FINAL

2001 AIR EMISSIONS INVENTORY

CRATER LAKE NATIONAL PARK
OREGON

U.S. NATIONAL PARK SERVICE

OCTOBER 2003

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OREGON

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1. INTRODUCTION

1.1 BACKGROUND

In August of *1999,* the National Park Service (NPS) embarked on the Natural Resource Challenge, a major effort to substantially improve how the NPS manages the natural resources under its care. As part of Natural Resource Challenge, the NPS Air Resources Division (ARD) was tasked with the responsibility of expanding efforts to monitor and understand air quality and related values in the parks. In addition, the NPS Environmental Leadership policy directs the NPS to manage the parks in a manner "that demonstrates sound environmental stewardship by implementing sustainable practices in all aspects of NPS management...." In order to achieve both of these objectives, it is necessary to gain an understanding of air pollution emissions that result from activities within the park. In this regard, development of an in-park air emissions inventory for Crater Lake National Park (NP) serves three functions. First, it provides an understanding of the sources and magnitude of in-park emissions and a basis for contrasting them with emissions from the surrounding area. Second, it identifies existing and potential strategies to mitigate in-park air emissions. Finally, it evaluates and ensures the compliance status of the park relative to state and federal air pollution regulations.

1.2 TYPICAL AIR EMISSION SOURCES

Typical air emission sources within NPS units include stationary, area, and mobile sources. Stationary sources can include fossil fuel-fired space and water heating equipment, generators, fuel storage tanks, and wastewater treatment plants. Area sources may include woodstoves, fireplaces, campfires, and prescribed burning. Mobile sources may include vehicles operated by visitors, tour operators, and NPS and concessioner employees, and nonroard vehicles and equipment.

The air pollutants that are addressed in this report are summarized in the table below. Of the pollutants noted, ozone is not produced and emitted directly from stationary, area, or mobile sources, but rather it is formed as a result a chemical reaction of NOx and VOC emissions in the presence of sunlight. Carbon dioxide historically has not been considered a pollutant. However, in recent years, there has been much interest in its contribution to global climate warning since it is considered a greenhouse gas.

AIR POLLUTANTS AND THEIR CHARACTERISTICS

Pollutant	Characteristics
Particulates (PM_{10})	• Mixture of solid particles and liquid droplets; fine particles (less than 10 micrometers) produced by fuel combustion, power plants, and diesel buses and trucks • Can aggravate asthma, produce acute respiratory symptoms, including aggravated coughing and difficult or painful breathing, and chronic bronchitis • Impairs visibility
Sulfur Dioxide (SO,)	• Can cause temporary breathing difficulties for people with asthma • Reacts with other chemicals to form sulfate particles that are major cause of reduced visibility in many parts of the country • Main contributor to acid rain
Nitrogen Oxides (NO_x)	• High temperature fuel combustion exhaust product • Can be an irritant to humans and participates in the formation of ozone • Reacts with other pollutants to form nitrite particles that are a significant contributor to visibility reduction in many parts of the country • Contributor to formation of acid rain
Carbon Monoxide (CO)	• Odorless, colorless gas produced by fuel combustion, particularly mobile sources • May cause chest pains and aggravate cardiovascular diseases, such as angina • May affect mental alertness and vision in healthy individuals
Volatile Organic Compounds (VOCs)	• Fuel combustion exhaust product • Consists of a wide variety of carbon-based molecules • Participates in the formation of ozone
Ozone (0_3)	• Not directly emitted by mobile, stationary, or area sources • Formed from complex reactions between NO_x and VOC emissions in the presence of sunlight • Occurs regionally due to multiplicity of sources • Can irritate the respiratory system • Can reduce lung function • Can aggravate asthma and increase susceptibility to respiratory infections • Can inflame and damage the lining of the lungs • Interferes with the ability of plants to produce and store food, which makes them more susceptible to disease, insects, other pollutants, and harsh weather • Damages the leaves of trees and other plants
Carbon Dioxide (CO_Q)	• Does not directly impair human health • It is a greenhouse gas that traps the earth's heat and contributes to global warming

1.3 INVENTORY METHODOLOGY

The methodology to accomplish the air emissions inventory was outlined in a protocol that was prepared at the initiation of the project (EA Engineering 2001). Tasks consisted of a site survey in July 2003, interviews with Crater Lake NP personnel (Jack Northcutt, 541-594-3033), review of applicable park records, emission calculations, review of applicable state and local air quality regulations, an assessment of mitigation measures and potential emission reduction initiatives, and report preparation. The data were used in conjunction with a number of manual and computer software computational tools to calculate emissions. Computational tools included U.S. Environmental Protection Agency (USEPA) emission factors such as the Factor Information

Retrieval System (FIRE) database, USEPA *TANKS 4.0* model, U.S. Forest Service *First Order Fire Effects Model (FOFEM) 4.0* model, and USEPA *MOBILE6.2* mobile source emissions model. The year 2001 was selected as the basis for the air emission inventory since data for that year were the most recent available at the park. It should be noted that emissions are expected to vary from year to year due to fluctuations in visitation, prescribed and wildland fires, and other activities. Additional information on emission estimation methodology, including emission factors, is provided in Appendices A and B.

1.4 PARK DESCRIPTION

Crater Lake NP is located in Southern Oregon on the crest of the Cascade Mountain range, 100 miles (160 km) east of the Pacific Ocean (Figure 1). It lies inside a caldera, or volcanic basin, and was created when the 12,000-foot (3,660 meter) high Mount Mazama collapsed 7,700 years ago following a large eruption. Crater Lake NP encompasses an area of 249 square miles.

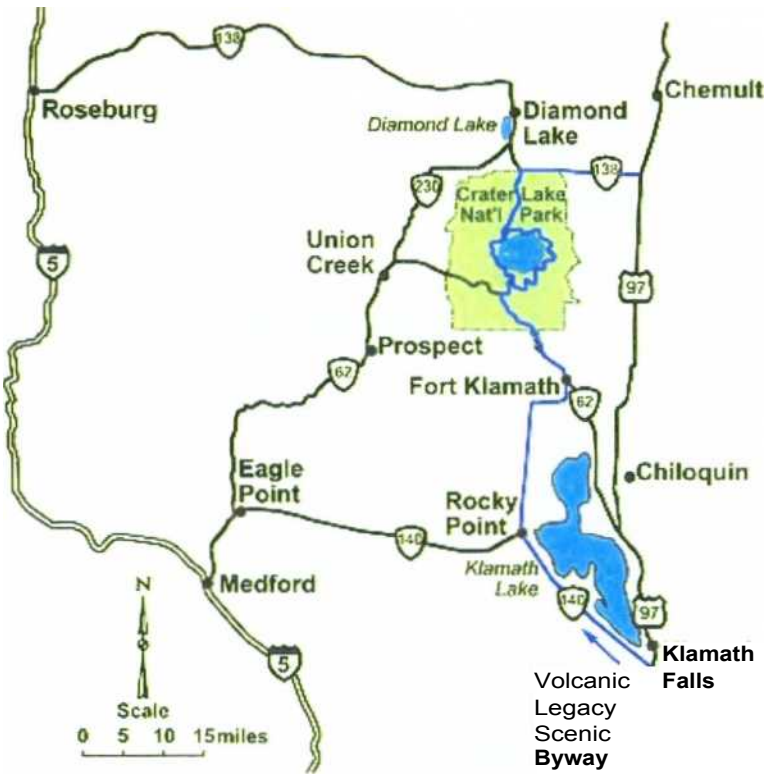

FIGURE 1. CRATER LAKE NATIONAL PARK LOCATION

Large amounts of winter snow, averaging 533 inches (1,354 cm) per year, supply the lake with water. There are no inlets or outlets to the lake. Crater Lake, at 1,943 feet (592 meters) deep, is

the seventh deepest lake in the world and the deepest in the United States. Evaporation and seepage prevent the lake from becoming any deeper.

The lake averages more than five miles (8 km) in diameter and is surrounded by steep rock walls that rise up to 2000 feet (600 meters) above the lake's surface. The lake level fluctuates slightly from year to year. The highest level was reached in 1975 when the water level rose to 6,179 feet (1,883 meters) above sea level. The lowest level was recorded in 1942 when it dropped to 6,163 feet (1,879 meters). For such a deep lake, the maximum observed variation of 16 feet (5 meters) is minor (less than 1 percent).

Following the collapse of Mount Mazama, lava poured into the caldera even as the lake began to rise. Today, a small volcanic island, Wizard Island, appears on the west side of the lake. This cinder cone rises 760 feet (233 meters) above the lake and is surrounded by black volcanic lava blocks. A small crater, 300 feet (90 meters) across and 90 feet (27 meters) deep, rests on the summit. The crater is filled by snow during the winter months, but remains dry during the summer.

Locations of developed areas are noted on a park map in Figure 2, and Table 1 is a summary of the facilities in the developed areas. Illustrations of the principal facilities in these areas are provided at the end of this section.

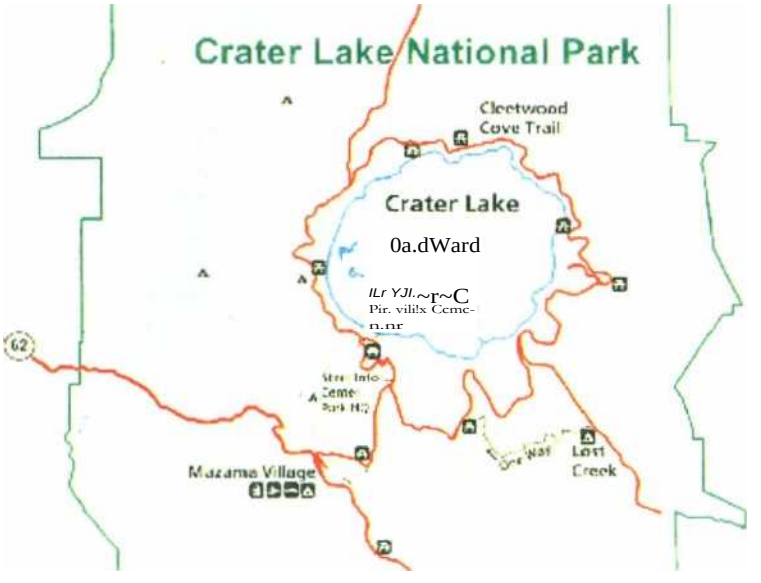

FIGURE 2. CRATER LAKE NATIONAL PARK MAP

The 33-mile Rim Drive encircles Crater Lake and is open only during the summer from late June to mid-October. The only access to the lake itself is via a steep trail to Cleetwood Cove, where concessionaire boat tours of the lake are offered.

Table 1: Crater Lake National Park Developed Areas

Name/Location	Function/Facilities
Munson Valley	Steel Information Center and Post Office, Park Headquarters (Sager Building), Ranger Station (Canfield Building), Maintenance Building, Rat Hall (Natural Resources), Employee Residences (Stone Houses, Steel Circle, and Sleepy Hollow), Superintendent's Residence
Rim Village	Visitor Center, Crater Lake Lodge, Restaurant, Cafeteria, Gift Shop, Community Center, Museum, Employee Dormitory
Mazama Village	Mazama Village Motor Inn, Convenience Store, Laundry and Showers, Public Gasoline Station, Campground, Employee Dormitories
Cleetwood	Boat Tours, Boat Gasoline Tank

1.5 AIR QUALITY STATUS

The Park is located in Klamath and Douglas Counties, Oregon. The Oregon Department of Environmental Quality is the governing authority for regulating air pollution from stationary sources in Oregon. The City of Klamath Falls, OR and its immediate surroundings are designated as a nonattainment area for PM10, but this designation is anticipated to be upgraded to a maintenance area in the Fall of 2003 [1]. However, the park lies outside this area, and thus is in an attainment area. Douglas County also is in attainment for all the national ambient air quality standards (NAAQS), including PM_{10}. There is also a new fine particulate NAAQS for PM2.5. Although official attainment status designations are forthcoming, areas that have historically exceeded the PM_{10} standard may have difficulty attaining the $PM2_{.5}$ standard. This may include Klamath Falls.

Crater Lake NP is designated a Class I airshed under the Clean Air Act, which requires the highest level of air-quality protection. With respect to visibility, trends indicate that on the clearest days during 1990-1999, there was a significant improvement in visibility at Crater Lake NP. However, during the same 10-year period, there was degradation in visibility during the haziest days at the park (NPS 2002).

[1] Personal communication. Larry Calkins. Oregon Department of Environment. Air Quality Program. October 2003.

Crater Lake

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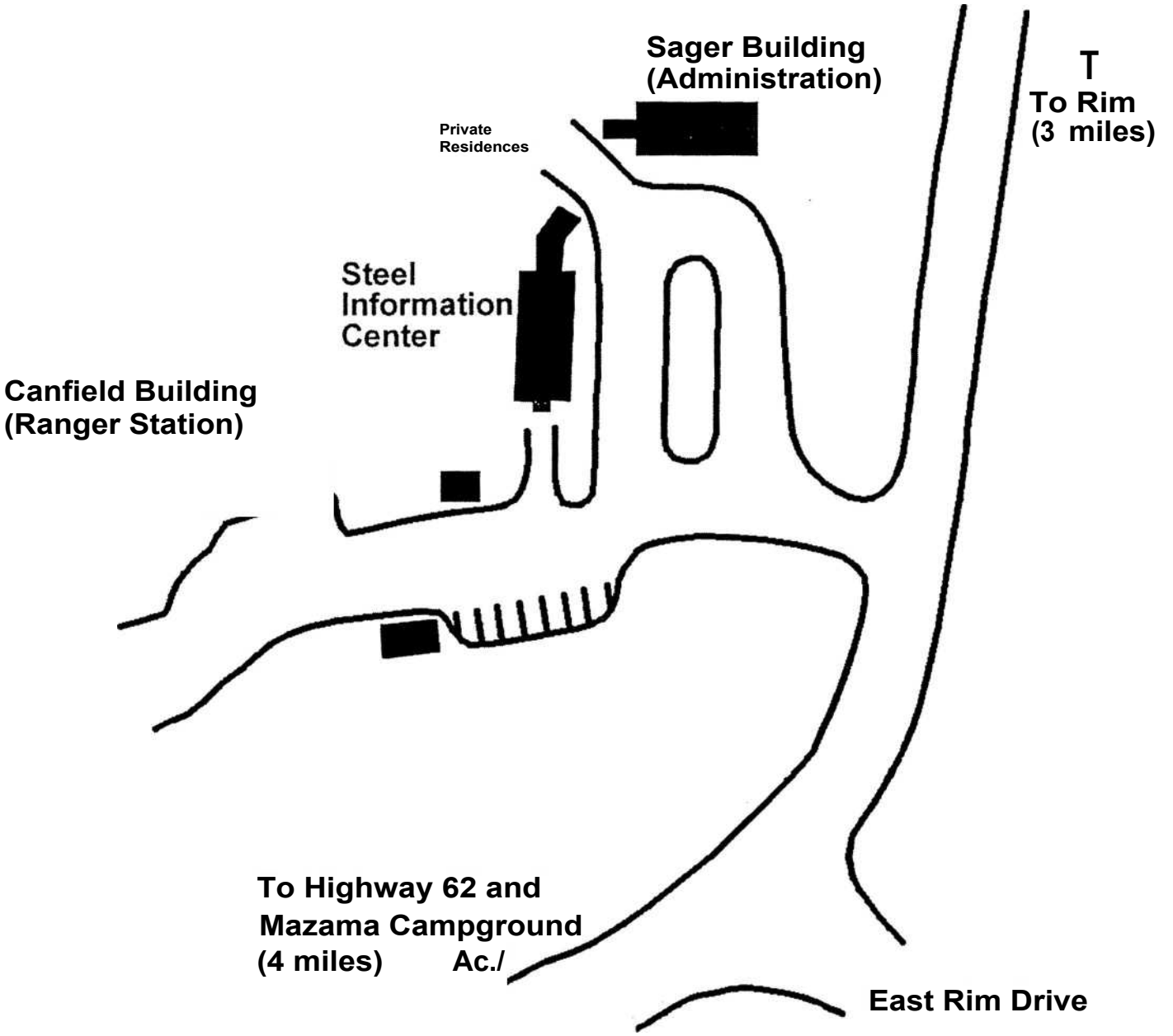
Munson Valley



