91tons/acre)/(1 - 0.72) = 6.82 tons/acre

Propane burning = 0.71 tons/acre
6.82 tons/acre * 72% removed = 4.91 tons/acre removed
6.82-4.91 = 1.91 tons/acre
propaning burns 37% of the leftover straw
1.91 * 0.37 = 0.71

Stack Burning = 4.7 tons/acre
4.91 tons/acre removed
95 % of the pile actually burns
4.91 * 0.95 = 4.7 tons/acre

Because of the impact on adjacent areas from emissions generated by field burning, these activities are restricted and permitted only on days that meet strict meteorological conditions.

3.6.7 Orchard Pruning Burning

This source is concerned with the open burning of agricultural wastes from the annual pruning of orchard crops in Oregon. Typically the pruning takes place after the harvest to prepare the trees for the next growing season. Then the limbs are piled for burning. There is the potential the large limbs are cut up for firewood but it is assumed here that the pruning amounts given in EPA AP-42 are all burned. The amount of prunings associated with the removal of old orchards was not considered for this calculation. Orchard pruning burning is not prohibited by DEQ because it is an agricultural practice (the orchard has to be operating for potential profit; i.e. filed tax form for farm gain/loss).

The 2002 crop acreage was downloaded from the Oregon State University Extension Service, Oregon Agricultural Information Network Databases at *http://ludwig.arec.orst.edu/oain/SignIn.asp*. The amounts of prunings per commodity in each county were estimated by multiplying the harvested acres by an AP-42 loading factor from Table 2.5-5 in the 5th edition. The tons of prunings burned were then multiplied by pollutant specific emission factors to estimate the amount of each pollutant. The emission factors are from EPA AP-42, section 2.5, page 10, Table 2.5-5 and rated 'D'.

Orchard pruning is regulated by applicable OAR 340-264-0030 (2-4) and 340-264-0120 (2), 340-264-0130 (2), 340-264-0140 (2). The activity is allowed on any day.

3.6.8 Orchard Heating

This area source category covers the emissions from fuel oil and propane driven heaters that are placed among orchards to provide protection from frost damage during the vulnerable bud stages that occur from late February through the first or second week of May. These heaters have historically been run on diesel fuel and the majority are still. There is an increasing trend though, toward the use of propane as an alternate source of fuel. The propane heaters are fed by a common supply line connected to a large on-site tank. These heaters are proving to be more efficient than the old diesel heaters and their use may be on the rise. Also a new development is the supplemental use of wind machines or irrigation to prevent damage to the buds. These methods can be used alone or in conjunction with the fuel heaters. When they are used they drastically reduce the number of heaters burning.

The most important component of the emission equation is the number of frost protection days that occur during the aforementioned period. These are the days or nights when the temperature drops below a certain point and the heaters are lit to prevent frost damage to the buds. The tricky part is that cherries, pears, and apples have different critical temperatures between them and even variable critical temperatures among different types of the same fruit. The critical temperatures for the stages of bud development also vary by as much as 13 ˚F from the separation of the scales until post bloom. For these reasons a temperature of 30˚ F was chosen as the highest temperature at which damage is known to occur. All days from February through May with temperatures less 30 ˚F were considered to be an orchard heating day.

The number of heating hours is estimated as an average of 4 hours for each day necessary. The fuel consumption rate of each heater type is from the Bear Creek Orchards (Medford) data. With or without the supplemental methods, the diesel heaters burn an average of 1 gallon of fuel per hour. On the "low" setting they use 0.5 gallon and can, if necessary, burn very hot at 1.5 gallons per hour. Similarly, the propane heaters typically burn 0.5 gallon per hour. The emissions are then calculated from the number of gallons of fuel burned over the season and the emission factor (from FIRE 6.2).

County orchard acreage is from Oregon State University Extension Service, Oregon Agricultural Information Network, Commodity Data Sheets web site http://ludwig.arec.orst.edu/oain/SignIn.asp. The acres of vineyards were included in the acreage because there are times when they need to be heated as well for the same purpose.

3.6.9 Structure Fires

Emission calculations for structure fires include both combustible structural materials and combustible building contents. Both commercial structures (hotels, motels, bed and breakfasts, room and boarding houses, public recreation, education, health care, business and office, basic utility and agriculture, manufacturing, storage and other non-residential occupancies) and residential structures (one and two family dwellings, mobile/manufactured homes, duplexes, and apartments with any number of units) are included in the inventory.

All data supplied by the State Fire Marshal's office, Data Services Section (Linda Palmer), which reported the number of fires, assigned fire type (commercial or structural), and a building size code and range for each fire. A weighted average structure size was then calculated for each county, and this structure size was assigned to structure fires for which the structure size was unavailable. Structure size was not available for approximately 20% of the structure fires in the data supplied by the Fire Marshal's Office. Therefore, a weighted average structure size was calculated for each county, and this structure size was assigned to structure fires in that county for which the structure size was unavailable. Fuel loading was determined using combustible structural materials and building contents calculated in turn using structure size. Individual fuel loadings were multiplied by the number of corresponding fires to yield fuel burned. Fuel burned was then summed for each county, and county fuel burned was multiplied by the emission factors found in the EIIP Table 18.4-1 (Emission Factors for Structure Fires).

3.6.10 Prescribed Burning

This category provides the emissions from all documented prescribed (managed) burning occurring by county in Oregon during 2004. The category encompasses fires that require a permit and are set for the purpose of undergrowth/brush control and/or wildlife enhancement. Prescribed fires include the burning of piled slash after logging operations, broadcast burning (burning without an overstory of trees), and underburning (burning with an overstory of trees). The tons burned per county for the fires is obtained from The Oregon Dept. of Forestry (ODF) and multiplied by criteria emission factors in lbs/ton.

3.6.11 Wildfires

The category covers the emissions from accidental or naturally started fires occurring in forests, shrublands, grasslands, etc. It does not include managed (prescribed) burns of any type. Wildfires occurring within a forest typically burn the crowns of trees in addition to the understory, whereas prescribed fires are set in a forest environment to burn off the understory and underbrush only.

Wildfire acreage burned by county gathered from the Northwest Interagency Coordination Center (NWICC) (Mike Fitzpatrick at (503) 808-2733) was multiplied by a wildfire fuel loading factor in tons/acre burned. The resulting tons fuel burned was then multiplied by criteria, emission factors to obtain emission estimates. Forest or grassland fuel loading factors were assigned to counties on the

recommendation of Mike Ziolko (ODF) due to the scarcity and variability of specific fire fuel loading data.

3.7: NONROAD MOBILE SOURCES

3.7.1 INTRODUCTION AND SCOPE

For the Scenic Area inventory domain, non-road mobile emission source categories inventoried include gasoline, compressed natural gas (CNG), liquefied petroleum gas (LPG), and diesel-powered vehicles and equipment, as well as commercial and recreational waterborne vessels, aircraft, and railroads.

3.7.2 NONROAD VEHICLES AND EQUIPMENT

Emissions for nonroad vehicles and equipment were modeled using the EPA Nonroad Emissions Model (Draft 2004 NONROAD model), downloaded from *http://www.epa.gov/otaq/models/nrpreview*. The model was used to generate CO, NO_X, PM_{10}, $PM_{2.5}$, SO_X and VOC emissions from all 2-stroke, 4-stroke, diesel, CNG, and LPG nonroad vehicles and equipment except marine vessels, aircraft, and railroad equipment. Model inputs included parameters for temperature, fuel, time period, inventory area, and emission sources. The model generated emissions data for both an annual period and a typical ozone season day depending upon input parameters selected.

3.7.2.1 NONROAD Model Scenario Inputs

3.7.2.1.1 Temperature

Average, average high, and average low temperature values were downloaded from the NOAA National Climatic Data Center website. The data was imported into an MS Access database and temperatures were allocated to counties using a weather station to county cross table. County-wide average, average maximum, and average minimum temperatures were annually and seasonally calculated using the database.

3.7.2.1.2 Period

The model interface contains a series of select buttons within the period screen, including:

Period – defines the modeling period as annual, monthly, or seasonal. Period input was set to seasonal for the typical day emissions.

Month – if the period is set to monthly, the appropriate month of the year may be selected. The month setting was NA for both annual and typical day modeling runs.

Season – if the modeling period is set to seasonal, the appropriate season may be selected. Summer season months were set to June, July, and August (from the NONROAD documentation, EPA report number NR-004a)[543]. The season selection was NA for the annual model runs.

Type – For any period selected, emissions may be estimated as the total for a 24 hour period (typical day), or for the period total. Typical day was selected for the seasonal runs.

Day – If the typical day is selected for type, weekday or weekend day may be selected. The weekday option was selected for typical day modeling.

Year – The specific year is entered (2004).

3.7.2.1.3 Fuel Parameters

Fuel parameter model inputs used for typical summer day runs as outlined in the table below:

2004 Columbia River Gorge National Scenic Area Air Quality Study: NONROAD2005 Model Run Inputs: Summertime Runs Summer runs June-September.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
	Baseline	Fuel O2	Fuel	-------- Fuel Sulfur Wt% --------			Stage II	----- Temperature, F -----		
County	Fuel RVP	wt%	RVP	Gasoline	Diesel	CNG/LPG	Control	Avg High	Avg Low	Avg
Benton	9.3 (a)	1.03%	10.3	0.0121	0.2283	0.0123	0%	78.38	51.35	64.90
Clackamas	8.3 (a)	1.03%	9.3	0.0121	0.2283	0.0123	93%	75.03	52.45	63.77
Clatsop	9.3 (a)	1.03%	10.3	0.0121	0.2283	0.0123	0%	68.04	53.37	60.73
Columbia	9.3 (a)	1.03%	10.3	0.0121	0.2283	0.0123	0%	76.74	50.21	63.24
Crook	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	81.10	42.95	62.06
Deschutes	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	77.85	42.97	60.44
Gilliam	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	82.18	55.09	68.68
Grant	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	81.73	45.65	63.54
Hood River	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	78.68	50.54	64.64
Jefferson	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	80.01	45.52	62.81
Lane	9.3 (a)	1.03%	10.3	0.0121	0.2283	0.0123	0%	78.29	51.10	64.72
Lincoln	9.3 (a)	1.03%	10.3	0.0121	0.2283	0.0123	0%	68.30	52.61	60.49
Linn	9.3 (a)	1.03%	10.3	0.0121	0.2283	0.0123	0%	76.98	48.43	62.73
Marion	8.7 (b)	1.03%	9.7	0.0121	0.2283	0.0123	0%	77.83	53.39	65.64
Morrow	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	83.93	55.11	69.54
Multnomah	8.3 (a)	1.03%	9.3	0.0121	0.2283	0.0123	93%	78.38	56.14	67.50
Polk	8.4 (b)	1.03%	9.4	0.0121	0.2283	0.0123	0%	73.86	50.33	62.12
Sherman	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	79.76	51.09	65.45
Tillamook	9.3 (a)	1.03%	10.3	0.0121	0.2283	0.0123	0%	68.88	51.43	60.16
Umatilla	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	83.76	54.84	69.32
Wasco	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	84.18	51.48	67.85
Washington	8.3 (a)	1.03%	9.3	0.0121	0.2283	0.0123	93%	81.74	53.51	67.65
Wheeler	9.3 (a)	1.03%	10.3	0.0160	0.2283	0.0123	0%	79.39	49.49	64.46
Yamhill	9.3 (a)	1.03%	10.3	0.0121	0.2283	0.0123	0%	79.70	52.48	66.13

Notes:

(1) ASTM terminal limits for 1997, before EtOH addition (ref. 523). These are assumed to remain unchanged for 2004.

(a) Weighted Average of June through September.

cont'd

(b) Marion & Polk Co. RVP calculations:

County/SKATS Population Ratios

Area	(1) RVP	Population Ratio	
SKATS: Polk Co.	8.3	0.88	(2)
SKATS: Marion Co.	8.3	0.58	(2)
remainder Polk Co.	9.3	0.12	(3)
remainder Marion Co.	9.3	0.42	(3)

(1) From ref. 523. Average of June - September.
(2) From the 1999 OR Statewide HAP EI, p. 18, footnote 4. (ref 530)
(3) 1 - (county SKATS ratio)

Polk Co. RVP = (SKATS Polk Co. RVP * SKATS Polk Co. Population Ratio) + (remainder Polk Co. RVP * remainder Polk Co. Population Ratio)
= (8.3 * 0.88) + (9.3 * 0.12) = 8.4

Marion Co. RVP = (SKATS Marion Co. RVP * SKATS Marion Co. Population Ratio) + (remainder Marion Co. RVP * remainder Marion Co. Population Ratio)
= (8.3 * 0.58) + (9.3 * 0.42) = 8.7

(2) DEQ estimates that 10% EtOH by volume is blended into gasoline year round for 30% of the total gasoline market in Oregon, equaling 3% EtOH by volume (ref. 580a).
Gasoline oxygen wt% = 0.3448 * volume % EtOH (ref. 574, p. 167)
Gas O2 wt% = (0.3448) * (0.03) = 1.03%

(3) From Note 2, the Vol % EtOH blended annually = 3.0%.
Seasonal fuel RVP = (baseline fuel RVP) + (RVP increase caused by 3.0 Vol % EtOH blended).
A conservative estimate of fuel RVP increase due to 3.0 vol % EtOH blended and a terminal RVP of 9 is 1 RVP.
This conservative estimate is based on ref. 580c, Figure 3, p. 32, and ref. 580b, figure on p. 21.

(4) MOBILE6.2 gasoline sulfur defaults (ref. 610). The numbers are averages, and account for Tier 2 requirements.

	-------2004-------	
County	ppm	wt%
Western OR	121	0.0121
Eastern OR	160	0.0160

(wt% = ppm/10,000)

(5) Diesel sulfur inputs from the NONROAD model runs EPA used to develop the 2004 Nonroad Diesel Engine Final Rule (ref. 602).

