

WASHOE COUNTY, NEVADA

**2005 PERIODIC
EMISSIONS INVENTORY**

May 2007

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Environmental Protection Division

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Washoe County Department of Community Development

Washoe County Utilities Department

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SECTION 1

INTRODUCTION

This document presents the 2005 periodic State Implementation Plan (SIP) emissions inventory for ozone precursors, carbon monoxide, and particulate matter less than 10 microns in diameter for the Washoe County, Nevada Non-Attainment Area (NAA). The inventory documents emissions of volatile organic compounds (VOC), oxides of nitrogen (NO_x), carbon monoxide (CO), particulate matter less than 10 microns in diameter and less than 2.5 microns in diameter (PM₁₀ and PM_{2.5}), and ammonia (NH₃), wherever emission factors were available to calculate PM_{2.5} and NH₃ emissions. All stationary point, stationary area, on-road mobile, and non-road mobile sources, which were addressed in the 2002 periodic emissions inventory, were included in this inventory.

Washoe County is located in the northwestern portion of Nevada and is bordered by California on the west and Oregon to the north. Within Nevada, Washoe County is surrounded by Carson City, Storey, Lyon, Churchill, Pershing, and Humboldt Counties. The county encompasses a land area of 6,600 square miles.

Located in the southern portion of Washoe County is the Truckee Meadows NAA. The boundaries of this area are synonymous with the boundaries of the Hydrographic basin 87 as defined by the Nevada Division of Water Resources. The Truckee Meadows is comprised of three governmental units including the two incorporated cities, Reno and Sparks, and portions of unincorporated Washoe County. The Truckee Meadows is a NAA for CO and PM₁₀. See Figure 1-1 for a map outlining Washoe County and the Truckee Meadows hydrographic basin 87 within Washoe County.

In past years, Washoe County, and specifically the Truckee Meadows hydrographic basin, has exceeded the National Ambient Air Quality Standards (NAAQS) for CO, PM₁₀, and 1-hour ozone (O₃). Based on those exceedances, the Truckee Meadows hydrographic basin is considered non-attainment for CO and PM₁₀ and the whole Washoe County is considered non-attainment for the 1-hour O₃.

Washoe County was designated a Marginal 1-hour O₃ NAA until June 5, 1998, when the EPA revoked the 1-hour O₃ NAAQS for this area and reclassified Washoe County as an attainment area. On December 20, 2000, the EPA reinstated the 1-hour O₃ NAAQS because the proposed 8-hour NAAQS had been challenged in a U.S. Supreme Court case. On June 15, 2004, the EPA rescinded the 1-hour O₃ standard and the 8-hour standard became effective on June 15, 2005. However, Washoe County must still submit an 8-hour maintenance plan for the new 8-hour standard, although Washoe County is in attainment for the 8-hour standard.

Since Washoe County was technically non-attainment for 1-hour O₃ for 5 months of the 2005 emission inventory year, this emission inventory report was prepared for 1-hour O₃ NAA. Because of the regional nature of O₃, the boundary for the 1-hour O₃ NAA corresponded to the actual border of Washoe County that includes the CO/PM₁₀ NAA, Incline Village to the west, and unincorporated regions to the east. Washoe County has not exceeded the 1-hour O₃ NAAQS since February 25, 1990. It is not currently, nor has it historically, exceeded the 8-hour O₃ NAAQS.

The peak ozone season for this periodic inventory was determined as outlined in the EPA document, Emission Inventory Requirements for Ozone State Implementation Plans.¹ This document defines the peak season as the three-month period during which the highest ozone concentrations occur. Reviewing the data for 2003, 2004 and 2005, it was determined that the Truckee Meadows experiences elevated ozone concentrations during the summer months, therefore the months of June, July and August were chosen as the peak ozone season.

The CO NAA was classified as a moderate [< 12.7 ppm] NAA. The last exceedance of the CO NAAQS was recorded on December 13, 1991. The Washoe County Air Quality Management Division (WCAQMD) is in the final process of requesting CO redesignation to attainment status.

The Truckee Meadows CO season was determined by reviewing the ambient air quality data between 1988

and 2005. The consecutive three-month period with the highest measured CO levels was then determined for each year. In 1988 the data were incomplete, although the highest recorded ambient CO levels were during the months of November and December. For each year from 1989 to 2005 the highest CO concentrations occurred during the months of November, December, and January. Therefore, for this inventory the emissions from the months of November 2005, December 2005, and January 2005 constitute the peak season emissions.

The PM₁₀ NAA was originally designated as a Moderate NAA. However, according to the Clean Air Act Amendments (CAAA) of 1990, if a Moderate area did not attain both the 24-hour and annual PM₁₀ NAAQS by December 31, 1994, the area should be bumped up to the designation of Serious non-attainment. The ambient air quality for the Truckee Meadows did not meet the CAAA deadline. The EPA never acted by redesignating the Truckee Meadows up to a Serious PM₁₀ NAA because they realized that the regulations adopted for the Moderate State Implementation Plan were improving the air quality.

In 2000, environmental groups sued the EPA for in-action. Consequently, the Truckee Meadows was bumped up to a Serious PM₁₀ NAA effective February 7, 2001. To further support the bumping, the Truckee Meadows exceeded the 24-hour NAAQS on January 6, 1999 as well as the annual NAAQS for 1999.

The PM₁₀ season was determined by reviewing the ambient air quality data between 1989 and 2005. The consecutive three-month period with the highest measured PM₁₀ levels was then determined for each year. The data show that the majority of PM₁₀ exceedances occurred during the months of November, December and January each year. Based on this review, it is evident that the peak PM₁₀ season occurs during the winter months. See Table 1-1 for a description of each peak season.

The VOC, NO_x, CO, PM₁₀, PM_{2.5}, and NH₃ inventory described herein was the responsibility of the staff of the WCAQMD. However, a number of local agencies were instrumental in compiling the activity data. The Regional Transportation Commission of Washoe County ran all necessary transportation planning models to develop vehicle miles traveled (VMT), vehicle speeds, etc. The WCAQMD ran the MOBILE6 model to determine motor vehicle emission factors. Fire activity data was reported by the three local fire agencies: the City of Reno Fire Department, the City of Sparks Fire Department, and the North Lake Tahoe Fire Protection District. Aircraft Landing and Take-Off data was provided by the Airport Authority of Washoe County. Railroad activity data was provided by the Union Pacific Railroad. The Washoe County Department of Community Development provided demographic data such as population, number of housing units, etc.

**TABLE 1-1
PEAK SEASONS**

NAA	Peak Season
CO	November, December, January
PM ₁₀	November, December, January
O ₃	June, July, August

Specific responsibilities within the inventory process were assigned in the following manner:

Lauri Mendoza & Yann Ling Air Quality Management Division Washoe County District Health Department (775) 784-7200	Point Sources, Stationary Area Sources
Yann Ling Air Quality Management Division Washoe County District Health Department (775) 784-7200	Non-Road Mobile Sources
Daniel Inouye Air Quality Management Division Washoe County District Health Department (775) 784-7200	On-Road Mobile Sources
Regional Transportation Commission of Washoe County (775) 323-2800	VMT and Facility Speed Estimates

Demographic data characterizing the three major governmental units in Washoe County are presented in Table 1-2. These data will be used in subsequent sections to determine emissions from per capita emission factors. Tables 1-3 and 1-4 summarize the emissions from each section: Section 2 - Point Sources, Section 3 – Stationary Area Sources, Section 4 - Non-Road Mobile Sources, and Section 5 - On-Road Mobile Sources for Washoe County/O₃ NAA and CO/PM₁₀ NAA, respectively. Figures 1-2 through 1-5 provide a graphical representation of the annual and seasonal emissions summary for both Washoe County/O₃ NAA and CO/PM₁₀ NAA.

State of Nevada



FIGURE 1-1

**TABLE 1-2
2005 DEMOGRAPHIC DATA FOR THE WASHOE COUNTY NAA**

DEMOGRAPHIC PARAMETER	CITY OF RENO	CITY OF SPARKS	UNINCORPORATED AREA OF WASHOE COUNTY	WASHOE COUNTY TOTAL
Population	206,735	85,618	104,490	396,843
Land Area (square miles)	56	20	6,524	6,600
Number of Households	85,664	32,151	37,471	155,286
Ozone Season (Jun – Aug) Temperature Range (°F)	57.5 - 89.1	57.5 - 89.1	57.5 - 89.1	57.5 - 89.1
Mean Ozone Season Temperature (°F)	73.3	73.3	73.3	73.3
CO/PM ₁₀ Season (Jan, Nov – Dec) Temperature Range (°F)	28.2 - 47.3	28.2 - 47.3	28.2 - 47.3	28.2 - 47.3
Mean CO/PM ₁₀ Season Temperature (°F)	37.8	37.8	37.8	37.8

**TABLE 1-3
EMISSIONS SUMMARY FOR WASHOE COUNTY/O₃ NAA**

Source Category	WC/O ₃ NAA Annual Emissions (tpy)						O ₃ Season Em. (lbs/day)					
	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃
POINT SOURCES	530	16	65	23	5	4	3,193	88	447	152	34	39
BUFFER ZONE SOURCES	134	4,703	678	465	N/D	N/D	736	25,839	3,725	2,556	N/D	N/D
STATIONARY AREA SOURCES	6,425	1,279	5,434	17,291	2,720	N/D	19,302	3,732	4,019	121,943	7,985	N/D
NON-ROAD MOBILE SOURCES	3,873	4,365	40,296	307	292	N/D	26,998	27,794	321,876	2,088	1,989	N/D
ON-ROAD MOBILE SOURCES	4,892	10,145	80,677	174	160	418	26,046	58,409	524,521	968	890	2,287
TOTAL	15,854	20,506	127,151	18,260	3,178	422	76,275	115,862	854,588	127,707	10,898	2,326

Note: The numbers may not add due to rounding.

**TABLE 1-4
EMISSIONS SUMMARY FOR CO/PM₁₀ NAA**

Source Category	CO/PM ₁₀ NAA Annual Emissions (tpy)						CO/PM ₁₀ Season Em. (lbs/day)					
	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃
POINT SOURCES	530	16	65	23	5	4	3,193	88	447	152	34	39
STATIONARY AREA SOURCES	3,315	997	4,378	4,856	1,172	N/D	52,420	6,815	69,815	31,288	11,124	N/D
NON-ROAD MOBILE SOURCES	2,391	1,475	23,812	142	135	N/D	105,439	8,378	86,925	741	702	N/D
ON-ROAD MOBILE SOURCES	3,362	6,528	53,479	116	106	281	17,907	53,227	351,329	644	592	1,539
TOTAL	9,598	9,015	81,734	5,137	1,419	285	178,959	68,508	508,517	32,825	12,453	1,578

Note: The numbers may not add due to rounding.

2005 Total Annual Emissions (tpy) for Washoe County/O₃ NAA

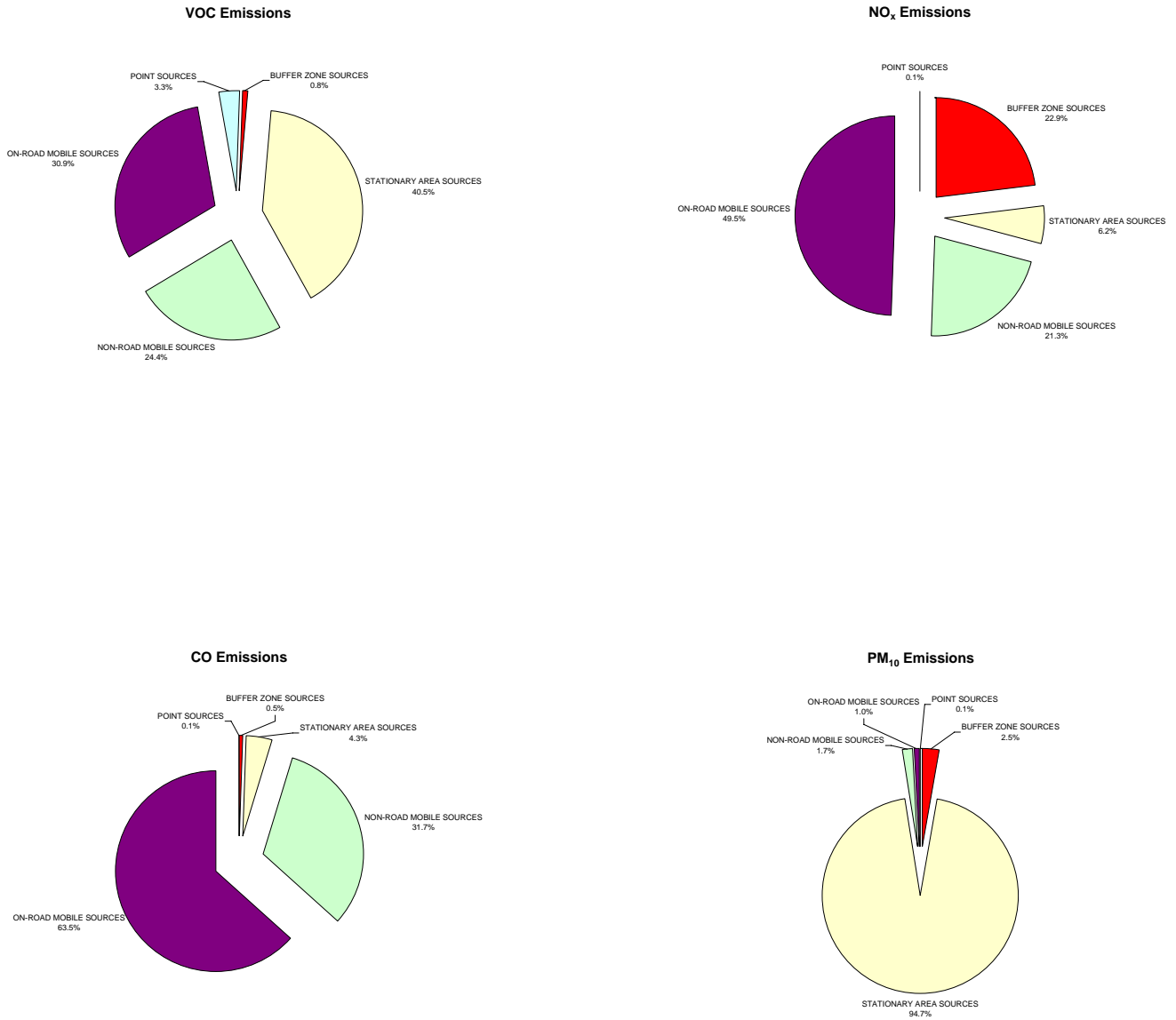


Figure 1-2

2005 Total Seasonal Emissions for Washoe County/O₃ NAA

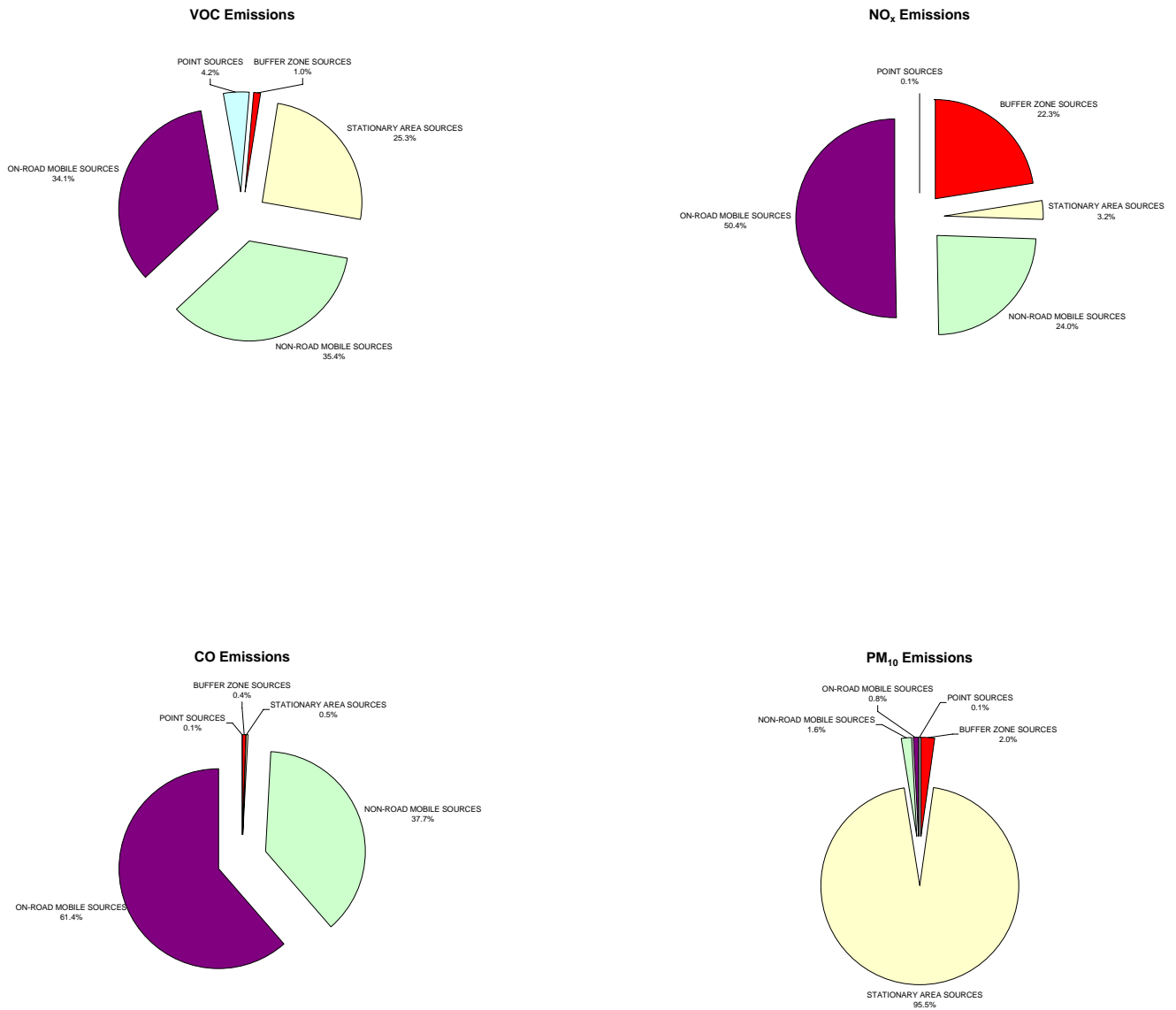


Figure 1-3

2005 Total Annual Emissions (tpy) for CO/PM₁₀ NAA

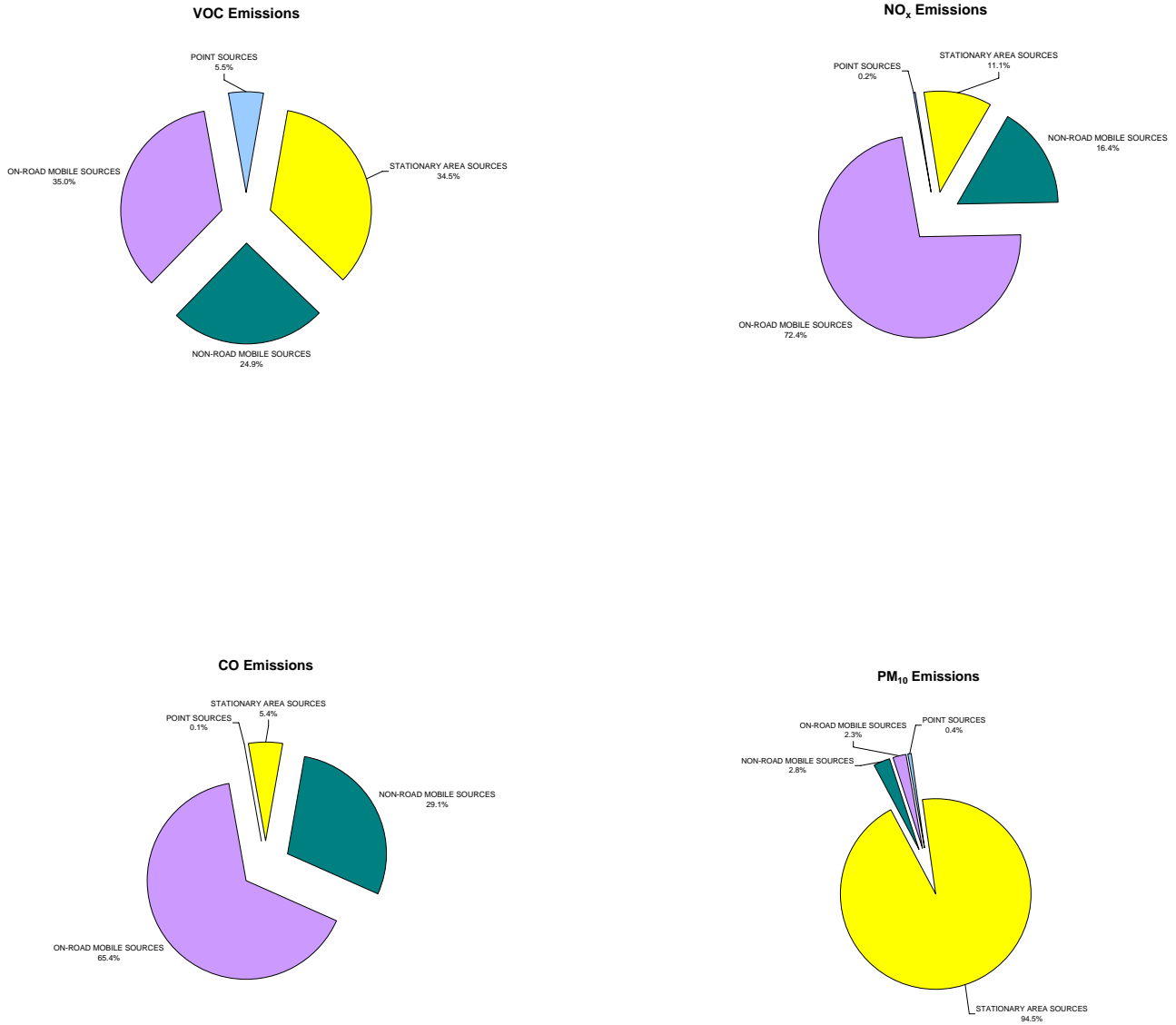


Figure 1-4

2005 Total Seasonal Emissions for CO/PM₁₀ NAA

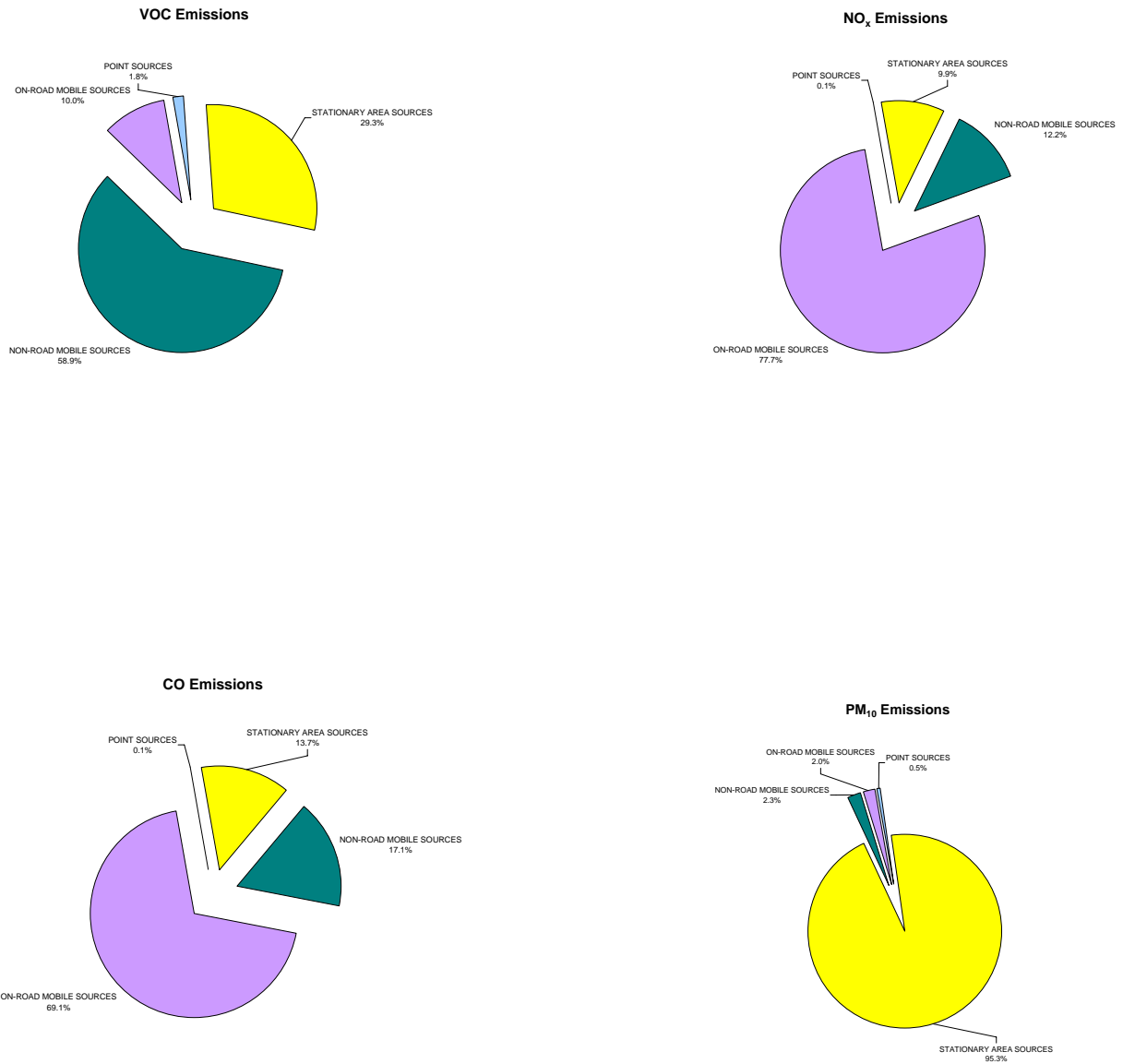


Figure 1-5

SECTION 2

POINT SOURCES

Point sources are those facilities for which individual source records are maintained in an emission inventory. For the purposes of the current inventory, EPA has designated 100 tons/year as the threshold for CO and NO_x point sources and 100 tons/year for PM₁₀ as the cutoff level for point sources in areas that are not serious PM₁₀ NAAs. The threshold for VOC point sources is 10 tons/year.² All sources above this threshold must be inventoried as individual point sources. Sources with emissions below these levels may also be treated as point sources if the responsible agency elects to do so.

