SECTION 5

ON-ROAD MOTOR VEHICLE EMISSIONS

The estimation of carbon monoxide (CO) emissions from on-road motor vehicles for the Truckee Meadows non-attainment area is presented in this section. Specifically, this section addresses on-road vehicles using gasoline and diesel fuels and includes the following vehicle classes:

- Light duty gasoline vehicles (LDGV)
- Light duty gasoline trucks (LDGT12 and LDGT 34)
- Heavy duty gasoline vehicles (HDGV)
- Motorcycles (MC)
- Light duty diesel vehicles (LDDV)
- Light duty diesel trucks (LDDT)
- Heavy duty diesel vehicles (HDDV)

Carbon monoxide emission factors were calculated using the EPA model MOBILE6 and data supplied by local agencies. MOBILE6 calculates emission factors for on-road (highway) vehicles expressed in grams of pollutant per mile traveled. The environmental and operational input parameters used to determine these emission factors are discussed in detail later in this section. The I&M program for Washoe County requires automotive technicians performing emissions equipment repairs to complete a emissions systems training course. The use of MOBILE6 incorporates the benefit of this training in the calculated emission rates. All MOBILE6 runs were performed by staff of the Washoe County District Health Department, Air Quality Management Division (AQMD).

Vehicle miles traveled (VMT) is the common measure of motor vehicle activity. The transportation models used to generate VMT estimates for the Truckee Meadows non-attainment area were run by the Regional Transportation Commission of Washoe County (RTC). VMT estimates were provided for each of the twelve (12) facility (roadway) types in the non-attainment area and the surrounding rural area.

Separate MOBILE6 runs were conducted for the non-attainment area to simulate the different meteorological, fuel qualities and I&M performance criteria during each month of the year. Peak season emissions were determined using the emissions factors and VMT estimates for the winter months of November, December, and January.

On-road motor vehicles were responsible for 58,267 tons of carbon monoxide emissions in the Truckee Meadows non-attainment area for 2002. Peak season emissions totaled 335,508 lbs/day. Table 5-1 provides a summary of on-road mobile source emissions. Due to numerical rounding, peak season emission totals presented in the text may not agree with the values detailed in Tables 5-1 and 5-6. Figure 5-1 shows the relative contribution of on-road mobile sources to the total. The contribution by each of the vehicle classes listed is shown in Figure 5-2. The remainder of this section will describe the methods used to determine emissions from each of these sources. Supporting documentation is provided in Appendix D.

TABLE 5-1
ON-ROAD MOBILE SOURCES EMISSIONS SUMMARY
FOR CARBON MONOXIDE NON-ATTAINMENT AREA

Vehicle Class	Annual Emissions (tons/yr)	Typical CO Season Emissions (lbs/day)
LDGV	23,141.90	137,277.01
LDGT12	19,919.83	117,616.83
LDGT34	9,137.99	51,396.02
HDGV	3,990.84	18,597.28
LDDV	4.17	21.39
LDDT	10.31	53.53
HDDV	1,704.34	8,901.78
MC	357.56	1,643.85
TOTAL	**58,266.95**	**335,507.68**

Note: The numbers do not add up due to rounding.