(6) Estimated by Ron Brunner, Gas Processors Association (ref. 512). This is a conservative estimate, based on maximum sulfur allowable in HD5 propane rated for engine use.

(7) Estimated by Kevin McCrann (ref. 492 and 611). Kevin estimates that Stage II phase-out will begin sometime around 2008 (ref. 611).
Stage II control applicable to tri-county area only (OAR 340-242-0520).

(8) 2002 temperatures are from Ei_Files:\Temperature Data\2004TempData.mdb
The temperature data in the database was downloaded from *http://ols.ncdc.noaa.gov/cgi-bin/nndc/gensub.cgi* (NOAA Data Centers, National Climatic data Center).
A station-county cross table was also downloaded to accurately allocate temperatures to county.
Temperatures are a four month (June, July, August, September) average.

Fuel parameter model inputs used for typical winter day runs are outlined in the table below:

2004 Columbia River Gorge National Scenic Area Air Quality Study: NONROAD2005 Model Run Inputs: Wintertime Runs Winter Runs: October - May

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)		
	Baseline	Fuel O2	Fuel	-------- Fuel Sulfur Wt% --------			Stage II	----- Temperature, F -----		
County	Fuel RVP	wt%	RVP	Gasoline	Diesel	CNG/LPG	Control	Avg High	Avg Low	Avg
Benton	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	56.23	38.79	47.54
Clackamas	13.7	2.20% (a)	13.7	0.0121	0.2283	0.0123	93%	53.75	38.38	46.09
Clatsop	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	55.34	41.28	48.34
Columbia	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	55.85	36.41	46.13
Crook	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	52.72	27.38	40.08
Deschutes	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	51.52	27.02	39.30
Gilliam	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	54.09	34.94	44.54
Grant	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	53.08	28.00	40.34
Hood River	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	54.76	34.66	44.73
Jefferson	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	53.62	30.98	42.33
Lane	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	57.10	39.02	48.06
Lincoln	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	56.13	41.91	49.04
Linn	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	53.97	35.74	44.89
Marion	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	55.79	39.76	47.80
Morrow	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	55.79	34.96	45.40
Multnomah	13.7	2.20% (a)	13.7	0.0121	0.2283	0.0123	93%	56.64	41.64	49.17
Polk	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	53.24	37.47	45.37
Sherman	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	52.16	32.88	42.55
Tillamook	13.7	1.03% (b)	13.7	0.0121	0.2283	0.0123	0%	56.84	41.14	49.02
Umatilla	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	55.58	35.04	45.34
Wasco	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	56.68	32.99	44.87
Washington	13.7	2.20% (a)	13.7	0.0121	0.2283	0.0123	93%	58.18	38.62	48.41
Wheeler	13.5	1.03% (b)	13.5	0.0160	0.2283	0.0123	0%	54.71	33.97	44.36
Yamhill	13.7	2.20% (a)	13.7	0.0121	0.2283	0.0123	0%	56.99	39.08	48.05

Notes:

(1) ASTM terminal limits for 1997, before EtOH addition (ref. 523). These are assumed to remain unchanged for 2004. Weighted Average of October through May.

(2) (a) Oxygen weight percent for Multnomah, Clackamas, Washington, & Yamhill counties estimated using the following rules: OAR 340-204-0090: Oxygenated gasoline control areas are Washington, Multnomah, Clackamas, & Yamhill counties until Oct. 31, 2007.

cont'd

OAR 340-258-0110 (2): Oxygenated fuel requirements applicable from November 1 through February 29.
OAR 340-258-0142 (2c): Oxygenated fuel shall have an average O2 content of 2.7% by weight per gallon, however
DEQ staff estimate that the average 02 content of gasoline sold during the CO season in the Tri-County area is 3.4 wt% (ref. 580d).
DEQ estimates that 10% EtOH by volume is blended into gasoline year round for 30% of the total gasoline market in Oregon, equaling 3% EtOH by volume (ref. 580a).
Gasoline oxygen wt% = 0.3448 * volume % EtOH (ref. 574, p. 167)
Gas O2 wt% = (0.3448) * (0.03) = 1.03%
Gasoline O2 wt% = (CO season days/wintertime days * 3.4%) + (non-CO season days/wintertime days * 1.03%)
= ((120/243)*0.034) + ((123/243)*0.0103) = 2.20%

(b) DEQ estimates that 10% EtOH by volume is blended into gasoline year round for 30% of the total gasoline market in Oregon, equaling 3% EtOH by volume (ref. 580a).
Gasoline oxygen wt% = 0.3448 * volume % EtOH (ref. 574, p. 167)
Gas O2 wt% = (0.3448) * (0.03) = 1.03%

(3) Baseline fuel RVP of greater than 10.5 is not affected by the addition of EtOH. This is a conservative estimate based on ref. 580c, Figure 3, p. 32, and ref. 580b, figure on p. 21.

(4) MOBILE6.2 gasoline sulfur defaults (ref. 610). The numbers are averages, and account for Tier 2 requirements.

	-------2004-------	
County	ppm	wt%
Western OR	121	0.0121
Eastern OR	160	0.0160

(wt% = ppm/10,000)

(5) Diesel sulfur inputs from the NONROAD model runs EPA used to develop the 2004 Nonroad Diesel Engine Final Rule (ref. 602).

(6) Estimated by Ron Brunner, Gas Processors Association (ref. 512). This is a conservative estimate, based on maximum sulfur allowable in HD5 propane rated for engine use.

(7) Estimated by Kevin McCrann (ref. 492 and 611). Kevin estimates that Stage II phase-out will begin sometime around 2008 (ref. 611).
Stage II control applicable to tri-county area only (OAR 340-242-0520).

(8) 2002 temperatures are from Ei_Files:\Temperature Data\2004TempData.mdb
The temperature data in the database was downloaded from *http://ols.ncdc.noaa.gov/cgi-bin/nndc/gensub.cgi* (NOAA Data Centers, National Climatic data Center).
A station-county cross table was also downloaded to accurately allocate temperatures to county.
Temperatures are an eight month (October through May) average.

3.7.2.1.4 Equipment Categories

Equipment categories (segments) selected as NONROAD model inputs include the following engine classifications:

22-60: 2-Stroke Gasoline
22-65: 4-Stroke Gasoline
22-67: Liquid Petroleum Gas (LPG)
22-68: Compressed Natural Gas (CNG)
22-70: Diesel

Emissions from aircraft and locomotives were not generated by the model, and marine vessel emissions generated by the model were not used. Emissions details for these source types are included in later sections of this document.

3.7.2.1.5 Region

The county option was selected for model runs. Counties were run individually to retain temperature and fuel parameter data accuracy.

3.7.2.1.6 Model Output

The model reporting utility segregates output from the general categories above into specific vehicles and equipment, some examples of which are given below:

22-XX-001 (*Recreational)*: All Terrain Vehicles (ATV's), Mini-bikes, Off-Road Motorcycles, Golf Carts, Snowmobiles, Specialty Vehicle Carts

22-XX-002 (*Construction)*: Asphalt Pavers, Tampers/Rammers, Plate Compactors, Concrete Pavers, Rollers, Scrapers, Paving Equipment, Surfacing Equipment, Signal Boards, Trenchers, Bore/Drill Rigs, Excavators, Concrete/Industrial Saws, Cement and Mortar Mixers, Cranes, Graders, Off-Highway Trucks, Crushing/Proc. Equip., Rough Terrain Forklifts, Rubber Tired Loaders, Rubber Tired Dozers, Tractors/Loaders/Backhoes, Crawlers, Skid Steer Loaders, Off-Highway Tractors, Dumpers/Tenders, Other Construction Equipment

22-XX-003 (*Industrial)*: Aerial Lifts, Forklifts, Sweepers/Scrubbers, Other General Industrial Equipment, Other Material Handling Equipment

22-XX-004 (*Lawn & Garden)*: Trimmers/Edgers/Brush Cutters, Lawn Mowers, Leaf Blowers/Vacuums, Rear Engine Riding, Mowers, Front Mowers, Chainsaw < 4 HP, Shredder <5 HP, Tillers < 5 HP, Lawn & Garden Tractors, Wood Splitters, Snowblowers, Chippers/Stump Grinders, Commercial Turf Equipment, Other Lawn & Garden Equipment

22-XX-005 (*Agricultural)*: 2-Wheel Tractors, Agricultural Tractors, Agricultural Mowers, Combines, Sprayers, Balers, Tillers >5 HP, Swathers, Hydropower Units, Other Agricultural Equipment

22-XX-006 (*Light Commercial)*: Generator Sets, Pumps, Air Compressors, Gas Compressors, Welders, Pressure Washers

22-XX-007 (*Logging)*: Chainsaws >4 HP, Shredders >5 HP, Skidders, Fellers/Bunchers

3.7.2 AIRCRAFT, AIRCRAFT REFUELING, AND AIRPORT GROUND SUPPORT EQUIPMENT (GSE)

3.7.2.1 Aircraft LTO

Airports that are located within the inventory domain counties were inventoried. The methodology followed guidelines established in the EPA's *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources,*1992 and 1999 NEI (National Emission Inventory) *Documentation for the 1999 Base Year Aircraft, Commercial Marine Vessel, and Locomotion National Emission Inventory for Criteria and Hazardous Air Pollutants*, 2001. The activity level used to estimate emissions was the number of landing and takeoff (LTO) cycles made by aircraft, with activity considered to be uniform throughout the year.

Annual aircraft emissions and airport GSE emissions data for Portland International Airport, Troutdale Airport, and Hillsboro Airport were obtained from the Aviation Division of the Port of Portland (POP). This data was thoroughly reviewed by DEQ Planning and Technical Services staff. In consultation with the POP, DEQ has incorporated POP activity and emissions estimates into this emission inventory. DEQ believes that the POP data, which is based on locally derived activity and operational aspects, is more accurate than DEQ estimates generated through EPA methodology.

3.7.2.2 Aviation Gas UST Filling

The emissions from the filling of storage tanks at airports begin with using the gallons of fuel transported from the transport calculation section. The VOC emission factor was calculated based on the AP-42 equation on page, 5.2-7:

$$L\ EF = 12.46 * (SPM)/T * (1-eff/100)$$

Where S = Saturation Factor
M = Molecular Weight of Vapors, lb/lb-mole
T = Temperature of Bulk Liquid Loaded (Degrees R. = Degrees F + 460)
Average temperature for the State assumed to be 52.4 ºF.

This category is tracked under SCC 22-75-900-201 Mobile Sources-Aircraft-Refueling: All Fuels-Underground Tank: Total

3.7.2.3 Aviation Gas UST Breathing and Working

This source category accounts for the activity of breathing and working loss of underground storage tanks (USTs) for the storage of aviation fuel. This stage of the process covers any evaporation emissions occurring that the UST has due to temperature changes and any loss from the tank. The 2002 Aviation Fuel distribution throughput for refueling of aircraft was derived from an apportionment to the county level of Jet Fuel and Aviation Gas sold in Oregon in 2002. This apportionment used the 2002 county LTO's divided by the State total LTO's to derive a county percentage that was then applied to the State totals reported from the Fuels Tax Group.

The VOC emission factor was calculated based on the EIIP Chapter 11 Gasoline Marketing, Table 11.3-1. The emission factors presented were modified to represent jet fuel and aviation gas by multiplying the fuel type Reid Vapor Pressure (RVP) divided by the EPA standard gasoline RVP. This category is tracked under 22-75-900-201.

3.7.2.4 Aircraft Refueling

This source category accounts for the activity of refueling aircraft. This stage of the process covers evaporative emissions from transfer of fuel between the underground storage tank and fuel tanks on the aircraft.

The VOC emission factor is calculated based on AP-42 Chapter 5.2 Transport and Marketing of Petroleum Liquids, Table 5.2-7. The emission factors were modified to represent jet fuel and aviation gas by multiplying the fuel type Reid Vapor Pressure (RVP) divided by the EPA standard gasoline RVP.

This category is tracked under SCC 22-75-900-101 Mobile Sources-Aircraft-Refueling: All Fuels-Displacement Loss/Uncontrolled.

3.7.2.5 Aircraft Ground Support Equipment (GSE)

Ground Support Equipment emissions data for Portland International Airport, Troutdale Airport, and Hillsboro Airport were obtained from the Aviation Division of the Port Of Portland (POP). This data was thoroughly reviewed by DEQ Planning and Technical Services staff. In consultation with the POP, DEQ has incorporated POP activity and emissions estimates into this emission inventory. DEQ believes that the POP data, which is based on locally derived activity and operational aspects, is more accurate than DEQ estimates generated through EPA methodology. The remaining counties were calculated with the NONROAD model.

3.7.3 MARINE VESSELS

Emissions for waterborne vessels are grouped as commercial or recreational. Annual commercial and recreational marine vessel emissions were taken from the 2002 OR HAP EI.

3.7.3.1 Commercial Marine Vessels (CMV)

Columbia River marine vessel emissions for the inventory domain counties in Oregon were estimated by SWCAA to avoid the potential of double counting the emissions.

3.7.3.2 Commercial Marine – Barges

Columbia River barge emissions for the inventory domain counties in Oregon were estimated by SWCAA to avoid the potential of double counting the emissions.

3.7.3.3 Recreational Marine Vessels (RMV)

The RMV category includes watercraft and vessels with two-cycle gasoline, four-cycle gasoline, and diesel engines. Activity data in the form of boating use days was taken from *2002 Oregon Recreational Boating Survey*. This survey covers all sizes and types of RMV, from large sail boats and cruisers, to skiffs, drift boats, jet boats and personal watercraft. Boating use days were allocated to RMV engine type and converted to boating hours from data in the Oregon Motorized Boat Survey – 2001.

Emission factors in lbs/hour were back-calculated from the California Air Resources Board document *Public Meeting to Consider Approval of California's Pleasure Craft Exhaust Emissions Inventory*.

