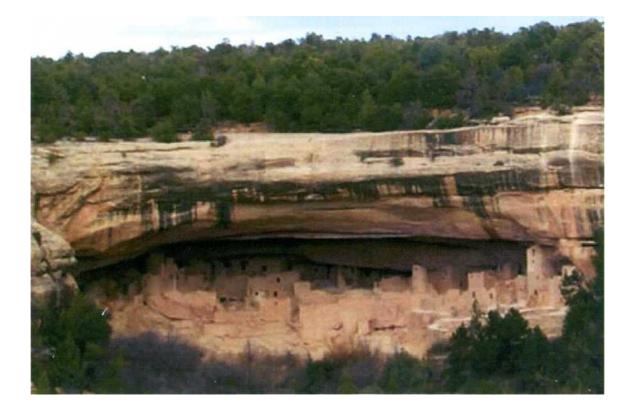
FINAL

2001 AIR EMISSIONS INVENTORY

MESA VERDE NATIONAL PARK COLORADO



U.S. NATIONAL PARK SERVICE

SEPTEMBER 2003

FINAL

2001 AIR EMISSIONS INVENTORY

MESA **VERDE** NATIONAL **PARK** COLORADO

Prepared for:

National Park Service WASO - Air Resources Division 12795 West Alameda Parkway Denver, CO 80228

Prepared by:

EA Engineering, Science, and Technology, Inc. 15 Loveton Circle Sparks, MD 21152 (410) 771-4950

SEPTEMBER 2003

Cover Photo Courtesy of NPS

CONTENTS

<u>Page</u>

		iv iv
1.	INTRO	DDUCTION1
2.	1.1 1.2 1.3 1.4 1.5	Background I Typical Air Emission Sources I Inventory Methodology 2 Park Description 3 Air Quality Status 5 IONARY AND AREA SOURCE EMISSIONS 6
Ζ.	2.1	Stationary Sources
	2.2	2.1.1Space and Water Heating Equipment62.1.2Generators62.1.3Fuel Storage Tanks92.1.4Wastewater Treatment Plants9Area Sources102.2.1Woodstoves102.2.2Campfires102.2.3Wildland Fires and Prescribed Burning102.2.4Miscellaneous Area Sources11
	2.3	Summary of Stationary and Area Source Emissions11
3.	MOBI	LE SOURCE EMISSIONS
	3.1	Highway Vehicles
		3.1.1Visitor Vehicles133.1.2NPS Vehicles15
	3.2	NPS Nonroad Vehicles16
	3.3	Summary of Mobile Source Emissions16

CONTENTS (Continued)

<u>Page</u>

4.	MESA	VERDE NP AND REGIONAL EMISSION SUMMARY	.18
	4.1	Mesa Verde NP Summary	.18
	4.2	Regional Air Emissions	.18
5.	COMP	LIANCE AND RECOMMENDATIONS	.20
	5.1	Compliance	20
	5.2	Recommendations	20
6.	REFE	RENCES	.22
APPEN	NDIX A	- FUEL DATA AND EMISSION FACTORS	
APPEN	NDIX B	- EMISSION CALCULATIONS	
APPE	NDIX C	2 - PUBLIC USE DATA	
APPE	NDIX D	- SELECTED COLORADO AIR QUALITY REGULATIONS	

FIGURES

Numbe	er <u>Title</u>	<u>Page</u>
1	Mesa Verde National Park Location	4
2	Mesa Verde National Park	4
	TABLES	
Numbe	er <u>Title</u>	<u>Page</u>
1	Mesa Verde National Park Developed Areas	5
2	2001 Actual Criteria Emissions from Heating Equipment at Mesa Verde NP	7
3	2001 Potential Criteria Emissions from Heating Equipment at Mesa Verde NP	8
4	Mesa Verde NP Fuel Tank Emissions	9
5	Woodstove Air Emissions from Mesa Verde NP	10
6	2001 Mesa Verde NP Campfire Emissions	10
7	Wildland Fire Prescribed Burning Air Emissions from Mesa Verde NP	11
8	Summary of 2001 Stationary and Area Source Emissions at Mesa Verde NP	12
9	Mesa Verde NP Annual Visitor Vehicle Summary	13
10	NPS Road Vehicles at Mesa Verde NP	15
11	Summary of 2001 Mobile Source Emissions at Mesa Verde NP	17
12	Estimated Annual Emissions from Mesa Verde NP	18
13	Estimated Annual Emissions from Mesa Verde NP, Surrounding County, and the State of Colorado	19

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. Development of an in-park air emissions inventory for Mesa Verde National Park (NP) serves three functions in this regard. 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 and wild fires. Mobile sources may include vehicles operated by visitors and NPS 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 nitrogen oxide (NOx) and volatile organic compound (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 warming since it is considered a greenhouse gas.

Pollutant	Characteristics
Particulates (PM ₁₀)	 Mixture of solid particles and liquid droplets; fine particles (less than 2.5 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 ₂)	 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 formation of acid rain
Nitrogen Oxides (NOx)	 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 nitrate 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 NOx 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 Damages green leaves and needles
Carbon Dioxide (CO $_2$)	 Does not directly impair human health It is a greenhouse gas that traps the earth's heat and contributes to global warming

AIR POLLUTANTS AND THEIR CHARACTERISTICS

INVENTORY METHODOLOGY 1.3

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 March 2003, interviews with Mesa Verde NP personnel, 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, are provided in Appendices A and B.

1.4 **PARK DESCRIPTION**

Mesa Verde NP is located in the high plateau country of southwestern Colorado (Figure 1). The park was established in 1906 to preserve the archeological sites that "Pre-Columbian Indians" built on the mesa tops and in the alcoves of a score of rugged canyons. The park, containing 52,073 acres of Federal land, was designated a World Heritage Site in 1978. Mesa Verde NP, Spanish for "green table", rises high above the surrounding country. For about 1,300 years, agrarian Indians occupied the mesa and surrounding regions. A map of the park is depicted in Figure 2.

There are over four thousand known archeological sites in Mesa Verde NP. Approximately 600 of these are cliff dwellings, and only a few of these sites have been excavated. The culture represented at Mesa Verde NP reflects more than 700 years of history. From approximately A.D. 600 through A.D. 1300, people lived and flourished in communities throughout the area, eventually building elaborate stone villages in the sheltered alcoves of the canyon walls. Today most people call these sheltered villages "cliff dwellings", which represent the last 75 to 100 years of occupation at Mesa Verde NP. In the late 1200s, within the span of one or two generations, they left their homes and moved away.

The archeological sites found in Mesa Verde NP are some of the most notable and best preserved in the U.S. Mesa Verde NP offers visitors a spectacular look into the lives of the Ancestral Pueblo people. Scientists study the ancient dwellings of Mesa Verde NP, in part, by making comparisons between the Ancestral Pueblo people and their contemporary indigenous descendants who still live in the Southwest today. Twenty-four Native American tribes in the southwest have an ancestral affiliation with the sites at Mesa Verde NP.

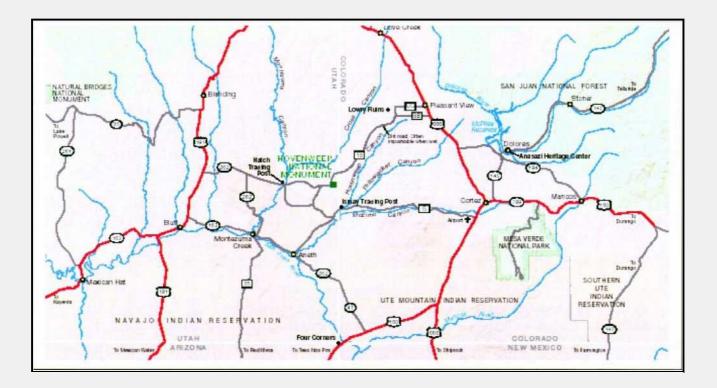


FIGURE 1. MESA VERDE NATIONAL PARK LOCATION

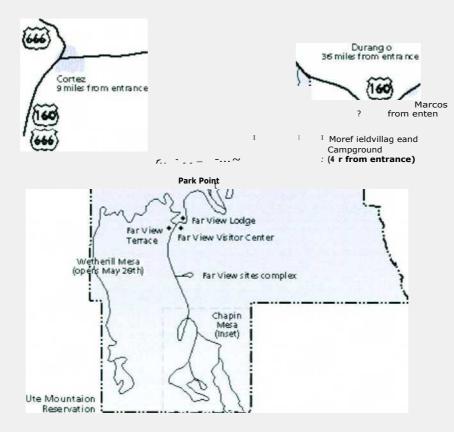


FIGURE 2. **MESA VERDE** NATIONAL PARK

Table 1 summarizes the facilities that are located at the developed areas, and the Figures following this section illustrate the developed areas.

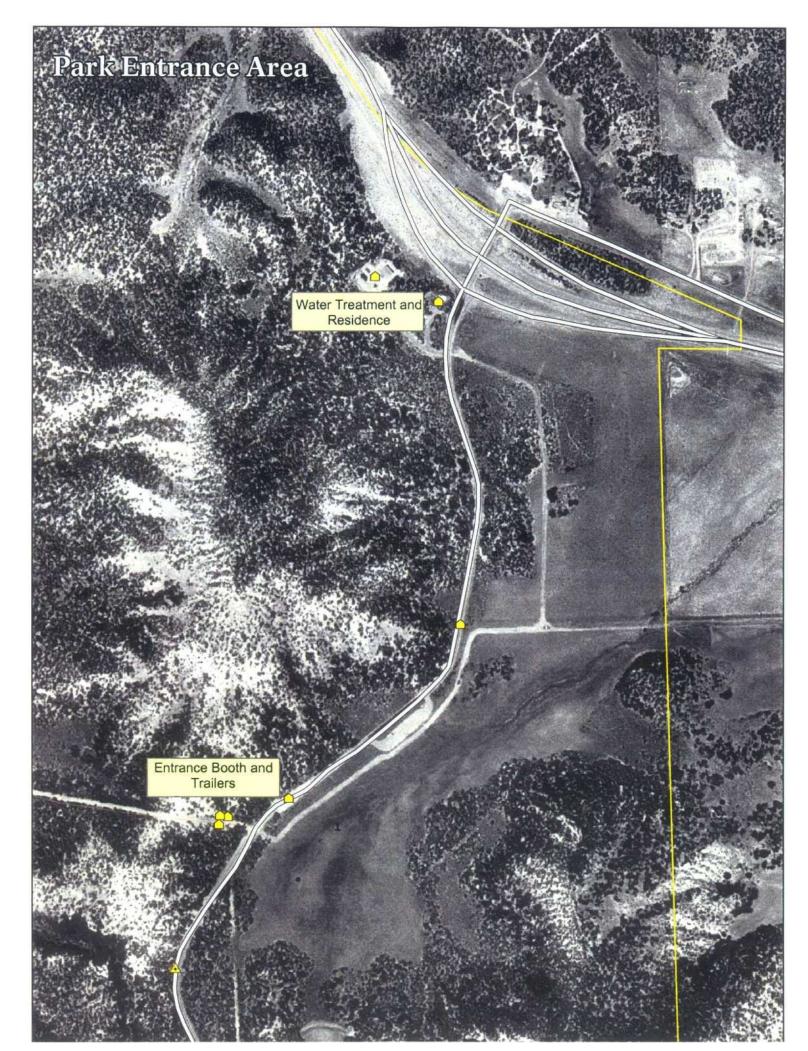
Area	Function/Facilities			
Entrance Area	Entrance Booth, Employee Trailers, Wastewater Treatment			
	Archeological Museum, Park Headquarters, Restaurant, Gift Shop, Chief Ranger			
Chapin Mesa	Office, Post Office, Employee Housing, Library, Fewkes Education Cabin			
CCC/Research AreaFire Cache, Natural Resource Building, Other Research Buildings, GIS/IT				
Maintenance Area Maintenance, Vehicle Refueling, Employee Housing				
	Visitor Center, Lodge/Restaurant, Food Court, Gift Shop, Gas Station, Employee			
Far View	Housing, Wastewater Treatment Plant			
Marcial	Ranger Station, Grocery Store, Gas Station, Restaurant, Campground, Laundry,			
Morefield Campground	Employee Housing			
Wetherill	Picnic Area, Snack Bar			

TABLE 1: MESA VERDE NATIONAL PARK DEVELOPED AREAS

1.5 AIR QUALITY STATUS

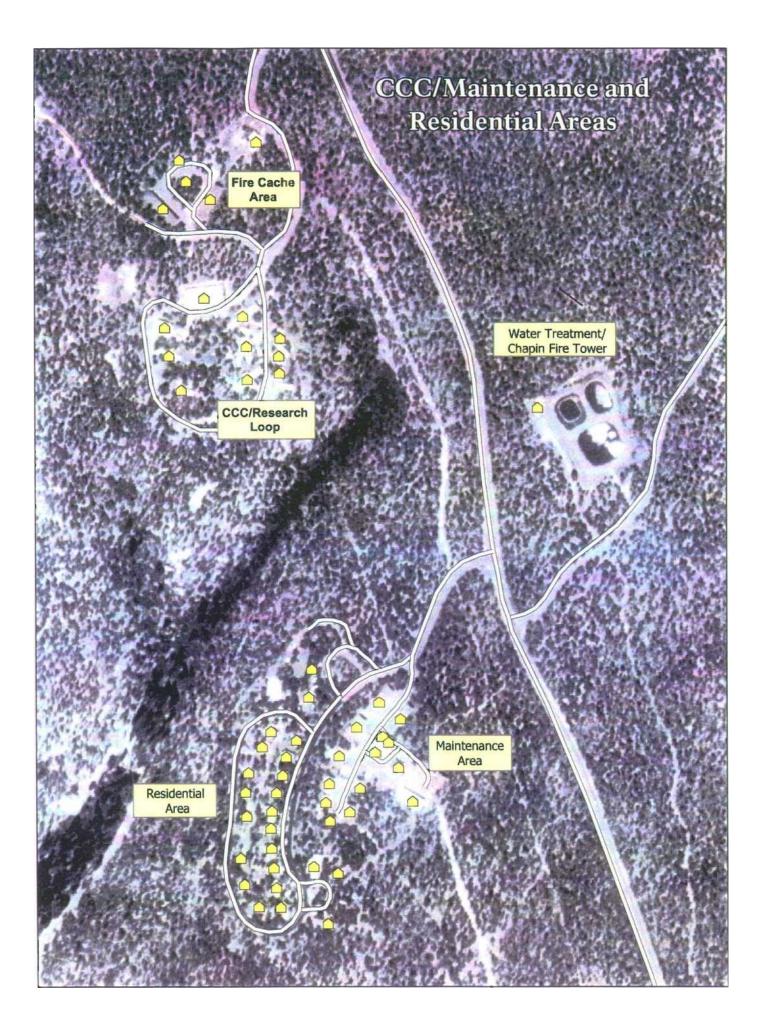
The Colorado Department of Public Health and Environment administers the state's air pollution program. The park is located in Montezuma County, which is classified as attainment for all state and national ambient air quality standards. The park operates an air monitoring station adjacent to the Natural Resources Building in the CCC/Research Area. In addition to ozone, the park monitors acid rain/snow, mercury wet deposition, particulates, and visibility. The latter is part of the Interagency Monitoring of Protected Visual Environments (IMPROVE) particulate monitoring network. The particulate monitoring portion of the IMPROVE program measures the concentration of the fine ($PM_{2.5}$) particles for mass, optical absorption, major and trace elements, organic and elemental carbon, and nitrate and of PM ₁₀ particles for mass. Data from 1990-1999 indicate that the one-hour average ozone levels have ranged from approximately 0.053 to 0.058 parts per million (ppm), which compares to the standard of 0.12 ppm (NPS 2002). Data from the same ten-year period indicate that the eight-hour average ozone levels have ranged from approximately 0.058 to 0.069 ppm, which compares to the standard of 0.08 ppm.

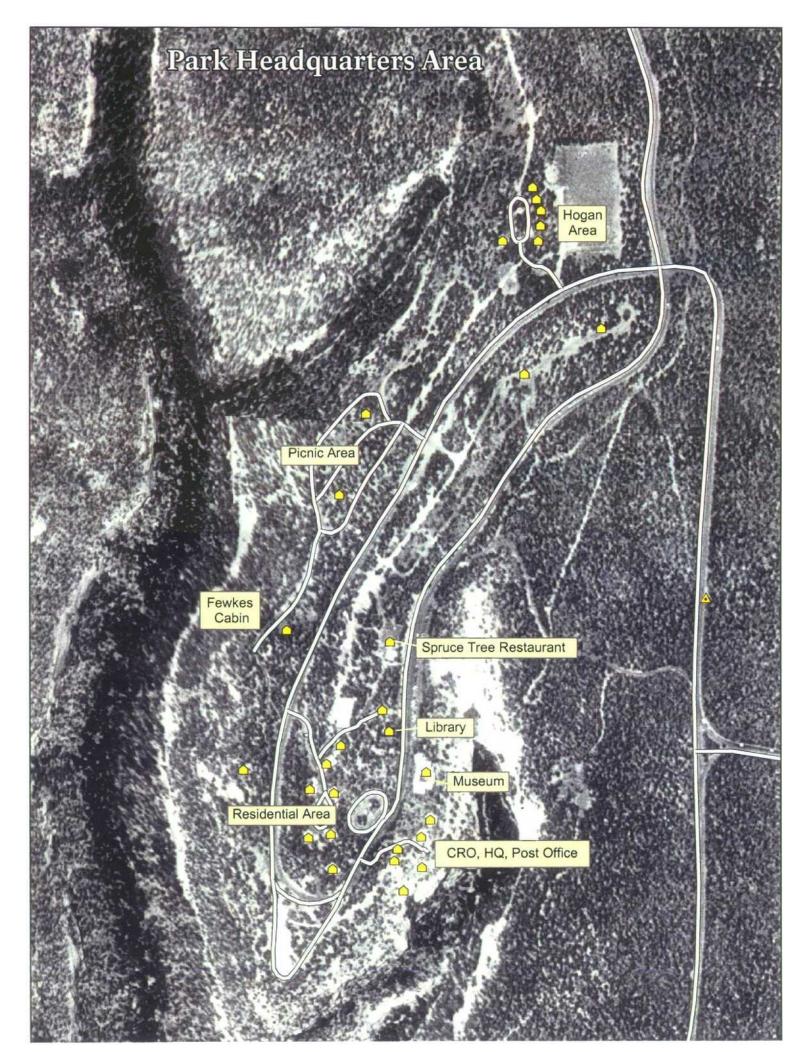
Mesa Verde National Park is a federally-mandated Class I area under the Clean Air Act. As such, air in the Park receives the most stringent protection against increases in air pollution from sources near the park and in further degradation of air quality related values. The Act also sets a further goal of natural visibility conditions, free of human-caused haze. Visibility monitoring at the park indicates that its visibility is as good as or better than other national park units where similar monitoring is conducted (NPS 2002).



Service Station, Laundry, Grocery, Ranger Station









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 (PM₁o), sulfur dioxide (SO₂), nitrogen oxides (NO_X), carbon monoxide (CO), carbon dioxide (CO₂), and volatile organic compounds (VOCs).

2.1 STATIONARY SOURCES

2.1.1 Space And Water Heating Equipment

There are 74 propane and four No. 2 fuel oil space and heating units in the Park that are operated by the NPS and the concessionaire, Aramark, including 38 employee residential heating units. Criteria emissions were calculated using the appropriate residential emission factors for the fuel types. For example, NOx emissions from the No. 2 oil boiler in the Museum at Headquarters Area was calculated as follows:

1,027 gallons/yr x $\frac{18 \ lb \ PM}{1,000 \ gallons}$ =211bNOx/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

There are no stationary generators in use at the park.