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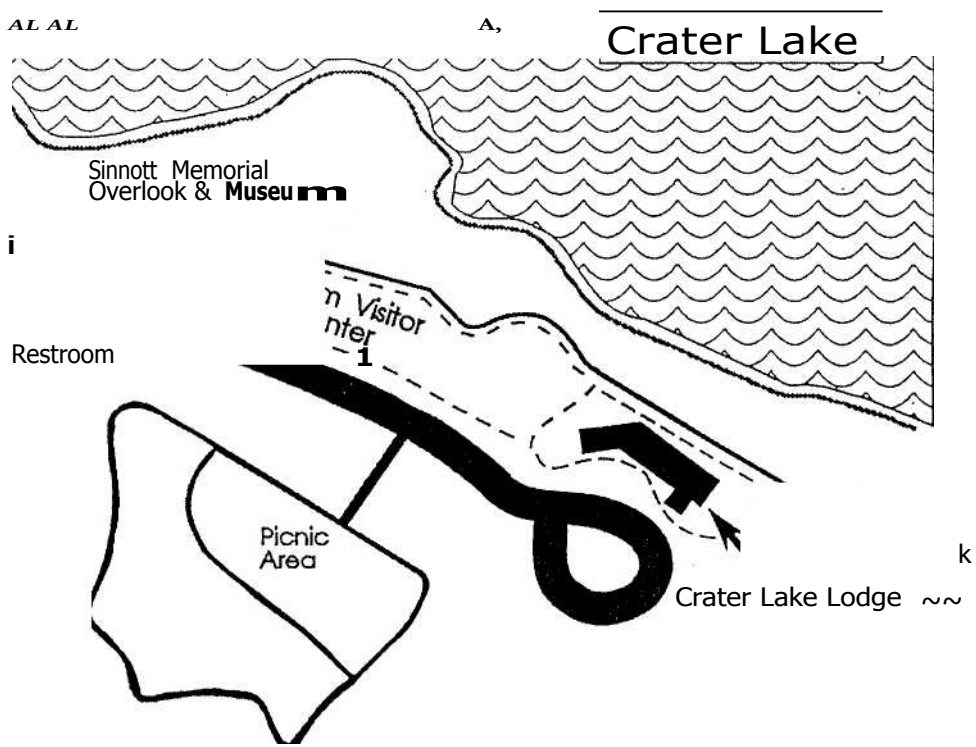

To
North
Entrance
and Cleetwood Trail

Cafeteria,
Restaurant,
& Gift Store

Rim Village

To Park Headquarters,
Mazama Village, and
Highway 62

Crater Lake

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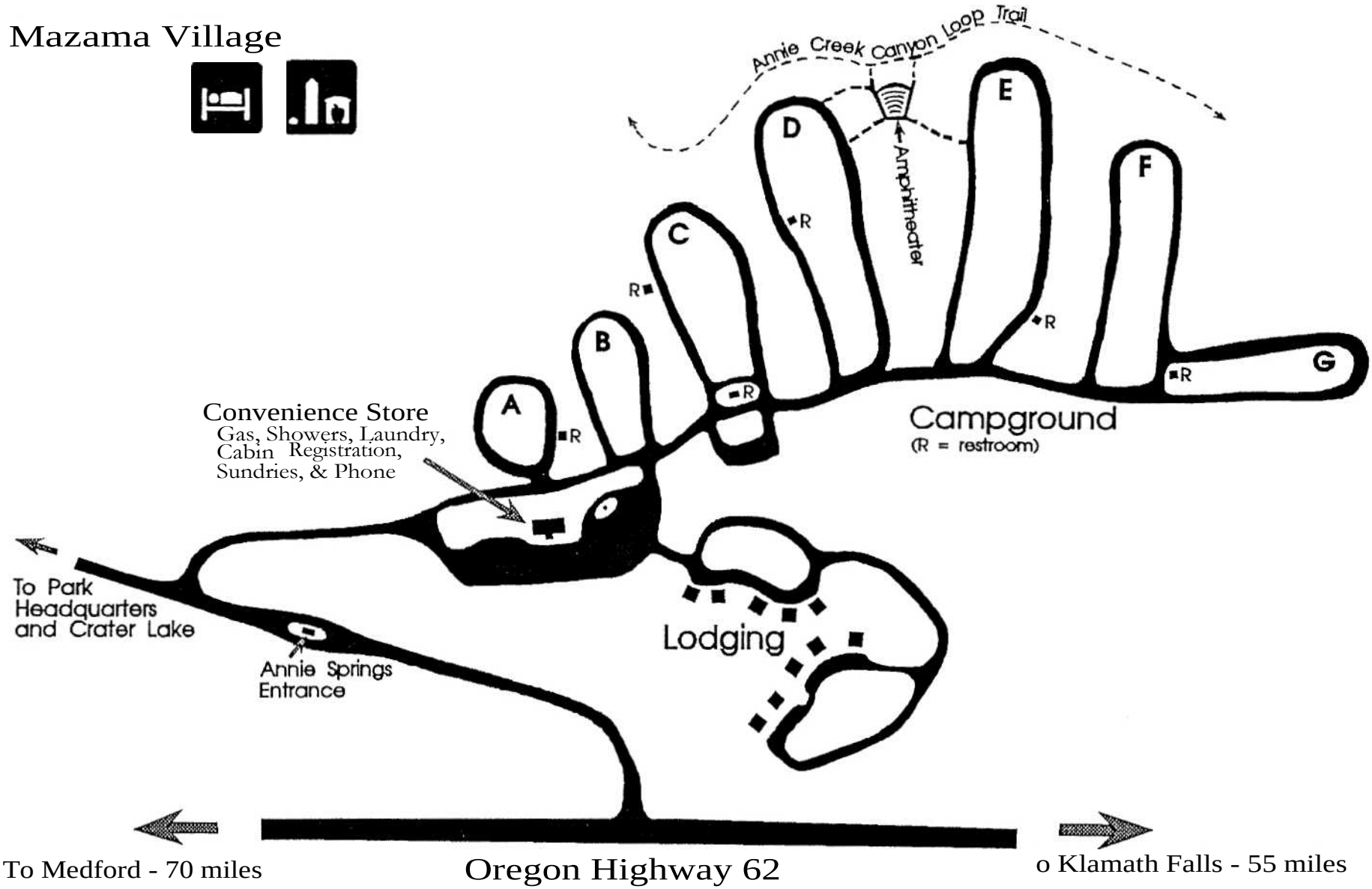
Crater Lake National Park



2. STATIONARY AND AREA SOURCE EMISSIONS

This section summarizes emissions from stationary sources at the Park for the year 2001. The discussion is divided into sections covering emissions from combustion sources, fuel storage sources, and area sources. The following emissions were calculated for each source: particulate matter (PM10), sulfur dioxide (SO_2), nitrogen oxides (NO_x), carbon monoxide (CO), carbon dioxide (C02), and volatile organic compounds (VOCs).

2.1 STATIONARY SOURCES

2.1.1 Space And Water Heating Equipment

There are seven No. 2 fuel oil space and water heating boilers in the Park that are operated by the NPS and the concessionaire, Xanterra Parks & Resorts. There are an additional 11 propane and No. 2 oil heating furnaces in employee residences. Criteria emissions were calculated using the appropriate commercial or residential emission factors for the fuel types. For example, NOx emissions from the No. 2 oil boiler in the NPS Maintenance Shop in Munson Valley was calculated as follows:

$$19{,}610 \text{ gallons/yr} \times \frac{20 \text{ lb PM}}{1{,}000 \text{ gallons}} = 392 \text{ lb NOx/yr}$$

Actual criteria pollutant emissions from space and water heating equipment are summarized in Table 2. Potential emissions also were calculated by assuming that the heating units were operated continuously during the year, and these emissions are noted in Table 3.

2.1.2 Generators

The concessionaire operates generators at the Crater Lake Lodge and the Employee Dormitory near Mazama Village. Emissions were calculated by multiplying the unit rating (kW) of the generator by an estimated annual run time (hr/yr) to get the kW-hr/yr, and the appropriate emission factors were then applied. For example, particulate emissions from the generator at Crater Lake Lodge are calculated as:

$$400 \text{ kW} \times \frac{52 \text{ hours}}{\text{year}} \times \frac{1.34 \text{ hp}}{\text{kW}} \times \frac{0.00220 \text{ lb PM}}{\text{hp-hr}} = 61 \text{ lb PM/yr}$$

TABLE 2. 2001 ACTUAL AIR EMISSIONS FROM CRATER LAKE NATIONAL PARK HEATING EQUIPMENT

Location	No.	Fuel	Fuel Consumption	PM_{10} (lbs/yr)	SO_2 (lbs/yr)	NO, (lbs/yr)	CO (Ibs/yr)	VOC (lbs/yr)	CO_2 (lbs/yr)
National Park Service									
Maintenance Shop	1	No. 2 Fuel Oil	19,610	39	1,392	392	98	7	421,615
Employee Housing			14,837	6	1,053	267	74	11	318,996
Employee Housing	2	Propane	1,062	0	0	15	2	0	13,275
			Subtotal	46	2,446	674	174	18	753,886
Xanterra-Parks and Resorts									
Crater Lake Lodge		No. 2 Fuel Oil	30,562	61	2,170	611	153	10	657,086
Dormitory - Space Heating	2		12,589	25	894	252	63	4	270,659
Dormitory - Water Heating	1		3,577	7	254	72	18	1	76,910
Dormitory - Water Heating	1		3,272	7	232	65	16	1	70,345
			Subtotal	100	3,550	1,000	250	17	1,075,000
Totals'									
			Park Totals	146	5,996	1,674	424	35	1,828,886

TABLE 3. 2001 POTENTIAL AIR EMISSIONS FROM CRATER LAKE NATIONAL PARK HEATING EQUIPMENT

Location	No.	Fuel	Fuel Consumption	PM,0 (lbs/yr)	SO_2 (lbs/yr)	NO_a (lbs/yr)	CO (Ibs/yr)	VOC (lbs/yr)	CO_2 (lbs/yr)
National Park Service									
Maintenance Shop	1	No. 2 Fuel Oil	205,860	412	14,616	4,117	1,029	70	4,425,990
_Employee Housing			47,867	19	3,399	862	239	34	1,029,144
Employee Housing	2	Propane	16,275	7	0	228	31	5	203,443
			Subtotal	437	18,015	5,207	1,299	109	5,658,576
Xanterra Parks and Resorts									
Crater Lake Lodge		No 2 Fuel Oil	306,850	614	21,786	6,137	1,534	104	*6,597,281*
Dormitory - Space Heating	2		126,394	253	8,974	2,528	632	43	2,717,477
Dormitory - Water Heating	I		35,916	72	2,550	718	180	12	772,194
Dormitory - Water Heating	1		32,850	66	2,332	657	164	11	706,275
			Subtotal	1,004	35,643	10,040	2,510	171	10,793,227
Totals									
			Park Totals	1,441	53,658	15,247	3,810	280	16,451,800

Potential emissions also were calculated for the generators. According to EPA guidance on calculating potential emissions from generators, 500 hours is an appropriate default assumption for estimating the number of hours that an emergency generator could be expected to operate.'

i *Calculating Potential to Emit (PTE)_for Emergency Generators,* Office of Air Quality Planning and Standards (MD-10) U.S. Environmental Protection Agency, September 6, 1995.

Actual and potential generator emissions are summarized in Table 4.

TABLE 4. 2001 ACTUAL AND POTENTIAL AIR EMISSIONS FROM CRATER LAKE NP GENERATORS

Location	Rating (kW)	Run Time (hrs/yr)	PM_{10} (lbs/yr)	SO_2 (lbs/yr)	NO_X (lbs/yr)	CO (lbs/yr)	VOC (lbs/yr)	CO_2 (lbs/yr)
		Actual Emissions						
Maintenance Shop	400	52	61	57	864	186	70	32,053
Wizard Island	20	10	1	1	8	2	1	308
Crater Lake Lodge	200	6	4	3	50	11	4	1,849
Mazama Dormitory	250	26	19	18	270	58	22	10,017
		Total	85	79	1,192	257	97	44,227
		Potential Emissions						
Maintenance Shop	400	500	590	549	8,308	1,790	673	308,200
Wizard Island	20	500	29	27	415	90	34	15,410
Crater Lake Lodge	200	500	295	275	4,154	895	336	154,100
Mazama Dormitory	250	500	369	343	5,193	1,119	420	192,625
		Total	1,282	1,195	18,070	3,894	1,463	670,335

2.1.3 Fuel Storage Tanks

Crater Lake NP has one gasoline underground storage tank (AST) at the Maintenance Shop and the concessionaire, Xanterra, has one gasoline underground storage tank (UST) for its vehicles and the public at Mazama Village and one AST at the boat tour site in Cleetwood. The Xanterra gasoline facility at Mazama Village is open to the public during the summer season.

There are two basic types of VOC emissions from storage tanks: working losses and standing losses. Working losses are composed of both withdrawal and refilling loss emissions. Withdrawal loss emissions result from the vaporization of liquid fuel residue on the inner surface of tank walls as the liquid levels in the tank are decreased and air is drawn into the tank. Refilling losses refer to fuel vapor releases to the air during the process of refilling the tank as the liquid level in the tank increases and pressurizes the vapor space. Standing losses describe those tank emissions from the vaporization of the liquid fuel in storage due to changes in ambient temperatures. VOC losses are also a direct function of the annual product throughput or turnovers. Emissions from diesel tanks are extremely small since the volatility of diesel fuel is extremely low compared to gasoline. VOC emissions from the NPS fuel storage tanks were calculated using the USEPA *TANKS* software program. *TANKS* is based on the emission estimation procedures from Chapter 7 of EPA's Compilation of Air Pollutant Emission Factors (AP-42) and uses chemical, meteorological, and other data to generate emission estimates for different types of storage tanks. Table 5 summarizes the calculated emissions.

TABLE 5: 2001 CRATER LAKE NP FUEL TANK EMISSIONS

Location	Product	Tank Type	Volume (gal)	Throughput (gal/yr)	VOC (lbs/yr)
Maintenance Shop	Gasoline	UST	6,000	21,000	121
Mazama Village	Gasoline	UST	15,000	160,000	922
Cleetwood	Gasoline	AST	5,000	7,000	40
				Total	1,083

2.1.4 Wastewater Treatment Plant

Wastewater is treated in lagoon systems and septic tanks. Since these are passive systems rather than mechanical processes such as primary wastewater treatment plants, few VOC emissions are generated.

2.2 AREA SOURCES

2.2.1 Woodstoves

Two employee housing units are equipped with woodstoves, but park officials estimated that they are not used.

2.2.2 Campfires

There are two campgrounds, one in Mazama Village and one in Lost Creek. Assuming that 90 percent of campsites had a morning or evening campfire and that each campfire site consumes approximately 15 lbs of wood, air emissions from campsites in 2001 were calculated and are summarized in Table 6.

TABLE 6: 2001 CRATER LAKE NP CAMPFIRE EMISSIONS

Mazama Village/213	12,140	91	3,150	36	237	22,999	20,850
Lost Creek/16	910	7	236	3	18	1,724	1,563
Totals	13,050	98	3,386	39	254	24,723	22,413

2.2.3 Wildfires and Prescribed Burning

Wildland fire consists of both wildfires and prescribed fires. Wildfires are ignited naturally, usually by lightening, are typically unwanted, and therefore suppressed. On the other hand,

prescribed burning is a land treatment process to accomplish natural resource management objectives, including reducing the potential for destructive wildfires, eliminating excessive fuel buildup, controlling insects and disease, improving wildlife habitat and forage production, maintaining natural succession of plant communities, and restoring natural processes. Prescribed burning can be for either ecological restoration or ecological maintenance. By policy, only prescribed burning for ecological restoration is considered an anthropogenic source of emissions; however, for the purposes of this emissions inventory, all prescribed burning has been treated as an anthropogenic source.

The First Order Fire Effects Model (FOFEM) was used to estimate emissions. FOFEM is a computer program developed by the Intermountain Fire Sciences Lab, U.S. Forest Service to predict the effects of prescribed fire and wildfire in forests and rangelands throughout the U.S. In particular, it quantifies emissions of PM10, $PM_{2,5}$, CO, $C0_2$, and VOC (as $CI^{-}_{14)}$.

By their very nature, wildfires vary significantly from year to year within most parks, particularly western parks. There have been very few wildfires in Crater Lake NP and no prescribed fires within the park. Table 7 summarizes the emissions from these fires for and average of eight acres a year over the last four years.

TABLE 7: WILDFIRE AIR EMISSIONS FROM CRATER LAKE NP

Fuel Type	Acres	PM'° (Ibs)	$PM_{2.5}$ (lbs)	CO (lbs)	CO_2 (Ibs)	VOC' (Ibs)
Wildfires						
Western Hemlock	4	11,264	9,544	5,784	547,616	126,660
Lodgepole Pine	4	2,616	2,216	1,340	133,500	29,300
Total	8	13,880	11,760	7,124	681,116	155,960

[1] As methane

2.2.4 Miscellaneous Area Sources

Miscellaneous area sources include food preparation, degreasers, paints and other surface coatings, lighter fluid consumption, consumer solvents, and propane use by visitors in recreational vehicles. Although there are no data on the consumption of these materials, emissions are estimated to be negligible.

2.3 SUMMARY OF STATIONARY AND AREA SOURCE EMISSIONS

Table 8 summarizes the stationary and area source emissions calculated above in a format that allows comparison between the various sources as well as providing totals for each pollutant or

pollutant category under consideration.