Emissions estimates were calculated using the formula:

*Emissions, tpy = (Annual Boating Hours) * (EF, lbs/hr) / (2000 lbs/ton)*

3.7.4 RAILROADS

This category includes emissions from both line-haul (road) and yard (switching) locomotives. Railroad maintenance equipment, such as equipment used for track repair, was not covered in the category.

Railroad county fuel consumption for both line-haul and yard locomotives was obtained from Burlington Northern Santa Fe (BNSF), Union Pacific (UP), and Amtrak. Smaller railroads operating in the tri-county area include the Peninsula Terminal, Portland Terminal, Port of Tillamook Bay, and Portland & Western railroads. When fuel consumption could not be obtained from these carriers, it was estimated using information such as system maps, engine type, and schedules obtained from either the railroad or through the internet.

Emission factors from the EPA document Emission Factors for Locomotives were used to estimate emissions. Emissions estimates were calculated using the formula:

Emissions, tpy = (Annual Fuel Consumption, gallons) x (Emission Factors, lbs/gallon) / (2000 lbs/ton)

DEQ Tables:

Gorge Project 2004 Point Source Estimated Emissions Including CAFOs: Oregon

	tpy emissions						
County	CO	NH3	NO2	PM10	PM25	SO2	VOC
BENTON	133.7	120.7	108.8	13.8	9.0	3.3	63.8
CLACKAMAS	147.8	191.1	1,120.1	159.0	28.2	523.3	472.9
CLATSOP	2,161.1	58.3	1,241.9	372.0	82.6	879.9	448.5
COLUMBIA	7,744.3	53.6	1,741.8	490.6	67.5	1,642.9	2,957.0
CROOK	0.4	0.0	1.8	8.0		0.05	156.9
DESCHUTES	156.7	44.7	167.2	5.2	5.2	2.2	16.7
GILLIAM	82.7	7.3	4.0	24.5	0.1	1.0	39.1
GRANT	119.7	11.9	210.8	101.1	45.3	9.1	168.3
HOOD RIVER	0	6.0	0	0.7	0.6	0	3.9
JEFFERSON	38.3	38.0	67.0	11.9		1.1	331.2
LANE		158.8					44.8
LINCOLN	2,402.6	4.3	970.1	709.8	19.3	434.0	885.9
LINN	7,222.9	323.1	1,353.9	1,187.2	163.5	1,822.9	1,517.7
MARION	26.0	1,164.1	300.1	15.9	2.8	6.2	492.2
MORROW	731.4	2,766.9	8,300.2	774.2	527.7	12,399.1	1,118.1
MULTNOMAH	676.6	10.4	934.2	559.4	159.9	243.5	1,607.4
POLK	9.0	230.1	3.9	14.1	1.3	0.1	327.2
SHERMAN	160.5	12.2	124.8	5.8		2.5	10.9
TILLAMOOK	406.6	1,324.5	77.8	240.3	16.1	43.9	505.1
UMATILLA	208.4	1,281.7	537.3	165.3	18.2	61.2	571.1
WASCO	4.2	17.1	14.1	14.0	7.8	0.5	22.8
WASHINGTON	259.9	220.2	215.5	166.6	14.0	18.4	541.1
WHEELER		3.4					1.9
YAMHILL	1,925.9	488.2	2,050.2	163.9	30.7	569.0	482.3
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Total	**24,618.4**	**8,536.7**	**19,545.3**	**5,203.5**	**1,199.8**	**18,664.0**	**12,786.9**

Gorge Project 2004 Point Source Estimated Emissions: Oregon

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
BENTON								
51	SOAP CREEK VILLAGE HORSE BOARDING		0.1					0.0
22173	Evanite Fiber Corporation	26.6		31.7	6.7	6.0	0.5	1.7
22298	Oregon State University	19.8		24.1	0.7		0.4	1.3
29502	Valley Landfills, Inc.	12.2		1.1	3.1		0.5	13.9
29503	Power Resources Cooperative	75.0		51.9	3.3	2.9	1.8	9.4
62666	DAVIS, LEIGHTON & SON		10.8					3.4
62671	DRAHNACRES FARM		2.4					0.4
62677	VAN BEEK DAIRY FARMS		45.1					14.1
62688	OSU DAIRY		8.6					2.7
63017	SILVER DOME FARMS		9.3					2.9
63855	GUERBER 4R RANCH		0.2					0.1
63866	O S U SWINE CENTER		0.2					0.0
63942	ROSENAST DAIRY		16.0					5.0
127408	ALSEA ACRE ALPINES		0.1					0.0
153096	PLATT'S OAK HILL DAIRY		13.9					4.3
158552	GOURLEY FAMILY FARMS		0.3					0.1
159776	HURTGEN-VUE DAIRY		13.7					4.3
CLACKAMAS								
44	C BAR J QUARTERHORSES		0.1					0.0
53	TALLENT, KEN		0.0					0.0
30003	S.R. Smith, Inc.				0.0			13.0
30004	Fred Meyer, Inc.	1.7		2.0				36.5
30017	Shaw's Fiberglass and Plastics, Inc.							8.1
31791	RSG Forest Products	2.4		1.0	12.7	11.4		1.0
31850	Blue Heron Paper Company	37.6		348.2	69.1		6.4	201.1
32145	West Linn Paper Company	35.5		448.8	58.8		515.9	22.5
32533	Interfor Pacific, Inc.	0.0		0.0	7.5	6.7	0.0	20.4
32631	Eagle Foundry Co.			1.7	9.2	8.3		26.5
32727	McClure Industries, Inc.							6.6
32729	Northwest Pipeline Corporation	69.8	2.7	317.4	1.8	1.8	1.0	10.9
32754	Safeway, Inc.	0.7		0.9				50.9
32777	Miles Fiberglass & Plastics, Inc.							10.5
32778	Miles Fiberglass & Plastics, Inc.							9.9
62673	HOODVIEW DAIRY LLC		8.0					2.5
62689	ALBER FARM		3.1					1.0
62715	BARLOW TRAIL DAIRY		8.6					2.7
62718	BARLOW TRAIL HEIFER FARM		9.3					2.9
62719	BENNETT'S ACRES		2.4					0.7
62720	BRINKMAN'S DAIRY INC		10.8					3.4
62721	CLOUD CAP FARMS		12.3					3.9
62723	FALLEN OAK JERSEYS		4.7					1.5
62726	GRASSY ACRES		1.0					0.3
62727	CASCADIA FARM		4.4					1.4
62729	MARK HESS FARMS		4.7					1.5
62731	IDYLWILD FARM INC		17.0					5.3
62732	LAZY H DAIRY		1.8					0.5
62741	POLACK, ROBERT & ELEANOR		1.5					0.5
62743	SCHAEFER, JOE		2.2					0.7
62747	STAEHELY BROTHERS		15.5					4.8
62754	WIL-VIEW FARMS		20.4					6.4
62757	KASER, RAYMOND		11.3					2.1

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
62758	SWARTOUT, RICHARD		0.5					0.1
62760	PETERSON, HARLEN J		0.2					0.1
63104	BREMER'S DAIRY		5.6					1.7
63685	BISCHOF, DON		17.6					3.2
66030	PERRIN FARMS		7.7					2.4
137878	LADY-LANE FARMS (ALBERS)		3.7					1.2
138508	MCNULTY, JACK P		1.0					0.3
147223	CRAMER'S GREEN ACRES		0.2					0.1
156663	LADY-LANE FARMS #2		4.1					1.3
156884	AAMODT DAIRY INC		8.0					2.5
157725	TMK FARM		0.7					0.2
CLATSOP								
40004	Fort James Operating Company	2,018.3	3.9	1,178.5	252.1	64.8	878.1	362.7
40041	Weyerhaeuser Company	142.7	2.5	63.4	119.9	17.8	1.8	69.6
62769	ALDER HILL FARM INC		0.1					0.1
62775	KELLY, DAN M		1.9					0.6
62776	MIDOAKS JERSEY FARM		3.1					1.0
62779	LEE, RICHARD H		8.8					2.7
62780	MILLER, GARY D		8.0					2.5
62781	ROHNE'S LONG ISLAND DAIRY		8.6					2.7
62782	SEPPA DAIRY CO		5.2					1.6
62784	WEAVER, HAROLD L		10.8					3.4
66609	WAIT DAIRY		2.1					0.7
157158	GARY MILLER FARM		3.3					1.0
COLUMBIA								
50014	Longview Fibre Company				10.2	9.2		
50016	RSG Forest Products, Inc.				7.3	6.6		0.7
51849	Boise White Paper, LLC	7,530.0	5.3	1,418.1	398.5	43.5	1,636.4	2,831.6
52085	Armstrong World Industries Inc.	148.0		20.2	59.8		0.1	63.6
52367	Northwest Aggregates Co.				9.2	8.3		
52520	Portland General Electric Company	56.3	8.5	295.1	5.6	0.0	6.4	41.4
52581	Northwest Natural Gas Company	9.9		8.4				6.5
62792	ARBOR ROSE FARM		16.8					5.3
62793	DUTCH CANYON DAIRY		0.6					0.3
62795	ELLIS, LOREN JR & SONS		15.6					4.9
62803	LOOSLEA HOLSTEINS		2.2					1.3
62875	WINANS, ROSS OR PATRICIA		4.6					1.4
CROOK								
6	BONNIEVIEW RANCH		0.0					0.0
9	COX		0.0					0.0
12	DENNIS & PAT WISBY		0.0					0.0
26	MCCORMACK RANCH		0.0					0.0
34	RYE GRASS FARMS		0.0					0.0
35	SANTUCCI RANCH		0.0					0.0
62876	MCCRIGHT, MILO & ANNETTA		0.0					0.0
70001	Clear Pine Mouldings, Inc.	0.4		1.8	8.0		0.0	156.9
DESCHUTES								
48	HEIGES VERNA MAE		0.0					0.0
62884	BURK DAIRY LLC		7.0					2.2
62886	CARTER, DEBRA		2.5					0.8
62887	DAVIDSON, ROBERT M		2.1					0.7
62888	DEMEYER, OSCAR		8.6					2.7
62891	HUDDLE, KENNETH L		2.2					0.7

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
62893	PUTNAM DAIRY		5.5					1.7
62895	WANZO DAIRY		2.6					0.8
90084	Gas Transmission Northwest Corporation	156.7	7.0	167.2	5.2	5.2	2.2	4.9
120092	RICH DAIRY		0.0					0.0
121352	M & M DAIRY INC		7.1					2.2
156029	JUNIPER GROVE FARM		0.2					0.1
GILLIAM								
70306	LEAR FARMS		7.3					1.3
110001	Waste Management Disposal Services of Or	82.7	0.0	4.0	24.5	0.1	1.0	37.7
GRANT								
8	CLYDE HOLLIDAY FAMILY RANCHES, INC.		0.0					0.0
10	CROSS D RANCH		0.0					0.0
38	SPROUL RANCH		4.5					2.6
39	VAUGHAN RANCH		0.0					0.0
43	BURNS WILDHORSE CORRALS		0.0					0.0
120001	Co-Gen Co. LLC	68.7	7.4	151.2	50.9		6.4	61.5
120003	Prairie Wood Products			0.0	20.5	18.4	0.0	10.1
120024	Grant Western Lumber Co.	32.9		25.5	15.7	14.2	1.7	53.5
120032	Ochoco Lumber Company	18.1		34.1	14.1	12.7	1.0	40.7
HOOD RIVER								
62901	CASCADE DAIRY, INC		6.0					1.9
140004	Quanex Corporation dba Homeshield				0.0	0.0		2.0
140006	Mt. Hood Forest Products, LLC	0.0		0.0	0.0	0.0	0.0	0.0
140027	Cascade Wood Components				0.7	0.6		
JEFFERSON								
14	DSP/CHERRY CREEK		0.0					0.0
62932	GALLUP, GEORGE & LINDA		4.7					2.7
132745	HANSEN LIVESTOCK LLC		28.1					16.0
160003	Bright Wood Corporation				9.5			228.9
160026	Gas Transmission Northwest Corporation	38.3	5.1	67.0	2.4		1.1	1.4
160027	Seaswirl Boats, Inc.							82.3
LANE								
15	EUGENE LIVESTOCK AUCTION		0.0					0.0
58	FLOYD AND NANCY HENDERSON		20.1					1.4
62972	HARROLD BROTHERS DAIRY		13.6					4.2
62975	JOHNSON RANCH CO		0.2					0.1
62976	KJELDE DAIRY FARM		15.6					4.9
62977	LOCHMEAD FARMS INC		55.6					17.4
62978	KEYSTONE RANCH		8.3					2.6
62979	SUMICH, NICHOLAS A		3.9					1.2
62983	WOODRUFF & SON		0.9					0.3
63001	KONYN DAIRY		24.8					7.8
129096	POLAND DAIRIES		15.9					5.0
LINCOLN								
47	GREEN ACRES EQUESTRIAN CTR, LLC		0.2					0.1
62985	KETOLA DAIRY		3.4					1.1
210005	Georgia-Pacific West, Inc.	2,399.3	0.7	956.9	708.6	18.2	418.1	884.5
210042	Northwest Natural Gas Co	3.3		13.2	1.2	1.1	15.9	0.3
LINN								
1	LAKEVIEW FARM		0.0					0.0
52	SPRING VALLEY RANCH		0.1					0.0
62989	CEDAR GROVE JERSEY		2.1					0.6
62991	DEJONG, JERRY		6.0					1.9