Within Washoe County and the Truckee Meadows CO/PM₁₀ NAA, all point sources with criteria pollutant emissions in excess of two (2) pounds/day (0.37 tons/year) are tracked through the WCAQMD permitting database. The WCAQMD is confident that all of the larger sources of air pollutants within the County are registered by coordinating with the business license departments of Reno, Sparks, and Washoe County to review new business applications to ascertain if the business needs an air quality permit. Staff also conducts door-to-door surveys in industrial areas to ensure compliance with WCAQMD's permitting requirements.

A search of the WCAQMD database was performed to determine which sources should be inventoried as point sources. The complete list of the permitted general sources in Washoe County and their 2005 emissions of VOC, NO_x, CO, PM₁₀, PM_{2.5}, and NH₃ (where available) are included in Appendix A. Currently, the Truckee Meadows CO/PM₁₀ NAA has no single stationary source emitting greater than 100 tons/year of CO, PM₁₀, or PM_{2.5}. Therefore, all sources pertaining to the CO/PM₁₀ NAA examined for this inventory were treated as area sources. This includes small stationary sources such as commercial/institutional boilers. The aggregate activity level for these sources was treated as a single area source rather than numerous point sources.

There were 18 permitted sources (84 permits total) in Washoe County with VOC emissions which exceeded 10 tons/year in 2005, and no permitted sources exceeded 100 tons/year for either NO_x or CO. All these sources and their 2005 emissions were entered into the EPA National Emission Inventory (NEI) through the Central Data Exchange (CDX).

In addition to sources located in the Washoe County NAA, EPA guidance documents require inclusion of 100 tons/year of VOC, NO_x, or CO sources within 25 miles of the NAA boundary. It was determined that within the 25-mile buffer zone of the Washoe County O₃ maintenance area, there were two (2) such sources. Because the buffer-zone sources are out of Washoe County jurisdiction, staff contacted adjacent air agencies to determine if they had major sources in the buffer zone. The two sources that were identified were located in Nevada so emissions data were obtained from the Nevada Division of Environmental Protection (NDEP) Bureau of Air Quality (BAQ). Appendix A contains the NDEP list from which the emissions data for the buffer-zone sources were obtained.

A total of 18 point sources were included in this inventory. The complete list of those sources is given in Table 2-1. Annual emission estimates for the Washoe County permitted sources were derived using either material balance or AP-42.³ The method utilized for each point source is listed in Table 2-1. Rule effectiveness and control device efficiency was applied to annual emission calculations where appropriate. Seven (7) of the inventoried point sources met the Washoe County criteria for submittal of Emission Statements.

Seasonally adjusted emissions were determined after the seasonal adjustment factor (SAF) was calculated using the following equation:

$$SAF = \frac{(Peak\ O_3\ or\ CO / PM_{10}\ Season\ Activity)(12\ months)}{(Annual\ Activity)(Peak\ O_3\ or\ CO / PM_{10}\ Season\ Months = 3)}$$

Then peak season daily emissions were determined using the equation below:

$$E_s = \frac{E_A * SAF}{D * W_s}$$

where:

E_s	= Seasonally adjusted emissions (lbs/day)
E_A	= Annual emissions of VOC, NO _x , CO, PM ₁₀ , or PM _{2.5} (lbs/year)
SAF	= Seasonal adjustment factor
W_s	= Weeks of the year
D	= Days in operation per week (days/week)

Or more simply:

$$\text{Emission / Typical Day (lbs / day)} = \frac{(\text{Annual Emissions (lbs / year)}) * SAF}{(\# \text{ Activity Days per week}) * (52 \text{ weeks per year})}$$

For sources with temperature-dependent VOC emissions (e.g. on-road motor vehicles, organic liquid storage tanks), EPA models or AP-42 equations were used in conjunction with the temperature data given in Table 1-1 to calculate seasonal emissions when determined necessary.

The calculation methods utilized to obtain emission estimates are outlined in the Appendix. Utilization of control device efficiency and rule effectiveness is also demonstrated in the examples in the Appendix. Table 2-1 indicates which section of the Appendix pertains to each point source.

The actual annual and peak season emissions for each of the sources listed in Table 2-1 are given in Tables 2-2 and 2-3 for Washoe County/O₃ NAA and CO/PM₁₀ NAA, respectively. Sixteen of the 18 point sources are located within CO/PM₁₀ NAA. Figures 2-1 and 2-2 graphically summarize the annual and seasonal emissions for point sources in Washoe County.

Data for each of the Washoe County point sources listed in Table 2-1 was submitted to EPA National Emission Trend database. At a minimum, the data elements required for ozone emission inventory submittals were provided. The data was collected during the annual permit renewal processes or when a source was required to submit Emission Statement information.

**TABLE 2-1
EMISSION ESTIMATION PROCEDURE USED FOR POINT SOURCES**

PLANT NAME AND PERMIT NUMBERS	LOCATION	EMISSION ESTIMATION METHOD
ACH FOAM TECHNOLOGIES, LLC. (formerly Advanced Foams) – C01765A	902 Kleppe Lane, Sparks, NV 89431	Material Balance
AIRPORT AUTHORITY OF WASHOE COUNTY – A01-0131, A01359A, J01419A	Reno/Tahoe International Airport, Reno, NV 89502	Material Balance
ATLANTIS HOTEL CASINO – A01-0033, B5036R, F01787A	3800 S. Virginia St., Reno, NV 89502	Material Balance
DATA-FORMS, INC. – K01957A	1070 Matley Lane, Reno, NV 89502	Material Balance
DYNAMIC ISOLATION SYSTEMS – A01-0013, A01-0015	2080 Brierly Way #101, Sparks, NV 89434	Material Balance
GRANITE CONSTRUCTION/ LOCKWOOD – F01510A, F01610A, F02006A	Exit 21/22 Interstate 80 East, Lockwood	Material Balance
HOLLY DECORATIONS, INC. – A01470A	650 Lillard Drive, Sparks, NV 89431	Material Balance
INTERNATIONAL GAME TECHNOLOGY– A03-0052, K01163A, K01295A, K01337A	9295 Prototype Way, Reno, NV 89511	Material Balance & AP-42
MARTIN IRON WORKS – K00902A	530 East Fourth Street, Reno, NV 89512	Material Balance
MFG/RATECH, INC. (formerly Ratech, Inc.) – A03-0043	855 E. Greg St. #103, Sparks, NV 89431	Material Balance
R.R. DONNELLEY & SONS CO. – D65TV	14100 Lear Blvd., Reno, NV 89506	Material Balance & AP-42
RENAISSANCE MARK – F01189A	295 Lillard Dr., Sparks, NV 89431	Material Balance
RENO GAZETTE JOURNAL – A02-0006, C00774A, C01024A	955 Kuenzli, Reno, NV 89502	Material Balance
SFPP, L.P. – B01195A thru B01198A, B01200A thru B01206A, C01346A, C01404A, L00070A thru L00073A, L00075A thru L00082A, L00098A, L00465A, L00513A, L00538A, L00613A, L00614A, L00927A, L00933A, L00934A, L01345A, L01695A, L01746A, L01811A	301 Nugget Avenue, Sparks, NV 89431	AP-42 & EPA Tanks 4 Program
SHORE TERMINALS LLC – C01333A, K00508A thru K00510A, K00602A, K01215A thru K01217A	525 Nugget Avenue, Sparks, NV 89431	Material Balance
SIERRA PACKAGING & CONVERTING LLC (formerly Sierra Converting Corporation) – L01356A	1400 Kleppe Lane, Sparks, NV 89431	Material Balance
STEAMBOAT GEOTHERMAL – A01177A, A01440A, A90A, C01174A, C01897A	1010 Power Plant Drive, Reno, NV 89511	Material Balance
WESTERN ENERGETIX TERMINALS, LLC. – C01417A, K01021A, K01022A, K01023A, K01328A, K01329A, K01747A	147 Stanford Way, Sparks, NV 89431	AP-42 & EPA Tanks4 Program
Nevada Cement Company - Fernley Plant	Fernley, Nevada in Lyon County	NDEP BAQ
Sierra Pacific Power Co. - Tracy Generating Station	I-80 East, in Storey County	NDEP BAQ

**TABLE 2-2
WASHOE COUNTY/O3 NAA POINT SOURCE EMISSION SUMMARY**

Facility Name	VOC Emissions		NO _x Emissions		CO Emissions		PM ₁₀ Emissions		PM _{2.5} Emissions		NH ₃ Emissions	
	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day
Storage, Transportation & Marketing of VOL												
SFPP, L.P./Shore Terminals, LLC	75	430	0	0	0	0	0	0	0	0	0	0
Western Energetix Terminals, LLC*	17	98	0	0	0	0	0	0	0	0	0	0
Subtotal	92	528	0	0	0	0	0	0	0	0	0	0
Industrial Surface Coating												
Airport Authority of Washoe County	28	153	0	2	0	1	0	0	0	0	0	0
Holly Decorations, Inc.	4	22	0	0	0	0	0	0	0	0	0	0
International Game Technology	38	292	0	1	0	0	0	0	0	0	N/D	N/D
Martin Iron Works	13	97	0	0	0	0	0	0	0	0	0	0
Subtotal	82	564	1	3	0	1	0	0	0	0	0	0
Other Solvent Use												
Data-Forms, Inc.	15	112	0	0	0	0	0	0	0	0	0	0
R.R. Donnelly & Sons Co.	143	788	14	75	11	63	7	36	N/D	N/D	N/D	N/D
Renaissance Mark	32	191	0	0	0	0	0	0	0	0	0	0
Reno Gazette Journal	16	89	0	1	0	0	0	0	0	0	N/D	N/D
Sierra Packaging & Converting LLC	30	229	0	0	0	0	0	0	0	0	0	0
Subtotal	236	1,409	14	76	11	63	7	36	0	0	0	0
Misc. Sources												
ACH Foam Technologies, LLC	0	1	1	5	1	8	0	1	1	8	2	16
Atlantis Hotel Casino	5	26	0	2	5	25	1	7	0	0	0	0
Dynamic Isolation Systems	7	53	0	0	0	0	0	3	1	10	2	18
Granite Construction/Lockwood	12	88	24	173	48	350	14	105	3	20	N/D	N/D
MFG/Ratech, Inc.	13	99	0	0	0	0	0	0	0	0	0	0
Steamboat Geothermal	113	623	1	3	0	1	0	0	N/D	N/D	N/D	N/D
Subtotal	150	889	25	183	54	384	16	116	5	39	4	34
Total	560	3,391	40	262	65	447	23	152	5	39	4	34

* Rule Effectiveness applied

Note: The numbers may not add due to rounding.

**TABLE 2-3
CO/PM₁₀ NAA POINT SOURCE EMISSION SUMMARY**

Facility Name	VOC Emissions		NO _x Emissions		CO Emissions		PM ₁₀ Emissions		PM _{2.5} Emissions		NH ₃ Emissions	
	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day	tons/yr	lbs/day
Storage, Transportation & Marketing of VOL												
SFPP, L.P./Shore Terminals, LLC	75	430	0	0	0	0	0	0	0	0	0	0
Western Energetix Terminals, LLC*	17	98	0	0	0	0	0	0	0	0	0	0
Subtotal	92	528	0	0	0	0	0	0	0	0	0	0
Industrial Surface Coating												
Airport Authority of Washoe County	28	153	0	2	0	1	0	0	0	0	0	0
Holly Decorations, Inc.	4	22	0	0	0	0	0	0	0	0	0	0
International Game Technology	38	292	0	1	0	0	0	0	0	0	N/D	N/D
Martin Iron Works	13	97	0	0	0	0	0	0	0	0	0	0
Subtotal	82	564	1	3	0	1	0	0	0	0	0	0
Other Solvent Use												
Data-Forms, Inc.	15	112	0	0	0	0	0	0	0	0	0	0
Renaissance Mark	32	191	0	0	0	0	0	0	0	0	0	0
Reno Gazette Journal	16	89	0	1	0	0	0	0	0	0	N/D	N/D
Sierra Packaging & Converting LLC	30	229	0	0	0	0	0	0	0	0	0	0
Subtotal	93	621	0	1	0	0	0	0	0	0	0	0
Misc. Sources												
ACH Foam Technologies, LLC	0	1	1	5	1	8	0	1	1	8	2	16
Atlantis Hotel Casino	5	26	0	2	5	25	1	7	0	0	0	0
Dynamic Isolation Systems	7	53	0	0	0	0	0	3	1	10	2	18
MFG/Ratech, Inc.	13	99	0	0	0	0	0	0	0	0	0	0
Steamboat Geothermal	113	623	1	3	0	1	0	0	N/D	N/D	N/D	N/D
Subtotal	138	802	1	10	6	33	2	10	2	19	4	34
Total	405	2,515	2	13	6	34	2	11	3	19	4	34

* Rule Effectiveness applied

Note: The numbers may not add due to rounding.

Washoe County Point Sources Annual Emissions (tpy)



Figure 2-1

Washoe County Point Sources Seasonal Emissions (lbs/day)

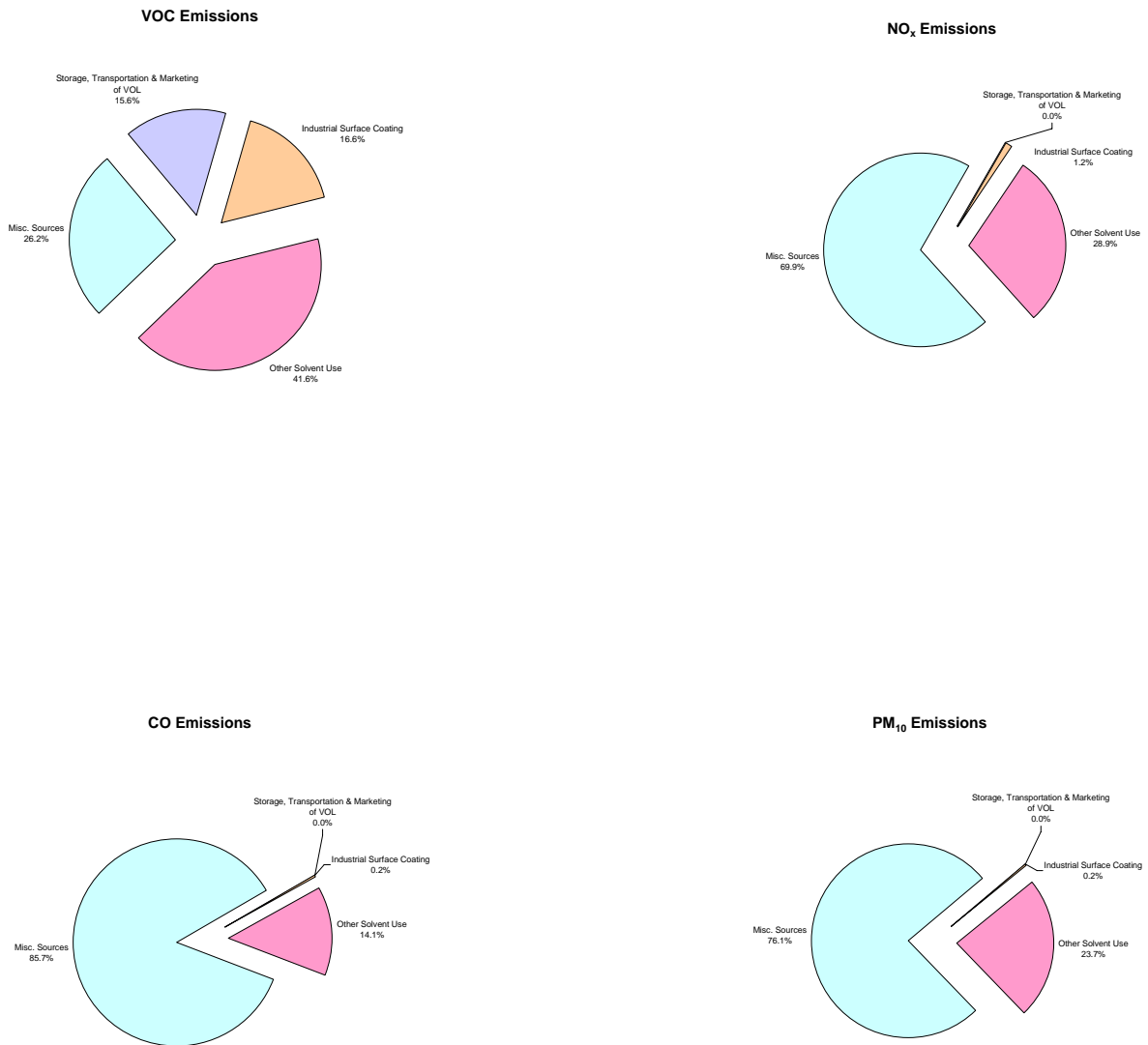


Figure 2-2

SECTION 3

STATIONARY AREA SOURCES

Area sources include all sources which are too small or too numerous to be treated individually as point sources. The majority of source categories considered for inclusion in this inventory were identified from Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Volume I: General Guidance for Stationary Sources (EPA-450/4-91-016).² The stationary area source categories that will be addressed in this inventory are shown in Table 3-1. Previous inventories have demonstrated that the contribution of these source categories is significant enough to warrant inclusion in this periodic inventory. All permitted sources with CO, NO_x, VOC, PM_{2.5}, PM₁₀, and NH₃ emissions are divided into one of the area source categories, unless these emissions were a result of fuel combustion (see Stationary Source Fuel Combustion). Mobile sources (both non-road and on-road) will be discussed in Sections 4 and 5, respectively.

For the O₃ NAA, those sources that were not included in the inventory were excluded for the following two reasons: 1) most commonly, the source category was excluded because review of the WCAQMD's permitting database and local agency data indicated these sources did not exist within Washoe County; 2) several sources were excluded because emission factors did not exist and activity data could not be obtained within a reasonable time frame. A source category was not excluded for this reason until it was determined that the source contribution would be insignificant.

For the CO/PM₁₀ NAA, the following source categories were not included in the inventory: slash burning, frost control, forest fires, electric utility fuel combustion, charcoal grilling, marine vessels, and aircraft engine testing. An activity was excluded from the inventory if it did not occur within the NAA/County or emissions are negligible.

Three approaches have been used to calculate area source emissions:

- per capita emission factors
- commodity consumption-related emission factors
- level-of-activity emission factors

The methodology used for each stationary area source is shown in Table 3-1. The emissions from most area sources were estimated using the emission factors from AP-42.³ Emissions from area sources which are not addressed in AP-42 were estimated using factors in the California Air Resources Board document Methods for Assessing Area Source Emissions in California⁴, the Procedures document referenced above, or documentation from AIRS Area and Mobile Source Subsystems (AMS). The reference document used to determine emission factors for each specific source is also listed in Table 3-1.

The activity/commodity level data for all point sources within Washoe County being considered aggregately as stationary area sources were taken from the WCAQMD's Permitting database. The Permitting database contains all point sources that emit at least two (2) pounds/day of the criteria pollutants (aggregate). Activity is reported to the WCAQMD on an annual basis as part of the permit renewal process. Activity data for area sources that are not contained within the permitting database, such as stationary source fuel combustion, residential wood use, fire data, and street sanding, were obtained from fuel providers, wood use survey, or local agencies. All small area stationary source categories and the sources of the activity/commodity data that were used to estimate emissions are also listed in Table 3-1.

The control efficiencies applied to stationary area source data were determined from the permitting database during permit renewal. Emission control efficiency data for a specific source were derived from source test data, mass balance calculations, engineering judgment, or AP-42. Details of annual emission calculations are either contained directly in the text or are illustrated by examples in Appendix A.