2002 On-Road Mobile Sources Annual Emissions
CO Non-Attainment Area

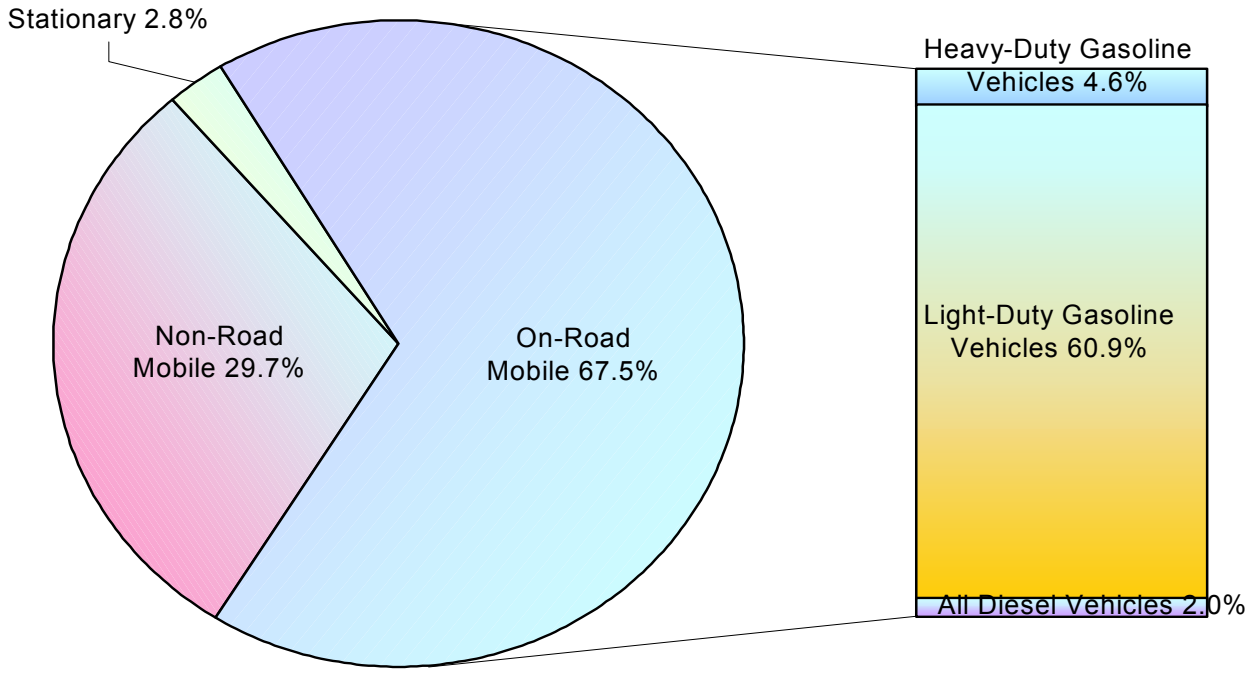

Figure 5-1

2002 On-Road Mobile Sources Annual Emissions by Vehicle Class

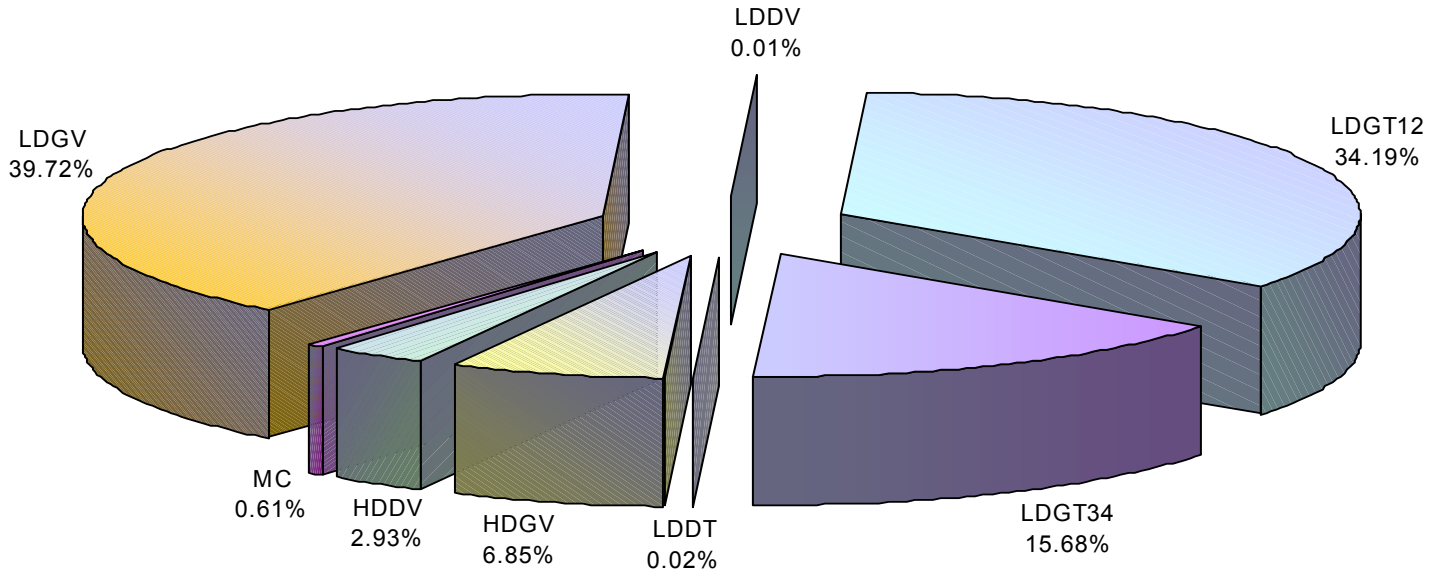

Figure 5-2

VMT ESTIMATION

The RTC is the designated Metropolitan Planning Organization (MPO) for Washoe County and, therefore, the agency responsible for transportation planning. The RTC maintains transportation models for estimating Average Daily Vehicle Miles Traveled (ADVMT) and Average Peak Hour Speeds (APHS) for each facility type (Table 5-2). However, the new MOBILE6 on-road model has consolidated the facility classes formerly known as collector, minor and major into a collective facility called arterial for both the urban and rural road ways.

Table 5-2
2002 AVERAGE PEAK HOUR SPEEDS (APHS) &
AVERAGE DAILY VEHICLE MILES TRAVELED (ADVMT)

Facility	APHS	ADVMT
Urban - Local	25.0	651,213
Urban - Collector	32.0	268,868
Urban - Minor	35.3	1,110,655
Urban - Major	38.5	1,876,541
Urban - Freeway	60.9	2,446,684
Urban - Ramps	36.9	222,700
Rural - Local	25.0	178,068
Rural - Collector	30.9	147,960
Rural - Minor	33.4	335,908
Rural - Major	36.2	406,474
Rural - Freeway	54.5	1,408,992
Rural - Ramps	33.5	75,662

Total Urban (NAA) ADVMT = 6,576,661
Total Rural ADVMT = 2,553,064
Total ADVMT = 9,129,725

MONTHLY TRAFFIC COUNT ADJUSTMENT