Location	No.	Fuel	Fuel Consumption	PM ₁₀ (lbs/yr)	SO ₂ (Ibs/yr)	NOx (lbs/yr)	CO (Ibs/yr)	CO ₂ (lbs/yr)	VOC (lbs/yr)
				al Park Se					
Museum	1		1,067	2	76	21	5	22,933	0
Chief Rangers	1	No. 2	1,067	2	76	21	5	22,933	0
Office		Fuel Oil	1,007				J		
Park Headquarters	1		1,067	2	76	21	5	22,933	0
Library	1	-	1,173	0	0	16	2	14,659	0
Hogan	2	-	2,345	1	0	33	5	29,318	1
Electric Shop	1	-	1,173	0	0	16	2	14,659	0
Warehouse	1	-	1,173	0	0	16	2	14,659	0
Auto Shop	1		1,173	0	0	16	2	14,659	0
Carpenter Shop	1		1,173	0	0	16	2	14,659	0
Lumber Shed	1		1,173	0	0	16	2	14,659	0
Snow Blast Shed	1		1,173	0	0	16	2	14,659	0
Fire Cache	1		1,173	0	0	16	2	14,659	0
Wastewater	1		1 172	0	0	16	2	14,659	0
Treatment Plant	1		1,173	0	0	16	2	14,039	0
Residences	1	Propane	1,173	0	0	16	2	14,659	0
Recreational Hall	1		1,173	0	0	16	2	14,659	0
Research			,	0	0	16	2	14 650	0
Laboratory	1		1,173	0	0	16	2	14,659	0
Visitor Center	1	1	1,173	0	0	16	2	14,659	0
Stabilization Shed	1]	1,173	0	0	16	2	14,659	0
Water Treatment						16	2	14.650	0
Plant	1		1,173	0	0	16	2	14,659	0
Barracks	3	1	3,518	1	0	49	7	43,977	1
Equipment Shed	2	1	2,345	1	0	33	5	29,318	1
Employee		-							-
Residences	38		23,060	9	0	323	46	288,250	7
Residences			NPS Totals	26	228	748	114	679,550	16
				k Parks &					
Laundry	1	No. ₂ Fuel Oil	1,500	3	11	30	8	32,250	1
Lodge	1	1 401 011	3,750	2	0	53	8	46,875	1
Terrace	1		3,000	1	0	42	6	37,500	1
Terrace	2		1,000	0	0	14	2	12,500	0
Lodge	2		3,500	1	0	49	7	43,750	1
Terrace	2	Propane	2,500	1	0	35	5	31,250	1
Spruce Tree	2	riopane	4,000	2	0	56	8	50,000	1
Spruce Tree	1		500	0	0	7	1	6,250	0
Trailer 5	1		500	0	0	7	1	6,250	0
Dorm 9	2		2,000	1	0	28	4	25,000	1
		Conc	essionaire Totals	11	11	321	49	291,625	7
			costonane rotals	1				7	
			Park Totals	37	239	1,069	163	971,175	22

TABLE 2. 2001 ACTUAL AIR EMISSIONS FROMMESA VERDE NATIONAL PARK HEATING EQUIPMENT

Location	No.	Fuel	Fuel Consumption	PM _i 0 (lbs/yr)	SO ₂ (lbs/yr)	NO _X (lbs/yr)	CO (Ibs/yr)	CO ₂ (Ibs/yr)	VOC (lbs/yr)
				<i>(los/yr)</i> nal Park S	· • • ·	(lbs/yr)	(10 5/y r)	(108/yr)	(lbs/yr)
Museum	1		7,821	16	555	156	39	168,161	3
Chief Rangers	1	No. 2	/,021	10	555	150		100,101	5
Office	1	Fuel Oil	7,821	16	555	156	39	168,161	3
Park Headquarters	1		7,821	16	555	156	39	168,161	3
Library	1		7,659	3	0	107	15	95,738	2
Hogan	2	-	15,318	6	0	214	31	191,475	5
Electric Shop	1	-	7,659	3	0	107	15	95,738	2
· · · · ·	1	-	· · · · · · · · · · · · · · · · · · ·						
Warehouse	1	-	7,659	3	0	107	15	95,738	2
Auto Shop	1	-	7,659	3	0	107	15	95,738	2
Carpenter Shop	1	-	7,659	3	0	107	15	95,738	2
Lumber Shed	l	-	7,659	3	0	107	15	95,738	2
Snow Blast Shed	l	-	7,659	3	0	107	15	95,738	2
Fire Cache	l	-	7,659	3	0	107	15	95,738	2
Wastewater	1		7,659	3	0	107	15	95,738	2
Treatment Plant		-	,						
Residences	1	Propane	7,659	3	0	107	15	95,738	2
Recreational Hall	1	-	7,659	3	0	107	15	95,738	2
Research	1		7,659	3	0	107	15	95,738	2
Laboratory	1	-	,	5	0	107			_
Visitor Center	1		7,659	3	0	107	15	95,738	2
Stabilization Shed	1	_	7,659	3	0	107	15	95,738	2
Water Treatment	1		7,659	3	0	107	15	95,738	2
Plant		-	,		-			-	
Barracks	3	-	22,977	9	0	322	46	287,213	7
Equipment Shed	2	-	15,318	6	0	214	31	191,475	5
Employee	38		145,521	58	3	2,037	291	1,819,016	44
Residences	50				5	-	291	1,019,010	
			NPS Totals	173	1,672	4,866	745	4,429,728	102
			Aramar	k Parks &	Resorts				
Laundry	1	No. 2 Fuel Oil	67,577	135	4,798	1,352	338	1,452,909	23
Lodge	1		50,262	20	1	704	101	628,279	15
Terrace	1		38,295	15	1	536	77	478,689	11
Terrace	2	1	29,487	12	01	413	59	368,590	9
Lodge	2	1	138,820	56	2	1,943	278	1,735,246	42
Terrace	2	Propane	38,295	15	1	536	77	478,689	11
Spruce Tree	2		57,443	23	1	804	115	718,033	17
Spruce Tree	1	1	7,180	3	0	101	14	89,754	2
Trailer 5	1	1	3,638	1	0	51	7	45,475	1
Dorm 9	2	1	38,276	15	1	536	77	478,449	11
		Conc	essionaire Totals	296	4,805	6,975	1,141	6,474,112	143
		Cont	containe 10tals	270		0,775		<u>,,,,,,,,,</u>	1.5
	-		Park Totals	468	6,477	11,841	1,887	10,903,840	246

TABLE 3. 2001 POTENTIAL AIR EMISSIONS FROMMESA VERDE NATIONAL PARK HEATING EQUIPMENT

2.1.3 Fuel Storage Tanks

Mesa Verde NP has one gasoline aboveground storage tank (AST) and the concessionaire, Aramark, has two gasoline ASTs and one underground storage tank (UST). The Aramark gasoline facility at Morefield 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 4 summarizes the calculated emissions.

Location	Product	Tank Type	Volume (gal)	Throughput (gal/yr)	VOC (lbs/yr)
Maintenance	Gasoline	AST	6,000	24,800	881
Morefield Village	Gasoline	UST	6,000	45,700	200
Far View Lodge	Gasoline	AST	500	1,232	190
Wetherill	Gasoline	AST	500	2,200	91
				Total	1,362

 TABLE 4: 2001 MESA VERDE NP FUEL TANK EMISSIONS

2.1.4 Wastewater Treatment Plant

There is a tertiary wastewater treatment plant near the maintenance are that processing approximately 25,000 gallons per day. Using a VOC emission factor of 8.9 lbs VOC per million gallons of influent treated, the estimated VOC emissions are approximately 80 lbs/year.

2.2 **AREA SOURCES**

2.2.1 Woodstoves

Twenty employee housing units are equipped with woodstoves, but park officials estimated that only eight are used and that the average wood consumption was two cords a year each. Emissions from these woodstoves are summarized in Table 5.

table 5: woodstove air emissions from mesa verde NP

Location	Number	Fuel	PM ₁₀	SO ₂	NOx	СО	voc
Docation	Number	Consumption	(lbs/yr)	(Ibs/yr)	(lbs/yr)	(lbs/yr)	(Ibs/yr)
Employee Residences	8	16 cords/yr	972	11	73	7,093	6,430

2.2.2 Campfires

There is one campground in Morefield Village. 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 mesa verde NP campfire emissions

Location	Campfires	Fuel (tons/yr)	PM ₁₀ (Ibs/yr)	SO ₂ (Ibs/yr)	NO _X (Ibs/yr)	CO (lbs/yr)	VOC (lbs/yr)
Morefield Village	18,747	141	4,865	56	366	35,516	32,198

2.2.3 Wildland Fires and Prescribed Burning

Wildland fires are ignited naturally, usually by lightening and are typically suppressed, while prescribed fires are ignited intentionally in order to achieve fire management objectives. 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. Only prescribed burnings for ecological restoration are considered as anthropogenic emissions.

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 PM 10, PM2,5, CO, CO2, and CH4.

By their very nature, wildland fires vary significantly from year to year within most parks, particularly western parks. For example, wildland fires in Mesa Verde NP varied from a low of two acres in 1999 to over 20,000 acres in 2000. In addition to wildland fires, there have been several prescribed fires within the park. Table 7 summarizes the emissions from these fires for the years 1999 to 2001.

	PM ₁₀	PM _{2.5}	со	CO ₂	\mathbf{VOC}^1
Acres	(1b s)	(Ibs)	(Ibs)	(Ibs)	(Ibs)
	Wi	ldland Fires			
2	222	187	2,317	20,706	109
20,061	1,186,380	987,693	11,675,514	146,970,531	562,620
4	444	374	4,634	41.412	213
	Preso	cribed Burnin			
25	300	225	1,450	114,375	10
48	576	432	2,784	219,600	19
	20,061 4 25	Acres (lb s) 2 222 20,061 1,186,380 4 444 Press 25 300	Acres (Ib s) (Ibs) (Ib s) (Ibs) (Ibs) 2 222 187 20,061 1,186,380 987,693 4 444 374 Prescribed Burnin 25 300 225	Acres (ib s) (Ibs) (Ibs) Wildland Fires 2 222 187 2,317 20,061 1,186,380 987,693 11,675,514 4 444 374 4,634 Prescribed Burnin 25 300 225 1,450	Acres (ib s) (Ibs) (Ibs) (Ibs) 2 222 187 2,317 20,706 2 222 187 2,317 20,706 20,061 1,186,380 987,693 11,675,514 146,970,531 4 444 374 4,634 41.412 Prescribed Burnin 25 300 225 1,450 114,375

TABLE 7: WILDLAND FIRE AND PRESCRIBED BURNINGAIR EMISSIONS FROM MESA VERDE NP

As methane

In addition to wildland fires and prescribed burning, the park also began pile burns in 2002. During that year, they burned approximately 138,000 cubic feet of Pinyon-Juniper vegetation, and at he time of the site visit in 2003, they had burned 120,000 cubic feet to date.

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. However, there are no data on the consumption of these materials.

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 MESA VERDE NP

Activity	Particulates (PM 10)		Sulfur Dioxide		Nitrogen Oxides		Carbon Monoxide		Carbon Dioxide		VOCs	
	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 E.uipment	37	0.02	34	0.02	1,069	0.53	163	0.08	971,175	486	22	0.01
Gasoline Storage Tanks											1,362	0.68
Wastewater Treatment Plant											80	0.04
Stationary Sources Subtotal	37	0.02	34	0.02	1,069	0.53	163	0.08	971,175	486	1,464	0.73
Area Sources												
Woodstoves	972	0.49	11	< 0.01	73	0.04	7,093	3.55			6,430	3.22
Campfires	4,865	2.43	56	0.03	366	0.18	35,516	17.76			32,198	16.10
Prescribed Burning	576	0.29					2,784	1.39	219,600	109.80	192	0.10
Area Sources Total	6,413	3.21	67	0.03	439	0.22	45,393	22.70	219,600	109.80	38,820	19.41
Totals												
	Particulates (PM, 0)		Sulfur Dioxide		Nitrogen Oxides		Carbon Monoxide		Carbon Dioxide		VOCs	
	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 Prescribed Burning	5,874	2.94	101	0.05	1,508	0.75	42,772	21.39	971,175	486	40,092	20.05
Totals with Prescribed Burning	6,450	3.23	101	0.05	1,508	0.75	45,556	22.78	1,190,775	595	40,284	20.14

^I As methane

3. MOBILE SOURCE EMISSIONS

This section summarizes emissions from mobile sources at Mesa Verde NP for 2001. Mobile emission sources include highway and nonroad vehicles. The following emissions were calculated for each source: particulate matter (PM_{10}), nitrogen oxides (NO,), carbon monoxide (CO), and volatile organic compounds (VOCs).

3.1 HIGHWAY VEHICLES

3.1.1 Visitor Vehicles

The number of visitor vehicles operating in NPS units is often correlated to the number of annual visitors to the park unit, and estimated visitors to Mesa Verde NP in 2001 were estimated to be 537,474. Table 9 summarizes the approximate number of vehicles entering the park and estimated roundtrip distances traveled by these vehicles. It was assumed that all visitor vehicles drove to the Chapin Mesa area. Visitation data indicate that the majority of these also traversed the Mesa Top Loop drive that is adjacent to the Chapin Mesa area and that a much smaller number visited the Wetherill Mesa area. Approximately 1,250 buses also entered the park and were assumed to travel to the Chapin Mesa area. The concessionaire, Aramark, also operates a tram to the west end of Wetherhill and tour buses in other parts of the park. Data on these vehicles also are provided in Table 9.

Area Visited	Visitation	No. Vehicles	MilesNehicle	Vehicle Miles Traveled			
Chapin Mesa	537,474	255,940	42	10,749,480			
Mesa Top Loop	407,545	194,070	9	1,746,630			
Wetherill Mesa	8,421	4,010	24	96,240			
	or Vehicle Totals	12,592,350					
Wetherhill Trams 60,4							
Tour Buses 26,8							

Assumes 2.1 visitors per vehicle

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, NOx, CO, and $PM_{\perp}0$. 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, PM _{I0} 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 vehicle miles traveled (VMT) data in order to estimate mobile source emissions for VOC (both exhaust and evaporative), NOx, and CO. Similarly, emission factors produced by the PARTS model were used in conjunction with VMT data to estimate PM₁o emissions. MOBILE6.2 produces exhaust and evaporative emission factors for the following classes of vehicles: light duty gasoline vehicles (LDGV), light duty gasoline trucks 1 (LDGTI), light duty gasoline trucks 2 (LDGT2), heavy duty gasoline vehicles (HDGV), light duty diesel vehicles (LDDV), light duty diesel trucks (LDDT), heavy duty diesel vehicles (HDDV), and motorcycles. It also produces a composite emission factor for all vehicles based on the vehicle class mix supplied to the model. Inputs to the model include average vehicle speed, vehicle VMT mix, annual mileage accumulation rates and registration distributions by age, inspection and maintenance (UM) program info' ination, fuel information, ambient temperature data, and others.

Both the MOBILE6.2 and PARTS models are 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 class 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 than the overall model default vehicle age distribution. Using the VMT data noted earlier in Table 10, the VMT by vehicle class for summer and winter travel also are provided in Table 11.

In addition to VMT mix and age distribution, CE-CERT also established park-specific modeling inputs for driving pattern characterization. CE-CERT found that park driving patterns differ

significantly from the default driving patterns typically used in mobile modeling, such as the Federal Test Procedure (FTP). In particularly, they found that the FTP reflects both higher speeds and a wider range of speeds than observed in the parks. However, since the MOBILE5b 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 models was assumed to be 35 mph. The fuel volatility was assumed to be RVP 13.6 (winter) and 8.8 (summer), and reformulated gasoline was not assumed to be present. Finally, inspection/maintenance (UM) program inputs were not included since there are no I/M programs in this part of Colorado.

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 the CE-CERT data, served as the basis for mobile source emission estimates. Additional particulate emissions (or entrained road dust) from vehicles operating on paved roads in Mesa Verde NP also were calculated based on VMT. A summary of visitor vehicle emissions is provided in Table 11.

3.1.2 NPS Vehicles

Mesa Verde NP operates a fleet of highway vehicles that are owned by the NPS. A summary of NPS vehicles and their estimated annual mileage is provided in Table 10, and emissions are provided in Table 11. The concessionaire also operates a fleet of approximately 20 vehicles, excluding the trams and tour buses. Since no mileage data were available for these vehicles, mileages were estimated proportionately to the NPS vehicles.

Vehicle Type	Annual Usage (milyr)	
Light-Duty Gasoline Vehicles		21,284
Light-Duty Pickups		166,632
Heavy Duty Diesel Trucks		57,917
Тс	otal	245,833

TABLE 10: NPS ROAD VEHICLES AT MESA VERDE NP

3.2 NONROAD VEHICLES

The NPS also owns and operates nonroad motorized equipment that is used to maintain roads and grounds and for other purposes. Data were not available on the types of nonroad vehicles and equipment, although total operating hours of approximately 1900 hours were estimated. In order to calculate annual emissions that are summarized in Table 11, it was assumed that these vehicles were similar to those operated by other park units.

3.3 SUMMARY OF MOBILE SOURCE EMISSIONS

Table 11 summarizes the mobile source emissions for road and nonroad vehicles and equipment operating in Mesa Verde NP in 2000.

2001 Air Emissions Inventory

		tes (PM $_{t}$ 0)	Sulfur	Dioxide	Nitrogen	Oxides	Carbon Monoxide		VOCs	
Activity	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr
Ro				ehicles						
Visitor Vehicles	24,211	12.11			33,936	16.97	477,603	238.80	28,645	14.32
Visitor Tour Buses	131 '	0.07			1,930	0.97	755	0.38	58	0.03
Concessionaire Trams	123	0.06			494	0.25	3,476	1.74	132	0.07
Concessionaire Tour Buses	67	0.03	45	0.02	985	0.49	386	0.19	29	0.01
NPS Road Vehicles	504	0.25			2,619	1.31	8,885	4.44	500	0.25
Concessionaire Road Vehicles	249	0.12			339	0.17	5,568	2.78	300	0.15
Vehicle Emission Subtotal	25,285	12.64	45	0.02	40,303	20.15	496,673	248.34	29,664	14.83
	Nonroad									
NPS Nonroad Vehicles	198	0.101			5181	0.26 ~	3441	0.17 ~	2261	0.11
Totals										
	Particula	tes $(PM, _0)$	Sulfur	Dioxide	Nitrogen	Oxides	Carbon I	Monoxide	VO	Cs
Totals	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr	lbs/yr	tons/yr
	25,483	12.74	45	0.02	40,821	20.41	497,017	248.51	29,890	14.95

TABLE 11: SUMMARY OF 2000 MOBILE SOURCE EMISSIONS AT MESA VERDE NP

' Includes exhaust, brake, and tire PM~o and road dust

4. MESA VERDE NP AND REGIONAL AIR EMISSIONS

4.1 MESA VERDE NP SUMMARY

A summary of Mesa Verde NP emissions is provided in Table 12.

Source	PM ₁ 0 (tons)	SO ₂ (tons)	NO _X (tons)	CO (tons)	VOCs (tons)				
Point Sources									
Heating Equipment	0.02	0.12	0.53	0.08	0.01				
Gasoline Storage Tanks					0.68				
Wastewater Treatment Plant					0.04				
Subtotal	0.02	0.12	0.53	0.08	0.73				
Area Sources									
Woodstoves	0.49	< 0.01	0.04	3.55	3.22				
Campfires	2.43	0.03	0.18	17.76	16.10				
Prescribed Burning	0.29			1.39	0.10				
Subtotal	3.21	0.03	0.22	22.70	19.41				
	Μ	obile Sources							
Road Vehicles	12.64		20.15	248.34	14.83				
Nonroad Vehicles	0.10		0.26	0.17	0.11				
Subtotal	12.74		20.41	248.51	14.95				
		Totals	i						
Totals	15.97	0.15	21.16	271.29	35.09				

TABLE 12: ESTIMATED ANNUAL EMISSIONS FROM MESA VERDE NP	TABLE 12:	ESTIMATED	ANNUAL	EMISSIONS	FROM MESA	VERDE NP
---	-----------	-----------	--------	-----------	-----------	----------

As methane

4.2 **REGIONAL AIR EMISSIONS**

Emission estimates for Montezuma County and the state of Colorado 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 preserve emission inventory and those used to generate the NET. For example, gasoline storage tanks have been included as stationary sources for the Park, while the NEI treats them as area sources. Table 13 provides a comparison of the Park emissions with those from the surrounding county and the State of Colorado.

Area	PM~p (tons/yr)	SO ₂ (tons/yr)	NO _X (tons/yr)	CO (tons/yr)	VOC (tons/yr)					
	Point Sources									
Mesa Verde NP Totals	0.02	0.12	0.53	0.08	< 0.01					
Montezuma County	40	47	473	204	232					
Colorado Totals	19,979	103,922	118,526	36,563	37,408					
Area Sources										
Mesa Verde NP Totals	3.21	0.03	0.22	22.70	19.41					
Montezuma County	1,556	27	292	3,432	908					
Colorado Totals	217,805	4,177	53,695	185,809	120,432					
	Mobile Sources									
Mesa Verde NP Totals	12.74		20.41	248.51	14.95					
Montezuma County	3,191	117	1,626	10,129	1,345					
Colorado Totals	183,131	19,243	244,978	1,245,011	123,773					

TABLE 13: ESTIMATED ANNUAL EMISSIONS FROM MESA VERDE NP,SURROUNDING COUNTIES, AND THE STATE OF COLORADO

5. COMPLIANCE AND RECOMMENDATIONS

This section discusses air emission related issues relating to the park and associated recommendations that may be considered to mitigate those issues.

5.1 COMPLIANCE

Mesa Verde NP is located in Montezuma County, CO, which is in attainment for all national and state ambient air quality standards (AAQS). The Colorado Department of Public Health and Environment administers the state's air pollution program. Park personnel should coordinate with the agency on permit issues relating to stationary sources, as well as prescribed burning activities. According to the Colorado Air Quality Control Commission Regulation No. 9, which is provided in Appendix D, open burning, under certain conditions, is allowed for fires used for noncommercial cooking of food for human consumption, or for instructional, training, or recreational purposes without a permit. However, since prescribed burning is not specifically exempt from the requirement to obtain a permit, presumably a permit must be obtained from the Colorado Department of Health and Environment to conduct prescribed burning.

Unlike some counties in Colorado, such as Denver and Boulder, there are no limitations on the use of wood burning stoves and other wood burning appliances. A construction permit for new or modified air pollution sources in Montezuma County is required only for a facility with actual emissions that exceed:

- $PM_1o 5 \text{ tons/year}$
- Sulfur dioxide 10 tons/year
- Nitrogen oxides 10 tons/year
- Carbon monoxide 10 tons/year
- Volatile organic compounds 5 tons/year

Since the park has no source that exceeds the above threshold, it does not require permits for any of its equipment.

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.