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
62994	FIR RIDGE HOLSTEIN FM,LLC		27.8					8.7
62997	FRITZ HEIFERS		0.2					0.1
62999	GOURLEY DAIRY		9.4					2.9
63002	JENSEN, PETER		8.6					2.7
63003	BROWN, CLINTON		0.1					0.0
63008	PLAINVIEW DAIRY		3.7					1.2
63009	PROVIDENCE DAIRY INC		4.6					1.4
63010	PUGH CENTURY DAIRY		6.5					2.0
63011	RIEDER DAIRY		9.2					2.9
63012	ROARING RIVER DAIRY		6.5					2.0
63013	SANTIAM JERSEYS		5.9					1.9
63018	SMALLEY, JACK & SUZY		3.0					0.9
63020	VAN DAM DAIRY		4.2					1.3
63022	ERNEST VAN LEEUWEN FARMS		1.3					0.4
63024	VOLBEDA DAIRY INC HEIFERS		37.0					11.6
63025	VOLBEDA DAIRY INC ENGLE ROAD		61.7					19.3
63026	WALDISPUHL, JOHN		2.5					0.8
63027	WILLAVAL DAIRY FARM		30.9					9.6
63033	COWDREY, DWIGHT		0.0					0.0
63037	GOURLEY, STANLEY E		2.0					0.4
63190	TROOST DAIRY		17.7					5.5
63852	VALLEY OAK FARM		1.6					0.9
64041	KIRSCH, JIM		5.6					1.7
71114	SHAY MAR DAIRY		1.8					0.6
122253	LAKESIDE DAIRY		1.1					0.3
130277	M-6 DAIRY, C/O MACEDO		7.8					2.4
135878	NORIS INC		23.1					7.2
152427	SPENCER DAIRY		13.9					4.3
220010	DeWALD Northwest Co.				3.6			28.3
220011	Pacific Cast Technologies, Inc.	1.8		9.3	5.6			0.7
220143	Weyerhaeuser Company	12.2	0.1	54.4	168.1		1.0	214.0
220328	Oregon Metallurgical Corporation	5.0		6.4	2.5	2.2	0.1	0.8
220471	Weyerhaeuser Company	743.9	10.2	332.7	246.7	16.6	159.6	401.5
220547	Wah Chang	4,855.3	0.1	32.6	150.7		5.5	225.9
221024	Georgia-Pacific Resins, Inc.	81.2		13.3	0.9	0.8	0.0	10.5
221034	Bear Mountain Forest Products, Inc.	66.6		14.5	39.0		2.8	1.4
222522	Freres Lumber Co. Inc.	17.1		8.5	21.4	19.3	2.2	37.9
222525	Frank Lumber Co. Inc.	190.7	0.9	7.6	36.7	14.4	0.8	39.5
223010	Weyerhaeuser Company	129.0	3.5	80.2	38.7	4.7	6.4	22.9
223501	Pope & Talbot, Inc.	1,004.1	1.9	424.5	392.0	32.7	528.3	336.2
225208	Weyerhaeuser Company	78.5		314.1	26.7	24.0	1,115.2	3.1
226002	Freres Lumber Co. Inc.	8.2		21.7	23.6	21.2	0.5	12.0
226024	Entek International LLC	15.7	0.6	15.7	0.5		0.3	1.0
226034	Fort James Operating Company	13.5		9.7	29.1	26.2	0.3	51.4
228041	Selmet, Inc.			8.6	1.4	1.3		1.2
228043	Monaco Coach Corporation							33.5
MARION								
50	PAUL KENNEDY		0.2					0.1
63099	A & H DAIRY		3.1					1.0
63100	A J DAIRY		54.0					16.9
63110	CARPENTER DAIRY		12.3					3.9
63113	CASCADE VIEW DAIRY, INC		13.1					4.1
63115	CHAFFEY, LOWELL		16.5					5.2

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
63118	COELHO DAIRY		21.0					6.6
63121	DEJAGER, ROGER		24.7					7.7
63123	DEVRIES, CHRIS		20.8					6.5
63126	DUTCH MILL DAIRY		11.7					3.7
63130	FISCHER DAIRY		3.1					1.0
63137	GRIESER'S NUOAK HOLSTEINS		7.7					2.4
63138	HAZENBERG, HENRY		129.6					40.5
63139	HESSE & SONS DAIRY LLC		24.5					7.7
63140	HITZ, ROY & JOE		8.0					2.5
63141	J & J HEIFERS		14.7					4.6
63144	JER-OSA ORGANIC DAIRY		0.2					0.1
63145	JORRITSMA DAIRY		3.2					1.0
63161	PARRISH GAP DAIRY		10.8					3.4
63163	MADSEN, JIM		1.1					0.3
63164	MEADOWOOD REGISTERED HOLSTEINS		11.9					3.7
63165	MANN'S GUERNSEY DAIRY		4.8					1.5
63166	MAURER, ANN		1.5					0.5
63167	MILKY WAY DAIRY INC		48.1					15.0
63168	MISSION LANE FARMS INC		19.1					6.0
63169	MOISAN DAIRY		41.4					12.9
63170	MORNING MIST DAIRY LLC		20.7					6.5
63173	NEFF DAIRY INC		23.8					7.4
63175	OAK LEA DAIRY		16.3					5.1
63176	OAKS DAIRY INC		3.1					1.0
63177	OTT DAIRY INC		17.7					5.5
63179	BIELENBERG, EDWARD G		0.0					0.0
63181	RUFFING DAIRY		4.6					1.4
63184	SAR-BEN FARMS INC		23.8					7.4
63192	VAN DAM DAIRY		8.8					2.7
63193	VAN LOON DAIRY		28.4					8.9
63194	DOUBLE V DAIRY		154.3					48.2
63195	VEEMAN DAIRY		61.7					19.3
63212	BAUMAN FARMS		0.9					0.2
63214	FRAZER, KENNETH E		1.5					0.3
63215	GOFFIN, DANIEL L		4.0					0.7
63221	MCKILLIP FEED LOT		0.3					0.2
63228	TWIN L FARM		1.8					0.3
63232	WURDINGER, HOWARD & MARY		8.9					1.6
66740	PINE ACRES INC		0.0					0.0
127723	PLANTENGA FARMS		2.2					1.3
128946	KENAGY FARMS LTD.		12.0					3.8
135684	GOSCHIE FARMS INC		9.6					1.7
138629	COLEMAN RANCH INC - DAIRY HQ		46.3					14.5
138820	COLEMAN RANCH INC (HEIFER)		3.6					2.0
160252	MALLORIE'S DAIRY INC		66.6					20.8
162006	Valley Fresh Foods Inc.Skylane Farms Div. Site 3		135.8					9.2
240008	Kal Kustom Enterprises							31.5
240017	Northwest Coating Systems, Inc.							51.3
241011	Norpac Foods, Inc.	3.1		3.7	0.1	0.1	0.1	0.2
245398	Covanta Marion, Inc.	15.0		285.0	12.8		6.0	2.3
247067	Norpac Foods, Inc.	7.4		8.8	0.2	0.2	0.2	0.5
248066	Patrick Industries, Inc.				1.2	1.1		28.4
248086	Oregon State Hospital				0.0	0.0		0.0

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
249201	Northwest Pipeline Corporation	0.4		2.6	0.1	0.1		
249203	Fiber-Fab, Incorporated							24.2
249205	Akzo Nobel Coatings Inc.	0.0		0.0	1.5	1.3	0.0	25.2
MORROW								
141110	TERRA POMA LAND LLC		5.6					1.7
160253	SIMPLOT LIVESTOCK CO #3		359.8					204.9
160255	BEEF NORTHWEST FEEDERS INC		393.5					224.2
160256	SIX MILE DAIRY		1,114.2					348.2
160258	H & J DAIRY		222.2					69.4
160259	COLUMBIA RIVER HOLSTEINS / COLUMBIA RIVER JERSEYS		592.6					185.2
250001	Finley Buttes Landfill Company	51.0		7.6	42.1			6.1
250003	Morrow Power, LLC	0.0			0.0			0.0
250016	Portland General Electric Company	520.4	0.0	7,813.5	697.9	522.6	12,392.1	62.3
250020	Port of Morrow	40.9	0.9	17.6	10.9	5.1	0.8	7.4
250026	Gas Transmission Northwest Corporation	53.8	6.4	334.7	3.4		1.3	1.9
250031	Portland General Electric Company	65.2	71.6	126.7	19.8		4.8	6.7
MULTNOMAH								
63245	VETSCH DAIRY		7.7					2.4
63247	MT VIEW BOARDING KENNELS		0.1					
63249	BURKE, WALTER		0.4					0.1
143193	PORTLAND LIVESTOCKS LLC		1.0					0.2
161634	PORTLAND MEADOWS		0.0					0.0
260012	Intelicoat Technologies, LLC	3.1	0.0	14.5	0.3		0.4	2.3
260088	Mutual Materials Company	60.6		17.7				1.2
261814	Hercules Incorporated	1.0		3.9	0.1	0.1	0.1	3.0
261815	Owens-Corning Corporation	1.9		1.8	39.7	35.8		3.6
261865	Oregon Steel Mills, Inc.	152.1		188.5	68.4		2.7	39.6
261867	PCC Structurals, Inc.	16.4		19.6	5.6	5.1		36.3
261869	Columbia Steel Casting Co Inc.	15.5		9.8	34.5	31.0		9.6
261876	Owens-Brockway Glass Container Inc.	10.2	0.1	389.7	60.0	0.7	112.9	1.6
261890	Consolidated Metco, Inc.	6.8		8.1	11.6	10.4		0.9
261891	Ash Grove Cement Company	31.1		22.2	25.8	23.2	30.2	3.5
261894	Malarkey Roofing Company	20.8		5.0				28.2
261912	Morse Bros.,Inc.				6.3	5.6		
262000	CLD Pacific Grain, LLC				1.1	1.0		
262003	CLD Pacific Grain, LLC				9.6	8.6		
262025	Chevron Products Company	7.8	0.7	31.3	0.6	0.0	6.0	92.8
262027	Chevron Products Company	1.1	0.1	1.0	0.3		0.0	41.4
262028	Kinder Morgan Energy Partners, L.P	0.0		0.0	0.0		0.0	43.0
262029	Shore Terminals LLC	0.3	0.0	0.2	0.0		0.0	18.2
262030	BP West Coast Products, LLC	18.3		7.2	1.1		1.1	56.7
262050	Oregon Health Sciences University	14.2	0.1	11.4	0.6	0.0	0.6	0.7
262068	ESCO Corporation	199.9		39.7	134.0		2.7	48.0
262197	Freightliner LLC	1.6	0.0	24.1	8.7		0.2	271.4
262332	Crown Cork & Seal Company (USA), Inc.	0.4		1.8	0.0		0.0	31.7
262478	Equilon Enterprises LLC	4.2		1.8	0.7		0.0	10.3
262492	Northwest Pipe Company			1.2	11.8			23.6
262572	Container Management Services, LLC	0.1		0.1	7.8	7.0		35.1
262777	Graphic Packaging International, Inc.	0.9	0.1	4.1	6.7	0.0	0.1	21.2
262807	Columbia Grain, Inc.				11.0	9.9		
262909	Kinder Morgan Bulk Terminals, Inc.				21.6	19.4		
262931	Graphic Arts Center	0.8		1.0				48.8
262944	Gunderson, Inc.			0.3	53.0			192.9

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
262952	Franz Bakery	1.3		2.3				37.8
262968	Kraft Foods Global,Inc.	2.2		9.9			0.2	7.6
263002	Siltronic Corporation	0.1		19.5			0.2	13.8
263009	Dynea Overlays, Inc.	9.5	0.1	35.5	0.2		0.2	317.8
263035	IMACC Corporation							29.5
263038	Cascade Corporation							0.6
263045	Oregonian Publishing Co.							44.6
263067	Owens-Corning Fiberglas Corporation	92.8	0.1	26.4	6.5		82.0	6.7
263135	Bullseye Glass Co.			24.3	2.3	2.1	3.7	
263224	Cascade General, Inc.	0.9	0.0	8.4	28.9	0.0	0.0	80.7
263310	St Johns Landfill	1.1		1.8	0.8		0.1	0.1
POLK								
45	DIMARPINO, W.		0.0					0.0
63250	CAL-GON FARMS		13.3					4.1
63251	FABER, FRED W		1.7					0.5
63252	FABER'S RIVERBEND HOLSTNS		9.6					3.0
63254	LEKKERKERKER DAIRY		18.7					5.8
63255	MANZI & SONS DAIRY INC		8.6					2.7
63256	PLATT'S OAK HILL DAIRY		108.0					33.8
63262	VALLEY CREEK DAIRY		38.3					12.0
63264	WALL, SAMUEL E		3.1					1.0
63265	WERTH FARMS		2.2					0.7
63267	CATTANACH, DONALD		0.0					0.0
63269	KUENZI, ARTHUR D		0.0					0.0
64800	DOUBLE J JERSEYS		9.4					2.9
121922	VOLBEDA FARMS		15.8					4.9
143906	WHITE'S HAULING & FARM		1.4					0.8
270001	Marquis Spas				5.5			44.8
270005	Medallion Cabinetry, Inc.	0.5	0.2	1.2	7.2	0.0		207.9
273001	Fort Hill Lumber Company	8.5		2.6	1.5	1.3	0.1	2.3
SHERMAN								
280007	Gas Transmission Northwest Corporation	160.5	12.2	124.8	5.8		2.5	10.9
TILLAMOOK								
63273	ABBOTT FARMS		8.9					2.8
63275	ALLEN, GEORGE OR RUTH		12.6					3.9
63278	ALPINE-VUE DAIRY		6.5					2.0
63282	ASAY DAIRY FARMS		6.9					2.2
63284	AUFDERMAUER FARMS		12.3					3.9
63285	AVERILL, DON & JO IDAVILLE ROAD FAC		4.6					1.4
63287	BAILEY FARMS INC		10.5					3.3
63288	BARKER, WAYNE OR EILEEN		12.3					3.9
63290	BENNETT, JACK & NORMAN		7.7					2.4
63291	SMITH, GLENICE M		1.2					0.4
63294	BLASER, LOUIS & FLORENCE		10.3					3.2
63297	BOHREN FARMS INC		10.6					3.3
63298	BOQUIST FARMS		4.3					1.4
63299	GEORGE ALLEN & SONS DAIRY		6.9					2.2
63300	BOSCH, CARL & IRENE		5.6					1.7
63301	BOSCH, HENRY J & JANA L		4.0					1.3
63306	PENNEY, DAVID & PATRICIA		4.4					1.4
63308	CHATELAIN'S FARMASEA INC		15.0					4.7
63309	CHITWOOD, MIKE & LORI		7.2					2.2
63310	CHRISTENSEN, TIMOTHY JASE		0.0					0.0