**TABLE 3-1
STATIONARY AREA SOURCE CATEGORIES**

Source Category	Emission Methodology ^a	Emission Factor Source ^b	Applicable NAA	Activity/Commodity Data Source
Stationary Fuel Combustion Sources (External and Internal)				
Industrial/Commercial Fuel Combustion	2	AP-42	CO/PM ₁₀ /O ₃	SPPCo & SWGas
Residential Fuel Combustion	2	AP-42	CO/PM ₁₀ /O ₃	SPPCo & SWGas
Residential Wood Combustion				
Fireplaces	2	AP-42	CO/PM ₁₀ /O ₃	Local Wood Use Survey
Woodstoves/Inserts - Certified	2	AP-42	CO/PM ₁₀ /O ₃	Local Wood Use Survey
Woodstoves/Inserts - Non-certified	2	AP-42	CO/PM ₁₀ /O ₃	Local Wood Use Survey
Pellet Stoves	2	AP-42	CO/PM ₁₀ /O ₃	Local Wood Use Survey
Industrial Processes				
Chemical Manufacturing	3	TANKS	CO/PM ₁₀ /O ₂	Permitting Database
Food & Kindred Products - Commercial Food Establishments	3	SCAQMD	CO/PM ₁₀ /O ₃	Permitting Database
Food & Kindred Products - Manufacturing	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database
Mineral Processes (Concrete, Gypsum, & Plaster Products)	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database
Rubber/Plastic Processes	3	AP-42/MB	CO/PM ₁₀ /O ₂	Permitting Database
Fabricated Metals	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database
Construction	3	AP-42/MRI	CO/PM ₁₀ /O ₃	Permitting Database
Machinery	3	AP-42	O ₃	Permitting Database
Mining and Quarrying	3	Various	CO/PM ₁₀ /O ₃	Permitting Database
Misc. Industrial Processes	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database
Solvent Utilization, Surface Coating				
Architectural Coatings	2/3	PROC	O ₃	Washoe County Community Development
Wood Furniture	3	AP-42/MB	O ₃	Permitting Database
Paper	3	AP-42/MB	PM ₁₀ /O ₃	Permitting Database
Plastic Products	3	AP-42/MB	O ₃	Permitting Database
Misc. Finished Metals	3	AP-42/MB	O ₃	Permitting Database
Machinery & Equipment	3	AP-42/MB	O ₃	Permitting Database
Electronic & other Other Electrical	3	AP-42/MB	O ₃	Permitting Database
Motor Vehicles	3	AP-42/MB	O ₃	Permitting Database
Misc. Manufacturing	3	AP-42/MB	O ₃	Permitting Database
Other Solvent Utilization				
Degreasing	3	MB	O ₃	Permitting Database
Dry Cleaning	3	MB	O ₃	Permitting Database
Graphic Arts	3	MB	O ₃	Permitting Database
Misc. Industrial Processes	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database
Misc. Non-Industrial Processes	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database
Consumer/Commercial Solvent Use	2	PROC	O ₃	Washoe County Community Development
Pesticide Application	2	MB	O ₃	Dept. of Agriculture
Emulsified/Cutback Asphalt Application	2	AMS	O ₃	Washoe County Community Development
Storage and Transport				
Organic Chemical Storage	3	AP-42/MB	O ₃	Permitting Database
Gasoline Service Station (UST & Stages I & II)	3	AP-42	O ₃	Permitting Database
Waste Disposal, Treatment, and Recovery				
Publicly Owned Treatment Works	3	PROC	CO/O ₃	Treatment Facilities
Commercial/Industrial Incineration	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database
Remediation/Reclamation/Recycle	3	Source Test/MB	O ₃	Permitting Database
Miscellaneous Area Sources				
Paved Roads, Fugitive	1	AP-42/ WCRSS	PM ₁₀	RTC / NDOT
Paved Roads, Sanding & Salting	2	AP-42	PM ₁₀	Local Road Depts.
Unpaved Roads, Fugitive	1	AP-42	PM ₁₀	RTC / NDOT
Wildfires	1	AP-42	CO/PM ₁₀ /O ₃	Fire Control Agencies
Structure Fires	1	MAASEC	CO/PM ₁₀ /O ₃	Fire Control Agencies
Automobile Fires	1	MAASEC	CO/PM ₁₀ /O ₃	Fire Control Agencies
Firefighting Training	1	AP-42	CO/PM ₁₀ /O ₃	Fire Control Agencies
Open/Permit Burning	1	AP-42	CO/PM ₁₀ /O ₃	Fire Control Agencies
Prescribed Burning	1	AP-42	CO/PM ₁₀ /O ₃	Fire Control Agencies
Refuse Fires	1	AP-42	CO/PM ₁₀ /O ₄	Fire Control Agencies
Automotive & Misc. Repair Shops	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database
Health Services, Hospitals	3	AP-42/MB	O ₃	Permitting Database
Health Services, Pathological Incineration	3	AP-42	CO/PM ₁₀ /O ₃	Permitting Database

^a 1 - commodity consumption-related emission factors
2 - per capita emission factors
3 - level-of-activity emission factors

^b The abbreviations used above refer to the following reference documents:

AP-42: Compilation of Air Pollutant Emission Factors (AP-42) Volume I, U.S. Environmental Protection Agency, Fifth Edition, 1995.³

WCRSS: Washoe County Road Silt Study, 1995.⁴

TANKS: U.S. EPA Windows-based computer software program for VOC and HAP emissions calculations from fixed- and floating-roof storage

tanks.⁵

SCAQMD: South Coast Air Quality Management District, Rule 1138, Control of Emissions from Restaurant Operations, adopted November 14, 1997.⁶

MB: Material balance (volatile content from MSDS, etc.)

MRI: Midwest Research Institute. Improvement of Specific Emission Factors (BACM Project No.1). March 29, 1996.⁷

AMS: Area and Mobile Sources Subsystem of AIRS, the Aerometric Information Retrieval System.

PROC: Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone, Volume I: General Guidance for Stationary Sources. U.S. EPA, May, 1991.²

MAASEC: Methods for Assessing Area Source Emissions in California. State of California Air Resources Board. September 1991.⁸

The examples demonstrate how the permitting database calculated the emissions for each type of permitted source. Following the examples for each source category is a list of the permit numbers from which the emissions were derived and then added together to obtain the total emissions for the category. Appendix A contains the list of all the general permitted sources within Washoe County. Any permit listed in Appendix A, which is not included in an area source category, was omitted because the source did not have any VOC, NO_x, CO, PM₁₀, or PM_{2.5} emissions, was outside of the CO/PM₁₀ NAA, or the emissions were excluded to avoid double counting the emissions.

Once annual emissions were determined, they were apportioned to the peak O₃ or CO/PM₁₀ seasons using the seasonal adjustment factors (SAF) listed in the EPA Procedures document.² Where an SAF was not listed for a given source category, it was calculated using the following equation²:

$$SAF = \frac{(Peak\ O_3\ or\ CO / PM_{10}\ Season\ Activity)(12\ months)}{(Annual\ Activity)(Peak\ O_3\ or\ CO / PM_{10}\ Season\ months = 3)}$$

Daily emissions can then be determined using the calculated SAF and the equation below:

$$Emission / Typical\ Day\ (lbs / day) = \frac{(Annual\ Emissions\ (lbs / year)) * SAF}{(\# Activity\ Days\ per\ week) * (52\ weeks\ per\ year)}$$

Table 3-2 summarizes the SAF and number of activity days used for each source category. The table also indicates whether the SAF listed was obtained from the reference document or derived using the above equations.

Stationary area sources were responsible for approximately 6,425 tons/year of VOC, 1,279 tons/year of NO_x, 5,434 tons/year of CO, 17,291 tons/year of PM₁₀, and 2,720 tons/year of PM_{2.5} in the Washoe County/O₃ NAA in 2005. Ozone season emissions totaled 19,302 lbs/day of VOC, 3,732 lbs/day of NO_x, 4,019 lbs/day of CO, 121,943 lbs/day of PM₁₀, and 7,985 lbs/day of PM_{2.5}. Emissions for these sources produced 3,315 tons/year of VOC, 997 tons/year of NO_x, 4,378 tons/year of CO, 4,856 tons/year of PM₁₀, and 1,172 tons/year of PM_{2.5} in the CO/PM₁₀ NAA. CO/PM₁₀ season emissions totaled 52,420 lbs/day of VOC, 6,815 lbs/day of NO_x, 69,815 lbs/day of CO, 31,288 lbs/day of PM₁₀, and 11,124 lbs/day of PM_{2.5}. See Tables 3-3 and 3-4 for a summary of stationary area source annual emissions, peak O₃ season, and peak CO/PM₁₀ season emissions. Figures 3-1 and 3-2 show the relative contribution of each pollutant to the total emissions in the Washoe County/O₃ NAA and the CO/PM₁₀ NAA, respectively. Figures 3-3 and 3-4 show the respective dominant seasonal pollutant, VOC for the Washoe County/O₃ NAA and CO for the CO/PM₁₀ NAA, respectively. The remainder of this section will describe in greater detail each area source category.

**TABLE 3-2
ESTIMATION PROCEDURES FOR STATIONARY AREA SOURCES**

Source Category	SAF Source	O ₃ Season	CO/PM ₁₀	Weekly Activity
		SAF	Season SAF	
Stationary Fuel Combustion Sources (External and Internal)				
Industrial/Commercial Fuel Combustion	CALC	0.47	1.14	6
Residential Fuel Combustion	CALC	0.37	1.05	7
Residential Wood Combustion				
Fireplaces	CALC	0	3.2	7
Woodstoves/Inserts - Certified	CALC	0	3.2	7
Woodstoves/Inserts - Non-certified	CALC	0	3.2	7
Pellet Stoves	CALC	0	3.2	7
Industrial Processes				
Chemical Manufacturing	CALC	1	1	5
Food & Kindred Products - Commercial Food Establishments	CALC	1	1	7
Food & Kindred Products - Manufacturing	CALC	1	1	5
Mineral Processes (Concrete, Gypsum, & Plaster Products)	CALC	1	1	5
Rubber/Plastic Processes	CALC	1	1	5
Fabricated Metals	CALC	1	1	5
Construction	CALC	1.33	0.4	5
Machinery	CALC	1	1	5
Mining and Quarrying	CALC	1	1	5
Misc. Industrial Processes	CALC	1	1	5
Solvent Utilization, Surface Coating				
Architectural Coatings	CALC	1.3	0	7
Wood Furniture	CALC	1	0	5
Paper	CALC	1	1	5
Plastic Products	CALC	1	0	5
Misc. Finished Metals	CALC	1	0	5
Machinery & Equipment	CALC	1	0	5
Electronic & other Other Electrical	CALC	1	0	5
Motor Vehicles	CALC	1	0	5
Misc. Manufacturing	CALC	1	0	5
Other Solvent Utilization				
Degreasing	CALC	1	0	6
Dry Cleaning	CALC	1	0	5
Graphic Arts	CALC	1	0	5
Misc. Industrial Processes	CALC	1	0	5
Misc. Non-Industrial Processes	CALC	1	0	5
Consumer/Commercial Solvent Use	CALC	1	0	7
Pesticide Application	CALC	1.33	0	7
Emulsified/Cutback Asphalt Application		1.33	0	5
Storage and Transport				
Organic Chemical Storage	CALC	1.08	0	7
Gasoline Service Station (UST & Stages I & II)	CALC	1.08	0	7
Waste Disposal, Treatment, and Recovery				
Publicly Owned Treatment Works	REF	0.9	1.04	7
Commercial/Industrial Incineration	REF	1	1	7
Remediation/Reclamation/Recycle	REF	1	1	7
Miscellaneous Area Sources				
Paved Roads, Fugitive	CALC	0	1	7
Paved Roads, Sanding & Salting	CALC	0	2.7	1
Unpaved Roads, Fugitive	CALC	0	1	7
Wildfires	CALC	varies	varies	7
Structure Fires	CALC	varies	varies	7
Automobile Fires	CALC	varies	varies	7
Firefighting Training	CALC	varies	varies	7
Open/Permit Burning	CALC	varies	varies	7
Prescribed Burning	CALC	1.14	0	7
Refuse Fires	CALC	varies	varies	7
Automotive & Misc. Repair Shops	CALC	1	1	7
Health Services, Hospitals	CALC	1	0	7
Health Services, Pathological Incineration	REF	1	1	7

Note: The abbreviations used above refer to the following references:

REF: Procedures for the Preparation of Emission Inventories for Carbon Monoxide and Precursors of Ozone - Volume I, Table 5.8-1, page 5-18.²

CALC: These values were calculated using the equations appearing in the text.

**TABLE 3-3
WASHOE COUNTY/O₃ NAA
STATIONARY AREA SOURCE EMISSIONS SUMMARY**

Source Category	Annual Emissions (tpy)					O ₃ Season Emissions (lbs/day)				
	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	VOC	NO _x	CO	PM ₁₀	PM _{2.5}
Stationary Fuel Combustion Sources (External and Internal)										
Industrial/Commercial Fuel Combustion	18	420	277	32	31	55	1,252	827	95	93
Residential Fuel Combustion	30	581	213	37	37	61	1,195	438	76	76
Category Total	48	1,001	490	69	68	116	2,447	1,265	171	169
Residential Wood Combustion										
Firesplaces	3,043	35	3,357	460	460	0	0	0	0	0
Woodstoves/Inserts - Certified	186	25	1,292	243	243	0	0	0	0	0
Woodstoves/Inserts - Non-certified	9	0	41	5	5	0	0	0	0	0
Pellet Stoves	0	35	199	21	21	0	0	0	0	0
Category Total	3,238	95	4,888	729	729	0	0	0	0	0
Industrial Processes										
Chemical Manufacturing	7	0	0	5	2	57	0	0	41	12
Food & Kindred Products - Commercial Food Establishments	84	6	46	25	0	464	33	254	138	0
Food & Kindred Products - Manufacturing	2	1	1	0	0	12	11	4	0	0
Mineral Processes (Concrete, Gypsum, & Plaster Products)	2	33	26	21	N/D	16	251	200	165	N/D
Rubber/Plastic Processes	7	0	0	27	N/D	54	0	0	208	N/D
Fabricated Metals	12	0	0	4	N/D	119	5	2	44	N/D
Construction	11	32	40	3,128	605	147	441	540	42,673	N/D
Machinery	0	0	0	0	0	4	0	0	0	0
Mining and Quarrying	3	19	6	47	N/D	26	194	58	478	N/D
Misc. Industrial Processes	0	0	0	9	N/D	5	0	0	87	N/D
Category Total	128	92	118	3,267	606	903	935	1,058	43,834	12
Solvent Utilization, Surface Coating										
Architectural Coatings	913	0	0	0	0	6,522	0	0	0	0
Wood Furniture	3	0	0	0	0	26	0	0	0	0
Paper	3	0	0	0	N/D	26	0	0	0	N/D
Plastic Products	2	0	0	0	0	14	0	0	0	0
Misc. Finished Metals	15	0	0	0	0	112	0	0	0	0
Machinery & Equipment	7	0	0	0	0	57	0	0	0	0
Electronic & Other Electrical	2	0	0	0	0	18	0	0	0	0
Motor Vehicles	0	0	0	0	0	0	0	0	0	0
Misc. Manufacturing	1	0	0	0	0	4	0	0	0	0
Category Total	946	0	0	0	0	6,775	0	0	0	0
Other Solvent Utilization										
Degreasing	2	0	0	0	0	14	0	0	0	0
Dry Cleaning	23	0	0	0	0	174	0	0	0	0
Graphic Arts	33	0	0	0	0	253	0	0	0	0
Misc. Industrial Processes	2	0	0	0	0	17	0	0	0	0
Misc. Non-Industrial Processes	138	0	0	0	0	1,062	0	0	0	0
Consumer/Commercial Solvent Use	1,250	0	0	0	0	6,868	0	0	0	0
Pesticide Application	7	0	0	0	0	51	0	0	0	0
Emulsified/Cutback Asphalt Application	74	0	0	0	0	9	0	0	0	0
Category Total	1,529	0	0	0	0	8,448	0	0	0	0
Storage and Transport										
Organic Chemical Storage	4	0	0	0	0	22	0	0	0	0
Gasoline Service Station (UST & Stages I & II)	312	0	0	0	0	1,854	0	0	0	0
Category Total	316	0	0	0	0	1,876	0	0	0	0
Waste Disposal, Treatment, and Recovery										
Publicly Owned Treatment Works	84	0	0	0	0	414	0	0	0	0
Commercial/Industrial Incineration	0	0	0	0	0	0	0	0	0	0
Remediation/Reclamation/Recycle	96	23	4	12	N/D	526	129	20	66	N/D
Category Total	180	23	4	12	0	941	129	20	67	0
Miscellaneous Area Sources										
Paved Roads, Fugitive	0	0	0	2,952	275	0	0	0	16,502	1,536
Paved Roads, Sanding & Salting	0	0	0	17	1	0	0	0	0	0
Unpaved Roads, Fugitive	0	0	0	10,214	1,018	0	0	0	61,152	6,096
Wildfires	9	2	69	7	6	66	15	511	50	44
Structure Fires	3	1	54	3	3	29	11	472	30	28
Automobile Fires	1	0	3	3	2	6	1	24	19	18
Firefighting Training	0	0	0	0	0	0	0	0	0	0
Open/Permit Burning	1	0	27	4	4	11	0	261	38	34
Prescribed Burning	4	0	55	8	7	23	0	347	51	45
Refuse Fires	1	0	3	1	1	8	2	21	4	4
Automotive & Misc. Repair Shops	0	0	0	0	N/D	0	0	0	2	N/D
Health Services, Hospitals	15	0	0	0	0	85	0	0	0	0
Health Services, Pathological Incineration	0	1	0	2	0	1	4	0	11	0
Category Total	35	4	212	13,210	1,317	229	32	1,636	77,858	7,804
Total - All Stationary Area Sources	6,420	1,215	5,712	17,286	2,720	19,287	3,543	3,978	121,929	7,985

Note: The numbers may not add due to rounding.

**TABLE 3-4
CO/PM₁₀ NAA
STATIONARY AREA SOURCE EMISSIONS SUMMARY**

Source Category	Annual Emissions (tpy)					CO/PM ₁₀ Season Emissions (lbs/day)				
	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	VOC	NO _x	CO	PM ₁₀	PM _{2.5}
Stationary Fuel Combustion Sources (External and Internal)										
Industrial/Commercial Fuel Combustion	16	343	238	27	26	115	2,507	1,740	196	193
Residential Fuel Combustion	21	403	152	26	26	121	2,315	872	150	150
Category Total	37	746	390	53	52	236	4,823	2,612	346	342
Residential Wood Combustion										
Firesplaces	2,718	31	2,998	411	411	47,794	543	52,719	7,221	7,221
Woodstoves/Inserts - Certified	96	13	669	126	126	1,690	225	11,762	2,208	2,208
Woodstoves/Inserts - Non-certified	7	0	29	4	4	118	6	516	68	68
Pellet Stoves	0	26	74	8	8	0	458	1,307	139	139
Category Total	2,821	70	3,771	548	548	49,602	1,232	66,304	9,637	9,637
Industrial Processes										
Chemical Manufacturing	7	0	0	5	N/D	57	0	0	41	N/D
Food & Kindred Products - Commercial Food Establishments	79	4	46	44	5	437	24	254	241	27
Food & Kindred Products - Manufacturing	2	1	1	0	0	12	11	4	2	0
Mineral Processes (Concrete, Gypsum, & Plaster Products)	2	33	26	21	N/D	16	251	200	165	N/D
Rubber/Plastic Processes	7	0	0	27	N/D	54	0	0	208	N/D
Fabricated Metals	12	0	0	4	N/D	119	5	2	44	N/D
Construction	11	32	40	1,958	362	44	133	162	8,032	N/D
Machinery	0	0	0	0	N/D	4	0	0	0	N/D
Mining and Quarrying	3	19	6	47	N/D	26	194	58	478	N/D
Misc. Industrial Processes	0	0	0	9	N/D	5	0	0	87	N/D
Category Total	123	90	118	2,115	367	772	618	680	9,298	27
Solvent Utilization, Surface Coating										
Architectural Coatings	913	0	0	0	0	6,522	0	0	0	0
Wood Furniture	3	0	0	0	0	26	0	0	0	0
Paper	3	0	0	0	N/D	26	0	0	0	N/D
Plastic Products	2	0	0	0	0	14	0	0	0	0
Misc. Finished Metals	15	0	0	0	0	112	0	0	0	0
Machinery & Equipment	7	0	0	0	0	57	0	0	0	0
Electronic & Other Electrical	2	0	0	0	0	18	0	0	0	0
Motor Vehicles	0	0	0	0	0	0	0	0	0	0
Misc. Manufacturing	1	0	0	0	0	4	0	0	0	0
Category Total	947	0	0	0	0	6,779	0	0	0	0
Other Solvent Utilization										
Degreasing	2	0	0	0	0	14	0	0	0	0
Dry Cleaning	23	0	0	0	0	174	0	0	0	0
Graphic Arts	33	0	0	0	0	253	0	0	0	0
Misc. Industrial Processes	2	0	0	0	0	17	0	0	0	0
Misc. Non-Industrial Processes	138	0	0	0	0	1,062	0	0	0	0
Consumer/Commercial Solvent Use	1,250	0	0	0	0	6,868	0	0	0	0
Pesticide Application	7	0	0	0	0	51	0	0	0	0
Emulsified/Cutback Asphalt Application	74	0	0	0	0	9	0	0	0	0
Category Total	1,529	0	0	0	0	8,448	0	0	0	0
Storage and Transport										
Organic Chemical Storage	4	0	0	0	0	22	0	0	0	0
Gasoline Service Station (UST & Stages I & II)	312	0	0	0	0	1,854	0	0	0	0
Category Total	316	0	0	0	0	1,876	0	0	0	0
Waste Disposal/Treatment/Recovery										
Publicly Owned Treatment Works	84	0	0	0	0	479	0	0	0	0
Commercial/Industrial Incineration	0	1	0	1	N/D	0	4	0	5	N/D
Remediation/Reclamation/Recycle	95	23	4	12	N/D	523	129	20	66	N/D
Category Total	179	24	4	13	0	1,002	133	20	72	0
Miscellaneous Area Sources										
Paved Roads, Fugitive	0	0	0	1,957	181	0	0	0	10,415	964
Paved Roads, Sanding & Salting	0	0	0	8	1	0	0	0	786	63
Unpaved Roads, Fugitive	0	0	0	147	15	0	0	0	699	70
Wildfires	4	1	34	3	3	13	3	103	10	9
Structure Fires	2	1	36	2	2	5	2	77	5	5
Automobile Fires	1	0	2	2	2	2	0	7	5	5
Firefighting Training	0	0	0	0	0	0	0	0	0	0
Open/Permit Burning	0	0	10	1	1	0	0	10	2	1
Prescribed Burning	0	0	0	0	0	0	0	0	0	0
Refuse Fires	1	0	0	0	0	2	0	1	1	1
Automotive & Misc. Repair Shops	138	0	0	0	0	759	0	0	0	N/D
Health Services, Hospitals	15	0	0	0	0	85	0	0	0	0
Health Services, Pathological Incineration	0	1	0	2	N/D	1	4	0	11	N/D
Category Total	162	3	82	2,123	205	867	9	199	11,934	1,118
Total - All Stationary Area Sources	4,269	933	4,365	4,852	1,172	59,258	6,815	69,815	31,288	11,124

Note: The numbers may not add due to rounding.