The park has undertaken a number of energy conservation and substitution initiatives. These include:

- Solar hot water assist units on six employee residences
- Waterless urinals in public restrooms
- Low-flow showers and toilets in employee residences
- Two photovoltaic-powered radio repeaters
- Recycling program.

The few woodstoves in employee residences are estimated to be the largest non-mobile sources of emissions in the park. If these are replaced, they should be replaced with units that meet the USEPA New Source Performance Standards for residential woodstoves. Based on laboratory testing, EPA has estimated that cleaner stove could reduce PM 10 emissions by at least 70 percent, and as much as 90 percent (USEPA 1990). The park has phased out its No. 2 fuel oil heaters and has only three remaining units that are planned for replacement with a cleaner burning propane heater.

The park does not utilize alternative fuels, and there are no near-term plans to implement them. Based on the park's relatively isolated location and the lack of other nearby relatively large vehicle fleets, the best opportunity to implement an alternative fuel would be if a nearby fuel supplier could be found to provide a biodiesel blend such as B20. This is a fuel that has been adopted by a number of western parks to reduce vehicle emissions.

6. REFERENCES

- College of Engineering at the University of California's Riverside Campus (CE-CERT). 2001. *Air Emissions Inventory for Zion National Park.*
- BRW, Inc. 1997. Mesa Verde National Park Transportation Study. December 18.
- EA Engineering, Science, and Technology. 2001. *Air Emission Inventory Preparation Plan.* Prepared for the National Park Service. November.
- Federal Highway Administration and Federal Transit Administration. 2001. Field Report -Mesa Verde National Park. Federal Lands Alternative Transportation Systems Study Congressional Report. August.

National Park Service. 2002. Air Quality in the National Parks. Second Edition. September.

USEPA. 1990. Buying an EPA-Certified Woodstove. February.

- USEPA. 1991. Nonroad Engine and Vehicle Emission Study Report. EPA-21A-2001 and EPA460/3 -91-02. November.
- USEPA. 1995a. Compilation of Air Pollution Emission Factors AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources.
- USEPA. 1995b. *Highway Vehicle Particulate Emission Modeling Software "PARTS"*. Office of Transportation and Air Quality.
- USEPA. 2000a. *Factor Information REtrieval (FIRE) Data System*. Office of Air Quality Planning and Standards.
- USEPA. 2000b. TANKS 4.09a. Office of Air Quality Planning and Standards.
- USEPA. 2000c. *Emission Modeling for Recreational Vehicles*. Office of Air and Radiation. 13 November.
- USEPA. 2002. User's Guide to MOBILE6.1 and MOBILE6.2 Mobile Source Emission Factor Model. EPA420-R-02-010. Office of Air and Radiation. March.
- U.S. Forest Service. 1997. First Order Fire Effects Model (FOFEM) 4.0 User's Guide. January.

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 ³	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)						
		SOz~ ^{b)}	NO _X (°)	со	VOC ^{d)}			
Residential Furnace ^(e)	0.4	142S	18	5	0.713			
Boilers < 100 Million Btu/hr (Commercial/Institutional Combust.~ ⁰)	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 ^(h))	2	157S	24	5				
Source: AP-42, 5th Edition, Supplements A, B, C, D, and E, Tables 1.3-1 and 1.3-3.								

Combustor Type	Er	nission Fac	tor $(lb/10^6 ft)$	³ fuel burn	ed)
(MMBtu/hr Heat Input)	$p_{\mathbf{M}^{U>}}$	SO ₂	NO,, ⁽⁶⁾	СО	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) ^(k)	7.6	0.6	280	84	5.5
-Uncontrolled (Post-NSPS) ^(k)	7.6	0.6	190	84	5.5
-Controlled-Low NO _x burners	7.6	0.6	140	84	5.5
-Controlled-Flue gas recirculation	7.6	0.6	100	84	5.5

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

PROPANE (LPG) - CRITERIA POLLUTANTS								
Combustor Ture		ssion Facto	al fuel burned)					
Combustor Type	PM ^(a)	SO_2	NO _x ^(c)	СО	VOC ^{d)}			
Commercial Boilers ⁽⁰	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

		Emissi					
Fuel Type	PM	SO _X	NO _X	СО	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/Propane	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 less than or equal to 448 kW (600 hp):

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

	Emission Factor (lb/hp-hr)											
Fuel Type	PM	PM SO _x (^b)		СО	VOC							
DF-2	0.0007	(8.09 E-03)S	0.024	5.5 E-03	6.4 E-04							
Source: AP-42	2, 5th Edition, Su	upplements A, B, C	C, D, and E, Tab	ble 3.4-1.								

FIREPLACE EMISSION FACTORS

Fuel Type		Em	ission Factor (1	b/ton)	
Fuel Type	PM°	SO,	NOX	СО	VOC
Wood	34.6	0.4	2.6	252.6	229.0
Source: AP-42	, 5th Edition, Su	upplements A, I	B, C, D, and E,	Table 1.9-1.	

WOODSTOVE EMISSION FACTORS

Stove Type		En	nission Factor (lb/ton)	
	PM°	SOx	NO _X ^{cc)}	СО	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, Su	upplements A, I	3, 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 E July 1994. Armstrong Laboratory.	Imission Inventories, AL/OE-TR-1994-0049,

- (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.
- (I) 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

Emission Source	Location	Facilities	Fuel	Number of c,,,.ces	Capacity (Btu%hr) Park Service		Consumption trab'vr)	PM (lbs/vr)	SO, (Ihs/vrl	NOa tlhetvrt	CO tlhr/vr1	CO. (Ibs/vr)	VOC (lhs/vr)
Boiler	Headquarters Area	Museum	No. 2 rues 011	Tationa	125,000		1.067	2	76	21	5	22.933	0
Furnace	Headquarters Area	Chief Rangers Office	No. 2 Fuel Oil	1	125,000	125.000	1.067	2	76	21	5	22,933	Ċ
Boiler	Headquarters Area		No. 2 Fuel Oil	1	125,00(1	125,(100	1,067	2	76	21	5	22,933	Č
00101	Troduquartero / 1 ou		Totals	3	375,000		3100	6	227	64	16	68,800	1
Emission Fac	ctors from AP-12, Tab	les 1,3-l and 1.3-3 for residential furnar les 1.3-l and 1.3-3 for furnaces (>300,0 Emission Factor (lb/1,000 gal)		5 percent				0.4 2.0	1425 1425	18.0 20.0	5.0 5.0	21,5(10 21,50(1	((. ((.
Boiler	Headquarters Area	Library	Propane	I	80,000	80,(100	1,173	(1	1)	16	2	14,659	11
Heater	Headquarters Area	Hogan	Propane	2	80,000	160,000	2.745	i i	0	33	5	29,318	1
Furnace	Maintenance	Electric Shop	Propane	1	80,000	80,018)	1,173	11	0	16	2	14,659	C
Furnace	Maintenance	Warehouse	Propane	1	80,00(1	80,000	1,173	0	0	16	2	14,659	C
Heater	Maintenance	Auto Shop	Propane	1	80,(100	80,000	1,173	(1	(1	16	2	14,659	C
Boiler	Maintenance	Carpenter Shop	Propane	1	80,00(1	80,000	1,173	(1	0	16	2	14,659	C
Furnace	Maintenance	Lumber Shed	Propane	1	80,000	8(1,000	1,173	0	0	16	2	14,659	0
Furnace	Maintenance	Snow Blast Shed	Propane	1	60,008	8(1,00(1	1,173	0	U	16	2	14,659	C
Furnace	CCC	Fire Cache	Propane	1	80,000	80,000	1,173	0	0	16	2	14,659	C
Furnace	Chapin	Wastewater Treatment Plant	Propane	1	80,000	80,000	1,173	0	0	16	2	14,659	(
Heater	Morefeld	Residences	Propane	1	80,000	80,00(1	1,173	0	0	16	2	14,659	0
Furnace	CCC	Recreational Hall	Propane	1	80,000	80,0(10	1,173	0	0	16	2	14,659	(1
Furnace	CCC	Research Laboratory	Propane	1	80,(10(1	80,0(10	1,173	0	0	16	2	14,659	Ó
Boiler	Far View	Visitor Center	Propane	1	80,000	80,000	1,173	0	0	16	2	14,659	C
Furnace	CCC	Stabilization Shed	Propane	1	80,000	80,000	1,173	(1	0	16	2	14,659	C
Furnace	Jackson Lake	Water Treatment Plant	Propane	1	8(1,000	80,00(1	1,173	0	0	16	2	14,659	0
Furnace	CCC	Barracks	Propane	3	80,000	24(1,000	3,518	1	0	49	7	43,977	1
Heater	Maintenance	Equipment Shed	Propane	2	80,000	160,000	2,345	1	0	33	5	29.318	
			Subtotal	22		1,760,0(10	25,8011	10	0	361	52	322,5011	8
	Parkwide	Employee Residences	B				23.060	9	0	323	46	288.250	-
Furnaces	Parkwide	Employee Residences	Propane				20,000		1				7
Emission Fac	ctors from AP-42, Tab	les 1.5-I for commercial boilers, S=(1.1	Totals					20	(LA'S		98 1.90	61(1,750 12,50(1	/ 15 (130
Emission Fac	ctors from AP-42, Tab	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal)	Totals 8 grains/10(1 cu ft					20	(LA'S	684 14.0(1	98	61(1,750 12,50(1	(130
Emission Fac	ctors from AP-42, Tab	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal)	Totals					20	1	684	98	61(1,750	15
Emission Fac	ctors from AP-42, Tab	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal)	Totals 8 grains/10(1 cu ft	Number of Sources	Capacity (Btu/hr)		Consumption (caVs+)	20	(LA'S	684 14.0(1	98	61(1,750 12,50(1	(130
Emission Fac Fommla = C Emission Source	ctors from AP-42, Tab onsumption (ga ¹ yr) • I Location	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (Ib/1,000 gal) Total National F Facilities	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel	Sources	(Btu/hr) Parks & Resorts	4000.000	Consumption (caVs+)	20 ((.4 26	1 (LA'S 228 SO. _(lbs/•-'	684 14.0(1 748 NOa _ <u>pbsh~)</u>	98 1.90 114 <u>CO</u> (11,0 <i>T</i>)	61(1,750 12,50(1 679,55(1 CO. Ohs/vs)	15 (130 16 VOC
Emission Fac Fommla = Co Emission	ctors from AP-42, Tab consumption (ga ¹ yr) ∙ ∣	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal) Total National F	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil	Sources	(Btu/hr)	1,080,000	Consumption (caVs+) 1, 510	20 ((.4 26	(LA'S 228 SO. _(lbs/•-'	684 14.0(1 748 <u>NOa</u> <u>pbsh~)</u> 30	98 1.90 114 CO	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250	15 (130 16 VOC
Emission Fac Fommla = Co Emission Source Boiler Emission Fac	ctors from AP-42, Tab onsumption (ga'yr) • 1 Location Morefeld ctors from AP-42, Tab	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (Ib/1,000 gal) Total National F Facilities	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal	Sources	(Btu/hr) Parks & Resorts	1,080,000	Consumption (caVs+)	20 ((.4 26 PM (hi ^t ^'	1 (LA'S 228 SO. _(lbs/•-'	684 14.0(1 748 NOa _ <u>pbsh~)</u>	98 1.90 114 <u>CO</u> (11,0 <i>T</i>) 6	61(1,750 12,50(1 679,55(1 CO. Ohs/vs)	15 (130 11 VOC pbs ¹ vr)
Emission Fac Formila = C Emission Source Boiler Emission Fac Formula = Cc	ctors from AP-42, Tab onsumption (ga'yr) • I Location Morefeld ctors from AP-42, Tab onsumption (gaVyr)	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal) Total National F Facilities Laundry les 1.3-1 and t 3-3 for furnaces (>300,0 Emission Factor (lb/1,000 gal)	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 100 Btu/hr) S = 0.5 percent	Sources	(Btu/hr) Parks & Resorts		Consumption (caVs+) 1, 510	20 ((.4 26 PM (hi ^t ^'	(LA'S 228 SO. _(lbs/•-' 	684 14.0(1 748 <u>NOa</u> <u>pbsh~)</u> 30 30	98 1.90 114 CO (11,07) 6 8	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1	15 (130 1 VOC pbs ^t vr)
Emission Fac Fommla = C Emission Source Boiler Emission Fac Formula = Cc Boiler	ctors from AP-42, Tab onsumption (ga'yr) • 1 Location Morefeld ctors from AP-42, Tab	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (Ib/1,000 gal) Total National F Facilities Laundry Laundry	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 100 Btu/hr) S = 0.5 percent Propane	Sources	(Btu/hr) Parks & Resorts 1,080,000	1,080,000	Consumption (caVs+) 1,510 1.580	20 ((.4 26 PM (hi ^t ^' 3 2.0	1 (LA'S 228 SO. _(lbs/*-' 11 11 142S	684 14.0(1 748 <u>NOa</u> <u>pbsh~)</u> <u>30</u> 30 2(1.0	98 1.90 114 CO (11,07) 6 8 5.0	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1 21,50(1	15 (130 1 VOC pbs ^t vr)
Emission Fac Fommla = C Emission Source Boiler Emission Fac Formula = Cc Boiler Furnace	ctors from AP-42, Tab ionsumption (ga'yr) • 1 Location Morefeld ctors from AP-42, Tab onsumption (gaVyr) Far View For View	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal) Total National F Facilities Laundry les 1.3-1 and t 3-3 for furnaces (>300,0 Emission Factor (lb/1,000 gal) Lodge Terrace	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 100 Btu/hr) S = 0.5 percent	Sources	(Btu/hr) Parks & Resorts 1,080,000 525,00(1 400,(10(1	1,080,000	Consumption (caVs+) 1.510 1.580 3.75(1	20 ((.4 26 PM (hi ^t ^' 3 2.0	1 (LA'S 228 SO(lbs/+-' 11 142S 0	684 14.0(1 748 <u></u>	98 1.90 114 <u>CO</u> (<u>11.0</u> 7) <u>6</u> 8 5.0	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1 21,50(1 46,875	15 (13) VOC pbs ^t vr) 1 0.
Emission Fac Formula = C Emission Source Boiler Emission Fac Formula = Cc Boiler Furnace	ctors from AP-42, Tab onsumption (ga'yr) • 1 Location Morefeld ctors from AP-42, Tab onsumption (ga'Vyr) Far View For View Far View	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal) Total National F Facilities Laundry	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 100 Btu/hr) S = 0.5 percent Propane Propane Propane	Sources raruerk I	(Btu/hr) Parks & Resorts 1,080,000 525,00(1 400,(10(1 154,(1(10	1,080,000 525,0(10 400,000	Consumption (caVs+) 1,510 1.580 3,75(1 3,000	20 ((.4 26 PM (hi ^t ^' 3 2.0 2 1	1 (LA'S 228 SO. _(lbs/*-' 11 11 142S 0 0	684 14.0(1 748 <u>pbsh-)</u> 30 30 2(1.0 53 42	98 1.90 114 CO (11.07) 6 8 5.0 8 6	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1 21,50(1 46,875 37,5(1(1	18 (13) VOC pbs ^t vr)
Emission Fac Fommla = C Emission Source Boiler Emission Fac Formula = Cc Boiler Furnace Furnace	ctors from AP-42, Tab ionsumption (ga'yr) • Location Morefeld ctors from AP-42, Tab onsumption (gaVyr) Far View For View Far View Far View er Far View	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (Ib/1,000 gal) Total National F Facilities Laundry les 1.3-1 and t 3-3 for furnaces (>300,0 Emission Factor (Ib/1,000 gal) Lodge Terrace Terrace Lodge	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 00 Btu/hr) S = 0.5 percent Propane Propane	Sources raruerk I I 1 1 2	(Btu/hr) Parks & Resorts 1,080,000 525,00(1 400,(10(1	1,080,000 525,0(10 400,000 308,000	Consumption (caVs+) 1,510 1.580 3,75(1 3,000 1,0(11)	20 ((.4 26 PM (hi ^t ^' 3 2.0 2 1	1 (LA'S 228 SO. _(lbs/*-' 11 142S 0 0 0 0	684 14.0(1 748 NOa <u>pbsh~)</u> 30 30 2(1.0 53 42 14	98 1.90 114 CO (11,0 τ) 6 8 5.0 8 6 2	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1 21,50(1 21,50(1 12,500	15 (13) VOC pbs ^t vr) 1 0.
Emission Fac Fommila = C Emission Source Boiler Emission Fac Formula = Cc Boiler Furnace	ctors from AP-42, Tab onsumption (ga'yr) • 1 Location Morefeld ctors from AP-42, Tab onsumption (gaVyr) Far View Far View Far View Far View er Far View er Far View	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal) Total National F Facilities Laundry	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 100 Btu/hr) S = 0.5 percent Propane Propane Propane Propane Propane Propane	Sources raruerk I I 1 1 2 2	(Btu/hr) Parks & Resorts 1,080,000 525,00(1 400,(10(1 154,(1(10 725,0(1(1	1,080,000 525,0(10 400,000 308,000 1,450,000	Consumption (caVs+) 1,510 1.580 3,75(1 3,000 1,0(11) 3,5(10	20 ((.4 26 PM (hi ^t ^' 3 2.0 2 1	1 (LA'S 228 SO. _(lbs/' 11 11 142S 0 0 0 0	684 14.0(1 748 NOa <u>pbsh~)</u> 30 30 2(1.0 53 42 14 49	98 1.90 114 CO (11.07) 6 8 5.0 8 6 2 7	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1 21,50(1 46,875 37,5(1(1 12,500 43,75(1)	15 (13) VOC pbs ^t vr) 1 0.
Emission Fac Fommla = C Emission Source Boiler Emission Fac Formula = Cc Boiler Furnace Furnace Water Heate Water Heate Water Heate	ctors from AP-42, Tab onsumption (ga'yr) • 1 Location Morefeld ctors from AP-42, Tab onsumption (gaVyr) Far View For View Far View ar Far View er Far View Chapin	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal) Total National F Facilities Laundry les 1.3-1 and t 3-3 for furnaces (>300,0 Emission Factor (lb/1,000 gal) Lodge Terrace Terrace Terrace Lodge Terrace	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 100 Btu/hr) S = 0.5 percent Propane Propane Propane Propane Propane Propane Propane	Sources raruerk I I 1 1 2 2 2	(Btu/hr) Parks & Resorts 1,080,000 525,00(1 400,(10(1 154,(1(1) 725,0(1(1 200,000	1,080,000 525,0(10 400,000 308,000 1,450,000 400,000	Consumption (caVs+) 1,510 1.580 3,75(1 3,000 1,0(11) 3,5(10 2,500	20 ((.4 26 PM (hi ^t ^' 3 2.0 2 1 0 1	1 (LA'S 228 SO. _(lbs/+-' 11 11 142S 0 0 0 0 0 0 0 0 0	684 14.0(1 748 NOa <u>pbsh-</u>) 30 2(1.0 53 42 14 49 35	98 1.90 114 CO (11.0 <i>r</i>) 6 8 5.0 8 6 2 7 5	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1 21,50(1 12,50(1 12,50(1 12,50(1) 12,500 43,75(1) 31,250	115 (134 VOC pbs [*] vr) 1 0.
Emission Fac Formula = C Emission Source Boiler Emission Fac Formula = Cc Boiler Furnace Furnace Water Heate Furnace Water Heate Furnace	ctors from AP-42, Tab ionsumption (ga'yr) • Location Morefeld ctors from AP-42, Tab onsumption (gaVyr) Far View For View Far View Far View er Far View er Far View chapin er Chapin er Chapin	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (lb/1,000 gal) Total National F Facilities Laundry les 1.3-1 and t 3-3 for furnaces (>300,0 Emission Factor (lb/1,000 gal) Lodge Terrace Terrace Terrace Spruce Tree Spruce Tree Spruce Tree	Totals Totals grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 00 Btu/hr) S = 0.5 percent Propane Pr	Sources raruerk I I 1 1 2 2 2 2 2	(Btu/hr) Parks & Resorts 1,080,000 525,00(1 400,(10(1 154,(1(10 725,0(1(1 220,000 300,000	1,080,000 525,0(10 400,000 308,000 1,450,000 400,000 60(1,00(1	Consumption (caVs+) 1,510 1.580 3,75(1 3,000 1,0(11) 3,5(10 2,500 4,00(1	20 (((4 26 PM (hi ^t ^' 3 2.0 2 1 1 2	1 (LA'S 228 SO(lbs/'(lbs/'	684 14.0(1 748 NOa <u>pbsh~)</u> 30 30 2(1.0 53 42 14 49 35 56	98 1.90 114 CO (11.0 <i>r</i>) 6 8 5.0 8 6 2 7 5	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1 21,50(1 12,50(1 12,50(1 33,25(1) 12,50(1 12,50(1)	15 (13(1) VOC pbs [*] vr) 1 0
Emission Fac Fommla = C Emission Source Boiler Emission Fac Formula = Cc Boiler Furnace Furnace Water Heate Water Heate Water Heate	ctors from AP-42, Tab onsumption (ga'yr) • 1 Location Location Morefeld ctors from AP-42, Tab onsumption (gaVyr) Far View Far View Far View Far View Far View er Far View chapin er Chapin f	les 1.5-I for commercial boilers, S=(1.1 Emission Factor (Ib/1,000 gal) Total National F Facilities Laundry	Totals 8 grains/10(1 cu ft Park Service Pleating Units Fuel No. 2 Fuel Oil Subtotal 100 Btu/hr) S = 0.5 percent Propane Propan	Sources raruerk I I 1 1 2 2 2 2 2	(Btu/hr) Parks & Resorts 1,080,000 525,00(1 400,(10(1 154,(1(1) 725,01(1 200,000 300,000 75,00(1	1,080,000 525,0(10 400,000 308,000 1,450,000 400,000 60(1,00(1 75,00(1	Consumption (caVs+) 1.510 1.580 3.75(1 3.000 1.0(11) 3.5(10 2.500 4.00(1 500	20 (((4 26 PM (hi ^t ^' 2.0 2 1 0 1 1 2 0	1 (LA'S 228 SO(lbs/' 11 11 142S 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	684 14.0(1 748 NOa <u>pbsh~)</u> 30 30 2(1.0 53 42 14 49 35 56 7	98 1.90 114 CO (11.0 <i>r</i>) 6 8 5.0 8 6 2 7 5	61(1,750 12,50(1 679,55(1 CO. Ohs/vs) 32,250 32,25(1 21,50(1 21,50(1 12,50(1 32,55(1) 32,55(1) 21,50(1) 32,55(1) 21,50(1) 32,55(1)	15 (130 11 VOC