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
63313	COASTAL VIEW DAIRY INC		0.0					0.0
63314	CRAVEN FARMS INC		0.0					0.0
63315	DEN-JO FARM		6.8					2.1
63316	PARAMOUNT DAIRY #1		16.8					5.2
63317	DESWART DAIRY		6.1					1.9
63318	DEVRIES, HANS		3.3					1.0
63319	DILA DAIRY INC		13.9					4.3
63322	DOUBLE C.M. DAIRY LLC		13.0					4.1
63323	DURSON FARM		3.3					1.0
63326	KILCHIS VALLEY DAIRY		0.0					0.0
63327	ESPLIN, JOHN & SANDRA		2.5					0.8
63328	FAIRVIEW ACRES DAIRY FARM, INC		27.8					8.7
63329	FARMER CREEK DAIRY		1.2					0.4
63330	FENK, HELEN		3.4					1.1
63332	FORSTER FARM INC		5.0					1.6
63336	GEO FARMS INC		16.2					5.1
63337	GIENGER FARMS INC		66.4					20.7
63338	GIENGER, RONALD J		6.0					1.9
63340	GOLD CREEK DAIRY		3.1					1.0
63344	GYPO JERSEYS		3.8					1.2
63346	HALE-VALLEY HOLSTEINS		8.5					2.7
63349	HANCOCK DAIRY		6.8					2.1
63354	HIGHTIDE HOLSTEINS		6.7					2.1
63361	HUBER, STEVE & PAM		1.4					0.4
63364	HURLIMAN, CLEM & CHRIS		4.4					1.4
63367	HURLIMAN, RONALD & YVONNE		4.2					1.3
63368	HURLIMAN, TOM & SUE		4.5					1.4
63369	HURLIMAN, TONY/MARGARET		4.0					1.3
63374	E & C DAIRY		4.7					1.5
63377	JENCK, KEN, TIM, SHARON &		5.2					1.6
63378	POMI DAIRY		4.7					1.5
63379	JOHNSTON, DEVIN, ELENA,		4.6					1.4
63384	LANDOLT, MIKE & KATHY		5.7					1.8
63387	LEUTHOLD,DAVID/CAROL/MARK		5.9					1.8
63391	LITTLE RIVER JERSEY DAIRY INC		7.9					2.5
63393	LO-LAND DAIRY INC		2.8					0.9
63394	LONG PRAIRIE DAIRY		5.8					1.8
63395	MACHADO DAIRY INC		0.0					0.0
63397	MAROLF DAIRY		1.9					0.6
63398	S & E MARTELLA DAIRY		10.6					3.3
63399	MARTI HOLSTEINS INC		9.9					3.1
63401	MEADOW VIEW DAIRIES INC		6.4					2.0
63402	FITCH, DELORIS MAE		2.6					0.8
63403	MIDWAY DAIRY		7.1					2.2
63404	MISTVALE FARM INC		12.3					3.9
63405	MISTY MEADOW DAIRY		104.9					32.8
63406	MOON CREEK		2.9					0.9
63407	MOON MEADOW DAIRY		3.6					1.1
63411	MOSS CREEK DAIRY		4.5					1.4
63412	MYERS BROTHERS		17.4					5.4
63413	MARWYN NAEGELI DAIRY		6.5					2.0
63414	MARWYN NAEGELI DAIRY		8.0					2.5
63415	NEAHRING, STEVE &/OR LYNDA		5.9					1.8

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
63416	NES-TILL FARMS INC		7.9					2.5
63418	OLDENKAMP FARMS INC		15.0					4.7
63420	WILSON RIDGE DAIRY CO		9.7					3.0
63427	SPRUCE GROVE DAIRY		4.6					1.4
63428	PEARN, ROY & CHRISTIE		3.6					1.1
63429	PETERSON, ERIC & LORETTA		10.9					3.4
63431	PLUM NELLIE FARM		5.7					1.8
63432	PORTER, DALE & JOYLIN		5.2					1.6
63433	PORTER DAIRY LLC		11.0					3.4
63435	PREMIUM FARMS		6.8					2.1
63436	RSC DAIRY		13.4					4.2
63473	REBOB FARM INC		9.0					2.8
63475	RIEGER, JAMES A		1.1					0.3
63476	RIEGER, JOHN		2.9					0.9
63478	RIEGER, STEVE & JERRILEE		1.9					0.6
63479	RIVER END DAIRY		11.0					3.4
63481	RIVER MEADOWS DAIRY		2.4					0.8
63484	SANDER DAIRY		5.9					1.8
63486	SCHWARZ DAIRY		1.9					0.6
63488	SHAN-COLE FARM		7.2					2.3
63490	SHREVE'S TRIPLE-K DAIRY		6.3					2.0
63493	MILLER, RANDALL & LYNNE		1.8					0.5
63494	STREETER, MIKE & JACKIE		1.5					0.5
63495	SUNRISE ACRES DAIRY		1.9					0.6
63496	SUNSHINE ACRES		3.4					1.1
63498	TANNLER, NEIL		4.0					1.3
63500	THOMAS, BRUCE		4.6					1.4
63502	THE THUNDERBIRD DAIRY		2.7					0.8
63503	TILLA-BAY FARMS INC		10.6					3.3
63504	TI-SUE HOLSTEINS		7.3					2.3
63505	TOHL, C DEAN & PATTI		6.0					1.9
63507	SCHRIBER, JOSEPH & CHERYL		4.0					1.3
63508	TRASKVIEW FARM INC		15.4					4.8
63509	TRENT, JIM		0.0					0.0
63512	VELLINGA, LEON & KATHRYN		3.1					1.0
63515	W D ROCK		4.8					1.5
63516	WALDRON, DENNIS/BARBARA		1.9					0.6
63517	WALDRON, EARL C		5.9					1.8
63520	WETZEL, HENRY & MARJORIE		3.2					1.0
63525	WILSONA FARMS LLC		10.6					3.3
63526	WILSONVIEW DAIRY INC		12.7					4.0
63527	WINDY-HAVEN FARMS		6.1					1.9
63528	WOODSTOCK DAIRY		8.8					2.7
63572	WYNANDS, MIKE & PATTY		0.5					0.2
63865	DON WERNER DAIRY		0.0					0.0
64887	JACK DANIEL FARMS		3.2					1.0
65819	HEIMDAL DAIRY		6.7					2.1
65890	WILLIAM ANDERSON DAIRY		1.5					0.5
66431	KOSTIC DAIRY		3.1					1.0
66471	FAIRVIEW ACRES DAIRY, FARMS, INC		7.3					2.3
66681	CORDEIRO FARMS		0.1					0.0
69359	WAYNE BENNETT DAIRY		3.1					1.0
69746	ELKRIDGE DAIRY		4.4					1.4

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
69788	KRAKE, WAYNE & JEANETTE		2.1					0.7
70951	J & C EDGERLY DAIRY		6.6					2.1
71139	JENCK FARM ,LLC		12.3					3.9
75060	MONAGON DAIRY INC		2.3					0.7
120319	WERNER, JEFF & DEBBIE		0.0					0.0
120326	CLEVERSTAR FARMS		7.5					2.4
120937	WASSMER DAIRY		3.8					1.2
121258	R & R DAIRY		13.6					4.2
121926	SOUTHFORK DAIRY		5.7					1.8
122171	FAWCETT CREEK FARM		7.9					2.5
124421	CHRISTIE DAIRY		3.4					1.1
124440	MIAMI RANCH		1.1					0.6
124583	DAN LANDOLT DAIRY		3.9					1.2
124803	MENEFEE DAIRY		13.0					4.1
126224	LAZY L RANCH		5.6					1.7
126541	G & S DAIRY		9.0					2.8
127240	SILVER MIST FARMS		11.1					3.5
130793	ONION PEAK DAIRY, INC		7.9					2.5
131404	VELLINGA DAIRY		4.1					1.3
132003	MAACK DAIRY		6.9					2.2
133022	KILCHIS VALLEY DAIRY		3.5					1.1
133300	NORMAN H MARTIN DAIRY		25.7					8.0
134236	SHELL- MI DAIRY		6.8					2.1
136673	BONA ENTERPRISES		2.6					0.8
137027	MATEJECK DAIRY II, DAVID ROCHA, MICHAEL, AND LISA RIDER		1.9					0.6
137543	HURLIMAN, TONY A		6.2					1.9
138587	COASTAL VIEW DAIRY INC		11.9					3.7
138706	AVERILL, DON G ALDERBROOK ROAD FACILITY		15.7					4.9
139566	HATHAWAY FARMS		0.0					0.0
141035	THE DAIRY COMPANY		12.3					3.9
141325	GANN, ROBERT & GLENDA		1.6					0.5
141326	J & D DAIRY		5.4					1.7
141994	FINDLEY DAIRY		2.8					0.9
142405	MOUNTAIN VISTA DAIRY		18.5					5.8
142983	EDWARD GOMES JERSEY DAIRY		9.3					2.9
143296	MATEJECK DAIRY I, DAVID ROCHA, MICHAEL & LISA RIDER		18.5					5.8
143709	BARKER'S DAIRY		6.3					2.0
144252	TORY ORELLA DAIRY		4.3					1.3
146398	POMI DAIRY		4.9					1.5
146407	ROCHA JERSEYS		3.2					1.0
146536	THREE BAR E DAIRY INC		3.9					1.2
147484	RIEGER, STEVE		3.7					1.2
147621	SANCHEZ DAIRY		6.8					2.1
150971	GEORGE ALLEN & SONS		6.9					2.2
153674	SILVER STREAM JERSEYS		6.5					2.0
154087	SANCHEZ DAIRY		4.3					1.4
154497	SUN ACRES DAIRY		1.6					0.5
154686	SEYMOUR DAIRY INC		12.3					3.9
155720	FIR RIDGE HOLSTEIN FM LLC		13.9					4.3
156464	MORETTI DAIRY		3.2					1.0
157037	FERREIRA JERSEY		6.0					1.9
158093	MOUNTAIN VISTA DAIRY		7.3					2.3
159350	RYAN LANDOLT DAIRY		4.0					1.2

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
159976	PRICE DAIRY		11.1					3.5
161635	GOODMAN, WILLIAM G		3.1					1.0
290004	Tillamook County Creamery Association	1.2		11.2	1.3	1.2	39.8	
290007	Tillamook Lumber Company	405.4	4.7	66.6	239.0	14.9	4.1	92.4
UMATILLA								
5	BEEF NORTHWEST		0.0					0.0
18	HELLBERG FEEDLOT		4.5					2.6
23	KESSLER ANGUS		0.9					0.5
28	PALMER FEEDLOT		1.3					0.8
63574	C & B		449.7					256.2
63576	TORCO RANCH		39.4					22.4
145633	CARROLL FAMILY FARMS		9.0					2.8
160264	H4 FARMS, INC. (STAGE GULCH DAIRIES)		398.2					124.4
161275	RAY L. WILLIAMS, WILLIAMS LLC		141.6					44.3
161636	M & P DAIRY		0.0					0.0
300004	Fleetwood Travel Trailers Of Oregon, Inc				0.1			16.6
300056	Blue Mountain Lumber Products, LLC	0.2		0.9	3.3	3.0	0.1	7.7
300075	ConAgra Foods Packaged Foods Company Inc	27.0		32.1	10.0	9.0	0.6	6.1
300078	J. R. Simplot Company	15.8		36.7	6.3	5.7	43.5	18.5
300112	Northwest Pipeline Corp.	23.9	0.7	84.8	0.5	0.5	0.7	4.0
300113	Hermiston Generating Company, L.P. and P	67.4	116.6	172.8	53.8		8.1	26.9
300118	Hermiston Power Partnership	74.1	119.8	209.9	91.3		8.3	37.3
WASCO								
37	SMITH RANCHES		0.0					0.0
42	YOUNG LIFE FS WA FAMILY RANCH		0.0					0.0
63588	TYGH VALLEY HOG RANCH		6.3					1.2
63589	WAPINITIA FARMS		10.7					1.9
330001	Northwest Aluminum Company, Inc.	2.1		8.9	3.5		0.2	0.3
330003	Amerities West, LLC	1.5		1.8	0.1	0.1	0.0	12.6
330004	Mid Columbia Producers, Inc.				8.5	7.6		
330007	Wasco County Landfill, Inc.	0.6		3.3	1.8		0.2	6.8
330030	Win-Quatt Crematory	0.0		0.0	0.1	0.1	0.0	0.0
WASHINGTON								
2	BEAVERTON HILLTOP BOARDING KENNEL		0.0					
49	MCKAY CREEK FARMS		0.3					0.1
63590	BEVI-JOE FARMS		9.2					2.9
63592	BOSCHMA DAIRY		21.6					6.8
63594	DANNY DAVE FARM		4.2					1.3
63595	DERSHAM, HAROLD		1.5					0.5
63596	DUYCK, EDWIN H & ETHEL J		4.5					1.4
63597	DUYCK, RALPH M		3.2					1.0
63600	HERING, DAN		4.9					1.5
63604	KALENE DAIRY FARM		6.2					1.9
63605	KISTNER & WEBER		0.0					0.0
63608	LICORICE LANE FARM INC		17.0					5.3
63609	MARSH HOMESTEAD INC		8.3					2.6
63611	MEURY DAIRY		10.3					3.2
63614	NUSSBAUMER DAIRY		4.2					1.3
63615	JUST MILK FARM		5.8					1.8
63620	TWIGG FARM		17.3					5.4
63622	VANDEHEY DAIRY		6.2					1.9
63625	WACHLIN FARMS		5.1					1.6
63626	WETZEL, GLEN T		3.7					1.2