TABLE 8: SUMMARY OF 2001 STATIONARY AND AREA SOURCE EMISSIONS AT CRATER LAKE NP

Activity	Particulates (PM_{10})		Sulfur Dioxide		Nitrogen Oxides		Carbon Monoxide		VOCs		Carbon Dioxide	
	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/ Yr
Stationary Sources												
Heating Equipment	146	0.07	5,996	3.00	1,674	0.84	424	0.21	35	0.02	1,828,886	914
Generators	85	0.04	79	0.04	1,192	0.60	257	0.13	97	0.05	44,227	22
Gasoline Storage Tanks	--	--	--	--	--	--	--	--	1,083	0.54	--	
Stationary Sources Subtotal	231	0.12	6,075	3.04	2,858	1.43	681	0.34	1,215	0.61	1,873,113	936
Area Sources												
Campfires	3,386	1.69	39	0.02	254	0.13	24,723	12.36	22,413	11.21		--
Wildfires	13,880	6.94	--	--	--	--	155,960	77.98	7,124	3.56	681,116	340.56
Area Sources Total	17,266	8.63	39	0.02	254	0.13	180,683	90.34	29,537	14.77	681,116	340.56
Totals												
	Particulates (PM_{10})		Sulfur Dioxide		Nitrogen Oxides		Carbon Monoxide		VOCs		Carbon Dioxide	
	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	Lbs/yr	tons/yr
Totals without Wildfires	3,617	1.81	6,114	3.06	3,112	1.56	25,404	12.70	23,628	11.81	1,873,113	936
Totals with Wildfires	17,497	8.75	6,114	3.06	3,112	1.56	[1] 81,364	90.68	30,752	[1] 5.38	2,554,230	1,277

[1] As methane (CH_4)

3. MOBILE SOURCE EMISSIONS

This section summarizes emissions from mobile sources at Crater Lake NP for 2001. Mobile emission sources include highway and nonroad vehicles.

3.1 HIGHWAY VEHICLES

3.1.1 Visitor Vehicles

An estimated 175,000 vehicles entered the park during 2001. During the summer season, vehicles enter the park from two southern entrances and a north entrance, but during the winter, the northern entrance is closed. Table 9 summarizes the estimated visitor vehicles and vehicle miles traveled (VMT), and emissions are summarized in Table 13 at the end of this section.

TABLE 9: ESTIMATED VISITOR VEHICLE TRAVEL IN CRATER LAKE NP

	Vehicles		Vehicle Miles Traveled		
	Summer	Winter	Summer	Winter	Total
South Entrance	91,235	20,000	3,649,400	500,000	4,149,400
North Entrance	63,750	0	2,550,000	0	2,500,000
Rim Road	22,800	0	752,689	0	752,689
Totals	177,785	20,000	6,952,090	500,000	7,452,090

The majority of mobile source emissions can be categorized as either exhaust or evaporative emissions. Exhaust emissions are related to the combustion of fuel in the engine and include VOC, NO_x, CO, and PM_{10}. Exhaust emissions are dependent on a number of factors, including engine load, engine design and age, combustion efficiency, emissions equipment such as catalytic converters, and other factors. Evaporative emissions, which can occur while the vehicle is running or at rest, are related to the volatilization of fuel from vapor expansion, leaks and seepage, and fuel tank vapor displacement. Evaporative emissions are primarily dependent on daily temperature cycles and fuel volatility. In addition to vehicle exhaust, PM10 emissions also result from brake and tire wear, as well as the re-entrainment of dust from paved and unpaved roads (referred to as fugitive dust).

Emission factors produced by the USEPA MOBILE6.2 model were used in conjunction with VMT data in order to estimate mobile source emissions for VOC (both exhaust and evaporative), NOx, CO, and PM1o (exhaust, brake, and tire) for visitor vehicles. MOBILE6.2 produces exhaust and evaporative emission factors for light duty gasoline vehicles, light duty gasoline trucks, heavy duty gasoline vehicles, light duty diesel vehicles, light duty diesel trucks, heavy duty diesel vehicles, and motorcycles. It also produces a composite emission factor for all vehicles based on the vehicle VMT mix supplied to the model. Inputs to the model include average vehicle speed, vehicle VMT mix, inspection and maintenance (UM) program information, fuel infoiwation, ambient temperature data, elevation, and others. Fugitive PM10 emissions resulting from tire-roadway interaction were based on EPA's road dust emission factors.

The MOBILE6.2 model is typically used to support planning and modeling efforts in urban or regional areas and include default inputs suited for these applications. Therefore, it is suitable for applications over large, regional transportation networks. Application of the MOBILE6.2 model required the utilization of unique inputs that were representative of mobile source activity within the park. In particular, it was necessary to utilize unique inputs for the visitor vehicle VMT mix and the vehicle age distribution. The Center for Environmental Research and Technology within the College of Engineering at the University of California's Riverside Campus (CE-CERT) established park-specific vehicle fleet characterizations in developing air emission inventories for Zion National Park (CE-CERT, 2001). CE-CERT found that the distribution of vehicle ages in the park reflected a larger fraction of newer vehicles compared to the general vehicle population. The park-specific mix vehicle types and vehicle age distribution developed by CE-CERT have been applied in the mobile modeling for Crater Lake NP.

In addition to park-specific age distribution, CE-CERT also developed park-specific modeling inputs for driving patterns that differ significantly from the default driving patterns typically used in mobile modeling, such as the Federal Test Procedure (FTP). In particular, they found that the FTP reflects both higher speeds and a wider range of speeds than observed in national parks. However, since the MOBILE6.2 model is not designed to readily incorporate unique driving pattern data, the default driving cycle remains the basis for the mobile source emission estimates provided here.

Other important mobile modeling inputs that can significantly affect mobile emission factors are the average speed, fuel characteristics, and UM program parameters. The average speed input to the mobile model was 35 mph, fuel volatility was assumed to be Reid vapor pressure (RVP) of

8.0 in the summer and 13.4 in the winter[5], and reformulated gasoline (RFG) was not assumed to be present. Finally, I/M program inputs were not included since there are no I/M programs in the areas near the park.

In order to account for seasonal differences in mobile emissions, separate MOBILE6.2 runs were performed to produce emission factors for winter and summer. A composite emission factor for each season, reflecting a park specific VMT mix adapted from CE-CERT, served as the basis for mobile source emission estimates. Additional particulate emissions (or entrained road dust) from vehicles operating on paved roads in Crater Lake NP also were calculated based on VMT. A summary of visitor vehicle emissions is provided in Table 13 at the end of this section.

3.1.2 GSA/NPS Highway Vehicles

Crater Lake NP operates a fleet of highway vehicles that are owned by the NPS or leased from the General Services Administration (GSA). Emission factors specific to vehicle classes (e.g., LDGVs) were used to estimate emissions from the NPS and GSA vehicles. In addition, the park's concessionaire, Xanterra, operates a fleet of LDGVs and LDGTs. A summary of NPS, GSA, and Xanterra vehicles and their estimated annual mileage is provided in Table 10, and emissions are summarized in Table 13 at the end of this section.

TABLE 10: NPS/GSA AND CONCESSIONAIRE ROAD VEHICLES AT CRATER LAKE NP

Vehicle Type	Number	Annual Usage (mi/yr)
National Park Service		
Light-Duty Gasoline Vehicles (LDGV)		44,900
Light-Duty Gasoline Trucks (LDGT)	36	255,380
Medium-Duty Gasoline Trucks (MDGV)	4	28,656
Total	47	328,936
Xanterra		
Light-Duty Gasoline Vehicles (LDGV)	2	5,000
Light-Duty Gasoline Trucks (LDGT)	10	125,000
Total	12	130,000
Park Totals		
	59	458,936

[5] Office of Transportation and Air Quality, U.S. Environmental Protection Agency, EPA420-R-02-011, February 2002

3.2 NPS NONROAD VEHICLES

The NPS also owns and operates nonroad motorized equipment that is used to maintain roads and grounds and for other purposes. There are records of the Crater Lake NP equipment inventory, and the larger pieces of equipment are noted in Table 11. Annual usage and emission factors from the USEPA nonroad emission database were used to calculate annual emissions that are provided in Table 13.

TABLE 11: NPS NONROAD VEHICLES AT CRATER LAKE NP

Vehicle Type	Number	Annual Usage (hrs/yr)
Grader	1	100
Backhoe	2	100
Dozer	1	100
Bobcat	1	100
Utility Vehicle	1	75
Front End Loader	1	100
Tractor	2	50
	9	625

3.3 MARINE VESSELS

The park concessionaire operates several marine vessels to provide boat tours on the lake for the public during the summer season. The NPS also operates several boats on the lake. Emissions from the boat engines were estimated using EPA emission factors for 2-stroke and 4-stroke engines. A summary of these data are provided in Table 12, and emission factors for the various types of marine vessels are provided in Appendix B.

TABLE 12: CRATER LAKE NP MARINE VESSEL EMISSIONS

Marine Vessel Type	Engine Power (hp)'	Hours of Operation	PM10 (lb/yr)	NO. (lb/yr)	CO (lb/yr)	HC (Ib/yr)
National Park Service						
4-Stroke	130	150		135	6,116	269
4-Stroke	35	75	0	6	294	13
4-Stroke	10	75	0	3	118	5
2-Stroke	15	75	4	1	120	61
4-Stroke	150	75	0	39	1,764	78
Xanterra Parks & Resorts						
Four-stroke	130	900		404	18,348	807
Totals						
				587	26,760	1,232

An average load factor of 0.21 was applied to all rated hp

3.4 SNOWMOBILES

The NPS operates four 2-stroke engine snowmobiles, and park officials estimated that these machines were operated a total of approximately 750 mi/yr. Emission factors that were developed for the Yellowstone Winter Use Plans EIS (NPS 2003) were used to estimate emissions, which are provided in Table 17 at the end of this section.

The public also is allowed to operate snowmobiles on a limited part of the park. Snowmobiles are allowed only in the road corridor between Highway 138 at the North Entrance Station and the North Junction of Rim Drive. Park officials estimated that approximately 2,800 snowmobiles enter the park annually, and emissions were calculated based on an average travel distance of 15 miles per machine. Again, emissions are provided in Table 17 at the end of this section

3.5 SUMMARY OF MOBILE SOURCE EMISSIONS

Table 13 summarizes the mobile source emissions calculated above in a format that allows a comparison between the various sources as well as providing totals for each pollutant or pollutant category under consideration.

TABLE 13: SUMMARY OF 2001 MOBILE SOURCE EMISSIONS AT CRATER LAKE NP

Activity	Particulates (PM,0)		Sulfur Dioxide		Nitrogen Oxides		Carbon Monoxide		VOCs	
	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr
Road Vehicles										
Visitor Vehicles	14,328	7.16	--	--	20,305	10.15	290,996	145.50	13,821	6.91
Tour Buses	28'	0.01	--	--	412	0.21	161	0.08	12	0.01
NPS/GSA Road Vehicles	645	0.32	--	--	1,838	0.92	13,807	6.90	647	0.32
Concessionaire Road Vehicles	249	0.12	--	--	359	0.18	5,937	2.97	274	0.14
Road Vehicle Emission Subtotal	15,250	7.63	--	--	22,914	11.46	310,901	155.45	14,754	7.38
Nonroad Vehicles										
NPS Nonroad Vehicles	112	0.06		--	357	0.18	220	0.11	128	0.06
NPS Marine Vessels	5	<0.01	--	--	183	0.09	8,412	4.21	425	0.21
Concessionaire Marine Vessels	3	<0.01	--	--	404	0.20	18,348	9.17	807	0.40
NPS Snowmobiles	2	<0.01	--	--	1	<0.01	380	0.19	142	0.07
Public Snowmobiles	116	0.06	--	--	47	0.02	21,293	10.65	7,939	3.97
Nonroad Vehicle Emission Subtotal	238	0.12	--	--	992	0.50	48,653	24.33	9,441	4.72
Totals										
	Particulates (PM,,,)		Sulfur Dioxide		Nitrogen Oxides		Carbon Monoxide		VOCs	
	lbs/ r	rm &	[illegible]							tons/ r
Totals	15,488	7.74	--	--	23,906	11.95	359,554	179.78	24,195	12.10

[1] Includes exhaust, brake, and tire PM 10 and dust from paved and unpaved roads

4. CRATER LAKE NP AND REGIONAL EMISSION SUMMARY

4.1 CRATER LAKE NP SUMMARY

A summary of Crater Lake NP emissions is provided in Table 14.

TABLE 14: ESTIMATED ANNUAL EMISSIONS FROM CRATER LAKE NP

Source	PM_{10} (tons)	SO, (tons)	NO_X (tons)	CO (tons)	VOCs (tons)
Point Sources					
Heating Equipment	0.07	3.00	0.84	0.21	0.02
Generators	0.04	<0.01	0.59	0.13	0.05
Gasoline Storage Tanks	--	--	--		0.54
Subtotal	0.12	3.00	1.43	0.34	0.61
Area Sources					
Campfires	1.69	0.02	0.13	12.36	11.21
Wildland Fires	6.94	--	--	77.98	3.56
Subtotal	8.63	0.02	0.13	90.34	14.77
Mobile Sources					
Road Vehicles	7.63	--	11.46	155.45	7.38
Nonroad Vehicles	0.12		0.50	24.33	4.72
Subtotal	7.75	--	11.96	179.78	12.10
Totals					
Totals	16.50	3.02	13.52	270.46	27.48

[1] As methane

4.2 REGIONAL AIR EMISSIONS

Emission estimates for Klamath and Douglas Counties and the State of Oregon were obtained from the 1999 National Emission Inventory (NEI) maintained by USEPA. It is important to note that differences may exist between the methodologies used to generate the park emission inventory and those used to generate the NEI. For example, here gasoline storage tanks have been included as stationary sources, while the NEI treats them as area sources. Table 15 provides a comparison of Crater Lake NP emissions with those from the surrounding counties and the State of Oregon. For all pollutants, Crater Lake NP emissions account for less than 1 percent of the surrounding counties point source emissions.

TABLE 15: ESTIMATED ANNUAL EMISSIONS FROM CRATER LAKE NP, SURROUNDING COUNTIES, AND THE STATE OF OREGON

Area	**PM_{10} (tons/yr)**	SO_2 **(tons/yr)**	NO_x **(tons/yr)**	**CO (tons/yr)**	**VOC (tons/yr)**
		Point' Sources			
Crater Lake NP	0.12	3.00	1.43	0.34	0.61
Klamath County	271	27	272	945	169
Douglas County	1,220	89	888	3,386	807
Surrounding County Totals	1,491	116	1,160	4,331	976
Oregon Totals	11,177	26,190	30,908	76,089	14,111
		Area Sources			
Crater Lake NP	8.63	0.02	0.13	90.34	14.77
Klamath County	12,625	491	3,518	98,523	6,784
Douglas County	11,965	392	3,456	100,200	8,212
Surrounding County Totals	24,590	883	6,974	198,723	14,996
Oregon Totals	219,727	18,768	45,370	1,195,495	152,738
		Mobile Sources			
Crater Lake NP	7.75	--	11.96	179.78	12.10
Klamath County	6,507	582	3,778	21,195	3,815
Douglas County	14,218	565	*9,654*	54,412	8,142
Surrounding County Totals	20,725	1,147	13,432	75,607	11,957
Oregon Totals	268,398	16,026	*210,790*	1,110,804	144,744

5. COMPLIANCE AND RECOMMENDATIONS

5.1 COMPLIANCE

The Oregon Department of Environmental Quality (DEQ) is the governing authority for regulating air pollution in the park. Park personnel should coordinate with the agency on permit issues relating to stationary sources, as well as prescribed burning activities. Prior to replacing or adding relatively large heating units, generators, and fuel storage tanks, the appropriate agency should be consulted regarding the need to obtain a permit to construct or a permit to operate such sources. For example, the Oregon Administrative Rule (OAR) 340-216-0020 Table 1, Part B exempts from its Air Contaminant Discharge Permit (ACDC) requirements:

- Natural gas and propane fired units (with or without #2 diesel backup) under 30 million Btus per hour heat input
- Boilers and other fuel burning equipment rated less than 10 million Btus per hour heat input
- Generators used exclusively as emergency generators

Rule 340-264-0040 authorizes recreational fires and ceremonial fires, for which a fire is appropriate, and the operation of barbecue equipment.

The Oregon Department of Forestry Smoke Management Plan considers Class I areas, including Crater Lake NP, as "smoke sensitive areas." Although the park has not conducted prescribed burning prior to 2002, approximately 168 acres were burned in 2002, and the park's Fire Management Plan outlines several prescribed fire projects totaling approximately 10,000 acres over the next five years. Each of these prescribed burning projects, as well as wildfires that are purposely allowed to burn to achieve management objectives, should be coordinated with both the state Department of Forestry (ODF) and DEQ. For example, the ODF prescribed burning strategy as delineated in its Visibility Protection Plan for Class I Areas strongly encourages that all such burning be conducted during the spring and fall months when area visitation is relatively low. Additional information on the ODF Smoke Management Plan and DEQ Visibility Protection Plan for Class I Areas is provided in Appendix D.

Although there are only two woodstoves in the park that are rarely, if ever, used, any future procurements of woodstoves should be limited to those specified in rule OAR 340-262-0010 Residential Heating. Such woodstoves must be certified and labeled for heating efficiency and emission performance in accordance with EPA New Source Perfoiiiiance Standards for

Residential Woodstoves. Although OAR 340-262-0010 also specifies limitations on woodstove use during certain air stagnation periods, the park is not located in an area that is subject to such limitations.