2001 ACTUAL CRITERIA EMISSIONS FROM HEATING UNITS AT MESA VERDE NATIONAL PARK

Emission Factors from AP-42, Tables 1.5-1 for commercial boilers, S=0.18 grains/100 cu 0 Fornntla = Consumption (gaVyr) Emission Factor (lb/1,000 gal) 0.4 (I.I•S 14.00 1.90 12,50(1 ((.30 Total Aramark Parks & Resorts Heating Units lbs/yr 11 11 321 49 291,625 15 37 971,175 22 Park Totals 15 lbs/yr 239 1,069 163 Q01 486 tons/yr 4(12 (1.12 0.53 0.08

7~

Image Paradipaties Area Check langes (Inne No. 2 Fail Oil 1 120 (Oil 722 (Intel 0 550 (Intel 68 (Intel mission Factors from A-42, Tables 1-3 I and L3-3 for maledrial formaces (<200.000 Blurh) S = (15 percent 0.4 1433 180.0 5.0 22.500 C mission Factors from A-42, Tables 1-3 I and L3-3 for maledrial formaces (<200.000 Blurh) S = (15 percent 0.4 1433 180.0 5.0 22.500 C outside - Cosamption (gelly) - Emsoin Factors (Pri-100) Propare 1 0(10.00 15.00 17.500 19.769 3 0 10.7 15 967.38 outside - Cosamption (Pri-100) Propare 1 0(10.00 15.16 0 12.67 15 967.38 outside - Ministrates Area Bactor Shop Propare 1 0(10.00 10.00<	Emission Source	Location	Facilities	Fuel	Number of Sources	Capacity (Btulhr)		onsumptio (gal/yr)	PM (Ibs/yr)	SO, (lbs/yr)	NO _{j5} (Ibs/vr)	CO ‼hshr ^s	CO, nti∼r, _'	VOC rlud.,r1
Minute Headquinter Aria Chart Engages Office No. 2 Fail OII I 125(110 T26(110			Museum		Nation			7 821	16	555	156	39	100,101	
Bit Bit Standpartier Ava Park Headgeather are Totals No. 2 rate 101 (1 mission Factors from P-42, Table 13 at at 12.5 & moderate 13 moderate					i i									3
Total Total 3 375.000 23.464 4* 1666 469 117 59.482 mission Factor from A-42, Table 1.3-1 and 1.3-3 for mass (20000 Buhr) S = (1 percent 0.4 423 18.0 5.0 21.500 C mission Factor from A-42, Table 1.3-1 and 1.3-3 for mass (20000 Buhr) S = (5 percent 0.4 423 18.0 5.0 21.500 C mission Factor from A-42, Table 1.3-1 and 1.3-3 for mass (20000 Buhr) S = (5 percent 0.4 423 18.0 5.0 21.500 C minase Mathemana Hogan Pogane 1 61.000 80.000 7.659 3 0 107 15 65.733 minase Mathemana Wathshave Pogane 1 80.000 7.659 3 0 107 15 65.733 minase Mathemana Lumber Shed Pogane 1 80.000 7.659 3 0 107 15 65.733 minase Mathemana Lumber Shed Pogane 1 80.000 7.659 3 0 107					i				16	555	156	39	168,161	3
Intellet Figure 1 1 Sol 1 <	DUIIGI	neduquditeis Ared	- Fdik Heduyudile is		3				47	1.666	469	117	504,482	8
and a - Consumption (gar (y))* Emission Factor ((br 1.000 a)) Proprint i 8(1.000 i) 7.659 iii) 3 0 1/17 iii) 15 95738 obler Headquarten Area Lobrary Proprint iii) 8(1.000 iii) 80.000 iii) 7.659 iii) 3 0 1/17 iii) 15 95738 unnoe Maintenance Harding Area Billini 8(1.000 iii) 8(1.000 iiii) 8(1.000 iiii) 8(1.000 iiii) 8(1.000 iiii) 8(1.000 iiii) 8(1.000 iiiii) 8(1.000 iiiii) 8(1.000 iiiii) 8(1.000 iiiiiii) 8(1.000 iiiiiiiiiiiiii) 8(1.000 iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	Emission Facto	ors from AP-42, Tables	1,3-1 and L3-3 for residential furnac	es (<300,000 Btu/hr) S = (1.5 perc	ent								0.
olier Headquarties Area Library Proprint 1 61.000 7.659 3 0 117 15 65.738 Letter Headquarties Area Hogan Proprint 2 61.000 105.106 5 6 7.759 3 0 107 15 65.738 Linnee Mathemance Auto Shop Proprint 80.100 80.000 7.659 3 0 107 15 65.738 Linnee Mathemance Auto Shop Proprint 1 80.100 7.659 3 0 107 15 65.738 Linnee Mathemance Show Blist Shed Proprint 1 80.000 80.000 7.659 3 0 107 15 65.738 urnee CCC Frie Cache Proprint 1 80.000 80.000 7.659 3 0 107 15 65.738 urnee CCC Frie Cache Proprint 80.000 80.000 <				100 Btu/hr) S = 0.5 p	ercent				2.0	142S	20.(1	5.0	21,500	0.
Care Productation Area Userity requires 2 81:000 80:000 75:38 6 7 214 31 91:475 Maintenance Warehouse Propane 1 80:100 7.859 3 0 107 15 95:738 Maintenance Warehouse Propane 1 80:100 7.859 3 0 107 15 95:738 Numee Maintenance Capenter Stop Propane 1 80:000 7.559 3 0 107 15 95:738 Numee Maintenance Stop Propane 1 80:000 80:000 7.559 3 0 107 15 95:738 Numee CCC File Cahe Propane 1 80:000 80:000 7.559 3 0 107 15 95:738 Numee CCC Research Laboratory Propane 1 80:000 80:000 7.559 3 0 107 15	Formula = Con	isumpuon (goryr) * Em	Ission Factor (Ib/ 1,000 gai)											
Babel medical bits Area Program	Boiler													2
Immedia Maintenance Listic broop mpare i Billion Scriptor Program I Billion Scriptor Program I Billion Scriptor Program I Billion Scriptor Program I Billion	Heater				2									
Mathematical Mathematical Action Mathematical Mathematical Action Mathematical Mathematical Mathematical Action Mathematical Mathematine Ma	Furnace				1									
Balafer Maniferance Auto Skilp Program 1 Bould School	Furnace	Maintenance	Warehouse	Propane	1									
Mathemanica Lumber Shall Propane 1 81.000 90.000 7.659 3 0 117 15 96.738 umace Mathemanica Downe 1 80.000 7.659 3 0 107 15 96.738 umace Downe 1 80.000 7.659 3 0 107 15 96.738 umace Coc Free Cache Propane 1 80.000 7.659 3 0 107 15 96.738 umace Coc Research Laboratory Propane 1 80.000 7.659 3 0 107 15 96.738 umace CCC Research Laboratory Propane 1 80.000 7.659 3 0 107 15 96.738 umace CCC Research Laboratory Propane 1 80.000 7.669 3 0 107 15 85.738 umace Coc Rational Park	Heater	Maintenance	Auto Shop	Propane	1		80,0(10							
Mantenance Lumber Sheat Propane I 80,000 7,659 3 0 107 15 86,7,48 urrace Maintenance Free Cathe Propane 1 80,000 7,659 3 0 107 15 85,738 urrace CCC Free Cathe Propane 1 80,000 7,659 3 0 107 15 85,738 urrace Chapin Wastewater Treatment Plant Propane 1 80,000 80,000 7,659 3 0 107 15 85,738 urrace CCC Recentor and Propane 1 80,000 7,659 3 0 107 15 85,738 outrace CCC Stabilization Shed Propane 1 80,000 7,659 3 0 107 15 85,738 urrace Atter Treatment Plant Propane 1 80,000 7,659 3 0 107 15 85,738	Boiler	Maintenance	Carpenter Shop	Propane	1	80,000	80,000	7,659						1
Maintenance Show Bast Shed Progame I B0,000 B0,000 7,659 3 1 1077 15 85,738 urrace CCC Fire Cache Progame 1 80,000 7,659 3 0 107 15 85,738 urrace CCC Fire Cache Progame 1 80,000 80,000 7,659 3 0 107 15 85,738 urrace CCC Recreational Hall Progame 1 80,000 7,659 3 0 107 15 85,738 urrace CCC Research Laboratory Progame 1 80,010 7,659 3 0 107 15 95,738 urrace CCC Research Laboratority Progame 3 80,010 7,659 3 0 107 15 95,738 urrace CCC Rarada Progame 3 80,000 7,659 3 0.107 15 95,738	Furnace	Maintenance		Propane	1	8(1,000	80,000	7,659	3	0				1
Dimage CCC Fire Cache Propame t 80.000 80.000 7.659 3 0 0/7 IS 85.738 unace Copin Wasterket Treatment Plant Propame 1 80.000 7.659 3 0 107 IS 85.738 unace CCC Research Laboratory Propame 1 80.000 80.000 7.659 3 0 107 IS 85.738 unace CCC Research Laboratory Propame 1 80.000 7.659 3 0 107 IS 85.738 unace CCC Research Laboratory Propame 1 80.000 7.659 3 0 107 IS 85.738 unace CCC Stabilization Sted Propame 3 0.007 7.659 3 0 107 IS 85.738 unace Additional Park Propame 3 80.000 15.318 6 0 2.14 31 <td></td> <td></td> <td></td> <td></td> <td>1</td> <td>80,000</td> <td>80,000</td> <td>7,659</td> <td>3</td> <td>(1</td> <td></td> <td></td> <td></td> <td>2</td>					1	80,000	80,000	7,659	3	(1				2
Umage Chappin Wastewater Tealment Plant Propane I 80,000 80,000 7,659 3 0 1077 IS 95,738 umage CCC Recreational Hall Propane 1 80,000 7,659 3 0 1077 15 95,738 umage CCC Recreational Hall Propane 1 80,000 7,659 3 0 107 15 95,738 umage CCC Research Laboratory Propane 1 80,010 80,000 7,659 3 0 107 15 95,738 umace CCC Stabilization Shed Propane 1 80,010 80,000 7,659 3 0 107 15 95,738 umace CCC Baracks Propane 2 80,100 82,010 82,213 3 119,475 3 3 2,137 2,14 19,475 3 3,172 2,162,13 16,672 4,68 2,238					t	80.000	80.000	7,659	3	0	107	IS	95,738	1
Displin Program I 80.000 80.000 7.659 3 0 107 15 95.738 Balar Modelled Research Laboratoral Harman Programe 1 80.000 7.659 3 0 107 15 95.738 Unace CCC Research Laboratory Programe 1 80.000 7.659 3 0 107 15 95.738 Unace Solution Center Programe 1 80.000 7.659 3 0 107 15 95.738 Unace Subtocal Laboratory Water Treatment Plant Programe 1 80.000 7.659 3 0 107 15 95.738 Unace Datational Programe 3 80.000 7.659 3 0 107 15 95.738 Unace Equipment Shed Programe 3 80.000 7.659 3 0 107 15 95.738 Unace Equipment Shed <td></td> <td></td> <td></td> <td></td> <td>i</td> <td></td> <td></td> <td>7.659</td> <td>3</td> <td>0</td> <td>107</td> <td></td> <td>95,738</td> <td>1</td>					i			7.659	3	0	107		95,738	1
tatal and circuit Programe 1 80,000 7,659 3 0 107 15 95,738 Umace CC Research Laboratory Programe 1 80,000 7,659 3 0 107 15 95,738 coller Far View Viator Center Programe 1 80,001 81,000 7,659 3 0 107 15 95,738 Umace CC C Stabilization Shed Proprame 1 80,101 81,000 7,659 3 0 107 15 95,738 Umace CC CC Barracks Programe 1 80,101 81,000 7,659 3 0 107 15 95,738 Umace CC CC Barracks Programe 1 80,101 81,000 7,659 3 0 107 15 95,738 Umace CC CC Barracks Programe 1 80,101 81,000 7,659 3 0 107 15 95,738 Umace CC CC Barracks Programe 1 80,101 81,000 7,659 3 0 107 15 95,738 Umace CC CC Barracks Programe 2 81,010 180,000 7,659 3 0 107 15 95,738 Umace CC CB Barracks Programe 2 81,010 180,000 7,659 3 0 2,216 337 2,216,230 2 Umace CC CB Barracks Programe 3 40,1110 145,521 58 3 2,2137 291 1,819,016 4 Umace CC CB Barracks Programe 3 41,1100 1520,11110 145,521 58 3 2,2137 291 1,819,016 4 Umace CC CB Barracks Programe 3 41,1100 1520,11110 145,521 58 3 2,2137 291 1,819,016 4 Umace CC CB Barracks Programe 3 41,1100 1520,1110 145,521 58 3 2,2137 291 1,819,016 4 Umace CC CB Barracks Programe 1 80,1110 1250,1110 145,521 58 3 2,2137 291 1,819,016 4 Umace Consumption (gabyr) "Emission Factor (br/100 gab) Umace CC CB Barracks Programe 3 41,1100 1520,1110 145,521 58 3 2,2137 291 1,819,016 4 Umace Consumption (gabyr) "Emission Factor (br/100 gab) Total National Park Service Heating Units 17 1,672 4,686 745 4,429,728 1 Emission Factor (br/100 gab) Total National Park Service Heating Units 17 1,6757 1, ⁵ 5 4, ⁵ 66 1,352 308 1,452,099 -2 Emission Factor (br/10,00 gab) Source Far View Lodge Programe 1 420,000 50,000 80,825 51 1,536 77 4,746,869 Umace Far View Terace Programe 1 420,000 50,000 38,825 55 1 536 77 4,746,869 Umace Far View Lodge Programe 1 520,011 550,000 38,820 56 2 1433 278 1,753,46 - View Heater Far View Lodge Programe 1 75,000 7,100 7,180 3 0 0101 14 89,754 - View Heater Far View Lodge Programe 1 75,000 7,100 7,180 3 0 0101 14 89,754 - View Heater Far View Lodge Programe 1 75,000 7,100 7,180 3 0 0101					i					0	107	IS	95,738	
Linde CC Research Landamory Propane i 80.000 7.559 3 0 107 15 95.738 Difer Far View Visitor Centre Propane I 80.001 80.000 7.559 3 0 107 15 95.738 Unace CC Stabilization Shed Propane I 80.010 80.000 7.559 3 0 107 15 95.738 Unace CC Baracks I Advanter Traitment Plant Propane I 80.010 80.000 7.559 3 0 107 15 95.738 Unace CC Baracks Propane 3 80.000 22.977 9 0 322 46 287.213 Unace CC Baracks Propane 3 80.000 22.977 9 0 322 46 287.213 Unace CC Baracks Propane 3 80.000 22.977 9 0 322 46 287.213 Unace CC Baracks Propane 3 80.000 22.977 9 0 322 46 287.213 Unace Parkwide Employee Residences Propane 3 81.010 150.000 15318 6 0 214 31 191.475 Unace Parkwide Employee Residences Propane 3 411.100 1530.1110 145.521 58 3 2.1396 528 3.925.246 5 Unace Consumption (gafyr) * Emission Factor (br) .001 gal) Total a ful 314.020 126 6 4.396 628 3.925.246 5 Unace Consumption (gafyr) * Emission Factor (br) .001 gal) Total Advantage Parkwide Employee Residences Propane 3 411.100 1530.1110 145.521 58 3 2.2139 327.246 5 Unace Consumption (gafyr) * Emission Factor (br) .001 gal) Total National Park Service Healing Units 172 4.496 73 2.239 3025.246 5 Emission Eactors from AP-42. Tables 1.5-16 for commercial boliers, § = 0.18 grains/100 cu ft Total National Park Service Healing Units 172 4.496 1.328 3.925.246 5 Emission Eactors from AP-42. Tables 1.3-1 and 13.3 for furnaces (>300.000 Bin/hr) S = 0.5 preent Emission Factor (br) .000 gal) Total Advantage Propane 1 525.0(10 525.000 50.262 20 1 704 105 50 50. 21.50(1 100 198.279 100 100 100 100 100 100 100 20 10 100 10										ů	107	15	95,738	:
Concerner fail View Visitor Control min/y Propane 1 80.00(1 80.000 7.659 3 0 107 15 95.738 umace Location Shed Propane 1 80.01(1 81.0000 7.659 3 0 107 15 95.738 umace Location Shed Propane 1 80.01(1 80.000 7.659 3 0 107 15 95.738 umace Location Shed Propane 2 81.0101 160.000 15.318 6 0 2.14 31 191.475 water leader Matinance Propane 2 81.0101 160.000 15.318 6 0 2.14 31 191.916 4 iurace Subtolal 22 1.761.000 168.498 67 3 2.219.230 6 iurace Emission Factor flort Action Stell Totals 61 134.020 126 6 4.396 228 3.925.246 5 Emission Factor flort Action (glashy) * Emission Factor (lb1.0011 gal) Totals 61.01 10.01														
Giler Far Wew Usaid Letting Figure Control 81000 7.859 3 0 107 15 96.738 umace CC Balilization Shed Propane 1 80.000 7.859 3 0 107 15 96.738 umace Jackson Lake Water Treatment Plant Propane 2 80.000 24(1.000 22.977 9 0 322 46 287.213 umace CC Barracks Propane 2 81.010 160.000 15.318 6 0 2/4 31 191.475 iseater Maintenance Englison Factors from AP-42, Tables 1.5-1 for commercial bolers, S = 0.18 grains/100 cu ft 0.4 (1.1"S 140.01 1.90 125.00 0 Source Location Factoliki/Join (1.90) Total 61 314.020 126 745 4.429,728 1 Emission Factors from AP-42, Tables 1.5-1 for commercial bolers, S = 0.18 grains/100 cu ft 0.4 (1.1"S 140.01 12.00 0	Furnace	CCC							-	-				
Undee OLC Statistization Sneg Inclusion Propane 3 0 107 15 957.78 urrace 2dxSon Lake Barracis Propane 3 80,000 22.977 9 0 522 44 31 191.475 urrace CCC Barracis Propane 2 81.010 160.000 153.18 6 0 214 31 191.475 urrace Equipment Stated Propane 3 411.100 152.0116 45.521 55 3 2.107 231 1.81.016 4 urraces Pat/wide Employee Residences Propane 3 411.100 152.0116 45.521 56 3<.2137	Boiler													
Undeg Occ. Dearacks Progense 3 00.00 224(1.00 222 46 287.213 water Martlenance Equipment Stad Progense 2 81.010 140.00 153.18 6 0 214 31 191.475 water Subtcal 22 1.76(1.000 165.496 67 3 2.359 337 2.106.230 € water Early State Engloyae Residences Progense 38 411.(100 1520.(1110) 145.521 58 3 2.(137 291 1.819.016 4 water Early State Fragense 34.020 126 6 4.396 628 3.925.246 5 water Fragense Fradits Fragense 1318.67 0.44 (1.11°S 1.401 1.90 12.500 0.1 Consumption (gaEyr)* Emission Factor (Br/ NOUG* a) Total National Park Service Heating Units 173 1.672 4.866 745 4.429,728 1 Emi	Fumace													
Unrable DUC Barracks Inclusion 2 DUC to 180000 15318 6 0 214 31 191475 Barracks Equipment Shed Prosame 2 17/81(.000 153.18 6 0 214 31 191475 Barracks Prosame 2 17/81(.000 153.18 6 0 214 31 191475 Barracks Prosame 2 17/81(.000 153.18 6 0 214 31 191475 Barracks Prosame 3 411(00 1520(110 145.521 58 3 2 (137 281 181006 4 Barracks Froat Totals 61 314.020 126 6 4.308 68 628 3.325.246 5 Emission Factors from AP-42, Tables 15.4 for commercial boliers, S = 0.18 grains/100 cu ft 0.4 (1.1'S 140.01 1.90 12.500 0.1 Emission Factors from AP-42, Tables 15.4 nd 13.3 for furnaces (>300.0000 Bin/hr) S = 0.5 percent Consumptio	Furnace	Jackson Lake	Water Treatment Plant	Propane	1									
Heater Mandmande Equipment Shed Probate 2 01/01/0 100/000 103/35 0 0 0 2 569 337 2,106,230 5 Subtoral 22 1,176(100 168,496 67 3 2,369 337 2,106,230 5 umages Parkwide Employee Residences Propane 38 411/100 1,520/110 145,521 58 3 2,1137 291 1,819,016 4 Emission Factors from AP-42, Tables 15-1 for commercial boliers, S = 0.18 grains/100 cu ft 0.4 (1.1"S 140,01 1.90 12,500 0. Formula = Consumption (gaEyr) * Emission Factor (br1,00(1 ga) Total National Park Service Heating Units 173 1.672 4,866 745 4,429,728 1 Emission Location Faeilitia Fuel Number of Capacity (gaUnit) Consumptio PM SO, NO, CO CO, VOC VOC VID ViDe/Vr (lbs/Vr) (lbs/Vr) (lbs/Vr) (lbs/Vr) (lbs/Vr) (lbs/Vr) (lbs/Vr) <td>Furnace</td> <td>CCC</td> <td>Barracks</td> <td>Propane</td> <td>3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Furnace	CCC	Barracks	Propane	3									
Subtolal 22 1,76(1,000 168,498 67 3 2,399 37 2,106,230 4 umages Parkwide Employee Residences Propane 38 411,(100 145,521 58 3 2,(137 291 1,819,016 4 Totals 6(1 314,020 126 6 4,396 628 3,925,246 5 Emission Factors from AP-42, Tables 1.5-1 for commercial boliers, S = 0.18 grains/100 cu ft 0.4 (1.1*S 14.0(1 1.90 12,500 0.1 Emission Location Faeilitia Fuel Number of Capacity Consumptio (lbs/vr)	Heater	Maintenance	Equipment Shed	Propane		8(1,0(10								
umages ParkWole Industry us united united <thun< th=""> united united</thun<>				Subtotal	22		1,76(1,000	168,498	67	3	2,359	337	2,106,230	51
India Bit SH,020 120 0 1000 000 0000 0000 Emission Factors from AP-42, Tables 1.5-I for commercial boilers, S = 0.18 grains/100 cu ft 0.4 (1.1'S 14.0(1 1.90 12.500 0.1 Formula = Consumption (gaEyr) * Emission Factor (Ib/1,00(1 gal) Total National Park Service Heating Units 173 1.672 4.866 745 4.429,728 1 Emission Source Location Faeilitia Fuel Number of Capacity Sources (Btu/hr) Consumption (Ib/J/r) (Ibs/vr) Ibs/vr) (Ibs/vr)	Furnaces	Parkwide	Employee Residences	Propane		4)1.(100	1,520,(1110							44
Emission factors from AP-42, Tables 1.5-1 for commercial bollers, S = 0.1 bit grains/100 cu ft 100 cu				Totals	6(1			314,020	126	6	4,396	628	3,925,246	94
Emission Sources Location Faeilitia Fuel Propane Number of Sources Capacity (Btu/hr) Consumptio (gaUvn) PM SO, (bs/vr) NO, (bs/vr) CO CO, (bs/vr) CO CO, (bs/vr) <thco< th=""> CO <thco< th=""> <t< td=""><td></td><td></td><td>ission Factor (lb/1,00(1 gal)</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>,</td><td></td><td></td><td>0.31</td></t<></thco<></thco<>			ission Factor (lb/1,00(1 gal)								,			0.31
Emission Source Location Faeilitia Total Notice Control Classing total Control Classing total Control Classing total Classing total <thclassing th="" total<=""> Classing total</thclassing>			I otal National Park Se	ervice Heating Units						.,	.,			
Boiler Morcheld Laundry No. 2 FFuel uel Oil 1,0 80,0 (10 67,577 1 5 4,496 1,352 338 1,452,909 Emission Factors from AP-42, Tables 13-1 and 13-3 for furnaces (>300,000 Bin/hr) S = 0.5 percent formula = Consumption (gallyr) * Emission Factor (lb/1,000 gal) 2.0 1425 20.0 5.0 21,50(1 Solier Far View Lodge Propane 1 525,0(10 525,000 50,262 20 1 704 101 628,279 Solier Far View Lodge Propane 1 525,0(10 525,000 50,262 20 1 704 101 628,279 Jumace Far View Terrace Propane 2 154,000 308,000 29,487 17 1 413 59 368,590 Viarace Far View Lodge Propane 2 725,000 1,450,000 318,820 56 2 1,433 1,735,246 - Viarace Chapin Spruce Tree Propane												_	.,,	1(
uel Oil 1 80,0 (10 67,577 1°5 4,°96 1,352 338 1,452,909 Emission Factors from AP-42, Tables 13-I and 13-3 for furnaces (>300,000 Bln/hr) S = 0.5 percent 2.0 1425 20.0 5.0 21,50(1 Sonlier Far View Lodge Propane 1 525,0(10 525,0(00 50,262 20 1 704 101 628,279 urnace Far View Terrace Propane 2 1400,100 400,0(10 32,295 15 1 536 77 478,689 vater Heater Far View Lodge Propane 2 725,000 1425 20.0 50 77 478,689 Vater Heater Far View Lodge Propane 2 200,000 38,295 15 1 536 77 478,689 Vater Heater Far View Terrace Propane 2 200,000 38,295 15 1 536 77 478,689 Vater Heater		Location	Faeilitia	Fuel										VOC