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
63627	WIL-RENE FARMS		4.4					1.4
63628	WISMER DAIRY		7.2					2.2
63686	DUYCK ƒS PEACHY PIG FARM		0.5					0.1
63696	RIEBEN, ERNEST R		7.6					1.4
65575	VAN DOMELEN FLOYD P		6.6					2.1
71338	RI MAR FARMS INC		15.7					4.9
120742	FRARENE DAIRY		0.2					0.1
126125	VAN DYKE, BERNARD C		4.0					2.3
138261	HANDY HANDLE DAIRY		2.9					0.9
139799	CHERRY LANE DAIRY		17.2					5.4
147990	BLOOMER DAIRY		6.1					1.9
151975	EVER MAY FARMS		10.8					3.4
342021	Baker Rock Crushing Co.				6.0	5.4		
342060	Masterbrand Cabinets, Inc.	0.9		1.1	15.5			167.4
342066	Stimson Lumber Company	146.3	3.5	101.2	138.4	2.9	5.0	105.4
342623	Clean Water Services	44.1		42.8	2.8	2.6	10.5	13.6
342637	Baker Rock Resources	4.2		3.3	1.4	1.2	0.7	1.9
342638	Tektronix, Inc.	3.3		4.0	0.1	0.1	0.1	9.3
342753	Clean Water Services	25.2		48.6	0.9	0.8	1.2	2.5
342756	DMH, Inc.				0.4			65.2
342778	Oregon Sandblasting & Coating Inc							25.0
342804	Maxim Integrated Products, Inc.	1.1		1.2	0.0	0.0		50.8
342809	Intel Corporation	34.8		13.3	1.0	0.9	0.9	27.2
342810	Pierce-Pacific Manufacturing, Inc.							5.1
WHEELER								
3	4-J RANCH		3.4					1.9
32	RICK PAUL RANCH		0					0
YAMHILL								
63707	ROBERT & TRACI BANSEN DAIRY		0					0
63709	BELTVIEW FARMS INC		2.8					0.9
63711	BIRCH CIRCLE FARMS INC		23.3					7.3
63713	C & A DAIRY		0.0					0.0
63719	CRUICKSHANK, DAVID D		0.6					0.2
63720	PETER DEHAAN HOLSTEIN LLC		74.1					23.1
63721	DE JAGER, ARTHUR		3.1					1.0
63722	DRAGGIN' WHEY DAIRY		12.3					3.9
63724	FOREST GLEN JERSEYS - DORA BANSEN LLC		11.4					3.6
63725	FOREST GLEN OAKS INC		61.7					19.3
63729	HOP'S HOLSTEIN HEIFERS		26.5					8.3
63731	KEMPEMA, OSCAR		0.0					0.0
63732	KIL-MAR ACRES		1.5					0.5
63733	LAUNE, DARYL		3.6					1.1
63734	ROSECREST FARMS		4.0					1.3
63735	SCHROCK, CLEMENTS		0.0					0.0
63737	SHENK, WESLEY V		3.7					1.1
63738	SLEGERS INC NICHOLS ROAD		111.1					34.7
63739	TOM'S DAIRY FARM		7.7					2.4
63740	WHITNEY, HAROLD		0.3					0.1
63743	WONDERBAAR DAIRY		3.7					1.2
63744	BRINKMANN PORK FARM		5.7					1.0
63749	MORRIS BROS FARM INC		15.7					2.9
69780	ATSMA DAIRY		18.5					5.8
70065	NGUYEN-VU FARM		0.0					0.0

County		tpy emissions						
Source No.	Name	CO	NH3	NO2	PM10	PM25	SO2	VOC
121578	SILVEIRA DAIRY RANCH		4.6					1.4
126965	WEST HOG FARM		12.6					2.3
132755	SWARTS, ROBERT		0.0					
134679	OAK HILL ACRES		23.0					7.2
136084	EMERALD VALLEY JERSEYS		13.9					4.3
143657	LEHMAN DAIRY II INC		8.5					2.6
360001	Homette Corporation				9.1	8.2		12.3
360005	Liberty Homes, Inc.				0.2	0.2		13.3
360011	Riverbend Landfill Co.	8.1		12.7	7.8		12.0	15.5
365034	Cascade Steel Rolling Mills, Inc.	1,271.7		254.7	74.7		50.4	55.1
366142	SP Newsprint Co.	640.5	34.3	1,776.1	60.0	11.4	506.5	235.3
367004	Pacific Wood Preserving of Oregon, Inc.	1.6		1.9	0.0	0.0	0.0	4.4
368010	Hampton Lumber Mills, Inc.	4.0		4.8	12.1	10.9	0.1	9.1
	Total	**24,618.4**	**8,536.7**	**19,545.3**	**5,203.5**	**1,199.8**	**18,664.0**	**12,786.9**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated CO Emissions in Tons per Year: Oregon

County	Commercial / Institutional Fuel Consumption	Industrial Fuel Consumption	Municipal (non-TV) Landfills	Nonroad: Aircraft & Aircraft Refueling	Nonroad: Airport GSE: Diesel	Nonroad: Locomotive	Nonroad: Recreational Marine	Open Burning: Agricultural	Open Burning: Residential	Prescribed Burning	Residential NG/Oil Consumption	Residential Wood Combustion	Structure Fires	Wildfires	**Total**
BENTON	12.6	30.6	9.7	111.1		15.9	31.2	323.4	310.4	3,612.0	21.8	6,161.9	5.8	84.0	**10,730.5**
CLACKAMAS	57.3	80.3	1.8	49.3	0.7	32.9	2,904.2	429.2	1,259.2	1,293.2	92.7	25,419.7	49.5	23.4	**31,693.4**
CLATSOP	6.6	1.3		260.1			1,922.7	0.0	438.9	2,800.4	10.4	3,696.2	5.1	7.8	**9,149.5**
COLUMBIA	3.6	0.9		205.8			1,531.6		542.2	2,396.3	11.9	3,117.2	3.0	355.1	**8,167.5**
CROOK	2.2	8.6	0.5	24.7			403.8	33.9	245.6	3,585.8	5.4	2,343.3	2.7	22,589.3	**29,245.8**
DESCHUTES	14.6	28.6	52.5	336.8		36.7	1,431.1	0.0	1,537.7	8,536.2	34.6	13,552.2	28.0	59,453.5	**85,042.4**
GILLIAM	0.3	0.0	156.4	15.1		79.1	18.1	1,052.0	23.1		0.1	227.6		76,551.0	**78,122.8**
GRANT	0.7	1.9	0.0	27.0			9.9	0.0	94.2	2,713.4	0.4	1,488.6	0.4	59,079.9	**63,416.5**
HOOD RIVER	4.1	8.9		49.2		61.1	248.1	1,014.2	248.7	1,241.6	5.2	1,805.1	0.4	908.6	**5,595.3**
JEFFERSON	1.5	11.9	0.0	39.7		9.0	1,231.1	3,029.1	241.3	305.5	4.9	1,952.1	2.6	63,718.2	**70,546.9**
LANE	62.8	147.5	100.8	565.2		225.5	2,325.6	895.6	2,201.9	11,319.0	93.1	25,588.8	75.7	3,390.7	**46,992.0**
LINCOLN	7.9	0.9	0.0	106.0		6.7	2,024.7		543.5	2,865.7	13.7	5,351.7	4.9	84.0	**11,009.5**
LINN	15.1	6.6		92.0		21.0	993.4	11,498.8	413.6	10,069.6	28.3	7,977.9	56.1	419.3	**31,591.8**
MARION	47.7	93.2	0.0	427.0		70.5	444.3	5,995.2	869.1	2,193.2	73.0	21,259.8	68.4	23.4	**31,564.7**
MORROW	0.7	6.0	2.9	18.3			221.6	800.1	136.8	926.5	2.7	960.3	0.3		**3,076.3**
MULTNOMAH	198.0	209.1	20.0	1,724.3	2,227.0	153.1	5,913.8	12.1	176.7	26.4	192.8	56,352.9	687.5		**67,893.8**
POLK	4.6	18.6		102.4		7.9	227.9	228.6	417.5	3,282.8	16.6	4,731.0	19.4	84.0	**9,141.3**
SHERMAN	0.2	0.0	0.0	7.5		42.5	92.6	332.1	22.5		0.6	204.6	0.1		**702.7**
TILLAMOOK	2.9	9.7	0.9	72.0		5.0	1,992.8		299.1	1,334.3	7.3	3,212.3	3.5	10.7	**6,950.6**
UMATILLA	10.6	3.2	0.1	190.3		240.4	476.4	4,363.0	863.1	4,248.2	17.9	7,474.2	25.0	917.5	**18,830.0**
WASCO	3.7	2.7	103.7	61.1		111.5	389.1	907.1	288.7	1,806.5	6.6	2,286.9	162.0		**6,129.5**
WASHINGTON	101.5	359.8	10.2	560.9	8.1	14.7	393.0	251.6	341.3	1,146.9	123.8	37,617.0	369.9		**41,298.9**
WHEELER	0.1	0.0	0.0				4.1	0.0	18.8	701.5	0.1	254.3	0.0	22,589.3	**23,568.3**
YAMHILL	10.3	4.3	13.1	262.5		10.7	518.1	478.5	356.6	3,179.6	21.1	7,118.9	9.8		**11,983.4**
Total	**569.6**	**1,034.6**	**472.6**	**5,308.2**	**2,235.8**	**1,144.3**	**25,749.3**	**31,644.4**	**11,890.4**	**69,584.6**	**784.9**	**240,154.3**	**1,580.2**	**310,289.8**	**702,443.1**

Gorge Project 2004 Area Source Estimated NH3 Emissions in Tons per Year: Oregon

County	CAFO: Total	Fertilizer Application	Open Burning: Agricultural	POTWs	Prescribed Burning	Wildfires	**Total**
BENTON	56.2	90.7	8.6	0.2	42.0	0.6	**198.3**
CLACKAMAS	764.1	251.9	11.5	0.8	15.0	0.2	**1,043.5**
CLATSOP	32.2	23.8		0.2	32.5	0.1	**88.7**
COLUMBIA	65.5	56.1		0.1	27.8	2.6	**152.2**
CROOK	346.7	193.6	1.0	0.0	41.7	164.8	**747.7**
DESCHUTES	168.3	140.5	0	0.2	99.2	433.7	**841.8**
GILLIAM	4.2	642.6	31.7	0.01		557.2	**1,235.8**
GRANT	305.5	247.2	0	0.03	31.5	431.0	**1,015.2**
HOOD RIVER	12.9	94.4	0	0.1	14.4	6.6	**128.4**
JEFFERSON	89.3	212.4	91.3	0.04	3.5	464.8	**861.4**
LANE	211.9	161.8	22.8	1.2	131.5	24.7	**554.0**
LINCOLN	38.1	8.6		0.2	33.3	0.6	**80.8**
LINN	385.9	193.7	345.6	0.3	117.0	3.1	**1,045.5**
MARION	134.1	231.8	174.5	1.5	25.5	0.2	**567.5**
MORROW	20.3	1,254.1	23.1	0.02	10.8		**1,308.3**
MULTNOMAH	13.0	50.9		2.6	0.3		**66.8**
POLK	146.7	253.8	0	0.1	38.1	0.6	**439.4**
SHERMAN	39.9	753.5	10.0	0.005			**803.4**
TILLAMOOK	16.1	8.6		0.1	15.5	0.1	**40.3**
UMATILLA	49.6	2,089.4	126.6	0.3	49.3	6.7	**2,321.9**
WASCO	193.7	478.4	20.9	0.1	21.0		**714.0**
WASHINGTON	61.7	307.6	0	1.1	13.3		**383.7**
WHEELER	137.7	11.4	0	0.002	8.1	164.8	**322.0**
YAMHILL	391.9	282.3	0.2	0.3	36.9		**711.7**
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Total	**3,685.5**	**8,038.9**	**867.9**	**9.5**	**808.3**	**2,262.4**	**15,672.4**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated NOx Emissions in Tons per Year: Oregon