Stationary Area Sources Annual Emissions (tpy) for Washoe County/O₃ NAA

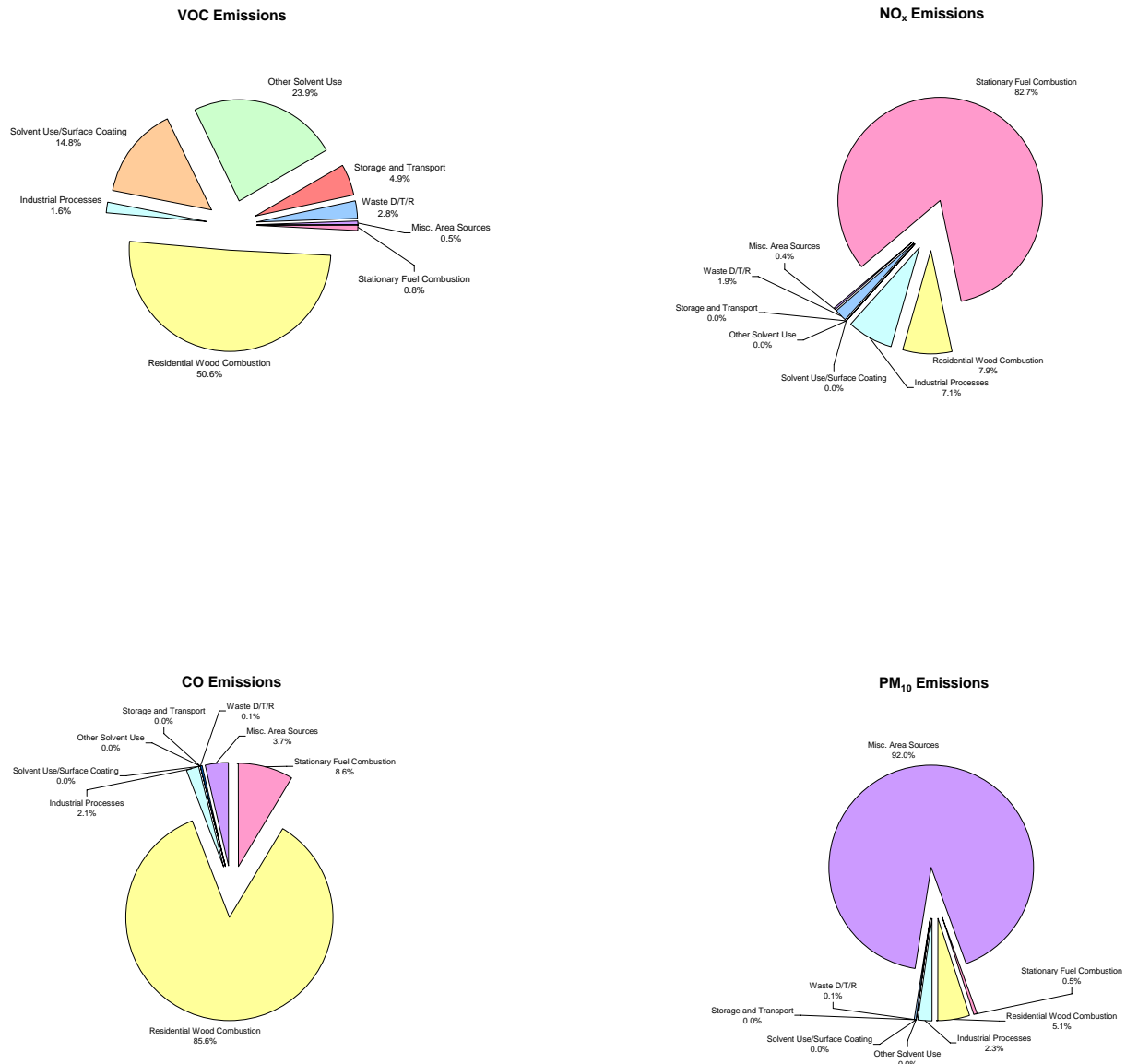


Figure 3-1

Stationary Area Sources O₃ Season Emissions (lbs/day) for Washoe County/O₃ NAA

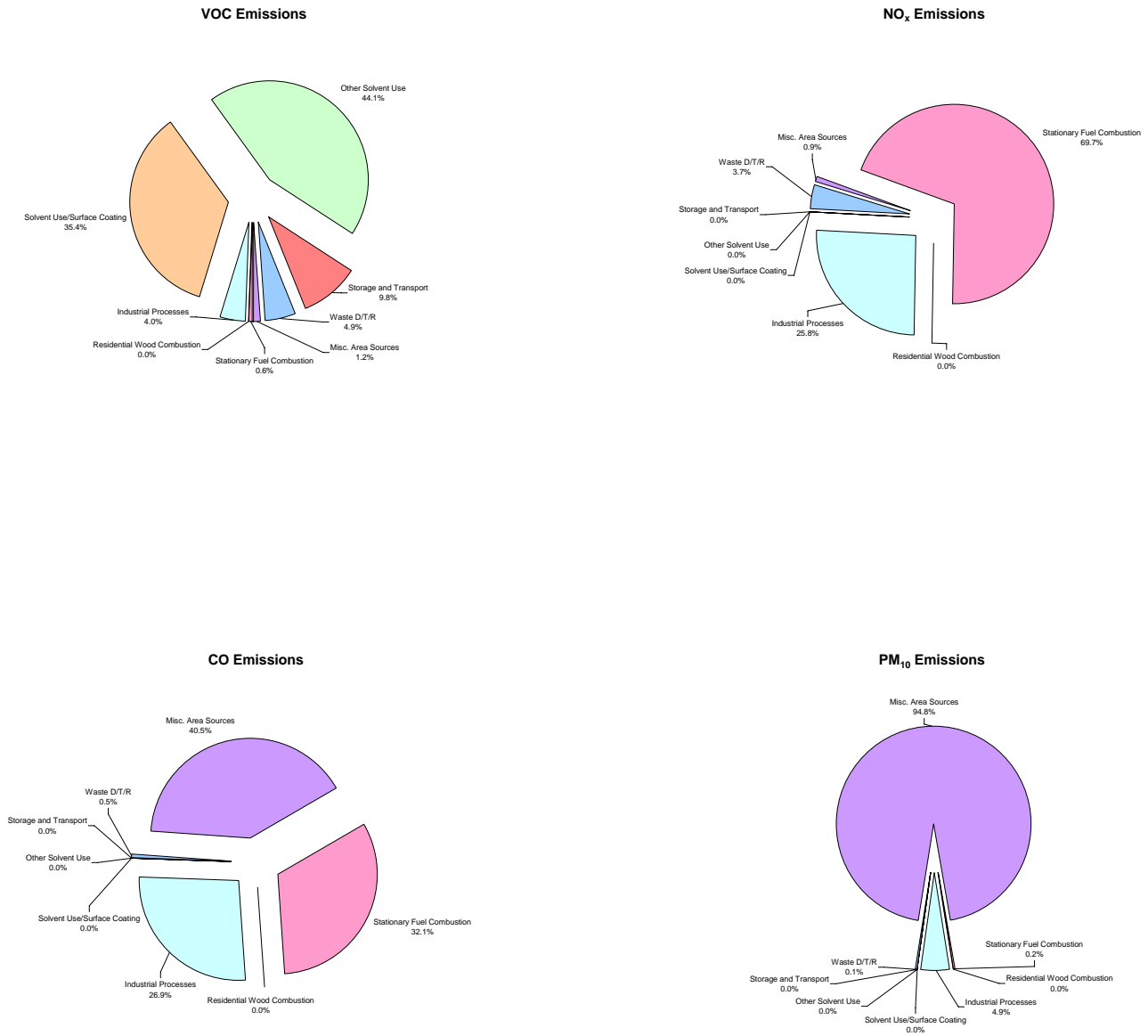


Figure 3-2

Stationary Area Sources Annual Emissions (tpy) for CO/PM₁₀ NAA

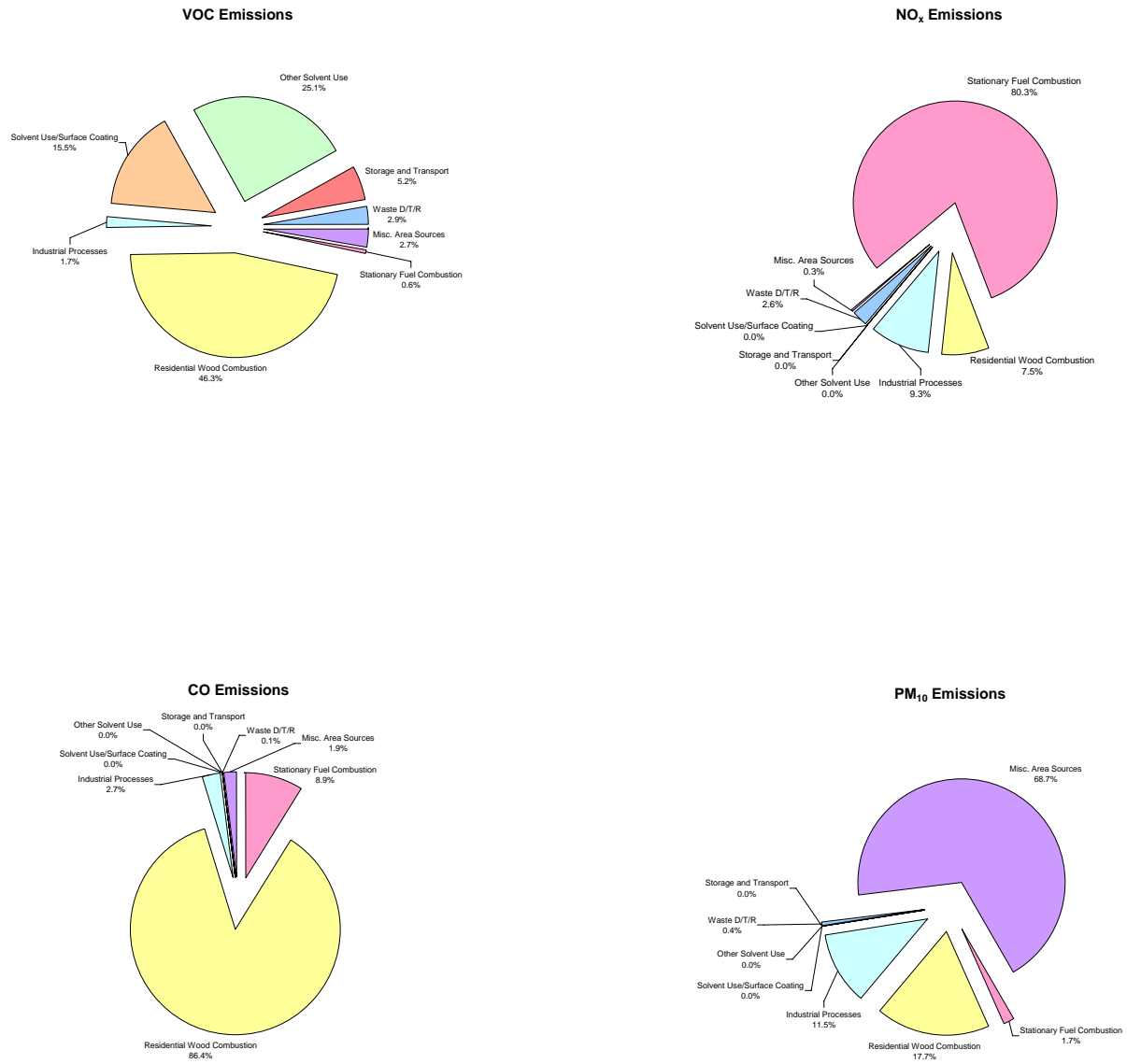


Figure 3-3

Stationary Area Sources CO/PM₁₀ Season Emissions (lbs/day) for CO/PM₁₀ NAA

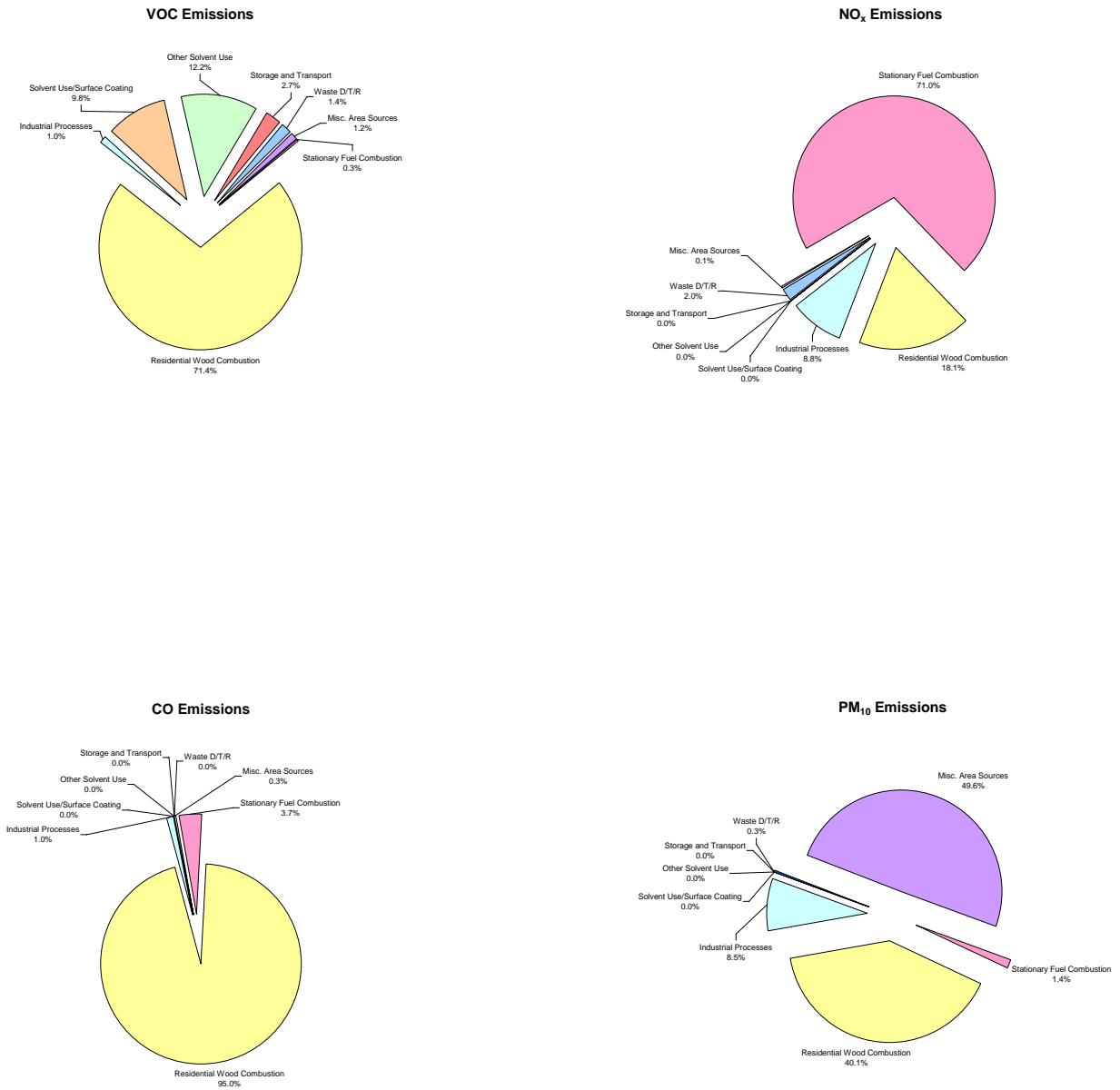


Figure 3-4

STATIONARY SOURCE FUEL COMBUSTION

Please see Tables 3-3 and 3-4 for pollutant specific emissions for stationary source fuel combustion in Washoe County/O₃ NAA and within the CO/PM₁₀ NAA for 2005. Emissions for this source category were subdivided into two classes:

- Industrial/Commercial
- Residential

Natural gas, fuel oil, and LPG consumption were determined through questionnaires sent to the local utility and each fuel distributor in the area. Fuel oil sales data collected from the distributors was incomplete in the 2002 emissions inventory year due to a major fuel oil distributor's sales not recorded as to sales within the county, the NAA or outside the county. Therefore, it is decided that subsequent emission inventory year fuel oil data to be estimated based on the percent population increase as determined by the Washoe County Department of Comprehensive Planning Consensus Forecast from 1996 to 2015. Likewise, since incomplete data of total LPG sales was available from the distributors, its usage was also calculated based on the same percent population increase as stated in this paragraph above.

Emissions for the industrial/commercial class were determined from consumption data from the local utility and distributors even though the AQMD permitting database contains data on many of those sources. It was decided that since the database only track sources with emissions greater than 2 lbs/day, many of the small commercial units would be missed. Therefore, in order to avoid double counting, any permit in AQMD's permitting database that covered commercial external combustion was excluded. A few of the permitted industrial external combustion units are included in the county-wide total because they use fuel oil number 5 or 6 and staff did not get consumption data for those fuels because they cannot be burned within the PM₁₀/CO NAA.

AP-42 emission factors were used to determine emissions.³ Tables 3-5 and 3-6 summarize the fuel combustion data and emissions for this source category in the Washoe County/O₃ NAA and PM₁₀/CO NAA, respectively. The emissions listed in the tables are given as both annual emissions (tons/year) and typical daily peak season emissions (lbs/day). The peak season emissions were determined using the equations listed at the beginning of this Section and the seasonal adjustment factors and number of activity days listed in Table 3-2.

**TABLE 3-5
SUMMARY OF WASHOE COUNTY/O₃ NAA FUEL COMBUSTION EMISSIONS**

Source Type	O ₃ NAA (County) Activity Level	Unit	VOC Emissions		NO _x Emissions		CO Emissions		PM ₁₀ Emissions		PM _{2.5} Emissions	
			Tons/yr	lbs/O ₃ day	Tons/yr	lbs/O ₃ day	Tons/yr	lbs/O ₃ day	Tons/yr	lbs/O ₃ day	Tons/yr	lbs/O ₃ day
Industrial/Commercial												
Natural Gas	5,963,225,827.4	scf	16	49	298	890	250	747	23	68	23	68
Distillate Fuel Oil	7,682,100.9	gal	1	4	77	229	19	57	8	23	7	21
LPG	4,691,260.8	gal	1	2	45	133	8	22	1	4	1	4
Subtotal			18	55	420	1252	277	827	32	95	31	93
Residential												
Natural Gas	8,571,399,189.9	scf	24	48	403	829	171	353	33	67	33	67
Distillate Fuel Oil	13,567,518.4	gal	5	10	122	251	34	70	3	6	3	5
LPG	8,007,241.8	gal	1	2	56	115	8	16	2	3	2	3
Subtotal			30	61	581	1195	213	438	37	76	37	76
Total	--	--	48	116	1001	2447	490	1265	69	171	68	169

Note: The numbers may not add due to rounding.

**TABLE 3-6
SUMMARY OF CO/PM₁₀ NAA FUEL COMBUSTION EMISSIONS**

Source Type	CO/PM ₁₀ NAA Activity Level	Unit	VOC Emissions		NO _x Emissions		CO Emissions		PM ₁₀ Emissions		PM _{2.5} Emissions	
			Tons/yr	lbs/CO-PM ₁₀ day	Tons/yr	lbs/CO-PM ₁₀ day	Tons/yr	lbs/CO-PM ₁₀ day	Tons/yr	lbs/CO-PM ₁₀ day	Tons/yr	lbs/CO-PM ₁₀ day
Industrial/Commercial												
Natural Gas	5,217,291,469	scf	14	105	261	1,906	219	1,601	20	145	20	145
Distillate Fuel Oil	6,354,705	gal	1	8	64	464	16	116	6	46	6	44
LPG	1,970,330	gal	0	2	19	137	3	23	1	4	1	4
Subtotal			16	115	343	2,507	238	1,740	27	196	26	193
Residential												
Natural Gas	6,192,157,971	scf	17	98	291	1,673	124	712	24	135	24	135
Distillate Fuel Oil	9,925,140	gal	4	20	89	513	25	143	2	11	2	11
LPG	3,202,897	gal	0	3	22	129	3	17	1	4	1	4
Subtotal			21	121	403	2,315	152	872	26	150	26	150
Total	-	-	37	236	746	4,823	390	2,612	53	346	52	342

Note: The numbers may not add due to rounding.

RESIDENTIAL WOOD/SOLID FUEL COMBUSTION

Please see Tables 3-3 and 3-4 for pollutant specific emissions for residential wood/solid fuel combustion in Washoe County/O₃ NAA and within the CO/PM₁₀ NAA for 2005. Emission sources in this category were subdivided into four classes:

- Fireplaces
- Woodstoves/Inserts – Certified
- Woodstoves/Inserts – Non-Certified
- Pellet Stoves

The relative contribution of each source class is shown in Figure 3-2. Emissions were determined using activity data compiled from a wood use survey/study conducted by WCAQMD for 2005-2006 season. Appendix A contains a copy of the latest 2005-2006 survey results and a report the WCAQMD completed comparing the surveys and their results. The WCAQMD hired a local marketing and survey company to administer the survey on a random sample of households within Washoe County. This survey provided the activity data for 2005 emission inventory as listed in Tables 3-7 and 3-8 for Washoe County/O₃ NAA and PM₁₀/CO NAA, respectively.

TABLE 3-7
RESIDENTIAL WOOD/SOLID FUEL COMBUSTION ACTIVITY DATA FOR WASHOE COUNTY/O₃ NAA

Type of Device	Average cords or tons used per Device	# of Units Used	Total # of Cords or Tons Used	Average Weight of Wood (lbs./cord)	Total Lbs. of Wood/Yr.
Fireplaces	0.88	20,858	18,355	2,896	26,578
Woodstoves/Inserts					
Certified	1.74	9,823	17,092	2,896	24,749
Uncertified	0.60	404	242	2,896	351
Wood Totals			35,689		51,678
Pellet Stoves	2.14	4,710	10,079	-	-

TABLE 3-8
RESIDENTIAL WOOD/SOLID FUEL COMBUSTION ACTIVITY DATA FOR CO/PM₁₀ NAA

Type of Device	Average cords or tons used per Device	# of Units Used	Total # of Cords or Tons Used	Average Weight of Wood (lbs./cord)	Total tons of Wood/Yr.
Fireplaces	0.88	18,631	16,395	2,896	23,740
Woodstoves/Inserts					
Certified	1.49	5,940	8,851	2,896	12,816
Uncertified	0.65	270	176	2,896	254
Wood Totals			25,421		36,810
Pellet Stoves	2.15	1,755	3,773	-	-

Using 2,896 lbs per cord as the average weight for wood and the emission factors from AP-42, 5th Edition, the emissions are estimated in Tables 3-9 and 3-10.

**TABLE 3-9
SUMMARY OF WASHOE COUNTY/O₃ NAA EMISSIONS FOR RESIDENTIAL WOOD/SOLID FUEL COMBUSTION**

Type of Device	Total tons of wood or pellets/yr.	Emission Factors (lbs./ton)					Emissions (tons/yr.)				
		PM ₁₀	PM _{2.5}	CO	NO _x	VOC	PM ₁₀	PM _{2.5}	CO	NO _x	VOC
Fireplaces	26,578	34.6	34.6	252.6	2.6	229	460	460	3,357	35	3,043
Woodstoves/Inserts											
Certified	24,749	19.6	19.6	104.4	2	15	243	243	1,292	25	186
Uncertified	351	30.6	30.6	230.8	2.8	53	5	5	41	0	9
Total Woodstoves/Inserts							248	248	1,332	25	195
Pellet Stoves	10,079	4.2	4.2	39.4	7	0*	21	21	199	35	0
Total Fireplaces + Woodstoves + Pellets (tons/yr.)							729	729	4,888	95	3,238

*No data.

**TABLE 3-10
SUMMARY OF CO/PM₁₀ NAA EMISSIONS FOR RESIDENTIAL WOOD/SOLID FUEL COMBUSTION**

Type of Device	Total tons of wood or pellets/yr.	Emission Factors (lbs./ton)					Emissions (tons/yr.)				
		PM ₁₀	PM _{2.5}	CO	NO _x	VOC	PM ₁₀	PM _{2.5}	CO	NO _x	VOC
Fireplaces	23,740	34.6	34.6	252.6	2.6	229	411	411	2,998	31	2,718
Woodstoves/Inserts											
Certified	12,816	19.6	19.6	104.4	2	15	126	126	669	13	96
Uncertified	254	30.6	30.6	230.8	2.8	53	4	4	29	0	7
Total Woodstoves/Inserts							129	129	698	13	103
Pellet Stoves	3,773	4.2	4.2	39.4	13.8	0*	8	8	74	26	0
Total Fireplaces + Woodstoves + Pellets (tons/yr.)							548	548	3,771	70	2,821

*No data.

The seasonal adjustment factor was calculated assuming 80% of the annual activity for this source category occurs during the peak CO/PM₁₀ season. The number of days a week each device type was used was derived from data collected from the 2005-2006 AQMD survey (see Appendix A).

INDUSTRIAL PROCESSES

Industrial processes was subdivided into the following classes:

- Chemical Manufacturing
- Food & Kindred Products – Commercial Food Establishments
- Food & Kindred Products – Manufacturing
- Mineral Processes (Concrete, Gypsum, Plaster Products)
- Rubber/Plastic Processes
- Fabricated Metals
- Construction
- Machinery
- Mining and Quarrying
- Misc. Industrial Process

Please see Tables 3-3 and 3-4 for pollutant specific emissions for industrial processes in Washoe County/O₃ NAA and within the CO/PM₁₀ NAA for 2005.

FOOD & KINDRED PRODUCTS - COMMERCIAL FOOD ESTABLISHMENTS

The WCAQMD issues air quality permits to those restaurants that have wood burning ovens, and those that do the largest quantity of frying and charbroiling. See Appendix A for a list of permits and an example of how emissions were calculated. The 2005 PM inventory assumed that 596 additional restaurants prepared food by broiling or frying and were exempt from WCAQMD permit requirements.

To estimate emissions from these 596 restaurants, WCAQMD assumed that 85% prepared food by griddle broiling or frying. The estimated emission factor for PM₁₀ emissions is 0.004 lb/lb of meat (see Appendix A for emission factor source and sample calculation). See Tables 3-3 and 3-4 for all pollutants emitted from this process. The typical daily emission levels were determined using the seasonal adjustment factors and number of activity days listed in Table 3-2.