Emission Factors from AP-42, Tables 13-1 and T3-3 for full/maces (>300,000 Bin/nf) S = 0.5 percent Entry term term term term term term term term	Source				Sources	(Btu/hr)								VOC
Formula = Consumption (gallyr) * Emission Factor (lb/l,000 gal) Soller Far View Lodge Propane 1 525,0(1) 525,0(0) 50,262 20 1 704 101 628,279 umace Far View Terrace Propane 400,1(0) 400,2(1) 38,295 15 1 536 77 476,689 ware Heater Far View Lodge Propane 2 725,000 1,450,000 138,820 56 2 1,943 278 1,735,246 9 Vater Heater Far View Lodge Propane 2 200,000 400,000 38,295 15 1 536 77 476,689 Vater Heater Far View Terrace Propane 2 200,000 30,295 15 1 536 77 476,689 varace Chapin Spruce Tree Propane 1 75,000 76,143 3 1 011 14 89,754 Vater Heater Trailet5				No. 2 FFuel	Sources	(Btu/hr)		(gaUvn)	(lb_/}r)	(Ibsrvr)	(lbs/vr)	(Ibs/yr)	rlbe/vr)	VOC (Ibs/se)
Solier Far View Lodge Inclusion Subject Subject <t< td=""><td>Source Boiler</td><td>lytorcheld</td><td>Laundry</td><td>No. 2 FFuel uel Öİl</td><td>Sources A remar</td><td>(Btu/hr)</td><td></td><td>(gaUvn)</td><td>(lb_/}r)</td><td>(Ibsrvr) 4, ⁴96</td><td>(lbs/vr)</td><td>(lbs/yr) 338</td><td>rlbe/vr)</td><td>VOC (lbs/se)</td></t<>	Source Boiler	lytorcheld	Laundry	No. 2 FFuel uel Öİl	Sources A remar	(Btu/hr)		(gaUvn)	(lb_/}r)	(Ibsrvr) 4, ⁴ 96	(lbs/vr)	(lbs/yr) 338	rlbe/vr)	VOC (lbs/se)
Far View Terrace Propane I 400,100 400,101 38,295 15 I 536 77 476,685 furnace Far View Terrace Propane 2 154,000 308,000 29,487 17 I 413 59 366,590 Water Heater Far View Lodge Propane 2 725,000 1,450,000 38,820 56 2 1,943 278 1,735,246 - Water Heater Far View Lodge Propane 2 200,000 400,000 38,295 15 1 536 77 478,689 Viarnace Chapin Spruce Tree Propane 2 300,010 600,000 57,443 3 1 604 115 718,033 Water Heater Trailer5 Propane 1 75,000 76,100 7,180 3 0 101 14 89,754 Water Heater Trailer5 Propane 2 199,900 38,27	Source Boiler Emission Factor	Ivtorcheld	Laundry s 13-I and 13-3 for furnaces (>300,0	No. 2 FFuel uel Öİl	Sources A remar	(Btu/hr)		(gaUvn)	(lb_/}r)	(Ibsrvr) 4, ⁴ 96	(lbs/vr)	(lbs/yr) 338	rlbe/vr)	VOC (lbs/se)
Make Propane 2 154,000 308,000 29,487 17 1 413 59 368,590 Water Heater Far View Lodge Propane 2 725,000 1,450,000 138,820 56 2 1,943 278 1,735,246 1,745,249 Water Heater Far View Terrace Propane 2 200,000 400,000 38,295 15 1 536 77 478,689 Water Heater Chapin Spruce Tree Propane 2 300,0(10 600,000 57,443 23 1 804 115 718,033 Water Heater Chapin Spruce Tree Propane 1 75,000 75,(100 7,180 3 0 101 14 89,754 Water Heater Trailer5 Propane 1 99,900 398,800 38,276 15 1 536 77 478,449 Water Heater Dorm 9 Subtotal (4 4,195,800 30,276 </td <td>Source Boiler Emission Fact Formula = Cor</td> <td>Ivtorcheld ors from AP-42, Tables nsumption (gallyr) * En</td> <td>Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal)</td> <td><u>No. 2 FFuel</u> uel Oil 000 Bln/hr) S = 0.5 p</td> <td>Sources A remar percent</td> <td>(Btu/hr) k P1.0 U «c 525,0(10</td> <td><u>1, ⁰ 80, ⁰ (10</u> 525,000</td> <td>(gaUvn) 67,577 50,262</td> <td>(lb_/}r) 1³⁵ 2.0 20</td> <td>(lbsrvr) 4, ⁴96 1425</td> <td>(lbs/vr) 1,352 20.0 704</td> <td>(lbs/yr) 338 5.0 101</td> <td>rlbe/vr) 1,452,909 21,50(1 628,279</td> <td>VOC (lbs/se) 2 1'</td>	Source Boiler Emission Fact Formula = Cor	Ivtorcheld ors from AP-42, Tables nsumption (gallyr) * En	Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal)	<u>No. 2 FFuel</u> uel Oil 000 Bln/hr) S = 0.5 p	Sources A remar percent	(Btu/hr) k P1.0 U «c 525,0(10	<u>1, ⁰ 80, ⁰ (10</u> 525,000	(gaUvn) 67,577 50,262	(lb_/}r) 1 ³⁵ 2.0 20	(lbsrvr) 4, ⁴ 96 1425	(lbs/vr) 1,352 20.0 704	(lbs/yr) 338 5.0 101	rlbe/vr) 1,452,909 21,50(1 628,279	VOC (lbs/se) 2 1'
Mater Heater Far View Lodge Propane 2 725,000 1,450,000 138,820 56 2 1,943 278 1,735,246 Water Heater Far View Terrace Propane 2 200,000 400,000 38,820 56 2 1,943 278 1,735,246 Vater Heater Far View Terrace Propane 2 200,000 400,000 38,225 15 1 536 77 476,689 Vater Heater Chapin Spruce Tree Propane 2 300,010 674,43 23 1 804 115 718,033 Water Heater Chapin Spruce Tree Propane 1 75,000 75,(100 7,180 3 0 101 14 88,754 Water Heater Trailer5 Propane 2 19,900 39,800 38,276 15 1 536 77 478,449 Water Heater Dorm 9 Propane 2 19,900 39,800 38,276 15 1 536 77 478,449 Water Heater Dorm 9 Subtotal (4 4,195,800 401,696 161 7 5,624 803 5,021,203 <t< td=""><td>Source Boiler Emission Fact Formula = Cor Boiler</td><td>Ivtorcheld ors from AP-42, Tables nsumption (gallyr) * En Far View</td><td>Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal) Lodge</td><td>No. 2 FFuel uel Oil 000 Bln/hr) S = 0.5 p Propane</td><td>Sources A remar percent</td><td>(Btu/hr) k P1.0 U «c 525,0(10</td><td><u>1, ⁰ 80, ⁰ (10</u> 525,000 400,0(10</td><td>(gaUvn) 67,577 50,262 38,295</td><td>(lb_/}r) 1.35 2.0 20 15</td><td>(lbsrvr) 4, ⁴96 1425</td><td>(lbs/vr) 1,352 20.0 704 536</td><td>(lbs/yr) 338 5.0 101 77</td><td>rlbe/vr) 1,452,909 21,50(1 628,279 478,689</td><td>VOC (lbs/se) 2 11 1 1</td></t<>	Source Boiler Emission Fact Formula = Cor Boiler	Ivtorcheld ors from AP-42, Tables nsumption (gallyr) * En Far View	Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal) Lodge	No. 2 FFuel uel Oil 000 Bln/hr) S = 0.5 p Propane	Sources A remar percent	(Btu/hr) k P1.0 U «c 525,0(10	<u>1, ⁰ 80, ⁰ (10</u> 525,000 400,0(10	(gaUvn) 67,577 50,262 38,295	(lb_/}r) 1.35 2.0 20 15	(lbsrvr) 4, ⁴ 96 1425	(lbs/vr) 1,352 20.0 704 536	(lbs/yr) 338 5.0 101 77	rlbe/vr) 1,452,909 21,50(1 628,279 478,689	VOC (lbs/se) 2 11 1 1
Water Heater Far View Terrace Propane 2 200,000 400,000 38,295 15 1 536 77 476,689 Water Heater Far View Terrace Propane 2 300,0(10 600,000 57,443 23 1 804 115 718,033 Water Heater Chapin Spruce Tree Propane 1 75,000 75,(100 7,180 3 0 101 14 89,754 Water Heater Trailer5 Propane 1 38,000 36,38 1 0 51 7 456,475 Water Heater Dorm 9 Propane 1 99,900 38,276 15 1 536 77 478,449 Water Heater Dorm 9 Propane 199,900 399,800 38,276 15 1 5,624 803 5,021,203 1 Emission Factors from AP-42, Tables 1.5.1 for commercial boilers, S = 18 groins/l OU cu 0 0.4 0.1 *S 14.00 1.90 1	Source Boiler Emission Fact Formula = Cor Boiler Furnace	Ivtorcheld ors from AP-42, Tables nsumption (gallyr) * En Far View Far View	Laundry s 13-I and 13-3 for furnaces (>300,0 mission Factor (Ib/I,000 gal) Lodge Terrace	No. 2 FFuel uel Oil 000 Bln/hr) S = 0.5 p Propane Propane	Sources A remar percent	(Btu/hr) k P1.0 U «c 525,0(10 400,1)00	<u>1, ⁰ 80, ⁰ (10</u> 525,000 400,0(10	(gaUvn) 67,577 50,262 38,295	(lb_/}r) 1.35 2.0 20 15	(lbsrvr) 4, ⁴ 96 1425	(lbs/vr) 1,352 20.0 704 536 413	(lbs/yr) 338 5.0 101 77 59	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590	VOC (lbs/se) 2 1' 1 1
Nater Heater Chapin Spruce Tree Propane 2 300,0(10 600,000 57,443 23 I 804 115 718,033 Water Heater Chapin Spruce Tree Propane I 75,000 75,(10) 7,180 3 0 101 14 89,754 Water Heater Trailer5 Propane I 38,000 36,38 I 0 51 7 45,475 Water Heater Dorm 9 Propane 2 199,900 398,800 38,276 I5 I 536 77 478,449 Water Heater Subtotal (4 4,195,800 401,696 161 7 5,624 803 5,021,203 1 Emission Factors from AP-42, Tables 1.5-1 for commercial boilers, S = 18 groins/l OU cu 0 0.4 0.1 *S 14.00 1.90 12,500 0 Formula = Consumption (gal/yr) * Emission Factor (lb/ 1,000 gal) 0 0.4 0.1 *S 14.00 1.90 12,500 0	Source Boiler Emission Fact Formula = Cor Boiler Furnace Furnace	Ivtorcheld ors from AP-42, Tables nsumption (gallyr) * Err Far View Far View Far Viesv	Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal) Lodge Terrace Terrace Terrace	No. 2 FFuel uel OII 000 Bln/hr) S = 0.5 p Propane Propane Propane	Sources A remar percent	(Btu/hr) k P1.0 U «c 525,0(10 400,1)00 154,000	<u>1, ⁰ 80, ⁰ (10</u> 525,000 400,0(10 308,000	(gaUvn) 67,577 50,262 38,295 29,487	(lb_/}r) 1.35 2.0 20 15 1?	(lbsrvr) 4, ⁴ 96 1425	(lbs/vr) 1,352 20.0 704 536 413 1,943	(lbs/yr) 338 5.0 101 77 59 278	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246	VOC (lbs/se) 2 1' 1 1 4
Umage Chapin Spruce Tree Propane I 300,010 000,000 07,180 3 0 101 14 89,754 Water Heater Trailer5 Propane I 38,000 38,030 36,38 I 0 51 7 45,475 Water Heater Trailer5 Propane 2 199,000 399,800 36,276 I5 I 536 77 478,449 Water Heater Dorm 9 Propane 2 199,000 399,800 38,276 I5 I 536 77 478,449 Emission Factors from AP-42, Tables 1.5-1 for commercial boilers, S = I8 groins/l OU cu 0 0.4 0.1 *S 14.00 1.90 12,500 0 Formula = Consumption (gal/yr) * Emission Factor (lb/ 1,000 gal) Emission Factors (rom AP-42, Tables 1.5-1 for commercial boilers, S = I8 groins/l OU cu 0 0.4 0.1 *S 14.00 1.90 12,500 0	Source Boiler Emission Fact Formula = Cor Boiler Furnace Furnace Water Heater	Intercheid ors from AP-42, Tables nsumption (gallyr) * En Far View Far View Far View Far View	Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal) Lodge Terrace Terrace Lodge	No. 2 FFuel uel Oil 000 Bln/hr) S = 0.5 p Propane Propane Propane Propane	Sources A remar percent	(Btu/hr) KP1.0 U «c 525,0(10 400,1)00 154,000 725,000	<u>1, ⁰80, ⁰(10</u> 525,000 400,0(10 308,000 1,450,000	(gaUvn) 67,577 50,262 38,295 29,487 138,820	(lb_/}r) 1 ³ 5 2.0 20 15 1? 56	(Ibsrvr) 4, ⁴ 96 1425 1 1 1 2	(lbs/vr) 1,352 20.0 704 536 413 1,943	(lbs/yr) 338 5.0 101 77 59 278	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246	VOC (lbs/se) 2 1' 1 1 1
Water Heater Trailer5 Propane 1 38,000 36,38 I 0 51 7 45,475 Water Heater Trailer5 Propane 2 199,900 39,276 I5 I 536 77 478,449 Water Heater Dorm 9 Propane 2 199,900 39,276 I5 I 536 77 478,449 Subtotal (4 4,195,800 401,696 161 7 5,624 803 5,021.203 1 Emission Factors from AP-42, Tables 1.5-1 for commercial boilers, S = 18 groins/l OU cu 0 0.4 0.1 *S 14.00 1.90 12,500 0 Formula = Consumption (gal/yr) * Emission Factor (lb/ 1,000 gal) 45.475<	Source Boiler Emission Fact Formula = Con Boiler Furnace Furnace Water Heater Water Heater	Ivtorcheld ors from AP-42, Tables nsumption (gallyr) * En Far View Far View Far View Far View Far View Far View	Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal) Lodge Terrace Terrace Lodge Terrace Terrace	No. 2 FFuel uel Oil 100 Bln/hr) S = 0.5 p Propane Propane Propane Propane	Sources A remar	(Btu/hr) k P1.0 U «c 525,0(10 400,1)00 154,000 725,000 200,000	525,000 400,0(10 308,000 1,450,000	(gaUvn) 67,577 50,262 38,295 29,487 138,820 38,295	(lb_/}r) 1 ³ 5 2.0 20 15 17 56 15	(lbsrvr) 4, ⁴ 96 1425 1 1 1 2 1	(lbs/vr) 1,352 20.0 704 536 413 1,943 536	(lbs/yr) 338 5.0 101 77 59 278 77	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246 478,689	VOC (lbs/se) 2 1' 1 1 1
Water Heater Inductor	Source Boiler Emission Fact Formula = Cor Boiler Furnace Furnace Water Heater Water Heater Furnace	Intercheid ors from AP-42, Tables nsumption (gallyr) * En Far View Far View Far View Far View Chapin	Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal) Lodge Terrace Terrace Lodge Terrace Spruce Tree	No. 2 Ffuel uel OI 100 Bin/hr) S = 0.5 p Propane Propane Propane Propane Propane Propane	Sources A remar	(Btu/hr) k P1:0 U «c 525,0(10 400,1)00 154,000 725,000 200,000 300,0(10	525,000 400,0(10 308,000 1,450,000 600,000	(gaUvn) 67,577 50,262 38,295 29,487 138,820 38,295 57,443	(lb_/}r) 1 ^{.3} 5 2.0 20 15 17 56 15 23	(lbsrvr) 4, ⁴ 96 1425 1 1 1 2 1 1 1 1 1 1 1 1 1 1 1 1 1	(lbs/vr) 1,352 20.0 704 536 413 1,943 536 804	(lbs/yr) 338 5.0 101 77 59 278 77 115	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246 478,689 718,033	VOC (lbs/se) 2 1' 1 1 1 1 1 1 1 1 1 1 1
Water Heater Dorm 9 Flopate 2 199.900 399.000 399.210 13 1 500 11 7 5624 803 5,021.203 1 Emission Factors from AP-42, Tables 1.5-1 for commercial boilers, S = 18 groins/l OU cu 0 0.4 0.4 0.1 *S 14.00 1.90 12,500 0 Formula = Consumption (gal/yr) * Emission Factor (lb/ 1,000 gal) 0.4 0.1 *S 14.00 1.90 12,500 0	Source Boiler Emission Fact Formula = Cor Boiler Furnace Furnace Water Heater Water Heater Furnace Water Heater	Intercheid ors from AP-42, Tables nsumption (gallyr) * En Far View Far View Far View Far View Chapin	Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal) Lodge Terrace Lodge Terrace Lodge Terrace Spruce Tree Spruce Tree	No. 2 Ffuel uel OI 000 Bin/hr) S = 0.5 p Propane Propane Propane Propane Propane Propane Propane Propane	Sources A remar	(Btu/hr) k P1:0 U «c 525,0(10 400,1)00 154,000 725,000 200,000 300,0(10 75,000	525,000 400,0(10 308,000 1,450,000 400,000 600,000 75,(10)	(gaUvn) 67,577 50,262 38,295 29,487 138,820 38,295 57,443 7,180	(lb_/}r) 1.5 2.0 20 15 17 56 15 12 3 3	(lbsrvr) 4, ⁴ 96 1425 1 1 1 2 1 1 1 1 0	(lbs/vr) 1,352 20.0 704 536 413 1,943 536 804 101	(lbs/yr) 338 5.0 101 77 59 278 77 115 14	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 3,86,590 1,735,246 478,689 718,033 89,754	VOC (lbs/se) 2 1' 1 1 1 1 1 1 1 1 1 1 1
Emission Factors from AP-42, Tables 1.5-1 for commercial boilers, S = 18 groins/I OU cu 0 0.4 0.1 *S 14.00 1.90 12,500 0 Formula = Consumption (gal/yr) * Emission Factor (lb/ 1,000 gal)	Source Boiler Emission Fact Formula = Cor Boiler Furnace Water Heater Furnace Water Heater Water Heater Water Heater Water Heater	Intercheid ors from AP-42, Tables nsumption (gallyr) * En Far View Far View Far View Far View Chapin	Laundry s 13-I and 13-3 for furnaces (>300,0 mission Factor (Ib/I,000 gal) Lodge Terrace Terrace Lodge Terrace Spruce Tree Spruce Tree Spruce Tree Trailer5	No. 2 Ffuel uel OI 200 Bln/hr) S = 0.5 g Propane Propane Propane Propane Propane Propane Propane Propane Propane	Sources A remar percent	(Btu/hr) K P1.0 U «c 525.0(10 400,1)00 154.000 725,000 200,000 300.0(10 75,000 38,000	525,000 400,0(10 308,000 1,450,000 400,000 600,000 75,(100 38,000	(gaUvn) 67,577 50,262 38,295 29,487 138,820 38,295 57,443 7,180 3,638	(lb_/}r) 	(lbsrvr) 4, ⁴ 96 1425 1 1 1 2 1 1 1 1 0	(lbs/vr) 1,352 20.0 704 536 413 1,943 536 804 101 51	(lbs/yr) 338 5.0 101 77 59 278 77 115 14 7	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246 478,689 718,033 89,754 45,475	VOC (lbs/se) 2 1' 1 1 1 1 1 1 1
Finission Factors from AF-42, radies 1.5-1 for commercial bolies, S - to growing to Cu V	Source Boiler Emission Fact Formula = Cor Boiler Furnace Furnace Water Heater Water Heater Furnace Water Heater	Intercheid ors from AP-42, Tables nsumption (gallyr) * En Far View Far View Far View Far View Chapin	Laundry s 13-I and 13-3 for furnaces (>300,0 mission Factor (Ib/I,000 gal) Lodge Terrace Terrace Lodge Terrace Spruce Tree Spruce Tree Spruce Tree Trailer5	No. 2 Ffuel uel OII 2000 Bin/hr) S = 0.5 g Propane Propane Propane Propane Propane Propane Propane Propane Propane Propane	Sources A remar percent	(Btu/hr) K P1.0 U «c 525.0(10 400,1)00 154.000 725,000 200,000 300.0(10 75,000 38,000	525,000 400,0(10 308,000 1,450,000 600,000 75,(100 38,000 399,800	(gaUvn) 67,577 50,262 38,295 29,487 138,820 38,295 57,443 7,180 3,638 38,276	(lb_/)r) 1 ³ 5 2.0 20 15 17 566 15 23 3 1 15 15	(lbsrvr) 4, 496 1425 1 1 1 2 1 1 1 0 0 0 0 0	(lbs/vr) 1,352 20.0 704 536 413 1,943 536 804 101 51 536	(lbs/yr) 338 5.0 101 77 59 278 77 115 14 7 7 77	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246 478,689 718,033 89,754 45,475 476,449	VOC (lbs/se) 2 11 1 1 1 1 1
	Source Boiler Emission Fact Formula = Cor Boiler Furnace Water Heater Water Heater Water Heater Water Heater Water Heater	Intercheid ors from AP-42, Tables nsumption (gallyr) * En Far View Far View Far View Far View Chapin	Laundry s 13-I and 13-3 for furnaces (>300,0 mission Factor (Ib/I,000 gal) Lodge Terrace Terrace Lodge Terrace Spruce Tree Spruce Tree Spruce Tree Trailer5	No. 2 Ffuel uel OII 2000 Bin/hr) S = 0.5 g Propane Propane Propane Propane Propane Propane Propane Propane Propane Propane	Sources A remar percent	(Btu/hr) K P1.0 U «c 525.0(10 400,1)00 154.000 725,000 200,000 300.0(10 75,000 38,000	525,000 400,0(10 308,000 1,450,000 600,000 75,(100 38,000 399,800	(gaUvn) 67,577 50,262 38,295 29,487 138,820 38,295 57,443 7,180 3,638 38,276	(lb_/)r) 1 ³ 5 2.0 20 15 17 566 15 23 3 1 15 15	(lbsrvr) 4, 496 1425 1 1 1 2 1 1 1 0 0 0 0 0	(lbs/vr) 1,352 20.0 704 536 413 1,943 536 804 101 51 536	(lbs/yr) 338 5.0 101 77 59 278 77 115 14 7 7 77	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246 478,689 718,033 89,754 45,475 476,449	
Total Aeomark Parks & Resorts Heating Units 15 IDS/yr 296 4,805 6,975 1,141 0,474,112	Source Boiler Emission Fact Formula = Cor Boiler Furnace Water Heater Water Heater Water Heater Water Heater Water Heater Emission Fact	Intercheid where the second s	Laundry s 13-I and 13-3 for furnaces (>300,0 nission Factor (Ib/I,000 gal) Lodge Terrace Terrace Lodge Terrace Spruce Tree Spr	No. 2 Ffuel uel Oil 000 Bln/hr) S = 0.5 f Propane Propane Propane Propane Propane Propane Propane Propane Propane Subtota	Sources A remar percent	(Btu/hr) K P1.0 U «c 525.0(10 400,1)00 154.000 725,000 200,000 300.0(10 75,000 38,000	525,000 400,0(10 308,000 1,450,000 600,000 75,(100 38,000 399,800	(gaUvn) 67,577 50,262 38,295 29,487 138,820 38,295 57,443 7,180 3,638 38,276	(lb_/)r) 1 ³ 5 2.0 20 15 17 56 15 23 3 1 15 15 15 15 15 15 15 15 15	(lbsvvr) 4, 496 1425 1 1 2 1 0 0 0 1 7	(lbs/vr) 1,352 20.0 704 536 413 1,943 536 804 101 51 536 5,624	(lbs/yr) 338 5.0 101 77 59 278 77 115 14 4 7 77 803	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246 478,689 718,033 89,754 45,475 478,449 5,021,203	VOC (lbs/se) 2 1' 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Source Boiler Emission Fact Formula = Cor Boiler Furnace Water Heater Water Heater Water Heater Water Heater Water Heater Emission Fact	Intercheid where the second s	Laundry s 13-1 and 13-3 for furnaces (>300,0 nission Factor (Ib/1,000 gal) Lodge Terrace Terrace Lodge Terrace Spruce Tree Spruce Tree Spruce Tree Trrailer5 Dorm 9 s 1.5-1 for commercial boilers, S = I8 nission Factor (Ib/ 1,000 gal)	No. 2 Ffuel uet Qil 000 Bln/hr) S = 0.5 p Propane Propane Propane Propane Propane Propane Propane Propane Subtota groins/I OU cu 0	Sources A remar percent 1 2 2 2 2 1 2 1 2 1 4	(Btu/hr) K P1.0 U «c 525.0(10 400,1)00 154.000 725,000 200,000 300.0(10 75,000 38,000	525,000 400,0(10 308,000 1,450,000 600,000 75,(100 38,000 399,800	(galVn) 67,577 50,262 38,295 29,487 138,809 38,295 57,443 7,180 3,638 38,276 401,696	(lb_/}r) 1 ³ 5 2.0 20 15 17 566 15 23 3 1 15 161 0.4	(lbsvr) 4, 496 1425 1425 1 1 1 1 1 1 1 1 1 1 1 1 1	(lbs/vr) 1,352 20.0 704 536 413 1,943 536 804 101 51 536 5,624 14.00	(lbs/yr) 338 5.0 101 77 59 278 77 75 9 278 77 115 14 14 7 77 803 1.90	rlbe/vr) 1,452,909 21,50(1 628,279 478,689 368,590 1,735,246 478,689 718,033 89,754 45,475 478,449 5,021,203 12,500	VOC (lbs/se) 2 11 1 1 1 1 1