County	Commercial / Institutional Fuel Consumption	Industrial Fuel Consumption	Municipal (non TV) Landfills	Nonroad: Aircraft & Aircraft Refueling	Nonroad: Airport GSE: Diesel	Nonroad: Locomotive	Nonroad: Recreational Marine	Open Burning: Agricultural	Fertilizer Application (as N2O)	Open Burning: Residential	Prescribed Burning	Residential NG/Oil Consumption	Residential Wood Combustion	Structure Fires	Wildfires	**Total**
BENTON	34.6	94.4	1.0	0.7		146.7	0.9	14.4	14.6	16.2	142.3	57.2	81.4	0.1	2.9	**607.6**
CLACKAMAS	159.3	257.3	0	0.2	1.0	317.9	79.0	31.9	40.6	78.2	50.9	242.9	335.8	1.2	0.8	**1,597.1**
CLATSOP	18.1	7.5		1.4			48.8	0.0	3.8	28.4	110.3	27.1	48.8	0.1	0.3	**294.7**
COLUMBIA	9.8	4.9		1.1			41.7		9.0	35.1	94.4	31.1	41.2	0.1	12.5	**280.9**
CROOK	6.1	24.5	0	0.1			11.0	1.1	31.2	15.9	141.3	14.2	40.7	0.1	792.3	**1,078.5**
DESCHUTES	44.5	86.9	0	10.4		354.3	38.9	0.0	22.6	99.5	336.3	90.7	235.1	0.7	2,085.3	**3,405.3**
GILLIAM	0.9	0.0	39.8	0.1		766.9	0.5	35.4	103.6	1.5		0.4	3.9		2,679.3	**3,632.3**
GRANT	2.1	5.3	0	0.1			0.3	0.0	39.9	6.1	106.9	1.5	22.0	0.0	2,072.2	**2,256.2**
HOOD RIVER	11.3	25.2		0.3		593.1	6.8	114.6	15.2	16.1	48.9	13.7	31.3	0.0	31.9	**908.3**
JEFFERSON	4.0	33.6	0	0.2		87.6	33.5	101.9	34.2	15.6	12.0	13.0	33.9	0.1	2,234.9	**2,604.5**
LANE	172.7	416.6	93.3	29.8		2,179.9	63.3	66.7	26.1	146.0	445.9	244.0	338.0	1.8	118.9	**4,343.1**
LINCOLN	21.7	6.1	0	0.6		61.2	55.1		1.4	35.2	112.9	36.0	70.7	0.1	2.9	**403.8**
LINN	41.4	45.3		0.5		196.0	27.0	412.9	31.2	21.8	396.7	74.2	105.4	1.3	14.7	**1,368.6**
MARION	131.8	263.2	0	2.3		680.1	12.1	313.3	37.4	40.6	86.4	191.3	280.8	1.6	0.8	**2,041.7**
MORROW	1.9	16.7	5.5	0.1			6.0	29.6	202.2	8.9	36.5	7.0	16.7	0.01		**331.1**
MULTNOMAH	552.8	633.0	34.5	880.4	177.1	1,467.7	160.9	2.8	8.2	4.7	1.0	505.2	744.4	16.0		**5,188.8**
POLK	12.7	52.5		0.6		72.9	6.2	30.9	40.9	24.9	129.3	43.5	62.5	0.5	2.9	**480.4**
SHERMAN	0.5	0	0	0.0		412.6	2.5	11.2	121.5	1.5		1.5	3.6	0.003		**554.8**
TILLAMOOK	8.0	26.8	0	0.4		48.5	54.2		1.4	19.4	52.6	19.1	42.4	0.1	0.4	**273.2**
UMATILLA	29.2	22.5	0	3.8		2,324.6	13.0	179.4	336.9	55.9	167.4	47.0	110.2	0.6	32.2	**3,322.6**
WASCO	10.3	9.1	40.3	0.3		1,081.4	10.6	101.0	77.1	18.7	71.2	17.3	39.7	3.8		**1,480.8**
WASHINGTON	279.3	1,017.8	1.8	16.6	12.8	136.5	10.7	71.2	49.6	22.1	45.2	324.6	496.9	8.6		**2,493.7**
WHEELER	0.2	0	0				0.1	0.0	1.8	1.2	27.6	0.3	4.4	0	792.3	**828.0**
YAMHILL	28.2	30.0	19.9	1.4		98.1	14.1	55.9	45.5	18.9	125.3	55.2	94.0	0.2		**586.9**
Total	**1,581.5**	**3,079.4**	**236.2**	**951.6**	**190.8**	**11,026.0**	**697.1**	**1,574.4**	**1,296.1**	**732.4**	**2,741.2**	**2,058.0**	**3,283.8**	**36.9**	**10,877.6**	**40,363.0**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated PM10 Emissions in Tons per Year: Oregon

Area	Commercial / Institutional Fuel Consumption	Crop Tilling / Harvesting	Commercial Food Preparation	Industrial Fuel Consumption	Municipal (non-TV) Landfills	Nonroad: Aircraft & Aircraft Refueling	Nonroad: Airport GSE: Diesel	Nonroad: Locomotive	Nonroad: Recreational Marine	Open Burning: Agricultural	Open Burning: Residential	Prescribed Burning	Residential NG/Oil Consumption	Residential Wood Combustion	Structure Fires	Wildfires	**Total**
BENTON	2.1	208.2	25.5	2.8	8.3	2.4		3.8	0.5	33.5	69.0	403.2	0.1	721.8	1.0	8.6	**1,490.9**
CLACKAMAS	9.6	224.0	100.1	8.6	0	0.0	0.2	8.3	43.8	55.0	280.6	144.3	0.5	2,977.7	8.9	2.4	**3,864.1**
CLATSOP	1.1	11.9	30.9	0.3		5.4			28.9	0.0	97.9	312.6	0.1	433.0	0.9	0.8	**923.8**
COLUMBIA	0.6	36.9	15.0	0.1		4.1			23.1		121.0	267.5	0.1	365.1	0.5	36.2	**870.1**
CROOK	0.4	136.9	6.9	0.6	0	0.5			6.1	3.4	54.8	400.2	0.03	294.1	0.5	2,300.4	**3,204.8**
DESCHUTES	2.2	79.6	62.4	2.5	0	9.2		9.3	21.6	0.0	343.0	952.8	0.2	1,700.8	5.0	6,054.4	**9,243.0**
GILLIAM	0.1	540.4	1.0	0.0	31.3	0.3		20.1	0.3	101.2	5.2		0.003	28.6		7,767.7	**8,496.0**
GRANT	0.1	106.4	4.7	0.1	0	0.5			0.1	0.0	21.0	302.9	0.01	191.6	0.1	6,016.4	**6,643.9**
HOOD RIVER	0.7	17.6	14.4	0.5		1.0		14.5	3.7	156.1	55.5	138.6	0.03	226.5	0.1	92.5	**721.8**
JEFFERSON	0.2	170.5	6.3	0.7	0	0.8		2.1	18.5	291.3	53.8	34.1	0.03	245.0	0.5	6,488.7	**7,312.6**
LANE	10.6	322.1	138.4	8.7	59.7	15.1		57.1	35.0	88.8	491.5	1,263.4	0.5	2,997.5	13.6	345.3	**5,847.4**
LINCOLN	1.3	14.1	36.5	0.5	0	2.1		1.6	30.5		121.2	319.9	0.1	626.9	0.9	8.6	**1,164.2**
LINN	2.5	566.1	33.3	3.7		1.8		5.1	15.0	1,118.7	91.9	1,123.9	0.2	934.5	10.1	42.7	**3,949.5**
MARION	8.1	650.1	107.0	5.5	0	8.6		17.8	6.7	603.5	192.7	244.8	0.4	2,490.4	12.3	2.4	**4,350.2**
MORROW	0.2	932.2	2.7	0.4	44.8	0.4			3.3	77.0	30.5	103.4	0.0	120.5	0.1		**1,315.5**
MULTNOMAH	33.1	41.4	358.3	17.7	14.5	44.4	8.7	38.4	89.1	1.6	38.9	3.0	1.1	6,601.2	123.7		**7,414.9**
POLK	0.8	284.8	13.9	1.1		2.0		1.9	3.4	26.0	93.0	366.4	0.1	554.2	3.5	8.6	**1,359.7**
SHERMAN	0.04	618.6	1.8	0.0	0	0.1		10.8	1.4	31.9	5.0		0.003	25.7	0.02		**695.4**
TILLAMOOK	0.5	18.3	16.8	0.6	0	1.4		1.3	30.0		66.7	148.9	0.04	376.3	0.6	1.1	**662.6**
UMATILLA	1.8	1,805.7	25.7	1.9	0	4.5		60.9	7.2	438.9	192.5	474.2	0.1	961.7	4.5	93.4	**4,073.1**
WASCO	0.6	428.0	12.9	0.3	17.6	1.3		28.3	5.9	103.7	64.4	201.6	0.04	287.0	29.2		**1,180.8**
WASHINGTON	17.2	328.4	160.2	21.5	0	0.3	0.5	3.5	5.9	27.6	76.1	128.0	0.7	4,406.5	66.6		**5,243.2**
WHEELER	0.01	39.1	1.3	0	0				0.1	0.0	4.2	78.3	0.003	31.9		2,300.4	**2,455.3**
YAMHILL	1.7	440.5	35.4	2.5	3.8	5.1		2.5	7.8	55.6	79.2	354.9	0.1	833.9	1.8		**1,824.9**
Total	**95.6**	**8,021.8**	**1,211.5**	**80.7**	**179.9**	**111.5**	**9.5**	**287.3**	**387.9**	**3,214.0**	**2,649.6**	**7,766.8**	**4.5**	**28,432.3**	**284.4**	**31,570.4**	**84,307.6**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated PM25 Emissions in Tons per Year: Oregon

County	Commercial / Institutional Fuel Consumption	Industrial Fuel Consumption	Nonroad: Aircraft & Aircraft Refueling	Nonroad: Airport GSE: Diesel	Nonroad: Locomotive	Nonroad: Recreational Marine	Open Burning: Agricultural	Open Burning: Residential	Prescribed Burning	Residential NG/Oil Consumption	Residential Wood Combustion	Wildfires	**Total**
BENTON	0.8	6.0	1.9		3.6	0.4	29.9	64.7	363.0	5.2	694.4	7.2	**1,177.2**
CLACKAMAS	4.1	15.8	0.004	0.2	7.8	40.3	40.7	259.9	130.0	21.9	2,864.5	2.0	**3,387.1**
CLATSOP	0.4	0.4	4.2			26.6		90.4	281.5	2.5	416.5	0.7	**823.0**
COLUMBIA	0.2	0.3	3.2			21.2		111.6	240.8	2.8	351.3	30.6	**762.1**
CROOK	0.1	1.7	0.4			5.6	3.1	50.6	360.4	1.3	283.9	1,949.2	**2,656.2**
DESCHUTES	1.7	5.6	7.1		8.7	19.8	0	316.6	857.9	8.2	1,642.0	5,130.1	**7,997.7**
GILLIAM	0.02	0	0.2		18.8	0.3	97.1	4.8		0.04	27.6	6,585.6	**6,734.4**
GRANT	0.05	0.4	0.4			0.1	0	19.4	272.7	0.2	185.3	5,097.8	**5,576.3**
HOOD RIVER	0.3	1.7	0.8		15.5	3.4	138.4	51.2	124.8	1.2	218.7	78.4	**634.5**
JEFFERSON	0.1	2.3	0.6		2.3	17.1	279.7	49.7	30.7	1.2	236.5	5,498.0	**6,118.2**
LANE	4.2	28.6	11.6		53.3	32.2	82.8	452.6	1,137.6	22.0	2,883.5	292.6	**5,001.1**
LINCOLN	0.5	0.2	1.7		1.5	28.1		111.9	288.0	3.2	603.1	7.2	**1,045.4**
LINN	1.0	1.5	1.4		4.8	13.8	1,062.0	86.1	1,012.0	6.7	899.0	36.2	**3,124.6**
MARION	3.3	18.0	6.7		16.6	6.2	554.1	182.0	220.4	17.3	2,395.7	2.0	**3,422.3**
MORROW	0	1.1	0.3			3.1	73.7	28.2	93.1	0.6	116.4		**316.5**
MULTNOMAH	14.7	40.8	34.2	7.8	35.9	82.0	1.3	37.7	2.7	45.6	6,350.2		**6,653.0**
POLK	0.3	3.6	1.5		1.8	3.2	22.1	86.4	329.9	3.9	533.1	7.2	**993.1**
SHERMAN	0	0	0.1		10.1	1.3	30.7	4.6		0.1	24.8		**71.7**
TILLAMOOK	0.2	1.8	1.1		1.2	27.6		61.6	134.1	1.7	362.0	0.9	**592.2**
UMATILLA	0.7	0.7	3.5		56.9	6.6	401.3	177.7	427.0	4.2	930.2	79.2	**2,088.1**
WASCO	0.3	0.5	1.0		26.5	5.4	94.3	59.4	181.6	1.6	277.1		**647.5**
WASHINGTON	6.8	69.6	0.2	0.5	3.4	5.4	22.3	70.3	115.3	29.3	4,238.9		**4,562.1**
WHEELER	0.006					0.1	0	3.9	70.5	0.03	30.8	1,949.2	**2,054.5**
YAMHILL	0.7	1.0	4.0		2.4	7.2	44.9	74.2	319.6	5.0	802.2		**1,261.2**
Total	**40.8**	**201.4**	**86.1**	**8.5**	**271.0**	**356.9**	**2,978.5**	**2,455.3**	**6,993.6**	**185.9**	**27,367.5**	**26,754.2**	**67,699.9**

Note: The following categories represented in the PM10 table are not represented here due to lack of emission factor data:

Crop Tilling / Harvesting
Commercial Food Preparation
Municipal (non-TV) landfills
Structure Fires

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated SOx Emissions in Tons per Year: Oregon