MINERAL PROCESSES

Mineral Processes include concrete production, gypsum wall board and plaster products manufacturing.

PM emissions from concrete production plants can be very significant, especially if there are fugitive emissions caused by tracking and haul roads. Emissions were determined from the permitting database maintained by the WCAQMD. Concrete batch plants must renew their permits annually and report production to the WCAQMD. See Appendix A for an example calculation for this category and a list of the WCAQMD permits included in this source category.

The Gypsum Wallboard Manufacturing category includes one source located outside the PM₁₀ NAA in northeastern Washoe County. Approximately half of the particulate emissions from this facility can be attributed to the use of residual fuel oil number 6 to operate the drying ovens. Residual fuel oil cannot be used within the PM₁₀ NAA, but can be used at this remote location. The remaining particulate emissions are a result of bulk loading of gypsum products, and the cutting of the final wallboard product.

See Tables 3-3 and 3-4 for annual and seasonal emissions from this process. The typical daily emission levels were determined using the seasonal adjustment factors and number of activity days listed in Table 3-2.

CONSTRUCTION

Any construction activity, which will disturb one acre or more of land, must submit a Dust Control Plan to the WCAQMD. The approval, or permit, is valid for 18 months from the date of issuance. To estimate emissions from construction activity, the WCAQMD researched the database containing the Dust Plan

Permits and selected the plans that were issued in the last quarter of 2004 and all of 2005. The Dust Plans were divided by residential and commercial/industrial construction. Appendix A contains the data retrieved from the Dust Plan database for this inventory. See Tables 3-3 and 3-4 for all pollutants emitted from this process.

The WCAQMD reviewed three sources of PM emissions from construction:

- Actual construction activity
- Erosion caused by wind on the disturbed land
- Mud and dirt trackout from the construction site

The WCAQMD assumes the average length of time the land is left disturbed on a project is three months (91 days), and 50% control efficiency because all Dust Plan Permits require varied control strategies including, but not limited to, watering. Table 3-11 below lists the emission factors used for each PM₁₀ source and the reference that the WCAQMD used to derive the emission factor. These typical daily emission levels were determined using the seasonal adjustment factors and number of activity days listed in Table 3-3.

**TABLE 3-11
CONSTRUCTION ACTIVITY EMISSION FACTORS**

PM ₁₀ Source	PM ₁₀ Emission Factor	Reference
Construction Activity	0.23 tons/acre-month	Improvement of Specific Emission Factors -- Midwest Research Institute, March 1996 ³
Wind Erosion	1.94 lbs/acre-day	EPA 450/3-88-008 -- Control of Open Fugitive Dust Sources ⁶
Mud and Dirt Trackout	30 lbs/day-project	EPA 450/3-88-008 -- Control of Open Fugitive Dust Sources ⁶

Appendix A also indicates the assumptions used in the calculations to derive the above emission factors.

Based on information from the WCAQMD Dust Plan database, there were 102 projects totaling 2,523 acres disturbed for residential construction within the PM₁₀ NAA. Commercial construction totaled 171 projects with 1,469 acres of land disturbed within the PM₁₀ NAA. Countywide dust plans totaled 169 projects for residential construction and 217 projects for commercial construction. These projects amount to 4,632 acres of land disturbed for residential construction and 2,170 acres disturbed for commercial construction.

Construction Processes also include sub processes of asphalt processes, sand and gravel operations, and sand blasting operations.

Asphalt process emissions were calculated by the database program using AP-42 emission factors³ and activity data reported during the annual permit renewal process. See Appendix A for the example calculation and a list of permits included in this source category. Emissions were determined from the permitting database maintained by the WCAQMD.

Because ambient temperatures during the January, November, and December are below the acceptable operating range for this type of operation, it was assumed that no asphalt processing occurred during the peak PM₁₀ season. Therefore, peak season PM emissions from asphalt production are 0 lb/day.

Sand and Gravel operations are the activities associated with the mining, handling and processing of earth materials such as sand and gravel. These types of activities can account for a significant fraction of particulate emissions; therefore, each sand and gravel operation is issued a permit to operate by the WCAQMD. See Appendix A for an example of how emissions were calculated.

The typical daily emission levels were determined using the seasonal adjustment factors and number of

activity days listed in Table 3-2.

SOLVENT UTILIZATION, SURFACE COATING

Solvent Utilization, surface coating includes the following source types:

- Architectural Coatings
- Wood Furniture
- Paper
- Plastic Products
- Misc. Finished Metals
- Machinery & Equipment
- Electronic & Other Electrical
- Motor Vehicles
- Misc. Manufacturing

Please see Tables 3-3 and 3-4 for pollutant specific emissions for industrial processes in Washoe County/O₃ NAA and within the CO/PM₁₀ NAA for 2005. Most process emissions are from Permits Plus database using U.S. EPA's AP-42 emission factors or material balance. These processes will not be further discussed below. Whereas if processes have emissions calculations not from the database or the processes warrant more clarification, they are further explained in more details in each sub section below.

ARCHITECTURAL COATINGS

Architectural coatings, also known as trade paints, are used primarily by homeowners and painting contractors for interior and exterior painting of residences, commercial buildings, curbs, etc. Due to a lack of specific local activity data, these emissions were determined from per capita emission factors and population data, shown below in Table 3-12.

TABLE 3-12
ARCHITECTURAL COATINGS EMISSIONS DATA

	Emission Factor (lbs/capita/year)	Washoe County Population Estimate for 2005
Architectural Coatings	4.6	396,843

OTHER SOLVENT UTILIZATION

This category includes the following source types:

- Degreasing
- Dry Cleaning
- Graphic Arts
- Misc. Industrial Processes
- Misc. Non-Industrial Processes
- Consumer/Commercial Solvent Use
- Pesticide Application
- Emulsified/Cutback Asphalt Application

Please see Tables 3-3 and 3-4 for pollutant specific emissions for industrial processes in Washoe County/O₃ NAA and within the CO/PM₁₀ NAA for 2005.

DEGREASING

Degreasers use solvents and mechanical action to remove grease, fats, oils, water, waxes, and similar materials from all types of metals. Degreasers are also used to clean non-metals, such as plastic and glass. Emissions were determined from commodity consumption data reported by the sources and material balance calculations -- see Appendix A.

DRY CLEANING

Dry cleaning operations generally use either petroleum-based or halogenated hydrocarbon-based solvents. All but one of the drycleaners use perchloroethylene (Perc) as the cleaning solvent and are equipped with reclamation systems. Their emissions are not included in this category since Perc was listed as a non-reactive VOC. Emissions from the one other dry cleaner which uses Stoddard were determined using commodity consumption data and material balance calculations -- see Appendix A.

GRAPHIC ARTS

Sources incorporated in this category include small printing and silk screening operations. Emissions from these sources were determined from commodity consumption data reported by the source during the annual permit renewal process and material balance calculations -- see Appendix A.

CONSUMER/COMMERCIAL SOLVENT USE

A number of consumer/commercial products contain solvents, which are emitted during use of the product. The vast majority of VOC emissions attributed to this source category are produced by the following products:

- Paints, primers, varnishes
- Hair sprays
- All-purpose cleaners
- Insect sprays
- Car polishes and waxes
- Room deodorants and disinfectants
- Adhesives
- Caulking and sealing compounds
- Moth control products
- Window and glass cleaners
- Herbicides and fungicides

Emissions from this source category were determined using the per capita emissions factor and population data shown in the table below.

**TABLE 3-13
CONSUMER/COMMERCIAL SOLVENT USE EMISSIONS DATA**

	Emission Factor (lbs/capita/year)	Washoe County 2005 Population
Consumer/Commercial Solvent Use	6.3	396,843

PESTICIDE APPLICATION

The activities inventoried in this category include pesticide applications by individuals or community agencies specifically for agricultural purposes, weed abatement, mosquito control, etc. This category does not include application of pesticides in residential or commercial property as these sources were considered in the consumer solvent category.

The 1990 estimate of 7 tons/year of VOC will be used for the 2005 inventory due to insufficient local data. It is assumed that the 1990 estimate will suffice since the 2005 amount of pesticide applied for mosquito abatement would probably be very similar to the 1990 levels, and the pesticides used for agricultural purposes would have decreased, as opposed to increased, because farm land is being invaded by urban development.

The emissions in 1990 were estimated from data provided by the Washoe County District Health Department and the Nevada Department of Agriculture. Approximately 2,297.25 gallons of pesticide, which could be considered volatile, were applied in Washoe County in 1990. All other pesticides applied were either applied as a solid or mixed with water.

EMULSIFIED/CUTBACK ASPHALT APPLICATION

Cutback asphalt is a liquefied road surfacing material that is prepared by blending asphalt cement with various petroleum distillates. This product is used as a pavement sealant, a tack coat, and a bonding agent between layers of paving materials. Emissions occur during mixing of asphalt batches, stockpiling, equipment application, and the curing of the road surface.

Emulsified asphalt is also a liquefied road surfacing material and is used in the same applications as cutback asphalt. However, instead of blending asphalt cement with petroleum distillates as in cutback asphalt, emulsified asphalt use a blend of water with an emulsifier.

While the asphalt processing plants in Washoe County are permitted and report activity data on an annual basis, a stationary source permit is not required for asphalt application so local activity data were not available. Therefore, the emissions from this source category were determined using the per capita emission factors and population data in the table below.

**TABLE 3-14
EMULSIFIED/CUTBACK ASPHALT EMISSIONS DATA**

	Emission Factor (lbs/capita/year)	Washoe County 2002 Population Estimate
Emulsified Asphalt	0.004	396,843
Cutback Asphalt	0.37	396,843

The seasonal adjustment factors provided in the EPA Procedures document² assume that use of cutback asphalt products is prohibited during the ozone season (typically summer months). Washoe County currently has regulations prohibiting use of this product except during the period November 1 through March 31, so use is indeed prohibited during the ozone season, and the SAF is 0. The peak season emissions from emulsified asphalt applications were determined assuming the same seasonal activity adjustment as was calculated for asphalt production. The SAF calculated from these assumptions and the estimated peak season emissions are shown in Table 3-2.

STORAGE AND TRANSPORT

Please see Tables 3-3 and 3-4 for pollutant specific emissions from this source category. Emissions for this source category were subdivided into two classes:

- Organic Chemical Storage
- Gasoline Service Station (UST & Stages I & II)

Each of these source classes is discussed below.

ORGANIC CHEMICAL STORAGE

Sources in this category include volatile organic liquid mixing, packaging, distribution, and storage facilities. The emissions were calculated from level-of-activity data and emission factors. The level of activity data was reported by the sources during the annual permit renewal process.

Because emissions from these sources are temperature dependent, calculation of peak season emissions requires the determination of seasonal adjustment factors for temperature as well as for level of activity. The EPA Procedures document⁴ states that seasonal temperature changes do not have to be considered when determining peak season emissions from this source class. However, because this adjustment is encouraged, the issue of temperature change was examined. The VOC emissions from floating roof storage tanks are dependent on temperature in two ways: the diurnal temperature change and the true vapor pressure of the organic fluid, which varies directly with temperature. The diurnal temperature change used to determine the annual emissions was 35 °F. Climatological data suggest this value is fairly consistent, regardless of season. The ambient temperature used to determine organic fluid true vapor pressure was 60 °F. Since this temperature is only slightly lower than the actual ambient temperature determined for the peak ozone season by guidance, the daily emissions calculated were determined to be a good estimate of peak season emissions and no further temperature correction was performed.

Seasonally adjusted emissions were determined assuming uniform activity distribution and seven operating days per week. See Appendix A for permit listing and calculation example. Emissions from these facilities were determined using the emissions in the Division's Permitting database. The emissions in the database were either generated by the database, which utilized the equations in Section 7 of AP-42³ for calculation of emissions from fixed roof and floating roof storage tanks, or from the EPA TANKS4 computer program. Annual throughput figures are reported by these sources during the permit renewal process.

GASOLINE SERVICE STATION (UST & STAGES I & II)

A control efficiency of 96% is assumed for Phase I controls and 90% is assumed for Phase II controls.

The SAF for level of activity was determined from data provided by the Nevada Department of Taxation Petroleum Products Tax report. This report provides data on the volume of gasoline pumped in Washoe County on a monthly basis. From these data, it was determined that 27.0% of annual gasoline consumption was pumped during the peak ozone period resulting in an SAF of 1.08.

Appendix A lists the permit numbers and emissions. The Appendix also shows calculations and how rule effectiveness was applied.

WASTE DISPOSAL, TREATMENT, AND RECOVERY

Please see Tables 3-3 and 3-4 for pollutant specific emissions from this source category. Emissions for this category were subdivided into three classes:

- Public Owned Treatment Works
- Commercial/Industrial Incineration
- Remediation/Reclamation/Recycle

The emissions from all sources in this category were determined from the AQMD permitting database. Emissions were calculated within the database using AP-42 emission factors³, and activity data reported by each source during the annual permit renewal process.

The typical daily emission levels were determined using the seasonal adjustment factors and number of activity days listed in Table 3-2. See example 1 for calculations and list of permit numbers in this source category.

MISCELLANEOUS AREA SOURCES

Emissions for this source category were subdivided into 13 classes:

- Paved Roads, Fugitive
- Paved Roads, Sanding & Salting
- Unpaved Roads, Fugitive
- Wildfires
- Structure Fires
- Automobile Fires
- Fire Fighting Training
- Open/Permit Burning
- Prescribed Burning
- Refuse Fires
- Automotive & Misc. Repair Shops
- Health Services, Hospitals
- Health Services, Pathological Incineration

Each source class will be discussed individually below. Annual and PM₁₀ Seasonal emissions for PM₁₀ and PM_{2.5} are listed in Tables 3-3 and 3-4.

For all the fire classes listed above, Reno Fire Department did not report fire activity to AQMD in time for this emission inventory report. Based on fire activity data received from the remaining two fire control agencies, staff decided that 2005 fire activity data for the other two agencies was similar to the 2002 fire activity data.

PAVED ROADS, FUGITIVE

Reentrained road dust is primarily generated from geologic material that has been tracked or deposited onto the roadway surface. Material deposition from other sources include: engine exhaust, wear of bearings and brake linings, and tire wear.

To calculate the particulate emissions from paved road surfaces, WCAQMD has utilized the emission factor equations provided in AP-42, section 13.2.1 (11/06). This category has historically been a significant portion of the PM₁₀ emissions inventory. A critical factor in the emission calculation is the silt loading (sL) value. Recognizing this importance, the WCAQMD has surveyed various paved roads for local sL values. The WCAQMD has compiled a database of silt loading values for the Truckee Meadows' paved roads and categorized those values for high and low average daily traffic (ADT) roads.

Predictive emission factor equation, AP-42, Volume 1, 13.2.1

$$E_{ext} = \left[k \left(\frac{sL}{2} \right)^{0.65} \left(\frac{W}{3} \right)^{1.5} - C \right] \left(1 - \frac{P}{4N} \right)$$

Where:

- E = particulate emission factor
- k = base emission factor for desired size fraction; 0.016 is used for PM₁₀ expressed in pounds per vehicle mile traveled (VMT)
- sL = silt loading, expressed as grams per square meter of silt (< 75 micron) on road surface. WCAQMD sampling⁴ indicates 0.44 g/m² for low average daily traffic (ADT) roads and 0.16 g/m² for high ADT roads in the Truckee Meadows NAA.
- W = mean weight of vehicles in tons. Discussion with Midwest Research Institute (MRI) suggests 2.0 as a good default value for lack of specific local data.
- C = emission factor for 1980's vehicle fleet exhaust, brake wear and tire wear.

P = number of "wet" days with at least 0.254 mm (0.01 in) of precipitation during the averaging period.

N = number of days in the averaging period.

Using the sL values determined for the Truckee Meadows, the predictive emission factors are:

Low ADT – 0.00267 lbs PM₁₀/VMT and 0.00044 lbs PM_{2.5}/VMT

High ADT – 0.00117 lbs PM₁₀/VMT and 0.00006 lbs PM_{2.5}/VMT

The Regional Transportation Commission of Washoe County (RTC) provided VMT data, which was distributed by geographic area, facility type, and level of ADT. Tables 3-15 and 3-16 indicate the VMT for both high and low ADT roads. The threshold between a high and low ADT road is approximately 5,000 average daily trips for a facility. Tables 3-3 and 3-4 show all the emissions related to paved roads.

**TABLE 3-15
LOW ADT ROADS
DAILY VEHICLE MILES TRAVELED (VMT)**

Facility	PM ₁₀ NAA	Washoe County
Local	793,841	1,048,044
Collector	446,716	940,557
Ramps	258,511	300,582
Total	1,499,068	2,289,183

**TABLE 3-16
HIGH ADT ROADS
DAILY VEHICLE MILES TRAVELED (VMT)**

Facility	PM ₁₀ NAA	Washoe County
Minor	1,374,257	1,710,154
Major	2,148,231	2,589,507
Freeway	2,238,657	4,325,647
Total	5,761,145	8,625,308

PAVED ROADS, SANDING & SALTING

During the winter season, sand and salt are applied to the roads for traction during ice and snow storms. This material can contribute to particulate pollution if not promptly removed from the road ways once the roads have dried. However, the emissions calculated below reflect dust generated only during application of sanding material, and do not reflect increased emissions from traffic subsequently driving over sanded streets.

All four of the road departments responsible for sanding within the County and PM10 NAA informed the WCAQMD how much sand and salt they used in 2005. The agencies also estimated how much of the total was used on roads just within the PM₁₀ NAA and how many storms required sanding in 2005. The WCAQMD used this information and the emission factors from a document compiled by Midwest Research Institute (MRI) for EPA entitled Gap filling PM₁₀ Emission Factors for Selected Open Area Dust Sources to estimate emissions. Table 3-17 summarizes the annual PM₁₀ emissions from street sanding.

The typical daily emission levels were determined using the seasonal adjustment factor and number of activity days listed in Table 3-2.

**TABLE 3-17
STREET SANDING PM₁₀ AND PM_{2.5} EMISSIONS**

Municipality	Sand		Salt		PM ₁₀ NAA				Washoe County			
	Amount		Amount		Annual (tons)		Seasonal (lb/day)		Annual (tons)		Seasonal (lb/day)	
	Used (tons)	EF (lb/ton)	Used (tons)	EF (lb/ton)	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}	PM ₁₀	PM _{2.5}
NDOT*	8,369.72	0.018	1,673.94	10.0	2.5	0.2	263	21	8.4	0.7	877	70
Washoe County	5,945.63	0.018	1,189.13	10.0	3.0	0.2	311	25	6.0	0.5	623	50
Reno	1,083.17	0.018	139.86	10.0	0.6	0.1	66	5	0.7	0.1	74	6
Sparks	1,482.71	0.018	293.89	10.0	1.3	0.1	139	11	1.5	0.1	154	12
RTC	24.96	0.018	13.88	10.0	0.1	0.0	7	1	0.1	0.0	7	1
Reno/Tahoe Airport Authority	140.00	0.018	0.00	10.0	0.0	0.0	0	0	0.0	0.0	0	0
Total	17,046.18		3,310.70		7.57	0.61	786.08	62.96	16.71	1.34	1,734.95	138.97

UNPAVED ROADS, FUGITIVE

Accurately estimating particulate emissions from unpaved roads can be a difficult task due to questionable applicability of the emission factors and lack of activity data for this source. WCAQMD reviewed both the EPA PART5 emission factor model and AP-42 5th edition for emission factor information. The two emission factor sources agreed well at lower vehicle speeds (25 mph); however, there are some differences at 40 mph. Ultimately, WCAQMD relied on the factor equations presented in AP-42.

The only available activity information data in Washoe County for unpaved roads is the length or distance in miles. Furthermore, the distance is only well known for the PM10 NAA; the rest of the county was estimated using best engineering judgment by the roads department. All road data were obtained from the respective public works/road department agencies.

**TABLE 3-18
MILES OF UNPAVED ROADS**

Jurisdiction	PM ₁₀ NAA	Washoe County
Reno	3.2	---
Sparks	2.5	---
Washoe County	12.5	1,000
Total	18.2	1,000

Because the emission factor equations are based on vehicle miles traveled (VMT), staff needed to convert the distance known in miles to vehicle activity level measured in VMT. The approach the WCAQMD took was to apply the ratio for local paved roads of VMT to distance to unpaved roads. An adjustment factor of 0.10 (10 percent) for overall use was also applied knowing that unpaved roads received much less traffic than paved.

$$UVMT = (UDT) (PVMT / PDT) (AF)$$

Where:

- UVMT = Unpaved Road Vehicle Miles Traveled
- UDT = Unpaved Road Distance (miles)
- PVMT = Paved Road Vehicle Miles Traveled
- PDT = Paved Road Distance (miles)
- AF = Adjustment Factor for low volumes

Therefore:

NAA UVMT

$$UVMT = (18.2) (793,841 / 1,170) (0.1) = 1,235$$

County UVMT

$$UVMT = (1,000) (254,203 / 380) (0.1) = 66,896$$

Paved road VMT and paved road length data were supplied by the Regional Transportation Commission of Washoe County.

The AP-42 5th edition, section 13.2.2 (11/06) equation for unpaved roads emission factor follows:

$$E = \frac{k (w/12)^2 (S/30)^4}{(M/0.5)^2} - C$$

Where:

- E = emission factor in lbs/VMT
- k = particle size multiplier, 0.36 for PM₁₀
- s = percent silt content, 5.7 = default
- S = mean vehicle speed, 25 for NAA, 40 for County
- M = surface material moisture content (%)

Applying local information to the equation, vehicle speeds and weights were adjusted for PM₁₀ NAA and County according to field observation:

PM₁₀ NAA, where S = 25.0

$$E = 0.68600 \text{ lbs PM}_{10}/\text{VMT and } 0.10265 \text{ lbs PM}_{2.5}/\text{VMT}$$

Washoe County, where S = 40.0

$$E = 0.86784 \text{ lbs PM}_{10}/\text{VMT and } 0.12992 \text{ lbs PM}_{2.5}/\text{VMT}$$

WILDFIRES

Emissions were determined from activity data reported by each of the three fire control agencies, two functioning within the CO/PM₁₀ NAA: City of Reno Fire Department and City of Sparks Fire Department. The remaining fire control agency, North Tahoe Fire Protection District, functions within the Washoe County and O₃ NAA. The number of wildfires reported by each agency is given in Table 3-19. The typical open area fire in the Truckee Meadows covers an approximate area of 0.5 acres and is fueled primarily by grass, brush, rubbish, and weeds. From AP-42, the average fuel loading was estimated to be 8 tons/acre. An emission factor of 140 lbs/ton burned, also from AP-42, was used to calculate the total annual emissions. See Appendix A for calculations.

The daily emissions were determined using the seasonal adjustment factors listed in Table 3-2. The SAFs were calculated from the actual number of fires reported during the peak O₃ and CO/PM₁₀ seasons.

**TABLE 3-19
WILDFIRE ACTIVITY DATA REPORTED FOR 2005**

Fire Agency	No. of Fires in WC/O ₃ NAA	No. of Fires in O ₃ Season	O ₃ SAF	No. of Fires in CO/PM ₁₀ NAA	No. of Fires in CO/PM ₁₀ Season	CO/PM ₁₀ SAF
City of Reno Fire Department	215	58	1.08	108	65	0.60
City of Sparks Fire Department	29	22	3.03	15	2	0.14
N. Lake Tahoe Fire Protection District	4	3	3.00	0	1	0.00

STRUCTURE FIRES

Emissions for this were determined from activity data reported by the three fire control agencies. The number of structure fires reported by each agency is given in Table 3-20. See Appendix A for calculations.

**TABLE 3-20
STRUCTURE FIRE ACTIVITY DATA REPORTED FOR 2005**

Fire Agency	No. of Fires in WC/O ₃ NAA	No. of Fires in O ₃ Season	O ₃ SAF	No. of Fires in CO/PM ₁₀ NAA	No. of Fires in CO/PM ₁₀ Season	CO/PM ₁₀ SAF
City of Reno Fire Department	243	109	1.79	168	22	0.60
City of Sparks Fire Department	72	19	1.06	50	23	0.14
N. Lake Tahoe Fire Protection District	12	3	1.00	0	3	0.00

The level of daily emissions was determined using the seasonal adjustment factors listed in Table 3-20. The SAFs were calculated from the actual number of fires reported for the peak O₃ and CO/PM₁₀ seasons.