Park Totals 15

lbs^ryr 468 6,477 11,841

3.24 5.92

0.23

tons/yr

1,887

0.94

10,903,840

5,452

246

(1.12

2001 POTENTIAL CRITERIA EMISSIONS FROM HEATING UNITS AT MESA VERDE NATIONAL PARK

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

Identification

User Identification: City: State:	MEVE AST Alamosa Colorado
Company:	
Type of Tank:	Horizontal Tank
Description:	6,000 Gallon Gasoline AST
Tank Dimensions	
Shell Length (ft):	16.00
Diameter (ft):	8.00
Volume (gallons):	6,000.00
Turnovers:	0.00
Net Throughput (gal/yr):	24,800.00
Is Tank Heated (yin):	N
Is Tank Underground (y/n):	Ν
Paint Characteristics	
Shell Color/Shade:	White/White
Shell Condition:	Good
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

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

	Daily Liquid Surf. Temperatures (deg F				Liquid Bulk Temp.	Vapor Pressures (psia)			Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight	Fract.	Fract.	Weight	Calculations
Gasoline (RVP 8)	All	43.33	34.96	51.69	41.10	2.8651	2.3894	3.4152	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)	115.04	766.06	881.10

MEVE Aramark Aramark

Horizontal Tank Alamosa, Colorado

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

Identification

User Identification: City: State: Company: Type of Tank: Description:	MEVE Aramark Alamosa Colorado Aramark Horizontal Tank 6000 UST
Tank Dimensions Shell Length (ft): Diameter (ft): Volume (gallons): Turnovers: Net Throughput (gal/yr): Is Tank Heated (y/n): Is Tank Underground (y/n):	16.00 8.00 6,000.00 0.00 45,700.00 N Y
Paint Characteristics Shell Color/Shade: Shell Condition:	

Breather Vent Settings

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

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

TANKS 4R Emissions Report - Summary Format Liquid Contents of Storage Tank

		Daily Liquid Surf.			Liquid Bulk Temp.	Bulk		Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure	
Mixture/Component	Month	Avg.	Min	Max.	(deg F)	Avq.	Min.	Max.	Weight	Fract.	Fract.	Weight	Calculations
Gasoline (RVP 8)	All	40.52	40.52	40.52	40.08	2.6973	2.6973	2.6973	68.0000			92.00	Option 4. RVP=8, ASTM Slope=3

TANKS 4M Emissions Report - Summary Format Individual Tank Emission Totals

Annual Emissions Report

	Losses(lbs)							
Components	Working Loss	Breathing Loss	Total Emissions					
Gasoline (RVP 8)	199.58	0.00	199.58					

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

Identification

User Identification: City: State: Company: Type of Tank: Description:	MEVE Aramark1 Alamosa Colorado Aramark Horizontal Tank 500 Gallon AST at Wetherill
Description	
Tank Dimensions Shell Length (ft): Diameter (ft): Volume (gallons): Turnovers: Net Throughput (gal/yr): Is Tank Heated (yin): Is Tank Underground (y/n):	5.50 4.00 500.00 0.00 2,202.00 N N
Paint Characteristics Shell Color/Shade: Shell Condition:	White/White Good

Breather Vent Settings

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

-0.03 0.03

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

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

			Liquid Daily Liquid Surf. Bulk Temperatures (deg F) Temp.			Vapor Pressures (psia)			Vapor Mol.	Liquid Mass	Vapor Mass		. Basis for Vapor Pressure
Mixture/Component	Month	Ava.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight	Fract.	Fract.	Weight	Calculations
Gasoline (RVP 8)	All	43.33	34.96	51.69	41.10	2.8651	2.3894	3.4152	68.0000			92.00	Option 4: RVP=8, ASTM Slope=3

TANKS 4M Emissions Report - Summary Format Individual Tank Emission Totals

Annual Emissions Report

		Losses(lbs) Working Loss Breathing Loss Total Emissions					
Components	Working Loss	Breathing Loss	Total Emissions				
Gasoline (RVP 8)	10.21	81.17	91.38				

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

Identification

User Identification: City: State:	Aramark2 Alamosa Colorado
Company:	Aramark
Type of Tank:	Horizontal Tank
Description:	500 gallon AST at Far View lodge
Tank Dimensions	
Shell Length (ft):	5.50
Diameter (ft):	4.00
Volume (gallons):	500.00
Turnovers:	0.00
Net Throughput (gal/yr):	1,232.00
Is Tank Heated (y/n):	Ν
Is Tank Underground (y/n):	Ν
č (, ,	
Paint Characteristics	
Shell Color/Shade:	Gray/Medium
Shell Condition:	Good
Breather Vent Settings	
Vacuum Settings (psig):	-0.03
Pressure Settings (psig):	0.03
0 (1 0)	

Meteorological Data used in Emissions Calculations: Alamosa, Colorado (Avg Atmospheric Pressure = 11.19 psia)

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

			y Liquid Surf. eratures (deg F)		Liquid Bulk Temp.	Vapor	Pressures (psi	a)	Vapor Mol.	Liquid Mass	Vapor Mass	Mol.	Basis for Vapor Pressure
Mixture/Component	Month	Avg.	Min.	Max.	(deg F)	Avg.	Min.	Max.	Weight	Fract.	Fract.		Calculations
Gasoline (RVP 8)	All	51.76	37.44	66.07	44.16	3.4201	2.5231	4.5598	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

Components	Working Loss	Breathing Loss			
Gasoline (RVP 8)	6.82	183.02	189.84		

2000 ACTUAL EMISSIONS FROM WOODSTOVES AT MESA VERDE NATIONAL PARK

Location	Number	Cords	tons/yr	PM (lbs/yr)	SO ₂ (lbs/yr)	NO _X (lbs/yr)	CO (lbs/yr)	VOC (lbs/yr)
Emplyee Residences	8	2	28.08	972	11	73	7,093	6,430
			-	<u>(tons/yr)</u> 0.49	<u>(tons/yr)</u> 0.01	<u>(tons/yr)</u> 0.04	<u>(tons/yr)</u> 3.55	_ <u>(tons/yr)</u> 3.22

Woodstoves

2001 ACTUAL EMISSIONS FROM CAMPFIRES AT MESA VERDE NATIONAL PARK

				PM	SO_2	NO.	CO	VOC
Location	Camps	Fires/Yr	Tons/Yr	(Ibs/yr)	(lbs/yr)	(lbs/yr)	(Ibs/yr)	(Ibs/yr)
Morefield Village	20,830	18,747	141	4,865	56	366	35,516	32,198
	20,830	18,747	141	4,865	56	366	35,516	32,198
			tons/yr	2.43	0.03	0.18	17.76	16.10

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

FUEL CONSUMPTION CALCULATIONS

Region: Interior West Cover Type: SAF/SRM - SRM 412 - Juniper - Pinyon **Woodland (also** SRM **504, SAP 239)** Fuel Type: Natural Fuel Reference: FOFEM 381

		FUEL C	ONSUMPTION	TABLE		
Fuel	Preburn	Consumed	Postburn	Percent	Equation	
Component	Load	Load	Load	Reduced	Reference	
Name	(t/acre)	(t/acre)	(t/acre)	(%)	Number	Moisture
Litter	1.00	1.00	0.00	100.0	999	
Wood (0-1/4 inch)	0.00	0.00	0.00	0.0	999	
Wood $(1/4-1 \text{ inch})$	0.00	0.00	0.00	0.0	999	25.0
Wood (1-3 inch)	0.00	0.00	0.00	0.0	999	
Wood (3+ inch) Sound	0.00	0.00	0.00	0.0	999	20.0
3->6	0.00	0.00	0.00	0.0		
6->9	0.00	0.00	0.00	0.0		
9->20	0.00	0.00	0.00	0.0		
20->	0.00	0.00	0.00	0.0		
Wood (3+ inch) Rotten	0.00	0.00	0.00	0.0	999	20.0
3->5	0.00	0.00	0.00	0.0		
6-y9	0.00	0.00	0.00	0.0		
9->20	0.00	0.00	0.00	0.0		
20-}	0.00	0.00	0.00	0.0		
Duff	9.00	3.70	5.30	41.1	2	100.0
Herbaceous	0.20	0.20	0.00	100.0	22	
Shrubs	1.30	0.78	0.52	60.0	23	
Crown foliage	0.00	0.04	0.00	0.0	37	
Crown branchwood	0.00	0.00	0.00	0.0	38	
Total Fuels	11.50	5.68	5.82	49.4		

FIRE EFFECTS ON FOREST FLOOR COMPONENTS

Forest Floor	Preburn	Amount	Postburn		Equation
Component	Condition	Consumed	Condition		Number
Duff Depth (in)	0.4	0.1	0.3	24,2	6
Miii Soil Exp (%)	.0	21.9	21.9	21.9	10

Note!

'Duff' (tons/acre) and 'Duff Depth (in)' burned are computed using different equations, sometimes this may cause an i.nconsistancy in the 'Percent **Reduced' shown on this report**. Duff (tens/acre) consumed is best suited for predicting smoke production, while Duff Depth (in) may be better related to fire severity and soil heating

	Emissions flaming	lbs/acre smoldering	total		
PM 10 -	12	198	210		
PM 2.5	10	168	178		
CH 4	3	102	105		
CO	26	2233	2259		
CO 2	7043	9088	16131		

Co	onsumption	Duration
	tons/acre	hour:min:sec
Flamin ^g ;	1,98	00:01;00
Smoldering:	3,70	00:29:00

FUEL CONSUMPTION CALCULATIONS

Region: Interior West Cover Type: SAF/SRM - SRM 729 - Mesquite (low shrub cover) Fuel Type: Natural Fuel Reference: FOFEM 501

Fuel Component Name	Preburn Load (t/acre)	FUEL (Consumed Load (t/acre)	CONSUMPTION Postburn Load (t/acre)	TABLE Percent Reduced (%)	Equation Reference Number	Moisture
Litter	0.07	0.07	0.00	100.0	999	
Wood (0-1/4 inch)	0.00	0.00	0.00	0.0	999	
Wood $(1/4-1 \text{ inch})$	0.00	0.00	0.00	0.0	999	25.0
Wood (1-3 inch)	0.00	0.00	0.00	0.0	999	
Wood (3+ inch) Sound	0.00	0.00	0.00	0.0	999	20.0
3->6	0.00	0.00	0.00	0.0		
6->9	0.00	0.00	0.00	0.0		
9->20	0.00	0.00	0.00	0.0		
20->	0.00	0.00	0.00	0.0		
Wood (3+ inch) Rotten	0.00	0.00	0.00	0.0	999	20.0
3->6	0.00	0.00	0.00	0.0		
6->9	0.00	0.00	0.00	0.0		
9->20	0.00	0.00	0.00	0.0		
20->	0.00	0.00	0.00	0.0		
Duff	0.00	0.00	0.00	0.0	2	100.0
Herbaceous	0.23	0.23	0.00	100.0	22	
Shrubs	1.26	1.01	0.25	80.0	231	
Crown foliage	0.00	0.00	0.00	0.0	37	
Crown branchwood	0.00	0.00	0.00	0.0	38	
Total Fuels	1.56	1.31	0.25	83.8		

FIRE EFFECTS ON FOREST FLOOR COMPONENTS

Forest Floor	Preburn	Amount	Postburn		Equation
Component	Condition	Consumed	Condition		Number
Duff Depth (in)	0.0	0.0	0.0	0.0	6
Min Soil Exp (१)		21.9	21.9	21.9	10

		lbs/acre smoldering	total	
PM 10 PM 2.5 CH 4 CO	8 6 2 16	4 3 2 42	12 9 4 58	
CO 2	4403	172	4575	

Со	nsumption	Duration
	tons/acre	hour:min:sec
Flaming:	1.24	00:01:00
Smoldering:	0.07	00:01:00
Total:	1.31	

			PM1,	PM 25	Cl-I ₄	CO	CO_2	PM,o	PM 2.5	CH_4	CO	CO 2
Year	Fuel Type	Acres	(Ibs/yr)	(Ibs/yr)	(Ibs/yr)	(Ibs/yr)	(Ibs/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)	(tons/yr)
	Mountain Shrub	1	12	9	4	58	4,575	0.0	0.0	0.0	0.0	2.3
1999	Pinyon Juniper	1	210	178	105	2,259	16,131	0.1	0.1	0.1	1.1	8.1
	Totals	2	222	187	109	2,317	20,706	0.1	0.1	0.1	1.2	10.4
	Mountain Shrub	15,285	183,420	137,565	61,140	886,530	69,928,875	92	69	31	443	34,964
2000	Pinyon Juniper	4,776	1,002,960	850,128	501,480	10,788,984	77,041,656	501	425	251	5,394	38,521
	Totals	20,061	1,186,380	987,693	562,620	11,675,514	146,970,531	593	494	281	5,838	73,485
	Mountain Shrub	2	24	18	8	116	9,150	0	0	0	0	5
2001	Pinyon Juniper	2	420	356	210	4,518	32,262	0	0	0	2	16
	Totais	4	444	374	218	4,634	41,412	0	0	0	2	21
	Mountain Shrub	284	3,408	2,556	1,136	16,472	1,299,300	2	1	1	8	650
2002	Pinyon Juniper	2,319	486,990	412,782	243,495	5,238,621	37,407,789	243	206	122	2,619	18,704
	Totals	2,603	490,398	415,338	244,631	5,255,093	38,707,089	245	208	122	2,628	19,354
	Emission Factors (lbs/acre	e)										
	Mountain Shrub	,	12	9	4	58	4,575					
	Pinyon Juniper		210	178	105	2,259	16,131					
			PRES		IING EMISSIO	NS AT MESA	VERDE NATIONAL P	PARK				
			PM	PM 25	CH₄	со	CO ₂	PM:0	PM25	CH	со	CO.