Selected regulations are included in Appendix D of this report. Based on the findings of this study, the park is in compliance with applicable state regulations.

5.2 RECOMMENDATIONS

Actions to promote sustainable development in the design, retrofit, and construction of park facilities have associated air quality benefits. These include actions that reduce or replace consumption of conventional fossil fuels and/or reduce the consumption of other resources. Reductions in potable and non-potable water consumption also achieve concurrent reductions in energy consumption and associated air emissions. Acquisition of energy efficient appliances whenever possible also is an incremental energy saving measure that has associated air quality benefits.

Current NPS initiatives include:

- Switched to B20 diesel fuel in March 2003
- Pacific Power and Light recently completed an energy audit to identify potential energy reduction measures
- Purchasing five percent of electricity derived from wind energy beginning in March 2004
- Motion sensors in visitor restrooms
- Water conservation program to actively look for leaks
- Installation of low-flow showerheads and toilets resulted in 15 percent water reduction from 1997 to 2001
- Installation of waterless urinals
- Installation of florescent lights in Administration Building and Sleepy Hollow employee residences
- Fixing summer employee residences to drain water lines to allow for heat cut-off in the winter
- Recycling program.

The concessionaire also has initiated a number of energy and pollution prevention measures, including:

- Comprehensive recycling program
- Switch to B20 diesel fuel beginning in the Fall of 2003
- Replacement of lake tour boats with modern, 4-stroke engines
- Operates an employee van system within the park to eliminate employee vehicles within the park, which reduces vehicle emissions and as well as general vehicle congestion
- Actively taken measures to reduce both the volume and weight of trash generation to reduce the annual trash truck trips from the park to Medford, OR.

Additional measures to reduce air emissions in the park include:

- When feasible, replace No. 2 fuel oil heating systems with cleaner propane-fueled systems.
- Investigate the feasibility and emission reduction potential of utilizing B20 fuel in stationary heating systems and generators
- Replace two-stroke engine snowmobiles with cleaner 4-stroke engine snowmobiles
- Identify management measures to reduce emissions from public snowmobiles operating in the north end of the park

The experience gained by Yellowstone and Grand Teton NPs during the development of their Winter Use Plans (NPS 2003) may provide some guidance in initiating a study of public snowmobiles in Crater Lake NP to reduce both noise and air emissions.

Several studies have been conducted to investigate the feasibility of implementing some form of visitor mass transportation system. However, costs and the short visitor season, particularly relating to access to the Rim road, remain significant obstacles (FHA 2001). With respect to alternative fuels, the park and concessionaire are switching its diesel vehicles to operate on B20 diesel fuel. The only feasible alternative fuel for its gasoline vehicles would be E10 (10 percent ethanol/90 percent gasoline) or propane since natural gas is not available in the park.

One near-term project that may have a negative impact on energy consumption involves the installation of a large exhaust system in the Maintenance Shop to rapidly extract exhaust fumes that otherwise migrate to offices on the second floor. The system will expel heated air and thus increase energy consumption. A possible alternative may be a system that attaches directly to individual vehicle exhaust pipes when vehicles are idling for maintenance or other purposes within the shop.

6. REFERENCES

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APPENDIX A

FUEL DATA AND EMISSION FACTORS

FUEL DATA

Fuel	Heating Value	Sulfur Content
No. 2 Distillate Fuel Oil/Diesel	140,000 Btu/gal	0.05% by weight
Natural Gas	1.050 Btu/ft'	2,000 grains/10^6 ft^3
Propane	91,500 Btu/gal	0.18 grains/ 100 ft^3

STATIONARY SOURCE EMISSION FACTORS - BOILERS/HEATING UNITS

DISTILLATE OIL (DF-2) - CRITERIA POLLUTANTS

Combustor Type	Emission Factor (lb/1,000 gal fuel burned)				
	PM[a]	SO·[b]	NO_X[e]	CO	VOC[d]
Residential Furnace[e]	0.4	142S	18	5	0.713
Boilers < 100 Million Btu/hr (Commercial/Institutional Combust.[c])	2	142S	20	5	0.34
Boilers < 100 Million Btu/hr (Industrial Boilers[g])	2	142S	20	5	0.2
Boilers > 100 Million Btu/hr (Utility Boilers)	2	157S	24	5	--

Source: AP-42, 5th Edition, Supplements A, B, C, D, and E, Tables 1.3-1 and 1.3-3.

NATURAL GAS - CRITERIA POLLUTANTS

Combustor Type (MMBtu/hr Heat Input)	Emission Factor (lb/10^6 ft^3 fuel burned)				
	PMWW	SO,	NO_X[e]	CO	VOC
Residential Furnaces (<0.3)					
-Uncontrolled	7.6	0.6	94	40	5.5
Tangential-Fired Boilers (All Sizes)					
-Uncontrolled	7.6	0.6	170	24	5.5
-Controlled-Flue gas recirculation	7.6	0.6	76	98	5.5
Small Boilers (<100)					
-Uncontrolled	7.6	0.6	100	84	5.5
-Controlled-Low NO, burners	7.6	0.6	50	84	5.5
-Controlled-Low NO,(burners/Flue gas recirculation	7.6	0.6	32	84	5.5
Large Wall-Fired Boilers (>100)					
-Uncontrolled (Pre-NSPS)[j]	7.6	0.6	280	84	5.5
-Uncontrolled (Post-NSPS)[k]	7.6	0.6	190	84	5.5
-Controlled-Low NO, burners	7.6	0.6	140	84	5.5
-Controlled-Flue gas recirculation	7.6	0.6	100	84	5.5

Source: AP-42, 5th Edition, Supplements A, B, C, D, and E, Tables 1.4-1 and 1.4-2.

STATIONARY SOURCE EMISSION FACTORS - BOILERS/HEATING UNITS (Continued)

PROPANE (LPG) - CRITERIA POLLUTANTS					
Combustor Type	Emission Factor (lb/1,000 gal fuel burned)				
	PM[a]	SO_2[b]	NO.,(`)	CO	VOC[d]
Commercial Boilers [f]	0.4	0.10S	14	1.9	0.3
Industrial Boilers [g]	0.6	0.10S	19	3.2	0.3
Source: AP-42, 5th Edition, Supplements A, B, C, D, and E, Table 1.5-1.					

STATIONARY SOURCE EMISSION FACTORS - GENERATORS

For generators rated at less than or equal to 448 kW (600 hp):

Fuel T ype	Emission Factor (lb/hp-hr)				
	PM	SO_X	*NO*,,	CO	VOC
DF-2	2.20 E-03	2.05 E-03	0.031	6.68 E-03	2.51 E-03
Gasoline	7.21 E-04	5.91 E-04	0.011	0.439	0.022
Natural Gas/P ropane	1.54 E-04	7.52 E-03(S)	3.53 E-03	8.6 E-04	1.92 E-04
Source: AP-42, 5th Edition, Supplements A, B, C, D, and E, Table 3.3-1 and 3.1-1					

For generators rated at greater than 448 kW (600 hp):

Fuel T ype	Emission Factor (lb/hp-hr)				
	PM	SO_X[b]	NO,	CO	VOC
DF-2	0.0007	(8.09 E-03)S	0.024	5.5 E-03	6.4 E-04
Source: AP-42, 5th Edition, Supplements A, B, C, D, and E, Table 3.4-1.					

FIREPLACE EMISSION FACTORS

Fuel Type	Emission Factor (lb/ton)				
	PMO[a]	SO_X	NO_X[c]	CO	VOC
Wood	34.6	0.4	2.6	252.6	229.0
Source: AP-42, 5th Edition, Supplements A, B, C, D, and E, Table 1.9-1.					

WOODSTOVE EMISSION FACTORS

Stove Type	Emission Factor (lb/ton)				
	PM°)	SO_X	NO,,(`)	CO	VOC
Conventional	30.6	0.4	2.8	230.8	53
Noncatalytic	19.6	0.4		140.8	12
Catalytic	20.4	0.4	2.0	104.4	15
Source: AP-42, 5th Edition, Supplements A, B, C, D, and E, Table 1.10-1.					

STATIONARY SOURCE EMISSION FACTORS - SURFACE COATING OPERATIONS

Surface Coating Type	VOC Emission Factor (lb/gal)
Paint: Solvent Base	5.6
Paint: Water Base	1.3
Enamel: General	3.5
Lacquer: General	6.1
Primer: General	6.6
Varnish/Shellac: General	3.3
Thinner: General	7.36
Adhesive: General	4.4
Source: *Calculation Methods for Criteria Air Pollutant Emission Inventories,* AL/OE-TR-1994-0049, July 1994. Armstrong Laboratory.	

(a) PM = Filterable Particulate Matter.

(b) These factors must be multiplied by the fuel sulfur content (for example, if the sulfur content is 0.05%, then S equals 0.05).

(c) Expressed as NO2.

(d) Emission factors given in AP-42 are actually for non-methane total organic compounds (NMTOC) which includes all VOCs and all exempted organic compounds (such as ethane, toxics and HAPs, aldehydes and semivolatile compounds) as measured by EPA reference methods.

(e) Unit Rating <300,000 Btu/hr.

(f) Unit Rating 3300,000 Btu/hr, but <10,000,000 Btu/hr.

(g) Unit Rating 310,000,000 Btu/hr, but <100,000,000 Btu/hr.

(h) Unit Rating 3100,000,000 Btu/hr.

(i) POM = Particulate POM only.

(j) PM = Filterable Particulate Matter + Condensible Particulate Matter.

(k) NSPS = New Source Performance Standard as defined in 40 CFR 60 Subparts D and Db. Post-NSPS units are boilers with greater than 250 MMBtu/hr of heat input that commenced construction, modification, or reconstruction after August 17, 1971, and units with heat input capacities between 100 and 250 MMBtu/hr that commenced construction, modification, or reconstruction after June 19, 1984.

(1) Emission factors are given on a fuel input basis (lb/MMBtu). To convert to a power output basis (lb/hp-hr), use an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr.

APPENDIX B

EMISSION CALCULATIONS

2001 ACTUAL CRITERIA EMISSIONS FROM HEATING UNITS AT CRATER LAKE NATIONAL PARK

Location	Emission Source	Building	Fuel	Nuniberof Sources	Capacity (Btu/hr)		Consumption (gal/yr)	PM, o (Ibs/yr)	SO, (Ibs/yr)	NO, (Ibs/yr)	CO (lbs/yr)	CO, (Ibs/yr)	VOC (Ibs/yr)
National Park Service													
Munson Valley	Furnace	Maintenance Shop	No. 2 Fuel Oil	I	3,290,000	3,290,000	19,610	39	1,392	392	98	421,615	7
Munson Valley	Furnace	Employee Housing	No. 2 Fuel Oil	9	85,000	765,000	14,837	6	1,053	267	74	318,996	11
Munson Valley	Furnace	Employee Housing	Propane	2	85.000	170,000	1,062	0	O	15	2	13,275	0
			Subtotal	12	3,460,000	4,225,000	35,509	46	2.446	674	174	753,886	18
Xauterra Parks anti Resorts													
Rini Village	Boiler	Crater Lake Lodge	No. 2 Fuel Oil	2	2,452,000	4,904,000	30,562	61	2,170	Oil	153	657,086	10
Mazama Village	Boiler	Dormitory- Space Heating	No. 2 Fuel Oil	2	1,010.000	2,020,000	12,589	25	894	252	63	270,659	4
Mazama Village	Boiler	Dormitory- Water Heating	No. 2 Fuel Oil	1	574.000	574,000	3,577	7	254	72	18	76,910	1
Mazama Village	Boiler	Dormitory - Water Heating	No. 2 Fuel Oil	I	525,000	525,000	3,272	7	232	65	16	70,345	1
			Subtotals	6	6,922,000	1 1,149,000	50,000	100	3.550	1.000	250	1.075.000	17
Park Totals													
				18				146	5,996	1,674	424	1,828,886	35
							Emission Factors (Ibs/1,000 gal)						
Emission Factors front AP-42. Tables 1.5-1 for commercial boilers, S=0.18 grains/100 cu ft								0.4	0.1 *S	14	1.9	12,500	0.3
Emission Factors from AP-42, Tables 1.3-1 and 1.3-3 for residential furnaces (<300,000 Btu/hr) S = 0.5 percent								2	142S	20	5	21,500	0.34
Emission Factors from AP-42. Tables 1.3-1 and 1.3-3 for furnaces (>300,000 Btu/hr) S = 0.5 percent								0.4	142S	18	5	21,500	0.713

2001 POTENTIAL CRITERIA EMISSIONS FROM HEATING UNITS AT CRATER LAKE NATIONAL PARK

Location	Emission Source	Building	Fuel	Number of Sources	Capacity (Btu/hr)		Consumption (gal/yr)	PM_{r5} (lbs/yr)	SO_2 (Ibs/yr)	NO, (lbs/yr)	CO (lbs/yr)	CO_2 (lbs/yr)	VOC (Ibs/yr)
National Park Service													
Munson Valley	Furnace	Maintenance Shop	No. 2 Fuel Oil	1	3,290,000	3,290,000	205,860	412	14,616	4,117	1,029	4,425,990	70
Munson Valley	Furnace	Employee Housing	No. 2 Fuel Oil	9	85,000	765,000	47,867	19	3,399	862	239	1,029,144	34
Munson Valley	Furnace	Employee Housing	Propane	2	85,000	170,000	16,275	7	0	228	31	203,443	5
			Subtotal	12	3,460,000	4,225,000	270,003	437	18,015	5,207	1,300	5,658,576	109
Nanterra Parks and Resorts													
Rim Village	Boiler	Crater Lake Lodge	No. 2 Fuel Oil	2	2,452,000	4,904,000	306,850	614	21,786	6,137	1,534	6,597,281	104
Mazama Village	Boiler	Dormitory-Space Heating	No. 2 Fuel Oil	2	11010,000	2,020,000	126,394	253	8,974	2,528	632	2,717,477	43
Mazama Village	Boiler	Dormitory - Water Heating	No. 2 Fuel Oil	1	574,000	574,000	35,916	72	2,550	718	180	772,194	12
Mazama Village	Boiler	Dormitory - Water Heating	No. 2 Fuel Oil	1	525,000	525,000	32,850	66	2,332	657	164	706,275	11
			Subtotals	6	6,922,000	11,149,000	502,011	1,004	35,643	10,040	2,510	10,793,227	171
Park Totals													
				18				1,441	53,658	15,247	3,810	16,451,803	280

		Emission Factors (lbs/1,000 gal)					
[1] Emission Factors from AP-42, Tables 1.5-1 for commercial boilers, S=0.18 grains/ 100 cu ft		0.4	0.1*S	14	1.9	12,500	0.3
[2] Emission Factors from AP-42, Tables 1.3-1 and 1.3-3 for residential furnaces (<300,000 Btu/hr) S = 0.5 percent		2	142S	20	5	21,500	0.34
[3] Emission Factors from AP-42, Tables 1.3-1 and 1.3-3 for furnaces (>300,000 Btu/hr) S = 0.5 percent		0.4	142S	18	5	21,500	0.713

[4] Formula=Consumption (gal/yr) * Emission Factor (lb/1,000 gal)

2001 ACTUAL CRITERIA EMISSIONS FROM GENERATORS AT CRATER LAKE NATIONAL PARK

Emission Source	Location	Fuel	Number of Sources	Rating (kW)	Run Time (hrs/yr)	Output (kW-hr/yr)	PM (lbs/yr)	SO, (lbs/yr)	NO, (lbs/yr)	CO (ibs/yr)	CO, (lbs/yr)	VOC (Ibs/yr)
National Park Service												
Generator	Maintenance Shop	Diesel	1	400	52	20,800	61	57	864	186	32,053	70
Generator	Wizard Island	Diesel	1	20	10	200	1	1	8	2	308	1
Xanterra Parks and Resorts												
Generator	Crater Lake Lodge	Diesel	1	200	6	1,200	4	3	50	11	1,849	4
Generator	Mazama Dormitory	Diesel	1	250	26	6,500	19	18	270	58	10,017	22
							85	79	1,192	257	44,227	97
Emission Factors from AP-42, Chapter 3.4-1 for generators rated less than 448 kW							2.20E-03	0.00205	3.10E-02	6.68E-03	1.15E+00	2.51 E-03

Formula = Output (kW-hr/yr) * 1.34 (hp/kW) * Emission Factor (lb/hp-hr)

2001 POTENTIAL CRITERIA EMISSIONS FROM GENERATORS AT CRATER LAKE NATIONAL PARK

Emission Source	Location	Fuel	Number of Sources	Rating (kW)	Run Time (hrs/yr)	Output (kW-hr/yr)	PM (lbs/yr)	SO, (Ibs/yr)	NO, (lbs/yr)	CO (lbs/yr)	CO, (lbs/yr)	VOC (lbs/yr)
Na tonal Park Service												
Generator	Maintenance Shop	Diesel	1	400	500	200,000	590	549	8,308	1,790	308,200	673
Generator	Wizard Island	Diesel	1	20	500	10,000	29	27	415	90	15,410	34
Xanterra Parks and Resorts												
Generator	Crater Lake Lodge	Diesel	1	200	500	100,000	295	275	4,154	895	154,100	336
Generator	Mazama Dormitory	Diesel	1	250	500	125,000	369	343	5,193	1,119	192,625	420
							1,282	1,195	18,070	3,894	670,335	1,463
Emission Factors from AP-42, Chapter 3.4-1 for generators rated less than 448 kW							2.20E-03	0.00205	3. I OE-02	6.68E-03	1.15E+00	2.51E-03