AUTOMOBILE FIRES

The number of automobile fires reported by each fire control agency is given below in Table 3-21. See Appendix A for calculations.

**TABLE 3-21
AUTOMOBILE FIRE ACTIVITY DATA REPORTED FOR 2005**

Fire Agency	No. of Fires in WC/O ₃ NAA	No. of Fires in O ₃ Season	O ₃ SAF	No. of Fires in CO/PM ₁₀ NAA	No. of Fires in CO/PM ₁₀ Season	CO/PM ₁₀ SAF
City of Reno Fire Department	234	78	1.33	161	49	0.58
City of Sparks Fire Department	68	24	1.41	47	12	0.49
N. Lake Tahoe Fire Protection District	7	2	1.14	0	2	0.00

The level of daily emissions were determined using the seasonal adjustment factors listed in Table 3-21. The SAFs were calculated from the actual number of fires reported for the peak O₃ and CO/PM₁₀ seasons.

FIRE FIGHTING TRAINING

None of the three fire control agencies conducted any fire fighting training in 2005.

OPEN/PERMIT BURNING

Emissions were determined from activity data reported by each fire control agency. The number of open/burn permits issued by each agency is given below in Table 3-22. Material burned was assumed to be 3.2 tons for each permit issued. See Appendix A for calculations and emission factors used.

No permits may be issued during the winter season, emissions from burn permits alone during the peak CO season are estimated to be zero. However, included in this category are other or unauthorized burns so the peak season emissions from those fires are included in Table 3-4.

**TABLE 3-22
OPEN/PERMIT BURNING FIRE ACTIVITY DATA REPORTED FOR 2005**

Fire Agency	No. of Fires in WC/O ₃ NAA	No. of Fires in O ₃ Season	O ₃ SAF	No. of Fires in CO/PM ₁₀ NAA	No. of Fires in CO/PM ₁₀ Season	CO/PM ₁₀ SAF
City of Reno Fire Department	0	0	0	0	0	0
City of Sparks Fire Department	43	16	1.49	30	3	0.19
N. Lake Tahoe Fire Protection District	40	20	2.00	0	10	0.00

PRESCRIBED BURNING

Only N. Lake Tahoe Fire Protection District have prescribed burning in 2005 due to its jurisdiction, which is outside the CO/PM₁₀ NAA. The number of burn permits issued by N. Lake Tahoe Fire Protection District is given below in Table 3-23. Material burned was assumed to be 38.4 tons for each permit issued. See Appendix A for calculations and emission factors used.

TABLE 3-23
PRESCRIBED BURNING ACTIVITY DATA REPORTED FOR 2005

Fire Agency	No. of Fires in WC/O ₃ NAA	No. of Fires in O ₃ Season	O ₃ SAF	No. of Fires in CO/PM ₁₀ NAA	No. of Fires in CO/PM ₁₀ Season	CO/PM ₁₀ SAF
N. Lake Tahoe Fire Protection District	14	4	1.14	0	0	0.00

REFUSE FIRES

Emissions from refuse fires totaled 2 tons/year. The number of refuse fires reported by each fire control agency is given below in Table 3-24.

TABLE 3-24
REFUSE FIRE ACTIVITY DATA REPORTED FOR 2005

Fire Agency	No. of Fires in WC/O ₃ NAA	No. of Fires in O ₃ Season	O ₃ SAF	No. of Fires in CO/PM ₁₀ NAA	No. of Fires in CO/PM ₁₀ Season	CO/PM ₁₀ SAF
City of Reno Fire Department	59	18	1.22	41	9	0.42
City of Sparks Fire Department	80	28	1.40	55	22	0.76
N. Lake Tahoe Fire Protection District	0	0	0.00	0	0	0.00

The level of daily emissions was determined using the seasonal adjustment factors listed in Table 3-24. The SAFs were calculated from the actual number of fires reported for the peak O₃ and CO/PM₁₀ seasons.

SECTION 4

NON-ROAD MOBILE SOURCES

Non-road mobile sources include recreational vehicles, construction equipment, farm equipment, aircraft, railroad locomotives, etc. The types of sources, which were considered for this inventory, were identified from EPA document.⁹ The non-road mobile source categories, which were included in this inventory, are listed in Table 4-1.

Emissions from all non-road mobile sources addressed in this inventory were calculated using level-of-activity emission factors. For a number of sources, an estimate of vehicle population was required to complete these calculations. Local data were used when available, as with the Aircraft and Railroad emissions; however, for the majority of the other non-road gasoline, compressed natural gas (CNG), diesel and liquefied petroleum gas (LPG) vehicles/equipment, Washoe County utilized the EPA NONROAD 2005 Model to obtain the data.

Table 4-1 shows the methodology and emission factors used for each source category. Local activity data for these sources were obtained, when available, from local agencies. The sources of the activity/commodity data, which were used to estimate emissions, are also listed in Table 4-1.

Once annual emissions were calculated, the peak O₃ and CO/PM₁₀ season emissions were determined. If available, an activity distribution representative of local conditions was estimated. The emissions from most non-road mobile sources were apportioned to the peak O₃ and CO/PM₁₀ season using the seasonal data calculated from the NONROAD 2005 Model. As previously mentioned, Washoe County's O₃ season is during the summer season, specifically the months of June, July, and August and CO/PM₁₀ season is during the winter season, specifically the months of November, December and January.

The SAFs for non-road mobile sources, except Aircraft and Railroad categories, were estimated by EPA's NONROAD 2005 model. Aircraft and Railroad SAFs were calculated using the equations presented in Section 3. Table 4-2 summarizes the SAFs and the number of activity days used for each calculated source category. The table also indicates whether the SAF listed was calculated from published or estimated seasonal activity breakdowns.

Tables 4-3 and 4-4 provide a summary of non-road mobile source emissions for Washoe County/O₃ NAA and CO/PM₁₀ NAA, respectively.

Figures 4-1 and 4-2 show the annual and seasonal ozone precursors emissions for Washoe County/O₃ NAA. Figures 4-3 and 4-4 show the annual and seasonal CO, PM₁₀, and PM_{2.5} emissions for CO/PM₁₀ NAA.

The remainder of this section will describe in greater detail the methods used to calculate the emissions. Supporting documentation is provided in Appendix B.

TABLE 4-1
NON-ROAD MOBILE SOURCE CATEGORIES & EMISSION ESTIMATION RESOURCES
Emission

Source Category	Methodology^a	Emission Factor Source	Activity Data Source
<u>Aircraft</u>			
Military Aircraft	1A	VOL. IV	Airport Authority of Washoe County, Stead Airport
Commercial Aircraft	1A	VOL. IV	Airport Authority of Washoe County
Civil Aircraft	1A	VOL. IV	Airport Authority of Washoe County
Air Taxis	1A	VOL. IV	Airport Authority of Washoe County
<u>Non-Road Gasoline Vehicles</u>			
Agricultural Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Airport Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Commercial Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Construction and Mining Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Industrial Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Lawn and Garden Equipment (Com)	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Lawn and Garden Equipment (Res)	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Pleasure Craft	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Railroad Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Recreational Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
<u>Non-Road CNG Engines</u>			
Agricultural Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Commercial Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Construction and Mining Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Industrial Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
<u>Non-Road Diesel Vehicles</u>			
Agricultural Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Airport Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Commercial Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Construction and Mining Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Industrial Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Lawn and Garden Equipment (Com)	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Pleasure Craft	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Railroad Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Recreational Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
<u>Non-Road LPG Engines</u>			
Agricultural Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Airport Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Commercial Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Construction and Mining Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Industrial Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Lawn and Garden Equipment (Com)	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Railroad Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
Recreational Equipment	1B	NONROAD 2005 Model	NONROAD 2005 Model built-in factor
<u>Railroads</u>			
Diesel	1A	VOL. IV	Union Pacific Railroad System

^a - level-of-activity emission factors

1A - local vehicle population data

1B – EPA Final NONROAD 2005 Model built-in factors

The abbreviations used above refer to the following reference documents:

NONROAD Model: EPA preferred method, December 2005.

VOL. IV: Procedures for Emission Inventory Preparation Volume IV: Mobile Sources, U.S. Environmental Protection Agency, EPA-450/4-81-026d, October 1991 Draft Revision.⁶

**TABLE 4-2
ESTIMATION PROCEDURES FOR NON-ROAD MOBILE SOURCES**

SOURCE CATEGORY	Seasonal Activity Source	O ₃ Season	SAF	CO/PM ₁₀ Season SAF	Weekly Activity (days/week)
<u>Aircraft</u>					
Military Aircraft	Calc.	1.01		0.97	7
Commercial Aircraft	Calc.	1.03		0.97	7
Civil Aircraft	Calc.	0.96		0.96	7
Air Taxis	Calc.	1.08		0.96	7
<u>Railroads</u>					
Diesel	Calc.	Uniform		Uniform	7

**TABLE 4-3
NON-ROAD MOBILE SOURCES EMISSIONS SUMMARY FOR
WASHOE COUNTY/O₃ NAA**

Source Category	VOC Emission		NO _x Emission		CO Emission		PM ₁₀ Emission		PM _{2.5} Emission	
	Annual (tpy)	Peak Season (lbs/day)	Annual (tpy)	Peak Season (lbs/day)	Annual (tpy)	Peak Season (lbs/day)	Annual (tpy)	Peak Season (lbs/day)	Annual (tpy)	Peak Season (lbs/day)
Aircraft										
Commercial	53	297	350	1,942	405	2,249	2	12	2	12
Air Taxi	5	27	5	30	1	4	0	2	0	2
Military	20	106	42	221	60	317	0	1	0	1
Civil	87	517	21	122	587	3,483	2	12	2	12
Subtotal	165	947	418	2,316	1,053	6,053	5	28	5	27
CNG Engines										
Agricultural Equipment	0	0	0	0	0	1	0	0	0	0
Commercial Equipment	0	7	8	48	56	357	0	0	0	0
Construction and Mining Equipment	0	0	0	0	0	1	0	0	0	0
Industrial Equipment	0	13	14	87	65	413	0	0	0	0
Subtotal	0	20	21	135	122	772	0	1	0	1
Diesel Engines										
Agricultural Equipment	4	37	33	338	18	184	3	34	3	33
Airport Equipment	4	19	45	243	20	106	3	16	3	16
Commercial Equipment	19	119	116	739	71	449	13	80	12	77
Construction and Mining Equipment	195	1,395	1,792	12,834	935	6,696	147	1,055	143	1,023
Industrial Equipment	12	72	120	716	55	327	10	59	10	58
Lawn and Garden Equipment (Com)	9	82	64	615	31	303	6	56	6	54
Pleasure Craft	2	10	58	255	9	41	2	7	2	7
Railroad Equipment	1	4	3	22	3	18	0	3	0	3
Recreational Equipment	1	4	2	14	2	15	0	2	0	2
Subtotal	245	1,742	2,234	15,774	1,144	8,138	185	1,313	179	1,273
Gasoline Engines										
Agricultural Equipment	1	8	0	3	18	193	0	0	0	0
Airport Equipment	1	6	1	4	27	162	0	0	0	0
Commercial Equipment	252	1,829	60	284	7,385	51,294	4	23	3	21
Construction and Mining Equipment	100	750	15	84	1,723	13,362	5	39	5	35
Industrial Equipment	11	75	9	45	289	2,005	0	1	0	1
Lawn and Garden Equipment (Com)	931	7,740	113	868	16,704	164,951	36	280	33	257
Lawn and Garden Equipment (Res)	388	3,011	38	205	5,681	39,471	7	38	6	35
Pleasure Craft	1,211	6,652	80	305	3,358	15,353	20	90	19	83
Railroad Equipment	0	1	0	0	8	56	0	0	0	0
Recreational Equipment	457	3,551	11	68	1,609	12,624	15	109	13	100
Subtotal	3,352	23,622	328	1,865	36,802	299,471	88	580	81	533
LPG Engines										
Agricultural Equipment	0	0	0	0	0	0	0	0	0	0
Airport Equipment	0	2	1	6	5	28	0	0	0	0
Commercial Equipment	5	31	22	142	75	476	0	1	0	1
Construction and Mining Equipment	2	13	7	48	31	224	0	0	0	0
Industrial Equipment	54	340	193	1,227	923	5,856	1	7	1	7
Lawn and Garden Equipment (Com)	1	11	4	38	19	186	0	0	0	0
Railroad Equipment	0	0	0	0	0	0	0	0	0	0
Recreational Equipment	0	0	0	1	1	5	0	0	0	0
Subtotal	62	397	228	1,462	1,055	6,777	1	8	1	8
Railroad										
Subtotal	49	269	1,136	6,242	121	665	29	159	27	146
Total	3,873	26,998	4,365	27,794	40,296	321,876	307	2,088	292	1,989

Note: The numbers may not add due to rounding.

**TABLE 4-4
NON-ROAD MOBILE SOURCES EMISSIONS SUMMARY FOR
CO/PM₁₀ NAA**

Source Category	VOC Emission		NOx Emission		CO Emission		PM ₁₀ Emission		PM _{2.5} Emission	
	Annual (tpy)	Peak Season (lbs/day)	Annual (tpy)	Peak Season (lbs/day)	Annual (tpy)	Peak Season (lbs/day)	Annual (tpy)	Peak Season (lbs/day)	Annual (tpy)	Peak Season (lbs/day)
Aircraft										
Commercial	53	285	350	1863	405	2157	2	12	2	11
Air Taxi	5	25	5	28	1	4	0	2	0	2
Military	20	106	42	221	60	317	0	1	0	1
Civil	43	228	10	54	281	1480	1	4	1	4
Subtotal	121	644	407	2,166	746	3,958	4	19	3	18
CNG Engines										
Agricultural Equipment	0	0	0	0	0	0	0	0	0	0
Commercial Equipment	0	1	5	33	38	242	0	0	0	0
Construction and Mining Equipment	0	0	0	0	0	0	0	0	0	0
Industrial Equipment	0	3	9	59	44	281	0	0	0	0
Subtotal	0	4	14	92	83	524	0	1	0	1
Diesel Engines										
Agricultural Equipment	1	2	7	22	4	12	1	2	1	2
Airport Equipment	2	13	30	165	13	72	2	11	2	3
Commercial Equipment	13	81	79	502	48	305	9	54	8	53
Construction and Mining Equipment	97	545	896	5,011	468	2,614	74	413	72	400
Industrial Equipment	8	49	82	487	37	222	7	40	7	39
Lawn and Garden Equipment (Com)	6	19	44	149	21	72	4	13	4	13
Pleasure Craft	0	0	0	0	0	0	0	0	0	0
Railroad Equipment	0	3	2	15	2	12	0	2	0	2
Recreational Equipment	0	1	1	3	1	3	0	0	0	0
Subtotal	128	713	1,141	6,354	595	3,313	96	536	93	513
Gasoline Engines										
Agricultural Equipment	0	7	0	0	4	10	0	0	0	0
Airport Equipment	1	66	1	4	19	86	0	0	0	0
Commercial Equipment	171	14,212	41	349	5,022	27,224	2	16	2	15
Construction and Mining Equipment	50	4,526	8	59	861	4,097	3	15	2	14
Industrial Equipment	8	689	6	55	197	1,064	0	0	0	0
Lawn and Garden Equipment (Com)	633	50,674	77	390	11,359	35,858	25	128	23	118
Lawn and Garden Equipment (Res)	264	14,842	26	89	3,863	8,168	5	17	4	15
Pleasure Craft	0	0	0	0	0	0	0	0	0	0
Railroad Equipment	0	11	0	0	5	30	0	0	0	0
Recreational Equipment	1,094	19,434	7	24	1,094	2,095	10	23	9	21
Subtotal	2,220	104,461	165	970	22,423	78,632	45	199	41	183
LPG Engines										
Agricultural Equipment	0	0	0	0	0	0	0	0	0	0
Airport Equipment	0	1	1	4	4	19	0	0	0	0
Commercial Equipment	3	21	15	97	51	324	0	1	0	1
Construction and Mining Equipment	1	5	3	19	16	88	0	0	0	0
Industrial Equipment	36	231	132	834	628	3,982	1	5	1	5
Lawn and Garden Equipment (Com)	1	2	3	9	13	42	0	0	0	0
Railroad Equipment	0	0	0	0	0	0	0	0	0	0
Recreational Equipment	0	0	0	0	0	1	0	0	0	0
Subtotal	42	261	154	962	712	4,456	1	5	1	5
Railroad										
Subtotal	14	76	193	1,061	28	154	5	30	5	28
Total	2,526	106,159	2,075	11,605	24,586	91,038	151	790	144	748

Note: The numbers may not add due to rounding

Non-Road Mobile Sources Annual Emissions (tpy) for Washoe County/O₃ NAA

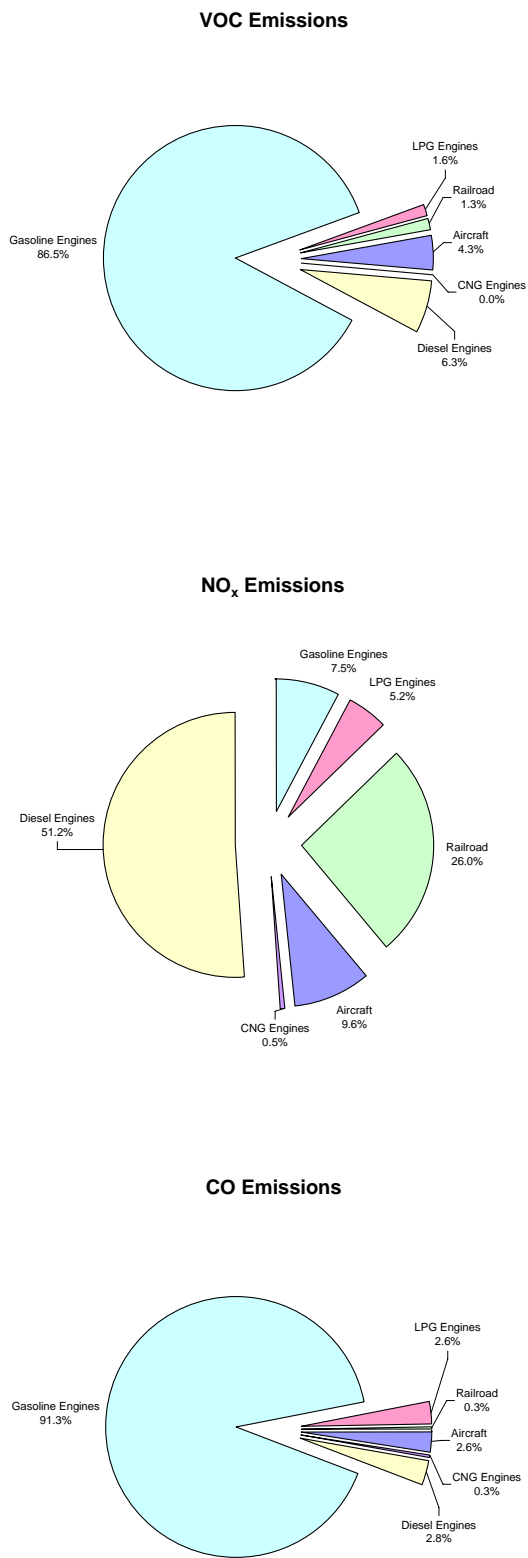


Figure 4-1

Non-Road Mobile Sources O₃ Season Emissions (lbs/day) for Washoe County/O₃ NAA

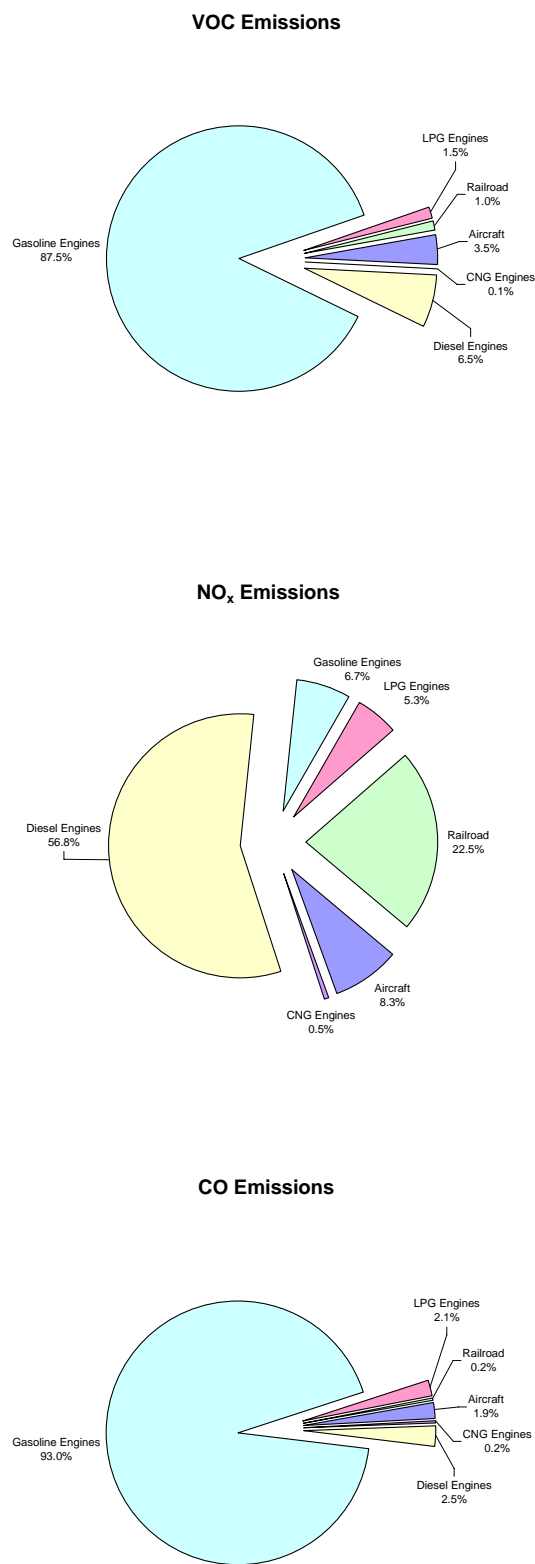


Figure 4-2

Non-Road Mobile Sources Annual Emissions (tpy) for CO/PM₁₀ NAA

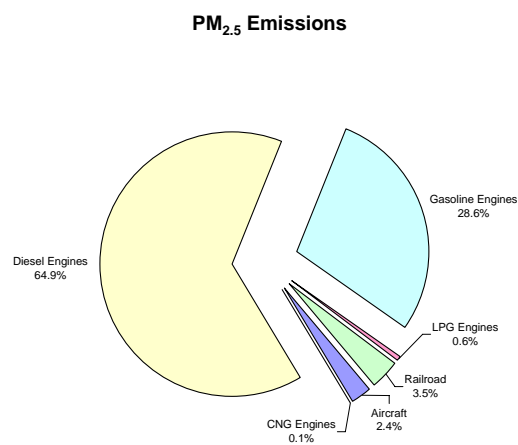
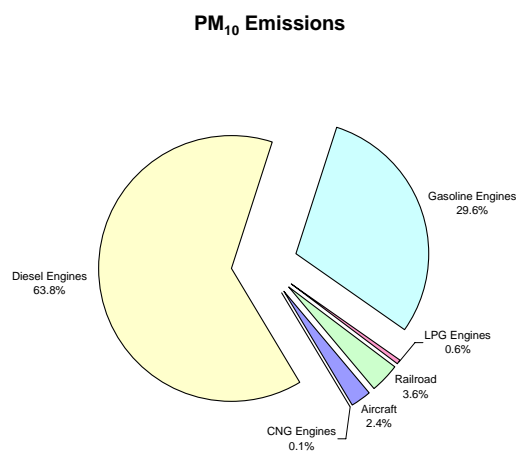
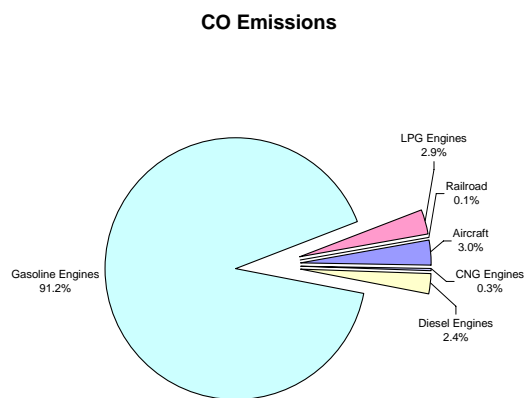