County	Commercial / Institutional Fuel Consumption	Industrial Fuel Consumption	Municipal (non-TV) Landfills	Nonroad: Aircraft & Aircraft Refueling	Nonroad: Airport GSE: Diesel	Nonroad: Locomotive	Open Burning: Agricultural	Open Burning: Residential	Prescribed Burning	Residential NG/Oil Consumption	Residential Wood Combustion	Wildfires	**Total**
BENTON	7.4	83.8	1.0	0.2		5.3	7.6	2.7	30.3	23.8	11.9	1.3	**175.3**
CLACKAMAS	36.3	255.5	0	0.03	0.1	15.3	60.4	13.0	10.8	101.0	49.1	0.4	**541.7**
CLATSOP	3.9	9.0		0.2			0.1	4.7	23.5	11.3	7.1	0.1	**59.9**
COLUMBIA	2.1	0		0.2				5.8	20.1	12.9	6.0	5.4	**52.7**
CROOK	1.3	16.6	0	0.03			0.1	2.6	30.1	5.9	5.0	346.2	**407.9**
DESCHUTES	15.0	73.5	0	1.6		16.8	0.0	16.5	71.6	37.7	29.1	911.2	**1,173.1**
GILLIAM	0.1	0.0	39.8	0.02		37.5	3.7	0.2		0.6	0.5	1,170.8	**1,253.3**
GRANT	0.4	3.3	0	0.03			0.0	1.0	22.7	2.5	3.0	905.5	**938.6**
HOOD RIVER	2.4	15.9		0.1		29.0	164.3	2.7	10.4	5.7	3.9	13.9	**248.3**
JEFFERSON	0.9	21.0	0	0.05		4.3	10.5	2.6	2.6	5.4	4.2	976.6	**1,028.1**
LANE	37.2	261.3	3.7	3.7		104.8	123.4	24.3	94.9	101.4	49.4	52.0	**856.2**
LINCOLN	4.7	14.9	0	0.1		2.2		5.8	24.0	14.9	10.3	1.3	**78.4**
LINN	8.9	110.0		0.1		7.7	137.5	3.6	84.4	30.8	15.4	6.4	**404.9**
MARION	29.0	165.7	0	0.5		32.3	426.8	6.7	18.4	79.5	41.1	0.4	**800.3**
MORROW	0.6	11.1	1.1	0.02			7.7	1.5	7.8	2.9	2.1		**34.7**
MULTNOMAH	128.9	528.2	1.9	68.7	5.7	67.6	7.0	0.7	0.2	210.0	108.8		**1,127.9**
POLK	2.7	33.3		0.1		2.6	49.2	4.1	27.5	18.1	9.1	1.3	**148.1**
SHERMAN	0.1	0.0	0	0.01		20.2	1.2	0.2		0.6	0.4		**22.8**
TILLAMOOK	1.7	18.3	0	0.1		2.3		3.2	11.2	7.9	6.2	0.2	**51.0**
UMATILLA	6.3	55.2	0	0.6		112.0	104.7	9.3	35.6	19.5	15.2	14.1	**372.4**
WASCO	2.1	10.1	0	0.1		52.9	239.3	3.1	15.1	7.2	4.9		**334.9**
WASHINGTON	60.0	644.2	0	1.7	0.3	5.3	203.6	3.7	9.6	134.9	72.6		**1,136.0**
WHEELER	0.001	0.0	0				0	0.2	5.9	0.5	0.5	346.2	**353.3**
YAMHILL	6.0	73.7	19.3	0.3		3.6	70.6	3.1	26.7	23.0	13.7		**240.0**
Total	**358.1**	**2,404.8**	**66.8**	**78.4**	**6.1**	**521.7**	**1,617.9**	**121.5**	**583.4**	**858.2**	**469.8**	**4,753.2**	**11,839.9**

Gorge Project 2004 Area/Rail/Marine/Aircraft Estimated VOC Emissions in Tons per Year: Oregon

County	Auto Gas: Storage & Transport	CAFO: Total	Commercial / Institutional Fuel Consumption	Degreasing: Cold Cleaning	Degreasing: Conveyorized	Degreasing: Open Top	Commercial Food Preparation	Graphic Arts	Industrial Fuel Consumption	Misc. Non-Industrial Solvent Utilization	Municipal (non TV) Landfills
BENTON	208.9768	27.1	0.9	151.7	57.7	57.7	2.3	281.7	2.2	307.9	65.6
CLACKAMAS	163.9168	2026.6	4.1	761.8	99.1	99.1	9.1	349.7	5.7	1,338.6	81.7
CLATSOP	239.2528	17	0.5	77.2	4.5	4.5	2.8	24.3	0.1	129.9	
COLUMBIA	314.5391	35.6	0.3	51.0	3.0	3.0	1.4	24.3	0.1	163.4	
CROOK	85.0851	191.5	0.2	50.5	2.3	2.3	0.6		0.6	105.3	4.3
DESCHUTES	902.3686	84.2	1.1	265.1	20.8	20.8	5.7	335.2	2.0	471.3	452.7
GILLIAM	0.131	1.6	0.02	8.4	0.3	0.3	0.1		0	31.9	2,274.6
GRANT	92.5048	170.9	0.1	5.6	0.3	0.3	0.4		0.1	601.0	0
HOOD RIVER	85.2089	6	0.3	44.6	5.6	5.6	1.3	167.6	0.6	460.8	
JEFFERSON	140.5038	44.6	0.1	38.6	3.6	3.6	0.6		0.8	144.2	0
LANE	2038.5201	150.8	4.5	674.4	82.9	82.9	12.6	905.9	10.4	1,196.3	100.8
LINCOLN	295.6109	20.1	0.6	62.8	3.6	3.6	3.3	145.7	0.1	159.8	0
LINN	831.4134	562.4	1.1	202.2	28.2	28.2	3.0	94.7	0.5	427.1	
MARION	1373.9018	55.7	3.4	477.7	61.1	61.1	9.7	614.5	6.6	1,232.5	0
MORROW	220.7118	7.2	0.1	12.6	0.5	0.5	0.2		0.4	1,100.8	15.1
MULTNOMAH	315.9287	6.6	14.2	1,453.5	215.3	210.0	32.6	5,739.0	14.7	2,780.1	4.5
POLK	185.6593	304.3	0.3	56.8	14.6	14.6	1.3		1.3	268.9	
SHERMAN	48.5343	22.4	0.01	1.4	0.1	0.1	0.2		0	19.1	0
TILLAMOOK	153.4395	8.9	0.2	43.8	2.0	2.0	1.5	24.3	0.7	87.6	8.1
UMATILLA	538.1842	18.6	0.8	122.9	9.6	9.6	2.3	24.3	0.2	1,317.8	0.7
WASCO	108.667	106.3	0.3	50.1	5.5	5.5	1.2	24.3	0.2	208.4	51.9
WASHINGTON	220.4308	27.9	7.3	1,153.6	273.6	273.6	14.6	2,302.4	25.3	1,817.9	6.7
WHEELER	0	77.5	0.01	2.9	0.2	0.2	0.1		0	5.6	0
YAMHILL	293.463	1178.7	0.7	163.6	28.4	28.4	3.2	427.4	0.3	376.2	18.8
Total	**8,857.0**	**5,152.5**	**40.9**	**5,932.6**	**922.8**	**917.5**	**110.3**	**11,485.3**	**72.9**	**14,752.4**	**3,085.5**

VOC Table cont'd

County	Non-Perc Drycleaning	Nonroad: Aircraft & Aircraft Refueling	Nonroad: Airport GSE: Diesel	Nonroad: Locomotive	Nonroad: Recreational Marine	Open Burning: Agricultural	Open Burning: Residential	POTWs	Prescribed Burning
BENTON		4.6		8.8	8.1	41.6	27.0	3.5	306.5
CLACKAMAS	0.9157	0.9	0.1	12.8	756.3	56.3	84.8	12.5	109.7
CLATSOP		11.7			500.3	0.0003	27.2	2.6	237.6
COLUMBIA		7.9			398.9		33.6	1.9	203.3
CROOK		0.9			105.2	4.5	15.2	0.4	304.2
DESCHUTES	0.1963	13.0		14.5	372.7	0	95.4	2.6	724.3
GILLIAM		0.5		29.6	4.7	139.1	1.4	0.1	
GRANT		1.0			2.6	0	5.8	0.4	230.2
HOOD RIVER		1.9		22.9	64.6	121.5	15.4	1.0	105.3
JEFFERSON		1.5		3.4	320.6	400.6	15.0	0.6	25.9
LANE	0.9048	23.8		87.2	605.6	114.5	129.6	18.2	960.4
LINCOLN		4.4		3.7	527.3		33.7	3.0	243.1
LINN		3.5		10.7	258.7	1,520.3	35.6	4.8	854.4
MARION	0.4522	16.7		27.9	115.7	788.4	85.2	21.5	186.1
MORROW		0.7			57.7	104.7	8.5	0.3	78.6
MULTNOMAH	7.8855	128.6	110.7	63.8	1,540.1	1.1	24.4	38.6	2.2
POLK		3.9		4.4	59.3	26.2	30.1	1.3	278.5
SHERMAN		0.2		15.9	24.1	43.9	1.4	0.1	
TILLAMOOK		2.8		2.0	519.0		18.6	1.5	113.2
UMATILLA		7.5		92.7	124.1	568.8	53.6	3.7	360.5
WASCO		2.4		41.8	101.3	124.9	17.9	1.4	153.3
WASHINGTON	0.149	21.4	1.5	7.7	102.4	25.9	21.2	16.1	97.3
WHEELER					1.1	0	1.2	0.03	59.5
YAMHILL		9.8		5.9	134.9	51.1	30.4	4.7	269.8
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Total	**10.5**	**269.8**	**112.3**	**455.7**	**6,705.3**	**4,133.5**	**812.3**	**140.9**	**5,904.2**

VOC Table cont'd

County	Residential NG/Oil Consumption	Residential Wood Combustion	Structure Fires	Surface Coating	Wildfires	**Total**
BENTON	1.5	2,714.8	1.1	2,261.5	7.1	**6,341.0**
CLACKAMAS	6.5	11,199.3	9.1	5,382.2	2.0	**22,409.1**
CLATSOP	0.7	1,628.4	0.9	402.9	0.7	**3,073.9**
COLUMBIA	0.8	1,373.4	0.6	382.6	30.2	**2,715.0**
CROOK	0.4	793.2	0.5	227.4	1,920.9	**3,730.4**
DESCHUTES	2.4	4,587.4	5.1	1,548.0	5,055.6	**14,079.9**
GILLIAM	0.0	77.1		16.6	6,473.1	**9,059.6**
GRANT	0.0	442.9	0.1	83.7	5,023.8	**6,569.2**
HOOD RIVER	0.4	611.0	0.1	297.7	77.3	**2,011.4**
JEFFERSON	0.3	660.8	0.5	245.4	5,418.2	**7,329.0**
LANE	6.5	11,273.8	13.9	5,101.0	288.3	**21,845.3**
LINCOLN	1.0	2,357.8	0.9	374.2	7.1	**3,955.7**
LINN	2.0	3,514.9	10.3	1,343.5	35.7	**8,941.8**
MARION	5.1	9,366.5	12.5	2,949.6	2.0	**16,099.9**
MORROW	0.2	325.0	0.1	104.4		**1,817.6**
MULTNOMAH	13.5	24,827.6	126.0	10,440.7		**47,795.9**
POLK	1.2	2,084.4	3.6	624.3	7.1	**3,786.5**
SHERMAN	0.04	69.2	0.0	16.7		**214.9**
TILLAMOOK	0.5	1,415.2	0.6	301.4	0.9	**2,554.9**
UMATILLA	1.3	2,224.1	4.6	999.4	78.0	**6,024.9**
WASCO	0.5	774.1	29.7	221.7		**1,922.6**
WASHINGTON	8.7	16,573.1	67.8	6,498.5		**29,344.8**
WHEELER	0.0	86.0	0	13.5	1,920.9	**2,168.6**
YAMHILL	1.5	3,136.4	1.8	1,039.3		**6,911.3**
Total	**54.9**	**102,116.4**	**289.7**	**40,876.3**	**26,348.9**	**230,703.2**

Gorge Project 2004 Nonroad Model Output: Emissions in Tons per Day: Oregon

	CO		NOX		PM10		PM2.5		SOX		VOC	
	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
BENTON	9.3	30.1	1.6	3.1	0.1	0.3	0.1	0.3	0.2	0.3	0.9	2.1
CLACKAMAS	64.2	200.8	5.4	9.3	0.5	1.0	0.5	0.9	0.5	0.8	6.1	12.4
CLATSOP	4.8	14.4	0.5	0.8	0.1	0.1	0.1	0.1	0.1	0.1	0.7	1.8
COLUMBIA	3.2	9.1	0.6	1.0	0.0	0.1	0.0	0.1	0.1	0.1	0.3	0.8
CROOK	2.0	5.3	0.4	0.9	0.0	0.1	0.0	0.1	0.0	0.1	0.3	0.8
DESCHUTES	19.6	47.8	3.3	5.0	0.3	0.5	0.3	0.5	0.4	0.5	2.2	5.2
GILLIAM	0.3	1.6	0.2	1.3	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.2
GRANT	11.4	2.4	0.2	0.5	0.1	0.1	0.1	0.1	0.0	0.1	4.6	0.5
HOOD RIVER	6.4	6.8	0.3	0.6	0.1	0.1	0.1	0.1	0.0	0.1	1.9	0.8
JEFFERSON	2.4	5.9	0.4	1.0	0.0	0.1	0.0	0.1	0.0	0.1	0.3	0.9
LANE	39.8	89.5	4.2	6.9	0.4	0.6	0.3	0.6	0.4	0.6	3.5	6.5
LINCOLN	4.4	13.9	0.4	0.7	0.1	0.1	0.0	0.1	0.0	0.1	0.6	1.7
LINN	15.0	39.1	1.7	4.5	0.2	0.5	0.2	0.4	0.2	0.4	1.6	2.8
MARION	31.0	87.2	3.1	6.7	0.3	0.7	0.3	0.7	0.3	0.7	3.1	6.5
MORROW	1.4	5.0	0.4	2.4	0.0	0.3	0.0	0.3	0.0	0.3	0.2	0.8
MULTNOMAH	93.5	203.3	10.1	14.6	0.9	1.3	0.8	1.2	0.9	1.4	7.2	12.8
POLK	4.2	13.3	0.6	1.8	0.1	0.2	0.1	0.2	0.1	0.2	0.5	1.3
SHERMAN	0.3	1.8	0.2	1.5	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.2
TILLAMOOK	3.0	8.2	0.4	0.6	0.0	0.1	0.0	0.1	0.0	0.1	0.5	1.3
UMATILLA	8.5	23.2	1.3	5.4	0.1	0.6	0.1	0.6	0.1	0.6	1.3	2.3
WASCO	3.1	8.4	0.3	1.4	0.0	0.2	0.0	0.2	0.0	0.1	0.5	1.5
WASHINGTON	75.3	259.3	8.3	13.7	0.7	1.3	0.7	1.3	0.8	1.2	5.8	15.4
WHEELER	0.2	0.4	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
YAMHILL	7.7	23.2	1.3	2.8	0.1	0.3	0.1	0.3	0.1	0.3	0.7	1.7
Total	**411.2**	**1,099.8**	**45.3**	**86.5**	**4.3**	**8.8**	**4.1**	**8.4**	**4.3**	**8.3**	**43.1**	**80.6**