Formula = Output (kW-hr/yr) * 1.34 (hp/kW) * Emission Factor (lb/hp-hr)

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Crater Lake NPS
City:	Medford
State:	Oregon
Company:	NPS
Type of Tank:	Horizontal Tank
Description:	6000 gal UST

Tank Dimensions

Shell Length (ft):	16.00
Diameter (ft):	8.00
Volume (gallons):	6,000.00
Turnovers:	0.00
Net Throughput (gal/yr):	21,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	Y

Paint Characteristics

Shell Color/Shade:	
Shell Condition:	

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig):	0.00

Meteorological Data used in Emissions Calculations: Medford, Oregon (Avg Atmospheric Pressure = 14.07 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 8)	All	53.70	53.70	53.70	53.26	3.5597	3.5597	3.5597	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 8)	121.03	0.00	121.03

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Crater Lake Xanterra
City:	Medford
State:	Oregon
Company:	Xanterra
Type of Tank:	Horizontal Tank
Description:	15000 gal UST

Tank Dimensions

Shell Length (ft):	25.50
Diameter (ft):	10.00
Volume (gallons):	15,000.00
Turnovers:	0.00
Net Throughput (gal/yr):	160,000.00
Is Tank Heated (y/n):	N
Is Tank Underground (y/n):	Y

Paint Characteristics

Shell Color/Shade:	
Shell Condition:	

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig):	0.00

Meteorological Data used in Emissions Calculations: Medford, Oregon (Avg Atmospheric Pressure = 14.07 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (degfL	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol, Weight	Liquid Mass Fract,	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 8)	All	53.70	53.70	53.70	53.26	3.5597	3.5597	3.5597	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3

TANKS 4.0
Emissions Report - Summary Format
|ndividual Tank Emission Totals

Annual Emissions Report

	Losses(jbsj		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 8)	922.14	0.00	922.14

TANKS 4.0
Emissions Report - Summary Format
Tank Identification and Physical Characteristics

Identification

User Identification:	Crater Lake Cleetwood
City:	Medford
State:	Oregon
Company:	Xanterra
Type of Tank:	Horizontal Tank
Description:	5000 gal UST

Tank Dimensions

Shell Length (ft):	13.25
Diameter (ft):	8.00
Volume (gallons):	5,000.00
Turnovers:	0.00
Net Throughput (gal/yr):	7,000.00
Is Tank Heated *(y/n)*:	N
Is Tank Underground (y/n):	Y

Paint Characteristics

Shell Color/Shade:	White/White
Shell Condition:	Good

Breather Vent Settings

Vacuum Settings (psig):	0.00
Pressure Settings (psig):	0.00

Meteorological Data used in Emissions Calculations: Medford, Oregon (Avg Atmospheric Pressure = 14.07 psia)

TANKS 4.0
Emissions Report - Summary Format
Liquid Contents of Storage Tank

Mixture/Component	Month	Daily Liquid Surf. Temperatures (deg F) Avg.	Min.	Max.	Liquid Bulk Temp. (deg F)	Vapor Pressures (psia) Avg.	Min.	Max.	Vapor Mol. Weight	Liquid Mass Fract.	Vapor Mass Fract.	Mol. Weight	Basis for Vapor Pressure Calculations
Gasoline (RVP 8)	All	53.70	53.70	53.70	53.26	3.5597	3.5597	3.5597	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3

TANKS 4.0
Emissions Report - Summary Format
Individual Tank Emission Totals

Annual Emissions Report

	Losses(Lbs)		
Components	Working Loss	Breathing Loss	Total Emissions
Gasoline (RVP 8)	40.34	0.00	40.34

2001 ACTUAL EMISSIONS FROM CAMPFIRES AT CRATER LAKE NATIONAL PARK

Location	Camp Sites	Fires/Yr	Tons/Yr	PM (lbs/yr)	SO_2 (lbs/yr)	NO_x (lbs/yr)	Co (lbs/yr)	VOC (lbs/yr)
Mazama Village	213	12,140	91	3,150	36	237	22,999	20,850
Lost Creek	16	910	7	236	3	18	1,724	1,563
Totals	229	13,050	98	3,386	39	254	24,723	22,413
			tons/yr	1.69	0.02	0.13	12.36	11.21

Assumption: Ninety percent of camp sites have either an evening or morning campfire

TITLE: Results of FOFEM model execution on date: 7/23/2003

FUEL CONSUMPTION CALCULATIONS

Region: Interior West
Cover Type: SAF/SRM - SAF 224 - Western Hemlock
Fuel Type: Natural
Fuel Reference: FOFEM 171

FUEL CONSUMPTION TABLE

Fuel Component Name	Preburn Load (t/acre)	Consumed Load (t/acre)	Postburn Load (t/acre)	Percent Reduced (%)	Equation Reference Number	Moisture
Litter	1.00	1.00	0.00	100.0	999	
Wood (0-1/4 inch)	0.90	0.90	0.00	100.0	999	
Wood (1/4-1 inch)	2.10	2.10	0.00	100.0	999	25.0
Wood (1-3 inch)	2.80	2.80	0.00	100.0	999	
Wood (3+ inch) Sound	45.00	29.11	15.89	64.7	999	20.0
3->6	11.25	11.25	0.00	1.0		
6->9	11.25	9.04	2.21	0.8		
9->20°	11.25	5.96	5.29	0.5		
20-> `	11.25	2.86	8.39	0.3		
Wood (3+ inch) Rotten	5.00	3.99	1.01	79.9	999	20.0
3->6	1.25	1.25	0.00	1.0		
6->9	1.25	1.24	0.01	1.0		
9->20	1.25	0.98	0.27	0.8		
20->	1.25	0.52	0.73	0.4		
Duff	35.00	14.38	20.62	41.1	2	100.0
Herbaceous	0.20	0.20	0.00	100.0	22	
Shrubs	0.35	0.21	0.14	60.0	23	
Crown foliage	0.00	0.00	0.00	0.0	37	
Crown branchwood	0.00	0.00	0.00	0.0	38	
Total Fuels	92.35	54.70	37.65	59.2		

FIRE EFFECTS ON FOREST FLOOR COMPONENTS

Forest Floor Component	Preburn Condition	Amount Consumed	Postburn Condition	Percent Reduced	Equation Number
Duff Depth (in)	2.0	0.8	1.2	40.0	6
Min Soil Exp (%)	.0	21.9	21.9	21.9	10

	Emissions -- lbs/acre flaming	smoldering	total
PM 10	14	2802	2816
PM 2.5	12	2374	2386
CH 4	4	1442	1446
CO	30	31635	31665
CO 2	8140	128764	136904

	Consumption tons/acre	Duration hour: min: sec
Flaming:	2.29	00:01:15
Smoldering:	52.41	q 02:12:00
Total:	54.70	

TITLE: Results of FOFEM model execution on date: 7/23/2003

FUEL CONSUMPTION CALCULATIONS

Region: Interior West
Cover Type: SAF/SRM - SAF 218 - Lodgepole Pine
Fuel Type: Natural
Fuel Reference: FOFEM 091

FUEL CONSUMPTION TABLE

Fuel Component Name	Preburn Load (t/acre)	Consumed Load (t/acre)	Postburn Load (t/acre)	Percent Reduced (%)	Equation Reference Number	Moisture
Litter	0.60	0.60	0.00	100.0	999	
Wood (0-1/4 inch)	0.18	0.18	0.00	100.0	999	
Wood (1/4-1 inch)	0.72	0.72	0.00	100.0	999	25.0
Wood (1-3 inch)	0.60	0.59	0.01	98.4	999	
Wood (3+ inch) Sound	13.50	3.82	9.68	28.3	999	20.0
3->6	3.38	1.87	1.51	0.6		
6->9	3.38	1.07	2.30	0.3		
9->20-	3.38	0.61	2.76	0.2		
20->`	3.38	0.27	3.11	0.1		
Wood (3+ inch) Rotten	1.50	0.70	0.80	46.9	999	20.0
3->6	0.38	0.32	0.06	0.8		
6->9	0.38	0.21	0.17	0.5		
9->20	0.38	0.12	0.25	0.3		
20->	0.38	0.06	0.32	0.2		
Duff	15.00	6.16	8.84	41.1	2	100.0
Herbaceous	0.20	0.20	0.00	100.0	22	
Shrubs	0.25	0.15	0.10	60.0	23	
Crown foliage	6.00	0.00	6.00	0.0	37	
Crown branchwood	4.80	0.00	4.80	0.0	38	
Total Fuels	43.35	13.13	30.22	30.3		

FIRE EFFECTS ON FOREST FLOOR COMPONENTS

Forest Floor Component	Preburn Condition	Amount Consumed	Postburn Condition	Percent Reduced	Equation Number
Duff Depth (in)	1.1	0.4	0.7	36.7	6
Min Soil Exp (%)	.0	21.9	21.9	21.9	10

	Emissions -- lbs/acre flaming	smoldering	total
PM 10	6	648	654
PM 2.5	5	549	554
CH 4	2	333	335
CO	13	7312	7325
CO 2	3612	29763	33375

	Consumption tons/acre	Duration hour:min:sec
Flaming:	1.02	00:01:00
Smoldering:	12.11	01:03:00
Total:	13.13	

2001 WILDLAND FIRE EMISSIONS AT CRATER LAKE NATIONAL PARK

Fuel Type	Acres	PM,p (lbs/yr)	PM,.5 (lbs/yr)	CH_4 (lbs/yr)	CO (lbs/yr)	CO, (lbs/yr)	PM_{10} (tons/yr)	PM2.S (tons/yr)	CH_4 (tons/yr)	CO (tons/yr)	CO,_ (lbs/yr)
Western Hemlock	4	11,264	9,544	5,784	126,660	547,616	5.63	4.77	2.89	63.33	273.81
Lodgepole Pine	4	2,616	2,216	1,340	29,300	133,500	1.31	1.11	0.67	14.65	66.75
Totals	8	13,880	11,760	7,124	155,960	681,116	6.94	5.88	3.56	77.98	340.56

Emission Factors (lbs/acre)

Western Hemlock		2,816	2,386	1,446	31,665	136,904
Lodgepole Pine		654	554	335	7,325	33,375

```
• # # # # # # # # # # # # # # # # # # # # # # # # # # #
• Crater Lake NP Winter Conditions.
• File 1, Run 1, Scenario 19.
• # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M584 Warning:
            The user supplied area wide average speed of 35.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways,
            freeway ramps, arterial/collector and local roadways
            for all hours of the day and all vehicle types.

• Reading PM Gas Carbon ZML Levels
• from the external data file PMGZML.CSV

• Reading PM Gas Carbon DR1 Levels
• from the external data file PMGDR1.CSV

• Reading PM Gas Carbon DR2 Levels
• from the external data file PMGDR2.CSV

• Reading PM Diesel Zero Mile Levels
• from the external data file PMDZML.CSV

• Reading the First PM Deterioration Rates
• from the external data file PMDDR1.CSV

• Reading the Second PM Deterioration Rates
• from the external data file PMDDR2.CSV

         User supplied gasoline sulfur content = 300.0 ppm.

  M616 Comment:
              User has supplied post-1999 sulfur levels.
  M 48 Warning:
             there are no sales for vehicle class HDGV8b

                   Calendar Year:   2001
                           Month:   Jan.
                        Altitude:   High
             Minimum Temperature:   18.0 (F)
```

Maximum Temperature: 34.0 (F)
Absolute Humidity: 75. grains/lb
Nominal Fuel RVP: 13.4 psi
Weathered RVP: 13.4 psi
Fuel Sulfur Content: 299. ppm

Exhaust I/M Program: No
Evap I/M Program: No
ATP Program: No
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.7002	0.1410	0.1044		0.0060	0.0008	0.0016	0.0180	0.0280	1.0000

Composite Emission Factors (g/mi):

Composite VOC :	0.815	1.123	1.022	1.080	0.954	0.433	0.439	0.509	2.54	0.923
Composite CO	20.22	26.57	23.77	25.38	28.19	1.308	0.931	6.582	26.87	21.429
Composite NOX :	0.882	1.281	1.494	1.372	3.922	1.267	1.212	16.834	1.25	1.319

Veh. Type:	LDGT1	LDGT2	LDGT3	LDGT4	LDDT12	LDDT34
VMT Mix:	0.0330	0.1080	0.0719	0.0325	0.0000	0.0016

Composite Emission Factors (g/mi):

Composite VOC :	1.051	1.145	0.994	1.084	2.424	0.391
Composite CO	25.85	26.79	23.65	24.05	6.522	0.795
Composite NOX :	1.008	1.365	1.349	1.814	2.555	1.180

Veh. Type:	HDGV2B	HDGV3	HDGV4	HDGV5	HDGV6	HDGV7	HDGV8A	HDGV8B
VMT Mix:	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Composite Emission Factors (g/mi):

Composite VOC :	0.954	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Composite CO	28.19	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Composite NOX :	3.922	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Veh. Type:	HDDV2B	HDDV3	HDDV4	HDDV5	HDDV6	HDDV7	HDDV8A	HDDV8B

```
            VMT Mix:     0.0020     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000     0.0000
                                     =
 Composite Emission Factors (g/mi):
     Composite VOC :      0.378      0.000      0.000      0.000      0.000      0.000      0.000      0.000
     Composite CO         1.942      0.000      0.000      0.000      0.000      0.000      0.000      0.000
     Composite NOX :      4.150      0.000      0.000      0.000      0.000      0.000      0.000      0.000
------------------------------------------------------------ ----------- -------------------------------------------

• # # # # # # # # # # # # # # # # # # # # # # # # # # #
• Crater Lake NP Summer Conditions.
• File 1, Run 1, Scenario 20.
• # # # # # # # # # # # # # # # # # # # # # # # # # # #
  M584 Warning:
            The user supplied area wide average speed of 35.0
            will be used for all hours of the day. 100% of VMT
            has been assigned to a fixed combination of freeways,
            freeway ramps, arterial/collector and local roadways
            for all hours of the day and all vehicle types.

• Reading PM Gas Carbon ZML Levels
• from the external data file PMGZML.CSV

• Reading PM Gas Carbon DR1 Levels
• from the external data file PMGDR1.CSV

• Reading PM Gas Carbon DR2 Levels
• from the external data file PMGDR2.CSV

• Reading PM Diesel Zero Mile Levels
• from the external data file PMDZML.CSV

• Reading the First PM Deterioration Rates
• from the external data file PMDDR1.CSV

• Reading the Second PM Deterioration Rates
• from the external data file PMDDR2.CSV

         User supplied gasoline sulfur content = 300.0 ppm.

  M616 Comment:
              User has supplied post-1999 sulfur levels.
```

M 48 Warning:
there are no sales for vehicle class HDGV8b

Calendar Year:	2001
Month:	July
Altitude:	High
Minimum Temperature:	40.0 (F)
Maximum Temperature:	69.0 (F)
Absolute Humidity:	75. grains/lb
Nominal Fuel RVP:	8.0 psi
Weathered RVP:	8.0 psi
Fuel Sulfur Content:	299. ppm
Exhaust I/M Program:	No
Evap I/M Program:	No
ATP Program:	No
Reformulated Gas:	No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.7002	0.1410	0.1044		0.0060	0.0008	0.0016	0.0180	0.0280	1.0000
Composite Emission Factors (g/mi):										
Composite VOC :	0.662	0.852	0.856	0.854	0.773	0.405	0.461	0.490	2.70	0.763
Composite CO	13.04	16.83	15.98	16.47	23.41	1.277	0.945	6.500	22.73	14.070
Composite NOX :	0.739	1.054	1.331	1.172	3.673	1.170	1.239	16.586	1.05	1.158

Veh. Type:	LDGT1	LDGT2	LDGT3	LDGT4	LDDT12	LDDT34
VMT Mix:	0.0330	0.1080	0.0719	0.0325	0.0000	0.0016
Composite Emission Factors (g/mi):						
Composite VOC :	0.805	0.866	0.836	0.901	2.512	0.418
Composite CO	16.45	16.95	15.89	16.19	6.775	0.824
Composite NOX :	0.835	1.120	1.198	1.624	2.574	1.212

Veh. Type:	HDGV2B	HDGV3	HDGV4	HDGV5	HDGV6	HDGV7	HDGV8A	HDGV8B
VMT Mix:	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Composite Emission Factors (g/mi):

Composite VOC ~	0.773	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Composite CO ~	23.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Composite NOX ~	3.673	0.000	0.000	0.000	0.000	0.000	0.000	0.000

---

veh. Type:	HDDV2B	HDDV3	HDDV4	HDDV5	HDDV6	HDDV7	HDDV8A	HDDV8B
VMT Mix:	0.0020	0.0000	0.0800	0.0000	0.0000	0.0000	0.0000	0.0000

