

Great Smoky Mountains  
National Park

Cades Cove Opportunities Plan

**Appendix L**  
**Air Quality Impacts Associated**  
**with Cades Cove Transportation**  
**Alternatives**

October 2004

United States Department  
Of the Interior  
National Park Service



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Baseline Air Emissions (Alternatives 1 and 2 – worst case weekend day)

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CO emissions	5,747 lbs/day
NO <sub>x</sub> emissions	553 lbs/day
VOC emissions	529 lbs./day
PM10 emissions	477 lbs/day

\*Note emissions from Alternative 2 may be somewhat lower than Alternative 1 due to potentially less vehicle idling time

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Air Emissions Associated with Alternative 3 (worst case weekend day)

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CO emissions	4,205 lbs/day
NO <sub>x</sub> emissions	397 lbs/day
VOC emissions	387 lbs/day
PM10 emissions	348 lbs/day

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Air Emissions Associated with Alternative 4 (worst case weekend day)

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CO emissions	4,217 lbs/day
NO <sub>x</sub> emissions	414 lbs/day
VOC emissions	390 lbs/day
PM10 emissions	251 lbs/day

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Air Emissions Associated with Alternative 5 (worst case weekend day)

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CO emissions	25 lbs/day
NO <sub>x</sub> emissions	34 lbs/day
VOC emissions	6 lbs/day
PM10 emissions	5 lbs/day

## Cades Cove Visitor Vehicle Emissions on October Weekend Day

Passenger Vehicles/Day					
Alternative	Gatlinburg	Townsend	Car VMT	Buses-Shuttles/Day	Bus VMT
1	3,024	1,776	248,064	0	0
2	3,024	1,776	248,064	0	0
3	2,211	1,304	181,531	0	0
4	2,211	1,304	181,531	32	928
5	0	0	0	90	1,945

### Emission Factors (g/ml) Passenger Vehicles

	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub> (Paved)		
				Exhaust, Brake and Tire	Fugitive	Total
Summer	0.930	8.410	0.950	0.0338	0.84	0.9738
Winter	1.060	12.650	0.990	0.341	0.84	0.8741
Average	0.995	10.530	0.970			0.874

### Emissions (lbs/day) – Passenger Vehicles

Alternative	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>
1	543	5,747	529	477
2	543	5,747	529	477
3	397	4,205	387	349
4	397	4,205	387	349
5	0	0	0	0

### Emission Factors (g/ml) - Buses

	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub> (Paved)		
				Exhaust, Brake and Tire	Fugitive	Total
Summer	7,990	5.840	1,300	0.2867	0.84	1.1267
Winter	7,990	5.840	1,300	0.3027	0.84	1.1427
Average	7,990	5.840	1,300			1.135

<b>Emissions (lbs/day) – Buses</b>				
<b>Alternative</b>	<b>NO<sub>x</sub></b>	<b>CO</b>	<b>VOC</b>	<b>PM<sub>10</sub></b>
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	16	12	3	2
5	34	25	6	5

<b>Total Emissions (lbs/day)</b>				
<b>Alternative</b>	<b>NO<sub>x</sub></b>	<b>CO</b>	<b>VOC</b>	<b>PM<sub>10</sub></b>
1	543	5,747	529	477
2	543	5,747	529	477
3	397	4,205	387	349
4	414	4,217	390	351
5	34	25	6	5

**Cades Cove Vehicle Emission Comparison**

		Pollutant (grams/mile)							
		NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>				
		Bus Emissions				Equivalent Car Pollution Displaced by One Bus			
		7.99	5.84	1.30	1.13				
Bus Capacity	Cars Displaced <sup>1</sup>	Passenger Car Emissions				NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>
35	15	14.51	153.56	14.15	12.75	2	26	11	11
50	21	20.73	219.38	20.21	18.21	3	38	16	16
70	29	29.02	307.13	28.29	25.49	4	53	22	22

Passenger Car Emission Factors			
NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>
0.995	10.53	0.97	0.87395

Bus Emission Factors			
NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>
7.990	5.840	1.300	1.135

<sup>1</sup>Assumes 2.4 passengers per car

## Cades Cove Visitor Vehicle Emissions on October Weekend Day

Alternative	Passenger Vehicles/Day		Car VMT	Buses-Shuttles/Day	Bus VMT
	Gatlinburg	Townsend			
1	3,024	1,776	248,064	0	0
2	3,024	1,776	248,064	0	0
3	2,211	1,304	181,531	0	0
4	2,211	1,304	181,531	32	928
5	0	0	0	90	1,945

**Note:**

Passenger Vehicle/Day = 2001 traffic count data

Car VMT – Vehicle Miles Traveled

Bus-Shuttle Trips/Day = Number of bus trips, not number of buses

### Total Emissions (lbs/day) - \*Passenger Vehicles

Alternative	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>
1	543	5,747	529	477
2	543	5,747	529	477
3	397	4,205	387	349
4	397	4,217	387	349
5	0	0	0	0

\*Reformulated gasoline

### Emissions (lbs/day) - \*Buses

Alternative	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>
1	0	0	0	0
2	0	0	0	0
3	0	0	0	0
4	16	12	3	2
5	34	25	6	5

\*Diesel fuel

### Combined Vehicular and Bus Emissions (lbs/day)

Alternative	NO <sub>x</sub>	CO	VOC	PM <sub>10</sub>
1	543	5,747	529	477
2	543	5,747	529	477
3	397	4,205	387	349
4	414	4,217	390	351
5	34	25	6	5