Figure 4-3

Non-Road Mobile Sources CO/PM₁₀ Season Emissions (lbs/day) for CO/PM₁₀ NAA

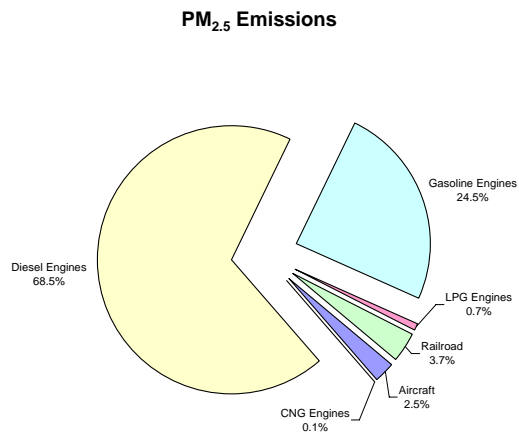
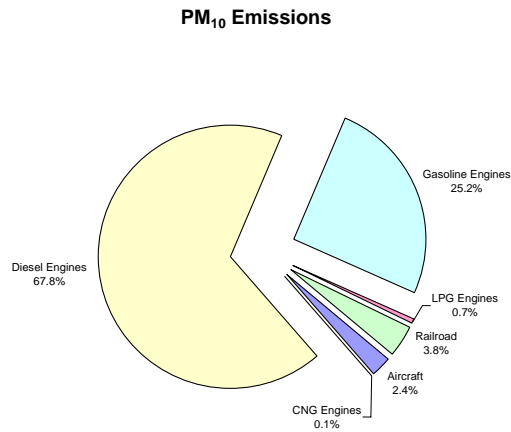
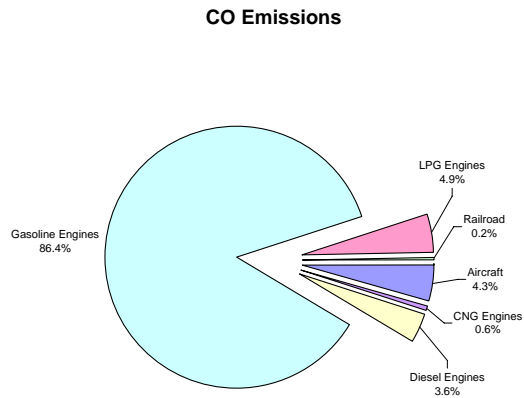


Figure 4-4

AIRCRAFT

Aircraft accounted for approximately 3% of CO emissions for both Washoe County/O₃ NAA and CO/PM₁₀ NAA from non-road mobile sources (Figures 4-2 and 4-5). Emissions were subdivided into four classes:

- Air Taxis
- Civil Aircraft
- Commercial Aircraft
- Military Aircraft

Emissions from aircraft are the direct result of the amount of fuel consumed during aircraft activity. Landing/takeoff (LTO) cycles are the common measure of aircraft activity and consist of all normal flight and ground operation modes including approach, taxi in, taxi out, takeoff, and climbout. The LTO data reported by the Airport Authority of Washoe County for 2005 are presented in Table 4-5. These data reflect activity at both Reno-Tahoe Airport and Stead Airport. There are no other airports in the Washoe County except for some small private landing strips.

Annual emissions by aircraft class are shown in Table 4-5. Aircraft engines within a specific class, such as commercial aircraft, can have significantly different emission characteristics. The spreadsheet and airport information used to determine emissions are contained in Appendix B.

**TABLE 4-5
AIRCRAFT ACTIVITY DATA**

Aircraft Type	W C / O ₃ N A A		C O / P M ₁₀ N A A	
	L T O s	S A F	L T O s	S A F
C o m m e r c i a l	30,402	1.01	30,402	0.97
A i r T a x i	1,378	1.03	1,378	0.97
M i l i t a r y	2,314	0.96	2,314	0.96
C i v i l	77,243	1.08	33,243	0.96

Typical daily peak season emissions (lbs/day) are given in Tables 4-3 and 4-4. The peak season emissions for this source were determined using the seasonal adjustment factors and are listed in Table 4-5. They are based on 7 activity days per week, see Table 4-2.

MISCELLANEOUS NON-ROAD MOTOR VEHICLES/EQUIPMENT

Carbon monoxide is the largest pollutant emitted for non-road motor vehicles and equipment, as calculated from EPA's NONROAD 2005 model. It accounted for 91% of annual CO emissions for both Washoe County/O₃ NAA and CO/PM₁₀ NAA. See Tables 4-3 and 4-4 for emission summary for all pollutants.

As stated above, annual and seasonal emissions for non-road vehicles were calculated using the EPA NONROAD 2005 Model. The NONROAD 2005 Model considered more than 520 different types of equipment based on Source Classification Codes (SCCs). Washoe County considered only 520 SCCs, excluding equipment used for logging, underground mining activities, and oil field because those activities do not exist within Washoe County/O₃ NAA or the CO/PM₁₀ NAA.

Appendix B lists the equipment considered in this inventory for 2-stroke Gasoline Equipment, 4-stroke Gasoline Equipment, CNG Equipment, Diesel Equipment and LPG Equipment, along with the Area and Mobile Source (AMS) SCCs. Unless otherwise noted, the CO/PM₁₀ NAA emissions are estimated to be 68% of the countywide emissions, based on GIS population information of the hydrographic basin as estimated by the Washoe County Department of Community Development's for WCAQMD.

NON-ROAD CNG ENGINES

Non-road CNG engines accounted for less than 1 % of VOC, NO_x, and CO emissions for both Washoe County/O₃ NAA and CO/PM₁₀ NAA (Figures 4-1 through 4-4). These emissions were subdivided into four

classes:

- Agricultural Equipment
- Commercial Equipment
- Construction and Mining Equipment
- Industrial Equipment

Their emissions are listed in Tables 4-3 and 4-4 for both Washoe County/O₃ NAA and CO/PM₁₀ NAA, respectively.

NON-ROAD DIESEL ENGINES

Annually, non-road diesel engines accounted for approximately 6%, 51%, and 3% of VOC, NO_x, and CO emissions, respectively, in Washoe County/O₃ NAA. The annual non-road diesel engines contributed 2%, 64%, and 65% of CO, PM₁₀, and PM_{2.5} emissions, respectively, in CO/PM₁₀ NAA. See Tables 4-3 and 4-4 for emission numbers. These emissions were subdivided into nine classes:

- Agricultural Equipment
- Airport Equipment
- Commercial Equipment
- Construction and Mining Equipment
- Industrial Equipment
- Lawn and Garden Equipment (Commercial)
- Pleasure Craft
- Railroad Equipment
- Recreational Equipment

Of the nine classes of non-road diesel equipment, the following two classes warrant further explanation:

AGRICULTURAL EQUIPMENT

Only 20% of the entire county emissions for agricultural activity are considered to occur within the CO/PM₁₀ NAA.

PLEASURE CRAFT

There are two major lakes in Washoe County where pleasure craft are used: Pyramid Lake and Lake Tahoe. Since the CO/PM₁₀ NAA does not contain a major lake, there were no CO, PM₁₀, and PM_{2.5} emissions for this source category in the CO/PM₁₀ NAA.

NON-ROAD GASOLINE ENGINES

Non-Road gasoline engines accounted for approximately 86%, 7%, and 91% of VOC, NO_x, and CO emissions, respectively, in Washoe County/O₃ NAA. The annual non-road gasoline engines contributed 91%, 30%, and 29% of CO, PM₁₀, and PM_{2.5} emissions, respectively, in CO/PM₁₀ NAA. See Tables 4-3 and 4-4 for emission numbers. These emissions were subdivided into ten classes:

- Agricultural Equipment
- Airport Equipment
- Commercial Equipment
- Construction and Mining Equipment
- Industrial Equipment
- Lawn and Garden Equipment (Commercial)
- Lawn and Garden Equipment (Residential)
- Pleasure Craft
- Railroad Equipment
- Recreational Equipment

Of the ten classes of non-road gasoline equipment, the following two classes warrant further explanation:

CONSTRUCTION AND MINING EQUIPMENT

Emissions for the CO/PM₁₀ NAA were estimated at 50% since a lot of construction and most mining activities occurred outside of the CO/PM₁₀ NAA.

PLEASURE CRAFT

There are two major lakes in Washoe County where pleasure craft are used: Pyramid Lake and Lake Tahoe. Since the CO/PM₁₀ NAA does not contain a major lake, CO, PM₁₀, and PM_{2.5} emissions from this source category in the CO/PM₁₀ NAA are estimated to be 0 ton/year.

NON-ROAD LPG ENGINES

Non-road LPG engines produced approximately 2%, 5%, and 3% of VOC, NO_x, and CO emissions, respectively, in Washoe County/O₃ NAA. The annual non-road LPG engines contributed 3% of CO, and less than 1% for PM₁₀, and PM_{2.5} emissions, respectively, in CO/PM₁₀ NAA. See Tables 4-3 and 4-4 for emission numbers. These emissions were subdivided into eight classes:

- Agricultural Equipment
- Airport Equipment
- Commercial Equipment
- Construction and Mining Equipment
- Industrial Equipment
- Lawn and Garden Equipment (Commercial)
- Railroad Equipment
- Recreational Equipment

RAILROADS

It is estimated that railroad operations in 2005 produced approximately 1%, 26%, and less than 1% of VOC, NO_x, and CO emissions, respectively, in Washoe County/O₃ NAA. The annual railroad emissions contributed less than 1% of CO, and 4% for PM₁₀, and PM_{2.5} emissions, respectively, in CO/PM₁₀ NAA. Railroad activity levels were obtained from Union Pacific Railroad. There are no coal-powered locomotives active in Washoe County. The activity data reported for diesel locomotives and emission calculations are contained in Appendix B. Annual emissions of all pollutants are summarized in Tables 4-3 and 4-4. The peak season emissions for this source were determined using a uniform seasonal adjustment factor and number of activity days listed in Table 4-2.

SECTION 5

ON-ROAD MOTOR VEHICLE EMISSIONS

The estimation of NO_x, VOC, CO, PM₁₀, and PM_{2.5} emissions from on-road motor vehicles for the Washoe County/O₃ NAA and CO/PM₁₀ NAA 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 diesel vehicles (LDDV)
- Light duty gasoline trucks (LDGT12 and LDGT 34)
- Light duty diesel trucks (LDDT)
- Heavy duty gasoline vehicles (HDGV)
- Heavy duty diesel vehicles (HDDV)
- Motorcycles (MC)

NO_x, VOC, CO, PM₁₀, and PM_{2.5} 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. Staff of the WCAQMD performs all MOBILE6 runs.

Vehicle miles traveled (VMT) is the common measure of motor vehicle activity. The Regional Transportation Commission of Washoe County (RTC) ran all transportation models used to generate VMT estimates for Washoe County/O₃ NAA and CO/PM₁₀ NAA. VMT estimates were provided for each of the twelve (12) facility (roadway) types in both NAAs.

Separate MOBILE6 runs were conducted for both NAAs to simulate the different meteorological, fuel qualities and I&M performance criteria during each month of the year. Peak O₃ season emissions were determined using the emissions factors and VMT estimates for the summer months of June, July, and August, and Peak CO/PM₁₀ season emissions were likewise determined for winter months of November, December, and January.

Carbon monoxide emissions from on-road motor vehicles were responsible for 80,677 tons emissions in Washoe County and 53,479 tons of emissions in the CO/PM₁₀ NAA for 2005. Tables 5-1 and 5-2 provide a summary of annual and seasonal day on-road mobile source emissions for Washoe County/O₃ NAA and CO/PM₁₀ NAA, respectively. Figure 5-2 shows the CO contribution by each of the vehicle classes listed for Washoe County/O₃ NAA and CO/PM₁₀ NAA. The remainder of this section will describe the methods used to determine emissions from each of these sources. Supporting documentation is provided in Appendix C.

**TABLE 5-1
ON-ROAD MOBILE SOURCES EMISSIONS SUMMARY
FOR WASHOE COUNTY/O₃ NAA**

Vehicle Class	Washoe County/O ₃ NAA Annual Em. (tpy)							O ₃ Season Emissions (lbs/day)						CO/PM ₁₀ Season Emissions (lbs/day)					
	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃		VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃
LDGV	1,833	1,829	31,307	10	9	201		9,361	10,786	211,298	56	52	1,100	10,208	9,492	130,456	55	52	1,100
LDGT12	1,538	1,727	28,167	9	8	149		8,355	10,304	188,208	50	47	817	8,173	8,752	116,883	49	46	818
LDGT34	861	777	12,165	4	3	50		4,807	4,679	78,142	21	19	271	4,453	3,897	52,725	20	19	272
HDGV	223	631	5,726	11	10	7		1,127	3,638	28,972	62	53	40	1,277	3,314	32,640	61	52	40
LDDV	2	5	5	0	0	0		10	26	30	3	2	0	10	25	29	3	2	0
LDDT	7	13	17	1	1	0		38	71	97	7	6	0	37	68	94	6	6	0
HDDV	355	5,134	2,501	127	118	10		1,979	28,730	13,858	711	657	57	1,910	27,541	13,556	684	632	57
MC	73	29	789	1	0	0		368	176	3,915	3	2	2	445	139	4,946	3	2	2
Diesel Idling	0	0	0	5	5	0		0	0	0	28	26	0	0	0	0	28	26	0
Total	4,892	10,145	80,677	169	155	418		26,046	58,409	524,521	940	864	2,287	26,512	53,227	351,329	909	837	2,289

Note: The numbers may not add due to rounding.

**TABLE 5-2
ON-ROAD MOBILE SOURCES EMISSIONS SUMMARY
FOR CO/PM₁₀ NAA**

Vehicle Class	CO/PM ₁₀ NAA Annual Em. (tpy)						O ₃ Season Emissions (lbs/day)						CO/PM ₁₀ Season Emissions (lbs/day)					
	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃	VOC	NO _x	CO	PM ₁₀	PM _{2.5}	NH ₃
LDGV	1,224	1,186	20,172	7	6	132	6,818	6,175	83,536	36	34	721	6,245	6,989	136,535	37	34	721
LDGT12	1,080	1,181	19,163	6	6	103	5,737	5,992	79,200	34	32	565	5,859	7,046	128,279	35	32	564
LDGT34	603	531	8,265	3	2	34	3,119	2,667	35,743	14	13	187	3,363	3,199	53,143	14	13	187
HDBGV	155	415	3,719	8	6	5	888	2,180	21,201	41	35	27	789	2,393	18,818	41	35	27
LDDV	1	3	3	0	0	0	6	14	18	2	1	0	6	14	18	2	1	0
LDDT	5	8	12	1	1	0	26	43	65	4	4	0	26	45	67	4	4	0
HDDV	248	3,185	1,685	86	80	7	1,334	17,084	9,131	462	427	38	1,383	17,818	9,334	481	444	38
MC	47	19	459	0	0	0	286	89	2,865	2	1	1	236	113	2,289	2	1	1
Diesel Idling	0	0	0	3	2	0	0	0	0	14	13	0	0	0	0	14	13	0
Total	3,362	6,528	53,479	113	104	281	18,214	34,243	231,758	610	561	1,540	17,907	37,616	348,483	630	579	1,539

Note: The numbers may not add due to rounding.

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 5-3). 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 roadways.

**TABLE 5-3
2005 AVERAGE PEAK HOUR SPEEDS (APHS) &
AVERAGE DAILY VEHICLE MILES TRAVELED (ADVMT)**

Facility	APHS	ADVMT
Urban - Local	12.9	839,189
Urban - Arterial	41.7	4,195,945
Urban - Freeway	60.5	2,322,455
Urban - Ramps	34.6	264,766
Rural - Local	12.9	265,187
Rural - Arterial	43.0	1,325,936
Rural - Freeway	66.4	2,060,805
Rural - Ramps	34.6	50,231

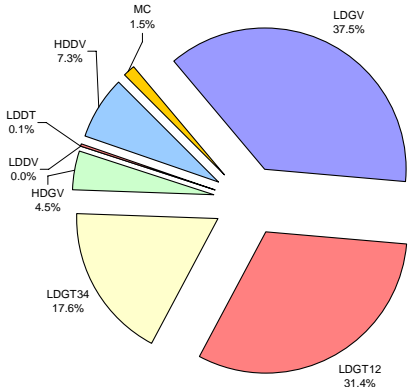
Total Urban (NAA) ADVMT = 7,622,355

Total Rural ADVMT = 3,702,159

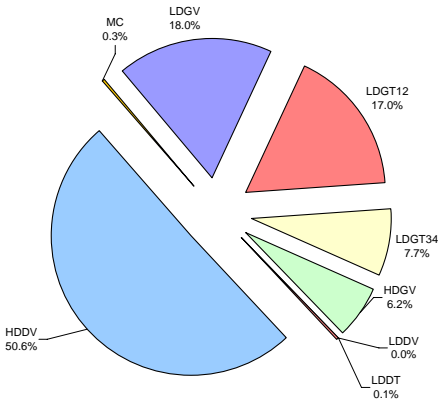
Total ADVMT = 11,324,514

On-Road Mobile Annual Emissions (tpy) for Washoe County/O₃ NAA

VOC Emissions



NO_x Emissions



CO Emissions

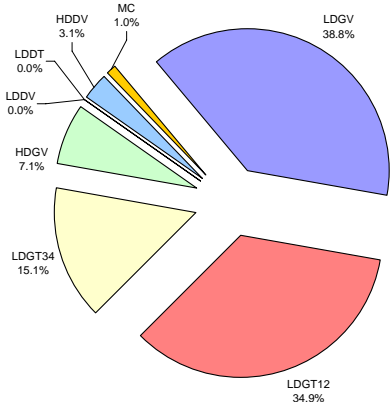
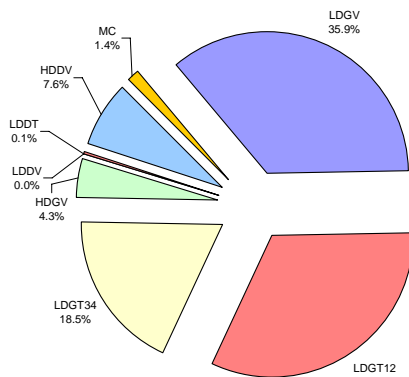


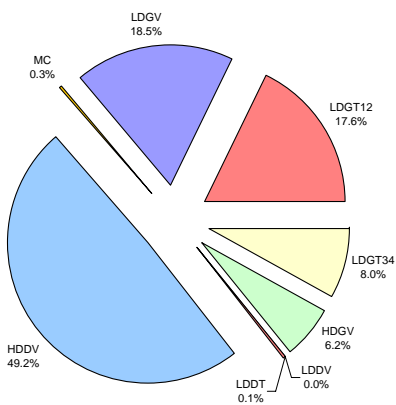
Figure 5-1

On-Road Mobile O₃ Season Emissions (lbs/day) for Washoe County/O₃ NAA

VOC Emissions



NO_x Emissions



CO Emissions

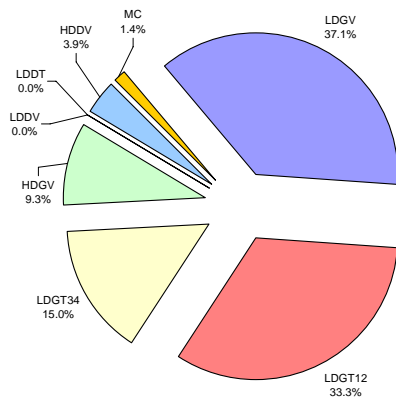
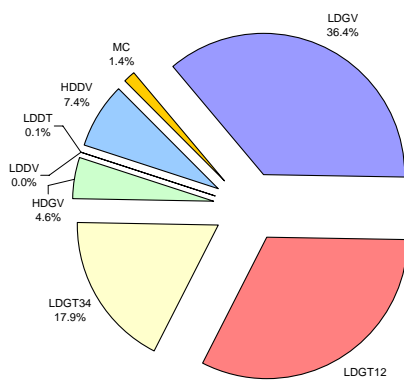


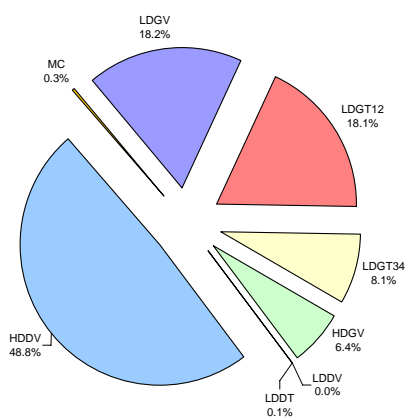
Figure 5-2

On-Road Mobile Annual Emissions (tpy) for CO/PM₁₀ NAA

VOC Emissions



NO_x Emissions



CO Emissions

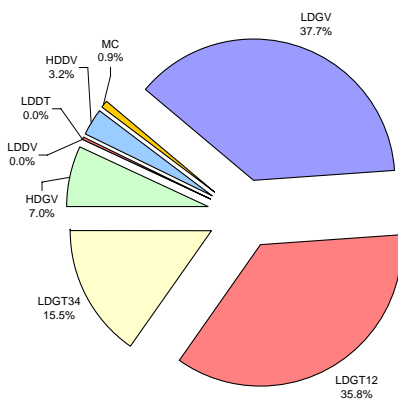
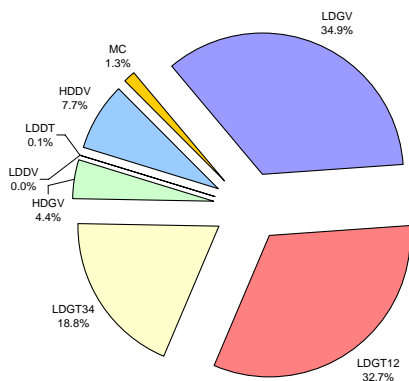


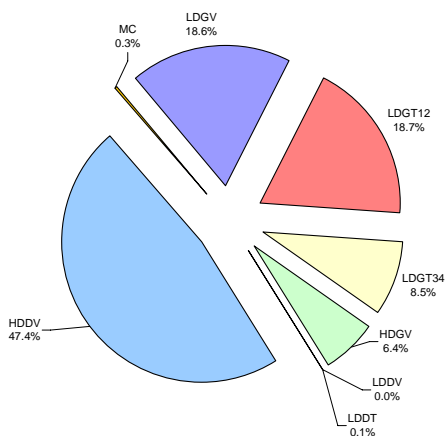
Figure 5-3

On-Road Mobile CO/PM₁₀ Season Emissions (lbs/day) for CO/PM₁₀ NAA

VOC Emissions



NO_x Emissions



CO Emissions

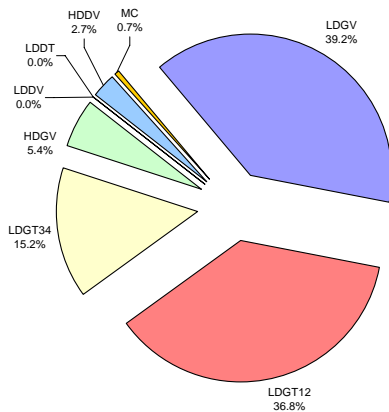


Figure 5-4

MONTHLY TRAFFIC COUNT ADJUSTMENT

The Nevada Department of Transportation (NDOT) has several automatic traffic monitoring stations throughout the NAA. 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. However, VMT data provided by RTC were unadjusted data. Since RTC is the MPO for Washoe County, WCAQMD used the non-adjusted VMT data provided by RTC to stay consistent with RTC.