The Nevada Department of Transportation (NDOT) has several automatic traffic monitoring stations throughout the non-attainment area. The stations provide an average daily traffic counts for each month. This monthly data is applied to the ADVMT provided by the RTC to yield a monthly adjusted traffic volume or VMT. Monthly 2002 data from 11 NDOT monitoring stations and the resulting averages are presented in Table 5-3.

TABLE 5-3
2002 AVERAGE DAILY TRAFFIC COUNTS

Month/ATR	3111109	31121109	3112209	3112309	3122109	31222209	3122309	3122509	3122609	3122809	3123009	Monthly Avg
Jan	21,683	109,998	67,588	78,178	14,443	21,590	11,890	16,035	32,061	17,179	17,435	37,098
Feb	23,481	118,586	71,861	83,535	15,353	23,237	12,739	16,969	34,659	19,053	18,575	39,823
Mar	24,270	120,233	73,784	84,356	15,353	23,921	13,094	17,333	34,453	19,607	19,208	40,510
Apr	25,730	122,528	76,254	85,049	15,613	24,012	13,251	17,849	35,688	19,492	19,898	41,397
May	27,075	124,347	78,593	86,215	15,759	24,085	13,532	17,675	34,912	19,177	20,588	41,996
Jun	29,740	127,338	82,828	90,297	16,469	24,170	13,451	19,982	35,301	18,690	21,380	43,604
Jul	29,618	125,495	80,037	89,223	15,696	22,966	12,810	19,376	34,424	17,824	20,134	42,509
Aug	30,993	127,392	77,316	92,834	17,263	24,466	14,147	22,265	38,069	19,421	20,313	44,044
Sep	28,703	122,968	73,903	91,314	16,387	25,351	14,456	20,608	34,480	21,633	19,790	42,690
Oct	27,680	118,845	73,365	88,356	16,056	24,675	14,253	19,783	33,752	20,341	19,300	41,491
Nov	25,360	110,746	69,225	83,365	15,566	23,915	13,844	18,798	32,918	19,302	18,376	39,220
Dec	23,764	102,956	67,000	78,989	15,500	22,947	13,959	17,542	33,168	17,739	17,636	37,382
Station Avg	26,508	119,286	74,313	85,976	15,788	23,778	13,452	18,685	34,490	19,122	19,386	