Conpooite Emission Factors (g/mi):

Composite VOC ~	0.374	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Composite CO	1.957	0.000	0.000	0.000	8.000	0.000	0.000	0.000
Composite NOX ~	4.078	0.000	0.000	0.000	0.000	0.000	0.000	0.000

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k # # # # # # # # # # # # # # # # # # # # # # # # # # #
k Crater Lake NP Winter Conditions.
* File 1, Run 1, Scenario 19.
* # # # # # # # # # # # # # # # # # # # # # # # # # # #
```

Calendar Year: 2001
Month: Jan.
Gasoline Fuel Sulfur Content: 299. ppm
Diesel Fuel Sulfur Content: 500. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.7002	0.1410	0.1044		0.0060	0.0008	0.0016	0.0180	0.0280	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
GASPM:	0.0042	0.0047	0.0044	0.0046	0.0523		------	------	0.0205	0.0050
ECARBON:	------	------	------	------	------	0.1244	0.0488	0.1250	------	0.0024
OCARBON:	------	------	------	------	------	0.0351	0.0703	0.0997	------	0.0019
S04:	0.0028	0.0049	0.0047	0.0048	0.0118	0.0049	0.0106	0.0540	0.0010	0.0043
Total Exhaust PM:	0.0071	0.0096	0.0091	0.0094	0.0640	0.1644	0.1297	0.2786	0.0215	0.0136
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0115	0.0040	0.0080
Total PM:	0.0276	0.0302	0.0297	0.0300	0.0846	0.1849	0.1503	0.3027	0.0380	0.0341
S02:	0.0684	0.0804	0.1134	0.0944	0.1603	0.0939	0.2028	0.7715	0.0328	0.0872
NH3:	0.1016	0.1005	0.1015	0.1009	0.0451	0.0068	0.0068	0.0270	0.0113	0.0970
Idle Emissions (g/hr)										
PM Idle:	------	------	------	------	------	------	------	1.0557	------	0.0190

Veh. Type:	LDGT1	LDGT2	LDGT3	LDGT4	LDDT12	LDDT34
VMT Mix:	0.0330	0.1080	0.0719	0.0325	0.0000	0.0016
Composite Emission Factors (g/mi):						
Lead:	0.0000	0.0000	0.0000	0.0000	------	------
GASPM:	0.0047	0.0047	0.0044	0.0044	------	------
ECARBON:	------	------	------	------	0.1498	0.0464
OCARBON:	------	------	------	------	0.2156	0.0668

S04:	0.0049	0.0049	0.0047	0.0047	0.0062	0.0107
Total Exhaust PM:	0.0096	0.0096	0.0091	0.0091	0.3717	0.1238
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080
Total PM:	0.0302	0.0302	0.0297	0.0297	0.3922	0.1444
S02:	0.0804	0.0804	0.1134	0.1134	0.1196	0.2049
NH3:	0.1005	0.1005	0.1015	0.1015	0.0068	0.0068

Idle Emissions (g/hr)

PM Idle:

Veh. Type:	HDGV2B	HDGV3	HDGV4	HDGV5	HDGV6	HDGV7	HDGV8A	HDGV8B
VMT Mix:	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GAS PM:	0.0523	0.0523	0.0503	0.0504	0.0503	0.0503	0.0503	0.0000
ECARBON:								
OCARBON:					------	------	------	------
S04:	0.0118	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Exhaust PM:	0.0640	0.0523	0.0503	0.0504	0.0503	0.0503	0.0503	0.0000
Brake:	0.0125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tire:	0.0080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total PM:	0.0846	0.0523	0.0503	0.0504	0.0503	0.0503	0.0503	0.0000
S02:	0.1603	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NH3:	0.0451	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Idle Emissions (g/hr)

PM Idle:

Veh. Type:	HDDV2B	HDDV3	HDDV4	HDDV5	HDDV6	HDDV7	HDDV8A	HDDV8B
VMT Mix:	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Composite Emission Factors (g/mi):

Lead:								
GASPM:	------	------	------	------	------			
ECARBON:	0.0514	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OCARBON:	0.0535	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S04:	0.0172	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Exhaust PM:	0.1221	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Brake:	0.0125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tire:	0.0080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Total PM:	0.1426	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
SO2:	0.2452	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NH3:	0.0270	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Idle Emissions (g/hr)								
PM Idle:	1.0617	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

\# #
Crater Lake NP Summer Conditions.
File 1, Run 1, Scenario 20.
* #

Calendar Year: 2001
Month: July
Gasoline Fuel Sulfur Content: 299. ppm
Diesel Fuel Sulfur Content: 500. ppm
Particle Size Cutoff: 10.00 Microns
Reformulated Gas: No

Vehicle Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV	MC	All Veh
GVWR:		<6000	>6000	(All)						
VMT Distribution:	0.7002	0.1410	0.1044		0.0060	0.0008	0.0016	0.0180	0.0280	1.0000
Composite Emission Factors (g/mi):										
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000				0.0000	0.0000
GASPM:	0.0042	0.0046	0.0044	0.0045	0.0523				0.0205	0.0050
ECARBON:						0.1192	0.0485	0.1160		0.0023
OCARBON:						0.0336	0.0698	0.0926		0.0018
SO4:	0.0028	0.0049	0.0047	0.0048	0.0120	0.0049	0.0106	0.0540	0.0010	0.0042
Total Exhaust PM:	0.0070	0.0095	0.0091	0.0093	0.0643	0.1576	0.1289	0.2626	0.0215	0.0133
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080	0.0116	0.0040	0.0080
Total PM:	0.0276	0.0300	0.0297	0.0299	0.0848	0.1782	0.1494	0.2867	0.0380	0.0338
SO2:	0.0684	0.0804	0.1134	0.0944	0.1601	0.0929	0.2031	0.7714	0.0328	0.0872
NH3:	0.1016	0.1007	0.1015	0.1010	0.0451	0.0068	0.0068	0.0270	0.0113	0.0970
Idle Emissions (g/hr)										
PM Idle:	------	------	-----	------	------	------	------	1.0472	------	0.0189

Veh. Type:	LDGT1	LDGT2	LDGT3	LDGT4	LDDT12	LDDT34
VMT Mix:	0.0330	0.1080	0.0719	0.0325	0.0000	0.0016

Composite Emission Factors (g/mi):

Lead:	0.0000	0 0000	0.0000	0.0000	------	--- --
GASPM:	0.0046	0 0046	0.0044	0.0044	------	------
ECARBON:	------	------	------	------	0.1498	0.0464
OCARBON:	------	------	------	------	0.2156	0.0668
S04:	0.0049	0.0049	0.0047	0.0047	0.0062	0.0107
Total Exhaust PM:	0.0095	0.0095	0.0091	0.0091	0.3717	0.1238
Brake:	0.0125	0.0125	0.0125	0.0125	0.0125	0.0125
Tire:	0.0080	0.0080	0.0080	0.0080	0.0080	0.0080
Total PM:	0.0300	0.0300	0.0297	0.0297	0.3922	0.1444
S02:	0.0804	0.0804	0.1134	0.1134	0.1196	0.2049
NH3:	0.1007	0.1007	0.1015	0.1015	0.0068	0.0068

Idle Emissions (g/hr)

PM Idle:	------	------	------	------	------	------

Veh. Type:	HDGV2B	HDGV3	HDGV4	HDGV5	HDGV6	HDGV7	HDGV8A	HDGV8B
VMT Mix:	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Composite Emission Factors (g/mi):

Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
GASPM:	0.0523	0.0523	0.0506	0.0506	0.0506	0.0506	0.0505	0.0000
ECARBON:	------	------	------	------	------	------	------	------
OCARBON:	------	------	------	------	------	------	------	------
S04:	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Exhaust PM:	0.0643	0.0523	0.0506	0.0506	0.0506	0.0506	0.0505	0.0000
Brake:	0.0125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tire:	0.0080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total PM:	0.0848	0.0523	0.0506	0.0506	0.0506	0.0506	0.0505	0.0000
S02:	0.1601	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NH3:	0.0451	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Idle Emissions (g/hr)

PM Idle:	------	------	------	------

Veh. Type:	HDDV2B	HDDV3	HDDV4	HDDVS	HDDV6	HDDV7	HDDV8A	HDDV8B
	------	------	------	------	------	------	------	------
VMT Mix:	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Composite Emission Factors (g/mi):

Lead:	------	------
GASPM:	------	------

ECARBON:	0.0503	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
OCARBON:	0.0523	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S04:	0.0171	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Exhaust PM:	0.1198	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Brake:	0.0125	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Tire:	0.0080	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total PM:	0.1403	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
S02:	0.2450	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
NH3:	0.0270	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Idle Emissions (g/hr)								
PM Idle:	1.0504	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

CRATER LAKE NATIONAL PARK VISITOR VEHICLE EMISSIONS

Annual VMT		South Entrance Summer	South Entrance Winter	North Entrance Summer	North Entrance Winter	Rim Road Summer
	Vehicles	91,235	20,000	63,750	0	22,809
7,452,089	VMT	3,649,400	500,000	2,550,000	0	752,689

Emission Factors (g/mi) - All Vehicles

	NO_x	CO	VOC	PM_{10} Exhaust, Brake, and Tire	PM_{10} Fugitive	PM_{10} Total
Summer	1.158	14.070	0.763	0.0338	0.84	0.8738
Winter	1.319	21.429	0.923	0.0341	0.84	0.8741
Average	1.239	17.750	0.843			0.874

Emissions (tons/yr) - All Vehicles

NO_x	CO	VOC	PM_{10}
10.15	145.50	6.91	7.16

Emissions (lbs/yr) - All Vehicles

NO_x	CO	VOC	PM_{10}
20,305	290,996	13,821	14,328

Bus Annual VMT		South Entrance Summer	North Entrance Summer
	Vehicles	140	140
11,200	VMT	5,600	5,600

Emission Factors (g/mi) - Buses

	NO_x	CO	VOC	PM_{10} (Paved) Exhaust, Brake, and Tire	PM_{10} (Paved) Fugitive	PM_{10} (Paved) Total
Summer	16.586	6.500	0.490	0.2867	0.84	1.1267
Winter	16.834	6.582	0.509	0.3027	0.84	1.1427
Average	16.710	6.541	0.500			1.135

Emissions (tons/yr) - Buses

NO_x	CO	VOC	PM_{10}
0.21	0.08	0.01	0.01

Emissions (lbs/yr) - Buses

NO_x	CO	VOC	PM_{10}
412	161	12	28

CRATER LAKE NATIONAL PARK NPS AND GSA VEHICLES

	LDGV	LDGT	HDGV	HDDV	Total
Total Miles	44,900	255,380	0	28,376	328,656

Emission Factors (g/mi) - LDGV

					PM_{10}	
	NOx	**CO**	**VOC**	Exhaust, Brake, **and Tire**	Fugitive	Total
Summer	0.7390	13.0400	0.6620	0.0276	0.8400	0.8676
Winter	0.8820	20.2200	0.8150	0.0276	0.8400	0.8676
Average	0.8105	16.6300	0.7385			0.8676

Emissions (tons/yr) - **LDGV**

NO_x	**CO**	**VOC**	PM10
0.04	0.82	0.04	0.04

Emissions (Ibs/yr) - LDGV

80	1,643	73	86

Emission Factors (g/mi) - LDGT

					PM_{10}	
	NO_x	**CO**	**VOC**	Exhaust, Brake, and Tire	Fugitive	Total
Summer	1.172	16.470	0.854	0.030	0.840	0.870
Winter	1.372	25.380	1.080	0.030	0.840	0.870
Average	1.272	20.925	0.967			0.870

Emissions (tons/yr) - **LDGT**

NO_x	**CO**	**VOC**	PM10
0.36	5.88	0.27	0.24

Emissions (Ibslyr) - LDGT

715	11,756	543	489

Emission Factors (g/mi) - HDDV

					PM_{10}	
	NO_x	**CO**	**VOC**	Exhaust, Brake, and Tire	Fugitive	Total
Summer	16.586	6.500	0.490	0.287	0.840	1.127
Winter	16.834	6.582	0.509	0.303	0.840	1.143
Average	16.710	6.541	0.500			1.135

Emissions (tons/yr) - **HDDV**

NO_x	**CO**	**VOC**	PM10
0.52	0.20	0.02	0.04

Emissions (Ibs/yr) - HDDV

1,043	408	31	71

Emissions (tons/yr) - Total

NO_x	CO	VOC	PM_{10}
0.92	6.90	0.32	0.32

Emissions (Ibslyr) - Total

NO_x	**CO**	**VOC**	PM1o
1,838	13,807	647	645

CRATER LAKE NP XANTERRA VEHICLES

	LDGV	LDGT	HDGV	HDDV	Total
Total Miles	5,000	125,000	0	0	130,000

Emission Factors **(g/mi) - LDGV**

	NO_x	CO	VOC	PM_{10} Exhaust, Brake, and Tire	PM_{10} Fugitive	PM_{10} Total
Summer	0.7390	13.0400	0.6620	0.0276	0.8400	0.8676
Winter	0.8820	20.2200	0.8150	0.0276	0.8400	0.8676
Average	0.8105	16.6300	0.7385			0.8676

Emissions (tonslyr) - LDGV

NO_x	CO	VOC	PM_{10}
0.00	0.09	0.00	0.00

Emissions (Ibs/yr) - LDGV

9	183	8	10

Emission Factors (g/mi) - LDGT

	NO_x	CO	VOC	PM_{10} Exhaust, Brake, and Tire	PM_{10} Fugitive	PM_{10} Total
Summer	1.172	16.470	0.854	0.030	0.840	0.870
Winter	1.372	25.380	1.080	0.030	0.840	0.870
Average	1.272	20.925	0.967			0.870

Emissions (tons/yr) - LDGT

NO_x	**CO**	**VOC**	**PM_{10}**
0.17	2.88	0.13	0.12

Emissions (Ibs/yr) - LDGT

350	5,754	266	239

Emissions (tons/yr) - Total

NO_x	**CO**	**VOC**	**PM_{10}**
0.18	2.97	0.14	0.12

Emissions (Ibs/yr) - Total

NO_x	**CO**	**VOC**	**PM_{10}**
359	5,937	274	249

2001 CRATER LAKE NP NONROAD VEHICLE EMISSIONS

		Emission Factors (gm/hp-hr)							Emissions (lbs/yr)			
Vehicle	No.	PM	Nox	Co	VOC	hp	load	hrs/yr	PM	Nox	CO	VOC
Utility Cart	1	2.04	1.03	2.31	2.19	20	0.55	75	3.7	1.9	4.2	4.0
Tractors	2	2.04	1.03	2.31	2.19	42.35	0.68	50	12.9	6.5	14.6	13.9
										0.0	0.0	
Backhoe	1	2.04	1.03	2.31	2.19	77	0.55	100	19.0	9.6	21.5	20.4
Bobcat	1	2.04	1.03	2.31	2.19	15	0.55	100	3.7	1.9	4.2	4.0
Dozer	2	2.04	1.03	2.31	2.19	77	0.55	100	38.0	19.2	43.0	40.8
Grader	1	1.06	9.6	3.8	1.43	172	0.61	100	24.5	221.6	87.7	33.0
Front End Loader	1	1.11	10.3	4.8	1.3	77	0.55	100	10.3	96.0	44.7	12
							Totals:	(lbs/yr)	112	357	220	128
								(tons/yr)	0.06	0.18	0.11	0.06

CRATER LAKE NP MARINE VESSEL EMISSIONS

Diesel Engine Emission Factors'

Units	HC	CO	NO.	PM	SO_2
(g/hp-hr)	1.26	1.91	8.92	0.563	0.352
(lb/hp-hr)	0.003	0.004	0.020	0.001	0.001

1 g = 0.002202
BSFC = 0.367

' Source: Exhaust Emission Factors for Nonroad Engine Modeling - Compression-Ignition EPA Report No., NR-009A; Table 1

2-Stroke Gasoline Engine Emission Factors [3]

Units	HC	CO	NO_x	PM	SO_2
(g/hp-hr)	116.38	231.26	1.19	7.7	0.000
(lb/hp-hr)	0.256	0.509	0.003	0.017	0.000

4-Stroke Gasoline Engine Emission Factors [3]

Units	HC	CO	NO_x	PM	SO_2
(g/hp-hr)	14.92	339.18	7.46	0.06	0.000
(lb/hp-hr)	0.033	0.747	0.016	0.000	0.000

[3] Source: Nonroad Emission Inventory Model, Draft, June 17, 1998

Criteria Pollutant Emission [S3]

Vessel Type	No.	No. of Engines	Engine Power (hp)	Hours of Operation	Load Factor	HC (lb/yr)	CO (lb/yr)	NO_X (lb/yr)	PM (lb/yr)	SO_2 (lb/yr)
4-Stroke'	3	1	130	900	0.21	807	18,348	404	3	0
4-Stroke [2]	1	2	130	150	0.21	269	6,116	135	1	0
4-Stroke [2]	1	1	25	75	0.21	13	294	6	0	0
4-Stroke [2]	1	1	10	75	0.21	5	118	3	0	0
2-Stroke [2]	1	1	15	75	0.21	61	120	1	4	0
4-Stroke [2]	1	1	150	75	0.21	78	1,764	39	0	0
					NPS Totals	425	8,412	183	5	0
					Park Totals	1,232	26,760	587	9	0
							tons/year			
						0.62	13.38	0.29	0.00	0.00

[1] Tour boats operated by Xanterra on Crater Lake
[2] NPS Boats
Emissions = Emission Factor * No. of Engines * Engine Power * Hours of Operation *Load Factor

Crater Lake NP Snowmobile Emissions

NPS **MilesIYear:** 750

Emission (grams/mile)'

CO	PM_{10}	NO_x	HC
230.44	1.25	0.51	85.92

Emission (lbs/yr)

CO	PM_{10}	NO_x	HC
380	2	1	142

Emission (tonslyr)

CO	PM_{10}	NO_x	HC
0.19	0.00	0.00	0.07

Public **Miles/Year:** 42,000

Emission (grams/mile)

CO	PM_{10}	NO_x	HC
230.44	1.25	0.51	85.92

Emission (lbs/yr)

CO	PM_{10}	NO_x	HC
21,293	116	47	7,939

Emission (tonslyr)

CO	PM_{10}	NO_x	HC
10.65	0.06	0.02	3.97

Totals

Emission (lbs/yr)

CO	PM_{10}	NO_x	HC
21,673	118	48	8,081

Emission (tonslyr)

CO	PM_{10}	NO_x	HC
10.84	0.06	0.02	4.04

Source: [1] National Park Service. *Winter Use Plans Final Supplemental Environmental Impact Statement Yellowstone and Grand Teton National Parks and the John D. Rockefeller, Jr., Memorial Parkway* February 2003

APPENDIX C

PUBLIC USE DATA

Monthly Public Use Report

Printed on 0 1/20/2003

CRATER LAKE NP			12/2001	9320
	December 2001			
	Recreational	Non-Recreational	Total	Calendar Year-To-Date
Visits	14,756	4,300	19,056	506,973
Visitor Hours	53,528	2,150	*55,678*	3,054,868
				Fiscal YTD
Total Fiscal YTD Visitor Days				16,867

Recreation O/N stays	Current Month	Year-To-Date	
Concessioner Lodging	0	31,762	NPS Campgrounds
Concessioner Campgrounds	0	39,683	Tents 0
			RIV's 0
NPS Campgrounds	0	4,290	Total 0
NPS Backcountry	93	2,009	
NPS Miscellaneous	0	0	
Non Recreation O/N stays	0	0	
Total Overnight stays	93	77,744	

	This Month	Same Month Last Year	Percent Change
Total Rec	14,756	6,904	113.73
Total NonRec	4,300	4,300	0.00
Total Visits	19,056	11,204	70.08
Total YTD	506,973	476,483	6.40

Special Use Data	This Month	Year-To-Date
ANNIE SPRINGS VISITORS	14,712	291,419
HWY 62 NONRECREATION VISITS	4,300	49,600
NORTH ENTRANCE VISITS	0	163,099

APPENDIX D

SELECTED OREGON AIR QUALITY REGULATIONS

Oregon DEQ

Home > Regulations > Division 216 Table 1

DEQ

Division 216 (OAR 340-216-0020) Table 1
(Last Revised 3/8/02)

Part A: Activities And Sources

The following commercial and industrial sources must obtain a Basic ACDP under the procedures set forth in 340-216-0056 unless the source is required to obtain a different form of ACDP by Part B or C hereof: (Production and emission parameters are based on the latest consecutive 12 month period, or future projected operation, whichever is higher. Emission cutoffs are based on actual emissions.)

1. ** Autobody Repair or Painting Shops painting more than 25 automobiles in a year.
2. Natural Gas and Propane Fired Boilers (with or without #2 diesel oil back-up(a)) of 10 or more MMBTU but less than 30 MMBTU/hr heat input constructed after June 9, 1989.
3. Bakeries, Commercial baking more than 500 tons of dough per year.
4. * Cereal Preparations and Associated Grain Elevators more than 2,000 but less than 10,000 tons per year throughput.
5. Coffee Roasters roasting more than 6 tons coffee beans in a year, but less than 30 tons/yr.
6. Concrete Manufacturing including Redimix and CTB more than 5,000 but less than 25,000 cubic yards per year output.
7. Crematory and Pathological Waste Incinerators with less than 20 tons/yr. material input.