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
2005 INSPECTION & MAINTENANCE (I/M) PROGRAM STATISTICS

	Pre - 1981 Stringency Rate	Pre - 1981 Waiver Rate	1981 & newer Waiver Rate
January February March	26.9	0.2	0.0
April May June	28.3	0.4	0.0
July August September	29.7	0.2	0.0
October November December	23.7	0.4	0.0

MOBILE6 INPUT PARAMETERS

Start Year:	1978
Pre-1981 Stringency (Failure) rate:	24–30%
First model year covered:	1968
Last model year covered:	2006
Waiver rate (pre-1981):	0.2-0.4%
Waiver rate (1981 & newer):	0.0%
Compliance rate:	98%
Inspection type:	Computerized decentralized
Inspection frequency:	Annual
1968 – 1995 MY test type:	
LDGV, LDGT12, LDGT34, HDGV	2500 rpm/Idle
1996 – 2006 MY test type:	
LDGV,LDGT12, LDGT34	OBD
HDGV	2500 rpm/Idle

ANTI-TAMPERING (ATP) PROGRAM

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 2005 ATP data were supplied by DMV.

Start year:	1981
1968 – 2006 model year covered:	HDGV
1968 – 1995 model year covered:	LDGV, LDGT12, LDGT34
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 2005 were not available for the NAA. The MOBILE6 default values, determined from national averages, were selected for all model runs.

HIGH ALTITUDE

Washoe County is listed in the Federal Register¹¹ 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 2005 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 2005. Carbon monoxide peak season temperatures were determined from the LCD reports for the months of January, November, and December of 2005.

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.¹² The base and controlled RVP values for 2005 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 Department of Agriculture, Division of Weights and Measures. Both local ambient temperatures and RVP by month are shown in Table 5-4.

**TABLE 5-5
2005 TEMPERATURE^A AND RVP^B INPUTS FOR MOBILE6**

	Maximum	Minimum	Average	RVP
January	36.0	21.8	28.9	12.78
February	46.5	30.6	38.6	12.78
March	59.2	33.3	46.3	12.81
April	61.7	36.6	49.2	10.18
May	72.2	47.7	60.0	8.58
June	78.6	50.0	64.3	7.68
July	96.5	63.4	80.0	7.59
August	92.2	59.1	75.7	7.79
September	78.9	46.7	62.8	8.37
October	70.0	40.8	55.4	9.54
November	58.7	32.1	45.4	10.33
December	47.2	30.7	39.0	11.52

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

^B RVP values represent both "Base" and "Controlled" levels as measured by the NV Dept. of Agriculture, Division of Weights and Measures, for this latitude.

MOBILE6 MODEL RESULTS

Mobile6 model calculates vehicle emissions for CO, PM10, PM2.5, NH3, and Hydrocarbon (HC) 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 total tons of pollutant, converted from kilograms, for the month and specific facility type.

$$\text{Facility Emission Factor (grams/mile) by month} \times \text{Average Daily VMT (monthly)} \times \text{Number of days in month} = \text{Total emissions by facility by month}$$

Tables 5-6 and 5-7 show the resulting CO emissions for the whole inventory year as well as for summer O₃ season and winter CO/PM₁₀ season by facility type and vehicle class for Washoe County/O₃ NAA and CO/PM₁₀ NAA, respectively.

**TABLE 5-6
ANNUAL & SEASONAL CO EMISSIONS^A
FOR WASHOE COUNTY/O₃ NAA**

Vehicle Class	Washoe County/O ₃ NAA Annual CO Em. (tpy)					O ₃ Season CO Emissions (lbs/day)					CO/PM ₁₀ Season CO Emissions (lbs/day)				
	Local	Arterial	Freeway	Ramps	Total	Local	Arterial	Freeway	Ramps	Total	Local	Arterial	Freeway	Ramps	Total
LDGV	2,479	14,287	13,355	1,186	31,307	9,375	58,683	57,255	5,142	130,456	17,360	97,180	88,937	7,821	211,298
LDGT12	2,357	13,123	11,679	1,009	28,167	9,465	53,828	49,427	4,162	116,883	15,939	88,192	77,352	6,725	188,208
LDGT34	1,062	5,674	5,015	413	12,165	4,571	24,406	21,974	1,774	52,725	6,828	36,583	32,071	2,660	78,142
HdGV	1,217	2,049	2,332	129	5,726	6,937	11,680	13,290	733	32,640	6,158	10,367	11,797	650	28,972
LDDV	1	2	2	0	5	5	13	12	1	29	5	13	12	1	30
LDDT	3	8	7	0	17	14	42	35	3	94	15	44	36	3	97
HDDV	582	966	890	63	2,501	3,155	5,236	4,825	341	13,556	3,225	5,352	4,932	348	13,858
MC	90	252	431	16	789	568	1,549	2,733	96	4,946	445	1,272	2,120	78	3,915
Total	7,791	36,361	33,710	2,816	80,677	34,030	155,438	149,550	12,251	351,329	49,975	239,003	217,257	18,287	524,521

^AO₃ Season = Summer season = June, July, August

CO/PM₁₀ Season = Winter season = Nov., Dec., Jan.

**TABLE 5-7
ANNUAL & SEASONAL CO EMISSIONS
FOR CO/PM₁₀ NAA**

Vehicle Class	CO/PM ₁₀ NAA Annual CO (tpy)					O ₃ Season CO Emissions (lbs/day)					CO/PM ₁₀ Season CO Emissions (lbs/day)				
	Local	Arterial	Freeway	Ramps	Total	Local	Arterial	Freeway	Ramps	Total	Local	Arterial	Freeway	Ramps	Total
LDGV	1,848	10,622	6,718	984	20,172	6,988	43,590	28,692	4,266	83,536	12,939	72,277	44,829	6,490	136,535
LDGT12	1,824	10,138	6,342	858	19,163	7,328	41,564	26,767	3,542	79,200	12,340	68,155	42,062	5,723	128,279
LDGT34	821	4,377	2,716	351	8,265	3,533	18,820	11,882	1,508	35,743	5,277	28,223	17,381	2,261	53,143
HGCV	924	1,557	1,131	108	3,719	5,264	8,876	6,445	615	21,201	4,673	7,878	5,720	546	18,818
LDDV	1	2	1	0	3	3	9	5	1	18	3	9	5	1	18
LDDT	2	6	3	0	12	11	33	19	2	65	11	34	19	2	67
HDDV	444	739	449	53	1,685	2,405	4,004	2,435	287	9,131	2,458	4,093	2,489	294	9,334
MC	68	189	189	13	459	426	1,165	1,194	80	2,865	334	956	935	65	2,289
Total	5,931	27,630	17,550	2,368	53,479	25,958	118,061	77,437	10,302	231,758	38,036	181,625	113,440	15,382	348,483

DIESEL IDLING

Diesel idling PM emission factors for heavy-duty diesel vehicles (HDDV) were obtained from the MOBILE6 model using the same environmental, fuel, and I&M characteristics used for non-road motor vehicles. Staff assumed 200 HDDV were idling at any given time within the CO/PM₁₀ NAA. An additional 200 HDDV were idling outside the CO/PM₁₀ NAA. Diesel idling PM emissions are summarized in Table 5-8.

**TABLE 5-8
DIESEL IDLING PM EMISSIONS**

	PM ₁₀				PM _{2.5}			
	CO/PM ₁₀ NAA		Washoe County		CO/PM ₁₀ NAA		Washoe County	
	Annual (tpy)	Seasonal (lb/day)	Annual (tpy)	Seasonal (lb/day)	Annual (tpy)	Seasonal (lb/day)	Annual (tpy)	Seasonal (lb/day)
Diesel Idling	2.6	14	5.1	28	2.4	13	4.7	26

SECTION 6

QUALITY ASSURANCE/QUALITY CONTROL POLICY STATEMENT

INVENTORY PURPOSE:

The objective of this emission inventory was to compile an accurate and comprehensive inventory of VOC, NO_x, CO, PM₁₀, PM_{2.5} and NH₃ (where available) emissions and facility data from all significant sources within Washoe County/O₃ NAA and the CO/PM₁₀ NAA for the year 2005. Emissions inventory information is relied upon by Air Programs to meet a variety of needs. This information:

- Supports aspects of the air quality planning function.
- Helps determine the trends in emission levels, past and future.
- Is an indicator for measuring progress in attaining ambient standards.
- Assists in evaluating the effect of transportation control measures on the region's emissions.
- Satisfies other regulatory needs such as evaluating the effects of emission controls and meeting emissions reporting requirements.

The 2005 Washoe County/O₃ NAA and CO/PM₁₀ NAA emissions inventory meets the periodic inventory requirements of the Clean Air Act Amendments of 1990 (CAAA) for CO, PM₁₀, PM_{2.5}, VOC, NO_x, and NH₃ emission estimates.

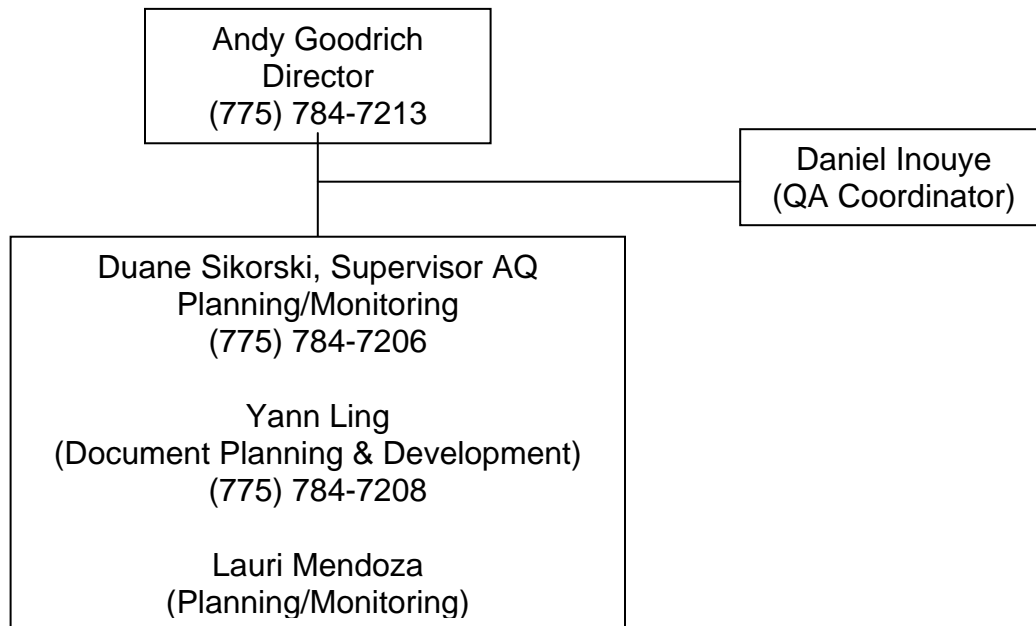
To ensure that the inventory was as accurate as possible, the Air Quality Management Division of the Washoe County District Health Department implemented certain quality assurance procedures at various points in the inventory process. This agency, to the best of its ability, followed the procedures outlined in Guidance for the Preparation of Quality Assurance Plans for CO/O₃ SIP Emission Inventories.¹⁰

PROGRAM SUMMARY:

The Washoe County District Health Department is the federally designated air pollution control agency for Washoe County. The Air Quality Management Division of the Health Department is responsible for preparing air quality planning documents for Washoe County. All plans are reviewed by the Truckee Meadows Regional Planning Agency (TMRPA) to ensure consistency with the regional master plan and the associated air quality element of that plan. Once adopted by the District Board of Health, plans are then submitted, through Nevada Division of Environmental Protection to EPA Region IX.

The Air Quality Management Division has 20 full time employees consisting of: 1 Director, 2 Program Supervisors, 3 Environmental Engineers, 10 Air Quality Specialists, 1 Public Information Officer, and 3 Clerical/Staff.

To compile the mandated state implementation plans, emission inventories and related documents, the following organizational responsibilities were followed:



This is the sixth comprehensive inventory done for CO, PM₁₀, PM_{2.5}, VOC, NO_x, and NH₃. Staff knew where problems arose with the previous inventories and was able to avoid those problems and mistakes. Overall quality assurance can be considered improved over the 1990 base year inventory.

The data-handling structure developed to manage the flow of data from initial reporting to the Air Quality Management Division through inclusion in the SIP is shown in Figure 6-1. The Figure also shows the critical points within the process where QA was applied. The implementation of QC procedures was not indicated in Figure 6-1 because these procedures were performed as an integral part of the inventory process.

The main elements of the quality control program are listed in Figure 6-2. Checkpoints for optimal problem detection are noted with an asterisk in the Figure. All QC requirements were the responsibility of staff compiling the inventory. A complete description of each of these elements is given in the following subsections.

There are two main elements in the QA program. The first element involved auditing all Data Error Reports to ensure the appropriate corrective action was performed. The second element involved a random audit of a percentage of the inventory data. The random audits included checking the QC procedures listed in Figure 6-2 to ensure these were performed properly. Both elements of the QA program were the responsibility of the QA coordinator.

Data Flow Chart

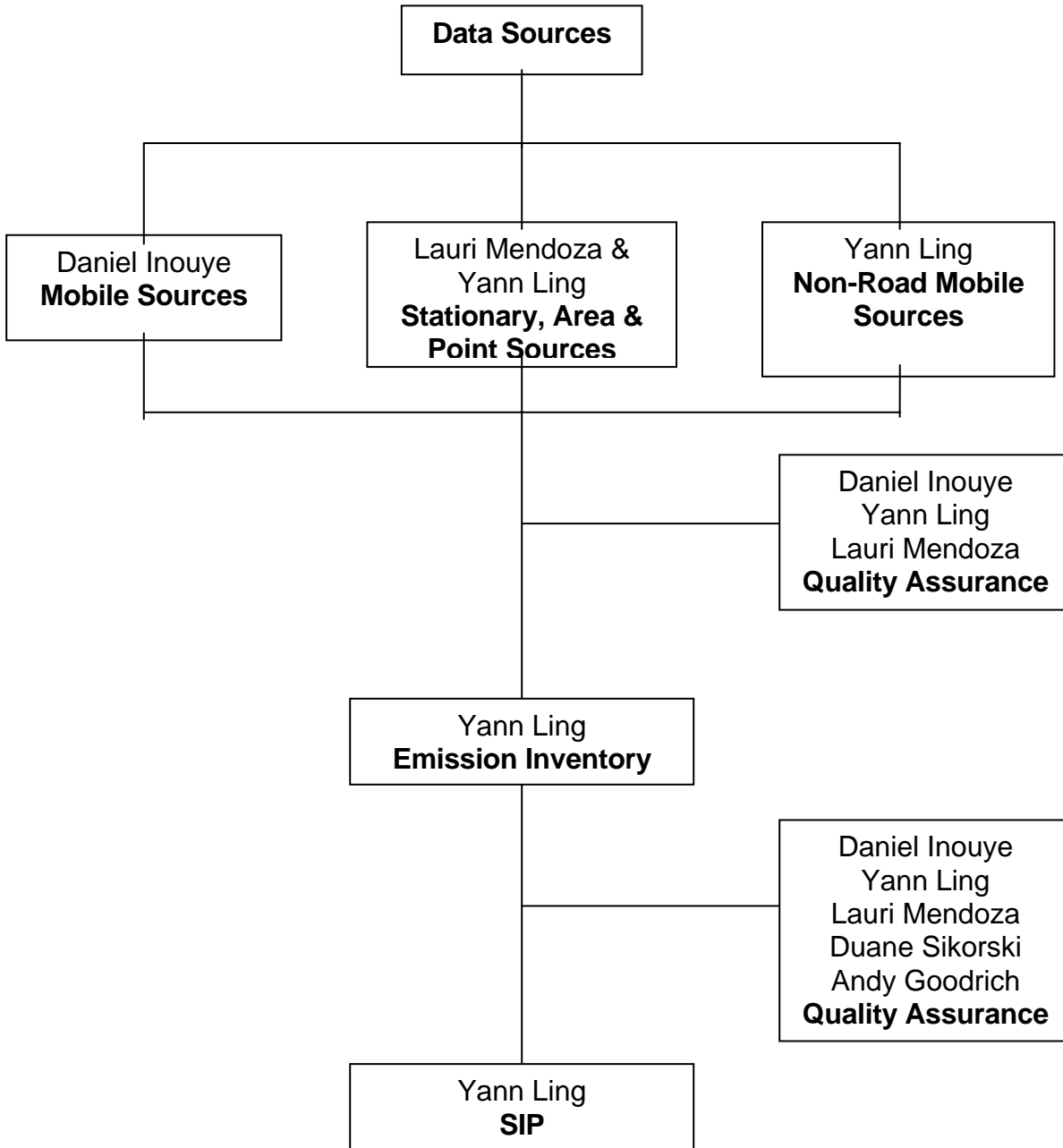


FIGURE 6-1

PRINCIPLES OF THE QC PROGRAM

QA PLANNING:

- Allocate resources for optimal QA.
- Prepare a checklist of sources to be evaluated.
- Identify critical data elements and impacts on results and utility of the inventory.
- Review questionnaire design.
- Schedule routine checking of calculations and data entry.
- Prepare data checking programs incorporating standard range and missing data checks.
- Plan audit procedures.

DATA COLLECTION AND ANALYSIS:

- Crosscheck identification of all major sources with permitting database to ensure inclusion.
- Check questionnaire responses and re-contact where necessary.
- * - Check data collected for missing information.
- Check emission estimation methods and consistency of application.
- * - Check calculated results against historical data for standard range check.

DATA HANDLING:

- Track data flow from raw data sheets to spreadsheet entry.
- Correct data errors - complete Data Error Report and file with QA coordinator.
- Check data after conversion to inventory format.
- * - Check individual data entries for missing emissions, SIC codes, implausible operating data, etc.
- Assign agency estimates for missing data on a consistent and documented basis.
- * - Review tabulated data for quality and identification of outliers.

DATA REPORTING:

- Check aggregate emissions.
- Check disaggregation of emissions.
- Compare results with other inventories.

* **Logical checkpoints.**

FIGURE 6-2

QA PLANNING:

Because Washoe County is such a small agency, it is difficult to find additional qualified staff to review the work of the staff actually performing the inventory; therefore, staff members who prepared the various source categories were also responsible for performing the appropriate quality control measures. There have been no workshops or training courses offered in recent years addressing periodic inventories. However, staff is aware of the Emission Inventory Improvement Program (EIIP), and has reviewed the documents that are the products of that group. The most current methodologies listed in the EIIP documents¹⁴ or in the guidance documents written for the base year inventories were used.

DATA COLLECTION AND ANALYSIS:

All source categories that exist in the non-attainment area and that have been shown to be significant contributors (at least 0.01 percent of total) are addressed in this inventory. Given limited staff resources, priority was given to the most significant source categories first. The 1990, 1993, 1996, 1999, and 2002 emission inventories were utilized in making these decisions. A sort of the Division's permitting database was performed to generate a list of individual sources for a given source category.

As with the 1990, 1993, 1996, 1999, and 2002 inventory, the goal was the inclusion of all sources contributing at least 0.01 percent of total of VOC, NO_x, CO, PM₁₀, PM_{2.5}, and NH₃ (where available). This goal was not only met but also exceeded.

Area sources, which are not represented in the permitting database (residential wood combustion, prescribed burning, etc.), were assessed using activity data compiled in the following manner:

- Mail and Telephone surveys
- Utility Records
- Public Service Commission/State Energy Office
- State Tax Records
- Economic Research Data

For those source categories that are difficult because of limited resources or for which it was not possible to determine precise level(s) of activity or emission characteristics, estimation techniques were used. Estimation methods, used in the inventory, such as per capita emission factors, are documented and follow established procedures whenever possible.

Mobile source activity levels were estimated using data from the Regional Transportation Commission of Washoe County (RTC), the Nevada Department of Motor Vehicles and Public Safety (DMV), and the Nevada Department of Transportation (NDOT).

The emission inventory document includes a narrative that describes the activity data source for each source category and the capability of that source to provide accurate data. Prior to calculating any emissions, the Division carefully scrutinized all data collected, as outlined in the QA guidance document. The data validation procedures included the following:

- ✓ Checking the date of the data to make sure that the data corresponded with the year being inventoried.
- ✓ Checking the data sources against other published data including prior inventories to ensure activity data were within a reasonable range.
- ✓ Assessing the professional capabilities and biases (if any) of the agencies supplying the data.
- ✓ Considering the purpose for which the data were compiled.

- ✓ Assessing the collection techniques used to compile the data.

A final check of the data collection phase was performed to determine inclusion of all critical data elements. The list of critical data elements given in Section 4 of the EPA document Emission Inventory Requirements for Ozone State Implementation Plans¹ and Emission Inventory Requirements for Carbon Monoxide State Implementation Plans¹⁰ was used for this check. Missing data identified through this process were compiled through source re-contacts prior to final submission of the data.

The emissions from stationary sources were determined using the Division's permitting database. The Division maintains an active permitting program that requires all stationary sources that emit more than two (2) pounds per day to be permitted. Activity data are reported annually by these sources as part of the annual permitting process. The database allows the Division to accurately estimate emissions from many of the sources within the air basin for any given year. Emissions were taken from the 2005 emission estimates derived from the permitting database.

The emission calculations performed within the permitting database use emission factors from AP-42³ in most cases. Emissions from stationary sources, which are not addressed in AP-42, were estimated using mass balance calculations or engineering judgment. These calculations were subject to extensive QA while the database program was in the development stages. As the program routines were completed and compiled into executable code, all emission calculations were checked for accuracy and consistency. However, all source data obtained from the database were randomly checked against hard copy permitting files to ensure the proper information was included, the correct year was indicated, etc.

The Division used the EPA MOBILE6 model for the estimation of on-road mobile source emissions. For non-road mobile source emissions, EPA NONROAD 2005 model was used. After all emission calculations were performed, a standard range check of all source categories was performed to assess the reasonability of the emissions reported. This check was performed using prior emission inventory data.

Double counting of sources was addressed in two ways. First, the EPA definition of a point source given in Emission Inventory Requirements for Ozone State Implementation Plans¹ (10 tons/year VOC, or 100 tons/year NO_x or CO emissions) and Emission Inventory Requirements for Carbon Monoxide State Implementation Plans¹⁰ (100 tons/year CO emissions) was adhered to strictly. This eliminated the potential of double counting a given source as both a point source and a stationary area source. For categories where source-specific activity data are not available and emissions must be estimated using indirect activity data such as population, if there were any point source emissions that would have been contained in that category, they were subtracted from the area source emissions. Area source categories where information was obtained from the Division's permitting database only used the database information as the activity data. The permit numbers, which pertained to each area source category, were divided up and the emissions totaled and verified. It was verified that no permit number was listed in more than one source category or as both an area and point source.

DATA HANDLING:

The Division established an organized document management system for handling all data relative to the preparation of the emission inventories. The data were backed up to CD periodically, particularly when corrections were made.

All raw data were recorded and filed in the inventory file system under the appropriate source category. Data were updated and returned to the file as the inventory process progressed. Information such as activity data source, emission estimation method, calculated emissions, reporting technique, etc. was kept in the file. The files were spot checked for missing information and transcription errors as part of the random data audit performed by the QA coordinator. Much of the information contained in these files is included as appendices to the narrative of this inventory.

All data errors and inconsistencies discovered by staff in the process of performing the QC checks were

recorded on standard Data Error Reports. These reports were then filed with the QA coordinator

All text narrative was prepared and edited on a word processor. The final document was saved on CD.

DATA REPORTING:

All text, tables, and figures included in the inventory document were audited. This audit consisted of ensuring the text, tables, and figures all contained the same data and that the data corresponded to the data contained in the source category inventory files.

SYSTEM AUDITS:

The Air Quality Management Division acknowledges that EPA may audit this QA plan. The Division will make every effort to rectify deficiencies that may be identified by such an audit.

REFERENCES

- 1) U.S. Environmental Protection Agency, Emission Inventory Requirements For Ozone State Implementation Plans (SIPS), EPA-450/491-010, Research Triangle Park, North Carolina, March 1991.
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