Source: "2002 Annual Traffic Report" - Nevada Department of Transportation[8]

INSPECTION & MAINTENANCE (I/M) PROGRAM

In Nevada, the I/M program is conducted by the Department of Motor Vehicles and Public Safety (DMV). Those vehicle classes required by statute to participate in the program are controlled through the vehicle registration process. Detailed and accurate information regarding the I/M program is an important element of the model. The following data were either received directly or calculated from quarterly reports received from the Nevada Department of Motor Vehicles and Public Safety.

TABLE 5-4
2002 INSPECTION & MAINTENANCE (I/M) PROGRAM STATISTICS

	Pre - 1981 Stringency Rate	Pre - 1981 Waiver Rate	1981 & newer Waiver Rate
January February March	18.8	1.4	0.1
April May June	27.3	2.0	0.2
July August September	29.0	1.0	0.2
October November December	25.2	1.0	0.2

MOBILE6 INPUT PARAMETERS

Start Year:	1978
Pre-1981 Stringency (Failure) rate:	18–29%
First model year covered:	1968
Last model year covered:	2003
Waiver rate (pre-1981):	1-2%
Waiver rate (1981 & newer):	0.1-0.2%
Compliance rate:	98%
Inspection type:	Computerized decentralized
Inspection frequency:	Annual
Vehicle type covered:	LDGV - Yes LDGT12 - Yes LDGT34 - Yes HDGV - Yes
1981 & Later MYR test type:	2500 rpm/Idle

ANTI-TAMPERING PROGRAM (ATP)

Like the I/M program, details of the Anti-Tampering Program (ATP) are also important inputs to the model. The ATP program is implemented concurrent with the I/M program and, therefore, many of the program parameters are similar. As with the I/M data, the 2002 ATP data were supplied by DMV.

Start year:	1981
First model year covered:	1968
Last model year covered:	2003
Vehicle types covered:	LDGV, LDGT12, LDGT34, HDGV
Type:	Decentralized
Frequency:	Annual
Compliance rate:	98%
Air pump disablement:	Yes
Catalyst removals:	Yes
Fuel inlet restrictor disablements:	Yes
Tailpipe lead deposit test:	No
EGR disablement:	Yes
Evaporative system disablement:	Yes
PCV disablement:	Yes
Missing gas cap:	Yes

FLEET MIX AND MILEAGE ACCUMULATION DATA

Fleet mix and mileage accumulation data by vehicle class for 2002 were not available for the non-attainment area. The MOBILE6 default values, determined from national averages, were selected for all model runs.

HIGH ALTITUDE

Washoe County is listed in the Federal Register[9] as a high altitude region for compliance with emission standards for motor vehicles. Therefore, Option Two was selected as the region descriptor in the Scenario Data section of the MOBILE6 input stream.

OXYGENATED FUELS PROGRAM

The MOBILE6 model is capable of calculating the effects of an oxygenated fuels program on CO emissions. Monitoring and survey activities by the AQMD have found compliance with the oxygenated fuels program to be extremely high. The 2002 oxygenated fuels program parameters indicate that the market share for ethanol was greater than 99 percent with all fuels being blended to 2.7 percent oxygen by weight.

AMBIENT TEMPERATURE AND REID VAPOR PRESSURE (RVP)

Seasonal temperature averages were obtained from the monthly Local Climatological Data (LCD) reports published by the National Oceanic and Atmospheric Administration for the Reno area during 2002. Carbon monoxide peak season temperatures were determined from the LCD reports for the months of November, December, and January, 2002.