2001 WILDFIRE EMISSIONS AT MESA VERDE NATIONAL PARK

			PM ₁ 0	PM 2.5	CH_4	CO	CO_2	PM _i o	PM 2,5	CH₄	CO	CO ₂	
	Fuel Type	Acres	<u>(lbs/yr)</u>	<u>(lbs/yr)</u>	<u>(Ibs/yr)</u>	<u>(Ibs/yr)</u>	<u>(lbs/yr)</u>	<u>(tons/yr)</u>	<u>(tons/yr)</u>	<u>(tons/yr)</u>	<u>(tons/yr)</u>	(tons/yr)	
1999	Mountain Shrub	25	300	225	100	1,450	114,375	0.2	0.1	0.1	0.7	57.2	
2001	Mountain Shrub	48	576	432	192	2,784	219,600						

Mesa Verde NP Winter Conditions. File 1, Run 1, Scenario 13. # # 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: Hiqh 12.0 (F) Minimum Temperature:

Absolu Nomir We Fuel Sul Exhaust Evap	Temperature: nate Humidity: nal Fuel RVP: eathered RVP: lfur Content: I/M Program: I/M Program: ATP Program:	75. g 13.6 p 13.6 p 299. p No No No	rains/lb si si							
Refor	rmulated Gas:	No								
Vehicle Type: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh
VMT Distribution:	0.7002	0.1410	0.1044		0.0060	0.0008	0.0016	0.0180	0.0280	1.0000
Composite Emission Fa	actors (g/mi)	:								
Composite VOC :	-		1.047	1.118	1.002	0.433	0.439	0.509	3.24	1.019
Composite CO	18.46	24.25	21.90	23.25	27.92	1.308	0.931	6.582	25.96	19.648
Composite NOX :	0.833		1.402	1.287	3.796	1.267	1.212	16.834	1.17	1.261
Veh. Type:	LDGT1	LDGT2	LDGT3	LDGT4	LDDT12	LDDT34				
VMT Mix:	0.0330	0.1080	0.0719	0.0325	0.0000	0.0016				
Composite Emission Fa	actors (g/mi)	:								
Composite VOC :	1.101	1.191	1.021	1.106	2.424	0.391				
Composite CO	23.48	24.48	21.78	22.17	6.522	0.795				
Composite NOX :	0.944	1.280	1.266	1.703	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 Fa	actors (g/mi)):								
Composite VOC :	1.002	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Composite CO	27.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Composite NOX :	3.796	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Veh. Type:	HDDV2B	HDDV3	HDDV4	HDDV5	HDDV6	HDDV7	HDDV8A	HDDV8E		

	VMT Mix:	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000				
Composite B	Composite Emission Factors (g/mi):												
Composi	Lte VOC :	0.378	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
Composi	lte CO	1.942	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
Composi	ite NOX :	4.150	0.000	0.000	0.000	0.000	0.000	0.000	0.000				

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: Julv Altitude: High 47.0 (F) Minimum Temperature: Maximum Temperature: 101.0 (F) Absolute Humidity: 75. grains/lb 8.8 psi Nominal Fuel RVP: Weathered RVP: 8.2 psi Fuel Sulfur Content: 299. ppm Exhaust I/M Program: No Evap I/M Program: No ATP Program: No Reformulated Gas: No HDDV MC All Veh LDGT HDGV LDDV LDDT LDGT34 Vehicle Type: LDGV LDGT12 <6000 (All) >6000 GVWR: 0.0280 1.0000 0.0060 0.0008 0.0016 0.0180 0.7002 0.1410 0.1044 VMT Distribution: Composite Emission Factors (g/mi): 1.027 0.981 0.405 0.461 0.490 5.42 1.049 1.002 0.900 1.045 Composite VOC : 0.945 6.500 29.13 14.832 16.76 16.27 16.55 24.33 1.277 13.84 Composite CO 1.239 0.89 1.189 1.170 16.586 1.342 1.179 3.635 0.787 1.059 Composite NOX : LDDT34 LDGT3 LDGT4 LDDT12 Veh. Type: LDGT1 LDGT2 0.0000 0.0016 0.0719 0.0325 0.0330 0.1080 VMT Mix: Composite Emission Factors (g/mi): 1.044 2.512 0.418 1.058 0.983 Composite VOC : 1.003 16.47 6.775 0.824 16.40 16.87 16.17 Composite CO 1.212 0.840 1.126 1.210 1.635 2.574 Composite NOX : HDGV8E HDGV4 HDGV5 HDGV6 HDGV7 HDGV8A Veh. Type: HDGV2B HDGV3 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0060 0.0000 VMT Mix:

Composite Emission Factors (g/mi):											
Composi	te VOC :	0.981	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Composi	te CO	24.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00		
Composi	te NOX :	3.635	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Ve	h. 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 Er	mission Fact	tors (g/mi):								
Composi	te VOC :	0.374	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Composi	te CO	1.957	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
Composi	te NOX :	4.078	0.000	0.000	0.000	0.000	0.000	0.000	0.000		

> 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: GVWR:	LDGV	LDGT12 <6000	LDGT34 >6000	LDGT (All)	HDGV	LDDV	LDDT	HDDV	MC	All Veh	
VMT Distribution:	0.7002	0.1410	0.1044		0.0060	0.0008	0.0016	0.0180	0.0280	1.0000	
Composite Emission Fa	ctors (g/m	i):								0 0000	
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	
SO4:	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 0.0125	0.0136 0.0125	
Brake:	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	
SO2:	0.0684	0.0804	0.1134	0.0944	0.1603	0.0939	0.2028	0.7715	0.0328 0.0113	0.0872	
NH3:	0.1016	0.1005	0.1015	0.1009	0.0451	0.0068	0.0068	0.0270	0.0115	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					

SO4:	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			
802:	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:			0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
	(<i>a</i> /m								
Composite Emission Fac Lead:	-	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
GASPM:		0.0523	0.0503	0.0504	0.0503	0.0503	0.0503	0.0000	
ECARBON:	0.0525	0.0525						0.0000	
OCARBON:									
SO4:	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:	0.0125	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	
SO2:	0.0848	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)	0.0451	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
PM Idle:									
rm idie.									
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 Fac									
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	
SO4:	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	

Tota	l PM:	0.1426	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1004	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)								
	Idle:	1.0617	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
# # #	# # =	# # # #	# # # # #	# # # # #					
Mesa Verde NP	Summer	Condition	s.						
File 1, Run 1	, Scenar	io 14.							
# # # # # #	* # # # #	* # # # #	# # # # #	# # # # #					
		Ca	lendar Yea	r: 2001					
		Ca	Montl						
	Gasoline	Fuel Sul	fur Conten ⁻	-	ma				
			fur Conten	-	-				
	DIESEI		Size Cutof		-				
			mulated Ga		-				
		INCIDI	maracea ea						
Vehicle	Type:	LDGV	LDGT12	LDGT34	LDGT	HDGV	LDDV	LDDT	HDDV
	GVWR:	_	<6000	>6000	(All)				

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 Fa	ctors (g/m									
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
	0.1010	0.100,	0.1010							
Idle Emissions (g/hr) PM Idle:								1.0472		0.0189
PM 1016.										
Veh. Type:	LDGT1	LDGT2	LDGT3	LDGT4	LDDT12	LDDT34				
VMT Mix:	0.0330	0.1080	0.0719	0.0325	0.0000	0.0016				

All Veh

Composite Emission Fac		• .						
Composite Emission rad	ctors (g/m	ιi):						
Lead:	0.0000	0.0000	0.0000	0.0000	'			
GA3PM:	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		
302:	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:	oo5v2B	HDGV3	HDGV4	HDGV5	HDGV6	HDGV7	HDGV8A	HDGV8B
\nMr Mix:	0.0060	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
				_ '		_ '		
	'							
				0.0000	0.0000	0.0000	0.0000	
Lead:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Lead: GASPM:	0.0000 0.0523	0.0000 0.0523	0.0506	0.0506	0.0506	0.0506	0.0505	0.0000
Lead: GASPM: ECARBON:	0.0000 0.0523	0.0000 0.0523	0.0506	0.0506	0.0506	0.0506	0.0505	
Lead: GASPM: ECARBON: oCARBmn:	0.0000 0.0523 	0.0000 0.0523	0.0506	0.0506	0.0506	0.0506	0.0505	0.0000
Lead: GASPM: ECARBON: oCARBmn: SO4:	0.0000 0.0523 0.0120	0.0000 0.0523 0.0000	0.0506 0.0000	0.0506 0.0000	0.0506 0.0000	0.0506	0.0505	0.0000
Lead: GASPM: ECARBON: oCARBmn: SO4: Total Exhaust em :	0.0000 0.0523 0.0120 0.0643	0.0000 0.0523 0.0000 0.0523	0.0506 0.0000 0.0506	0.0506 0.0000 0.0506	0.0506 0.0000 0.0506	0.0506 0.0000 0.0586	0.0505 0.0000 0.0505	0.0000
Lead: GASPM: ECARBON: oCARBmn: SO4: Total Exhaust em: Brake:	0.0000 0.0523 0.0120 0.0643 0.0125	0.0000 0.0523 0.0000 0.0523 0.0000	0.0506 0.0000 0.0506 0.0080	0.0506 0.0000 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000	0.0506 0.0000 0.0586 0.0000	0.0505 0.0000 0.0505 0.0000	0.0000 0.0000 0.0000 0.0000
Lead: GASPM: ECARBON: oCARBmn: SO4: Total Exhaust em: Brake: Tire:	0.0000 0.0523 0.0120 0.0643 0.0125 0.0080	0.0000 0.0523 0.0000 0.0523 0.0000 0.0000	0.0506 0.0000 0.0506 0.0080 0.0080	0.0506 0.0000 0.0506 0.0000 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000	0.0506 0.0000 0.0586 0.0000 0.0000	0.0505 0.0000 0.0505 0.0000 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000
Lead: GASPM: ECARBON: oCARBmn: SO4: Total Exhaust em: Brake: Tire: Total PM:	0.0000 0.0523 0.0120 0.0643 0.0125 0.0080 0.08*8	0.0000 0.0523 0.0000 0.0523 0.0000 0.0000 0.0000 0.0523	0.0506 0.0000 0.0506 0.0080 0.0000 0.0000 0.0506	0.0506 0.0000 0.0506 0.0000 0.0000 0.0000 0.0506	0.0506 0.0000 0.0506 0.0000 0.0000 0.0000 0.0506	0.0506 0.0000 0.0586 0.0000 0.0000 0.0000 0.0506	0.0505 0.0000 0.0505 0.0000 0.0000 0.0000 0.0505	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Lead: GASPM: ECARBON: oCARBmn: SO4: Total Exhaust em: Brake: Tire: Total PM: SO2:	0.0000 0.0523 0.0120 0.0643 0.0125 0.0080 0.08*8 0.1601	0.0000 0.0523 0.0000 0.0523 0.0000 0.0000 0.0523 0.0000	0.0506 0.0000 0.0506 0.0080 0.0000 0.0506 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000 0.0506 0.0000	0.0506 0.0000 0.0586 0.0000 0.0000 0.0506 0.0000	0.0505 0.0000 0.0505 0.0000 0.0000 0.0505 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Lead: GASPM: ECARBON: oCARBmn: SO4: Total Exhaust em: Brake: Tire: Total PM: SO2: NH3:	0.0000 0.0523 0.0120 0.0643 0.0125 0.0080 0.08*8	0.0000 0.0523 0.0000 0.0523 0.0000 0.0000 0.0000 0.0523	0.0506 0.0000 0.0506 0.0080 0.0000 0.0000 0.0506	0.0506 0.0000 0.0506 0.0000 0.0000 0.0000 0.0506	0.0506 0.0000 0.0506 0.0000 0.0000 0.0000 0.0506	0.0506 0.0000 0.0586 0.0000 0.0000 0.0000 0.0506	0.0505 0.0000 0.0505 0.0000 0.0000 0.0000 0.0505	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Lead: GASPM: ECARBON: OCARBmn: S04: Total Exhaust em: Brake: Tire: Total PM: S02: NH3: Idle Emissions (g/hr)	0.0000 0.0523 0.0120 0.0643 0.0125 0.0080 0.08*8 0.1601	0.0000 0.0523 0.0000 0.0523 0.0000 0.0000 0.0523 0.0000	0.0506 0.0000 0.0506 0.0080 0.0000 0.0506 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000 0.0506 0.0000	0.0506 0.0000 0.0586 0.0000 0.0000 0.0506 0.0000	0.0505 0.0000 0.0505 0.0000 0.0000 0.0505 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
Lead: GASPM: ECARBON: oCARBmn: SO4: Total Exhaust em: Brake: Tire: Total PM: SO2: NH3:	0.0000 0.0523 0.0120 0.0643 0.0125 0.0080 0.08*8 0.1601	0.0000 0.0523 0.0000 0.0523 0.0000 0.0000 0.0523 0.0000	0.0506 0.0000 0.0506 0.0080 0.0000 0.0506 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000 0.0506 0.0000	0.0506 0.0000 0.0586 0.0000 0.0000 0.0506 0.0000	0.0505 0.0000 0.0505 0.0000 0.0000 0.0505 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000
GASPM: ECARBON: oCARBmn: SO4: Total Exhaust em: Brake: Tire: Total PM: SO2: NH3: Idle Emissions (g/hr)	0.0000 0.0523 0.0120 0.0643 0.0125 0.0080 0.08*8 0.1601	0.0000 0.0523 0.0000 0.0523 0.0000 0.0000 0.0523 0.0000	0.0506 0.0000 0.0506 0.0080 0.0000 0.0506 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000 0.0506 0.0000	0.0506 0.0000 0.0506 0.0000 0.0000 0.0506 0.0000	0.0506 0.0000 0.0586 0.0000 0.0000 0.0506 0.0000	0.0505 0.0000 0.0505 0.0000 0.0000 0.0505 0.0000	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000

GASPM:

Idle Emissions (g/hr) PM Idle:	1.0504	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
SO2:	0.2450	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
Tire:	0.0080	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
Total Exhaust PM:	0.1198	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
OCARBON:	0.0523	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
ECARBON:	0.0503	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

2001 MESA VERDE NATIONAL PARK VISITOR VEHICLE EMISSIONS

Paved Road Annual VMT 12,592,350

		Emissio	on Factors		(Paved)	
	NOx	СО	voc	Exhaust, Brake, and Tire	Fugitive	Total
Summer	1.189	14.832	1.049	0.0338	3 0.84	0.8738
Winter	1.261	19.648	1.019	0.0341	0.84	0.8741
Average	1.225	17.240	1.034			0.874
_		Emis	sions (ton	s/yr) - All Vehicles		Paved
	NOx	CO	voc			Paved PM ₁₀
	16.97	238.80	14.32			12.11
		Emis	sions (Ibs	<u>slyr) - All Vehicles</u>		
	<u>NOx</u> 33,936	<u>CO</u> 477,603	<u>VOC</u> 28,645			Paved <u>PM 10</u> 24,211
Bus <u>Annual VMT</u> 52,500						
		Emis	sion Fact	ors (g/mi) - Buses	(Deved)	
				Exhaust, Brake, and	<u>(Paved)</u>	
	NOx	CO	VOC	Tire	Fugitive	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
_		En	<u>nissions (t</u>	<u>ons/yr) - Buses</u>		
	<u>NOx</u> 0.97	<u>CO</u> 0.38	<u>VOC</u> 0.03			Paved <u>PM₁₀</u> 0.07
		<u>E</u>	missions	<u>(Ibs/yr) - Buses</u>		
_	<u>NOx</u> 1,930	<u>CO</u> 755	<u>VOC</u> 58			Paved <u>PM₁₀</u> 131

MESA VERDE NP CONCESSIONAIRE BUS EMISSIONS

	I	Emission F	actors (glı	ni) - Gasoli P Exhaust, Brake,	ne Buses M10 (Paved)	
	NOx	CO	VOC	and Tire	Fugitive	Total
Summer	3.635	24.330	0.981	0.0848	0.84	0.9248
Winter	3.796	27.920	1.002	0.0846	0.84	0.9246
Average	3.716	26.125	0.992			0.925
_		<u>Emissi</u>	<u>ons (tons/</u>	<u>yr) - All Vel</u>	<u>nicles</u>	
	<u>NOx</u> 0.25	CO 1.74	<u>VOC</u> 0.07			Paved <u>PM₁₀</u> 0.06
		<u>Emiss</u>	ions (lbs/	yr) - All Veh	<u>iicles</u>	
	<u>NOx</u> 494	<u></u>	VOC 132			Paved <u>PM₁₀</u> 123
Tour Bus VMT 26,800						
	-	Emissio	n Factors (r Buses PM ₁₀ (Paved)	1
				Exhaust, Brake,		
	NOx	СО	VOC	and Tire	Fugitive	Total
Summer	16.586	6.500	0.490	0.2867	0.84	1.1267

6.582

16.834

0.509

Average

Winter

16.710	6.541	0.500	1.135	0.7715
	Emi	ssions (tons/yr) - Buses	6	
			Paved	
NOx	CO	VOC	PM 10	SO ₂
0.49	0.19	0.01	0.03	0.02
	Em	issions (Ibslyr) - Buses		
			Paved	
<u>NOx</u> 985	<u>CO</u> 386	VOC 29	<u>PM₁₀</u> 67	<u>SO₂</u> 45

0.3027

0.84

1.1427

0.7715

	LDGV	LDGT	LDDT	HDDV	Total	_
Total Miles	21,284	166,632	0	57,917	245,833	
		Emi	ssion Fact	ors (glmi) - LD	GV PM₁o	
	NOx	СО	VOC	Exhaust, Brake, and Tire	Fugitive	Total
Summer	0.7870	13.8400	0.9000	0.0276	0.8400	0.8676
Winter	0.8330	18.4600	0.9110	0.0276	0.8400	0.8676
Average	0.8100	16.1500	0.9055			0.8676
	NOx 0.02	Er CO 0.38	missions († VOC 0.02	tonslyr) - LDGV	,	P ^M ₁₀ 0.02
		Emi	ssion Fact	ors (glmi) - LD	GT PM	
				Exhaust,	PM 10	
	NOx	со	VOC	Brake, and Tire	Fugitive	Total
Summer	1.179	16.550	1.027	0.030	0.840	0.870
Winter	1.287	23.250	1.118	0.030	0.840	0.870
Average	1.233	19.900	1.073			0.870
	<u>NOx</u> 0.23	En <u>CO</u> 3.65	missions († <u>VOC</u> 0.20	tonslyr) - LDGT		PM1o 0.16
		Emi	ssion Fact	ors (glmi) - LDI	DT PM	
	NOx	со	VOC	Exhaust, Brake, and Tire	10 Fugitive	Total
Summer	1.239	0.945	0.461	0.149	0.840	0.989
Winter	1.212	0.931	0.439	0.150	0.840	0.990
Average	1.226	0.938	0.450			0.990
	<u>NOx</u> 0.00	En <u>CO</u> 0.00	missions (1 <u>VOC</u> 0.00	tonslyr) - HDG∖	/	РМ 10 0.00
		Emi	ssion Fact	ors (glmi) - HD	DV	
	NOx	СО	VOC	Exhaust, Brake, and Tire	PM₁0 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
		E	missions (tonslyr) - HDD	/	
	<u>NOx</u> 1.06	<u> </u>	<u>VOC</u> 0.03			<u>PM1o</u> 0.07
	NOx	<u>E</u> CO 4.44	missions VOC 0.25	(tonslyr) - Total -	L	<u>РМ 10</u> — 0.25
-	1.31	4.44	0.25			
-	1.31			<u>(lbslyr) - Total</u>		PM10