8. * Flour, Blended and/or Prepared and Associated Grain Elevators more than 2,000 but less than 10,000 tons per year throughput.
9. * Grain Elevators used for intermediate storage more than 1,000 but less than 10,000 tons/yr. throughput.
10. Gray iron and steel foundries, malleable iron foundries, steel investment foundries, steel foundries more than one ton/yr. but less than 100 tons/yr. metal charged (not elsewhere identified).
11. Millwork (including kitchen cabinets and structural wood members) more than 5,000 but less than 25,000 bd. ft./maximum 8 hour input.
12. Non-Ferrous Metal Foundries more than one ton/yr. but less than 100 tons/yr. of metal charged.
13. Pesticide Manufacturing more than 1,000 tons/yr. but less than 5,000 tons/yr.
14. Prepared feeds for animals and fowl and associated grain elevators more than 1,000 tons/yr. but less than 10,000 tons per year throughput.
15. Rock, Concrete or Asphalt Crushing both portable and stationary more than 5,000 tons/yr. but less than 25,000 tons/yr. crushed.
16. Sawmills and/or Planing Mills more than 5,000 but less than 25,000 bd. ft./maximum 8 hour finished product.
17. * Seed Cleaning and Associated Grain Elevators more than 1,000 but less than 5000 tons per year throughput, if particulate emission equal or exceed ½ ton/yr. (sources in this Basic permit category that have less than ½ ton of PM emissions are not required to have an ACDP).
18. Surface coating operations whose actual or expected usage of coating materials is greater than 250 gallons per month, excluding sources that exclusively use non-VOC and non-HAP containing coatings (e.g. powder coating operations).
19. Wood Furniture and Fixtures more than 5,000 but less than 25,000 bd. ft./maximum 8 hour input.

Part B: Activities And Sources

The following commercial and industrial sources must obtain either:

. a General ACDP, if one is available for the source classification and the source qualifies for a General ACDP under the procedures set forth in 340-216-0060;

- a Simple ACDP under the procedures set forth in 340-216-0064; or
- a Standard ACDP under the procedures set forth in 340-216-0066 if the source fits one of the criteria of Part C hereof.

1. Aerospace or Aerospace Parts Manufacturing
2. Aluminum Production - Primary
3. Ammonia Manufacturing
4. Animal Rendering and Animal Reduction Facilities
5. Asphalt Blowing Plants
6. Asphalt Felts or Coating
7. Asphaltic Concrete Paving Plants both stationary and portable
8. Bakeries, Commercial over 10 tons of VOC emissions per year
9. Battery Separator Manufacturing
10. Battery Manufacturing and Re-manufacturing
11. Beet Sugar Manufacturing
12. Boilers and other Fuel Burning Equipment over 10 MMBTU/hr. heat input, except exclusively Natural Gas and Propane fired units (with or without #2 diesel backup) under 30 MMBTU/hr. heat input
13. Building paper and Buildingboard Mills
14. Calcium Carbide Manufacturing
15. *** Can or Drum Coating
16. Cement Manufacturing
17. * Cereal Preparations and Associated Grain Elevators 10,000 or more tons/yr. throughput
18. Charcoal Manufacturing
19. Chlorine and Alkalies Manufacturing
20. Chrome Plating
21. Coffee Roasting (roasting 30 or more tons per year)
22. Concrete Manufacturing including Redimix and CTB 25,000 or more cubic yards per year output
23. Crematory and Pathological Waste Incinerators 20 or more tons/yr. material input
24. Degreasers (halogenated solvents subject to a NESHAP)
25. Electrical Power Generation from combustion (excluding units used exclusively as emergency generators)
26. Ethylene Oxide Sterilization
27. *** Flatwood Coating regulated by Division 232
28. *** Flexographic or Rotogravure Printing subject to RACT
29. * Flour, Blended and/or Prepared and Associated Grain Elevators 10,000 or more tons/yr. throughput
30. Galvanizing and Pipe Coating (except galvanizing operations that use less than 100 tons of zinc/yr.)
31. *** Gasoline Plants and Bulk Terminals subject to OAR 232
32. Gasoline Terminals
33. Glass and Glass Container Manufacturing
34. * Grain Elevators used for intermediate storage 10,000 or more tons/yr. throughput
35. Grain terminal elevators
36. Gray iron and steel foundries, malleable iron foundries, steel investment foundries, steel foundries 100 or more tons/yr. metal charged (not elsewhere identified)
37. Gypsum Products Manufacturing
38. Hardboard Manufacturing (including fiberboard)
39. Incinerators with two or more ton per day capacity
40. Lime Manufacturing
41. *** Liquid Storage Tanks subject to OAR Division 232
42. Magnetic Tape Manufacturing
43. Manufactured and Mobile Home Manufacturing
44. Marine Vessel Petroleum Loading and Unloading
45. Millwork (including kitchen cabinets and structural wood members) 25,000 or more bd. ft./maximum 8 hr. input
46. Molded Container
47. Motor Coach Manufacturing
48. Natural Gas and Oil Production and Processing and associated fuel burning equipment
49. Nitric Acid Manufacturing
50. Non-Ferrous Metal Foundries 100 or more tons/yr. of metal charged
51. Organic or Inorganic Chemical Manufacturing and Distribution with 'h or more tons per year emissions of

any one criteria pollutant (sources in this category with less than 1/2 ton/yr. of each criteria pollutant are not required to have an ACDP)

52. *** Paper or other Substrate Coating
53. Particleboard Manufacturing (including strandboard, flakeboard, and waferboard)
54. Perchloroethylene dry cleaners that do not submit a complete Dry Cleaner Annual Hazardous Waste and Air Compliance Report by June 1 of any given year
55. Pesticide Manufacturing 5,000 or more tons/yr. annual production
56. Petroleum Refining and Re-refining of Lubricating Oils and Greases including Asphalt Production by Distillation and the reprocessing of oils and/or solvents for fuels
57. Plywood Manufacturing and/or Veneer Drying
58. Prepared feeds for animals and fowl and associated grain elevators 10,000 or more tons per year throughput
59. Primary Smelting and/or Refining of Ferrous and Non-Ferrous Metals
60. Pulp, Paper and Paperboard Mills
61. Rock, Concrete or Asphalt Crushing both portable and stationary 25,000 or more tons/yr. crushed
62. Sawmills and/or Planing Mills 25,000 or more bd. ft./maximum 8 hr. finished product
63. Secondary Smelting and/or Refining of Ferrous and Non-Ferrous Metals
64. * Seed Cleaning and Associated Grain Elevators 5,000 or more tons/yr. throughput
65. Sewage Treatment Facilities employing internal combustion for digester gasses
66. Soil Remediation Facilities stationary or portable
67. Steel Works, Rolling and Finishing Mills
68. *** Surface Coating in Manufacturing subject to RACT
69. Surface Coating Operations with actual emissions of VOCs before add on controls of 10 or more tons/yr.
70. Synthetic Resin Manufacturing
71. Tire Manufacturing
72. Wood Furniture and Fixtures 25,000 or more bd. ft./maximum 8 hr. input
73. Wood Preserving (excluding waterborne)
74. All Other Sources not listed herein that the Department determines an air quality concern exists or one which would emit significant malodorous emissions
75. All Other Sources not listed herein which would have actual emissions, if the source were to operate uncontrolled, of 5 or more tons a year of PM10 if located in a PM10 non-attainment or maintenance area, or 10 or more tons of any single criteria pollutant in any part of the state

Part C: Activities And Sources

The following sources must obtain a Standard ACDP under the procedures set forth in 340-216-0066:

1. Incinerators for PCBs and / or other hazardous wastes
2. All Sources that the Department determines have emissions that constitute a nuisance
3. All Sources electing to maintain the source's baseline emission rate, or netting basis
4. All Sources subject to a RACT, BACT, LAER, NESHAP, NSPS, State MACT, or other significant Air Quality regulation(s), except:
   a. Source categories for which a General ACDP has been issued, and
   b. Sources with less than 10 tons/yr. actual emissions that are subject to RACT, NSPS or a NESHAP which qualify for a Simple ACDP
5. All Sources having the Potential to Emit more than 100 tons of any regulated air contaminant in a year
6. All Sources having the Potential to Emit more than 10 tons of a single hazardous air pollutant in a year
7. All Sources having the Potential to Emit more than 25 tons of all hazardous air pollutants combined in a year

Notes:

* Applies only to Special Control Areas
** Portland AQMA only
*** Portland AQMA, Medford-Ashland AQMA or Salem SKATS only
(a) "back-up" means less than 10,000 gallons of fuel per year

The Oregon Administrative Rules contain OARS filed through December 13, 2002

DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION 264

RULES FOR OPEN BURNING

340-264-0010

How to Use These Open Burning Rules

(1) This Division classifies all open burning into one of seven classes: Agricultural; Commercial; Construction; Demolition (which includes land clearing); Domestic (which includes burning commonly called "backyard burning" burning of yard debris); Industrial; or Slash. Except for field burning within the Willamette Valley regulated throui OAR Chapter 340, Division 266 and slash burning administered by the forest practices smoke management plan o the Oregon Department of Forestry, this Division prescribes requirements for and prohibitions of open burning for every location in the state. Generally, if a class of open burning is not specifically prohibited in a given location then it is authorized subject to OAR 340-264-0050 and 340-264-0060 and the requirements and prohibitions of loc jurisdictions and the State Fire Marshal. In addition, some practices specifically mentioned in OAR 340-264-0040 exempted from this Division.

(2) Organization of rules: (a) OAR 340-264-0020 is the Policy statement of the Environmental Quality Commission setting forth the goals of this Division;

(b) OAR 340-264-0030 contains definitions of terms that have specialized meanings within the context of this Division;

(c) OAR 340-264-0040 lists specific types of open burning and practices that are not governed by this Division;

(d) OAR 340-264-0050 lists general requirements that usually apply to any open burning governed by this Divisior

(e) OAR 340-264-0060 lists general prohibitions that apply to most open burning;

(f) OAR 340-264-0070 establishes the open burning schedule based on air quality and meteorological conditions 2 required by ORS 468A.570;

(g) OAR 340-264-0075 allows the delegation of some or all of the open burning authority to be administered by a | ocal jurisdiction;

(h) OAR 340-264-0078 contains the legal description of Open Burning Control Areas and maps that generally depi these areas;

(i) OAR 340-264-0080 indexes each county of the state to a specific rule giving specific restrictions for each cl~ of open burning applicable in the county;

(j) OAR 340-264-0100 through 340-264-0170 are rules that give specific restrictions to open burning for each cla of open burning in the counties named in each rule;

[ED. NOTE: The Figures referenced in this rule are not printed in the OAR Compilation. Copies are available frorr the agency.]

Stat. Auth.: ORS 468, ORS 468A & ORS 477
Stats. Implemented: ORS 468A.555
Hist.: DEQ 123, f. & ef. 10-20-76; DEQ 23-1979, f. & ef. 7-5-79; DEQ 27-1981, f. & ef. 9-8-81; DEQ 10-1984, f. 29-84, ef. 6-16-84; DEQ 21-1991, f. & cert. ef. 11-13-91; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 14-1999, f. F cert. ef. 10-14-99, Renumbered from 340-023-0030; DEQ 21-2000, f. & cert. ef. 12-15-00

340-264-0040

Exemptions, Statewide

Except for the provisions contained in OAR 340-264-0050 and 340-264-0060, this Division does not apply to:

(1) Recreational fires and ceremonial fires, for which a fire is appropriate.

(2) The operation of any barbecue equipment.

(3) Fires set or permitted by any public agency when such fire is set or permitted in the performance of its offici duty for the purpose of weed abatement, prevention or elimination of a fire hazard, or a hazard to public health c safety, or for instruction of employees in the methods of fire fighting, which in the opinion of the public agency i; necessary. Open burning fires otherwise exempt from the requirements of this division are still subject to the requirements and prohibitions of local jurisdictions and the State Fire Marshall.

(4) Agricultural open burning pursuant to ORS 468A.020. Agricultural open burning is still subject to the requirements and prohibitions of local jurisdictions and the State Fire Marshal.

(5) Open field burning, propane flaming, and stack and pile burning in the Willamette Valley between the crests o the Cascade and Coast Ranges pursuant to OAR Chapter 340, Division 266, Rules for Field Burning.

(6) Slash burning on forest land or within one-eighth mile of forest land permitted under the Oregon Smoke Management Program regulated by the Department of Forestry pursuant to ORS 477.515.

(7) Fires set pursuant to permit for the purpose of instruction of employees of private industrial concerns in methods of fire fighting, or for civil defense instruction.

(8) Fires set for the purpose of disposal of dry tumbleweed plants (typically Russian Thistle and Tumbleweed Mustard plants) that have been broken off, and rolled about, by the wind.

(9) Agricultural burning for disease or pest control when the fire is set or authorized in writing by the Departmen Agriculture.

(10) When caused by an authorized representative of the Department of Agriculture, open burning of carcasses o animals that have died or been destroyed because of an animal disease emergency.

[NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-200-0040.]

Stat. Auth.: ORS 468, ORS 468A & ORS 477
Stats. Implemented: ORS 468A.555
Hist.: DEQ 123, f. & ef. 10-20-76; DEQ 23-1979, f. & ef. 7-5-79; DEQ 27-1981, f. & ef. 9-8-81; DEQ 10-1984, f, 29-84, ef. 6-16-84; DEQ 6-1992, f. & cert. ef. 3-11-92; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-023-0035; DEQ 21-2000, f. & cert. ef. 12-15-00

340-264-0050

General Requirements Statewide

This rule applies to all open burning, unless expressly limited by any other rule, regulation, permit, ordinance, or

VISIBILITY PROTECTION PLAN FOR CLASS I AREAS
(OAR 340-200-0040, Section 5.2)

5.2 What Is Visibility?

5.3 Introduction
5.3.1 Definitions

5.4 Mandatory Class I Areas
5.4.1 Areas Redesignated to Class I

5.5 History of Visibility Impairment in Oregon Class I Areas

5.6 Visibility Monitoring Network

5.7 Procedures For Review, Coordination and Consultation
5.7.1 Annual Visibility Advisory Committee Meetings
5.7.2 Periodic Plan Review and Assessment
5.7.3 Other Meetings

5.8 Control Strategies
5.8.1 Short-Term Strategy
5.8.1.1 Overview
5.8.1.2 Willamette Valley Open Field Burning
Reduction in Acreage Allowed to be Burned
Restrictions on Weekend Burning
Encourage Early Season Burning (July)
Smoke Management Improvement
Improve Burning Methods
5.8.1.3 Jefferson County Open Field Burning
5.8.1.4 Union County Open Field Burning
5.8.1.5 Prescribed Burning
Smoke Sensitive Areas
Encourage Spring and Fall Burning
Naturally-ignited Prescribed Fire
5.8.2 Long-Term Strategy
5.8.2.1 Overview
5.8.2.2 New Source Review Visibility Protection
5.8.2.3 Willamette Valley Open Field Burning
5.8.2.4 Prescribed Burning
5.8.2.5 Emission Reductions Due to On-Going Control Programs
5.8.2.6 Maintenance of Control Equipment

5.9 Protection of Integral Vistas

5.10 Best Available Retrofit Technology

5.11 Interstate Visibility Protection

will be open to the public, the news media, and interested persons included on a Department mailing list.

Topics to be addressed at this meeting will include a review of the monitoring data, an assessment of visibility trends and sources contributing to visibility impairment, and discussion of reasonable progress toward achievement of the national visibility goal. A report summarizing this meeting will be prepared and distributed to the Federal Land Manager, EPA, and other interested parties. This report will serve as an important element in the periodic plan review process.

5.7.2 Periodic Plan Review and Assessment