The model requires input of gasoline volatility, measured as Reid Vapor Pressure (RVP). The two values required are the "base" or pre-controlled RVP level and the "controlled" RVP standard. Also included is the start year for in-use control. These values were obtained from the Federal Register[10]. The base and controlled RVP values for 2002 are the same value, as new RVP standards were implemented in 1992. Compliance with these federal standards has been monitored through samples taken by the Nevada Division of Agriculture, Division of Weights and Measures. Both local ambient temperatures and RVP by month are shown in Table 5-4.

TABLE 5-5
2002 TEMPERATURE[A] AND RVP[B] INPUTS FOR MOBILE6

	Maximum	Minimum	Average	RVP
January	45.5	23.2	34.4	15.0
February	54.4	27.3	40.9	15.0
March	56.3	29.0	42.7	13.5
April	65.7	38.2	52.0	13.5
May	73.9	42.7	58.3	9.0
June	86.9	53.0	70.0	7.8
July	95.7	61.1	78.4	7.8
August	89.9	55.0	72.5	7.8
September	83.2	49.5	66.4	9.0
October	68.6	36.5	52.6	10.0
November	56.6	29.6	43.1	13.5
December	48.1	26.8	37.5	15.0

[A] National Oceanic and Atmospheric Administration - Local Climatological Data for Reno, Nevada.

[B] RVP values represent both "Base" and "Controlled" levels as listed in 40 CFR 80.27 for this latitude.

MOBILE6 MODEL RESULTS

The model calculates vehicle emissions in grams of pollutant per mile by vehicle speed (facility type) and monthly conditions. This emission factor is then multiplied by the VMT for the given facility and month. The result is the total kilograms of pollutant for the month and specific facility type.

Facility Emission Factor (grams/mile) by month	**X**	Average Daily VMT (monthly)	**X**	Number of days in month	**=**	Total emissions by facility by month

Table 5-6 shows the resulting carbon monoxide emissions for the winter season in kilograms/day by facility type and vehicle class. Table 5-7 reports annual average CO emissions by vehicle class and facility type in tons/year.

TABLE 5-6
WINTER SEASON[A] CARBON MONOXIDE EMISSIONS (LBSDAY)
CARBON MONOXIDE NON-ATTAINMENT AREA

Vehicle Class	LOCAL	ATERIAL	FREEWAY	RAMPS	TOTAL
LDGV	11,499.66	64,582.52	53,957.87	7,236.95	137,277.01
LDGT12	10,095.97	55,693.89	46,118.66	5,708.30	117,616.83
LDGT34	4,694.98	24,539.62	19,832.77	2,328.65	51,396.02
HDGV	4,306.54	7,949.72	5,795.29	545.74	18,597.28
LDDV	3.55	10.18	6.96	0.70	21.39
LDDT	8.64	25.57	17.56	1.75	53.53
HDDV	2,114.74	3,984.07	2,529.28	273.70	8,901.78
MC	259.34	801.93	527.83	54.75	1,643.85
Total	**32,983.42**	**157,587.51**	**128,786.22**	**16,150.54**	**335,507.68**

a Winter season = Nov., Dec., Jan.

TABLE 5-7
ANNUAL AVERAGE CARBON MONOXIDE EMISSIONS (TONS)
CARBON MONOXIDE NON-ATTAINMENT AREA

Vehicle Class	LOCAL	COLLECTOR	INTERSTATE	RAMPS	TOTAL
LDGV	1,828.07	10,642.07	9,433.69	1,238.07	23,141.90
LDGT1	1,664.93	9,246.50	8,057.45	950.94	19,919.83
LDGT2	826.18	4,288.95	3,618.62	404.25	9,137.99
HDGV	912.81	1,684.99	1,277.37	115.67	3,990.84
LDDV	0.68	1.96	1.39	0.13	4.17
LDDT	1.64	4.86	3.47	0.33	10.31
HDDV	400.55	754.58	497.37	51.84	1,704.34
MC	56.65	171.97	117.21	11.74	357.56
Total	**5,691.51**	**26,795.89**	**23,006.58**	**2,772.99**	**58,266.95**