MESA VERDE NATIONAL PARK NPS AND GSA VEHICLES

MEVE ARAMARK VEHICLES

	LDGV	LDGT	LDDT	HDDV	Total	
Total Miles	15,000	115,000	0	0	130,000	
		Emiss	ion Factor	rs (glmi) - L	DGV	
					PM 10	
				Exhaust,		
				Brake,		
	NOx	CO	VOC	and Tire	Fugitive	Total
Summer	0.7870	13.8400	0.9000	0.0276	0.8400	0.8676
	0.8330	18.4600	0.9110	0.0276	0.8400	0.8676
Winter	0.0330	16.4000	0.9110	0.0276	0.0400	0.0070
Average	0.8100	16.1500	0.9055			0.8676
		_	,		~ ~	
				nslyr) - LD	GV	DM a
	NOx	CO	VOC			PM ₁o
	0.01	0.27	0.01			0.01
		Emiss	ion Facto	rs (glmi) - L	DGT	
					PM 10	

					PM 10			
				Exhaust,				
			Brake,					
	NOx	CO	VOC	and Tire	Fugitive	Total		
Summer	1.179	16.550	1.027	0.030	0.840	0.870		
Winter	1.287	23.250	1.118	0.030	0.840	0.870		
Average	1.233	19.900	1.073			0.870		
		Emi	ssions (to	nslyr) - LD	GT			
	NO.	CO	VOC			PM ₁ 0		
	0.16	2.52	0.14			0.11		

Emission Factors (glmi) - LOOT PM 10

					PM 10					
				Exhaust,						
		Brake,								
	NOx CO VOC and Tire Fugitive									
Summer	1.239	0.945	0.461	0.149	0.840	0.989				
Winter	1.212	0.931	0.439	0.150	0.840	0.990				
Average	1.226	0.938	0.450			0.990				

	Emissions (tonslyr) - HDGV									
NOx	_ <u>CO</u>	VOC		<u>PM</u> 10						
0.00	0.00	0.00		0.00						

Emission Factors (glmi) - HDDV

					PM ₁ 0					
				Exhaust,						
				Brake,						
	NOx	CO	VOC	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				
		Emi	ssions (to	nslyr) - HD	DV					
	NOx	CO	VOC			PMio				
	0.00	0.00	0.00			0.00				
		<u>Em</u>	issions (to	onslyr) - To	tal					
	NOx	<u></u>	VOC_	-		PM.o				
	0.17	2.78	0.15			0.12				
		En	Emissions (Ibslyr) - Total							
	NOx	<u>CO</u>	VOC			PM.o				
	339	5,568	301	249						

2001 MESA VERDE NP NONROAD VEHICLE EMISSIONS

	Emission Factors (gm/hp-hr) Emissions (lbs/yr)										
Vehicle	PM	Nox	CO	VOC	hp	load	hrs/yr	PM	Nox	CO	VOC
Utility Vehicle	2.04	1.03	2.31	2.19	15	0.55	700	25.9	13.1	29.3	27.8
Tractors	2.04	1.03	2.31	2.19	42.35	0.68	600	77.5	39.2 0.0	87.8 0.0	83.2
Backhoe	2.04	1.03	2.31	2.19	77	0.55	200	38.0	19.2	43.0	40.8
Bobcat	2.04	1.03	2.31	2.19	15	0.55	200	7.4	3.7	8.4	7.9
Grader	1.06	9.6	3.8	1.43	172	0.61	200	48.9	443.2	175.4	66.0
						Totals:	(lbs/yr)	198	518	344	226
					(tons/yr) 0.10 0.26		0.17	0.11			

APPENDIX C

PUBLIC USE DATA

	12/2001	1490		
	Recreational	Non-Recreational	Total	Calendar Year-To-Date
Visits	5,597	408	6,005	537,474
Visitor Hours	25,187	408	25,595	4,128,450
				Fiscal YTD
Total Fiscal YTD	Visitor Days		(31,110

Monthly Public Use Report Printed on 01/20/2003

Recreation O/N stays	Current Month	Year-To-Date	
Concessioner Lodging	0	46,818	NPS Campgrounds
Concessioner Campgrounds	0	0	Tents 0 RN's 0
NPS Campgrounds	0	51,616	Total 0
NPS Backcountry	0	0	
NPS Miscellaneous	0	1,236	
Non Recreation O/N stays	0	0	
Total Overnight stays	0	99,670	

	This Month	Same Month Last Year	Percent Change
Total Rec	5,597	6,746	-17.03 %
Total NonRec	408	761	-46.39 %
Total Visits	6,005	7,507	-20.01 %
Total YTD	537,474	471,084	14.09 %

NIS DACKGONNINT Image: Second model in the image: Second	/08/02
NIS BARCOMINAL I I I I I SEE WORKSHEET NPS MISCELLANEOUS I 0 I 1236 I I I NON RECREATION O/N STAYS I I 0 I I I I TOTAL OVERNIGHT STAYS 01 99670 I I I I I SPECIAL USE DATA I MONTH DATE I MONTH I I PARK POINT 30781 26215911WETHERILL MESA II II III IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	
NPS MISCELLANEOUS 0 01 1236 NON RECREATION O/N STAYS 0 0 TOTAL OVERNIGHT STAYS 01 99670 TOTAL OVERNIGHT STAYS 01 99670 SPECIAL USE DATA MONTH DATE MONTH DATE MONTH PARK POINT 30781 26215911WETHERILL MESA 01 FAR VIEW RUINS 39181 346420'' 1 MESA TOP LOOP 44781 407545'' CLIFF PALACE 01 39102611n. EUSES SI REMARKS: THIS MONTH SAME MO LAST YEAR 1 TOTAL VISITS 6005ITOTAL VISITS 75071<%CHANGEI	21.0
NPS MISCELLANEOUS 0 1236 NON RECREATION O/N STAYS 0 0 TOTAL OVERNIGHT STAYS 0 0 TOTAL OVERNIGHT STAYS 01 99670 THIS YEAR-TO SPECIAL USE DATA MONTH PARK POINT 30781 26215911WETHERILL MESA FAR VIEW RUINS 39181 346420'' MESA TOP LOOP 44781 407545'' CLIFF PALACE 01 39102611n. BUSES REMARKS: THIS MONTH SAME MO LAST YEAR	14.1
NIS DACKCOONTIAL 1 01 1236 SEE WORKSHEET NPS MISCELLANEOUS 1 01 1236 NON RECREATION O/N STAYS 0 1 0 TOTAL OVERNIGHT STAYS 01 99670 SPECIAL USE DATA THIS YEAR-TO THIS PARK POINT 30781 26215911WETHERILL MESA 01 FAR VIEW RUINS 39181 346420'' 1	-20.0
NIS BARROONNNI I III NPS MISCELLANEOUS I 01 1236 NON RECREATION O/N STAYS I 0 TOTAL OVERNIGHT STAYS 01 99670 THIS YEAR-TO THIS SPECIAL USE DATA I I I	125
NISCELLANEOUS 1 01 1236 NPS MISCELLANEOUS 1 01 1236 NON RECREATION O/N STAYS 1 0 1 0 TOTAL OVERNIGHT STAYS 01 99670 SPECIAL USE DATA 1 MONTH DATE 1 MONTH 1 PARK POINT 1 30781 26215911WETHERILL MESA 1 01	
NISCELLANEOUS 1 01 1236 NON RECREATION O/N STAYS 01 0 TOTAL OVERNIGHT STAYS 01 99670 SPECIAL USE DATA 1 MONTH DATE 1 NONTH 1 NONTH 1	
NPS MISCELLANEOUS 1 01 1236 NON RECREATION O/N STAYS 01 0 1 0 TOTAL OVERNIGHT STAYS 01 99670 SPECIAL USE DATA 1 MONTH DATE 1 MONTH 1	842
NIS DACROSONINI I OI SEE WORKSHEET NPS MISCELLANEOUS I OI 1236 NON RECREATION O/N STAYS I O I O	YEAR-TO DATE
NIS EACHCOONTRI I 01 SEE WORKSHEET NPS MISCELLANEOUS 1 01 1236 NON RECREATION O/N STAYS 1 0 1 0	
NPS MISCELLANEOUS 1 01 1236	
SEE WORKSHEET	
NPS BACKCOUNTRY 1 01 0 VISITOR-HOUR APPEN	IDIX
NPS CAMPGROUNDS 1 01 51616	

		YEAR-TO-DATE					
VISITS	Recreati g	5971	Nonrecre	eat 408 fl	I 1	Total 60051	537474
				RENT-MONTH			YEAR-TO-DATE
VISITOR HOURS	Recreat 25	P871	Nonrecre	eational 4081	I	Total 255951	4128450
RECREATION O/N		CURREN	IT MONTH	YEAR-TO-D	ATE	NPS CAME	GROUNDS
CONCESSION	ER LODGING	Ι	01	46818		TENTS	0
CONCESSIONER C.	AMPGROUNDS	Ι	Ι		_	IR/VS	0
NDS C	AMPGROUNDS	ŗ	01	51616		TOTAL	0
NFS C.		1		01010		:	
NPS B	ACKCOUNTRY	Ι	01.	0		VISITOR-HOU	JR APPENDIX

PARK MESA VERDE NATIONAL PARK	MONTH YEAR 12/2001	PARK CODE 11490'	
	CURRENT-MONT	Н	YEAR-TO-DATE

VER=4.03 ~rMESA VERDE NATIONAL PARK WORKSHEET-ENTER REPORTING MONTH/YEAR >*12/20011 П * 30301 ENTER THE TRAFFIC COUNT FROM THE MAIN ENTRANCE ENTER THE NUMBER OF NON-RECREATION VEHICLES 2721 rBUSES1 rPASSn * 51 * 701 ENTER THE NUMBER OF BUSES/BUS PASSENGERS -RV'S₁ rTENTS₁ * 01 ENTER THE NUMBER OF TENT/RV CAMP SITES OCCUPIED * 01 0 | 5 * 01 ENTER THE NUMBER OF OVERNIGHT STAYS AT FAR VIEW LODGE 0 1 ENTER THE TRAFFIC COUNT AT WETHERILL ENTER YES IF THE FOLLOWING ROADS WERE OPEN FOR THE ENTIRE MONTH OR A PARTIAL 31 MONTH, IF CLOSED ENTIRE MONTH ENTER NO. **r**⁻7 11 YI IF CLOSED PARTIAL MONTH # DAYS OPEN 01 PARK POINT (Y OR N) 11 Н н IF CLOSED PARTIAL MONTH # DAYS OPEN 01 FAR VIEW RUINS (Y OR N) П Н f | YI IF CLOSED PARTIAL MONTH # DAYS OPEN 1 01 MESA TOP LOOP (Y OR N) Н CLIFF PALACE (Y OR N) INI IF CLOSED PARTIAL MONTH # DAYS OPEN + 01 11 Н н IF CLOSED PARTIAL MONTH # DAYS OPEN 101 WETHERILL (Y OR N) NI 1_1 <u>L</u>J 1— I PRESS>-{ F10 | TO SAVE=I J T PERSONS-PER-VEHICLE MULTIPLIER 12.41 NONREPORTABLE 4501 REC AUTOMOBILE VISITORS 55271 BUS VISITORS 11 701 01 OVERNIGHT STAYS it 55971 TOTAL NONRECREATION VISITS TOTAL RECREATION VISITS 4081 251871 TOTAL NONRECREATION HOURS 4081 TOTAL RECREATION HOURS 1

11

п

CONTROL#00108 LAST # 107 CLY 96

Y	EAR	MONTH												TOTAL	DIFFERENCE	
		January	February	March	April	May	June	July	August	September	October	November	December			
	1980	1,488	1,152	3,411	10,747	49,804	98,701	131,609	133,424	68,558	30,879	7,245	3,808	542,806		
	1981	3,424	1,808	3,200	12,104	65,443	108,301	141,882	130,318	77,007	35,166	7,378	2,816	590,828	8.8%	
	1982	1,200	1,872	5,552	13,090	57,751	117,150	146,716	141,005	73,581	32,393	9,010	3,648	604,950	2.4%	
	1983	3,584	3,200	7,680	14,620	65,574	108,195	141,833	130,249	79,709	38,707	8,364	2,400	604,115	-0.1%	1
	1984	2,528	3,078	8,663	14,269	47,117	92,120	117,588	120,858	72,038	26,087	7,636	4,883	516,865	-14.4%	
	1985	5,346	4,628	10,218	20,971	65,951	117,501	155,297	139,039	82,706	36,328	11,246	7,060	656,291	27.0%	
	1986	7,497	4,799	16,430	20,449	66,006	111,035	154,908	147,714	81,426	33,974	7,980	6,670	658,888	0.4%	
	1987	4,386	4,441	9,726	23,938	75,867	125,223	165,166	156,573	101,517	45,013	12,266	4,450	728,566	10.6%	
	1988	3,753	5,577	14,533	26,583	79,298	128,602	172,929	164,245	108,421	52,549	10,617	5,076	772,183	6.0%	
	1989	2,990	3,401	14,593	21,683	57,557	111,661	128,270	134,791	70,471	37,899	10,457	6,272	600,045	-22.3%	
	1990	3,926	4,232	12,856	25,531	56,647	111 215	142,952	136,791	69788	33,157	9583	4,801	611,479	1.9%	1
	1991	3,885	6,001	12,317	22,225	61,574	96,769	173,774	158,191	80,823	45,855	11434	5,227	678,0_75	10.9%	
	1992	5,090	6,545	14,614	31,207	67,353	136,273	172,012	158,503	86,893	48,508	10,097	4,925	742,020	9.4%	
	1993	3,768	4,666	13,283	28,575	64,748	113,462	150,932	142,614	79,541	48,728	10,015	5,724	666,056	-10.2%	
a	1994	6,126	3,947	18,802	26,196	66,517	119,260	159,407	147,527	83,579	51,733	9,798	6,752	699,644	5.0%	
b	1995	4,938	6,710	16,568	27,605	64,167	109,197	171,053	137,981	82,474	46,707	10,452	2,981	680,833	-2.7%	
c	1996	4,486	5,373	16,284	29,373	67,113	114,588	152,711	106,638	74,899	44,533	10,785_	6,150	632,933	-7.0%	
	1997	4,427	4,771	16,547	25,781	61,288	116,398	148,967	135,008	77.691	42,539	9,477	5,702	648,596	2.5%	
d	1998	4,905	4,666	13,526	25,886	62,091	109,226	137.955	123,132	80,306	45,949	8,482	7,386	623,510	-3.9%	
	1999	6,103	6,552	19,502	24,474	63,487	115,0.43	143 ; ^3	130,354	82,142	45,062	12,219	7,802	656,023	5.2%	
eḟ	2000	5,923	5,832	14,087	26,313	57,157	98,175	77,946	64,221	64,411	38,861	10,651	7,507	471,084	-28.2%	
	2001	6,897	6,567	15,411	27,053	53,173	94,178	116,882	101,748	58,631	38,928	12,001	6,005	537,474	14.1%	
g	2002	5,807	6,441	13,820	22,724	56,739	82,169	78,058	53,380	49,901	34,797	9,478	6,347	419,661	-21.9%	1
	2003	5,529	4,849												-15.3%	
	2004															
	2005															
	2006		a change in		,							sed due to				
	2007 b - Due to a congressional shutdown, the park was closed 11/14-19 and 12/16/95 - 1/6/96								5 - 1/6/96			osed due to	,			
		•	k was close			hapin 5 fire.					g- Park clo	sed due to	Long Mesa	02 Fire, Ju	ıly 29 - Aug 9, 20	J02
	2009 d- Traffic counter failure in December 1998.										j					

APPENDIX D

SELECTED COLORADO AIR QUALITY REGULATIONS

Colorado Air Quality Control Commission Regulation No. 9:

Open Burning, Prescribed Fire, and Permitting.

Scope

This regulation applies to all open burning activity throughout the state.

II. Definitions

The following definitions apply for the purposes of this Regulation No. 9.

A. Agricultural Open Burning

The open burning of cover vegetation for the purpose of preparing the soil for crop production, weed control, maintenance of water conveyance structures related to agricultural operations, and other agricultural cultivation purposes.

B. Broadcast Burn

A broadcast burn is the controlled application of fire to wildland fuels in their natural or modified state over a predetermined area. Broadcast burns do not include the burning of wildland fuels that have been concentrated in piles by manual or mechanical methods.

C. Class I Area and Mandatory Federal Class I Area

A class I area is an area listed in Regulation No. 3, Part B, section V.A.

D. Fuel Treatment

Manipulation, including combustion, or removal of wildland fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control of wildfire.

E. Land Manager

Any federal, state, local or private person or entity that administers, directs, oversees or controls the use of public or private land, including the application of fire to the land.

F. Local Agency

A local air pollution control authority to which the division has delegated authority to issue general open burning permits.

wildland fires ignited by military munitions.

S. Wildfire

Any fire that is not intended for use for grassland or forest management, regardless of whether the fire is ignited by natural or human means.

T. Wildlands

An area where development is generally limited to roads, railroads, power lines and widely scattered structures. The land is not cultivated (i.e., the soil is disturbed less frequently than once in ten years), is not fallow, and is not in the United States Department of Agriculture Conservation Reserve Program. The land may be neglected altogether or managed for such purposes as wood or forage production, wildlife, recreation, wetlands or protective plant cover.

U. Wildland Fuels

Combustible vegetative materials located on wildlands that can be consumed by fire, including naturally occurring live and dead vegetation, such as grass, leaves, ground litter, plants, shrubs, and trees, as well as excessive buildups of these materials resulting from resource management and other land use activities, as well as from natural plant growth and succession.

- III. Open Burning Permit Requirements
 - A. No person shall conduct any open burning activity not exempted from this regulation without first obtaining an open burning permit from the division or from a local agency. No person shall burn or allow the burning of rubbish, wastepaper, wood, vegetative material, or any other flammable material on any open premises, or on any public street, alley, or other land adjacent to such premises without first obtaining an open burning permit from the division or local agency.
 - B. The following activities are exempt from the requirement to obtain an open burning permit:
 - noncommercial burning of private household trash in particulate matter (PM 10) attainment areas unless local ordinances or rules prohibit such burning;
 - 2. fires used for noncommercial cooking of food for human consumption, or for instructional, training or recreational purposes;
 - 3. safety flares used to signal danger to the public;

duct design, combustion function and probable emissions performance.

V. ENFORCEMENT

- A. The Division may enter and inspect the property or premises of any manufacturer, or dealer, for the purpose of investigating any actual, suspected, or potential violation of this regulation; and may, at reasonable times, have access to and copy any document, inspect any wood stove, wood stove component, pellet stove, masonry heater or testing equipment, or test the emissions of any wood stove, pellet stove or masonry heater possessed by any manufacturer, or dealer, for the purpose of ascertaining compliance or noncompliance with this regulation.
- B. The Division shall also enforce the provisions of this regulation through all means authorized by Part 1 of Title 25, C.R.S.

VI. LIST OF APPROVED SOLID FUEL APPLIANCES

The Division shall request each dealer to make available to consumers a list of certified wood stoves, exempt, approved pellet stoves and approved masonry heaters to be compiled by the Division.

VII. HIGH POLLUTION DAYS

A. Applicability

Limitations on the use of wood burning stoves, pellet stoves, masonry heaters and fireplaces shall be applicable only in those portions of the counties of Adams, Arapahoe, Boulder, Denver, Douglas, and Jefferson which are located in the AIR program area, as such area is defined in Section 42-4-307(8), C.R.S. but not including those areas above seven thousand feet elevation.

B. Provisions of this section may be enforced by the appropriate local agency. Local agencies are encouraged to develop suitable enforcement programs and enter into an agreement with the State to promote more effective enforcement of this regulation.
 Approval of a wood stove, pellet stove or masonry heater model pursuant to this regulation does not constitute authorization not to comply with requirements of any local ordinance or

resolution relating to the installation or use of any woodburning appliance,

- C. This section shall not apply within any municipality which had an ordinance mandating restricted use of wood burning stoves, pellet stoves, masonry heaters and fireplaces on high pollution days in effect on January 1, 1990.
 - 1. All such exempt areas shall be required to submit a yearly report to the commission no later than June 30, which provides information concerning the enforcement actions pursuant to theft ordinance for the previous healing season.
- D. Prohibitions of use

No person shall operate a wood burning stove, pellet stove, masonry heater or fireplace during a high pollution day. A burn-down time shall be allowed for the burn-down of existing fires prior **to** the initiation of enforcement action.

- E. Exemptions
 - 1. Persons utilizing their wood burning stove, pellet stove, masonry heater or fireplace as a primary source of heat.
 - 2. Persons operating a Phase IIi certified wood burning stove.
 - 3. Persons operating an approved pellet stove.
 - 4. Persons operating an approved masonry heater.

VIII. REQUIREMENTS FOR INSTALLATION OF FIREPLACES

- A. On and after the effective date of this regulation no person shall install any fire place in any dwelling in the area defined in Section Vfl.A. unless it is one of the following:
 - 1. a gas appliance.
 - 2. an electric device.
 - 3. a fireplace insert that meets the requirements set forth in Section ILA.
 - 4. an approved pellet burning fireplace insert.