Every three years the Department will conduct a formal review of the Visibility Protection Plan. The meeting will provide an opportunity for affected State and Federal Land Managers, the Oregon Visibility Advisory Committee, the Oregon Seed Council, other affected parties and the public to provide the Department with feedback on the effectiveness of the Plan. Specifically, the periodic review process will address: (a) assessment of visibility trends and impairment; (b) review of annual emissions trends; (c) recommendations regarding the effectiveness of visibility control strategies; (d) assessment of whether Reasonable Progress is being made; and (e) additional measures which may be needed to assure reasonable progress.

All available monitoring and emission data applicable to Class I visibility impact assessment will be summarized and provided for use during the periodic plan review. A report summarizing the periodic plan review will be prepared and distributed to State and Federal Land Managers, EPA and other interested parties.

5.7.3 Other Meetings

Meetings may be called by any interested party at any time to discuss the Plan with the Department.

5.8 Control Strategies

The Oregon Visibility Protection Plan incorporates both short-term and long-term strategies to make reasonable progress toward remedying impairment caused by Willamette Valley, Jefferson and Union County agricultural field burning, and forest prescribed burning. The Plan includes provisions for the protection of all Class I areas from future impairment through the visibility impact assessment requirements of the New Source Review rule. The principal elements of the control strategy are described below.

5.8.1 Short-Term Strategy

5.8.1.1 Overview

The short-term control strategies are directed at remedying visibility impairment during the Visibility Protection Period (July 1 through September 15, inclusive) caused by plume blight from agricultural field burning and forest prescribed burning. The Department will make efforts to ensure on an on-going basis that good coordination is

mechanical fluffing). Oregon Department of Agriculture open field burning rules (603-077-0110) require "every reasonable effort to expedite and promote efficient burning and prevent excessive emissions". As a result, most field burning now involves rapid-ignition burning (where safe) and significant field preparation.

These short-term strategies have been incorporated into the Oregon Department of Agriculture Open Field Burning Rules, OAR 607-077 (Attachment A).

5.8.1.3 Jefferson County Open Field Burning

Agricultural open field burning in Jefferson County has been found to impair visibility in the central Cascade Class I areas. The short-term strategy to mitigate this impairment is through a mandatory county smoke management program described and enforced through Jefferson County Ordinance (Attachment D). The ordinance requires that all burning be conducted so that smoke is not transported into a Class I area at any time. The enforcement provisions of the ordinance are sufficiently stringent to assure that smoke management instructions issued by the smoke management coordinator are followed. Since most of the burning occurs during the summer months, the benefits of this strategy coincide with the period of heaviest wilderness visitor use.

5.8.1.4 Union County Open Field Burning

Agricultural open field burning in Union County has been found to impair visibility in the Eagle Cap Wilderness. The short-term strategy to mitigate the impairment of visibility caused by agricultural field burning is through a mandatory county smoke management program enforced through Union County Ordinance (Attachment E). The ordinance requires that Union County smoke from field burning is not transported into the Eagle Cap Wilderness at any time. Since most of the burning occurs during the summer months, the benefits of this program coincide with the period of heaviest wilderness visitor use.

5.8.1.5 Prescribed Burning

The prescribed burning short-term strategy applies to the controlled application of fire to wildland fuels for silvicultural, wildlife habitat, fuels management or ecosystem purposes. This strategy is directed at reducing visibility impairment within the northern and central Cascade Class I areas during the Visibility Protection Period.

1. **Smoke Sensitive Areas.** The ODF Smoke Management Plan (OAR 629-043-0043) will consider the following Class I areas as "smoke sensitive areas" and protect accordingly during the Visibility Protection Period: Mt. Hood, Mt. Jefferson, Mt. Washington, Three Sisters and Diamond Peak wilderness areas, and Crater Lake National Park.

2. **Encourage Spring and Fall burning.** Efforts will be made under the ODF Smoke Management Program to conduct all prescribed burning in Western Oregon during the spring and fall months, when Class I area visitation is much lower. In addition, during these months ventilation conditions for burning generally are better, and higher fuel moisture can result in fewer emissions being generated. Western Oregon is defined here as Lane, Linn, Marion, Clackamas, Multnomah,

Hood River, Columbia, Clatsop, Tillamook, Yamhill, Polk, Benton, Lincoln and Washington counties.

3. **Naturally-ignited Prescribed Fire.** Natural fires that are ignited by lightning and then managed like a prescribed burn are one way Federal Land Managers can achieve certain resource management objectives. The Oregon Department of Environmental Quality and the Oregon Department of Forestry will participate in the development and be provided an opportunity to comment on draft fire management plans developed by the Federal Land Managers that include provisions for naturally-ignited prescribed fire and whether smoke impacts on visibility are being considered.

5.8.2 Long-Term Strategy

5.8.2.1 Overview

The long-term strategies are directed at making reasonable progress toward the national visibility goal over the next 10-15 year period, in accordance with Section 51.306(a) of EPA regulations. The long-term control strategies are primarily directed at mitigation of visibility impacts, emission reductions, and preventing plume impairment caused by open field and prescribed burning, and from new and modified large industrial sources. In the development of the long-term strategies, several factors were considered in accordance with Section 51.306(e) and (f) of EPA regulations:

(a) Emission reductions due to on-going programs, as discussed in Section 5.8.2.5 of the Plan.

(b) Additional emission limitations and schedules for compliance for stationary sources. These were not considered necessary for the long-term strategy at this time, since there is no monitoring data to support a finding that any industrial point source is contributing directly to visibility impairment.

(c) Measures to mitigate impacts from construction activities. Visibility impacts from stationary sources are administered through the Air Contaminant Discharge Permitting and the PSD rule process, while soil dust entrained as a result of construction activities is controlled under the A-95 review process, State and Federal Forest Practices Acts and permitting processes.

(d) Enforceability of emission limitations. This was not considered important to the long-term strategy because of the reasons outlined in (b) above.

(e) Smoke Management Techniques for agricultural and forestry management. These are essential elements of the strategy, as discussed in the Plan.

(f) Source Retirement and Replacement. On-going stationary source emission reductions may reduce impairment associated with urban plume impacts on Class I areas in the future.

The elements of the long-term strategy are listed below. As with the short-term control strategies, those related to Willamette Valley open field burning are designed to

Protection From Fire Program
2600 State St
Salem, OR 97310

Oregon Smoke Management Plan Information

Information shown below is included in the **Smoke Management Reference Manual** that is available to field users working in the Smoke Management Program. This same information also may be reviewed online at the links listed below. The statute, rules, directive and visibility plan elements constitute the forest land prescribed burning portion of the Oregon Clean Air Act State Implementation Plan requirements that are on file with the Oregon Department of Environmental Quality and the U.S. Environmental Protection Agency in compliance with the federal Clean Air Act.

Smoke Management Plan Review

Currently, the Smoke Management Plan is undergoing its periodic review. Information about the review may be found by clicking on this link.

Proposed Smoke Management Burn Fee ***Increase***

The public comment period opens on October 1, 2003 regarding a proposed rule amendment to increase pile burning fees on forest land. Comments must be received by 5 pm on November 3, 2003. Information about the proposed rule amendment may be found here.

Oregon Revised Statutes (the law)

ORS 477.013: Smoke Management Plan authorization

ORS 477.515: Burn permits

ORS 477.552-562: Advisory Committee and burn

fees

Oregon Administrative Rules (the implementing regulations)

OAR*629-0043-041:* Burn fees

OAR*629-0043-043:* The basic plan

These Pages Last updated August 07, *2003*

Link to Oregon.Gov

Oregon Department of Forestry Smoke Management Directive (operational direction)

Directive*1-4-1-601*

Visibility Protection Plan for Class I areas

An Oregon Department of Environmental Quality Plan that affects prescribed burning.

Online data screen instructions for mainframe users

Click here to see basic mainframe instructions for entering burn data.

A COST and PCOST fuel consumption program instructions

Click here to see basic instructions for fuel consumption estimation programs.

Latest Annual Report

Review the latest smoke management program information in the Smoke Management Annual Report . You will need the Adobe Acrobat reader to view this report as it is in PDF format.

Email comments on this page to mziolko(a~odf.state.or.us

[About ODF] [Living in the Forest] [Working in the Forest] [Your State Forests] [ODF Sells] [Learnin from the Forest] [Fire in the Forest]

[Forest Practices] [Forestry Assistance] [Resources Planning] [State Forests Management] [Protection from Fire]

[Eastern Oregon Area] [Southern Oregon Area] [Northwest Oregon Area]

NOTE: This web site has been tested and is known to work correctly with Internet Explorer 5.x and above and Netscape 6.x and above. Although

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The Oregon Administrative Rules contain OARs filed through September 15, 2003

DEPARTMENT OF ENVIRONMENTAL QUALITY

DIVISION 262

RESIDENTIAL WOODHEATING

340-262-0010

Purpose

The purpose of this Division is to establish rules to control, reduce and prevent air pollution caused by residential woodheating emissions.

[NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-200-0040.]

Stat. Auth.: ORS 468 & ORS 468A
Stats. Implemented: ORS 468A.460
Hist.: DEQ 25-1991, f. & cert. ef. 11-13-91; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-034-0001

340-262-0020

Definitions

The definitions in OAR 340-200-0020, 340-204-0010 and this rule apply to this division. If the same term is defined in this rule and OAR 340-200-0020 or 340-204-0010, the definition in this rule applies to this division.

(1) "Administrator" means the administrator of the Environmental Protection Agency or the administrator's authorized representative.

(2) "Antique Woodstove" means a woodstove built before 1940 that has an ornate construction and a current market value substantially higher than a common woodstove manufactured in the same time period.

(3) "Commission" means the Environmental Quality Commission.

(4) "Consumer" means any person who buys a woodstove for personal use.

(5) "Cookstove" means an indoor woodburning appliance the design and primary purpose of which is to cook food.

(6) "Curtailment" means a period during which woodburning is prohibited due to the existence of an air stagnation condition.

(7) "Dealer" means any person engaged in selling wood-stoves to retailers or other dealers for resale. A dealer which is also an Oregon retailer shall be considered to be only a retailer for purposes of this Division.

(8) "Destroy" means to demolish to such an extent that restoration is impossible.

(9) "Department" means the Oregon Department of Environmental Quality.

(10) "Director" means the Director of the Department or the Director's authorized delegates.

(11) "EPA" means the United States Environmental Protection Agency.

(12) "Federal Regulations" means **Volume 40 CFR, Part 60, Subpart AAA, Sections 60.530** through **60.539b,** dated **July 1, 1993.**

(13) "Fireplace" means a framed opening made in a chimney to hold an open fire.

(14) "Manufacturer" means any person who imports a woodstove, constructs a woodstove or parts for woodstoves.

(15) "New Woodstove" means any woodstove that has not been sold, bargained, exchanged, given away or has not had its ownership transferred from the person who first acquired the woodstove from the manufacturer's dealer or agency, and has not been so used to have become what is commonly known as "second hand" within the ordinary meaning of that term.

(16) "Pelletstove" means a woodburning heating appliance which uses wood pellets as its primary source of fuel.

(17) "Retailer" means any person engaged in the sale of woodstoves directly to consumers.

(18) "Used Woodstove" means any woodstove that has been sold bargained, exchanged, given away, or has had its ownership transferred from a retailer, manufacturer's dealer or agent to a consumer.

(19) "Woodstove" or "Woodheater" means an enclosed, woodburning appliance capable of and intended for space heating and domestic water heating that meets all of the following criteria:

(a) An air-to-fuel ratio in the combustion chamber averaging less than 35-to-1 as determined by the test procedure prescribed in federal regulations, **40 CFR, Part 60, Subpart AAA, §60.534** performed at an accredited laboratory;

(b) A usable firebox volume of less than 20 cubic feet;

(c) A minimum burn rate less than 5 kg/hr as deteimined by the test procedure prescribed in federal regulations, **40 CFR, Part 60, Subpart AAA, §60.534** perfouned at an accredited laboratory; and

(d) A maximum weight of 800 kg. In determining the weight of an appliance for these purposes, fixtures and devices that are normally sold separately, such as flue pipe, chimney, heat distribution ducting, and masonry components that are not an integral part of the appliance or heat distribution ducting, shall not be included.

[NOTE: This rule is included in the State of Oregon Clean Air Act Implementation Plan as adopted by the Environmental Quality Commission under OAR 340-200-0040.]

[Publications: The publication(s) referred to or incorporated by reference in this rule are available from the agency.]

Stat. Auth.: ORS 468 & ORS 468A
Stats. Implemented: ORS 468A.480
Hist.: DEQ 11-1984, f. & ef. 6-26-84; DEQ 5-1990, f. 3-7-90, cert. ef. 7-1-90; DEQ 25-1991, f. & cert. ef. 11-13-91; Renumbered from 340-021-0100; DEQ 4-1993, f. & cert. ef. 3-10-93; DEQ 1-1994, f. & cert. ef. 1-3-94; DEQ 14-1999, f. & cert. ef. 10-14-99, Renumbered from 340-034-0005

Woodstove Sales

340-262-0030

Requirements for Sale of Woodstoves

(1) Requirements applicable to the sale of new woodstoves:

(a) No person shall advertise to sell, offer to sell, or sell a new woodstove in Oregon unless the woodstove has been labeled for heating efficiency and tested, certified and labeled for emission performance in accordance with criteria, emission standards, and procedures specified in the federal regulations, **40 CFR, Part 60, Subpart AAA;**

(b) No manufacturer, dealer, retailer or individual shall alter the permanent certification label in any way from the label approved by the Administrator pursuant to federal regulations, **40 CFR, Part 60, Subpart AAA;**

(c) No manufacturer, dealer or retailer shall alter the removable label in any way from the label approved by the Administrator pursuant to federal regulations, **40 CFR, Part 60, Subpart AAA.**

(2) Requirements applicable for the sale of used woodstoves. A person shall not advertise to sell, offer to sell, or sell a used woodstove unless:

(a) The woodstove was certified by the Department or the Administrator on or after July 1, 1986, in accordance with emission performance and heating efficiency criteria applicable at the time of certification;

(b) The woodstove has peiinanently attached an emission performance label authorized by the Department or the EPA.